

C I N T R A F O R

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72

**AN ASSESSMENT OF THE
PNW HARDWOOD LUMBER INDUSTRY**

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September 1999



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EXECUTIVE SUMMARY

Currently, less than one percent of the private and industrial timberlands in the Pacific Northwest (PNW) are managed for hardwood production. In order to provide an incentive to manage the hardwood resource actively, hardwood stumpage prices must be consistently competitive with conifer stumpage prices, although this has generally not been the case in the PNW. A variety of factors could contribute to hardwoods being more actively promoted in the timberland manager's portfolio. For example, species diversity provides stability in a cyclical market, improves soil fertility, and promotes biodiversity in forest stands.

The hardwood industry in the PNW, largely red alder, has experienced surprising success over the past decade in both domestic and international markets. This success is of interest considering that commercial hardwood species in the PNW have traditionally been considered a low value by-product of the softwood inventory. While PNW hardwoods have enjoyed increased market acceptance, little market research has been done to characterize the hardwood industry or identify the factors that have contributed to its success. The objectives of this research were to: 1) explore the competitive conditions of the hardwood industry, 2) identify the range of products currently manufactured from hardwoods, 3) analyze current hardwood markets (domestic and international), 4) identify the factors that are perceived to restrict the growth of the hardwood industry in the PNW, and 5) assess future market and product opportunities for PNW hardwood products.

Since the number of firms involved in hardwood lumber production in the PNW is relatively small (less than 15), a census of the hardwood industry was conducted. The PNW region, for the purpose of this research, consists of western Washington, western Oregon, and northern California. The survey was administered via fax to each firm in the sample frame. Thirteen hardwood manufacturers were contacted. Of the firms contacted, 10 completed and returned the survey, an effective response rate of 76.9%.

Results

The PNW hardwood lumber industry directly employs approximately 2,000 workers. Collectively, the hardwood lumber manufacturers surveyed in this study produced approximately 450 mmbf of lumber, with exports totaling approximately 126 mmbf or 28% of total production. The range of products manufactured included kiln dried and green lumber, pallet stock, veneer, plywood, agricultural boxes and crates, and chips. Hardwood chips represent the primary by-product and all of the chips produced are sold to pulp and paper manufacturers. Approximately half of the slabs and sawdust generated are sold (as chips and mulch, respectively) with the remainder being burned as hog fuel. Similarly, approximately one-third of the planer shavings and bark are sold for livestock bedding and landscaping bark, respectively, with the remainder being burned as hog fuel.

While both large and small hardwood lumber manufacturers sell a substantial percentage of their production direct to the end-user, large manufacturers tend to rely on wholesalers to the exclusion of brokers. In the case of small manufacturers, the opposite is true and they tend to favor brokers while minimizing their use of wholesalers.

Problems and Threats to the Hardwood Industry: The problems confronting manufacturers in the hardwood industry were categorized into three areas: domestic regulatory issues, domestic resource issues, and international regulatory issues. Survey respondents were asked to indicate the impact of each factor on the competitiveness of their firm. Respondents utilized a seven-point scale ranging from a value of 1 (Strong Negative Impact) to 7 (Strong Positive Impact).

Domestic Regulatory Factors: The range of domestic regulatory factors identified in the survey included: federal harvest regulations, state forest practice regulations, and state taxes. Survey respondents indicated that all three domestic regulatory factors had a negative impact on the competitiveness of their firms. The mean scores for the three factors (state taxes, federal regulations, and state forest practice regulations) were 2.6, 2.8, and 2.9, respectively.

Domestic Resource Factors: The specific hardwood resource factors examined in the survey included rising raw material prices, rapid price fluctuations (*i.e.*, price volatility), labor quality, resource availability, and resource quality. Rapid price fluctuations and increasing raw material prices were perceived as having the most negative impact on

competitiveness, receiving an average score of 2.8 and 3.1 respectively. Quality of labor (4.1) and resource quality (4.3) were each generally perceived to have relatively little impact on the overall competitiveness of the respondents' firms. It is interesting to note that resource availability, with a mean score of 4.6, had a slightly positive impact on overall competitiveness.

International Regulatory Factors: The international regulatory factors included in the survey were: regional trade agreements, tariff barriers, non-tariff barriers, and sustainable forest certification. The survey results suggest that environmental certification of wood products (3.4) and tariff barriers (3.4) were perceived to have a more negative impact on the competitiveness of hardwood manufacturers than were non-tariff barriers (3.6) and regional trade agreements (3.7), although the difference in score was small. Further analysis of the survey data showed that hardwood firms exporting to Europe perceived environmental certification as having a more adverse effect on their competitiveness than did firms exporting to Asia and North America.

Marketing Variables: Survey respondents were asked to evaluate the importance of each variable to the competitiveness of their firm using a seven-point scale ranging from 1 (Not Important) to 7 (Very Important). The importance ratings for the individual marketing variables indicate that a firm's reputation within the hardwood industry was identified as the single most important marketing variable, receiving a mean score of 6.7. Communicating regularly with customers, product quality control, and providing on time delivery all received relatively high mean scores of 6.3, suggesting that these variables are also very important. Efficient operation of production facilities, with a mean score of 6.1, and procuring raw material, with a mean score of 5.7, were also perceived to be highly important.

It is interesting to note that virtually all of the marketing variables associated with innovation received relatively low importance ratings from survey respondents: developing new products (3.9), manufacturing specialty products (3.9), utilizing new marketing techniques (3.8), conducting market research (3.0), and performing promotional and advertising activities (2.5). Only a single marketing variable associated with innovation, product branding (5.2), was viewed as being relatively important. However, given the low level of importance attached to promotional activities, it remains problematic on how a company might successfully brand its products.

Conclusions

The hardwood industry has experienced substantial and solid growth over the past ten years despite the timber regulations that have restricted the harvest levels from federal and state forests. This growth has occurred in both the domestic US market as well as in foreign markets which now account for almost 28% of red alder production. While survey respondents did not feel that harvest restrictions had adversely impacted their industry, riparian zone regulations related to endangered salmon populations could have a severe impact on the hardwood resource, particularly if those regulations are vigorously applied to private forests.

Respondents indicated that virtually none of the regulatory factors evaluated in the survey were viewed in a positive light, although few were perceived to have a strongly negative impact on the industry. Despite this, a variety of factors were perceived by respondents to have had a moderately negative impact on the hardwood industry. These factors included: state taxes, federal harvest restrictions, state forest practice regulations, hardwood log price volatility, and hardwood log price increases. It is interesting to note that while federal and state harvest restrictions were perceived to have a moderately negative impact on the industry, respondents indicated that resource availability has not yet had an adverse impact on the hardwood industry.

Respondents indicated that those marketing variables that influenced a firm's reputation and production efficiency were the most important in terms of positively impacting the firm's performance. In contrast, virtually all of the marketing variables associated with acquiring market information and promoting innovation were perceived to have a negative impact on the firm's performance. In general, these results seem to suggest that hardwood companies in the PNW are conservative and tend to place a low value on the marketing activities associated with innovation and product differentiation.

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INTRODUCTION

The hardwood industry in the Pacific Northwest (PNW) has experienced surprising success in both domestic and international markets. This success is of interest considering that commercial hardwood species in the PNW have traditionally been considered low value by-products of the softwood inventory. While PNW hardwoods enjoy increased market acceptance, little market research has been done to characterize the industry or identify the factors that have contributed to its success.

Contrary to what many believe, the forests of the PNW produce high quality hardwoods. Red alder (*Alnus rubra*) and bigleaf maple (*Acer macrophyllum*) are the most abundant regional species and they enjoy the greatest commercial acceptance. A positive attribute of the hardwood industry is that hardwood markets tend to be less cyclical than the commodity-driven softwood markets. As is true for hardwoods in general, the use of PNW hardwoods in the manufacture of value-added wood products means that the demand is less dependent on new home construction than is the demand for softwood lumber. As a result, the PNW hardwood lumber market typically does not experience the same boom and bust cycles that characterize the softwood lumber industry (Raettig, Connaughton, and Ahrens 1995).

RESEARCH OBJECTIVES

This study was focused on the hardwood lumber manufacturing industry in the PNW. Red alder was the focus of this study since it is the dominant hardwood species in the PNW. The objectives of this research were to:

- explore the competitive conditions of the hardwood industry;
- identify the range of products currently manufactured from hardwoods;
- analyze current hardwood markets (domestic and international);
- identify the factors that are perceived to restrict the growth of the hardwood industry in the PNW; and
- assess future market and product opportunities for PNW hardwood products.

LITERATURE REVIEW

Characteristics and End-Uses of Red Alder

Red alder, for example, has a variety of uniquely favorable characteristics: both heartwood and sapwood are fairly uniform in color, the density of the wood varies little with growth rate, tension wood is usually not a problem, and the physical and mechanical properties of red alder allow it to substitute for more expensive hardwood species such as black cherry (*Prunus serotina*).

Commercially and silviculturally, red alder is the dominant hardwood species in the PNW. The demand for red alder is directly linked to its physical properties, appearance, and supply. The fine, even-textured wood grain and moderate density of red alder provide excellent machining characteristics. Red alder sands and polishes well, and because the wood of red alder is diffuse porous (i.e., the vessels are small and uniform in diameter), the finished wood does not have the open grain appearance common in the coarser textured woods such as oak. The grain of red alder does not show through a painted surface and it takes stains and finishes readily. The uniform grain pattern of red alder allows it to substitute for more expensive traditional species and it can be stained to match consumer preferences and market trends. An historically abundant resource supply, combined with good physical and mechanical properties, has contributed to the strong domestic and international demand for western red alder.

Industry Evolution

The early development of the hardwood industry was restricted, in large part, by the forest management regimes practiced over the past century. During this period, the dominant management practice for softwood forests was to clear-cut the forest, burn the site, and allow natural regeneration to complete the cycle. This practice allowed red alder, a pioneer species that thrives on sunlight, moisture, and exposed and disturbed soil, to establish itself rapidly in riparian areas and many other parts of the forest landscape. The forests that regenerated in lowland and wetland areas as a result of these early harvest regimes generally consisted of mixed softwood and hardwood species, although in some locations they consisted almost entirely of red alder.

During the 1960s, many second growth forests were again clear-cut to harvest the higher value softwood species and, given their mixed species composition, substantial volumes of hardwood logs were available. These hardwoods were considered a residual weed species component of the softwood harvest. The early innovators of the hardwood industry in the PNW recognized the opportunity to utilize this low cost resource as the basis for a hardwood sawmill industry. With forests dominated by softwoods, the various hardwood species were generally under-utilized and the surplus of hardwood growth over harvest gave the region the high hardwood inventories upon which to base a sawmill industry.

The Hardwood Resource and Harvest in the Pacific Northwest

The demand for hardwood logs in the PNW has been stimulated by a combination of factors, including relatively low stumpage prices, ready resource availability, and successful species substitution in the marketplace. In the future, hardwood stumpage prices are anticipated to increase because access to the resource may, for a variety of reasons, become restricted (Raettig, Connaughton, and Ahrens 1995). Ironically, despite the anticipated increase in the demand for hardwoods, and increasing prices for red alder lumber, very little timberland in the PNW is actively managed for hardwood production. While forest owners have usually felt that management for hardwoods should be a last resort and then only on low productivity sites, hardwood processors in the PNW have tended to favor progressive management of hardwoods,.

Currently, less than 1% of the private and industrial timberlands in the PNW are managed for hardwood production and most forest owners are hesitant to manage intensively for the production of hardwood timber until stumpage prices become more competitive with softwood stumpage prices. As a result, it appears there could be a decline in the future available hardwood supply with no apparent decrease in demand. This is unfortunate since strong domestic and international demand exists for western hardwoods, particularly red alder (Raettig, Connaughton, Ahrens 1995). In any case, whether this situation will impact stumpage prices is speculative and will certainly be influenced by species substitution. In addition, the willingness of hardwood sawmills to pay higher prices for hardwood logs remains to be seen and will certainly influence the mix of species planted.

In order to provide an incentive to manage the hardwood resource actively, hardwood stumpage prices must be consistently competitive with conifer stumpage prices, although this has generally not been the case in the PNW. A variety of factors could contribute to hardwoods being more actively promoted in the timberland manager's portfolio. For example, species diversity provides stability in a cyclical market, improves soil fertility, and improves the biodiversity of forest stands. Despite the advantages provided by these factors, there appears to be a clear lag in hardwood silviculture practices being implemented. Trend analysis of hardwood timber harvest and growing stock inventory data in the PNW indicates a sizable difference between harvest volume and inventory, with inventory far exceeding harvest (Table 1). While hardwood timber harvests are projected to increase through the year 2010, and

Table 1. Historical and projected PNW hardwood timber harvest and inventory.

Year^a	Timber Harvest (million ft³)	Timber Inventory (million ft³)
1952	37	14,099
1962	62	16,419
1970	87	19,197
1976	102	18,441
1986	145	22,446
2000 (est.)	352	23,286
2010 (est.)	443	24,639
2020 (est.)	451	26,050
2030 (est.)	427	27,320
2040 (est.)	402	28,305

Source: Haynes 1990

then decline gradually through the year 2040, the hardwood inventory is projected to continue increasing (Figure 1). Obviously, the huge and growing disparity between harvest volumes and standing inventory is another factor influencing the management of hardwoods in the PNW.

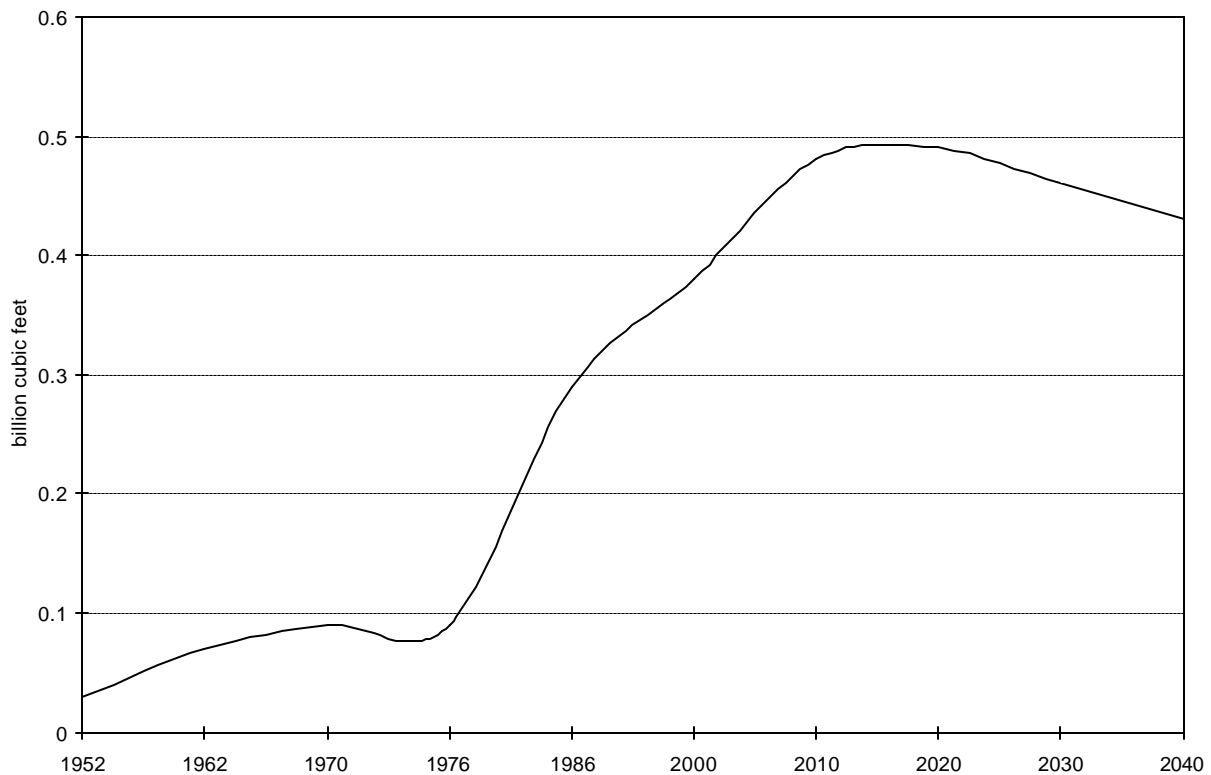


Figure 1. Actual (1952-1986) and projected hardwood timber harvests in the PNW.
Source: Haynes 1990

A variety of sources was used to summarize the hardwood harvest in Washington and Oregon during the period 1985 through 1997 (MacLean, et al. 1992; McKay, et al. 1998; Oregon Department of Forestry 1985-1996; Washington State Department of Natural Resources 1985-1998). Much of the data presented in the following figures can be found in Appendix C. Hardwood harvests by ownership class throughout Washington and Oregon from 1985 through 1997 are presented in Figures 2-4. The harvest data clearly indicate that the vast majority of hardwood logs are obtained from non-industrial private forests and industry timberlands. State forests have consistently accounted for less than 10% of the hardwood log harvest. The remaining timberland ownerships generally account for less than 1% of the hardwood harvest.

The Washington hardwood log harvest peaked in 1989 at 513 mmbf while the Oregon hardwood harvest reached 233 mmbf in 1994 (Figures 3 and 4). The hardwood log harvest declines are somewhat difficult to explain given the steady growth of the hardwood industry in the PNW, although some of the decline can be attributed to increased regulatory constraints. These constraints have had a much larger impact on state and federal lands than on private lands.

Declines in hardwood timber harvests in Washington appear to be offset by the import of hardwood logs from other states (Figure 5). Prior to 1982, less than 10% of the hardwood logs consumed in Washington were obtained from out-of-state sources. In 1996, which is the last year for which out-of-state hardwood log consumption is available, out-of-state hardwood logs comprised approximately 69% of the hardwood logs processed in Washington. The data presented in Figure 6 indicates that hardwood log consumption in the various manufacturing sectors changed substantially over the period 1976 to 1996, with consumption in the sawmill, veneer/plywood industries, and log

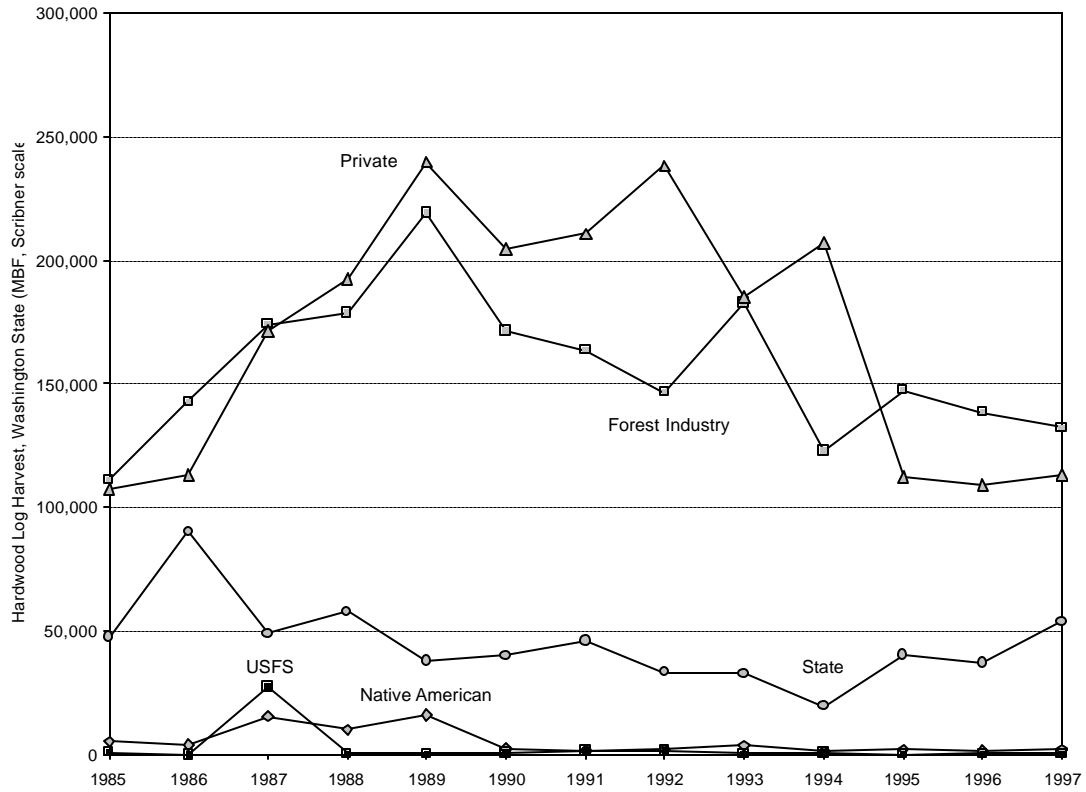


Figure 2. Washington State hardwood log harvest, 1985-1997.
 Source: Washington State Department of Natural Resources, Washington Timber Harvest Reports.

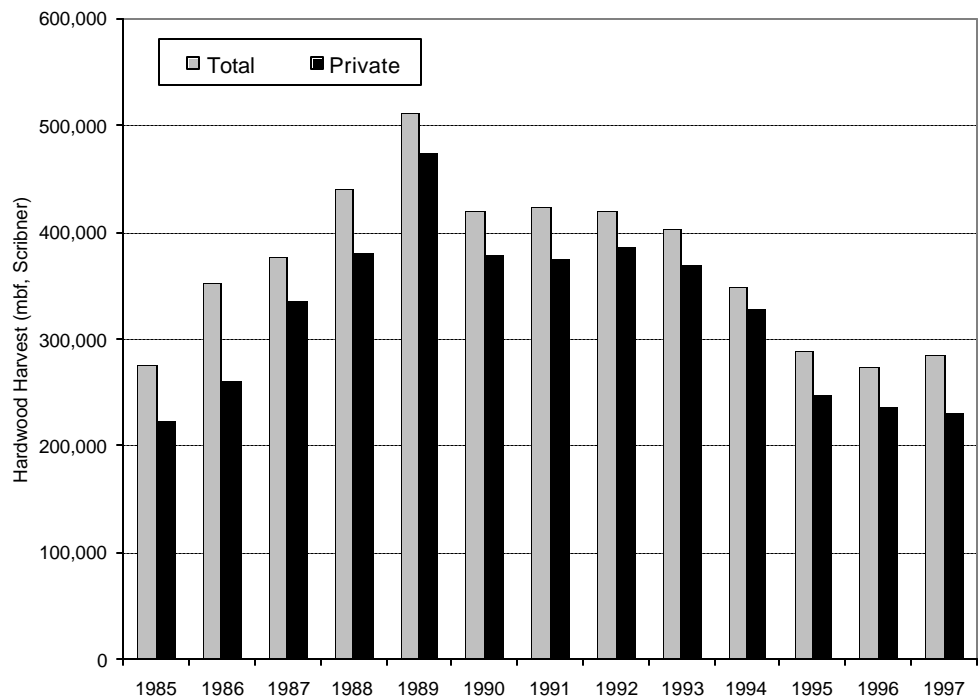


Figure 3. Western Washington hardwood log harvest, 1985-1997.

Source: Washington Department of Natural Resources, Washington Mill Survey.

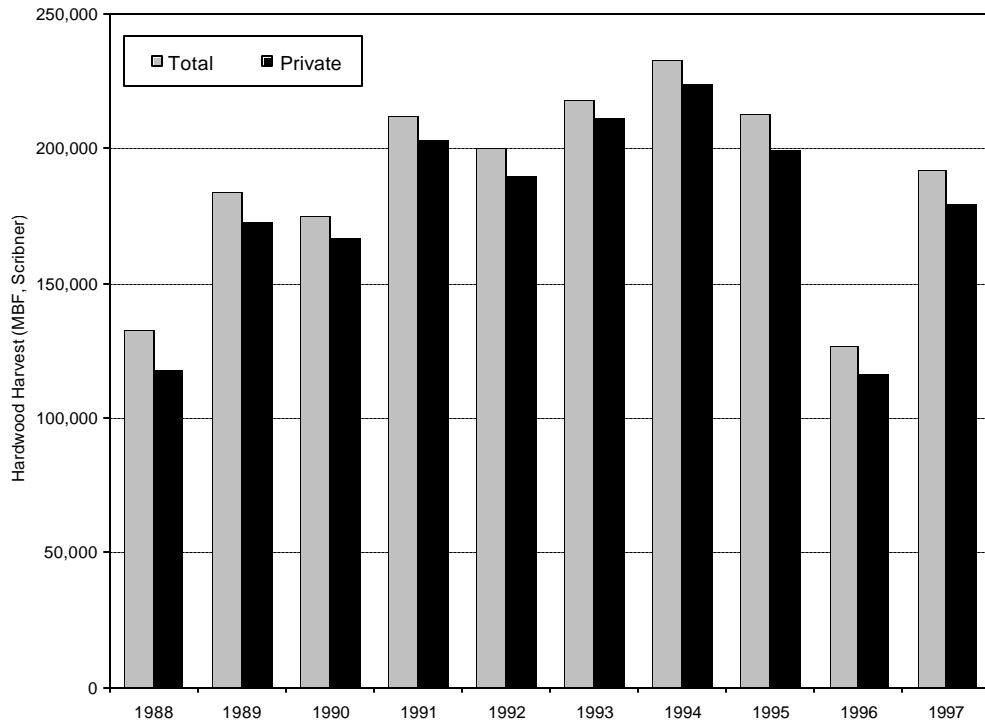


Figure 4. Western Oregon hardwood log harvest, 1988-1997.
Source: Oregon Department of Forestry, Annual Reports.

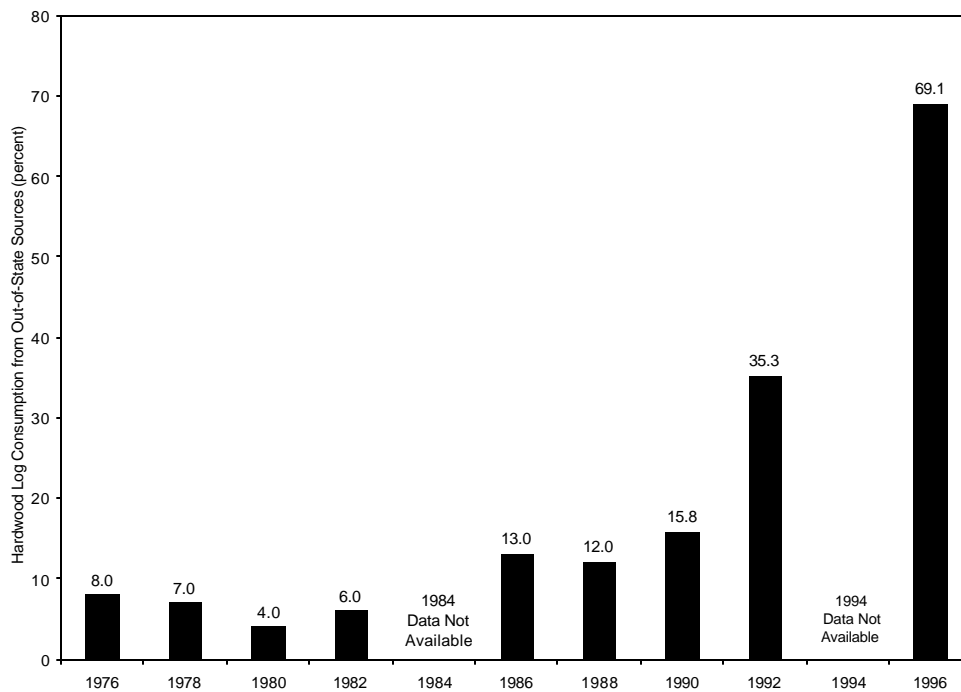


Figure 5. Percent of hardwood logs consumed in Washington State originating from out-of-state.
Source: Washington State Department of Natural Resources, Washington Timber Harvest Reports

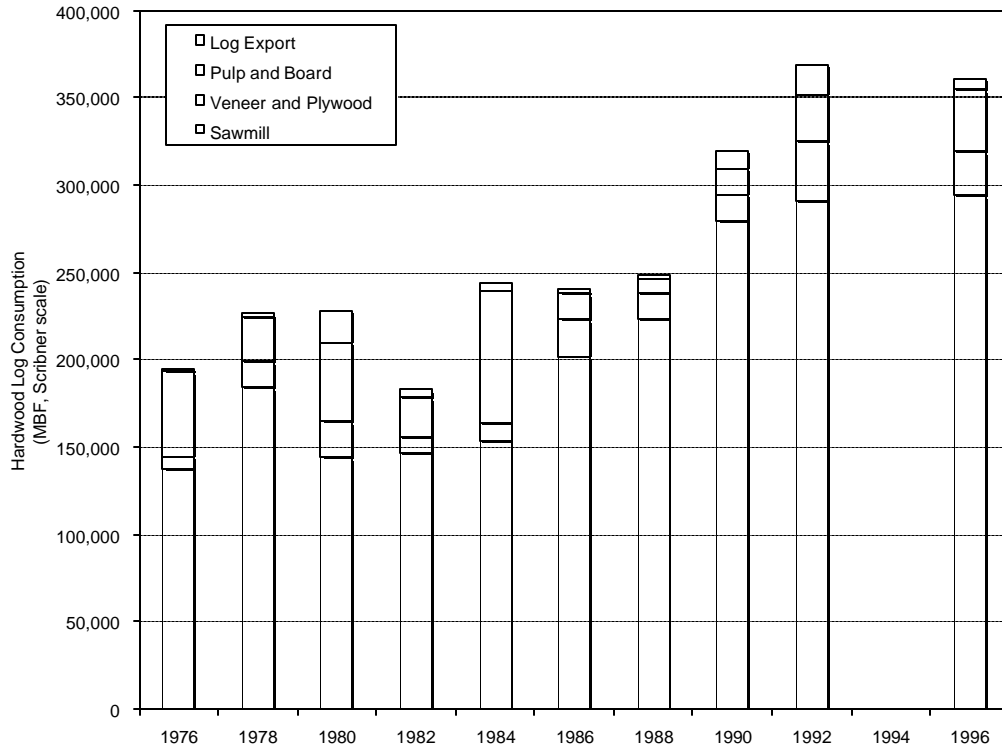


Figure 6. Washington State hardwood log consumption by industry sector, 1976-1996.
Source: Washington State Department of Natural Resources, Washington Timber Harvest Reports

exports increasing while log consumption in the pulp and paper industry declined. Hardwood log consumption in the sawmill industry increased from 71% to 82% of total hardwood consumption, while in the veneer/plywood industry consumption increased from 4% to 7%, and log exports increased from 0.7% to 1.7%. In contrast, consumption in the pulp and paper industry declined from 25% to 10%.

PNW Resource Base and Ownership Categories

The current and projected harvest and growth data indicates that there is not a shortage of hardwood resource to support current and projected hardwood demand. Rather, the anticipated raw material shortage will likely be due to a combination of factors, including the structure of timberland ownership, management regimes, and regulatory restrictions. Private timberland managers can be expected to continue managing their forest holdings for softwood timber production. In contrast, future timber harvest levels in federal and state forests are less predictable. The percentages of total growing stock and sawtimber volume by ownership are presented in Tables 2-5.

Table 2. Ownership of forest inventories in western Washington and western Oregon.

Ownership	% of Growing Stock ^a
Federal	51%
Industrial	24%
Other Public	13%
Other Private	12%

^a Hardwood represents 12% of total growing stock volume (Source: Raettig, Connaughton, and Ahrens 1995).

Timberland ownership in the PNW consists of federal, state, industrial and non-industrial private forests (Table 2). The majority of the total growing stock is located in federally owned forests. Given current and pending legislation restricting access to timber in riparian zones, it is unlikely that the supply of hardwood logs from public forests will increase in the future. It is much more likely that the volume of hardwood logs harvested from public forests will decline substantially in the future.

Table 3. Western Washington hardwood growing stock by ownership and region (%)

Ownership	Olympic Peninsula	Puget Sound	Southwest
Forest Industry	48	24	46
Other Private	30	55	33
Public	22	21	21
% of Growing Stock^a	29	43	28

^a Western Washington hardwood growing stock volume is estimated to be 5.888 billion ft³ (Source: Raettig, Connaughton, Ahrens 1995).

Table 4. Western Oregon hardwood growing stock by ownership and region (%).

Ownership	Northwest	Southwest	West-Central
Forest Industry	35	59	49
Other Private	44	33	44
Public	21	8	7
% of Growing Stock^a	43	34	23

^a Western Oregon hardwood growing stock volume is estimated to be 6.1 billion ft³ (Source: Raettig, Connaughton, Ahrens 1995).

Table 5. Western Washington and western Oregon hardwood sawtimber stock by ownership (%).

Ownership Category	Western Washington	Western Oregon
Forest Industry	34.8	33.1
National Forest	2.5	30.1
Other Private	41.4	25.2
Other Public	21.4	11.7

Source: Raettig, Connaughton, Ahrens 1995

hardwood industry averaged 7,000-8,000 jobs during the period 1990-1998 (Oregon Department of Human Resources, Washington State Department of Employment Security). Direct employment includes growing timber (*i.e.*, forestry), primary processing, and value-added manufacturing; it does not include indirect employment or induced (multiplier) effects. Approximately 5% of direct employment is in the forestry sector, 10% in harvesting, 25% in the sawmill industry, 5% in veneer and plywood, 35% in secondary manufacturing, and 20% in the pulp and paper sector. Fluctuations in direct employment on a year-to-year basis are quite low relative to the region's wood products industry as a whole (Raettig, Connaughton, and Ahrens 1995). A study of the Washington State forest products industry estimates that for every direct job in the timber industry an additional 1.54 jobs are created in the trade and service sectors (Governor's Timber Team 1992). Given this multiplier effect, the total employment impact of the hardwood industry in the PNW is estimated to be nearly 20,000.

Regulatory Impacts

Current forest management practices utilized by industrial and non-industrial private forest owners generally emphasize elimination of hardwoods to promote the establishment of softwood species. The use of herbicides and mechanical techniques to eliminate hardwoods growing within softwood plantations is the norm on industrial timberlands. Forest practice regulations in the PNW specify that harvested areas must be replanted utilizing commercial tree species. While hardwood species are included in the list of commercial tree species, the establishment of hardwood plantations is rare.

Compounding the hardwood supply issues associated with softwood forest management practices in the PNW is the fact that hardwoods, red alder in particular, are abundant in stream-side riparian zones and wetlands. Riparian

However, the hardwood industry depends on industrial and non-industrial private timberland ownerships to supply the majority of their raw material (McGillivray 1981). Considering hardwood inventory across all ownership categories, there has been a large increase in the inventory of seedling and sapling-size stands, a large drop in the inventory of pole timber-size stands, and a modest decrease in the inventory of sawtimber-size stands (Raettig, Connaughton, Ahrens 1995). The decrease in pole timber-sized stands indicates potential hardwood supply shortages in the future as mature sawtimber stands are harvested. Some of this potential supply reduction could be offset by investment in the management of hardwood stands, with the assumption that more intensive management of hardwoods would accelerate growth, shorten the rotation age, and improve resource quality.

Employment

Direct employment in the PNW

regulations typically require that buffer zones be left undisturbed to protect water quality and to provide functional habitat for riparian dependent species. New regulations designed to protect riparian habitat are expected to extend these no-harvest buffers. Since there is a greater proportion of hardwoods in riparian areas, a greater proportion of the hardwood resource is likely to be in the no-harvest buffers, therefore affecting the supply of hardwoods available to processors. While forest practice regulations serve the intent of protecting public natural resources, including water quality, soil quality, biodiversity, and wildlife, it is difficult to write regulations that promote the intended restoration. No-harvest zones essentially lock in current conditions for a long time even as they may for a time prevent increased sediment. Retaining a hardwood component as a part of the understory in a mixed species stand can restore more complex forest functions, thereby contributing to the intended goals. For example, a study in the Oregon coast range found a linear increase in bird species diversity as the hardwood component of a softwood forest increased from 0 to 50% (Hibbs 1996). In another study, there was evidence that the rare white-footed vole finds its ecological niche in riparian alder stands (Hibbs 1996).

From the perspective of sustaining both timber and certain wildlife habitats, hardwoods play an important role in managed forests. Pure alder stands, on the other hand, may have been more transitory in pre-European times, but today represent an increasing share of the acres in riparian zones as a consequence of commercial harvest practices during a period of time when the value of timber was too low for more than minimal attention to regeneration. Active management (rather than no-management) buffers would be required to restore these stands quickly to a more diverse structure. Hardwoods play an important role in public attempts to restore some of the functions of forests that have been lost by a history of (until recently) strictly commercial management. Economic incentives for restoration would likely encourage more intense management of hardwoods and mixed stands while at the same time regenerating some pure hardwood stands. Both results could have a substantial impact on hardwood availability over time. Hardwood supplies will be impacted as forest practices change whether in response to public perceptions or a better understanding of forest restoration principals.

Hardwood Lumber Production

Historically, lumber production in the US has been dominated by softwood species, with approximately three times the volume of softwood lumber being produced relative to hardwood lumber (Figure 7). However, the production volume data in Figure 7 clearly shows that hardwood lumber production is much less volatile than softwood lumber production. This is a reflection of the fact that softwood lumber production volumes are closely related to residential housing and the number of housing starts while hardwood lumber production is generally used within the secondary wood processing industries (e.g., cabinets, flooring, and furniture). The production of hardwood lumber is highly concentrated in the eastern US (Figure 8). While hardwood lumber production has been steadily increasing in the west, it still represents just 3% of total US hardwood lumber production.

The predominant supply region for hardwood lumber in the west are the states of Washington and Oregon. Comparatively, Washington is the larger producer of the two states, supplying approximately 350 mmbf compared with Oregon's 125 mmbf in 1995 (Figure 9). The hardwood lumber production data clearly shows that production volumes have increased consistently and rapidly since 1982. For example, over the period 1950-1980, hardwood lumber production increased from 17 mmbf to 162 mmbf while over the period 1981-1997 hardwood lumber production jumped from 162 mmbf to 467 mmbf. Over the past five years, hardwood lumber production in the PNW averaged approximately 450 mmbf. A recent Forest Service production forecast (Figure 10) suggested that hardwood lumber production would decline dramatically over the period 1985-2010 from approximately 400 mmbf to 180 mmbf, before stabilizing at approximately 200 mmbf (Haynes, 1990). To date we have seen no evidence of a decline in hardwood lumber production, although new harvest restrictions in riparian zones may severely restrict the availability of hardwood logs in the future.

Hardwood Lumber Exports

Western red alder hardwood lumber represents an important component of the US hardwood export mix, Tables 6 and 7. Despite the fact that red alder lumber production constitutes less than 3% of total US hardwood lumber production, red alder ranks fourth in total volume and third in total export revenue among all hardwood species exported from the US. Over the period 1994-1997, red alder lumber exports increased by 76%, jumping from 170

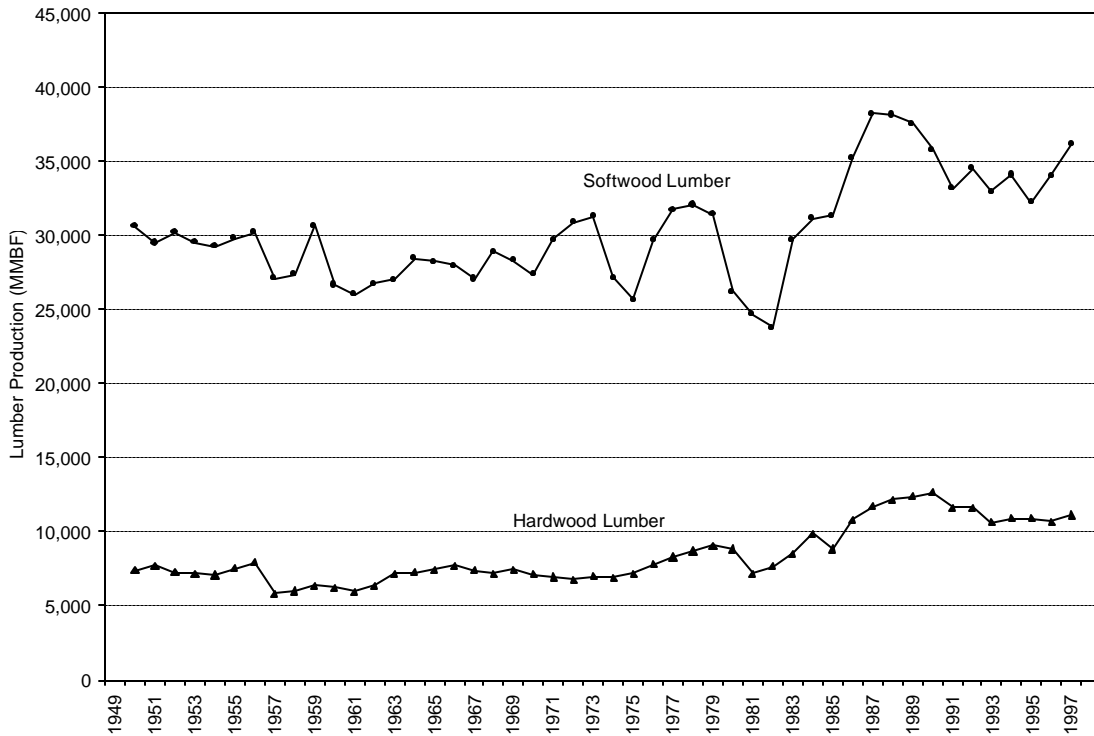


Figure 7. US hardwood and softwood lumber production, 1950-1997.

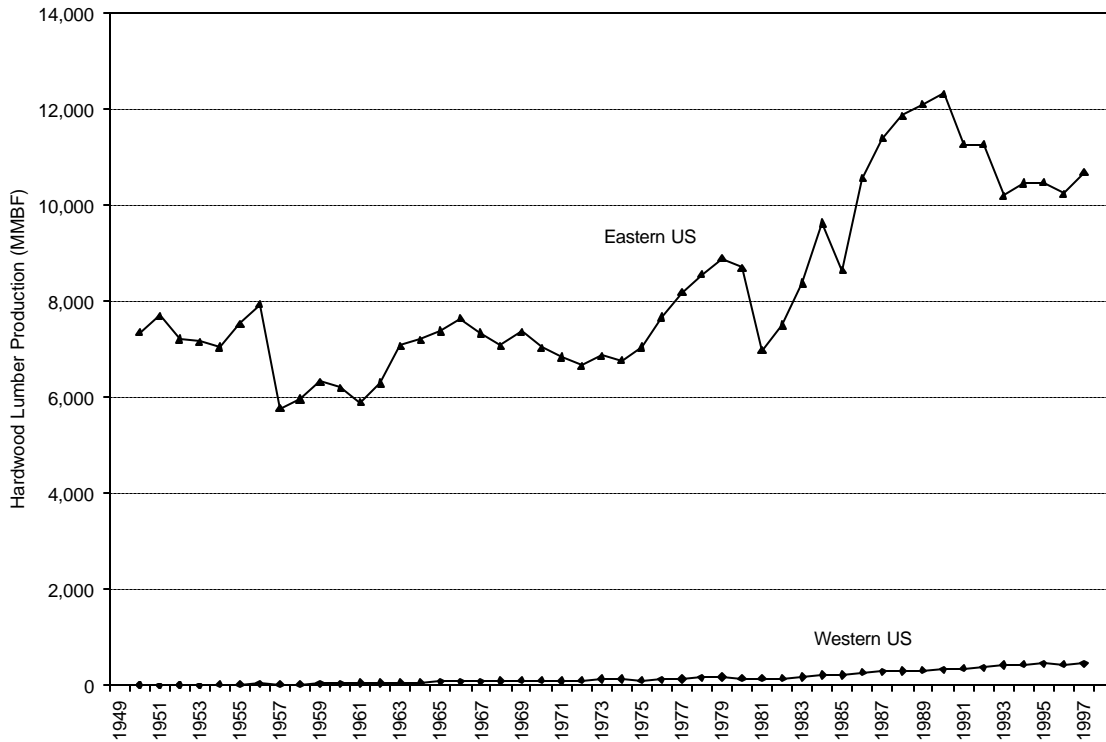


Figure 8. Comparison of eastern and western US hardwood lumber production, 1950-1997.

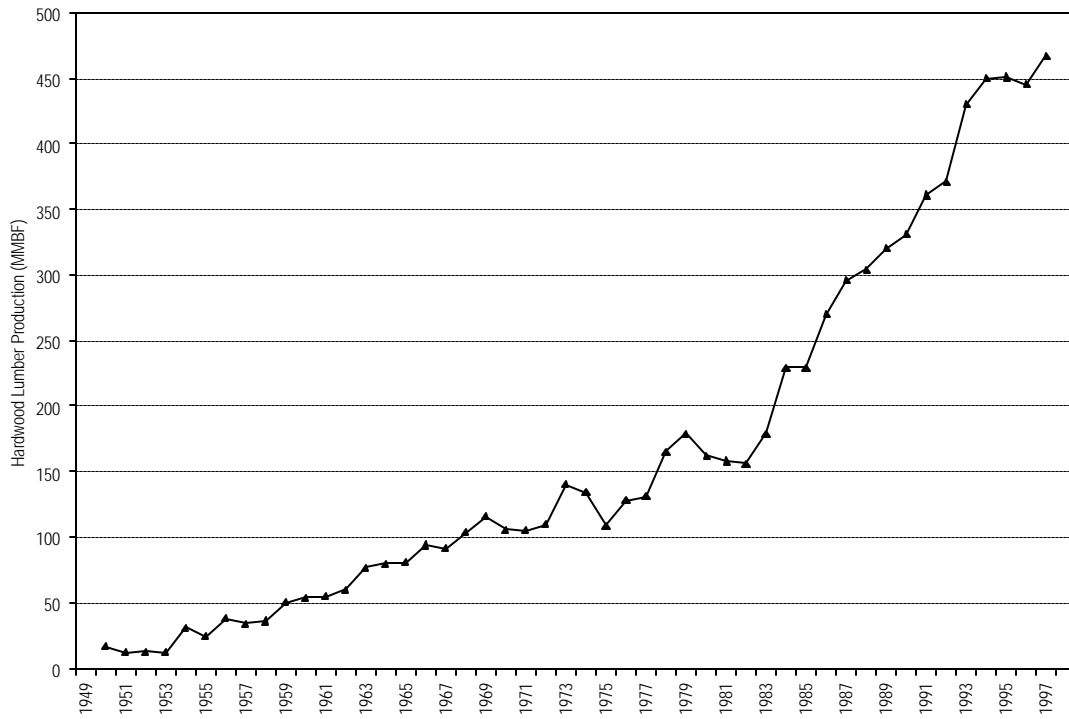


Figure 9. Annual hardwood lumber production in the Pacific Northwest.
Source: WWPA, 1998; USDOC, 1999.

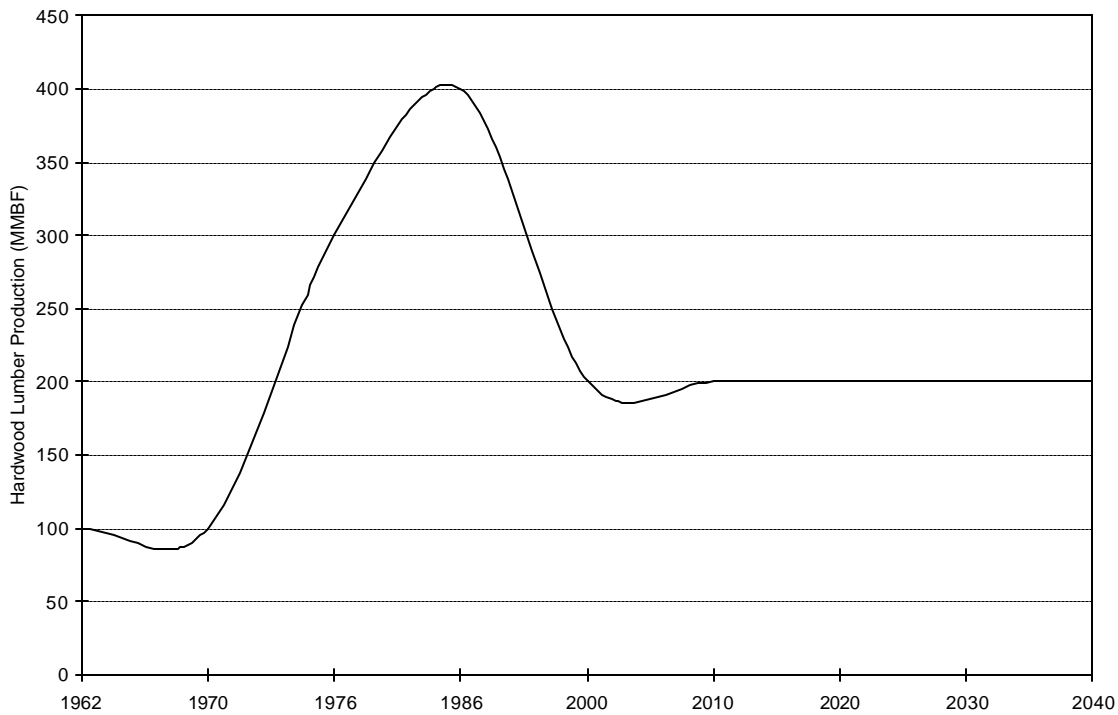


Figure 10. Projected hardwood lumber production in the Pacific Northwest (actual through 1988).
Source: Haynes 1990

Table 6. Value of US exports of hardwood lumber, 1993-1997 (\$1,000).

	1993	1994	1995	1996	1997
White Oak	289,895	288,895	335,103	333,794	381,220
Red Oak	289,713	294,270	286,272	266,831	297,815
Maple	89,111	105,743	126,248	133,288	190,890
Red Alder	103,092	92,859	90,934	132,181	160,529
Cherry	44,648	54,060	52,386	60,734	82,330
Yellow Poplar	59,980	61,904	65,828	60,916	77,294
Ash	81,260	77,817	86,188	74,941	76,438
Walnut	12,788	15,019	14,801	12,651	13,984
Beech	4,301	10,731	7,221	8,835	10,600
Birch	4,969	5,924	6,381	6,665	8,334
Hickory	3,003	3,705	5,476	5,299	6,090
Total	1,077,280	1,118,094	1,201,224	1,220,291	1,431,699

Source: U.S. Department of Commerce, Bureau of the Census (data issued June 1998)

Table 7. Volume of US exports of hardwood lumber, 1993-1997 (cubic meters).

	1993	1994	1995	1996	1997
White Oak	539,432	548,279	600,441	593,369	666,008
Red Oak	655,918	661,503	637,906	631,444	648,820
Maple	210,414	258,735	313,076	322,521	390,699
Red Alder	198,160	169,877	170,283	243,347	298,470
Yellow Poplar	145,958	150,295	161,718	162,409	203,822
Ash	156,498	156,734	157,787	146,756	151,782
Cherry	66,434	75,211	74,728	86,334	112,524
Beech	14,823	27,050	22,013	32,230	34,433
Birch	19,186	20,979	24,967	24,805	26,598
Walnut	18,387	22,250	21,057	17,813	19,692
Hickory	7,902	9,163	15,333	14,867	17,915
Total	2,274,518	2,368,344	2,495,152	2,571,784	2,889,540

Source: U.S. Department of Commerce, Bureau of the Census (data issued June 1998)

mmbf in 1994 to 298 mmbf in 1997. Over the same period the value of red alder lumber exports increased from \$93 million to \$161 million, or 73%. Perhaps more significantly, the contribution of western red alder to total US hardwood lumber exports has increased substantially in the past three years. As a result, red alder lumber exports now represent 10.3% of total US hardwood lumber exports, up from 6.8% in 1995. At the same time, the unit value of red alder lumber has remained relatively consistent, fluctuating between \$520/m³ and \$547/m³ over the period 1993 to 1997 (Table 8). This compares favorably to the unit values obtained for exports of other hardwood species of lumber, with the obvious exceptions of walnut and cherry.

The export destinations for red alder lumber during the period 1993-1997 are presented in Tables 9 and 10. The primary importer of red alder lumber has been Germany, followed by Italy, Taiwan, and Japan. Since 1993, the ratio of German and Italian red alder lumber imports relative to total red alder exports has remained fairly consistent, representing 32.8% and 16.4% of US red alder lumber exports in 1997.

Taiwanese imports of red alder lumber have increased from 9.2% of total red alder exports in 1993 to 12.8% in 1997. In contrast, Japanese imports

Table 8. Unit value of US hardwood lumber exports in 1997, by species.

Species	Unit Value \$/cubic meter
Cherry	732
Walnut	710
White Oak	572
Red Alder	538
Ash	504
Maple	489
Red Oak	459
Yellow Poplar	379
Hickory	340
Birch	313
Beech	308

Table 9. Value of red alder lumber exports, 1993-1997 (\$1,000).

	1993	1994	1995	1996	1997
Germany	\$40,944	\$31,721	\$37,241	\$47,204	\$62,200
Italy	15,844	17,028	8,170	25,722	29,959
Japan	23,067	18,960	15,129	15,726	18,871
Taiwan	5,003	4,803	6,815	12,610	14,596
Mexico	3,049	4,729	3,597	5,797	5,510
Belgium-Lux	4,029	1,808	3,489	2,852	4,174
Hong Kong	216	433	1,616	2,890	4,082
Korea	3,375	6,958	6,696	5,897	3,964
Netherlands	2,914	1,151	1,315	2,607	2,592
Spain	348	637	734	1,160	2,467
World	103,092	92,859	90,934	132,181	160,529

Source: U.S. Department of Commerce, Bureau of the Census (data issued June 1998).

Table 10. Volume of red alder lumber exports, 1993-1997 (m³).

	1993	1994	1995	1996	1997
Germany	67,386	49,882	53,291	67,618	97,818
Italy	29,110	29,053	13,385	40,675	48,812
Taiwan	18,284	15,153	20,235	32,429	38,230
Japan	46,543	34,447	29,161	30,635	35,516
S. Korea	4,578	10,298	15,949	18,753	12,697
Mexico	9,886	13,619	9,764	14,844	12,639
Hong Kong	603	1,479	5,598	9,002	12,375
Belgium-Lux	6,800	3,017	6,075	4,942	7,087
Thailand	68	522	756	2,960	4,823
Spain	847	1,483	1,643	2,238	4,104
World	198,160	169,877	170,283	243,347	298,470

Source: U.S. Department of Commerce, Bureau of the Census (data issued June 1998).

of red alder lumber have dropped from 23.4% of total red alder lumber exports in 1993 to 11.9% in 1997, reflecting a consistent decline over the 1993-1997 period. It is interesting to note that while the vast majority of softwood lumber exported from the PNW goes to Asia (primarily to Japan, S. Korea, and China), red alder lumber exports are fairly evenly divided between European and Asian destinations. The unit values for red alder lumber summarized in Table 11 indicate that European markets tend to pay higher prices for red alder lumber than either Asia or Mexico. While one might suspect that the higher unit prices for European countries would suggest that higher grade lumber is being exported to European destinations, lumber grade information is not included in the export data.

Western Red Alder Prices

While smaller sawmills typically suffer from a raw material supply shortfall, the availability of red alder sawlogs appears to be sufficient to meet current demand. Historically, the price of red alder sawlogs has not fluctuated as greatly as softwoods in the PNW, although the long-term upward price trend of red alder is similar to that of western

Table 11. Unit value of red alder lumber exports in 1997, by country.

Region	Country	Unit Value \$/m ³
Europe	Netherlands	681
	Germany	636
	Italy	614
	Spain	601
	Belgium-Lux	589
Asia	Japan	531
	Taiwan	382
	Hong Kong	330
	Korea	312
N. America	Mexico	436

softwoods (Figure 11). The prices for red alder sawlogs tend to increase in late summer, remain high throughout the

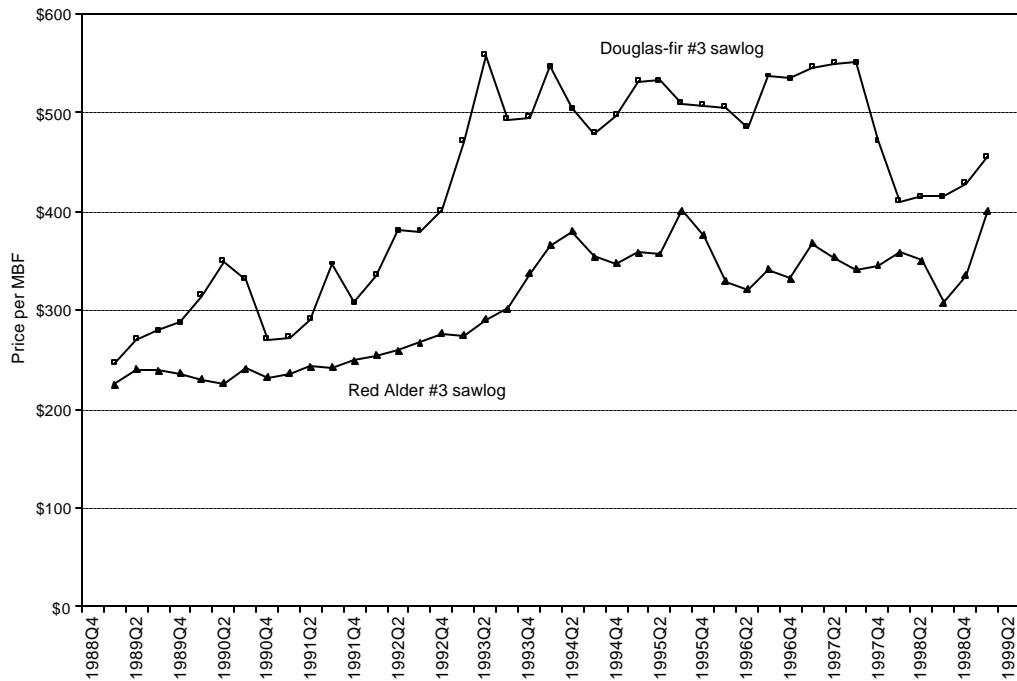


Figure 11. Average quarterly prices for red alder and Douglas-fir #3 sawlogs, 1989-1998.
Source: Log Lines Price Reporting Service.

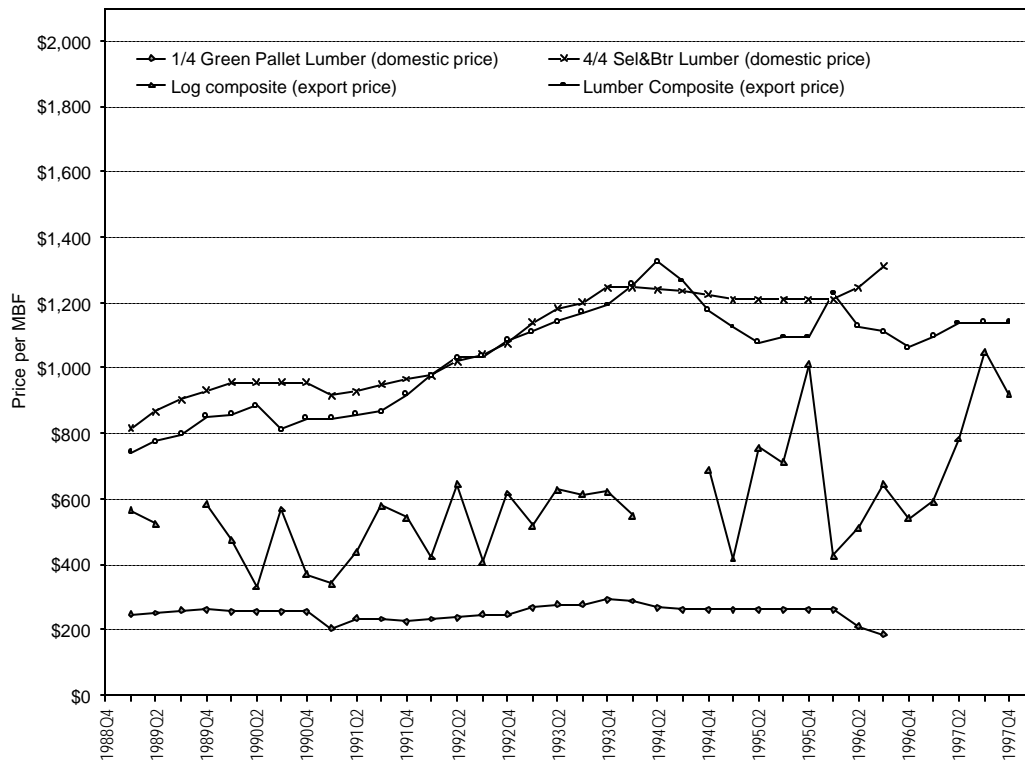


Figure 12. Western red alder domestic and export prices, 1989-1997.

Source: Warren, 1998.

fall and winter months, and decline in spring and summer. Red alder sawlog prices are dependent on the softwood log market to some extent. If softwood harvest activity decreases due to falling markets, then the hardwood supply can be adversely impacted. This hardwood/softwood relationship has a direct influence on fluctuations in hardwood sawlog prices in the PNW.

Increasing market interest in PNW red alder has contributed to steady increases in raw material prices. Prices for number 3 red alder sawlogs have been rising steadily since 1989. Prior to mid-1993, number 3 red alder sawlog prices were relatively stable, showing small monthly fluctuations in price. Examination of 1993 to present time period data for number 3 red alder sawlogs indicates that the monthly price volatility has increased by over 75% relative to the 1989-1993 period. However, since 1994, the trend in number 3 red alder sawlog prices appears to have leveled off.

The domestic price of red alder 4/4 select and better lumber rose steadily over the past eight years, although there was a slight stagnation in prices during 1995 with a recovery in 1996 (Figure 12). The composite price of red alder export lumber climbed substantially between 1989 and 1994, but declined to 1992 price levels as of first quarter 1997. The composite price of red alder export logs reveals strong price volatility with little gain in overall price level. The domestic price of red alder ¼ green pallet lumber has remained static since 1989, thus in real terms its price has declined. Interestingly, there is little volatility in the price of red alder ¼ green pallet lumber.

SURVEY METHODOLOGY

Sample Frame

Since the number of firms involved in hardwood lumber production in the PNW is less than 15, a census sample was deemed most appropriate. The sample frame was derived via an examination of PNW mills utilizing hardwood logs (*i.e.*, primary manufacturers) found in Miller Freeman's *Directory of the Wood Products Industry* and from the membership list of the Washington Hardwood Commission. The sample frame was reviewed by a hardwood industry professional and additions were made per expert recommendations. The sample frame was screened using a brief phone call interview with representatives from the prospective mills. The PNW region for the purpose of this research consisted of western Washington, western Oregon, and northern California.

Survey Instrument

The survey instrument was designed to generate primary data from hardwood lumber manufacturers in the PNW. The survey contained questions to assess respondents' perceptions of current trends and future opportunities in the PNW hardwood lumber industry, specifically: range of hardwood products manufactured, geographic markets served, potential future opportunities, problems and threats confronting the industry, and cooperation within the PNW hardwood industry. The survey was pre-tested by industry experts to assess the clarity, comprehensiveness, importance, and efficiency in design of all questions. The final research questionnaire is included in Appendix A.

Survey Execution

The survey was administered via fax to each firm included in the sample frame. Each firm was first called to identify the person to whom the survey should be addressed, to alert the participant about the objectives of the research, and to solicit the participant's cooperation. The survey was faxed rather than mailed for two reasons. First, the small sample size made it feasible to utilize fax technology. Second, faxing allowed for a more personal approach, which generally enhances survey response rates. Respondents were assured that all information provided would be kept strictly confidential and reported only in an aggregated form.

Response Rate

Thirteen hardwood primary producers were contacted and faxed surveys. Of the firms contacted, ten completed and returned the survey, an effective response rate of 76.9%.

RESULTS AND DISCUSSION

Hardwood Supply

Hardwood species of commercial importance in the PNW include western red alder, big leaf maple, cottonwood, and to a lesser extent birch and black oak. Western red alder dominates the hardwood lumber industry in availability and raw material utilized. Survey participants reported that they utilized 456 mmbf of western red alder sawlogs and 34.9 mmbf of big leaf maple sawlogs in 1996. Other species of sawlogs participants reported using included cottonwood (8.7 mmbf), cherry (1.9 mmbf), and birch (1.9 mmbf).

Participants were asked to identify their sources of hardwood raw material (Figure 13). Most respondents sourced their hardwood raw material from non-industrial forests (31%), industrial forests (30%), and state forests (23%). Company-owned forests (8%) and federal forests (8%) represented a much smaller source of supply. The hardwood lumber industry in the PNW is much smaller than the softwood lumber industry. In 1997 the total volume of hardwood lumber produced in the PNW totaled 467 mmbf while softwood lumber production exceeded 12.5 bbf.

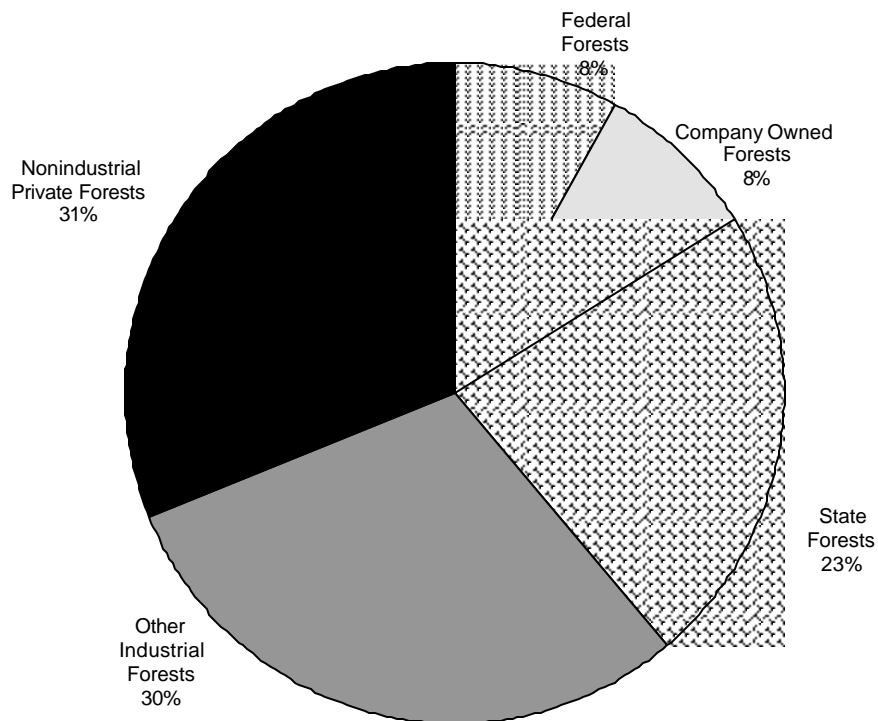


Figure 13 Respondents sources of hardwood raw material supply.

Hardwood Industry Profile

The PNW hardwood lumber industry directly employs approximately 2,000 people, excluding the silviculture, harvesting, and pulp and paper sectors. The larger hardwood lumber manufacturers generate sales revenues in excess of \$20 million annually (Table 12). All of the large hardwood lumber manufacturers are active in the export market, exporting an average of 28% of their production. An analysis of the survey data found that the large manufacturers, in terms of both number of employees and sales revenues, tended to export a greater percentage of their production than did smaller manufacturers. Collectively, the hardwood lumber manufacturers surveyed in this study produced approximately 450 mmbf of lumber, with exports totaling approximately 126 mmbf or 28% of their total production.

Table 12. Demographic description of survey participants.

Primary Product	Number of Firms	1996 Sales Revenue	Number of Employees
Lumber (large firms)	4	> \$20 million	160 to 850
Lumber (small firms)	2	< \$20 million	16 and 73
Pallets	1	> \$10 million	85
Boxes and Crates	1	< \$1 million	4
Plywood	1	> \$20 million	220
Chips	1	< \$10 million	28

The range of products manufactured by respondent firms included kiln dried and green lumber, pallet stock, veneer, plywood, agricultural boxes and crates, and chips (Figure 14). A majority of hardwood manufacturers surveyed in this study focused on lumber production. Hardwood lumber and pallet stock were typically produced at the same mill. Maximizing raw material sorts and lumber grades is of critical value to these hardwood lumber mills. The hardwood lumber manufactured by respondents is typically kiln dried and cut to standard (non-metric) dimensions.

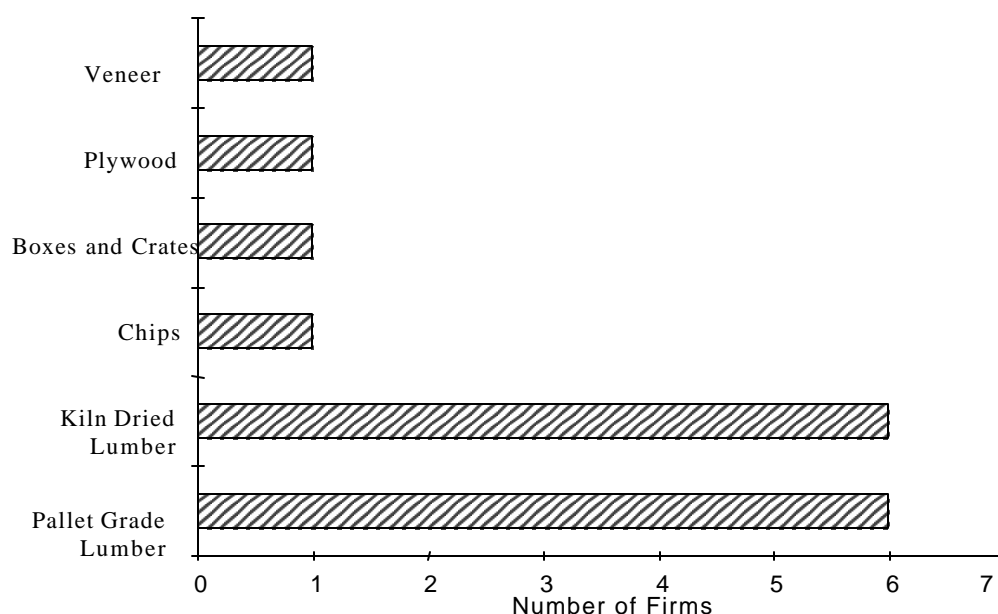


Figure 14. Range of hardwood products manufactured by survey participants.

Distribution

Large lumber manufacturers, defined as those reporting annual revenues in excess of \$20 million, utilize a combination of distribution strategies. Almost half of their lumber production (46%) is sold to wholesalers, while the remainder is either sold to secondary manufacturers (23%) or sold directly to the end user (29%) (Table 13). In contrast, small lumber manufacturers, those with annual revenues below \$20 million, relied on lumber brokers to sell 38% of their lumber production. Direct sales to the end-user accounted for 43% of their production while 10% went to wholesalers and 7% went to secondary manufacturers. While both large and small hardwood lumber manufacturers sell a substantial percentage of their production direct to the end-user, large manufacturers rely to a large degree on wholesalers to the exclusion of brokers. In the case of small manufacturers, the opposite is true and they tend to favor brokers while minimizing their use of wholesalers.

Manufacturers of products other than lumber appear to have developed specialized distribution strategies based on the type of product being manufactured. These distribution strategies appear to be unique for each of the different types of products, although our sample size for each product type was small. For example, pallet manufacturers sold

all of their products directly to the end-user, plywood manufacturers sold all of their production to wholesalers, and box/crate manufacturers sold virtually all of their production to retailers (Table 13).

Table 13. Range of distribution channels reported by survey respondents.

Product	Percent of Production				
	End User	Wholesaler	Retailer	Secondary Manufacturer	Broker
Lumber (large firms)	29	46	2	23	0
Lumber (small firms)	43	10	2	7	38
Boxes and Crates	5	0	95	0	0
Plywood	0	100	0	0	0
Pallets	100	0	0	0	0

Use of Manufacturing By-Products

A variety of by-products is generated during any manufacturing process. Within the forest products industry, by-products typically include chips, bark, slabs, sawdust and planer shavings. The survey results show that the complete utilization of by-products is the norm within the hardwood lumber industry, with virtually no by-products being sent to the landfill for disposal (Table 14). In general, those by-products that cannot be sold are utilized as hog fuel and burned. Hardwood chips represent the primary by-product and all of the chips produced are sold to pulp and paper manufacturers as a raw material input to the paper manufacturing process. Approximately half of the slabs and sawdust generated are sold (as chips and mulch, respectively) with the remainder being burned as hog fuel. Similarly, approximately one-third of the planer shavings and bark are sold (for livestock bedding and landscaping bark) with the remainder being burned as hog fuel.

Table 14. Respondents' utilization of manufacturing by-products (%).

By-product	Sold	Burned as Hog Fuel
Bark (<i>sold for landscaping bark</i>)	35	65
Chips (<i>sold for pulp and paper</i>)	100	0
Planer Shavings (<i>sold for livestock bedding</i>)	40	60
Sawdust (<i>sold for mulch</i>)	54	46
Slabs (<i>chipped for pulp and paper</i>)	50	50

Problems and Threats to the Hardwood Industry

The problems and threats confronting manufacturers in the hardwood industry were categorized into three topics: domestic regulatory issues, domestic resource issues, and international regulatory issues. Survey respondents were asked to indicate the impact that each factor had on the competitiveness of their firm. Respondents utilized a seven-point scale ranging from a value of 1 (Strong Negative Impact) to 7 (Strong Positive Impact). The factors included in this section of the survey included: domestic regulatory factors, domestic resource factors, international regulatory factors, and sustainable forest certification.

Domestic Regulatory Factors: The range of domestic regulatory factors identified in the survey included: federal harvest regulations, state forest practice regulations, and state taxes. Survey respondents indicated that all three domestic regulatory factors had a negative impact on the competitiveness of their firms (Figure 15). The mean scores for the three factors (state taxes, federal regulations, and state forest practice regulations) were 2.6, 2.8, and 2.9, respectively. While state taxes were perceived to have the strongest negative impact, the range of scores was relatively small. This would seem to suggest that the negative impact of all three factors was perceived to be fairly similar. However, it should be noted that of all the factors included in the survey, state taxes were rated as having the strongest negative impact by the survey respondents.

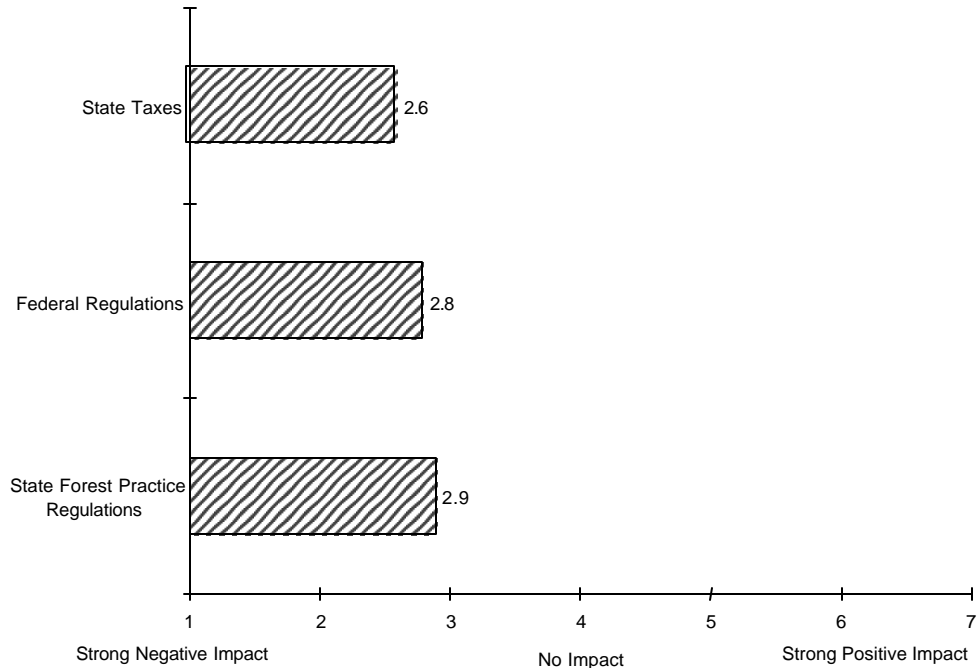


Figure 15. Perceived impact of domestic regulations on competitiveness.

Domestic Resource Factors: Survey respondents were also asked to assess the impact that domestic hardwood resource factors have had on the overall competitiveness of their firms. The specific hardwood resource factors examined in the survey included rising raw material prices, rapid price fluctuations (*i.e.*, price volatility), labor quality, resource availability, and resource quality. Rapid price fluctuations and increasing raw material prices were perceived as having the most negative impact on competitiveness, receiving an average score of 2.8 and 3.1 respectively (Figure 16). Quality of labor (4.1) and resource quality (4.3) were each generally perceived to have relatively little impact on the overall competitiveness of the respondents' firms. It is interesting to note that survey respondents reported that resource availability, with a mean score of 4.6, had a slightly positive effect on competitiveness. While riparian zone regulations will undoubtedly have an adverse impact on the hardwood supply in the PNW in the future, the results of this survey suggest that these supply restrictions have not impacted the hardwood industry yet.

International Regulatory Factors: The third set of factors included in the survey was related to the impact that international regulatory issues might have on the competitiveness of hardwood firms in the PNW. The international regulatory factors included in the survey were: regional trade agreements, tariff barriers, non-tariff barriers, and sustainable forest certification. Examples of regional trade agreements that could have a competitive impact include the North American Free Trade Agreement (NAFTA), European Union tariff and non-tariff barriers, and Japanese Agricultural Standards (JAS) that discriminate against imported wood products in residential construction. In general, the four international regulatory factors included in the survey were perceived to have a slightly negative impact on the competitiveness of hardwood manufacturers in the PNW (Figure 17).

The survey results suggest that environmental certification of wood products (3.4) and tariff barriers (3.4) were perceived to have a more negative impact on the competitiveness of hardwood manufacturers than were non-tariff barriers (3.6) and regional trade agreements (3.7), although the difference in score was small. Further analysis of the survey data showed that hardwood firms exporting to Europe perceived environmental certification as having a more adverse effect on their competitiveness than did firms exporting to Asia and North America. This is undoubtedly a reflection of the fact that many building material retailers in the UK have announced their intention to sell wood products that originate only from sustainably managed forests by the year 2000.

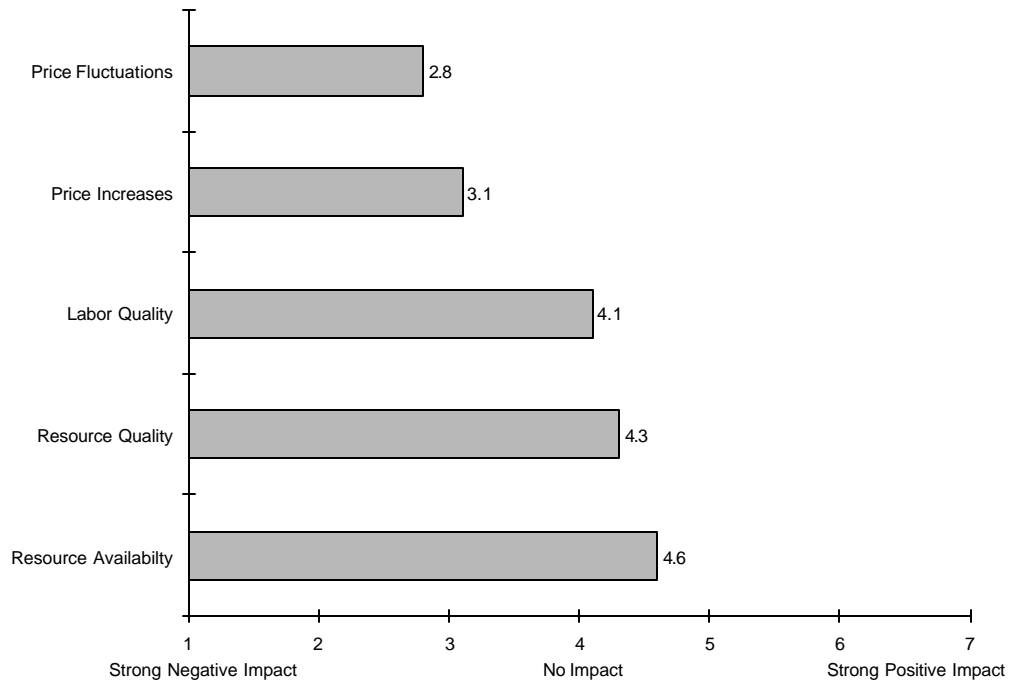


Figure 16. Perceived impact of domestic resource factors on competitiveness.

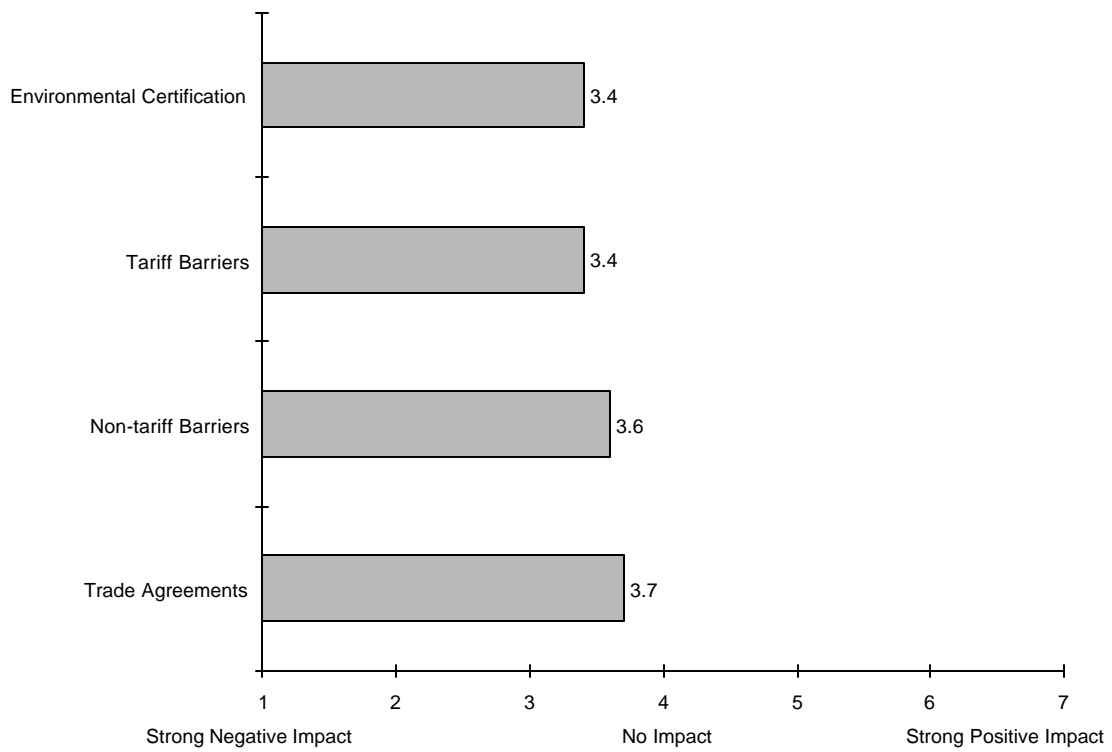


Figure 17. Perceived impact of international regulatory factors on competitiveness.

Sustainable Forest Certification: The concept of environmental certification, designed to address global resource sustainability, is relatively new and evolving. From the forestry perspective, certification is expected to contribute to sustainable forest management. Three general principles are typically addressed when dealing with the issue of sustainable forest management: environmental sustainability (there should be no net loss to the forest ecosystem), social sustainability (communities with an integral relationship with the forest are perpetuated), and economic sustainability (costs and benefits of forest management are positive and intergenerational).

Forest certification could significantly impact timberland owners, forest product manufacturers, and other distribution channel members. To obtain forest certification, forest managers and manufacturers generally contract with third party certification organizations to audit their forest management practices and production facilities to determine whether the firm is operating in a sustainable fashion per the audit guidelines. If the third party inspection/audit determines the firm is operating in a sustainable fashion, the firm is granted an environmental certification grade stamp.

Survey respondents were asked a series of questions regarding environmental certification. Collectively analyzed, the responses indicated that there is little interest in environmentally certified raw material among manufacturers. There may be several reasons for this general lack of interest, such as the lack of a certified raw material supply or the perceived lack of demand for certified hardwood products in the markets where PNW manufacturers do business. Survey participants indicated that the domestic sourcing of environmentally certified timber would have a somewhat negative impact on their competitiveness (with a mean score of 3.0).

Marketing Factors

Most firms do not have the resources to be industry leaders in every area of business. Rather, firms tend to focus their scarce resources in a few key areas perceived to be most important to their competitiveness. To develop a better understanding of the importance that industry managers attach to different marketing variables, survey respondents were asked to evaluate each variable using a seven-point scale. An importance rating of 1 indicated that the variable was not perceived to be important, and an importance rating of 7 indicated that the variable was considered to be very important to the competitiveness of the firm.

The importance ratings for the individual marketing variables are presented in Figure 18. Reputation within the hardwood industry was identified as being the single most important marketing variable among all survey participants, receiving a mean score of 6.7. Communicating regularly with customers, product quality control, and providing on time delivery of product all received relatively high mean scores of 6.3, which suggests that these variables are also very important. Communicating regularly with customers is a component of a promotional strategy (e.g., personal selling), while quality control is a component of a product strategy, and providing on time delivery is a component of a distribution strategy. Collectively these three highly rated variables encompass three of the four marketing factors used to develop a marketing strategy (i.e., product, promotion, distribution, and price). These three marketing variables are probably not valued independently of one another, but rather collectively hold a high level of importance in the marketing strategies of firms in the hardwood industry. Further, it could be argued that of the twenty marketing variables included in the survey, these three have the greatest influence on a firm's reputation with its customers. Thus the high level of importance attached to these three marketing variables further emphasizes the fact that a good company reputation has a critical impact on the competitiveness of a firm in the hardwood industry.

Efficient operation of production facilities received an average score of 6.1, meaning that it is also considered to be relatively important. This internal marketing activity is directly linked to the product marketing mix factor. Efficient operations can have a positive impact on profitability, particularly in a competitive industry. Procuring raw material received an average score of 5.7, indicating that it also was perceived to be highly important. This result runs somewhat counter to the participants' earlier responses regarding resource availability. When survey participants were asked to evaluate the impact that resource availability has had on the overall competitiveness of their firm, they indicated that it had only a slightly positive impact. The difference between the two responses would seem to

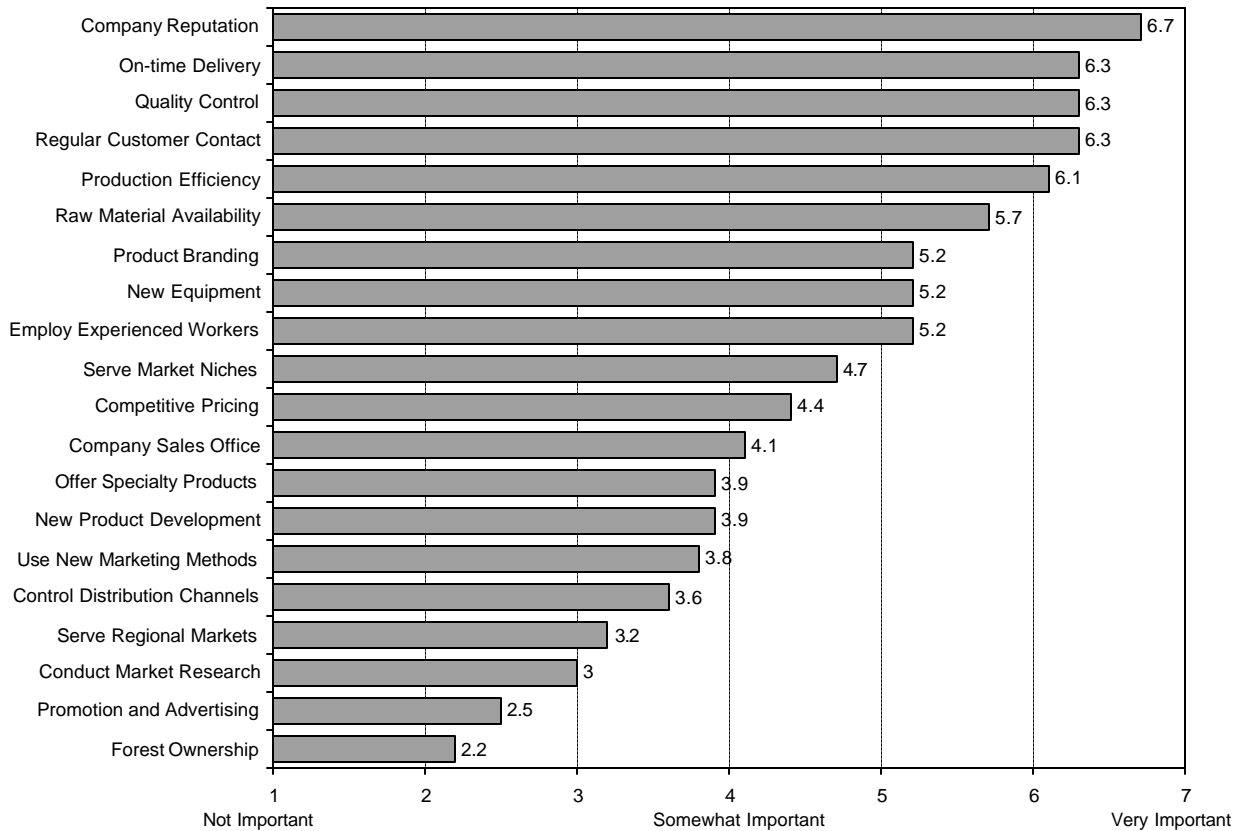


Figure 18. Perceived importance of marketing variables.

suggest that, while resource availability, *in general*, is an important concern to industry managers, it was not widely perceived to be a constraining factor at the time of this survey.

It is useful to make a few general observations of the survey data before discussing the importance of the individual marketing variables. In general, a factor analysis could be used to reduce the original twenty marketing variables down to a smaller number of factors to help facilitate the analysis of the data and identify groups of variables that are relatively similar. However, the small size of our sample frame precluded the use of this statistical technique. Despite this limitation, it is still useful to evaluate the data in an attempt to understand the relationship between the marketing variables included in the survey and their perceived impact on competitiveness.

A qualitative examination of the of the results displayed in Figure 18 suggests that the original twenty marketing variables could be segmented into six groups based on the functionality of each variable with respect to the marketing mix (Figure 19). The importance ratings for each group is summarized on the right hand side of the figure and was derived by averaging the individual importance ratings for each of the variables in the group. The average importance ratings for each group were: Group I (6.4), Group II (5.6), Group III (4.3), Group IV (2.72), Group V (3.1), and Group VI (2.2). In general, the survey respondents perceived Group I variables as being very important to their competitiveness. Group II variables, while still considered to be important, were definitely perceived as being less important than the Group I marketing variables. Groups III and IV were perceived as being somewhat important to firm competitiveness while Groups V and VI were not considered to have an important impact on the competitiveness of firms in the PNW hardwood lumber industry.

The first group of marketing variables, denoted as Reputation of the Firm, were clearly perceived by survey respondents as having the greatest influence on the competitiveness of the firm. As discussed previously, the marketing variables in Group I directly influence a firm’s reputation with other companies and its customers. The

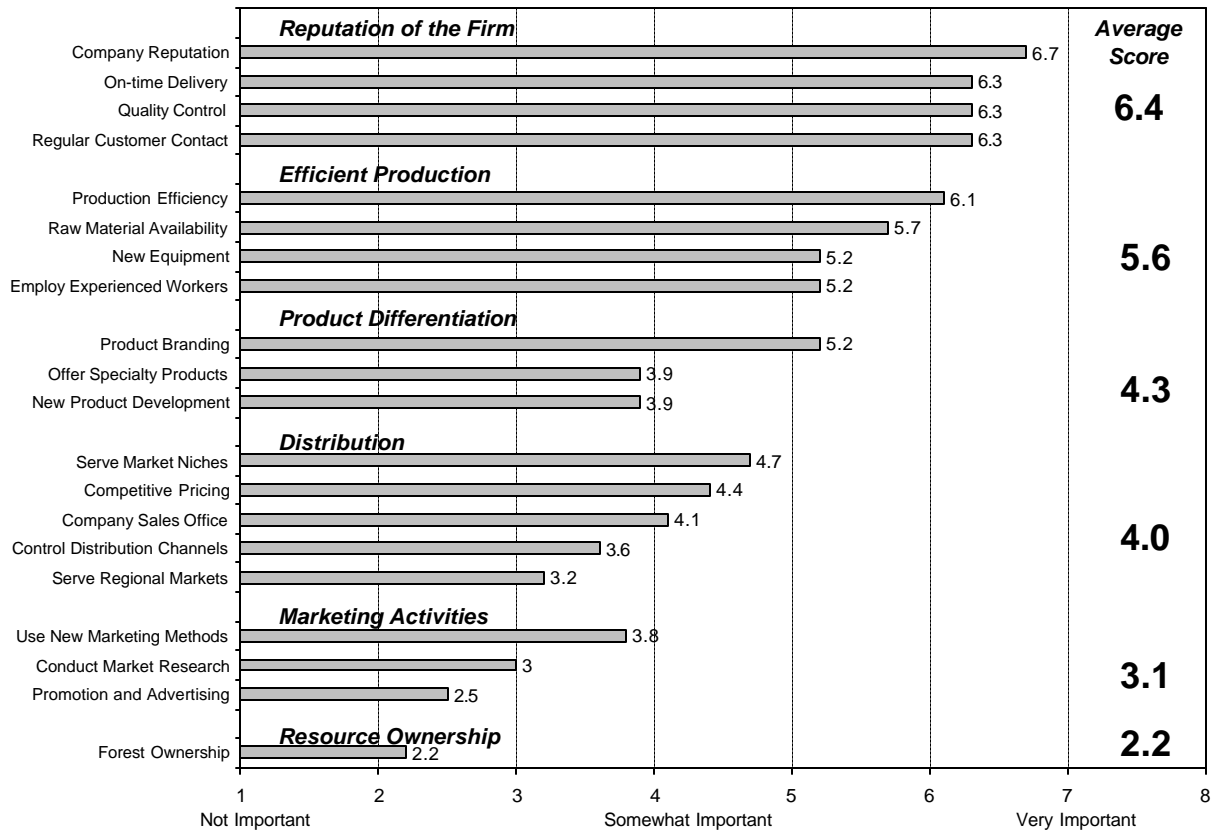


Figure 19. Perceived importance of functional groupings of marketing variables.

consistently high importance ratings attached to each of these variables substantiates the fact that hardwood firms regard their reputations as one of their most important marketing tools.

The second group of marketing variables, Efficient Production, while rated as being less important than Group I variables, was nonetheless perceived to have a very important impact on the competitiveness of the firm. Considering the specific variables within Group II, production efficiency, new equipment, and employing experienced workers are all relate directly to the efficiency with which the manufacturing process is performed. In a mature and highly competitive industry, such as the hardwood industry, gains in manufacturing efficiency can often be used to develop a competitive advantage over other manufacturers. The fourth marketing variable in this group, raw material availability, while not having a direct influence on manufacturing efficiency, obviously has important implications on the manufacturing process.

The third functional group of marketing variables, Product Differentiation, was perceived by survey respondents as only being somewhat important to the competitiveness of hardwood firms in the PNW, although product branding received a substantially higher importance rating than the other two variables. The marketing variables in this group, product branding, offering specialty products, and developing new products, can provide an innovative, market oriented firm with an opportunity to augment a product in such a way as to differentiate the product from those of its competitors. Assuming that the product is differentiated in a way that provides the customer with greater value, this would potentially allow a manufacturer to increase the price of the product to reflect better the higher value of the augmented product while developing a competitive advantage over rival firms' product offerings. Based on the moderate level of importance attached to these variables, it would appear that the survey respondents do not perceive these marketing strategies as being effective in increasing the competitiveness of their firms.

The fourth group of marketing variables, Distribution, was also perceived by survey respondents as being only somewhat important to the competitiveness of their firms. The marketing variables included in this group included:

servicing niche markets, competitive pricing, maintaining a company sales force, controlling distribution channels, and serving regional markets. Establishing competitive pricing and maintaining a company sales force are components of a company's pricing strategy. In general, pricing related activities are the only components of a firm's marketing strategy that generate revenues. All other marketing activities (i.e., production, promotion, and distribution) require revenue and resources. Thus it might be expected that these pricing related variables would be perceived as being very important to a manager. Pricing related variables' relatively low importance rating might be a reflection of the fact that most hardwood firms in the PNW sell only a small percentage of their production themselves, relying instead on brokers and wholesalers. This is further supported by the fact that controlling channels of distribution received a mean importance rating of just 3.6, suggesting that many hardwood manufacturers in the PNW rely on external brokers and wholesalers to sell and distribute their production. While serving niche markets was perceived to be somewhat important, limiting distribution and sales to regional markets was viewed negatively.

Survey respondents generally perceived the fifth group of variables, Marketing Activities, as not having an important impact on their competitiveness. Finally, the sixth variable, owning timberland or logging operations, received a mean importance rating of 2.2. In an earlier question survey respondents indicated that they typically outsource for their raw material and the low level of importance attached to owning timberland or logging operations is consistent with that result.

It is interesting to note that the virtually all of the marketing variables associated with innovation received relatively low importance ratings from survey respondents. These variables were: developing new products (3.9), manufacturing specialty products (3.9), utilizing new marketing techniques (3.8), conducting market research (3.0), and performing promotional and advertising activities (2.5). Only a single marketing variable associated with innovation, product branding with a mean importance rating of 5.2, was viewed as being relatively important. However, given the low level of importance attached to promotional activities, it remains problematic on how a company can successfully develop a product brand that effectively differentiates its product from competitors. In general, these results seem to suggest that hardwood companies in the PNW are conservative by nature and tend to place a low value on marketing activities associated with innovation and aggressive differentiation.

PNW Hardwood Exports

Lumber is the primary hardwood product being exported from the PNW, although a small number of wooden boxes is also exported. Hardwood lumber is exported from the PNW to a broad range of countries, in Europe, Asia, and North America (Table 15). Half of the hardwood lumber manufacturers export to Germany and Japan, while 40% export Taiwan and South Korea. Less than a third of the survey respondents reported exporting hardwood lumber to China, Italy, Canada, Mexico, or the United Kingdom. Not unexpectedly, survey respondents indicated that they restrict their export activities to two or three countries.

Domestic sales of hardwood products accounted for almost 60% of total hardwood sales in the PNW (Table 16). Surprisingly, over 40% of the hardwood industry's sales revenue was generated from exports. This high level of involvement in the export market is somewhat surprising given the small size of the industry. In contrast, consider the softwood lumber industry in the PNW. Although softwood lumber production in the PNW totaled 12.5 billion board feet in 1997 (more than 25 times greater than hardwood lumber production), exports of softwood lumber represented just 7.4% of total softwood lumber production (compared to 28%) of hardwood lumber production. While hardwood lumber exports represent 28% of hardwood lumber production, they generate almost 41% of hardwood lumber sales revenue, a clear indication that the unit price of export lumber is higher than that sold in the US. Exports of hardwood lumber to Germany and Canada provided the highest level of export sales revenue to hardwood manufacturers in the PNW, although Japan, Italy, S. Korea, and Taiwan were also important markets (Table 16). Larger firms were found to generate a higher proportion of their total annual sales revenues through export activities.

Table 15. Foreign markets served by hardwood manufacturers in the PNW.

Export Destination	% of Firms Exporting
Germany	50
Japan	50
Taiwan	40
South Korea	40
China	30
Italy	30
Canada	30
Mexico	20
United Kingdom	20

Table 16. Sources of sales revenue reported by survey respondents, by destination.

	% of Sales Revenue
Domestic Sales	59.08
Export Sales	40.91
Germany	7.50
Canada	7.19
Japan	5.99
Italy	5.84
South Korea	5.83
Taiwan	4.81
China	1.19
Mexico	1.08
United Kingdom	0.74
Other Countries	0.75

Table 17. Perceived opportunities for future sales growth for hardwood products.

Country	% Responding
China	49
United States	25
Germany	13
Japan	13
Total	100

Product	% Responding
Edge-glued panels	29
Blockboard	29%
Solid Panels	14%
Plywood	14%
Pallets and boxes	14%
Total	100%

Future Market Opportunities

Survey participants were asked to identify the single country that they perceived as representing the greatest market potential for PNW hardwood products. Approximately 50% of the respondents considered China to be the country with the single greatest growth potential for PNW hardwood products (Table 17). Twenty-five percent of the respondents felt that the United States had the single greatest market growth potential for PNW hardwood products, while 12.5% of the respondents felt that Germany and Japan represented the greatest growth potential.

Survey participants were also asked to identify the single product that represented the greatest growth potential for the PNW hardwood industry. Responses ranged from pallets to edge-glued panels (Table 17). Frequently, the responses to this question reflected products that the respondent’s firm currently manufactured.

CONCLUSIONS

This objectives of this research were to: 1) explore the competitive conditions of the hardwood industry, 2) identify the range of products currently manufactured from hardwoods, 3) analyze current hardwood markets (domestic and international), 4) identify the factors that are perceived to restrict the growth of the hardwood industry in the PNW, 5) assess future market and product opportunities for PNW hardwood products.

The hardwood industry has experienced substantial and solid growth over the past ten years despite regulations that have restricted the harvest levels from federal and state forests. This growth has occurred in both the domestic US market as well as in foreign markets which now account for almost 28% of red alder production, generating just over 40% of hardwood lumber sales revenue. Ironically, despite the increase in the demand for red alder, very little timberland in the PNW is actively managed for hardwood production. Currently, less than 1% of the private and industrial timberlands in the PNW are managed for hardwood production and most forest owners are hesitant to manage intensively for the production of hardwood timber until stumpage prices become more competitive with softwoods. The willingness of hardwood sawmills to pay higher prices for hardwood logs remains to be seen and will certainly influence the mix of species planted.

Western red alder hardwood lumber represents an important component of the US hardwood export mix. Despite the fact that red alder lumber production constitutes less than 3% of total US hardwood lumber production, exports of red alder lumber now represent 10.3% of total US hardwood lumber exports. At the same time, the unit value of red alder lumber has remained relatively consistent, fluctuating between \$520/m³ and \$547/m³ over the period 1993 to 1997. The primary importer of red alder lumber is Germany, followed by Italy, Taiwan, and Japan. The unit values for

red alder lumber indicate that European markets tend to pay higher prices for red alder lumber than those in Asia or Mexico.

A survey of the hardwood industry indicates that virtually none of the regulatory factors evaluated in the survey were viewed in a positive light, although few were perceived to have a strongly negative impact on the industry. Despite this, various factors were perceived by respondents to have had a moderately negative impact on the hardwood industry. These factors included: state taxes, federal harvest restrictions, state forest practice regulations, hardwood log price volatility, and hardwood log price increases. While federal and state harvest restrictions were perceived to have a moderately negative impact on the industry, survey respondents indicated that resource availability has not yet had an adverse impact on the hardwood industry.

Survey respondents were asked to rate the importance of a broad range of variables in terms of their importance to firm competitiveness. The importance ratings for the individual marketing variables clearly showed that the reputation of the firm within the hardwood industry is the single most important asset that a firm has. Communicating regularly with customers, maintaining good product quality control, and providing on time delivery of product all received relatively high mean scores, suggesting that these variables are also very important. It could be argued that of the twenty marketing variables included in the survey, these three have the greatest influence on a firm's reputation with its customers. Thus the high level of importance attached to these three marketing variables further emphasizes the fact that a good company reputation has a critical impact on the competitiveness of a firm in the hardwood industry. Efficient operation of production and procuring raw materials both received high importance scores, indicating that they are also perceived to have an important impact on the competitiveness of hardwood manufacturers in the PNW.

A qualitative examination of the of the survey data suggests that the original twenty marketing variables could be segmented into six groups based on the functionality of each variable with respect to the marketing mix. The average importance ratings for each of the six groups were: Group I: *Reputation of the Firm* (6.4), Group II: *Efficient Production* (5.6), Group III: *Product Differentiation* (4.3), Group IV: *Distribution* (4.0), Group V: *Marketing Activities* (3.1), and Group VI: *Resource Ownership* (2.2). In general, the survey respondents perceived Group I variables as having a very important impact on the competitiveness of their firms. Group II variables, while still considered to be important, were definitely perceived as being less important than the Group I marketing variables. The variables included in Groups III and IV were perceived as being somewhat important to firm competitiveness while Groups V and VI were not considered to have an important impact on the competitiveness of firms in the PNW hardwood lumber industry.

Respondents indicated that those marketing variables that influenced a firm's reputation and production efficiency were the most important in terms of positively impacting a firms performance. In contrast, virtually all of the marketing variables associated with acquiring market information and promoting innovation were perceived to be unimportant in terms of affecting the competitiveness of the firm. In general, these results seem to suggest that hardwood companies in the PNW are conservative and tend to place a low value on the marketing activities associated with innovation and product differentiation.

Contrary to what many believe, the forests of the PNW produce high quality hardwoods. Red alder (*Alnus rubra*) and bigleaf maple (*Acer macrophyllum*) are the most abundant regional species and they enjoy the greatest commercial acceptance. As is true for hardwoods in general, the use of PNW hardwoods in the manufacture of value-added wood products means that the demand for hardwood lumber is less dependent on new home construction than is the demand for softwood lumber. As a result, the PNW hardwood lumber market typically does not experience the same boom and bust cycles that characterize the softwood lumber industry.

In order to provide an incentive to manage the hardwood resource actively, hardwood stumpage prices must be consistently competitive with conifer stumpage prices, although this has never occurred in the PNW. Promoting species diversity in the forest and including hardwood species in the mix can provide a variety of benefits to the forest and the forest owner. The benefits of emphasizing species diversity in forest stands include: more stable demand in cyclical markets and improved soil fertility and biodiversity of the forest. Despite these advantages, there is a lag in hardwood silviculture practices being implemented in the Pacific Northwest.

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APPENDIX A

Survey Instrument

I. HARDWOOD SUPPLY

1. What product does your firm primarily manufacture?

2. Approximately what **percent** of your hardwood raw material input is represented by the following species?
(should total 100%)

a. red alder	_____	%
b. bigleaf maple	_____	%
c. cottonwood	_____	%
d. birch	_____	%
e. oak	_____	%
other (please specify)		
_____	_____	%
_____	_____	%
	<u>100%</u>	

3. Approximately what percentage of your raw material requirements are obtained from the following sources?
(should total 100%)

a. company owned forests	_____	%
b. other industrial forests	_____	%
c. non-industrial private forests	_____	%
d. state forests	_____	%
e. federal forests	_____	%
other (please specify)		
_____	_____	%
_____	_____	%
	<u>100%</u>	

II. HARDWOOD PRODUCTS

1. Approximately what percentage of your total annual hardwood sales does each of the following products represent? (should total 100%)

a. green lumber	_____	%
b. kiln dried lumber	_____	%
c. pallet grade lumber	_____	%
d. veneer	_____	%
e. plywood	_____	%
f. other	_____	%
g. other	_____	%
	<u>100%</u>	

2. What percentage of your hardwood production is sold through the following channels? (*should total 100%*)

a. to end user	_____ %
b. to wholesaler	_____ %
c. to retailer	_____ %
d. to secondary manufacturers	_____ %
e. other	_____ %
f. other	_____ %
<u>100%</u>	

3. What percent of the log processing byproducts go to the following uses? (*each byproduct should total 100%*)

By-products	Sold	Hog fuel	Land Fill	Total
a. Bark				100%
b. Chips				100%
c. Slabs				100%
d. Sawdust				100%
e. Planer shavings				100%
f. Other (<i>please specify</i>)				100%

III. HARDWOOD MARKETS and EXPORT TRENDS

1. Does your firm currently export? yes no (*if no please skip to Section IV*)

2. What product does your firm primarily export?

3. Approximately what percentage of these exports are cut to metric sizes?

_____ %

4. What type of international operations does your firm engage in? (check all that apply)

- _____ exporting logs
- _____ exporting lumber
- _____ overseas manufacturing facility
- _____ overseas sales office
- _____ overseas distribution facility
- _____ foreign marketing agent
- _____ other (*please specify*) _____

5. Please estimate the **percentage** of your **total export revenue** derived from each of the following countries: (*note: should total 100%*)

Product	Germany	Italy	UK	Japan	Korea	Taiwan	China	Canada	Mexico	Other	Export Total
Lumber											100%
Veneer											100%
Plywood											100%
Components											100%

IV. POTENTIAL MARKETS

1. In your opinion, what single **market place** represents the greatest growth potential for hardwood products? (*note: should be a country*)

2. In your opinion, what single **product** represents the greatest growth potential for hardwood producers?

V. ENVIRONMENTAL CERTIFICATION (*i.e., providing a third party analysis/guarantee to the buyer that the product being purchased comes from a sustainably managed forest*)

- 1. Does your firm source raw material from environmentally certified forests? yes no
- 2. If not, has your firm considered sourcing from environmentally certified forests? yes no
- 3. To what extent would sourcing environmentally certified timber impact the competitiveness of your firm? (please circle one)

Greatly Decreases			No Impact			Greatly Increases
1	2	3	4	5	6	7

VI. Most companies do not have the resources to become the industry leader in every area of business. Instead, they concentrate on a few key areas that are important to their company. Please indicate how important each of the following factors is to your firm. (Please circle the number that best corresponds to the importance of each area)

	Not		Important			Extremely	
	Important					Important	
1. DEVELOPING NEW PRODUCTS	1	2	3	4	5	6	7
2. REGULARLY COMMUNICATING WITH CUSTOMERS	1	2	3	4	5	6	7
3. EFFICIENT OPERATION OF PRODUCTION FACILITIES	1	2	3	4	5	6	7
4. PRODUCT QUALITY CONTROL	1	2	3	4	5	6	7
5. EMPLOYING TRAINED/EXPERIENCED PERSONNEL	1	2	3	4	5	6	7

6. COMPETITIVE PRICING	1	2	3	4	5	6	7
7. DEVELOPING BRAND IDENTIFICATION	1	2	3	4	5	6	7
8. USING NEW MARKETING TECHNIQUES/METHODS	1	2	3	4	5	6	7
9. CONTROLLING CHANNELS OF DISTRIBUTION	1	2	3	4	5	6	7
10. PROCURING RAW MATERIALS	1	2	3	4	5	6	7

11. SERVING SPECIAL GEOGRAPHIC MARKETS	1	2	3	4	5	6	7
12. MANUFACTURING SPECIALTY PRODUCTS	1	2	3	4	5	6	7
13. PROMOTING AND ADVERTISING	1	2	3	4	5	6	7
14. MAINTAINING A COMPANY SALES FORCE	1	2	3	4	5	6	7
15. OWNING TIMBERLAND OR LOGGING OPERATIONS	1	2	3	4	5	6	7

16. PROVIDING ON TIME DELIVERY	1	2	3	4	5	6	7
17. MARKETING RESEARCH	1	2	3	4	5	6	7
18. INVESTING IN NEW PROCESSING EQUIPMENT	1	2	3	4	5	6	7
19. SERVING PARTICULAR CUSTOMER GROUPS	1	2	3	4	5	6	7
20. REPUTATION WITHIN THE INDUSTRY	1	2	3	4	5	6	7

VII. PROBLEMS AND THREATS

1. How do each of the following factors impact the competitiveness of your firm?

Impacts	Strong Negative Impact			No Impact			Strong Positive Impact	
	1	2	3	4	5	6	7	
Federal Regulations	1	2	3	4	5	6	7	
State Forest Practice Regulations	1	2	3	4	5	6	7	
Rising Raw Material Prices	1	2	3	4	5	6	7	
Rapid Price Fluctuations of Raw Materials	1	2	3	4	5	6	7	
Environmental Certification	1	2	3	4	5	6	7	
Trade Agreements (NAFTA, European Union)	1	2	3	4	5	6	7	
Quality of Labor	1	2	3	4	5	6	7	
Resource Availability	1	2	3	4	5	6	7	
State Taxes	1	2	3	4	5	6	7	
Tariff Barriers	1	2	3	4	5	6	7	
Non-tariff Barriers	1	2	3	4	5	6	7	
Resource Quality	1	2	3	4	5	6	7	
Other (please specify) _____	1	2	3	4	5	6	7	

2. What single factor poses the greatest threat to the competitiveness of your firm? *(please state)*

VIII. COOPERATION IN THE HARDWOOD INDUSTRY

1. Please evaluate the competitiveness of the hardwood industry in the PNW

Not at All Competitive				Somewhat Competitive				Extremely Competitive
1	2	3	4	5	6	7		

2. Does your firm belong to any industry groups or associations? yes no

If yes, which ones?

IX. BACKGROUND INFORMATION

1. How long has your firm been in business? _____ years
2. Approximately what percent of your total sales revenue are derived from the export market? _____ %
3. Please estimate your firm's total revenue for 1996. (please check only one box)
- 0 - \$1,000,000 \$10,000,001 - \$15,000,000
 \$1,000,001 - \$5,000,000 \$15,000,001 - \$20,000,000
 \$5,000,001 - \$10,000,000 over \$20,000,000
4. How many full time people does your firm employ? _____
5. Are your full time production employees members of a labor union? yes no

We sincerely appreciate your effort, time, and patience in filling out this questionnaire. Your answers to the questions are very important to our research. The results will allow us to analyze the current problems, threats, and impacts for the PNW hardwood export/domestic industry, as well as analyze the current PNW hardwood markets (domestic and export) and predict the future market opportunities for PNW hardwoods.

Please fax the questionnaire back to us at: FAX _____

Thank you for your help!

APPENDIX B

Hardwood Associations

Western Hardwood Association

This association was formed in 1955 to promote the growth, management, and marketing of western hardwoods. The association sponsors research on western hardwood management, production, and marketing. The association also publicizes the current and potential uses and values of western hardwoods.

Washington Hardwood Commission

This commission was created in 1991 by the Washington Legislature to promote the western hardwood industry and to address issues such as hardwood supply, marketing research, and education. The commission is patterned after the commodity commissions in Washington DC. It is financed through an assessment (on the volume of Washington State-based production) on hardwood processors. A seven-person board made up of members of the hardwood industry administers the commission.

The Oregon Hardwood Forest Products Resources Committee

This committee was formed in 1987 by the Oregon Legislature to examine issues pertaining to industries based on hardwood resources. A major goal of the committee is to assess the need for a Hardwood Commission similar to the Washington Hardwood Commission.

APPENDIX C

PNW Hardwood Data

Washington State Hardwood Statistics, 1980-1996 (Thousands of BF, Scribner Rule)

Mills Types and Dependency	Number of Mills and Dependency on Hardwood					
	Sawmills		Veneer and Plywood Mills		Pulp Mills	
	Under 90%	90% +	Under 90%	90% +	Under 90%	90% +
1976	14	12	5	1	8	4
1978	13	12	6	1	2	2
1980	26	11	6	1	2	1
1982	14	11	2	1	8	2
1984	5	11	2	1	4	1
1986	7	9	3	1	5	0
1988	4	11	3	0	6	0
1990	3	11	2	1	5	0
1992	7	9	2	0	na	na
1996	3	10	4	1	na	na

Hardwood Log Consumption (MBF, Scribner scale)

	Sawmill	Veneer and Plywood	Pulp and Board	Log Export	Total
1976	137,621	7,240	48,612	1,304	194,777
1978	184,247	14,559	25,548	2,263	226,617
1980	144,080	20,768	45,160	18,448	228,456
1982	146,668	9,040	22,944	4,541	183,193
1984	153,372	9,970	76,433	3,708	243,483
1986	202,000	21,000	15,000	2,000	240,000
1988	222,800	15,300	8,600	1,500	248,200
1990	279,400	15,300	14,800	10,000	319,500
1992	291,000	33,954	27,046	17,000	369,000
1996	294,000	25,000	35,496	6,000	360,496

Hardwood Logs Consumed as a Percent of All Log Species Consumed

	Sawmill	Veneer and Plywood	Pulp and Board	Log Export	Total
1976	4.63	1.10	9.21	0.06	2.95
1978	5.93	2.11	9.26	0.09	3.28
1980	5.91	4.48	11.12	0.80	3.94
1982	6.88	2.90	4.41	0.21	3.52
1984	5.88	2.46	18.83	0.16	4.20
1986	7.28	5.08	3.63	0.09	4.07
1988	7.51	3.17	1.56	0.05	3.60
1990	10.47	4.40	5.10	0.42	5.51
1992	11.65	11.33	9.02	0.92	7.39

Hardwood Logs Consumed from Out-of-State (%)

1976	8.0
1978	7.0
1980	4.0
1982	6.0
1984	NA
1986	13.0
1988	12.0
1990	15.8
1992	35.3

Sources: Washington State Department of Natural Resources. Various Years. Washington Mill Survey. Washington State Department of Natural Resources, Olympia, WA.

Hardwood Timber Harvest Data - Western Washington

Red Alder (MBF, Scribner scale)

	Native American	Forest Industry	Private	State	Other Nonfederal	USFS	Other Federal	Total Private	Percent Private	Total Public	Percent Public	Grand Total
1985	5,112	45,320	30,809	35,949	742	1,059	2,845	81,241	66.68	40,595	33.32	121,836
1986	3,820	55,176	38,882	71,550	1,102	0	1,578	97,878	56.87	74,230	43.13	172,108
1987	9,728	66,804	60,588	30,010	1,549	640	90	137,120	80.94	32,289	19.06	169,409
1988	8,416	80,034	65,801	45,403	533	333	318	154,251	76.80	46,587	23.20	200,838
1989	15,448	105,234	80,527	28,204	440	229	0	201,209	87.45	28,873	12.55	230,082
1990	2,333	79,393	73,117	32,838	1,437	574	0	154,843	81.63	34,849	18.37	189,692
1991	1,038	66,381	73,482	34,427	516	1,282	0	140,901	79.55	36,225	20.45	177,126
1992	1,395	74,959	62,791	25,842	570	950	0	139,145	83.57	27,362	16.43	166,507
1993	2,876	78,775	57,933	24,754	428	209	21	139,584	84.60	25,412	15.40	164,996
1994	785	73,314	90,689	14,100	77	517	1,766	164,788	90.92	16,460	9.08	181,248
1995	1,725	131,169	64,519	35,560	297	150	27	197,413	84.56	36,034	15.44	233,447
1996	1,043	124,606	56,190	33,250	942	320	0	181,839	84.05	34,512	15.95	216,351

Other Hardwoods (MBF, Scribner scale)

	Native American	Forest Industry	Private	State	Other Nonfederal	USFS	Other Federal	Total Private	Percent Private	Total Public	Percent Public	Grand Total
1985	117	65,959	75,572	11,677	659	0	36	141,648	91.97	12,372	8.03	154,020
1986	44	87,694	74,118	18,660	30	0	9	161,856	89.64	18,699	10.36	180,555
1987	2,130	93,137	103,320	8,574	0	0	0	198,587	95.86	8,574	4.14	207,161
1988	1,670	98,760	126,218	12,536	31	0	3	226,648	94.75	12,570	5.25	239,218
1989	466	113,915	158,061	9,541	81	1	0	272,442	96.59	9,623	3.41	282,065
1990	126	92,000	130,562	7,226	165	20	0	222,688	96.78	7,411	3.22	230,099
1991	643	97,244	136,216	11,609	11	254	0	234,103	95.17	11,874	4.83	245,977
1992	619	71,693	173,628	7,392	36	302	0	245,940	96.95	7,730	3.05	253,670
1993	700	103,820	125,041	8,027	1	101	0	229,561	96.58	8,129	3.42	237,690
1994	360	49,759	112,357	5,490	18	68	0	162,476	96.68	5,576	3.32	168,052
1995	359	16,339	32,696	4,681	129	40	0	49,394	91.06	4,850	8.94	54,244
1996	595	13,885	38,965	4,000	171	17	0	53,445	92.73	4,188	7.27	57,633

Total Hardwoods (MBF, Scribner scale)

	Native American	Forest Industry	Private	State	Other Nonfederal	USFS	Other Federal	Total Private	Percent Private	Total Public	Percent Public	Grand Total
1985	5,229	111,279	106,381	47,626	1,401	1,059	2,881	222,889	80.80	52,967	19.20	275,856
1986	3,864	142,870	113,000	90,210	1,132	0	1,587	259,734	73.65	92,929	26.35	352,663
1987	11,858	159,941	163,908	38,584	1,549	640	90	335,707	89.15	40,863	10.85	376,570
1988	10,086	178,794	192,019	57,939	564	333	321	380,899	86.56	59,157	13.44	440,056
1989	15,914	219,149	238,588	37,745	521	230	0	473,651	92.48	38,496	7.52	512,147
1990	2,459	171,393	203,679	40,064	1,602	594	0	377,531	89.93	42,260	10.07	419,791
1991	1,681	163,625	209,698	46,036	527	1,536	0	375,004	88.63	48,099	11.37	423,103
1992	2,014	146,652	236,419	33,234	606	1,252	0	385,085	91.65	35,092	8.35	420,177
1993	3,576	182,595	182,974	32,781	429	310	21	369,145	91.67	33,541	8.33	402,686
1994	1,145	123,073	203,046	19,590	95	585	1,766	327,264	93.69	22,036	6.31	349,300
1995	2,084	147,508	97,215	40,241	426	190	27	246,807	85.79	40,884	14.21	287,691
1996	1,638	138,491	95,155	37,250	1,113	337	0	235,284	85.88	38,700	14.12	273,984

Sources: Washington State Department of Natural Resources. Various Years. Washington Timber Harvest. Washington State Department of Natural Resources, Olympia, WA.

Hardwood Timber Harvest Data - Eastern Washington

Red Alder (MBF, Scribner scale)

	Native American	Forest Industry	Private	State	Other Nonfederal	USFS	Other Federal	Total Private	Percent Private	Total Public	Percent Public	Grand Total
1985	0	0	0	0	0	0	0	0	#DIV/0!	0	#DIV/0!	0
1986	0	0	0	0	0	0	0	0	#DIV/0!	0	#DIV/0!	0
1987	0	0	0	0	0	0	0	0	#DIV/0!	0	#DIV/0!	0
1988	0	0	0	0	0	0	0	0	#DIV/0!	0	#DIV/0!	0
1989	0	0	0	0	0	0	0	0	#DIV/0!	0	#DIV/0!	0
1990	0	0	0	0	0	0	0	0	#DIV/0!	0	#DIV/0!	0
1991	0	0	0	0	0	0	0	0	#DIV/0!	0	#DIV/0!	0
1992	0	0	0	0	0	0	0	0	#DIV/0!	0	#DIV/0!	0
1993	0	0	0	0	0	0	0	0	#DIV/0!	0	#DIV/0!	0
1994	0	0	0	0	0	0	0	0	#DIV/0!	0	#DIV/0!	0
1995	0	0	0	0	0	0	0	0	#DIV/0!	0	#DIV/0!	0
1996	0	0	0	0	0	0	0	0	#DIV/0!	0	#DIV/0!	0

Other Hardwoods (MBF, Scribner scale)

	Native American	Forest Industry	Private	State	Other Nonfederal	USFS	Other Federal	Total Private	Percent Private	Total Public	Percent Public	Grand Total
1985	0	1	1,149	0	0	0	0	1,150	100.00	0	0.00	1,150
1986	0	2	91	19	0	0	0	93	83.04	19	16.96	112
1987	3,709	14,094	7,333	10,290	7	26,838	124	25,136	40.29	37,259	59.71	62,395
1988	0	85	421	7	0	0	0	506	98.64	7	1.36	513
1989	0	2	1,181	13	0	0	0	1,183	98.91	13	1.09	1,196
1990	0	19	861	0	0	0	0	880	100.00	0	0.00	880
1991	0	21	933	0	0	1	0	954	99.90	1	0.10	955
1992	0	0	1,878	0	0	0	0	1,878	100.00	0	0.00	1,878
1993	0	32	2,207	0	0	1	0	2,239	99.96	1	0.04	2,240
1994	0	0	3,905	0	0	1	0	3,905	99.97	1	0.03	3,906
1995	0	0	14,980	0	0	0	0	14,980	100.00	0	0.00	14,980
1996	0	17	13,807	0	0	0	0	13,824	100.00	0	0.00	13,824

Total Hardwoods (MBF, Scribner scale)

	Native American	Forest Industry	Private	State	Other Nonfederal	USFS	Other Federal	Total Private	Percent Private	Total Public	Percent Public	Grand Total
1985	0	1	1,149	0	0	0	0	1,150	100.00	0	0.00	1,150
1986	0	2	91	19	0	0	0	93	83.04	19	16.96	112
1987	3,709	14,094	7,333	10,290	7	26,838	124	25,136	40.29	37,259	59.71	62,395
1988	0	85	421	7	0	0	0	506	98.64	7	1.36	513
1989	0	2	1,181	13	0	0	0	1,183	98.91	13	1.09	1,196
1990	0	19	861	0	0	0	0	880	100.00	0	0.00	880
1991	0	21	933	0	0	1	0	954	99.90	1	0.10	955
1992	0	0	1,878	0	0	0	0	1,878	100.00	0	0.00	1,878
1993	0	32	2,207	0	0	1	0	2,239	99.96	1	0.04	2,240
1994	0	0	3,905	0	0	1	0	3,905	99.97	1	0.03	3,906
1995	0	0	14,980	0	0	0	0	14,980	100.00	0	0.00	14,980
1996	0	17	13,807	0	0	0	0	13,824	100.00	0	0.00	13,824

Sources: Washington State Department of Natural Resources. Various Years. Washington Timber Harvest. Washington State Department of Natural Resources, Olympia, WA.

Hardwood Timber Harvest Data - Washington State

Red Alder (MBF, Scribner scale)

	Native American	Forest Industry	Private	State	Other Nonfederal	USFS	Other Federal	Total Private	Percent Private	Total Public	Percent Public	Grand Total
1985	5,112	45,320	30,809	35,949	742	1,059	2,845	81,241	66.68	40,595	33.32	121,836
1986	3,820	55,176	38,882	71,550	1,102	0	1,578	97,878	56.87	74,230	43.13	172,108
1987	9,728	66,804	60,588	30,010	1,549	640	90	137,120	80.94	32,289	19.06	169,409
1988	8,416	80,034	65,801	45,403	533	333	318	154,251	76.80	46,587	23.20	200,838
1989	15,448	105,234	80,527	28,204	440	229	0	201,209	87.45	28,873	12.55	230,082
1990	2,333	79,393	73,117	32,838	1,437	574	0	154,843	81.63	34,849	18.37	189,692
1991	1,038	66,381	73,482	34,427	516	1,282	0	140,901	79.55	36,225	20.45	177,126
1992	1,395	74,959	62,791	25,842	570	950	0	139,145	83.57	27,362	16.43	166,507
1993	2,876	78,775	57,933	24,754	428	209	21	139,584	84.60	25,412	15.40	164,996
1994	785	73,314	90,689	14,100	77	517	1,766	164,788	90.92	16,460	9.08	181,248
1995	1,725	131,169	64,519	35,560	297	150	27	197,413	84.56	36,034	15.44	233,447
1996	1,043	124,606	56,190	33,250	942	320	0	181,839	84.05	34,512	15.95	216,351

Other Hardwoods (MBF, Scribner scale)

	Native American	Forest Industry	Private	State	Other Nonfederal	USFS	Other Federal	Total Private	Percent Private	Total Public	Percent Public	Grand Total
1985	117	65,960	76,721	11,677	659	0	36	142,798	92.03	12,372	7.97	155,170
1986	44	87,696	74,209	18,679	30	0	9	161,949	89.64	18,718	10.36	180,667
1987	5,839	107,231	110,653	18,864	7	26,838	124	223,723	83.00	45,833	17.00	269,556
1988	1,670	98,845	126,639	12,543	31	0	3	227,154	94.75	12,577	5.25	239,731
1989	466	113,917	159,242	9,554	81	1	0	273,625	96.60	9,636	3.40	283,261
1990	126	92,019	131,423	7,226	165	20	0	223,568	96.79	7,411	3.21	230,979
1991	643	97,265	137,149	11,609	11	255	0	235,057	95.19	11,875	4.81	246,932
1992	619	71,693	175,506	7,392	36	302	0	247,818	96.98	7,730	3.02	255,548
1993	700	103,852	127,248	8,027	1	102	0	231,800	96.61	8,130	3.39	239,930
1994	360	49,759	116,262	5,490	18	69	0	166,381	96.76	5,577	3.24	171,958
1995	359	16,339	47,676	4,681	129	40	0	64,374	92.99	4,850	7.01	69,224
1996	595	13,902	52,772	4,000	171	17	0	67,269	94.14	4,188	5.86	71,457

Total Hardwoods (MBF, Scribner scale)

	Native American	Forest Industry	Private	State	Other Nonfederal	USFS	Other Federal	Total Private	Percent Private	Total Public	Percent Public	Grand Total
1985	5,229	111,280	107,530	47,626	1,401	1,059	2,881	224,039	80.88	52,967	19.12	277,006
1986	3,864	142,872	113,091	90,229	1,132	0	1,587	259,827	73.65	92,948	26.35	352,775
1987	15,567	174,035	171,241	48,874	1,556	27,478	214	360,843	82.20	78,122	17.80	438,965
1988	10,086	178,879	192,440	57,946	564	333	321	381,405	86.57	59,164	13.43	440,569
1989	15,914	219,151	239,769	37,758	521	230	0	474,834	92.50	38,509	7.50	513,343
1990	2,459	171,412	204,540	40,064	1,602	594	0	378,411	89.95	42,260	10.05	420,671
1991	1,681	163,646	210,631	46,036	527	1,537	0	375,958	88.66	48,100	11.34	424,058
1992	2,014	146,652	238,297	33,234	606	1,252	0	386,963	91.69	35,092	8.31	422,055
1993	3,576	182,627	185,181	32,781	429	311	21	371,384	91.72	33,542	8.28	404,926
1994	1,145	123,073	206,951	19,590	95	586	1,766	331,169	93.76	22,037	6.24	353,206
1995	2,084	147,508	112,195	40,241	426	190	27	261,787	86.49	40,884	13.51	302,671
1996	1,638	138,508	108,962	37,250	1,113	337	0	249,108	86.55	38,700	13.45	287,808

Sources: Washington State Department of Natural Resources. Various Years. Washington Timber Harvest. Washington State Department of Natural Resources, Olympia, WA.

Total Hardwood and Softwood Harvest, Eastern Washington (MBF, Scribner scale)

	Native American	Forest Industry	Private	State	Other Nonfederal	USFS	Other Federal	Total Private	Percent Private	Total Public	Percent Public	Grand Total
1985	148,384	380,248	154,758	93,545	227	324,138	2,744	683,390	61.90	420,654	38.10	1,104,044
1986	168,241	377,200	173,196	104,438	2,997	396,551	1,539	718,637	58.70	505,525	41.30	1,224,162
1987	189,431	349,716	190,781	138,753	2,338	462,312	4,931	729,928	54.54	608,334	45.46	1,338,262
1988	210,568	364,363	173,790	115,984	5,573	426,280	0	748,721	57.75	547,837	42.25	1,296,558
1989	188,159	393,467	224,045	117,867	1,448	433,511	614	805,671	59.28	553,440	40.72	1,359,111
1990	144,712	406,466	208,727	84,245	13,940	313,259	4,443	759,905	64.63	415,887	35.37	1,175,792
1991	2,140	386,904	196,227	67,675	175	284,304	823	585,271	62.38	352,977	37.62	938,248
1992	148,960	342,462	308,172	53,990	3,967	205,206	218	799,594	75.22	263,381	24.78	1,062,975
1993	156,205	263,383	374,066	63,078	321	160,975	4,613	793,654	77.61	228,987	22.39	1,022,641
1994	166,261	237,635	383,804	48,561	0	85,664	0	787,700	85.44	134,225	14.56	921,925
1995	194,217	262,170	351,406	82,667	13,670	71,306	0	807,793	82.81	167,643	17.19	975,436
1996	244,686	257,097	321,108	107,723	79	147,407	0	822,891	76.33	255,209	23.67	1,078,100

Total Hardwood and Softwood Harvest, Western Washington (MBF, Scribner scale)

	Native American	Forest Industry	Private	State	Other Nonfederal	USFS	Other Federal	Total Private	Percent Private	Total Public	Percent Public	Grand Total
1985	64,869	2,211,656	814,746	919,780	26,768	803,518	18,162	3,091,271	63.61	1,768,228	36.39	4,859,499
1986	66,813	2,472,186	966,070	959,993	11,581	835,706	19,446	3,505,069	65.74	1,826,726	34.26	5,331,795
1987	48,497	2,540,168	1,284,383	830,782	19,896	960,512	13,009	3,873,048	67.98	1,824,199	32.02	5,697,247
1988	60,278	2,499,672	1,368,077	710,449	33,235	1,059,327	17,776	3,928,027	68.33	1,820,787	31.67	5,748,814
1989	73,563	2,413,897	1,550,925	724,118	12,086	708,431	8,815	4,038,385	73.53	1,453,450	26.47	5,491,835
1990	37,614	2,143,755	1,387,880	573,129	15,983	503,952	11,122	3,569,249	76.37	1,104,186	23.63	4,673,435
1991	17,651	1,730,442	1,336,265	467,472	32,610	419,446	9,624	3,084,358	76.85	929,152	23.15	4,013,510
1992	36,887	1,934,234	1,258,638	422,060	39,053	255,866	7,963	3,229,759	81.67	724,942	18.33	3,954,701
1993	36,175	1,597,865	1,085,949	398,401	16,784	161,026	11,138	2,719,989	82.24	587,349	17.76	3,307,338
1994	32,343	1,596,686	1,202,903	274,172	9,619	113,863	4,419	2,831,932	87.57	402,073	12.43	3,234,005
1995	35,805	1,752,936	1,123,456	413,531	6,180	78,904	6,275	2,912,197	85.22	504,890	14.78	3,417,087
1996	25,310	1,760,824	934,677	491,898	34,751	34,088	6,639	2,720,811	82.75	567,376	17.25	3,288,187

Total Hardwood and Softwood Harvest, Washington State (MBF, Scribner scale)

	Native American	Forest Industry	Private	State	Other Nonfederal	USFS	Other Federal	Total Private	Percent Private	Total Public	Percent Public	Grand Total
1985	213,253	2,591,904	969,504	1,013,325	26,995	1,127,656	20,906	3,774,661	63.30	2,188,882	36.70	5,963,543
1986	235,054	2,849,386	1,139,266	1,064,431	14,578	1,232,257	20,985	4,223,706	64.43	2,332,251	35.57	6,555,957
1987	237,928	2,889,884	1,475,164	969,535	22,234	1,422,824	17,940	4,602,976	65.42	2,432,533	34.58	7,035,509
1988	270,846	2,864,035	1,541,867	826,433	38,808	1,485,607	17,776	4,676,748	66.38	2,368,624	33.62	7,045,372
1989	261,722	2,807,364	1,774,970	841,985	13,534	1,141,942	9,429	4,844,056	70.71	2,006,890	29.29	6,850,946
1990	182,326	2,550,221	1,596,607	657,374	29,923	817,211	15,565	4,329,154	74.01	1,520,073	25.99	5,849,227
1991	19,791	2,117,346	1,532,492	535,147	32,785	703,750	10,447	3,669,629	74.11	1,282,129	25.89	4,951,758
1992	185,847	2,276,696	1,566,810	476,050	43,020	461,072	8,181	4,029,353	80.30	988,323	19.70	5,017,676
1993	192,380	1,861,248	1,460,015	461,479	17,105	322,001	15,751	3,513,643	81.15	816,336	18.85	4,329,979
1994	198,604	1,834,321	1,586,707	322,733	9,619	199,527	4,419	3,619,632	87.10	536,298	12.90	4,155,930
1995	230,022	2,015,106	1,474,862	496,198	19,850	150,210	6,275	3,719,990	84.69	672,533	15.31	4,392,523
1996	269,996	2,017,921	1,255,785	599,621	34,830	181,495	6,639	3,543,702	81.16	822,585	18.84	4,366,287

Sources: Washington State Department of Natural Resources. Various Years. Washington Timber Harvest. Washington State Department of Natural Resources, Olympia, WA.

Hardwood Harvest as a Percent of Total Harvest, Washington State

	Native American	Forest Industry	Private	State	Other Nonfederal	USFS	Other Federal	Timberlands	lic Timberlands	All Timberlands
1985	2.45	4.29	11.09	4.70	5.19	0.09	13.78	5.94	2.42	4.64
1986	1.64	5.01	9.93	8.48	7.77	0.00	7.56	6.15	3.99	5.38
1987	6.54	6.02	11.61	5.04	7.00	1.93	1.19	7.84	3.21	6.24
1988	3.72	6.25	12.48	7.01	1.45	0.02	1.81	8.16	2.50	6.25
1989	6.08	7.81	13.51	4.48	3.85	0.02	0.00	9.80	1.92	7.49
1990	1.35	6.72	12.81	6.09	5.35	0.07	0.00	8.74	2.78	7.19
1991	8.49	7.73	13.74	8.60	1.61	0.22	0.00	10.25	3.75	8.56
1992	1.08	6.44	15.21	6.98	1.41	0.27	0.00	9.60	3.55	8.41
1993	1.86	9.81	12.68	7.10	2.51	0.10	0.13	10.57	4.11	9.35
1994	0.58	6.71	13.04	6.07	0.99	0.29	39.96	9.15	4.11	8.50
1995	0.91	7.32	7.61	8.11	2.15	0.13	0.43	7.04	6.08	6.89
1996	0.61	6.86	8.68	6.21	3.20	0.19	0.00	7.03	4.70	6.59

Sources: Washington State Department of Natural Resources. Various Years. Washington Timber Harvest. Washington State Department of Natural Resources, Olympia, WA.

Western Oregon Hardwood Harvests, 1988-1997

Red Alder, Western Oregon (MBF, Scribner scale)

	USFS	BLM	ODOF	Private	BIA	Total
1988	1,436	4,568	2,072	98,698	324	107,098
1989	95	4,196	1,617	135,710	584	142,202
1990	1,210	2,935	989	133,213	0	138,347
1991	27	3,128	1,726	155,145	0	160,026
1992	0	4,545	1,253	142,878	0	148,676
1993	644	2,643	2,020	160,786	6	166,099
1994	219	1,194	6,518	158,962	58	166,951
1995	2,210	1,186	7,787	121,838	456	133,477
1996	19	2,685	4,907	84,738	115	92,464
1997	26	249	10,159	109,787	463	120,681

Bigleaf Maple, Western Oregon (MBF, Scribner scale)

	USFS	BLM	ODOF	Private	BIA	Total
1988	0	2,282	102	7,315	8	9,707
1989	5	2,153	51	17,304	0	19,513
1990	0	1,507	88	11,209	0	12,804
1991	0	616	24	15,273	0	15,913
1992	0	918	72	15,255	0	16,245
1993	0	534	7	13,462	0	14,003
1994	0	241	5	11,003	0	11,249
1995	0	239	32	14,895	0	15,166
1996	0	541	14	12,755	3	13,313
1997	371	151	56	8,429	0	9,007

Pacific Madrone, Western Oregon (MBF, Scribner scale)

	USFS	BLM	ODOF	Private	BIA	Total
1988	0	2,718	0	0	0	2,718
1989	0	437	0	0	0	437
1990	0	305	0	0	0	305
1991	0	75	0	0	0	75
1992	0	160	86	0	0	246
1993	0	93	0	0	0	93
1994	43	42	0	0	0	85
1995	20	42	0	0	0	62
1996	48	95	0	0	0	143
1997	0	0	0	0	0	0

Other Hardwoods, Western Oregon (MBF, Scribner scale)

	USFS	BLM	ODOF	Private	BIA	Total
1988	15	1,764	2	11,424	0	13,205
1989	1	1,094	745	19,489	0	21,329
1990	0	765	3	22,078	486	23,332
1991	1	2,380	376	32,815	0	35,572
1992	3	2,840	197	31,653	0	34,693
1993	0	892	1	36,798	0	37,691
1994	0	402	93	53,857	52	54,404
1995	50	741	23	62,739	787	64,340
1996	57	1,677	169	18,744	0	20,647
1997	66	1,262	0	60,802	0	62,130

Sources: Oregon Department of Forestry. Various Years. Oregon Department of Forestry Annual Reports. Oregon Department of Forestry, Salem, OR.

Total Hardwood Harvest, Western Oregon (MBF, Scribner scale)

	USFS	BLM	ODOF	Private	BIA	Total
1988	1,451	11,332	2,176	117,437	332	132,728
1989	101	7,880	2,413	172,503	584	183,481
1990	1,210	5,512	1,080	166,500	486	174,788
1991	28	6,199	2,126	203,233	0	211,586
1992	3	8,463	1,608	189,786	0	199,860
1993	644	4,162	2,028	211,046	6	217,886
1994	262	1,879	6,616	223,822	110	232,689
1995	2,280	2,280	7,842	199,472	1,243	213,045
1996	124	4,998	5,090	116,237	118	126,567
1997	463	1,662	10,212	179,018	463	191,818

Total Softwood Harvest, Western Oregon (MBF, Scribner scale)

	USFS	BLM	ODOF	Private	BIA	Total
1988	2,182,782	1,387,181	181,533	2,254,516	22,695	6,028,707
1989	2,144,702	1,071,794	189,858	2,667,849	29,916	6,104,119
1990	1,008,457	749,864	131,481	2,419,404	7,347	4,316,553
1991	882,404	434,441	105,074	2,215,423	20,671	3,658,013
1992	590,689	470,757	132,431	2,077,966	19	3,271,862
1993	411,363	337,901	111,862	2,066,505	2,821	2,930,452
1994	256,037	123,609	111,219	1,990,896	20,203	2,501,964
1995	194,701	122,866	93,041	2,121,016	14,930	2,546,554
1996	175,916	278,151	105,837	1,860,544	8,998	2,429,446
1997	122,508	133,219	165,007	2,077,444	5,502	2,503,678

Percent of Hardwoods Harvested from Private Timberlands, Western Oregon

	Total	Private	% Private
1988	132,728	117,437	88.5
1989	183,481	172,503	94.0
1990	174,788	166,500	95.3
1991	211,586	203,233	96.1
1992	199,860	189,786	95.0
1993	217,886	211,046	96.9
1994	232,689	223,822	96.2
1995	213,045	199,472	93.6
1996	126,567	116,237	91.8
1997	191,818	179,018	93.3

Hardwood Harvest as a Percent of Total Harvest, Western Oregon

	USFS	BLM	ODOF	Private	BIA	Total
1988	0.07	0.82	1.20	5.21	1.46	2.20
1989	0.00	0.74	1.27	6.47	1.95	3.01
1990	0.12	0.74	0.82	6.88	6.61	4.05
1991	0.00	1.43	2.02	9.17	0.00	5.78
1992	0.00	1.80	1.21	9.13	0.00	6.11
1993	0.16	1.23	1.81	10.21	0.21	7.44
1994	0.10	1.52	5.95	11.24	0.54	9.30
1995	1.17	1.86	8.43	9.40	8.33	8.37
1996	0.07	1.80	4.81	6.25	1.31	5.21
1997	0.38	1.25	6.19	8.62	8.42	7.66

Sources: Oregon Department of Forestry. Various Years. Oregon Department of Forestry Annual Reports. Oregon Department of Forestry, Salem, OR.