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Forestry, Forest Industry, and Forest Products Consumption in California

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FOREST RESOURCES

Forest Cover and Inventory

California has 39.7 million acres of forestland¹, almost 40 percent of the land area in the entire state. The timberland² area in the state was 16.7 million acres in 1996, a slight increase from 16.3 million in 1975. However, the current acreage of timberland is less than the 17.3 million acres reported for 1953. Most of the forestland, as well as timberland, is located in the northern part of the state. The largest timberland areas are in Humboldt, Mendocino, Plumas, Shasta, Siskiyou, and Trinity Counties (Table 1) (Bolsinger 1980; FRAP 2001; Waddell and Bassett 1996, 1997a, 1997b, 1997c, 1997d).

Most of the timberland in California (about 77%) is softwoods. The prominence of softwoods is even more significant by volume. In 1994 the net volume of sawtimber³ on timberland was almost 260 billion board feet (BBF), of which over 240 BBF (94%) was softwoods. In comparison, in 1975 almost 228 BBF (97 percent) was softwoods. The most abundant species by volume were Douglas-fir (almost 74 BBF), white fir (more than 45 BBF), and ponderosa pine (more than 32 BBF). The most significant hardwoods were tanoak (more than 5 BBF) and California black oak (more than 3 BBF) (Bolsinger 1980; Waddell and Bassett 1996, 1997a, 1997b, 1997c, 1997d).

According to the latest forest inventory in California in 1994, the net volume of growing stock in California was 55 billion cubic feet (bcf) and the net volume of sawtimber was 258 BBF. The net growth of the growing stock was estimated to be 1.3 bcf. The distribution of growing stock in different resource areas is shown in Table 2 (Waddell and Bassett 1996, 1997a, 1997b, 1997c, 1997d).

Both the net volume of growing stock and the net volume of sawtimber have increased since 1975, when those figures were 49.7 bcf and 236 BBF, respectively. The net growth of growing stock also increased from the 801.6 million cubic feet (mcf) of 1975 (Bolsinger 1980).

Forest Ownership

The National Forests, managed by the United States Department of Agriculture Forest Service, make up about 53 percent of the timberland area in California, and only about 3 percent is in other public ownership. Private ownership is significant in California: about 25 percent of timberland is owned by forest industry companies, 6 percent by private farmers, and 14 percent by other private parties (California State Board of Equalization 2001). The most significant change in timberland ownership from 1975



1. *Forestland* is defined as land at least 10 percent stocked by forest trees of any size, including land that formerly had such tree cover and that will be naturally or artificially regenerated (Helms 1998).
2. *Timberland* (commercial forestland) is defined as land declared suitable for producing timber crops and not withdrawn from timber production by statute or administrative regulation; the minimum level of productivity is often set at 20ft³/ac/yr (1.4m³/ha/yr) (Helms 1998).
3. *Sawtimber* is trees or logs cut from trees with minimal diameter and length and with stem quality suitable for conversion to lumber (Helms 1998).

Table 1. Timberland area by county in 1996

County	1,000 acres	County	1,000 acres	County	1,000 acres
Alameda	0	Marin	19	San Luis Obispo	0
Alpine	85	Mariposa	152	San Mateo	55
Amador	104	Mendocino	1,303	Santa Barbara	1
Butte	354	Merced	0	Santa Clara	8
Calaveras	204	Modoc	668	Santa Cruz	156
Colusa	23	Mono	183	Shasta	1,231
Contra Costa	0	Monterey	26	Sierra	450
Del Norte	320	Napa	22	Siskiyou	2,188
El Dorado	636	Nevada	354	Solano	0
Fresno & Madera	572	Orange	1	Sonoma	303
Glenn	101	Placer	421	Stanislaus	0
Humboldt	1,487	Plumas	1,235	Sutter	0
Imperial	0	Riverside	35	Tehama	410
Inyo	27	Sacramento	0	Trinity	1,062
Kern	148	San Benito	11	Tuolumne	479
Kings & Tulare	391	San Bernardino	179	Ventura	31
Lake	180	San Diego	47	Yolo	0
Lassen	796	San Francisco	0	Yuba	112
Los Angeles	79	San Joaquin	0	Total	16,649

Source: FRAP 2001

Table 2. Net volume of the growing stock by resource area and species, in million cubic feet (mcf)

Resource area	Softwoods	Hardwoods
	mcf	
North Interior	15,082	2,157
North Coast	9,807	3,942
Sacramento Valley	12,717	1,235
Central Coast	1,415	505
San Joaquin and Southern	7,430	732
Total	46,451	8,571

Source: Waddell and Bassett 1996, 1997a, 1997b, 1997c, 1997d

and the harvest value was \$909 million (\$764 million in 1999). Currently, the majority of the harvested timber volume originates in private forests. In 2000, only 13.5 percent of the volume (265 million board feet [MMBF]) and 7.6 percent of the harvest value (\$69 million) came from public forests. This represents a significant shift from the 1980s when about 40 percent of timber was harvested from public forests (FRRAP 1988, California State Board of Equalization 1991–2000, 2001).

The total timber harvest in California was highest in 1955, at over 6 BBF due to the high post-WWII demand for housing. From 1978 to 1985, the average annual timber harvest in California was about 3.4 BBF, just over half of the average from 1950 through 1960. The timber harvest continued to decline until 1982. After reaching a low point in annual average harvest level in 1982, timber harvest volumes increased quickly, almost doubling by 1988. The decline of public timber harvests since the end of the 1980s is due to increased harvesting restrictions on public lands. This has also had a major effect on the total harvested volume in California (Figure 1) (FRRAP 1988, California State Board of Equalization 1991–2000, 2001).

to 2000 was the nearly 10 percent increase in area owned by the forest industry, despite the simultaneous decline in the number of forest industry companies in business. In 1975 the forest industry owned 17 percent of timberland, farmers held 10 percent, and 20 percent belonged to other private owners. The National Forests constituted 50 percent of timberland, and 3 percent was in other public ownership (Bolsinger 1980). The ownership structure, however, changed swiftly. By 1982, 23 percent of timberland was already held by forest industry, 53 percent was in National Forests, and 4 percent was in other public ownership (FRRAP 1988).

The National Forests in California are mostly located in the northern region. The largest areas of privately owned forests are in Humboldt and Mendocino Counties, but there is also a significant amount of private forestry in Shasta and Siskiyou Counties (California State Board of Equalization 1981–2000, 2001).

ROUNDWOOD MARKETS

Timber Harvest

Total timber harvest. In 2000 the California timber harvest was 2.0 BBF (2.1 BBF in 1999),

Consequently, timber harvest values have decreased, following fairly closely the decline in harvest volumes. Yet despite the decline in timber harvest values, timber is still a significant crop in California. Using the 1999 harvest and commodity values, the harvest value for stumpage (i.e., value of standing trees before harvest, transportation, and processing) was \$764 million, and timber ranked as California’s ninth most valuable commodity after milk and cream, grapes, nursery products, cattle and calves, tomatoes, lettuce, strawberries, and flowers and foliage. Timber harvest value was more than that of, for example, almonds or oranges (California State Board of Equalization 2001, California Department of Food and Agriculture 2001).

Timber harvest by county. The timber harvest values in counties correspond closely to the size of their timberland area. In 2000, the most timber was harvested in Humboldt, Siskiyou, Mendocino, Plumas, and Shasta Counties. Humboldt County alone accounted for almost 20 percent of California’s timber harvest (Figure 2). More complete information about timber harvest in thousands of board feet (MBF) volumes in each county can be found in Table 3 (California State Board of Equalization 2001).

Table 3. Timber harvest (volume by county in 2000)

County	MBF	County	MBF	County	MBF
Alameda	0	Marin	0	San Mateo	4,505
Alpine	0	Mariposa	2,746	Santa Barbara	0
Amador	28,423	Mendocino	156,101	Santa Clara	3,954
Butte	85,791	Merced	0	Santa Cruz	18,414
Calaveras	49,070	Modoc	41,628	Shasta	144,640
Colusa	0	Mono	0	Sierra	40,848
Contra Costa	0	Monterey	0	Siskiyou	193,408
Del Norte	46,133	Napa	649	Solano	0
El Dorado	107,498	Nevada	47,250	Sonoma	24,157
Fresno	16,301	Orange	0	Stanislaus	0
Glenn	15,522	Placer	32,452	Sutter	0
Humboldt	388,886	Plumas	154,225	Tehama	100,887
Imperial	0	Riverside	0	Trinity	72,735
Inyo	0	Sacramento	0	Tulare	5,445
Kern	5,253	San Benito	0	Tuolumne	61,061
Kings	0	San Bernardino	0	Ventura	0
Lake	6,146	San Diego	0	Yolo	0
Lassen	60,566	San Francisco	0	Yuba	46,767
Los Angeles	0	San Joaquin	0		
Madera	3,196	San Luis Obispo	0	Total	1,965,657

Source: California State Board of Equalization 2001

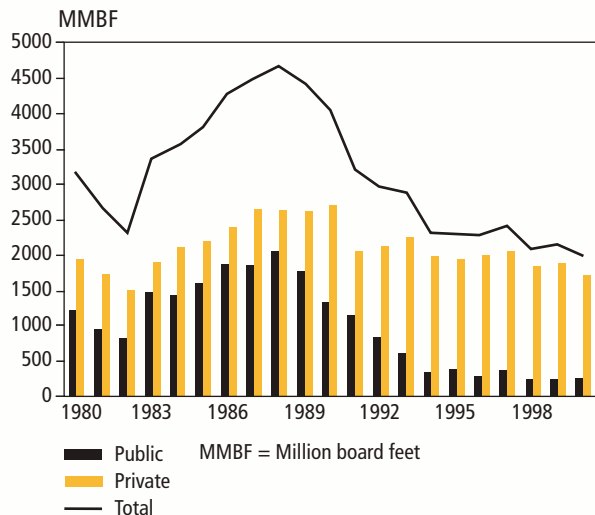


Figure 1. California timber harvest volume 1980–2000 (California State Board of Equalization 1981–2000a, 2001).

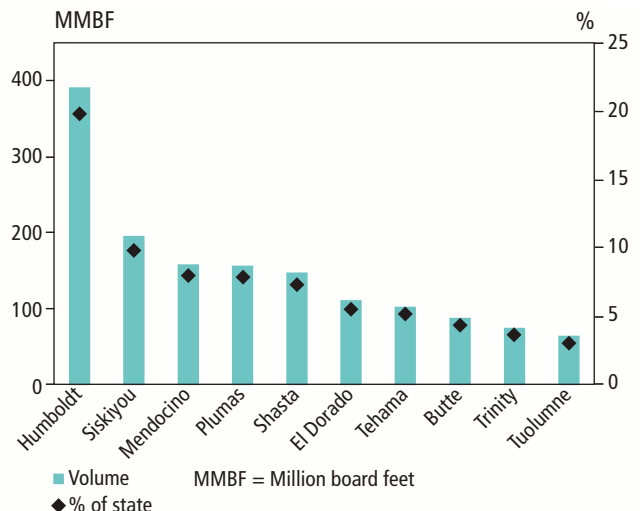


Figure 2. Top ten California counties in timber harvest for 2000 (California State Board of Equalization 2001).

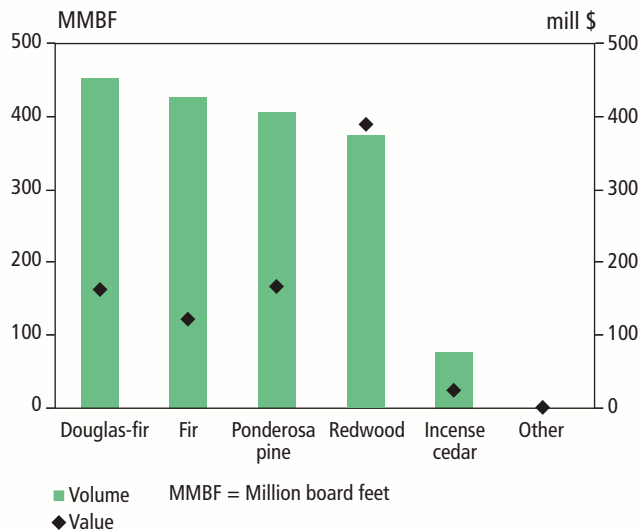


Figure 3. California timber harvest by species, for 2000 (California State Board of Equalization 2001).

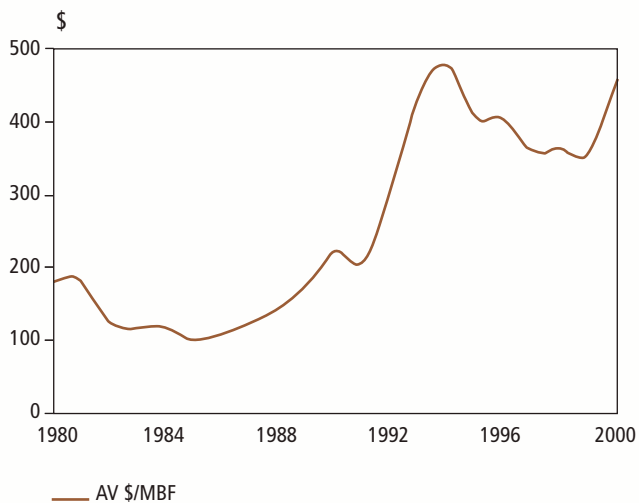


Figure 4. Average harvest value per thousand board feet (MBF), 1980–2000 (California State Board of Equalization, 1981–2000a, 2001).

In 1990 the largest timber volumes were harvested in Humboldt, Mendocino, Siskiyou, El Dorado, and Trinity Counties. The decline in public harvest during the past decade has affected the total timber harvest, especially in counties with large public forest ownership such as Siskiyou, El Dorado, and Plumas (Waddell and Bassett 1996, 1997a, 1997b, 1997c, and 1997d).

When harvest value is considered, the significance of Humboldt County is even greater. Over 30 percent of the state’s harvest value comes from Humboldt County, and almost 13 percent originates in Mendocino County. A pattern became established over the decade from 1991 to 2000 in which Humboldt County’s share of the California harvest value was more than 20 percent and Mendocino County’s more than 10 percent (California State Board of Equalization 2001).

Timber harvest by species. Douglas-fir and true fir, with harvests of 453 MMBF and 428 MMBF, respectively, were the most harvested species in California in 2000. These species were followed by ponderosa pine and redwood. Redwood is, however, the most valuable species in California. The value of redwood harvest in 2000 was \$390 million, which is about 43 percent of the total timber harvest value for California (Figure 3). There were no significant shifts in relative harvest volumes between species in the 1990s. However, Douglas-fir became slightly more predominant toward the end of the decade (California State Board of Equalization 1991–2000, 2001).

Stumpage Prices

The trends in average harvest value per 1,000 board feet (MBF) can be seen in Figure 4. The decline in the mid-1990s was partially due to the harvest of smaller quantities of more-valuable, large-diameter timber. The average harvest value increase at the end of the 1990s was in part caused by higher prices for redwood (California State Board of Equalization 1990–2000, 2001).

The average stumpage price of timber from the publicly owned or managed lands in California has decreased since the beginning of the 1990s (Table 4). Unfortunately, the data series is too short to show whether there was an upward movement in prices similar to that in average harvest values in 1999 and 2000. In general, the USDA Forest Service prices are more representative than the others due to the large volumes sold by the Forest Service. More

Table 4. Average stumpage prices of timber sold from publicly owned or managed lands, 1993–1998

Agency	1993	1994	1995	1996	1997	1998	1999
USDA Forest Service							
Price (\$/MBF)	229.73	193.49	109.30	117.08	105.52	81.51	84.57
Volume (MBF)	651,282	539,006	453,066	480,224	539,298	400,368	314,540
U.S. Bureau of Land Management							
Price (\$/MBF)	279.24	60.29	221.21	275.03	295.87	304.91	352.57
Volume (MBF)	7,876	18,570	5,733	13,780	81	234	3,483
U.S. Bureau of Indian Affairs							
Price (\$/MBF)	331.19	455.66	525.84	455.66	NA	367.48	428.31
Volume (MBF)	12,867	14,576	15,328	14,576	NA	10,253	6,980
State of California							
Price (\$/MBF)	629.34	596.06	428.51	460.02	NA	NA	593.51
Volume (MBF)	12,200	10,683	49,193	33,747	NA	NA	25,610

Source: Warren 2000, 2001

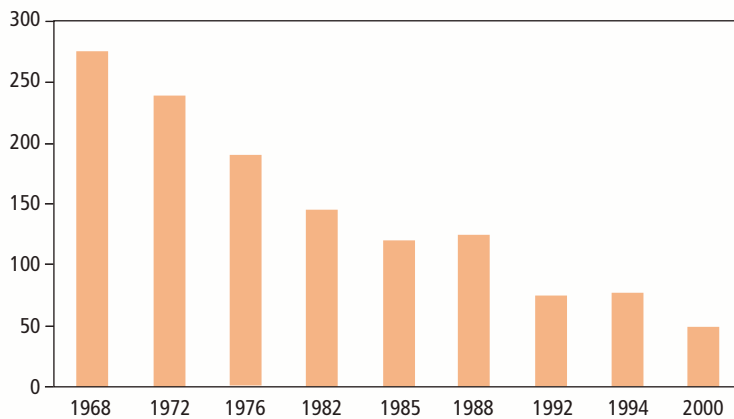


Figure 5. Number of mills (including sawmills, veneer and plywood mills, board mills, and pulp mills) in California, 1968–2000 (Ward 1995, Warren 2001).

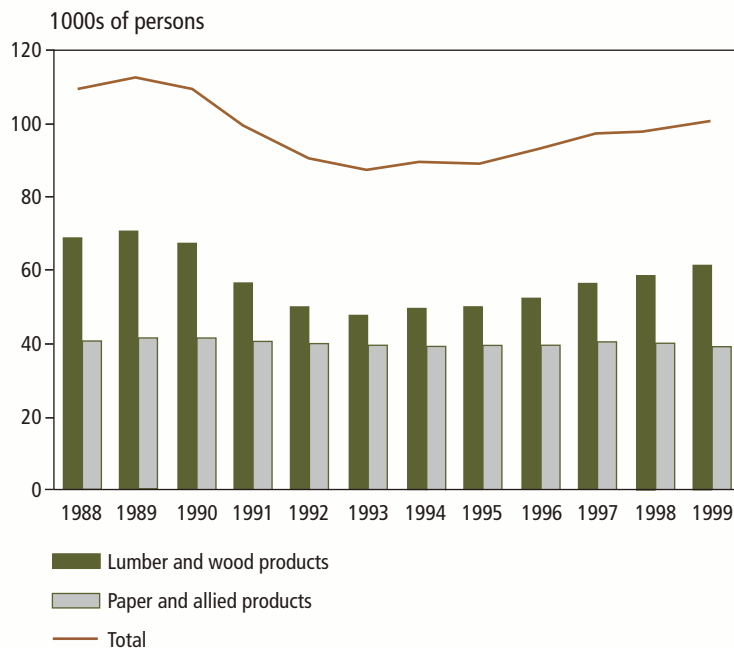


Figure 6. Forest products industry employment in California, 1988–1999 (Warren 2000, 2001).

detailed information on stumpage prices by species for sawtimber sold from National Forests in the Pacific Southwest can be found in [Appendix A](#) (Warren 2000, 2001).

FOREST PRODUCTS INDUSTRY

Industry Characteristics

Number of mills. The number of forest product mills in California has decreased significantly in the past few decades, reflecting the consolidation of the forest products industry and the subsequent closures of small mills ([Figure 5](#)). This declining trend has been apparent in all branches of the forest industry; the effect of closures on production volume, however, has been uneven across the industry. The number of sawmills dropped from 93 in 1988 to 53 in 1994, and then further to 42 mills by the end of 2000. In 1994 there were four veneer and plywood mills in California, but by 2001 none were left in the state. Only a few medium density fiberboard (MDF) plants remain.

There were two pulp mills left in California in 2000, but no significant paper production. However, some paperboard and specialty products are produced, and there is a considerable amount of converted paper product manufacturing in California. Recent developments in forestry and in the primary forest industry (e.g., consolidations, mergers, and closings of small, less-efficient plants) indicate that the number of mills will decrease even further in the future as consolidation continues (Ward 1995; Warren 2000, 2001).

Forest industry employment. The decline in the number of mills and in the volume of production in California has had a direct effect on employment in wood product manufacturing as well as in paper manufacturing. The decline in employment has followed more closely the trends in production

volumes, however, and it has not been as pronounced as the decline in the number of mills. The number of workers decreased for about 20 years until the beginning of the 1990s, but has been slowly increasing since then ([Figure 6](#)).

The production of lumber and wood products employs more than half of the workforce in the forest industry, and the recent upward trend in total employment in this industry took place in this sector. Since the 1970s, the number of workers in the paper industry has remained the same at about 40,000 (Warren 2000, 2001).

Employment in the forest products industry plays a vital role in several counties in Northern California ([Table 5](#)). Although the number of people employed in the industry in these Northern California counties is a small percentage of total forest

industry employment in California, the economies of these counties have traditionally been very much dependent on the forest industry. In recent years their economies have become more diversified, but forestry and the forest industry are still extremely important. In 1999, for example, the total number of employees in wood product manufacturing alone made up 12 percent of all employment in Plumas County and 11 percent in Tehama County.

Forest industry costs. Cost comparisons between 1993 through 1996 and 1997 through 1999 are somewhat difficult due to a switch from Standard Industrial Classification (SIC) codes to North American Industry Classification System (NAICS) codes. Nevertheless, it is still obvious that the raw material costs (about 80% of total costs) both in wood product manufacturing and in paper manufacturing are significantly higher than either payroll (15%) or capital expenditure (5%) costs (Figures 7 and 8).

Appendix B has more detailed information about industry costs (U.S. Census Bureau 1995–2000a, 2001).

The cost structures in national and state forest industries are fairly similar except for a slight difference in productivity. In wood products manufacturing in 1999, for example, each worker on the national level contributed about \$166,000 to the total value of shipments, whereas in California this figure was \$160,000. This difference is probably due primarily to the difference in size of production facilities. In paper manufacturing, the industry structure in California is so different that this kind of com-

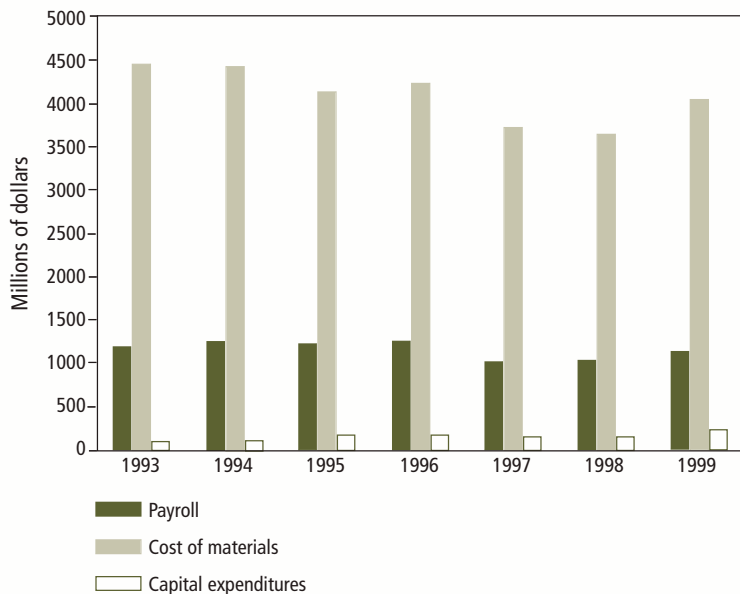


Figure 7. Labor, material, and capital costs in wood product manufacturing (U.S. Census Bureau 1995–2000a, 2001).

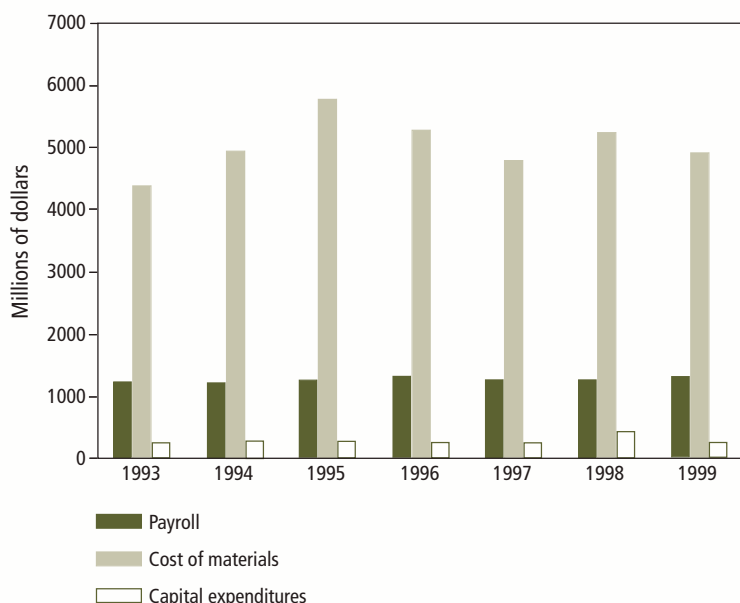


Figure 8. Labor, material, and capital costs in paper manufacturing (U.S. Census Bureau 1995–2000a, 2001).

Table 5. Employment in wood products* manufacturing in 14 selected “timber counties” in 1990 and 1999

County	Employed in 1990*	Employed in 1999*
Butte	1,803	738
Del Norte	432	20–99
Humboldt	4,055	3,073
Lassen	654	311
Mendocino	2,975	1,638
Modoc	133	0
Nevada	254	70
Plumas	787	548
Shasta	2,489	836
Sierra	165	100–249
Siskiyou	1,452	430
Tehama	1,714	1,238
Trinity	410	100–249
Yuba	558	506
“Timber counties” total	17,881	
California total	66,468	39,999

Sources: McWilliams and Goldman 1994, U.S. Census Bureau 2000b
 *In 1990, employed in the lumber and wood products industry (SIC 2400); in 1999, employed in wood products manufacturing (NAICS 321). Does not include forestry.

parison between national and state figures is not meaningful (U.S. Census Bureau 1995–2000a, 2001).

Lumber Production

Softwood lumber production in California reached its highest-ever level in 1988 at almost 5.7 BBF (Figure 9). Production then decreased, falling to 3.2 BBF in 1995. Production stayed relatively stable at or around this level during the second half of the 1990s. In 1999 production was slightly over 3.2 BBF. The estimated wholesale value of this production was over \$1.6 billion. Douglas-fir, hem-fir, and redwood have been, and still are, the most predominant lumber species, whereas ponderosa pine lumber production has decreased. Detailed production figures by species can be found in Appendix C (WWPA 1999).

Hardwood lumber is also produced in California, but there are no comprehensive statistics concerning this sector. In 1999, Shelly et al. estimated California's hardwood lumber production at about 4 MMBF per year.

The value of shipments in sawmilling and wood preservation⁴ in 1999 was \$1.87 billion, slightly down from 1998 and 1997 (U.S. Census Bureau 1995–2000a, 2001).

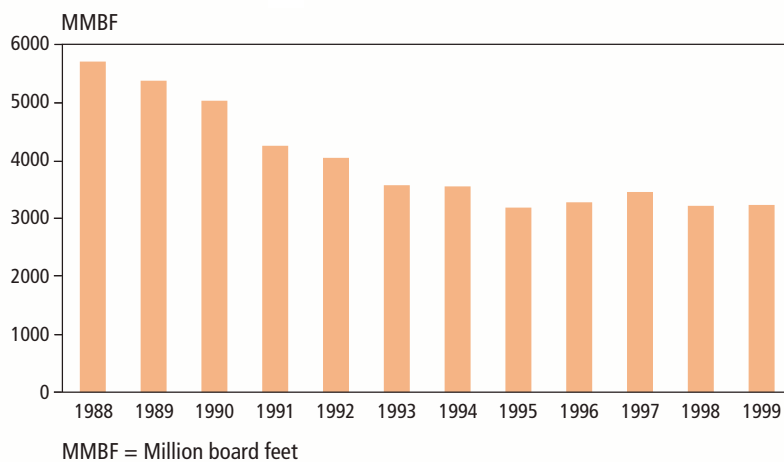


Figure 9. Softwood lumber production in California, 1988–1999 (WWPA 1999).

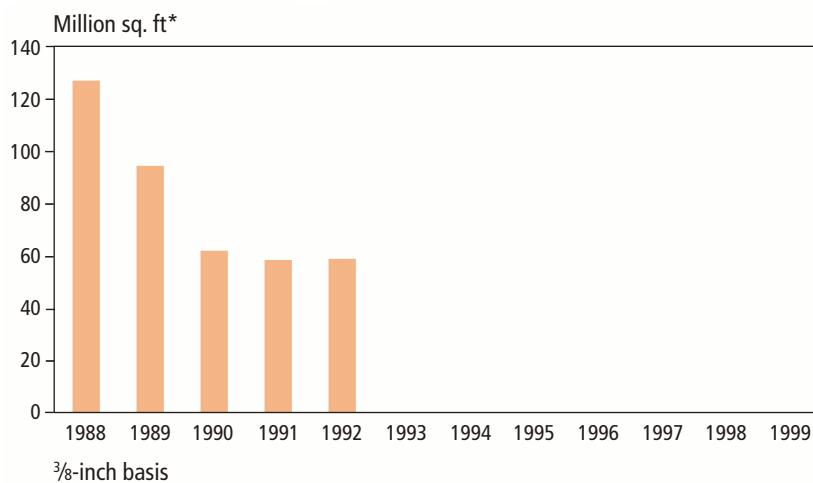


Figure 10. Structural panel board production in California, 1988–1999 (Warren 2000).

Board Production

Structural panel board⁵ production declined from the end of the 1980s through 1992, and there has been no production since then (Figure 10) (Warren 2000, 2001). A limited amount of medium density fiberboard is produced in the state.

The value of shipments in veneer, plywood, and engineered wood product manufacturing⁶ in 1999 was \$967 million. This constituted a 28 percent increase over 1998 (U.S. Census Bureau 1995–2000a, 2001).

Pulp, Paper, and Paperboard Production

Pulp production is minimal in California. In 2000 there were only two operating pulp mills. There is also very little paper production. There are a few paperboard production facilities in the state, mostly producing kraft. There are some production facilities for specialty products and several converted paper product manufacturing plants. The California production of paper and paperboard is insignificant compared to the state's consumption of those products.

According to the U.S. Census Bureau (2001), the values of shipments from pulp, paper, and paperboard mills⁷ in 1999 was \$1.7 billion, and the value from converted paper product manufacturing⁸ was \$6.9 billion.

4. North American Industry Classification System 3211

5. Structural panel board includes plywood, wafer board, and oriented strand board (OSB).

6. North American Industry Classification System 3212

7. North American Industry Classification System 3221

8. North American Industry Classification System 3222

Forest Products Markets

The majority of the lumber produced in California stays within the state. For example, in 1999 about two-thirds of the 3.2 BBF of lumber production was consumed in California. Around 20 percent was transported to other western states, and about 10 percent to other U.S. states. Only about 1 percent of California-produced lumber was exported. The most common distribution channels were independent wholesalers: almost 60 percent of production was marketed this way. The main mode of transportation was by truck (WWPA 1999).

Large quantities of lumber are also brought into California from other U.S. states (Figure 11) and from Canada. California is the largest single market for western lumber. In 1999 the state received over 26 percent of all western shipments. At about 2,020 MMBF, most of the imported lumber comes from Oregon, and about 760 MMBF originates in Washington. (WWPA 1999).

Besides the lumber shipments from the western states, in 1999 about 235 MMBF of southern pine was shipped to California (SFPA Industry Statistics 2000). Due to inadequate statistics, it is difficult to assess how much softwood or hardwood lumber from other U.S. states is exported to California in any given year.

Canada is the world's largest lumber exporter and a majority of its lumber is exported to the United States. The combined softwood and hardwood lumber exports from Canada directly to California in 1999 were 383 MMBF (Statistics Canada 2001). The volume of Canadian lumber consumed in California probably is significantly higher, but some of the lumber is shipped to California through other states, such as Washington and Oregon, and so appears in volumes received in California from these states. Lumber is also imported from other countries, but documenting these trade flows is difficult because most countries do not separate the U.S. states in their customs statistics; they simply show total exports to the United States.

Information concerning markets for boards, paperboard, and other specialty products are not readily available. Due to the scale of these operations, it is likely that most of California's production is also consumed in California.

Energy Production

The California forest industry also produces energy from woody biomass (Figure 12). The peak years in the biomass energy industry came in the beginning of the 1990s

when more than 10 million tons (5.5 million bone dry tons) per year of solid waste were converted into 3 percent of the state's electricity supply of 240,000 gigawatt-hours (GWh) (Morris 1999, California Energy Commission 2001). In 2000, the in-state biomass and waste-based installed capacity was 936 megawatts (MW), with actual energy generation of 6,000 GWh, about 2 percent of the total electricity generation in California. Energy generation had risen slightly from 1999, when 5,700 GWh were produced from biomass and waste. Sufficient resources are available to allow these numbers to increase substantially: the total estimated biomass resource potential of California is approximately 47 million bone dry tons (California Energy Commission 2001, 2002).

The California Public Utilities Commission's initial 1994 proposal to restructure the electricity market and the subsequent passing of comprehensive electricity utility restructuring legislation

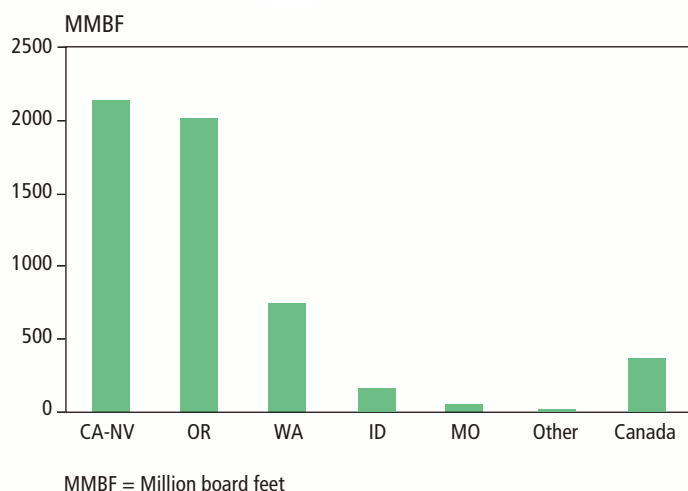


Figure 11. Origin of Western and Canadian lumber produced in or shipped to California in 1999 (WWPA 1999, Statistics Canada 2001). ("Western" includes Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota, Utah, Washington, and Wyoming. There was no lumber production in Nevada in 1999.)

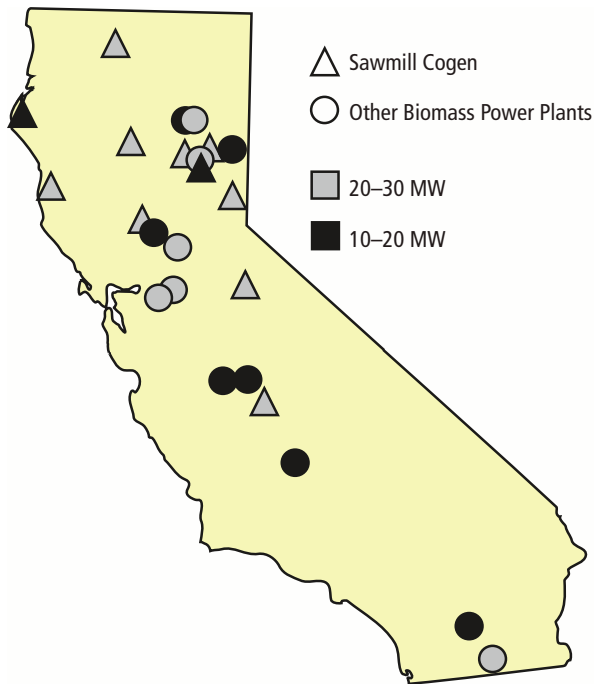


Figure 12. Biomass-based energy production in California in 2000 (Bellis 2001).

(Assembly Bill 1890) have had, however, a profound impact on California’s biomass energy industry. AB 1890 called upon the Energy Commission to create a program that would enable the renewable energy sector to compete in a deregulated market, and it recognized the valuable environmental services provided by biomass generation. Before the electricity market crisis began in 2000, the Energy Commission’s Renewable Energy Policy was instrumental in increasing the supply and demand of renewables within the market-based system. The crisis led to the elimination of direct access and caused financial difficulties for investor-owned utilities, though, and as a result there is currently no buyer for much of California’s new renewable resources (Morris 1999, California Energy Commission 2002).

ECONOMIC IMPACT OF THE FOREST PRODUCTS INDUSTRY

California

The direct economic impact of the California forest products industry in terms of jobs created, wages paid, and tax revenue generated is fairly small in the state economy. The indirect effects, however — that is, the multiplied amounts of income, employment, and sales in

other industries and sectors as a result of economic activity in the forest industry — are more significant. The greater the interdependence of different sectors in the economy, the greater the multiplier effects.

We have chosen to use the IMPLAN⁹ system to calculate the multiplier effects of the forest products industry in California. These multiplier effects include the processing of California timber into final products and also the processing in California of timber or already-processed wood products from other states into final products.

A summary of the economic effects of the forest products industry in California is included in [Table 6](#), and more detailed results can be found in [Appendix D](#). In 1999, the amount of personal income in California generated directly or indirectly as a result of economic activity in the forest products industry was almost \$12.4 billion¹⁰. The comparable figure for 1992 was \$11.4 billion. Nevertheless, in 1999 the number of workers employed in the forest products industry or in other sectors as a result of the economic output of the forest products industry was 227,000, as compared to more

Table 6. The economic impact of the forest products industries in California in 1999

Economic sector	Sales from production & processing	Personal income	Value added	Number of jobs
— \$1000 —				
Forest products	15,205,146	12,372,026	13,346,041	227,042
California total	—	1,093,196,182	1,229,098,000	15,731,700
% of total of all industries in California	—	1.13%	1.09%	1.44%

9. The IMPLAN (Impact Analysis for Planning) system was created by the USDA Forest Service to estimate the economic input-output models for different regions. Using a large database of secondary published data and algorithms, IMPLAN provides detailed economic multipliers for all sectors of the economy.

10. All dollar amounts are in current dollars.

Table 7. The economic impact of the forest products industries in Northern California's "timber counties"* in 1999

	Sales from production & processing	Personal income	Value added	Number of jobs
\$1,000				
Forest products	3,281,699	2,693,509	2,925,324	59,217
California total	–	20,323,456	25,242,285	379,850
% of total of all industries in "timber counties"	–	13.25%	11.59%	15.59%

*The fourteen "timber counties" included are Butte, Del Norte, Humboldt, Lassen, Mendocino, Modoc, Nevada, Plumas, Shasta, Sierra, Siskiyou, Tehama, Trinity, and Yuba.

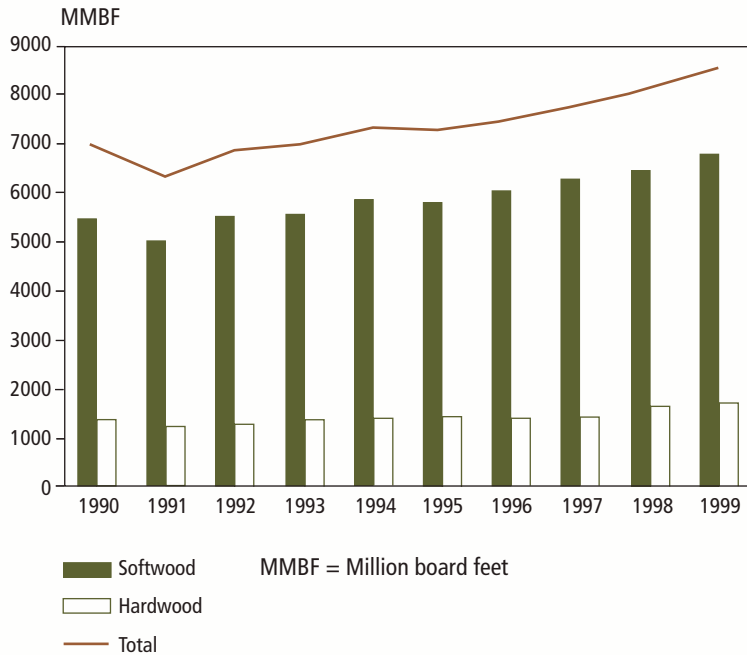


Figure 13. Lumber consumption in California, 1990–1999.

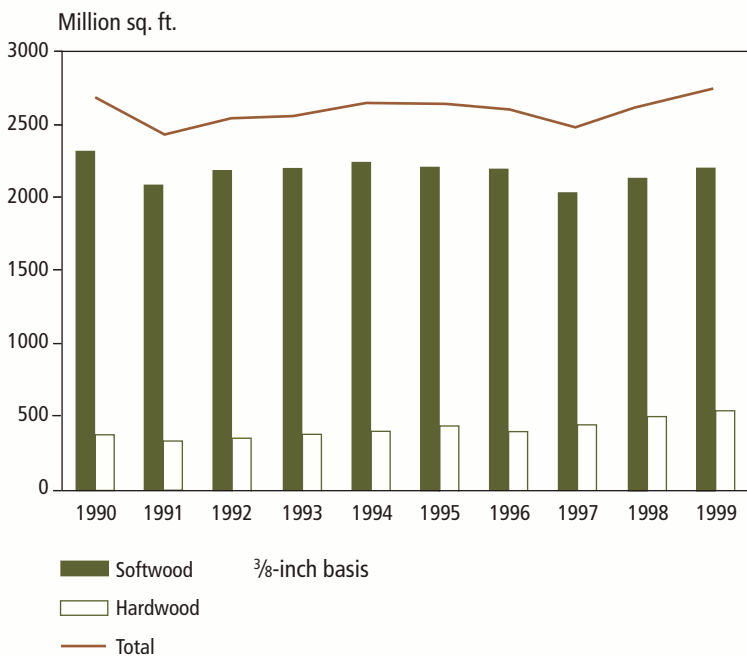


Figure 14. Plywood consumption in California, 1990–1999.

than 258,000 in 1992 (McWilliams and Goldman 1994).

A third measure used for economic impacts, besides personal income and number of jobs, was *value added*. The total value added corresponds to the value of goods and services sold by the sector in question minus the cost of inputs and services, without labor, required to produce those goods. The value added in 1999 was more than \$13.3 billion, whereas the 1992 value added was more than \$12.2 billion (McWilliams and Goldman 1994).

The forest products industries represent a small percentage of the overall California totals. Using any of the three measures, the industry's contribution to the California total is only about 1 percent for 1999.

Northern California

Although the significance of the forest products industry is fairly small at the state level, it is extremely important to many local economies in Northern California. In 1999 in so-called timber counties, the forest products industry generated about 13 percent of personal income (about 18 percent in 1992), 11 percent of value added (about 16 percent in 1992), and 16 percent of jobs (about 22 percent in 1992) (Table 7). More detailed information can be found in Appendix E (McWilliams and Goldman 1994).

FOREST PRODUCTS CONSUMPTION

Lumber Consumption

The exact consumption of lumber and other forest products is difficult to calculate on a state level since there are no comprehensive public statistics of forest product trade flows across state borders. Therefore, we calculated our estimates for total consumption of forest products in California (Figures 13, 14, 15, and 16) in two different ways using existing information

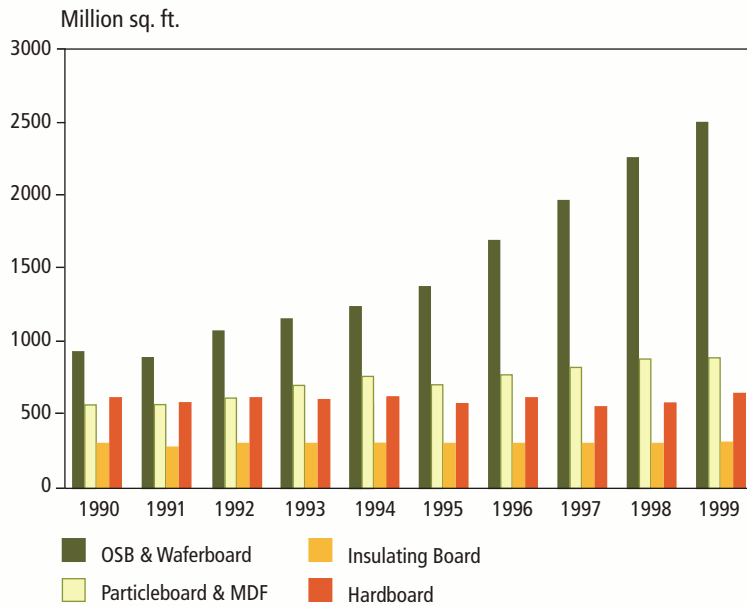


Figure 15. Board consumption in California, 1990–1999. (For OSB and waferboard, the figures are income based. OSB and waferboard statistics use 3/8-inch basis, particleboard and MDF statistics use 3/4-inch basis, insulating board statistics use 1/2-inch basis, and hardboard statistics use 1/8-inch basis.)

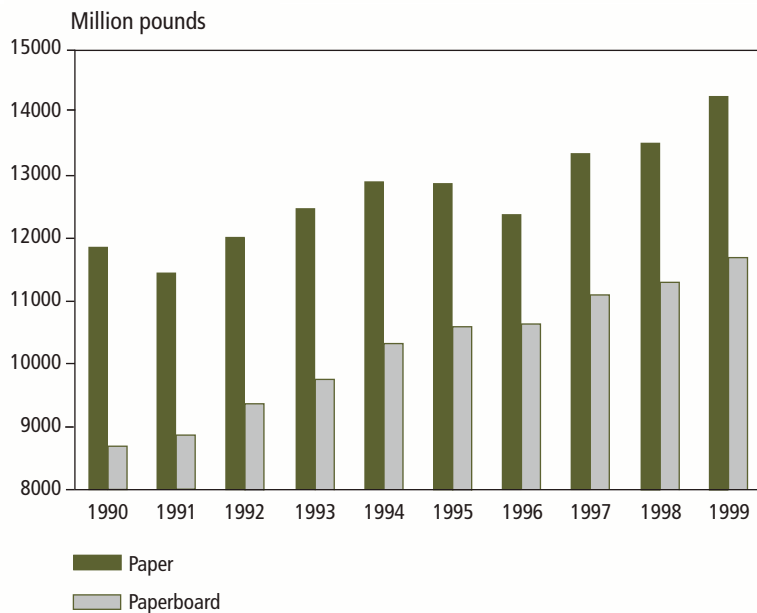


Figure 16. Paper and paperboard consumption in California, 1990–1999.

about forest products consumption in the United States as well as population and gross national and state products¹¹. All of the figures in this section on lumber consumption show per capita-based consumption: that is, the average U.S. per capita consumption multiplied by the figure for California’s total population.

Using this method, we established a total per capita-based lumber consumption in California for 1999 of about 8.5 BBF. The majority of this, almost 6.8 BBF, was softwood lumber, with about 1.7 BBF of hardwood lumber. Consumption grew steadily in the 1990s, especially at the end of the decade. The booming economy and increased building activity caused a rapid increase in lumber consumption. Income-based consumption estimates indicate an even higher consumption rate than the per capita figures. According to income-based calculations, California lumber consumption in 1999 was about 9 BBF.

Board Consumption

Unlike lumber consumption, the per capita-based total plywood consumption in California stayed relatively constant during the 1990s. In 1999 plywood consumption was about 2.7 billion square feet (bsqft), of which 2.2 bsqft was softwood and 0.5 bsqft was hardwood. Consumption slumped slightly in 1991 and in 1997, but a high level of building activity increased plywood consumption toward the end of the 1990s. As is the case with lumber, 1999 income-based consumption estimates for plywood indicate even higher figures for consumption: about 2.9 bsqft.

Oriented strand board (OSB) has become progressively more popular in the building industry because it is less expensive than plywood and other alternative materials and because of its availability. Oriented strand board consumption was less than 1 bsqft at the beginning of the 1990s, but by the end of the decade consumption was at almost 2.5 bsqft.

11. Due to the lack of comprehensive statistics concerning the forest products trade between individual states, the consumption of different forest products in California was estimated in two indirect ways. The per capita-based consumption was calculated by multiplying the average U.S. per capita consumption with California population: $(Q_{US}+M_{US}-X_{US})/POP_{US} * POP_{CA}$. The income-based approach utilizes information about U.S. consumption and California’s share of the U.S. gross national product of the total: $(Q_{US}+M_{US}-X_{US}) * (GSP_{CA}/GNP_{US})$. The true consumption is very likely to be somewhere between these two estimates (Howard 2001; U.S. Department of Commerce, Bureau of Economic Analysis 2001a, 2001b; U.S. Census Bureau 2001).
 Q_{US} =U.S. production
 M_{US} =U.S. imports
 X_{US} =U.S. exports
 POP_{US} =U.S. population
 POP_{CA} =CA population
 GNP_{US} =U.S. gross national product
 GSP_{CA} =CA gross state product

There was a slight increase in the consumption of particleboard and medium density fiberboard during the 1990s. By 1999 consumption was about 896 million square feet (msqft) compared to about 569 msqft in 1990. The consumption of hardboard and insulating board stabilized at around 620 and 300 msqft, respectively. In 1999 hardboard consumption was 654 msqft and insulating board consumption was 308 msqft.

Paper and Paperboard Consumption

Since consumption of paper and paperboard follows general economic activity fairly closely, it is not surprising that the consumption of paper and paperboard increased in California during the 1990s. Paper consumption in California was about 11.8 billion pounds in 1990 and about 14.2 billion pounds in 1999. Although it is not possible to separate paper consumption into different product groups using this data, consumption patterns in California most likely followed the overall patterns of North America and Europe, for which data are available (e.g., Howard 2001). In those larger economies, a significant portion of the increase in paper consumption was attributable to an increase in consumption of printing and writing papers, excluding newsprint. The increase in newsprint consumption has been very modest since the mid 1980s (Hetemäki 1999), most likely due to the increased accessibility of news media and other publications online.

Paperboard consumption was about 11.7 billion pounds in 1999 compared to almost 8.7 billion pounds in 1990. The majority of this considerable increase in paperboard consumption is probably due to an increase in product packaging.

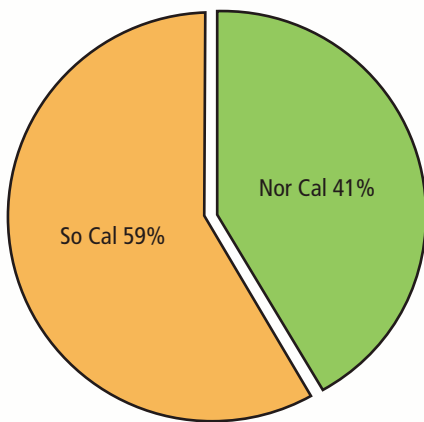


Figure 17. Statewide taxable sales of lumber and building materials (sales for resale are excluded) (California State Board of Equalization 2000b).

EXPENDITURE ON FOREST PRODUCTS

Taxable Sales of Lumber and Building Materials

Figures of expenditure on lumber and building materials were used to study the significance of forest products consumption for consumers. In 1999 the taxable sales of lumber and building materials were \$14.1 billion, about 3.6 percent of total taxable sales in California. Per capita taxable transactions for lumber and building materials were \$414 (California State Board of Equalization 2000).

Although most lumber production in California takes place in about 12 counties in the northern part of the state, almost 60 percent of expenditures on lumber and building materials takes place in Southern California¹² (Figure 17). As shown in Figure 18, the largest taxable sales of lumber and building materials take place in Los Angeles County, followed by San Diego and Orange Counties (California State Board of Equalization 2000).

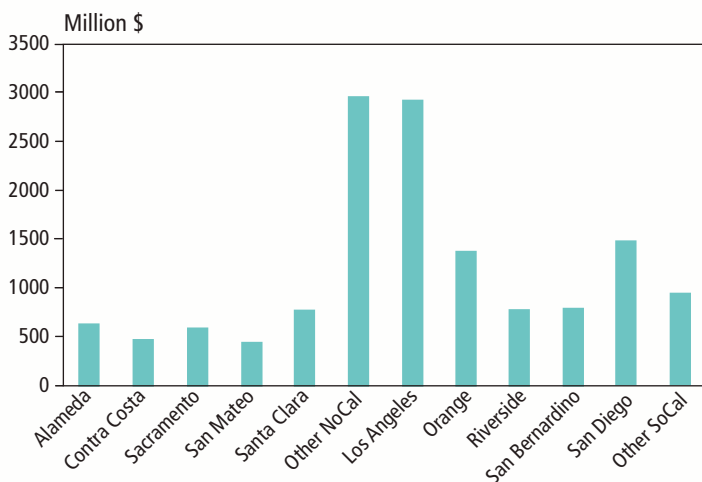


Figure 18. Taxable sales of lumber and building materials by county (sales for resale are excluded) (California State Board of Equalization 2000b).

12. Imperial, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura Counties.

CONCLUSIONS

In 1994 the net volume of growing stock in California was estimated to be 340 BBF, and annual growth was estimated at 8 BBF, or 2.4 percent. The timber harvest in 2000 was 2 BBF, significantly less than the highest timber harvest on record, 6 BBF in 1955, or the almost 5 BBF of 1988. In the 1990s, the downward trend in timber harvest was attributable to the declining harvest of timber on public lands, whereas private harvest levels stayed relatively stable (California Board of Equalization 1991–2000, 2001).

Consolidation and increasing efficiency in the forest products industry has significantly decreased the number of mills operating in California. The production of forest products and employment in the forest industry in the state, however, have not undergone so pronounced a decline. Both board and pulp production in California have diminished, but, especially since the mid-1990s, lumber production has stabilized at about 3 BBF per year.

The consumption of most forest products increased steadily during the 1990s. For example, estimated lumber consumption in California was almost 9 BBF per year. This suggests that about one-third of the lumber consumed was produced in California. California producers' share of state consumption of other forest products seems to be smaller than for lumber.

The overall economic impact of forestry and the forest industry is not very great in California. The forest products industry contributes only about 1 percent to total personal income, value added, and employment figures in the state. There are considerable regional differences in the relative economic effects of the forest products industry, however. Economic impact results indicate that the forest products industry contributes almost one-sixth of all employment and income in many Northern California counties.

APPENDICES

Appendix A. Average stumpage prices for sawtimber sold on National Forests in Pacific South-west Region* 1988–1998

Year	Douglas-fir	Ponderosa & Jeffrey pines	Sugar pine	Lodgepole pine	Cedars	True firs	All species
\$/MBF							
1988	95.64	182.14	260.43	43.20	190.90	68.89	135.65
1989	201.26	291.96	289.15	57.02	153.30	88.30	177.60
1990	218.91	217.62	285.13	84.12	231.48	85.02	166.25
1991	186.62	237.62	241.25	80.05	184.64	83.08	156.70
1992	320.19	292.30	491.64	90.80	374.41	156.15	234.05
1993	390.17	535.17	598.17	163.70	245.24	272.75	367.30
1994	416.25	291.34	625.19	165.10	189.98	159.36	241.46
1995	250.92	158.36	396.82	105.64	120.08	171.00	186.16
1996	189.36	299.48	318.08	53.61	135.26	182.11	184.12
1997	183.17	237.48	212.37	71.66	114.66	181.90	169.37
1998	172.89	182.66	177.47	47.98	183.87	135.01	134.71

Source: Warren 2000, 2001.

* Pacific Southwest Region includes California and Hawaii.

Appendix B. California forest products industry costs, 1993–1998

Year	Industry*	Payroll	Cost of materials	Total capital expenditures
<i>\$ million</i>				
1993	Lumber and wood products	1,167.3	4,448.3	89.4
	Logging	117.7	396.5	11.6
	Sawmills and planing mills	357.1	1,757.9	44.7
	Millwork, plywood, and structural	395.5	1,360.1	17.9
	Wood containers	77.7	252.3	3.9
	Wood buildings and mobile homes	63.8	194.7	2.0
	Misc. wood products	155.3	486.8	9.2
	Paper and allied products	1,208.8	4,380.1	264.7
	Paper mills	D	D	D
	Paperboard mills	71.9	295.9	17.1
	Paperboard containers and boxes	592.6	2,275.2	71.5
	Misc. converted paper products	443.3	1,484.1	76.9
	1994	Lumber and wood products	1,253.0	4,428.6
Logging		118.5	374.2	17.3
Sawmills and planing mills		338.5	1,594.6	40.3
Millwork, plywood, and structural		477.8	1,475.7	25.7
Wood containers		84.6	268.4	4.4
Wood buildings and mobile homes		65.9	202.1	0.9
Misc. wood products		167.7	513.7	12.0
Paper and allied products		1,228.3	4,942.7	281.0
Paper mills		D	D	D
Paperboard mills		76.1	374.6	51.2
Paperboard containers and boxes		599.6	2,543.3	112.7
Misc. converted paper products		464.0	1,632.2	76.9
1995		Lumber and wood products	1,204.2	4,134.0
	Logging	113.4	305.4	27.5
	Sawmills and planing mills	317.1	1,413.4	87.3
	Millwork, plywood, and structural	459.1	1,375.4	34.0
	Wood containers	84.4	262.7	4.8
	Wood buildings and mobile homes	60.1	182.5	0.7
	Misc. wood products	170.0	594.6	18.0
	Paper and allied products	1,260.6	5,804.9	285.7
	Paper mills	D	D	D
	Paperboard mills	77.0	437.2	50.7
	Paperboard containers and boxes	618.3	3,055.5	98.7
	Misc. converted paper products	470.5	1,781.1	96.8
	1996	Lumber and wood products	1,247.3	4,247.4
Logging		100.8	294.0	30.4
Sawmills and planing mills		330.6	1,481.5	64.6
Millwork, plywood, and structural		478.1	1,365.5	46.7
Wood containers		90.4	276.1	4.2
Wood buildings and mobile homes		71.9	205.1	1.4
Misc. wood products		175.5	625.2	22.4
Paper and allied products		1,338.3	5,266.9	259.8
Paper mills		D	D	D
Paperboard mills		78.9	352.5	32.8
Paperboard containers and boxes		665.2	2,734.7	100.8
Misc. converted paper products		503.8	1,777.7	99.8
1997		Wood product mfg.	1,015.7	3,720.1
	Sawmills and wood preservation	272.2	1,275.9	56.6
	Veneer, plywood, and engineered wood product mfg.	144.2	469.1	20.9
	Other wood product mfg.	599.3	1,975.2	62.7
	Paper mfg.	1,264.0	4,794.9	257.6
	Pulp, paper and paperboard mills	200.6	866.8	47.8
	Converted paper product mfg.	1,063.4	3,928.1	209.8
1998	Wood product mfg.	1,032.0	3,645.4	145.2
	Sawmills and wood preservation	276.9	1,287.7	78.2
	Veneer, plywood, and engineered wood product mfg.	140.7	417.8	12.5
	Other wood product mfg.	614.4	1,940.0	54.5
	Paper mfg.	1,273.2	5,243.1	446.2
	Pulp, paper, and paperboard mills	199.0	848.8	64.8
Converted paper product mfg.	1,074.3	4,394.2	381.4	

Source: U.S. Census Bureau 1995-2000a, 2001.

*SIC 24 Lumber and wood products, SIC 26 Paper and allied products, NAICS 321 Wood product manufacturing, NAICS 322 Paper manufacturing.

D. Withheld to avoid disclosing data of individual companies; data are included in higher level totals.

Appendix C. California-Nevada lumber production by species, 1990–1999, in million board feet (MMBF)

	Douglas-fir	Hem-fir	Incense cedar	Other softwood	Ponderosa pine	Redwood	Sitka spruce	Sugar pine
1990	1,381	1,228	162	3	830	1,073	0	304
1991	1,135	1,065	136	0	702	886	3	291
1992	1,113	1,035	154	0	666	803	3	223
1993	968	917	138	1	656	707	0	152
1994	948	906	138	9	604	782	0	134
1995	822	815	131	9	564	733	0	95
1996	851	801	126	15	563	770	9	122
1997	989	879	136	15	452	824	0	137
1998	968	771	145	12	438	752	0	102
1999	981	888	157	8	392	658	10	122

Source: WWPA 1997, 1999

Appendix D. Economic impact of forestry and related processing industries in California in 1999

Sector(s)	Description	Sales to final demand/total output (\$1,000)	Multipliers				Impact on California			
			Output (type II)	Total income (total coef.)	Value added (total coef.)	Employment (jobs/\$1,000,000)	Sales (\$1,000)	Total income (\$1,000)	Value added (\$1,000)	Employment (number of jobs)
24	Forestry products	752,020	1.8497	0.8339	0.9682	22.1766	1,391,005	627,112	728,131	16,677
133	Logging camps and logging contractors	155,352	1.6240	0.7314	0.7726	11.1780	252,287	113,620	120,017	1,737
134, 135, 136	Sawmills and planing mills	285,910	2.0660	0.8870	0.9595	15.2759	590,687	253,613	271,757	4,368
137	Millwork	275,586	2.1792	1.0363	1.1119	22.4594	600,549	285,580	306,412	6,189
138	Wood kitchen cabinets	205,070	2.0738	1.0510	1.1206	21.9644	425,265	215,524	229,805	4,504
139	Veneer and plywood	19,772	1.9819	0.8480	0.9074	16.9108	39,185	16,766	17,940	334
140	Structural wood members, N.E.C.	88,686	2.1605	0.9624	1.0358	19.4954	191,603	85,349	91,857	1,729
141, 142	Wood containers, pallets, skids	137,916	2.1307	1.0491	1.1212	24.3753	293,858	144,681	154,627	3,362
143	Mobile homes	839,283	1.9400	0.9087	0.9682	15.5997	1,628,180	762,683	812,611	13,093
144	Prefabricated wood buildings	232,891	2.1842	0.9402	1.0114	19.6577	508,684	218,954	235,553	4,578
145	Wood preserving	4,995	2.2579	0.8032	0.8745	14.6941	11,278	4,012	4,368	73
146	Reconstituted wood products	17,666	2.1011	0.9150	0.9789	13.8027	37,117	16,164	17,294	244
147	Wood products	474,980	2.1012	1.0219	1.0921	22.3339	998,029	485,366	518,746	10,608
148	Wood household N.E.C. furniture	1,126,232	2.1640	0.9794	1.0479	23.0867	2,437,189	1,103,067	1,180,141	26,001
152	Wood TV and radio cabinets	42,618	2.1690	1.0224	1.0933	25.9339	92,438	43,573	46,596	1,105
154	Wood office furniture	76,394	2.2087	1.0373	1.1112	22.9728	168,727	79,244	84,890	1,755
156	Public building furniture	9,883	2.2568	0.9285	0.9963	17.0899	22,304	9,176	9,847	169
157	Wood partitions and fixtures	89,539	2.1578	1.0385	1.1061	19.9781	193,205	92,985	99,040	1,789
161, 162	Pulp and paper mills	982,427	2.0715	0.9128	0.9803	13.8185	2,035,051	896,782	963,050	13,576
163	Paperboard mills	532,760	2.1130	0.8184	0.8864	12.7441	1,125,705	436,007	472,254	6,790
164	Paperboard containers and boxes	5,165,608	1.7149	0.6879	0.7442	12.1733	8,858,286	3,553,304	3,844,241	62,883
165	Paper coated and laminated packaging	327,887	1.9609	0.8065	0.8652	13.8706	642,946	264,427	283,704	4,548
166	Paper coated and laminated, N.E.C.	651,212	1.9040	0.9426	1.0032	12.1387	1,239,917	613,819	653,314	7,905
168	Bags, paper	165,383	2.0129	0.8213	0.8810	17.8391	332,905	135,821	145,708	2,454
169	Die-out paper and board	605,324	1.7591	0.7593	0.8173	14.0213	1,064,808	459,649	494,729	8,487
170	Sanitary paper products	901,988	1.6884	0.7162	0.7649	8.7719	1,522,906	646,027	689,937	7,912
171	Envelopes	377,160	1.8226	0.7779	0.8374	14.6548	687,409	293,381	315,834	5,527
172	Stationery products	96,981	1.6180	0.6551	0.7041	10.2004	156,914	63,530	68,280	989
173	Converted paper products, N.E.C.	563,624	1.7910	0.8016	0.8611	13.5839	1,099,440	451,810	485,361	7,656
	Total	15,205,146					28,557,876	12,372,026	13,346,041	227,042
	% of California's Gross State Product							1.13%	1.09%	1.44%

California Personal Income, 1999 (\$1,000): 1,093,196,182

California Gross State Product, 1999 (\$1,000): 1,229,098,000

California Employment, 1999 (includes salary workers, employers, own-account workers, unpaid family workers, and workers directly involved in work stoppages): 15,731,700

Sources:

California Personal Income, 1999: U.S. Bureau of Economic Analysis: Released: June 11, 2001.

California Gross State Product, 1999: Bureau of Economic Analysis: Released: June 4, 2001.

California Employment, 1999: Labor Market Information Division, EDD, Sacramento.

Appendix E. Fourteen-county region, * California: Economic impact of forestry and related processing industries

Sector(s)	Description	Sales to final demand/total output, 1999 (\$1,000)	Multipliers				Impact on California			
			Output (type II)	Total income (total coef.)	Value added (total coef.)	Employment (jobs/\$1,000,000)	Sales (\$1,000)	Total income (\$1,000)	Value added (\$1,000)	Employment (number of jobs)
24	Forestry products	624,119	1.6670	0.7661	0.8951	21.4359	1,040,421	478,139	558,623	13,379
133	Logging camps and logging contractors	137,885	1.4742	0.6518	0.6863	11.7699	203,274	89,878	94,627	1,623
134, 135, 136	Sawmills and planing mills	1,661,112	2.0171	0.8523	0.9105	17.3867	3,350,637	1,415,724	1,512,505	28,881
137	Millwork	188,715	2.0606	0.9538	1.0210	25.3438	388,875	180,001	192,676	4,783
138	Wood kitchen cabinets	16,305	1.9725	0.9565	1.0185	25.5448	32,162	15,597	16,607	417
139	Veneer and plywood	35,847	1.9456	0.8547	0.9105	18.9312	69,745	30,640	32,640	679
140	Structural wood members, N.E.C.	21,573	2.1227	0.9302	0.9977	22.5015	45,793	20,067	21,525	485
141, 142	Wood containers, pallets, skids	11,470	2.0973	1.0096	1.0766	26.9847	24,057	11,580	12,349	310
143	Mobile homes	865	1.5904	0.7697	0.8168	14.9113	1,376	666	707	13
144	Prefabricated wood buildings	7,869	2.0238	0.8414	0.9031	21.8628	15,926	6,621	7,107	172
145	Wood preserving	6,188	2.1699	0.7810	0.8459	16.9018	13,428	4,833	5,235	105
146	Reconstituted wood products	102,879	1.8090	0.7834	0.8356	13.9827	186,104	80,598	85,965	1,439
147	Wood products, N.E.C.	13,028	1.9823	0.9800	1.0430	23.8856	25,826	12,768	13,589	311
148	Wood household furniture	2,174	1.9461	0.7854	0.8417	26.6714	4,230	1,707	1,830	58
154	Wood office furniture	628	1.9837	0.7714	0.8324	28.2355	1,245	484	522	18
156	Public building furniture	1,728	1.6844	0.5901	0.6352	16.2492	2,911	1,020	1,098	28
157	Wood partitions and fixtures	1,101	1.8474	0.8426	0.8963	21.6700	2,034	928	987	24
161, 162	Pulp and paper mills	306,978	1.8060	0.7933	0.8495	14.2013	554,394	243,536	260,781	4,359
164	Paperboard containers and boxes	14,555	1.6567	0.5562	0.6035	14.7069	24,114	8,096	8,784	214
166	Paper coated and laminated, N.E.C.	329	1.5888	0.7599	0.8072	12.4472	523	250	266	4
173	Converted paper products, N.E.C.	126,348	1.6491	0.7153	0.7669	15.1743	208,359	90,376	96,902	1,917
	Total	3,281,699					6,195,433	2,693,509	2,925,324	59,217
	% of fourteen-county total							13.25%	11.59%	15.59%

*Fourteen counties included are Butte, Del Norte, Humboldt, Lassen, Mendocino, Modoc, Nevada, Plumas, Shasta, Sierra, Siskiyou, Tehama, Trinity, and Yuba.

Fourteen-county personal income, 1999 (\$1,000): 20,323,456

Estimated fourteen-county value added, 1999 (\$1,000): 25,242,285

Fourteen-county employment, 1999 (includes salary workers, employers, own-account workers, unpaid family workers, and workers directly involved in work stoppages): 379,850

Sources: Fourteen-County Personal Income, 1999: U.S. Bureau of Economic Analysis, Updated June 25, 2001.

Estimated Fourteen-County Value Added, 1999: Applying 1999 State Ratio of GDP to Personal Income to 1999 Fourteen-County Personal Income.

Fourteen-County Employment, 1999: Labor Market Information Division, EDD, Sacramento.

Market Value of Timber Harvest, 1999: California State Board of Equalization.

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