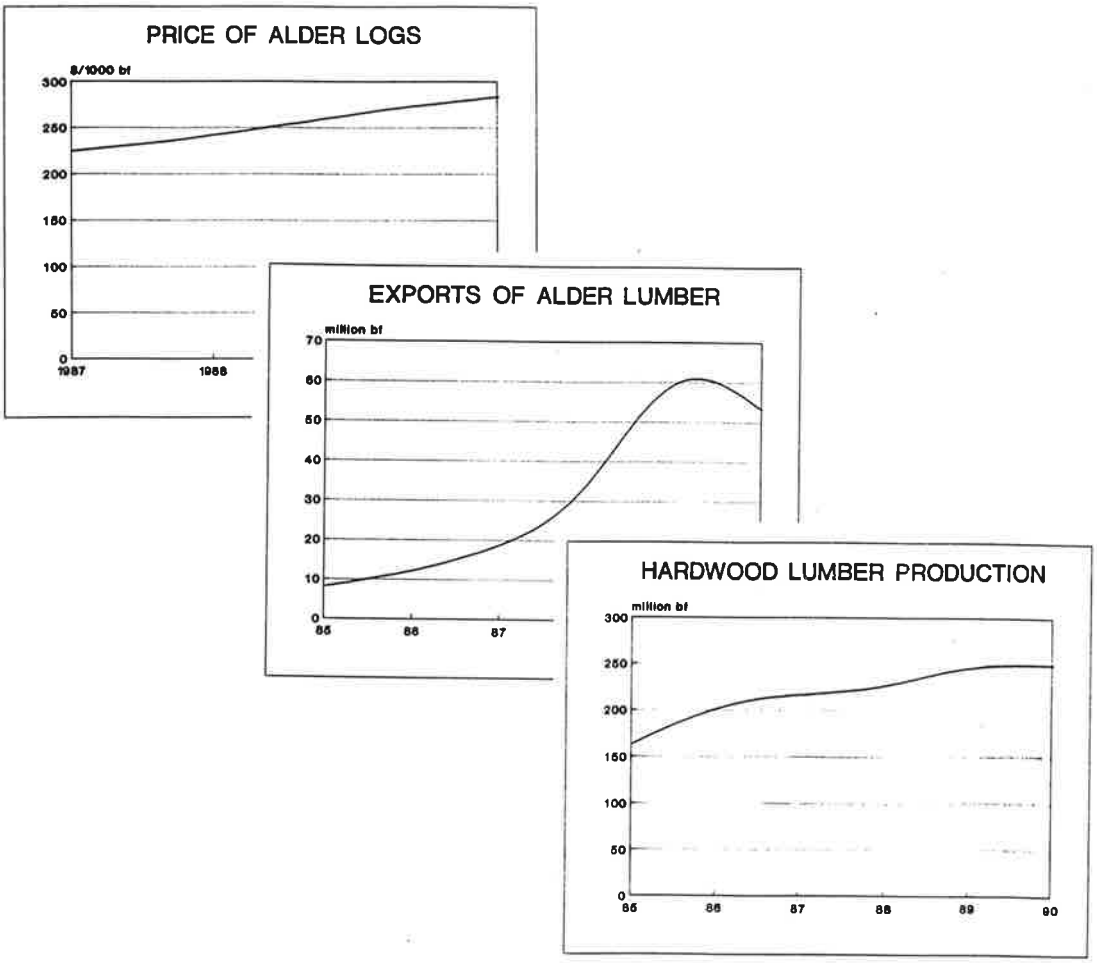
C I N T R A F O R

Working Paper 37

Pacific Northwest Hardwoods Capture International Attention: An Analysis of the Washington State Hardwood Industry

Håkan Ekström



CENTER FOR INTERNATIONAL TRADE IN FOREST PRODUCTS
University of Washington
March 1992

ACKNOWLEDGMENTS

The degree of success in a study concerning an industry's production and trade is, of course, very dependant on the cooperation from the industry itself. Everyone has been very cooperative in answering my never-ending questions via questionnaire, personal interviews, and telephone.

I would therefore like to thank all directors, general managers, plant managers and sales people for all the time they spent and for the information they shared with me. Special thanks are due to Dr. William Luppold and Dr. Bruce Hansen at USDA Forest Service, Forestry Sciences Laboratory in Princeton, West Virginia, for their help with the section on alder exports.

The staff at CINTRAFOR at the University of Washington has been of great assistance with my work. I am especially grateful to Professor David Briggs and Research Consultant John Dirks for their extensive help in completion of this report.

I would also like to thank Dr. Briggs, Mr. Dirks, Research Associate Ivan Eastin, Program Manager Lu-Ann Branch, and secretary Lynn Catlett for their constructive criticism of my report and for critical appraisal of my English.

Seattle, December 1991

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EXECUTIVE SUMMARY

Washington State Hardwood Sawmilling Industry 1990

Highlights:

* Direct employment: 850 people
* Lumber production: 250 million board feet
* Lumber production up 93% since 1982
* Almost 35% of lumber production exported
* Export volumes of alder up 300% since 1987
* Alder number three hardwood lumber species exported from US
* 50% of exported lumber sold to Japan
* Increased demand of alder in European markets
* Main end uses: furniture, cabinets and pallets
* Hardwood markets show greater stability than softwood markets
* Prices of alder logs and lumber increase 25% since 1987
* Timber supply biggest concern of mill managers
* Two thirds of harvested hardwood logs utilized for chips

Hardwood lumber production in Washington grew 93% over the period 1980-90. This compares with softwood lumber growth of 24% and a national growth rate for hardwood lumber production of just 21% over the same period. Hardwood species like red alder, which were until recent years considered undesirable weed species in the softwood forests of the Pacific Northwest, have increased remarkably in value and now provide financial returns as great as softwoods. The low level of historic interest in hardwoods has resulted in limited knowledge about the northwest hardwood resource and Washington state hardwood lumber producers. These facts together with a growing worldwide demand for hardwoods motivated a study by the Center for International Trade in Forest Products (CINTRAFOR) at the University of Washington to understand the changing capabilities of Washington hardwood lumber producers and their markets.

WASHINGTON HARDWOOD SAWMILLING INDUSTRY

The Washington hardwood sawmilling industry of 1990 was twice as large as in 1982, with direct employment of 850 people. The industry consumes approximately 340 million board feet of timber, of which 75% was manufactured into lumber and pallet stock. The remainder was utilized for pulp chips. Washington hardwood production represents almost eight percent of the total lumber production in the state and is over 2.5 times the hardwood production in Oregon. The nine major hardwood sawmills, representing about 98% of Washington's total hardwood production, are all located west of the Cascades in rural communities. The primary species used were western red alder (*Alnus rubra* Bong.) and bigleaf maple (*Acer macrophyllum* Purch.).

Since most of the raw material for the industry, about 74%, was purchased from private timber owners and only one percent from federal timber sales, preservation of northern spotted owl habitat--most prevalent on federal lands--should not substantially impact hardwood timber availability.

SWEDISH HARDWOOD SAWMILLS

The author has also carried out similar research in his home country, Sweden. With a smaller production, Sweden has ten times as many hardwood mills, most of which produce the higher-valued secondary manufactured products, used for furniture, parquet flooring, cabinets or mouldings. While the Washington state hardwood sawmills are more quality-oriented than many of their softwood counterparts, they are still far from the value-added manufacturing facilities observed in Sweden.

HARDWOOD MARKETS FOR WASHINGTON SAWMILLS

Hardwood markets do not share the characteristics of softwood commodity markets. Quality and customer service attributes are often more important than price. Mill owners and managers said that the most critical production features were the ability to produce kiln-dried, high quality, accurately graded planed or surfaced lumber. A mill's reputation, its ability to deliver on time, and its personal relationships with its customers were rated more important than competitive pricing and the ability to provide custom orders. Competitive pricing and custom orders were considered more important by a few of the mills, however.

Hardwood markets, growing faster than softwood markets, have also shown greater stability with little change in demand with the boom and bust housing cycle. Alder has

been discovered as a valuable species, and will play an increasing role in rural timber-dependent communities. While hardwood chips are also valuable for pulp and paper production, the higher-valued furniture, cabinet and interior applications, will set the pace for much of the future industry development.

Only about seven percent of the Washington-produced hardwood lumber is utilized by local secondary manufacturers, with almost no secondary manufacturing in local lumber mills. California and Oregon firms consumed large amounts of the lumber, however, and exports take about 36% of the volume. The foreign market is very important for the industry, since export customers usually purchase the higher quality products. While Japan is the largest market, recent growth in European markets has been dramatic.

The recognition of alder as an important commercial species has resulted from its increased worldwide use in higher- valued applications. Higher-grade lumber was used mainly for furniture where the wood was visible (21%), and for cabinets (22%). Upholstered furniture (17%) together with pallets (33%) were the principal end products for low-grade hardwood lumber. Small quantities were also used for mouldings, toys, and for the do-it-yourself market.

The increased demand for red alder lumber has influenced its price, especially for the higher grades. Between 1988 and 1990, the price of kiln dried 4/4" lumber of the highest grade increased approximately 25%, from $766 per thousand board feet (MBF) to $955 per MBF.

RED ALDER EXPORTS FROM THE US

In recent years, Pacific Northwest hardwood species, primarily red alder, have been elevated from positions of relatively low value into commercially important wood species in world trade. Red alder, only processed at Oregon and Washington sawmills, was the number three hardwood lumber export by volume from the United States in 1990, behind the species groups white oak and red oak. In log form alder was the number one hardwood species exported from the U.S. in 1990.

There has been a substantial increase in the export of alder lumber during the last ten years. In 1981 the export trade of alder lumber totalled only two million board feet (MMBF), while ten years later in 1990, the trade had reached 56 MMBF.

The most important single market for alder lumber during the last decade has been Japan, even though its share has been declining recently. The Japanese market accounted for 95% of the lumber exported 1981, while in 1990 its share had decreased to 55%.

The new and growing market has been in Europe, which now purchases about 25% of the alder lumber exported. The main importing countries in Europe are Italy, Germany and France. The total alder export to Europe during 1990 was 13.8 MMBF. While the Washington hardwood sawmills have increased their lumber production by 50% since 1985, the export of alder lumber, which predominantly originates from Washington state, has increased by almost 700%.

WASHINGTON HARDWOOD SUPPLY, GROWTH AND HARVEST

The hardwood timber resource in Washington is growing, with the annual cut at about half the annual growth. In the region west of the Cascades, 15% of the growing stock on timberland is composed of hardwood species. Red alder was the most common species (67%) and, together with bigleaf maple and black cottonwood, accounted for 95% of the hardwood volume. In the Southwest region of the state, the annual harvest of hardwoods was 7 MMBF on state lands, which is only ten percent of the total annual growth. This situation is in contrast to forest industry owned land in the same region, where the removal rate is 26% higher than the current growth rate. The potential for expansion exists. It may be possible for the Washington State Department of Natural Resources (DNR) to increase the harvest of hardwoods from the land it administers and become a bigger and more important timber supplier for the hardwood sawmills.

MANAGEMENT OF HARDWOOD STANDS

Managing a hardwood stand, whether pure or mixed with conifers, can substantially improve the quality and increase dimension yield. The alder regeneration cycle is shorter than that of softwood species. With intensive management of red alder, which is a fast growing species with good self pruning, high quality sawlogs and peelers can probably be grown in 28 to 37 years.

It is important to inform forest owners, loggers and contractors about the value of hardwood logs and about the hardwood industry that is prepared to pay for the sawlogs.

If too many hardwood logs are cut and chipped today, the supply of sawlogs will be limited in the future. As this study found, the economics have been rapidly changing, making it pay to grow alder for higher-value markets.

KEY FACTORS FOR FUTURE SUCCESS

There is little doubt that Washington state hardwood sawmills can be successful in the future. It is the opinion of this author that it is necessary to address the following key areas to yield long-term benefits for the companies in this industry:

* Develop closer contacts with the end user.
* Increase value-added production.
* Develop a skilled and loyal labor force.
* Intensify quality control.
* Increase research and development.
* Build awareness among forest owners of the value of hardwood.
* Maintain a secure and stable timber supply.

Future hardwood products

It is important for the sawmills to focus on quality control, to utilize the wood to a higher-degree and to produce a higher valued product than commodity lumber. Lower-grade lumber products, No. 1 Shop to No. 3 Shop, comprise about 45% of the hardwood sawmills production; these grades should be further utilized. No.1 Shop lumber, together with No.2 Shop, which is the most difficult grade to sell today, could be remanufactured for cut stock, edge-glued panels, finger-jointed and edge-glued components.

Most of the mill managers interviewed indicated that the future success of the industry would rely more heavily on value-added products. Another broad area mentioned was the production of more custom-cut products for the furniture and cabinet industries.

Planned investment, however, generally fell in the area of upgrading primary log breakdown facilities, indicating that many mills must concentrate limited investment dollars in more efficiency at the headrig just to keep up with industry standards.

With the cost of capital rated as the second largest production problem next to labor costs, mills will be constrained in their ability to invest in value-added production.

Secondary manufacturing

Most hardwood lumber produced in Washington is leaving the state. Only seven percent of the alder lumber produced is currently utilized by secondary manufacturers in the state (pallet production not included). The volume of hardwood lumber products flowing out

of the state for further manufacture may suggest an opportunity for Washington remanufacturers and secondary manufacturers to expand their use of alder and other local hardwood species.

The labor force

To be more competitive, the United States, with higher labor costs than many other countries now producing commodity lumber, should concentrate on manufacturing high-quality products. Low-quality products and "bulk-type" production can be made less expensively in countries that have lower wage structures.

By taking measures to develop a flexible and knowledgeable labor force, performance and recovery rates can be high. The skill level of the labor is particularly important when customers' specifications may be more demanding and there are more custom-made products and value-added processes required.

Future markets

Japan is the largest export market for alder lumber today, and will probably continue as a large and important market, although its share of the total alder exports from the U.S. will decrease. The new and expanding market is in Europe, especially Germany, as producers substitute alder and other temperate species for tropical timber imports, mainly because of policies influenced by the European Green Movement.

If sawmills in the Pacific Northwest can deliver high quality lumber and components and follow and analyze customer demand, the European market will be much more important in the future.

RESTRICTIONS AND OPPORTUNITIES

Hardwood sawmill managers said that their greatest concern for the future was the timber supply. While currently not a problem for most of the mills, timber quality and availability were foremost on the minds of those in the industry when asked about future critical issues.

Availability of timber is a major concern of the purchasing mills, as much of the hardwood sawtimber is a byproduct of softwood timber harvest, and the softwood harvest is expected to decline. State and federal regulations regarding timber supply as well as environmental issues were the top three overall concerns facing mill-owners. Actions by the Washington State Department of Natural Resources (DNR) with respect to hardwood

sales, timber availability, and environmental protection were of great importance to a majority of those interviewed.

Besides the problem of limited investment dollars and the cost of capital, the issue for many local hardwood producers may become how to procure sufficient timber supply to maintain consistent quality and mill production. These are the main restrictions but there are also opportunities for the hardwood sawmills today.

Red alder represents an under-utilized timber resource. It is a fast growing species, it has excellent wood characteristics, and it has a growing demand in domestic and international markets. This all contributes to making red alder a potentially important species for forest owners, for sawmills and for secondary manufacturers in the Pacific Northwest.

1. BACKGROUND

Historically, interest in timber and forest products in the Pacific Northwest, has been focused on softwoods. There has long been a negative attitude toward the region's hardwood species. This is despite the fact that 15% of the net growing stock on timberland west of the Cascades is comprised of hardwoods. Over the years various management methods have been used to cope with the "hardwood problem", including spraying, weeding or cutting older hardwood stands or mixed hardwood/softwood stands to replant with conifers.

Hardwood species included in timber sales in the Pacific Northwest have been and still are considered a low priority for timber purchasers and loggers who often treat hardwoods as secondary or nonbid species with very low profitability. One reason why red alder (*Alnus rubra* Bong.), the region's most prevalent species and a species indigenous only to the Pacific Northwest, has a bad reputation in this region is that it has primarily been used for non-visual applications during furniture manufacturing or stained to imitate other more "valuable" species like cherry, walnut and mahogany. For example, this is the case in countries like Japan and Italy. Few products are produced, using unstained, natural and finished alder for visible parts.

Currently, times are changing, and there has been a marked increase in both regional and global demand for red alder from the Pacific Northwest. The production of hardwood lumber in the region has increased dramatically and is now approximately twice what it was eight years ago. There is a growing interest in hardwoods from forest owners and sawmillers as well as secondary industries in the United States and abroad.

Red alder is a better timber species than its reputation implies. It grows rapidly and is found in large volumes extending from the coast of British Columbia in the north of its range to northern California at the south of its range. The wood is fine grained with a homogeneous grain structure, has excellent gluing characteristics and good workability.

As an under-utilized resource with good characteristics and growing domestic and global demand, it merits thorough inquiry into present levels of usage and how it can be utilized to a higher degree.

2. OBJECTIVES AND BENEFITS

Local government, the forest products industry and research institutions in the Pacific Northwest have traditionally shown little interest in issues concerning hardwood species. As a result of this lack of interest, there is little knowledge regarding the hardwood industry in this region, its opportunities and its current concerns.

Recently there has been a growing interest in Northwest hardwoods, from forest owners and sawmills as well as from secondary industries in the United States and abroad. To provide information regarding the hardwood sawmilling industry's capabilities, trade, and the competitive outlook for this sector, this project was started during the spring of 1991.

Study objectives

The overall purpose of this research was to perform an in-depth study and analysis of the Washington hardwood sawmill industry.

The specific objectives were as follows:

- Identify existing hardwood sawmills in the state of Washington.
- Measure each sawmill's present consumption of raw material and production.
- Determine annual lumber production.
- Assess the processing technologies employed in each sawmill.
- Identify products manufactured and their end-uses.
- Identify the markets where the sawn products were sold.
- Evaluate problems and concerns facing the industry today and expected in the future.

This study is limited to the primary hardwood industry in the state of Washington. Since red alder is the main hardwood species in the Pacific Northwest and also grows in the state of Oregon, some comparisons will be made with that state and its hardwood industry. The trade statistics (Chapter 6), with export figures of logs and lumber of red alder, refer to exports from both states.

Benefits

The information from this study will be important as land-owners and policy makers develop management plans for the future. The results of this study will also give local and federal government officials a better background with which to make decisions that

can support the industry and make it more competitive. It will also identify problems and concerns that this industry has today.

- By studying the export volumes of hardwood lumber from Pacific Northwest the importance of export markets for the region can be shown.
- By presenting the number of people employed by the hardwood sawmills, the industries importance for the rural communities can be shown.
- Opportunities for the secondary industry in the state to utilize more hardwood species.
- Opportunities for forest owners to profit from hardwood timber sales.
- Opportunities for sawmills to produce more value-added products and to market them internationally.

Literature review

There have been few studies focusing on the hardwood sawmilling industry in Washington state. For the last 15 years the following studies have reviewed hardwood sawmills:

Washington Mill Survey (Larsen, D., 1988). Seven mill surveys have been conducted by the Washington State Department of Natural Resources every two years since 1976. In those studies, the forest products industry in the state has been surveyed. The report presents number of mills, wood consumption and supply by county and ownership. The most recent survey was conducted in 1988 but not yet publicized.

The Role of Northwest Hardwoods in International Trade (Buhler, R. and Briggs, D., 1988). The role of Northwest hardwoods in international trade was the focus of a detailed review and bibliography from the Center for International Trade in Forest Products (CINTRAFOR). The report presented the hardwood resource, hardwood log harvest and exports, and primary hardwood products in the Northwest. The paper also dealt with the hardwood industry's problems, issues and concerns.

Economic Value of the Pacific Northwest Hardwood Industry (Cunningham, C., & McMahon, R., 1978 and Beachy, D. & McMahon, R., 1987). The economic value of the hardwood lumber industry was described in two reports from the Forest Research Laboratory at Oregon State University in 1978 and 1987. In the projects both the hardwood sawmills and the secondary manufacturing mills were surveyed. The studies focused on wood consumption, employment, the end-use of hardwoods and costs for the lumber and secondary manufacturing industry in Oregon and Washington.

1980 Alder Survey (McGillivray, R., 1981a). The Washington State Department of Natural Resources conducted a study in 1980 concerning red alder consumption in

primary and secondary manufacturing facilities and the alder resource utilization in Washington state. In this study a survey was sent out to 446 furniture manufacturers in the United States and Canada to measure their interest in alder.

Barriers Limiting Northwest Alder Utilization (McGillivray, R., 1981b). In a separate report the same department identified barriers regarding alder utilization. The barriers were divided into three main sections: Transportation, Properties and Economics-time.

3. RESEARCH METHODOLOGY

3.1 Washington Hardwood Sawmill Survey

3.1.1 Questionnaire Development. The survey questionnaire for this study was designed following a review of literature (Jobber, 1986; Pressley, 1980 and Walker, *et al.*, 1987) and of other similar surveys conducted for forest industries (Dirks & Briggs, 1991; Smith, 1991; Larsen & Bearden, 1988). Discussions about survey layout and questions were held with researchers at the College of Forest Resources at the University of Washington.

Six general topics were covered in the 10-page questionnaire (see Appendix A). The topics included:

1. Sales and Marketing
2. Future Issues for the Firm
3. Current Problems and Concerns
4. Production and Processing Technologies
5. Raw Material Consumption
6. Products Profile

A cover letter explained the background, purpose and how the results from the survey would be presented. The first page of the questionnaire was designed to provide the respondent a place to include his/her name, address and contact person.

All results from the study were promised to be presented in a form so that no individual sawmills could be identified. Mills were given the option of having information about them published in a directory which would be part of the study results. This directory is presented in Appendix B.

3.1.2 Identification of Mills and Mailing Procedure. Sawmills using hardwoods within the state were identified by cross-referencing the following sources:

Washington Forest Industry Mill Directory, 1988 (Washington State Department of Natural Resources).

Washington State Forest Products Trade Directory, 1989-1990.

Western Hardwood Association Membership Roster, 1989.

Personal contacts with the Washington Hardwood Commission.

A total of 30 mills were identified as possibly sawing hardwoods in 1990. During the first part of May, 1991, personal interviews were conducted at nine mills that were believed to be the largest producers of hardwood lumber. After the general manager, plant manager, vice president or president accepted and agreed on a visitation date, the

survey was sent out with three to five days lead time to give the respondent a chance to read through and answer some of the questions in advance. Each interview lasted between two and four hours.

The author's experience from other surveys has shown that presidents, general managers and plant managers do not always have the same opinions regarding the firm's current concerns and future issues (Ekstrom, 1990). Personnel higher up in the hierarchy tend to place more blame on problems from outside forces, such as taxes and regulations, while plant managers and personnel closer to the production more often see problems with outdated facilities and lack of an educated labor force.

Joint discussions with the general manager, the plant manager, quality control manager and sales manager make it possible to obtain a more complete picture of the industry and what the main issues are. These "optimum" discussions were conducted whenever possible during this study. It was valuable to obtain points of view from people having different positions and responsibilities within each company.

In addition to these nine interviews with the largest hardwood sawmills, the survey questionnaire was administered to the remaining 21 firms by mail in May 1991. This mailing included a cover letter explaining the purpose of the study, a copy of the survey, and a business reply return envelope.

Follow-up efforts to non-respondents included a reminder letter 15 days after the initial mailing and, after another 10 days, a third letter with a replacement survey and another business reply return envelope. All mail was sent first class to insure that the post office would return undeliverable mail with an address correction.

3.1.3 Survey Response. All nine mills selected for personal interviews agreed to participate in the study.

Of the 21 mills that were mailed the survey, seven responded after the initial mailing. Following the third mailing a total of 15 mills had responded. Of those sawmills, none produced hardwood lumber. They were either no longer in business or were not currently sawing hardwood lumber. This brings the total of hardwood sawmills in the state to nine.

Following discussions with the Washington Hardwood Commission, the managers at the nine visited mills, and comparing the production at the non-respondent mills in 1988, the production of the respondent mills was determined to represent at least 98% of the total hardwood production in Washington state.

3.2 Trade Statistics

The trade statistics used in this report were collected from two sources: the U.S. Department of Commerce Bureau of the Census and USDA Forest Service Forestry Sciences Laboratory in Princeton, West Virginia. The latter source purchased and analyzed data from the Journal of Commerce's "Port Import Export Reporting Service" (PIERS). This database was developed from ocean freight manifests of ships leaving U.S. ports and includes data from 1981.

The Census data, which are export declarations filled in by the freight forwarder, did not separate western red alder until early 1989. These documents are filled in for U.S. customs and treasury purposes.

The data reported by PIERS include only shipments from U.S. ocean ports direct to the destination country, while the Commerce data includes exports from all US ports, including border ports with Canada and Mexico.

It is important not to accept the trade data as exact export volumes. The accuracy of the log export volumes are especially questionable. This is due to problems with conversion factors and the impact of improper documentation. For example, a review of the documentation for May, 1989, red oak log exports indicates that nearly 50% of these exports were lumber (Hansen & Luppold, 1989).

In the Bureau of Census statistics, there is a differentiation between "rough lumber" and lumber "not elsewhere specified or included." Since this classification is not always filled in correctly, the two groupings are combined in this report. Occasionally surfaced lumber is classified as "rough" by the seller to avoid custom tariffs in the importing country. Hardwood lumber exported from the Pacific Northwest is with very few exceptions surfaced.

Based on discussion with exporting firms and Forest Service trade experts, the consensus is that PIERS reports contain the most accurate volumes, hence this information is used in this report. According to the same sources the unit values reported by Census seem to be accurate. Total export values in this report are estimated by combining data from both sources.

4. HARDWOOD SAWMILLS IN WASHINGTON STATE

4.1 Industry Profile

A list of the mills with addresses, person to contact, telephone number and facilities can be found in Appendix B.

4.1.1 Location and Year Established. The nine major hardwood sawmills in the state are all located west of the Cascade mountains, three of them in the northern part and the other six in the most southern part (Figure 1).

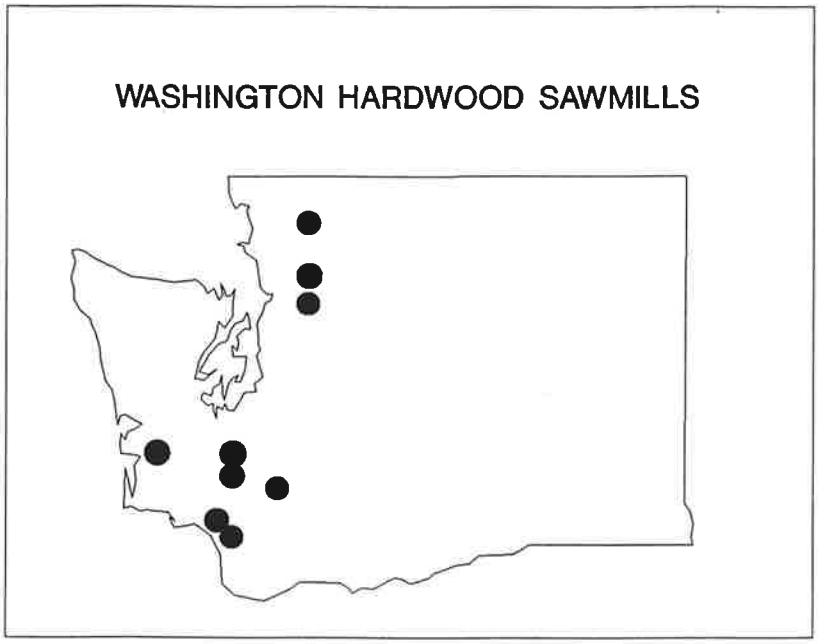

Figure 1: Location of the hardwood sawmills in the state of Washington in 1990.

The hardwood mills were specialized and did not produce any softwood lumber. They were all located in smaller towns and eight of them had easy access to the main freeway in the state, Interstate 5. The largest mills were all located close to the timber resource. The five counties that recorded the highest hardwood harvesting level each contained a hardwood sawmill.

Except for one mill which was established in 1928, all of the hardwood mills were started after 1950: three during the 1950's, three during the 1960's, one during the 1970's and one during the 1980's.

4.1.2 Employment and Labor Productivity. The hardwood sawmills employed 859 persons in 1990. Of those employed, 799 were labor-force and 60 worked in administration. Most of the employees worked full time; only eight had part-time jobs. The seven largest mills represented 96% of the total employment. The approximate lumber production per person employed by the industry in 1990 was 280 thousand board feet.

4.2 Raw Material

4.2.1 Consumption. The hardwood mills bought 400 million board feet (MMBF) of logs in 1990. About 65% of the volume was utilized for lumber and pallet stock. The remaining quantity was for producing chips for pulp. Except for small quantities of Oregon ash and Western paper birch, the two main hardwood species used were red alder, which accounted for 93% of the consumption, and bigleaf maple.

Most mills measured the logs either by board foot scaling (Scribner) or by weight. Some mills have been using weight measuring for many years and those interviewed expected more weighing in the future. Cubic volume scaling was not used by any mill.

The quality of the alder logs has not changed during the last five years, according to half of the managers. The other half were of the opinion that the quality is lower now and that the logs usually are smaller.

4.2.2 Source of Timber. Most of the sawmills' raw material came from private land: about 56% from industry-owned land and 18% purchased from other private owners in 1990 (Figure 2). Most of the remaining timber purchased was from state land. Timber from federal ownership accounted for less than one percent.

About 92% of the timber supply was purchased within the state. A couple of the most southerly mills obtained small quantities of logs from Oregon. The mills usually purchase from an area within a range of 60 to 80 miles. Most of the timber was bought from the counties of Lewis and Cowlitz in the southwestern part of the state. About 53 percent of the raw material came from this region (Figure 3). One third came from the Puget Sound area, in particular from Whatcom and Snohomish counties. There were no hardwood logs imported during 1990 by the sawmills in the state.

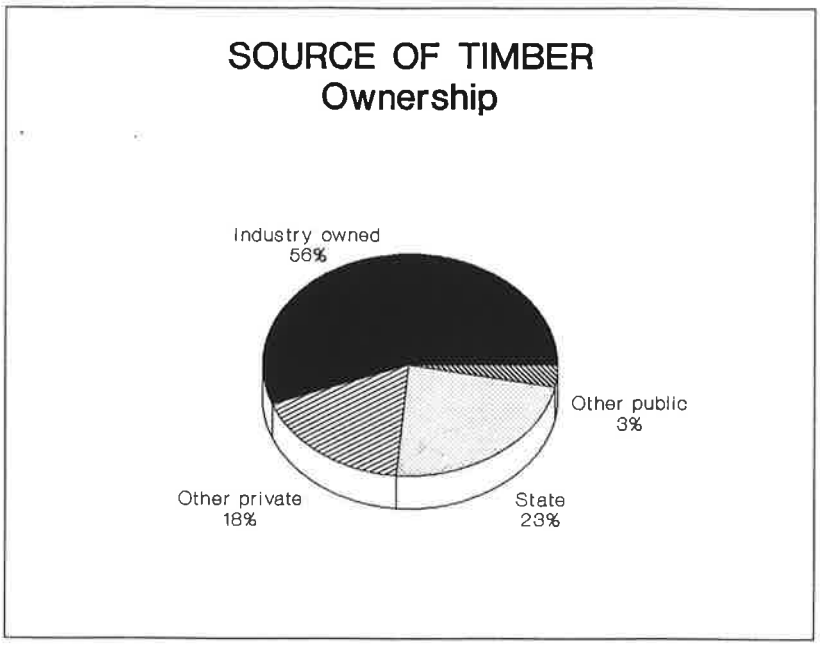

Figure 2. Source of timber for the hardwood sawmills in 1990.

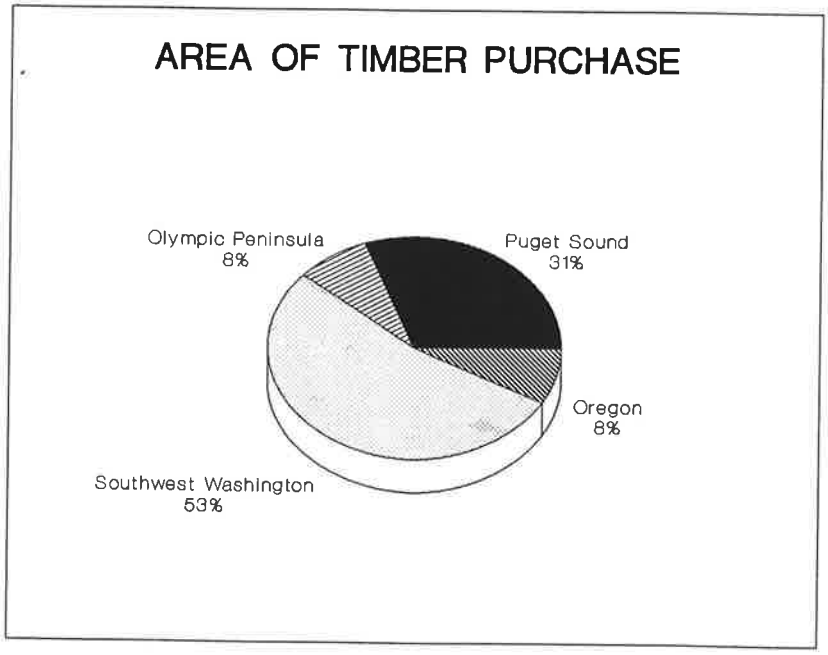

Figure 3. Area of timber purchase for the hardwood sawmills in 1990.

4.2.3 Flow of Hardwood Raw Materials. The quantities presented in this chapter are the annual estimates for 1990/91. Sources are hardwood exporters and the hardwood industry in the state of Washington.

The supply picture for the hardwood sawmills shows steady demand; however, chipping operations have a great deal of flexibility and are changing regularly depending on chip price domestically and abroad. More than 2/3 of harvested hardwoods logs in the state of Washington are utilized for chips. Approximately 50% of this quantity is exported. Most of the chips are produced by whole log chippers, which are smaller firms commonly employing five to ten people. The hardwood sawmills are also producing chips by chipping smaller pulp logs. Together with the residual chips from the lumber production, they produced almost 550 thousand bone dry tons (MBDT) of chips during 1990 (Figure 4). Of this quantity, more than half was sold to pulp mills in Washington and Oregon, mainly mills on the Columbia River. The remaining quantity was exported chiefly to Japan.

The whole log chippers sell approximately 55% of produced chips on the export market, while the remainder is sold locally to pulp mills in the Pacific Northwest.

4.3 Production

The total production of hardwood lumber in Washington state in 1990 was 247 million board feet (MMBF), which represented 91% of the industry's capacity. This was similar to the hardwood production in 1989 (Statistical Yearbook of the Western Lumber Industry, 1990). Until 1989, production had increased every year since 1982. The fastest growth, 53%, occurred between 1985 and 1989 when volumes grew from 163 MMBF to 250 MMBF (Figure 5). This trend was in contrast to that observed in the softwood industry, which has had a more cyclical production, reflecting the general economic cycle (Figure 6).

Production of softwood lumber is more closely linked to housing and construction than hardwood lumber. The demand for hardwood lumber, which is mostly utilized for furniture and cabinets, is more steady. One reason is that even when the housing starts are down there are still houses being rebuilt or remodelled. Some home owners renovate their kitchens or bathrooms instead of buying a new house when times are hard. Another reason is that a larger percentage of hardwood lumber production is sold on the international market than is softwood production. This contributes to a more steady demand for hardwood lumber because the world-wide business cyclic behavior is out of phase; booms and busts do not appear at the same time all over the world.

Of the total volume of lumber produced in Washington state in 1990, hardwoods represented eight percent. This was up from five percent in 1985 (Statistical Yearbook of the Western Lumber Industry, 1990).

Most mills visited in this study ran two eight-hour shifts with a capacity per shift ranging from 50 to 115 MBF. The smaller mills had a capacity of between 5 to 15 MBF per shift.

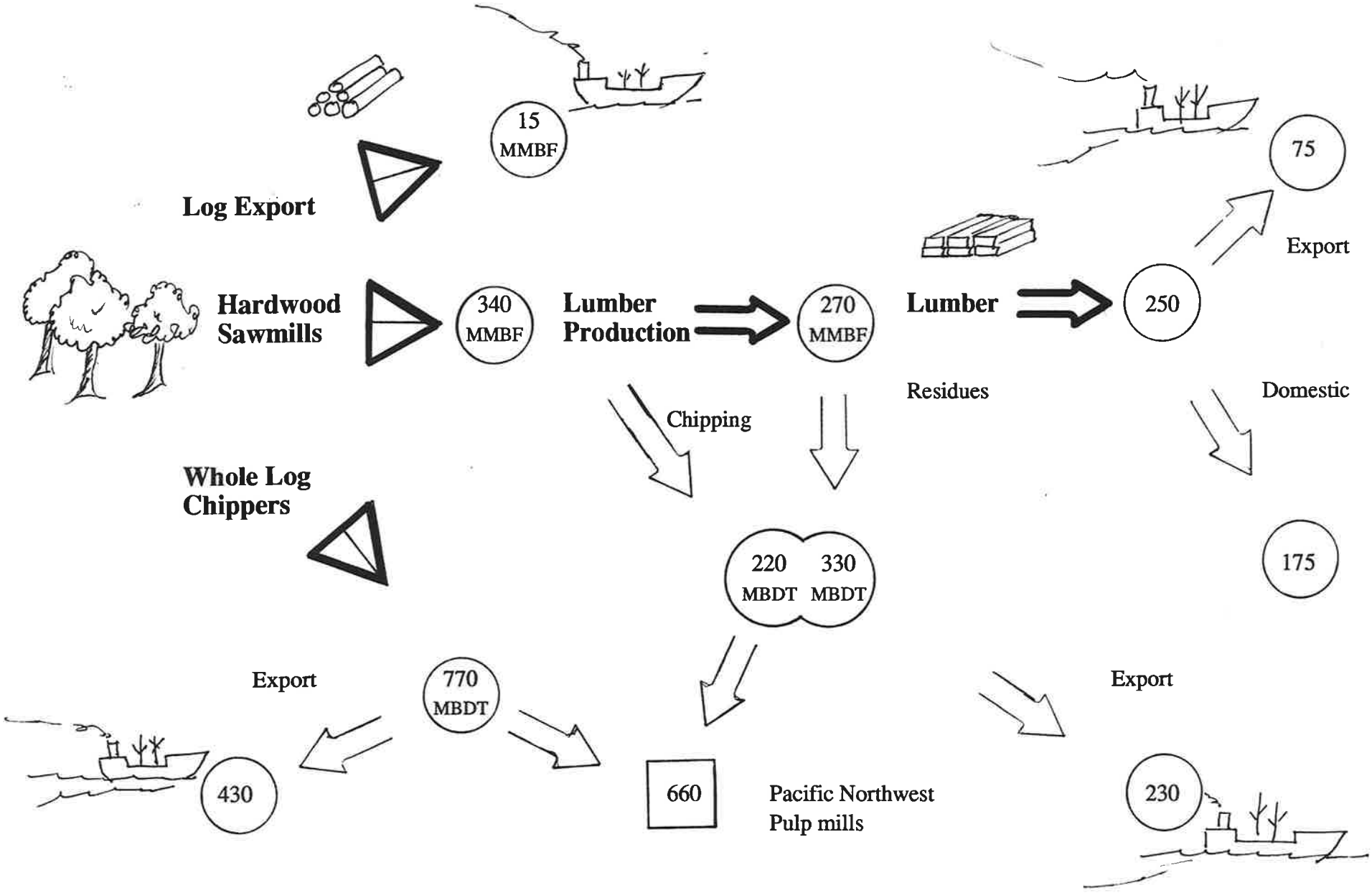

Figure 4. The flow of Washington State hardwood raw materials.

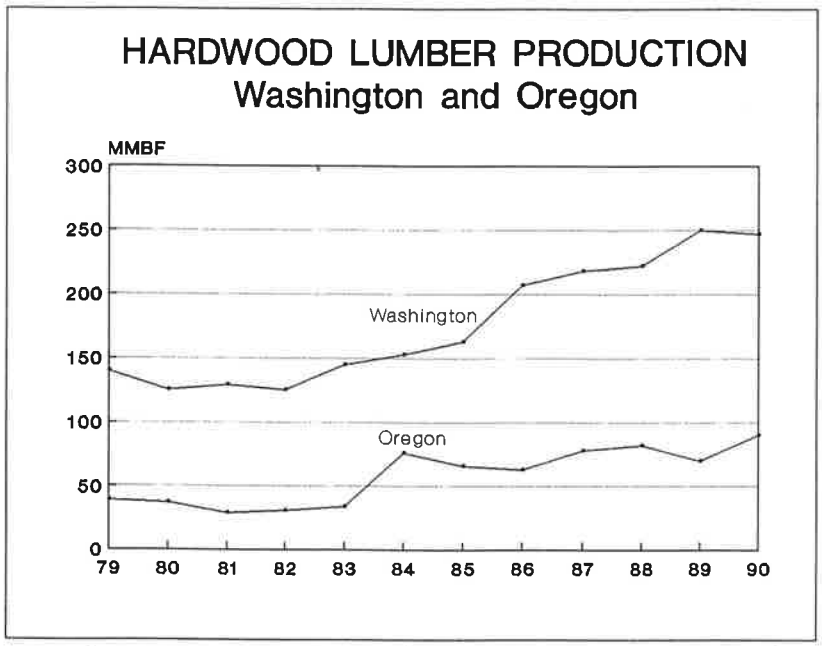

Figure 5. Hardwood lumber production in Washington and Oregon 1979 to 1990. Sources: *Statistical Yearbook of the Western Lumber Industry*, 1987 and 1990.

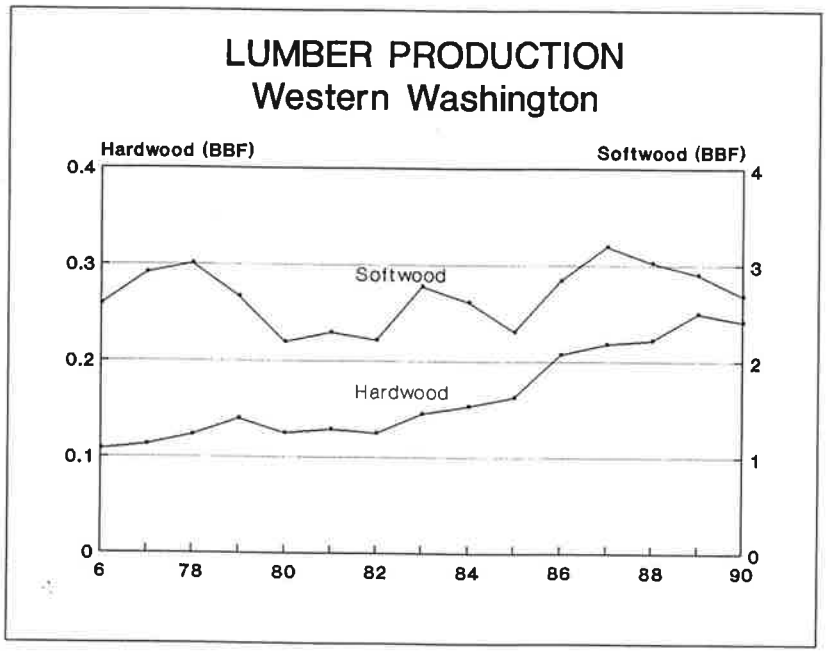

Figure 6. The production of hardwood and softwood lumber in Western Washington 1976 to 1990. Source: *Statistical Yearbook of the Western Lumber Industry*, 1987 and 1990.

The state of Washington has the highest hardwood lumber production in the Pacific coast region of North America. In comparison, Oregon sawmills produced slightly more than a third of Washington's sawmills production, or about 90 MMBF of hardwood lumber

during 1990. This was up from 70 MMBF the year before. California produces very little hardwood lumber while British Columbia produced approximately 30 MMBF in 1989, consisting of mainly red alder (Simons, 1991).

4.4 Mill Technology

The majority of the hardwood sawmills utilized similar processing technologies. Primary sawing was accomplished with a band saw for the quality lumber, while a gang saw was used for cants, which often were sawn for pallets. Some of the smaller mills had circular saws, either as the headrig or for sawing pallet stock.

All mills had trimmers, edgers, chippers, and either a planer or a sander for surfacing. Since most secondary manufacturers want to buy kiln-dried lumber, all mills had a dry kiln. The lumber is typically dried to between eight to ten percent moisture content, usually taking about six days for 4/4 thick stock and up to 14 days for 8/4 thick stock.

Only one company had installed finger joint machinery to up-grade and add value to the lower quality lumber. No mill had installed edge gluing equipment.

When asked about equipment purchase plans over the next five years, most mills reported plans to replace old and out-dated machinery: barkers, log handlers, log carriages, chippers, etc. No mills planned to buy finger joint or edge gluing equipment. This was despite the fact that most sawmill managers believe they will be producing more custom and value-added products in the future (see also Chapter 4.8).

4.5 Product Profile

4.5.1 Manufacture Products. A majority of the mills produced only surfaced, kiln dried lumber and pallet stock. Only small quantities of green and dry rough lumber were produced by a few sawmills. Pallet stock production appeared to be very dependant on the price relationship between pallet stock and chips. In 1990 most sawmills had a pallet stock production between 20 to 40% of total production. When the price of chips is high the production share of pallet stock is usually between 10 and 20%.

Most sawmills use their own lumber grading rules. Some also use the National Hardwood Lumber Association (NHLA) lumber grading rules. Standard grades are

usually not important for the customer and as one mill manager said: "We don't sell grades; we sell products that are adjusted to the customer's needs." The sawmills' own grading rules have more grades than the five basic grades provided by NHLA. Especially on the export market it is necessary to adjust the grading rules.

For example, in Germany the highest NHLA grade is not equivalent to their highest lumber grade. The consequence of this "grade discrepancy" is that some U.S. mills now are offering regraded lumber of Selects and Better. For example, Northwest Hardwoods (a division of The Weyerhaeuser Company), has created a grade called "Superior", which is lumber practically free from all defects (Eastman, 1991).

Although most sawmills had their own grading rules, they either used them together with NHLA rules or had grades that could be roughly converted to the NHLA rules. According to these grading standards approximately 28% of the lumber was of the highest grade, Selects & Better (Figure 7). The lowest grade, Frame, represented about 17% of lumber manufactured.

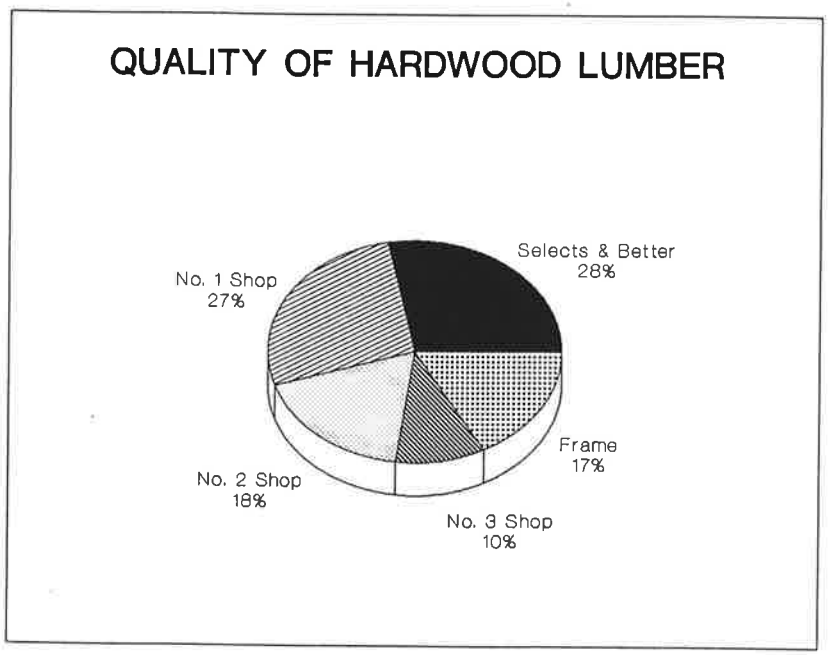

Figure 7. Approximate quality distribution of hardwood lumber from sawmills in Washington state. Grading rules according to National Hardwood Lumber Association.

4.5.2 End Products

Solid wood. Most of the mills interviewed did not have any value-added production, so secondary manufacturing was done at other locations in and outside the state. Since many managers and sales people had direct contacts with domestic buyers, they were knowledgeable about the end uses for their mill's products.
Between 10 and 40% of each mill's alder lumber production had a final use as covered parts in upholstered furniture. This was, together with pallets, the main end product for the lower-quality lumber. The higher-grade lumber was used mostly for furniture where the wood was visible (21%) and for cabinets (22%). Small quantities were also used for mouldings, toys and the do-it-yourself market (Figure 8).

The end use of hardwoods determined from this study can be compared with a study conducted in Oregon (Beachy & McMahon, 1985). That study showed that fine furniture comprised 27%, upholstered furniture 25%, cabinets 23% and pallets 25% of the total hardwood production in that state.

Sawmill residues. About 50% to 80% of the chipped residue from each mill was sold to domestic pulp mills. Some of the mills also exported chips, chiefly to Japan. About 15% of the residue material was used to fire on-site steam generators for lumber drying, or was sold to other mills for this purpose.

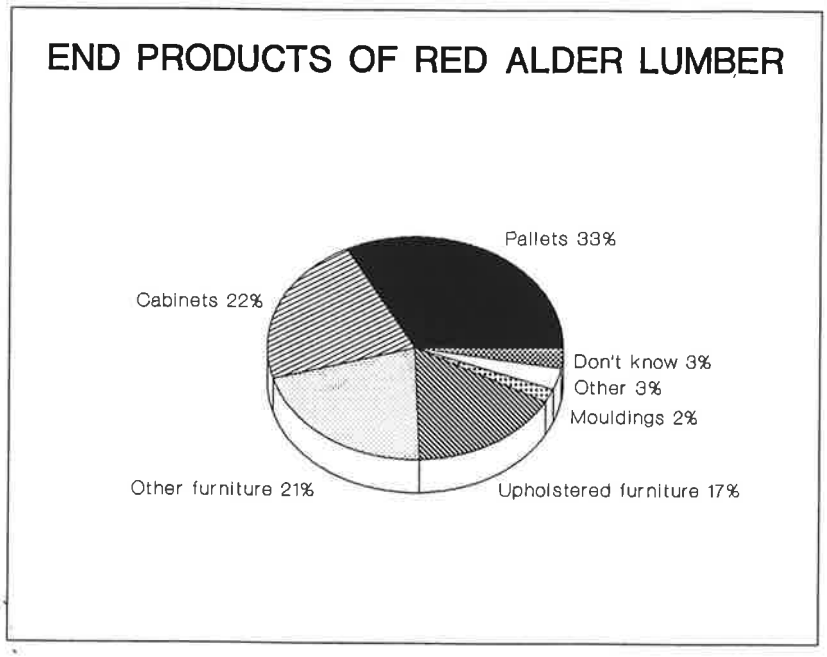

Figure 8. End products of hardwood lumber and pallet stock produced at Washington hardwood sawmills. The percentage may not add up to 100% due to rounding.

4.6 Marketing Profile

4.6.1 Domestic Sales. US domestic sales of hardwood lumber from Washington state sawmills were primarily direct to the customer in 1990. Although selling direct was the preferred channel, all mills also sold via brokers or intermediaries. The proportion that was sold directly differed between mills, varying between 50 and 95% depending on firm size and knowledge of market. The larger sawmills had, in general, more direct sales.

Approximately half of the volume of lumber produced and sold domestically was sold to industries in California (Figure 9). The majority of pallet stock was sold to California while lumber used for furniture, cabinets and mouldings was also sold to Oregon, the Rocky Mountain states, and the Midwest.

Surprisingly, only a small volume of Washington-produced hardwood lumber was further utilized in the state of Washington (about 12% of the domestic sales), which was only about half of Washington-produced hardwood lumber utilized by secondary manufacturers in Oregon state. This substantiates Dirks & Briggs' (1991) results that only about 25% of Washington's secondary manufacturing firms were using alder 1988.

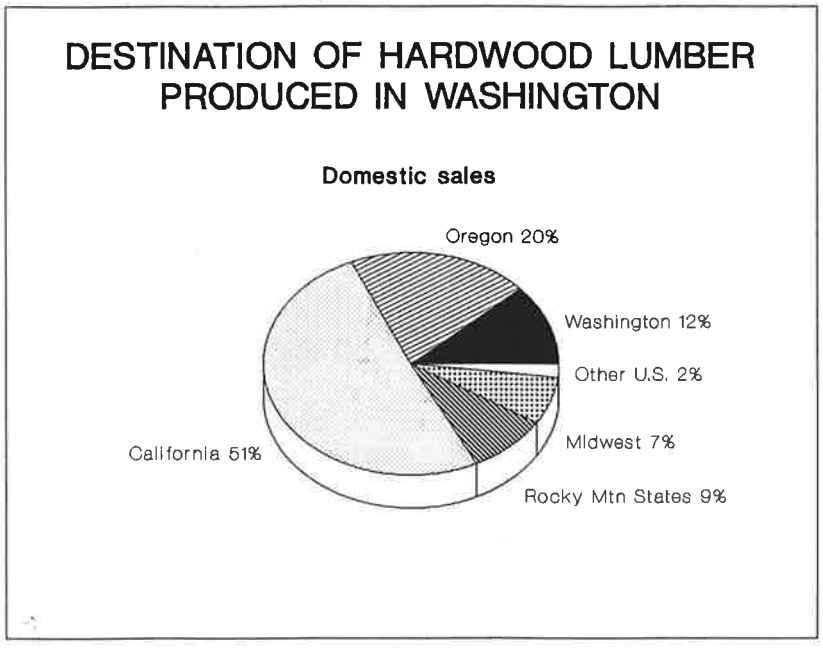

Figure 9. Final domestic destination for hardwood lumber produced in the state of Washington based on volume sold in 1990. The percentage may not add up to 100% due to rounding.

Alder was used in eight remanufacturing firms producing parts and components for other industries. In their survey, 8 firms used alder for final millwork products, 21 for cabinets and 12 for furniture.

The hardwood sawmilling industry produced about 77 MMBF of alder pallet stock in 1990, less than a fifth of which was sold in the Washington. According to a study conducted in 1989, there were 28 firms producing pallets in Washington state, consuming a total of 13 MMBF of alder (Smith, 1991). The rest of the pallet stock was sold to food-processing industries in California, Oregon and Arizona. A small quantity was also exported.

The quality of lumber sold on the domestic market was generally lower than that exported. Qualities most often used by the American furniture and cabinet industry were No. 2 Shop (National Hardwood Lumber Association standards) and lower. Only small quantities of the highest grades, Selects and Better, were sold domestically; the majority of these high grades were exported.

4.6.2 Export Sales. The export of Washington hardwood lumber was found to be about 36% of the sawmills total lumber production. The foreign market is very important for the industry, since it usually purchases the higher-quality products. The principal qualities exported were No. 1 Shop and Selects & Better (National Hardwood Lumber Association standards). All lumber was sold surfaced and kiln dried.

Mills producing more than 10 MMBF exported between 20% and 60% of their lumber production. The major markets were Japan, Italy, Taiwan, South Korea, Mexico and Germany. The highest qualities were sold to Italy, Germany, and Japan, while the lower qualities were more commonly sold to South Korea, Taiwan and Mexico. The main species exported were red alder, representing 95% of the export volume, and bigleaf maple, which accounted for the remainder.

All exporting mills used a broker or an intermediary to market their export products. With few exceptions, at least 70% of each firm's exports were sold this way. Export sales were often initiated by a foreign customer visiting the mill or by the company visiting a foreign country to find customers. About 85% of the sales were established these ways. Other sales were initiated by a broker or foreign agent visiting the mill.

With two exceptions, all mills reported that export prices and domestic prices were the same for the same product. The lumber exported was primarily in thicknesses of 4/4" and 5/4", in lengths of eight and ten feet, while the width of the lumber was random. Only one sawmill sold lumber in metric sizes.

For a more comprehensive and complete picture of the exports of alder lumber from the United States see Chapter 6.

4.6.3 Importance of Product and Service Attributes. Price and product appearance are not the only factors that are important when a customer makes a purchase decision. By asking the mills about different attributes and then rating the importance of each attribute, it is possible to get an indication of which factors are perceived as being most important. In this study the factors were divided into two areas: products quality and characteristics, and service and customer relations. Seventeen factors were rated. The importance for each issue was rated on a seven-point scale where one was "very important" and seven was "not important." Product and service attributes were developed following a review of related studies (Bush, Sinclair & Araman, 1991; Dirks & Briggs, 1991) and through the personal experience of the investigator.

Product factors determined to be most important to the customer were: 1) the ability to provide kiln-dried lumber, 2) accurate grading, 3) high quality, and 4) planed or surfaced lumber (Figure 10 and Table 1). The least important factors were ability to provide a variety of species and custom-cut products. These factors also had the greatest variations in rating between the mills.

Of the ten service and customer relationship attributes, the most important factor was the company's reputation, a factor which all mills rated very important. Other issues rated as very important were the mill's ability to deliver on time and the personal relationship established with the customer (Figure 11 and Table 1). The least important factors were the ability to provide protective packaging and competitive pricing. Although the latter issue's mean importance ranked the lowest, some mills rated it very important.

It should be noted that, with the exception of "variety of species," all attributes from both categories were, on average, at least moderately important. Further, every attribute was given at least "2" by at least one respondent.

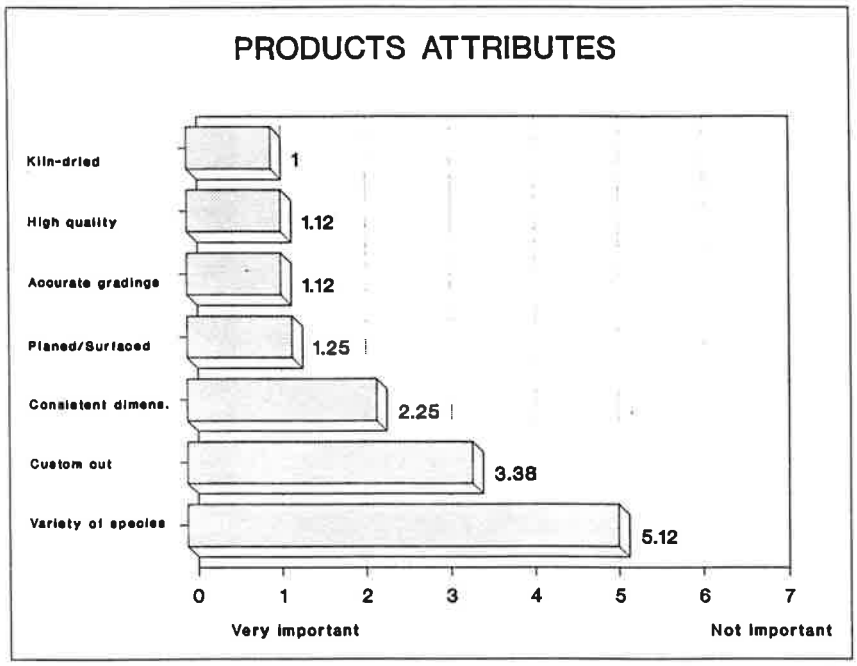

Figure 10. The respondents' perceptions of attributes concerning **products**. Ratings of relative importance to the customer is based on a seven-point scale where: 1 = very important and 7 = not important.

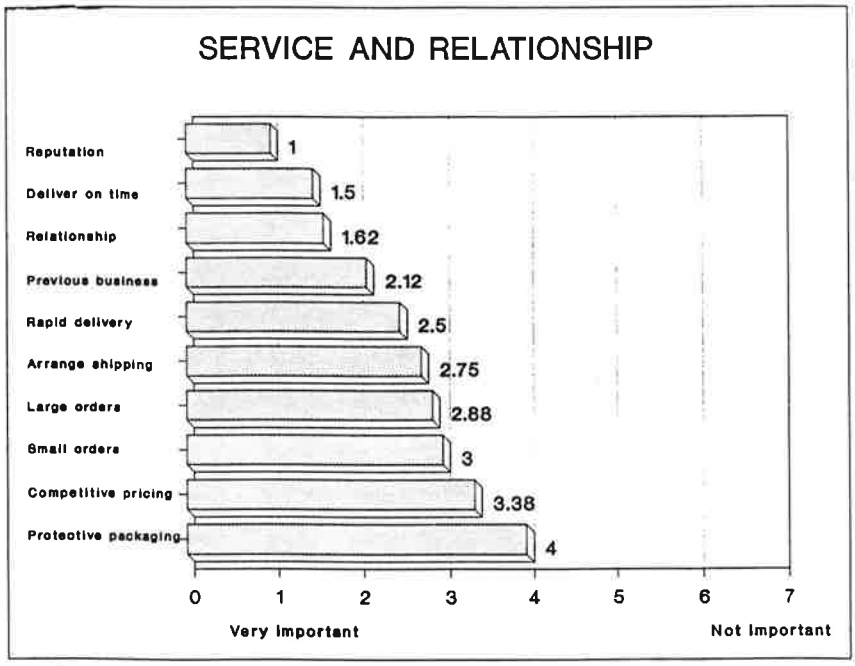

Figure 11. The respondents' opinions of attributes concerning **service and customer relations**. Ratings of relative importance to the customer were based on a seven-point scale where 1 = very important and 7 = not important.

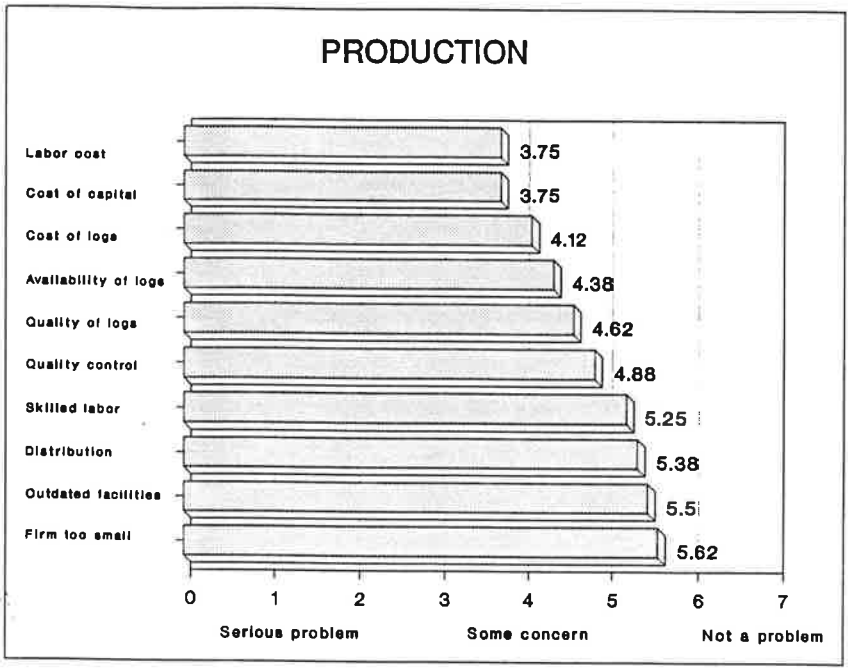

Figure 12. Current **production problems** facing the hardwood sawmills. Ratings were made by managers and presidents of firms on a seven-point scale where 1 = serious problem, 4 = some concern and 7 = not a problem.

Table 1. Hardwood lumber producers' opinions of the importance of different product, service and relationship attributes. The figures shown are mean importance ratings and the range of ratings. Rating of relative importance to the customer is based on a seven-point scale where 1 = very important and 7 = not important.

Product attributes

Supplier's ability to . . .	Mean	Range
provide kiln-dried lumber	1.0	1
provide high quality	1.12	1 - 2
deliver accurate gradings	1.12	1 - 2
provide planed or surfaced lumber	1.25	1 - 3
deliver consistent dimension	2.25	2 - 7
provide custom-cut products	3.38	1 - 7
provide a variety of species	5.12	2 - 7

Service and relationship attributes

Supplier's ...	Mean	Range
reputation	1.0	1
ability to deliver on time	1.50	1 - 4
personal relationship with customer	1.62	1 - 3
customer's previous business with the firm	2.12	1 - 7
ability to provide rapid delivery	2.50	1 - 5
ability to arrange shipping	2.75	1 - 7
ability to fill large orders	2.88	2 - 6
ability to fill small orders	3.0	2 - 5
competitive pricing	3.38	1 - 7
ability to provide protective packaging	4.0	1 - 7

4.7 Current Concerns

Mill managers' biggest current concerns include the future raw material supply and how to obtain consistent quality sawlogs. With the exception of one mill, the availability, quality and cost of timber appears not to be a serious problem at this time (Figure 12 and Table 2). This was determined when the managers of the mills were asked to rate different problems currently facing their firm. Twenty factors were presented and the concerns for each issue were rated on a seven-point scale where "one" was a serious problem and "seven" not a problem. The factors were divided into two areas: one group related to production issues while the second group concerned sales and government regulations.

The results indicate that serious concerns include state and federal regulations, taxes and environmental issues (Figure 13 and Table 2). The mean ratings were between 1.9 and 2.9, which can be interpreted as major problems for the mills. Most managers agreed on these issues. Regulations which concerned managers most were pollution issues and logging restrictions that might limit the timber supply in the future.

Lesser problems seemed to be in the area of sales and marketing. Issues like "contacts on export market", "limited marketing expertise," "lack of customers" and "sales problems" all had high mean ratings (5.4-5.9), which would be equivalent to minor concerns.

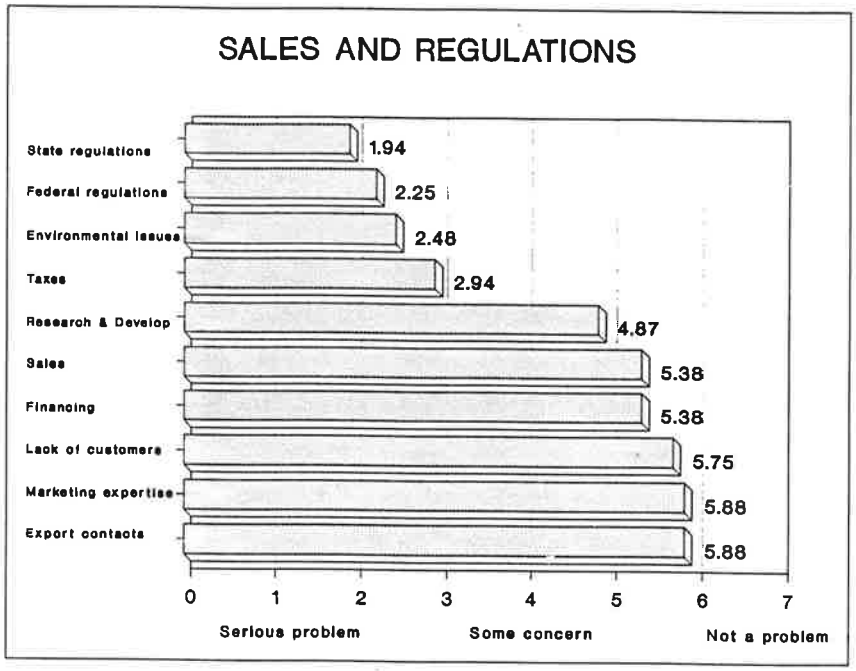

Figure 13. Current **sales and restriction problems** facing the hardwood sawmills. Ratings were made by managers and presidents of firms on a seven-point scale where 1 = serious problem, 4 = some concern and 7 = not a problem.

Table 2. Current problems facing the hardwood sawmills. The figures shown are mean ratings and the range of ratings made by managers and presidents of firms on a seven-grade scale where 1 = serious problem, 4 = some concern, and 7 = not a problem.

	Mean	Range
Raw material issues		
Cost	4.12	1 - 6
Availability	4.38	1 - 7
Quality	4.62	3 - 6
Production issues		
Labor cost	3.75	2 - 5
Cost of capital	3.75	1 - 6
Quality control problems	4.88	1 - 6
Availability of skilled labor	5.25	4 - 7
Distribution problems	5.38	2 - 7
Outdated production facility	5.50	3 - 6
Size of firm is too small	5.62	4 - 7
Sales and regulation issues		
Washington State regulations	1.94	1 - 4
US government regulations	2.25	1 - 4
Environmental issues	2.48	1 - 4
Taxes	2.94	1 - 4
Limited investment in R & D	4.87	2 - 7
Sales problems	5.38	3 - 6
Financial problems	5.38	3 - 7
Lack of customers	5.75	4 - 7
Limited marketing expertise	5.88	3 - 7
Export contacts	5.88	3 - 7

4.8 Future Issues

Sawmill managers were asked to rate the key areas critical for a future successful hardwood sawmill industry. The number one issue and the biggest concern that all mills rated highest was the raw material supply. The concern was not only to produce enough volume in the future, but also to get consistent quality timber. Some of the comments were :

It's not good for the future supply of logs that a lot of smaller trees are chipped today.

The protection of more and more forest land will be a big problem.

It is going to be of vital importance for the DNR (Washington State Department of Natural Resources) to start an active hardwood sale program.

DNR has the volume, and it needs to be placed on the market.

Tell forest owners not to sell logs for chips. Tell them to wait and get a better price for the sawlog.

Log exports should be stopped.

According to some mill managers, large amounts of alder smaller than 8-9 inches in diameter are now chipped because sawmills cannot be competitive and pay the same price for the logs as the chipping facilities. Instead of being a future valuable resource of high quality logs, these logs are now utilized as chips, mainly for the export market.

To secure the future raw material supply it is, in the opinion of the author, crucial that more research be done in forest management to increase the timber quality of hardwoods. It is also necessary to educate many forest owners about how to manage their forests to increase quality of the forest and consequently their value.

Other areas mentioned as important for the future success of the industry were the development of value-added products, availability of a skilled and stable labor force, access to world markets, extended quality control and less government and state regulations.

More value-added products in the future?

Most mills intended to produce more value-added products in the future. The products they considered could be classified into two categories: more custom-made products and more efficiently utilized wood.

Examples of custom products included glued-up panels, finger-jointed products and custom-cut dimensions. The mills have very little value-added production today but they believe it will be necessary to produce more than just lumber in standard sizes in the future. For example, the medium quality lumber (No. 2 Shop), currently in low demand on the market today, can be used in finger-joint production.

It is also believed that mill processes will be more automated in the future. A major reason for this development is that labor costs are higher in Washington state than, for example, California. To be able to compete, sawmills in Washington have to automate their process additionally.

The most important products for the mills in the future were believed to be custom made, high-grade material for the furniture and cabinet industry, mainly for export. With few exceptions, most managers expected to export more in the future than today. Growing markets in the future were assumed to be Mexico and European countries such as Italy and Germany.

4.9 Comparison of hardwood sawmills in Washington and Sweden

The author of this report has also investigated the hardwood industry in Sweden (Ekström, 1990) and found that there are many similarities between the Swedish hardwood industry and the hardwood industry in Washington state. Similarities and differences are presented in this chapter.

The forest industry, both in Sweden and Washington state, has traditionally focused on softwood species. This is despite the fact that large volumes of hardwood timber are found among the timber resources in both regions. There is now a growing interest from industry, forest owners and governments in both countries to manage and utilize this resource more extensively.

Background figures

	Washington	**Sweden**
Land area (million acres)	42.4	100.2
Forest area (million acres)	21.9	42.5
Hardwood timber resource (billion cubic feet)	21.8*	14.1
Hardwood timber resource (% of total resource)	15*	15
Number of hardwood sawmills	9	109
Hardwood lumber production (million board feet)	250	180
Hardwood lumber production (% of total production)	8.0*	2.0
Export of hardwood lumber (% of lumber produced)	35	7
Main hardwood species	Red alder	Birch
	Bigleaf maple	Aspen
	Black cottonwood	Alder
		Oak

*Western Washington only.

Similarities and differences

There are many issues and concerns in the hardwood industry which are alike in Washington and Sweden. The future supply of logs and the lack of knowledge of how to manage hardwood stands are primary concerns in both areas.

Hardwood lumber has similar final uses in both countries. The higher qualities are used for furniture, cabinets and mouldings, while the lower qualities are used mainly for pallets and crates. Sawmills in both regions also have Europe as their fastest growing export market.

The growing interest in hardwood species has also resulted in the establishment of hardwood industry organizations. In Washington, the Washington Hardwood Commission and in Sweden, the Swedish Hardwood Sawmills Association were both established in 1990. The purpose of the organizations is to develop and support the hardwood industry, for instance by developing new products and markets. The organizations also initiate research in hardwood silviculture and management practices.

Some of the principal differences between hardwood sawmills in Sweden and Washington state are:

- The hardwood sawmills in Washington are fewer and generally larger than in Sweden. The five largest mills in Washington produce approximately 90% of the total hardwood lumber production in the state, while the five largest in Sweden produce only 45% of the total production.
- The mills in Washington measure logs either by weight or by board feet scaling. In Sweden logs are measured in cubic meters. Sawmills in Washington purchase logs predominantly according to diameter. A few mills also consider surface quality. The sawmills in Sweden pay according to diameter, length and quality.
- Hardwood sawmills in Washington purchase logs in lengths usually between 20 and 40 feet and buck them into eight or ten foot lengths at the sawmill. In Sweden, logs are usually purchased in lengths between nine and fifteen feet.
- Swedish sawmills have a greater degree of value-added processing than the sawmills in Washington. Approximately 50% of the Swedish sawmills had some kind of value-added production, such as dimension cutting, edge-gluing or component production. Most of these products were produced for the furniture and flooring industry.
- Washington sawmills usually have only two lengths of lumber, eight or ten feet. This is in contrast to the Swedish mills, which have a variety of lengths between nine and fifteen feet in increments of four inches. The most common length is nine feet.
- The lumber sold by Washington sawmills is almost 100% kiln-dried. This is in contrast to the Swedish mills that sell both green, air-dried and kiln-dried lumber.

Swedish sawmills tend to sell direct, without intermediaries and they export less of the lumber produced than the sawmills in Washington.

Case Study: A Successful Swedish Sawmill

One of the most successful and profitable sawmills in Sweden in recent years has been a small hardwood sawmill in a rural area in the southern part of the country. It is small compared with Swedish softwood mills, but it is the largest hardwood sawmill in the country.

The sawmill's annual hardwood lumber production is approximately 15 MMBF. Its 50 employees include workers in the production of lumber, cut stock, dimension lumber and pallets. The labor productivity is 300,000 board feet (BF) per employee. This can be compared to 280,000 BF per employee for the average hardwood sawmill in Washington state producing only lumber, pallet stock and chips.

Some of the reasons that may explain why this sawmill has been so successful are:

- The sawmill is family-owned and has a management interested in new products and new mill technology. They are also interested in continuously exploring new markets. Management continually invests in machinery for automation and for more value-added processing. Most of the profit from the sawmill is invested in long-term projects. Forest owners selling sawtimber to the sawmill are well informed about what dimensions and qualities the sawmill demands.
- The sawmill has a high degree of value-added production. Since lower grade lumber often is more difficult to sell and demand for these lower grades fluctuates more than for higher qualities, the sawmill has chosen to utilize almost one hundred percent of the low-grade lumber in their own pallet production.
- Rather than produce commodity lumber, the sawmill tries to produce as many custom-cut products and components as possible. To be successful in this approach, management seeks to be close to its customers and responsive to customer needs. This has resulted in diversified production, utilizing many different sizes and species.
- To make sure the customers' specific demands can be met, the sawmill has a skilled and loyal labor force which is well paid.
- The management participates in symposia and seminars and prefers to be in close contact with researchers at universities and other institutions. They can then be better informed about ongoing research.

5. PRICES OF RED ALDER LUMBER AND LOGS

5.1 Alder Lumber Prices

As the demand for red alder has increased dramatically, especially in export markets, between 1987 and 1990, the prices of kiln-dried alder lumber have also increased. This has been especially true for the higher qualities.

The price of red alder lumber has increased 26% between 1987 and 1990 which was more than many other U.S. hardwoods. The price of Appalachian white oak and soft maple lumber of highest grade increased 12% and 22%, respectively, while the price of red oak lumber from the same region remained the same (Figure 14).

In September, 1991, the price for the highest grade of red alder, Selects and Better, was $965 per thousand board feet (MBF) for kiln-dried 4/4" lumber. Compared with the average price in 1988, this was up $200 dollars from $766/MBF (Figure 15).

The prices/MBF of kiln-dried, surfaced two-sides, red alder lumber on September 27, 1991, were as follows (All prices are from the price report, *Weekly Hardwood Review* 1985 to 1991. These prices are collected from phone interviews with the major alder manufacturers in Washington and Oregon and from distributors of alder lumber. A complete list of prices for the two major hardwoods in the western US, red alder and bigleaf maple, can be found in Appendix C.):

	4/4"	8/4"
Selects & Better	$ 965	$ 1050
No. 1 Shop	$ 515	$ 570
No. 2 Shop	$ 280	$ 375
No. 3 Shop	$ 200	$ 320
Frame	$ 305	--

Pallet stock	1x4	$ 225
Pallet stock	1x6	$ 225
Pallet stock	2x4	$ 235

The largest price increase of alder lumber occurred during 1989 when the price of kiln dried 4/4" lumber climbed from $800/MBF in January to $955/MBF by December. During 1990 and the first half of 1991 the price remained stable at around $ 950. The price of Selects & Better has remained stable during 1990 and 1991 mainly because of strong export markets to Japan, Italy and Germany.

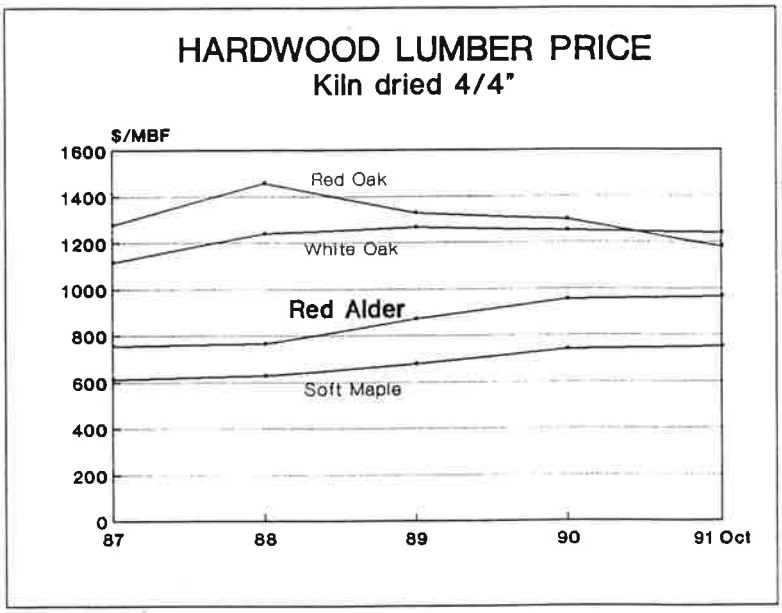

Figure 14. Prices of kiln dried hardwood 4/4" F O B mill from 1987 to October 1991 (yearly average prices for 1987-1990). All prices, except for red alder, are for the Appalachian region and for grade FAS/1F. Red alder prices are for the Pacific Northwest and for grade Selects & Better. It should be noticed that Appalachian lumber, unlike western red alder, is measured green, which is approximately seven percent higher volume than dry lumber. Sources: *Hardwood Review Yearbook 1990*, 1990 and *Weekly Hardwood Review*, October 1991.

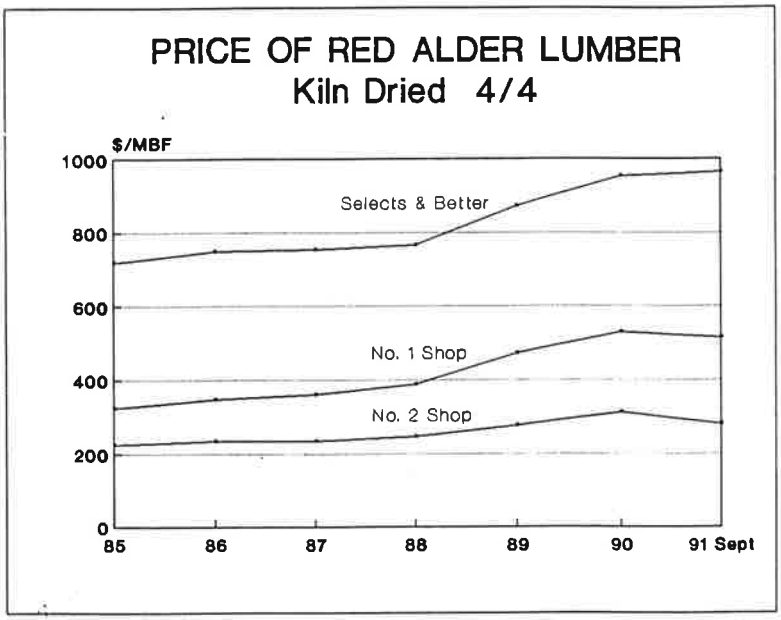

Figure 15. Price of kiln dried red alder lumber 4/4" F O B mill from 1985 to September 1991. The prices are yearly averages and for the three highest grades, Selects & Better, No. 1 Shop and No. 2 Shop. Sources: *Hardwood Review Yearbook 1990*, 1990 and *Weekly Hardwood Review* September 1991.

The price of No. 1 and No. 2 Shop has also increased and followed the same pattern as Selects and Better. From January 1988 to December 1989 the price of these grades increased 44 and 34%, respectively. During 1990 prices stabilized at around $530/MBF and $315/MBF respectively. For the first six months of 1991 the price decreased five percent for No. 1 Shop and 12% for No. 2 Shop.

5.2 Alder Log Prices

The price for alder logs has slightly increased between 1987 and 1991. The increase has been less than for alder lumber. Log prices in September 1991 were ($/MBF):

Diameter (Inches)	Southwest Washington	Puget Sound
6 - 7	130	(5-7) 140 - 150
8 - 9	200 - 220	180 - 190
10 -11	220 - 240	210 - 220
12 -14	250 - 265	240 - 250
15+	280	270 - 280

Source: *Pacific Rim Wood Market Report*, 1991.

The largest price increase between 1987 and 1991 has been for logs with a diameter of 15 inches and greater, which was approximately 24%. The price for smaller logs has increased between 12 and 19% depending on diameter (Figure 16).

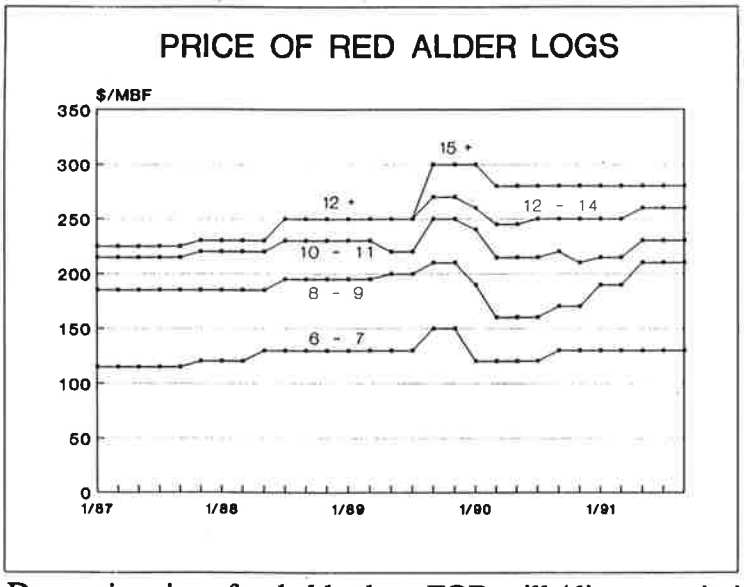

Figure 16. Domestic price of red alder logs FOB mill (diameters in inches). Sources: *Pacific Rim Log Market Report*, 1987-1988, *Pacific Rim Wood Market Report*, 1989-1991.

6. EXPORTS OF RED ALDER FROM THE U.S.

As discussed in Chapter 3, the export volume statistics from the U.S. Department of Commerce have greatly overstated the volume of hardwood lumber exported during the 1980's (Luppold & Thomas, 1991). Because of this problem, the USDA Forest Service, Forestry Sciences Laboratory has used data from the Journal of Commerce's "Port Import Export Reporting Service" (PIERS) to obtain more reliable trade statistics.

In this chapter, volume statistics for Asia and Europe are from PIERS and for other regions from the U.S. Department of Commerce. Values per unit are those reported by the U.S. Department of Commerce. The accuracy of the average unit prices was confirmed by discussions with experts in hardwood trade and exporters of red alder.

Export figures in this chapter are from the entire United States. For western red alder, this applies to the only two red alder lumber producing states, Washington and Oregon.

6.1 Exports of Red Alder Logs

6.1.1 Volumes of Exported Red Alder Logs. Red alder log exports have grown significantly during the late 1980's. From 1981 to 1986, annual log exports were only about one million board feet (MMBF). During 1990, total log exports were up to 33 MMBF, which makes red alder the most exported hardwood species in the United States. Growth of alder exports has been greatly fueled by South Korea, which has increased its imports from about 0.8 MMBF in 1986 to 23 MMBF in 1990.

Over the years almost all alder log exports have been to three countries: Japan, South Korea and Taiwan. However, the ranking between them has changed. In 1987 Taiwan was the largest buyer with South Korea as the second largest (Figure 17); but during 1990 South Korea accounted for 71% of the total trade in alder logs (Figure 18).

Most of the logs exported to Korea, about 90%, were small logs of "pulpwood size" suggesting that they were used for pulp and not sawn for lumber (Luppold, 1991). Another indication that reinforces this assumption is that logs exported to South Korea (and also to Taiwan) had a much lower unit price than logs exported to other countries.

6.1.2 Total Value of Exported Red Alder Logs. The prices of logs reported by the U.S. Department of Commerce are showing major errors because of reporting problems attributed to freight carriers and forwarders who handle much of the paperwork. Therefore the values presented in this chapter should only be seen as approximate values.

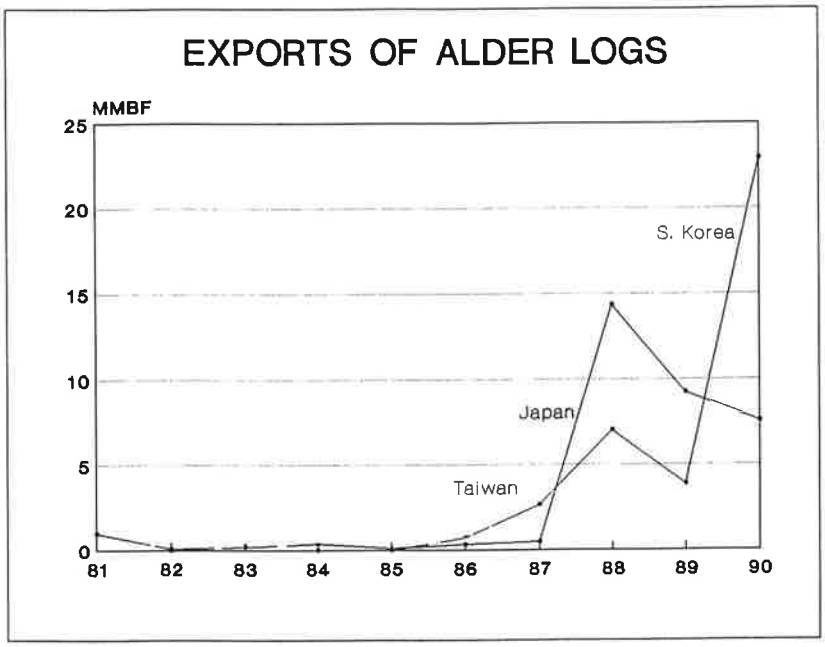

Figure 17. The total export **volume** of western red alder **logs**, from the US, 1981-1990. The figures for 1990 are preliminary. Source: USDA Forest Service, Forestry Sciences Laboratory.

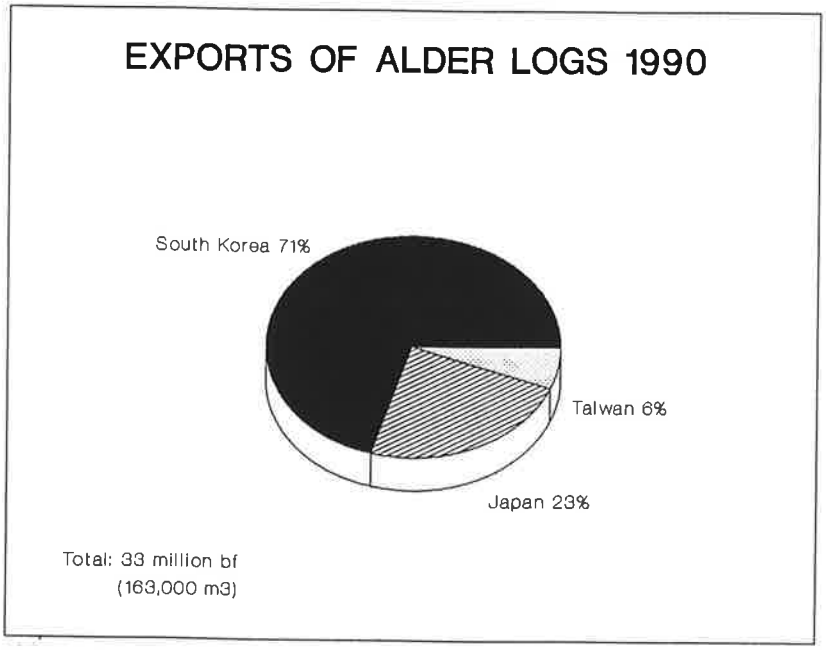

Figure 18. Countries to where western red alder **logs** were exported in 1990. Shares based on **volumes**. The figures are preliminary. Source: USDA Forest Service, Forestry Sciences Laboratory.

By combining the volume of logs reported by PIERS and the unit value reported by U.S. Department of Commerce, the 1990 total value of alder log exports is estimated to be $13.5 million, up from $5.3 million the year before. South Korea's share was 60%, Japan's 34% and Taiwan's 5%.

6.2 Exports of Red Alder Lumber

The lumber export statistics used in this chapter originate from ocean freight manifests. By comparing the export volumes according to these manifests with information from the hardwood sawmills in the Pacific Northwest, a discrepancy can be noticed. The actual export volumes of red alder lumber are 20 to 25% higher than presented in the official statistics.

6.2.1 Volumes of Exported Red Alder Lumber. There has been a substantial increase in the export of alder lumber during the 1980's. In 1981 the export trade of alder lumber totalled only 2 MMBF. Ten years later in 1990 the trade had reached 56 MMBF (Figure 19). The most important single market during this period has been Japan, even though its share has been declining. The Japanese market accounted for 95% of the lumber exported in 1981, while in 1990 its share had decreased to 55%. The new and growing market has been Europe, which now purchases about 25% of the alder lumber exported (Figure 20).

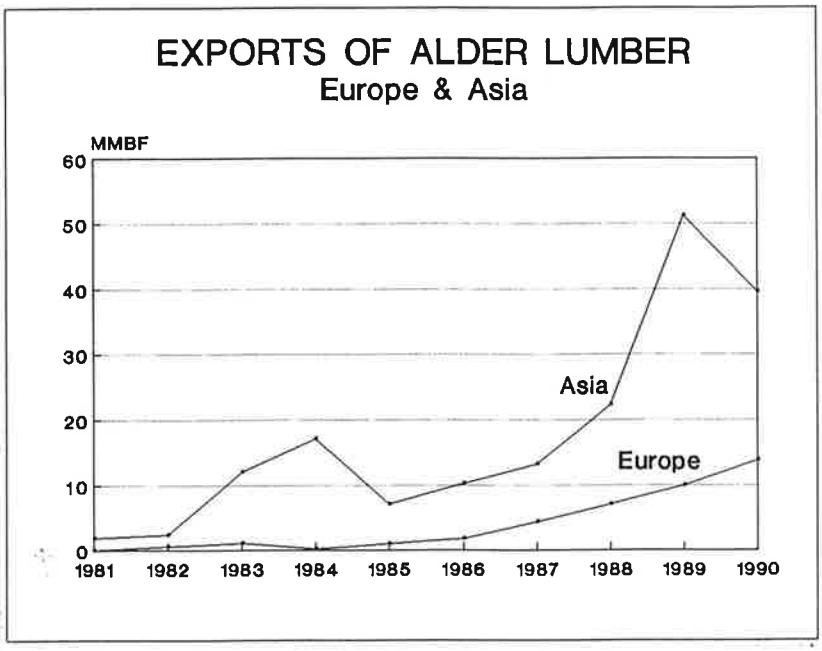

Figure 19. The total export **volume** of red alder **lumber** to Asia and Europe 1981-1990. The figures for 1990 are preliminary. 10 MMBF = 23,600 m^3. Source: USDA Forest Service, Forestry Sciences Laboratory.

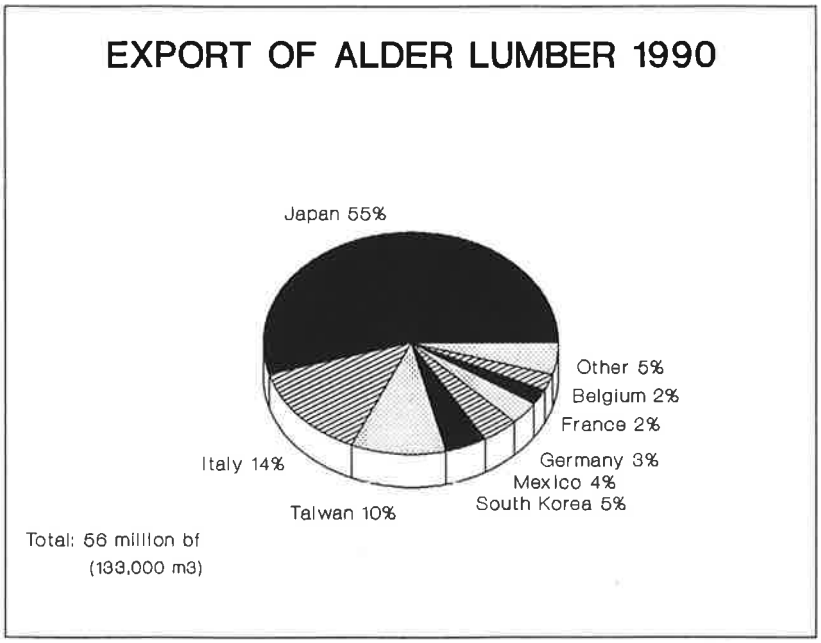

Figure 20. Importing countries and their share of the total trade with red alder **lumber** 1990, based on **volume**. The figures are preliminary. The percentage may not add up to 100% due to rounding. Source: USDA Forest Service, Forestry Sciences Laboratory.

The importance of the export of alder lumber has increased more and more over the years and the share is now 12% of the total hardwood exports from the U.S. This makes alder the third most important hardwood species exported (Figure 21 and Appendix D). In 1981 alder's share was only 1.5% of total U.S. hardwood lumber exports.

Export to Europe. In the beginning of the 1980's there was little trade in alder lumber between the U.S. and Europe. Only in the last few years has the trade grown dramatically, from 2 MMBF in 1986 to 13.8 MMBF in 1990 (Figure 22).

The main importing countries have been Italy, West Germany, and France (Figure 23). Italy alone imported 7.8 MMBF of alder lumber in 1990, which was more than half of the total export to Europe. The amount of red alder exported to Germany is larger than the figures indicate. This is because some of the alder lumber shipped to Belgium and Netherlands is transshipped overland to wood manufacturing firms in southern Germany (Jensen International, 1991). Other countries that have entered the market recently include the Netherlands, Spain, United Kingdom, Denmark and Sweden. These countries are now buying small quantities, but there is a growing

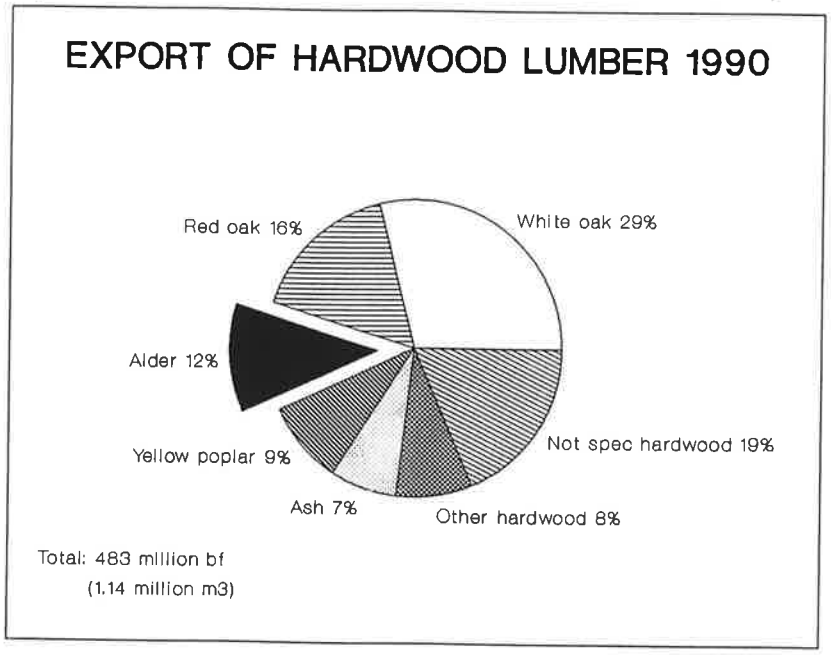

Figure 21. Western red alder share of total hardwood **lumber** exported to Asia and Europe 1990 based on **volume**. The figures are preliminary. Source: USDA Forest Service, Forestry Sciences Laboratory.

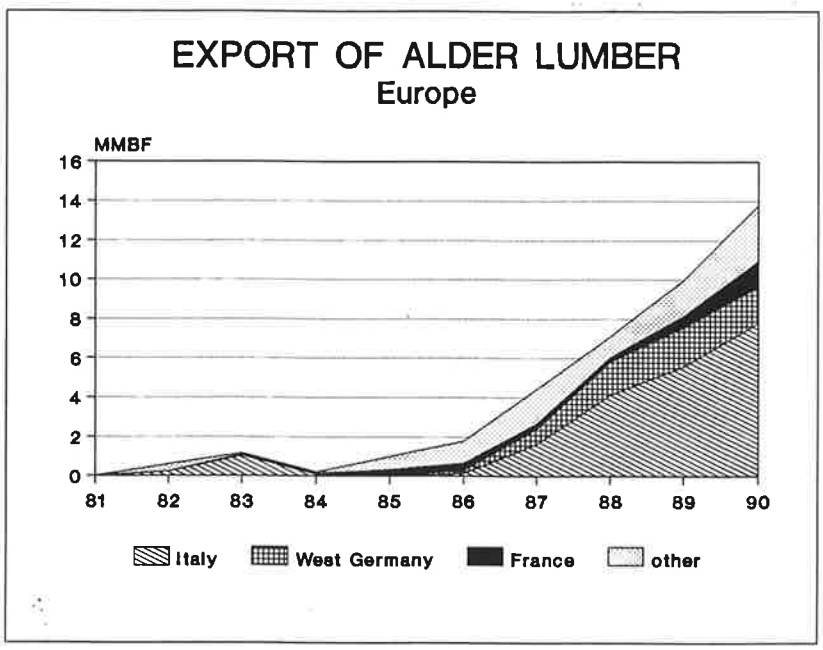

Figure 22. The export **volumes** of western red alder **lumber** to Europe, including the three main buyers from 1981-1990. The figures for 1990 are preliminary. 10 MMBF = 23,600 m^3 Source: USDA Forest Service, Forestry Sciences Laboratory, Princeton.

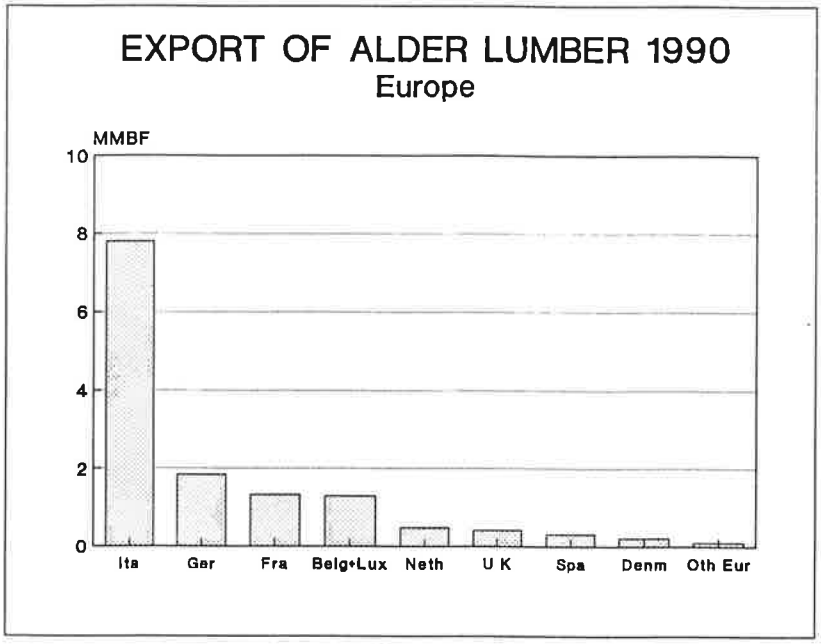

Figure 23. The total export **volumes** of western red alder **lumber** to Europe 1990. The figures are preliminary. 1 MMBF = 2360 m^3 Source: USDA Forest Service, Forestry Sciences Laboratory.

interest in alder. The trade is predicted to grow, provided Pacific Northwest sawmills can deliver the demanded qualities. One reason for this increasing demand is the European countries' attempts to substitute temperate species for tropical species.

Export to Asia. Asia has historically been the main export market for red alder lumber produced in the Pacific Northwest. Starting with small quantities, about 2 MMBF in 1981, it has increased almost 20 times during the last ten years to 40 MMBF during 1990 (Figure 24).

In 1981 the export of alder lumber was primarily to Japan. Its share of the total trade in alder lumber has declined, but the Asian region is still a dominant trade partner, with more than 60% of the export market. During 1990 Japan, Taiwan and South Korea were the three principal buyers of alder in Asia accounting for 39.0 MMBF of the total 39.5 MMBF exported to the region. Other countries that imported smaller quantities were Saudi Arabia, Hong Kong, Indonesia, Thailand and China (Figure 25 and Appendix E).

Export to North American countries. Smaller quantities of alder lumber were exported within North America. Mexico and Canada imported 0.4 and 2.3 MMBF, respectively, during 1990. This was almost five percent of the total world trade of western red alder lumber.

Export to other countries. There were only small quantities of lumber exported to areas other than Europe, Asia and within North America. Some lumber was exported to Australia (9 MBF), and to the Marshall Islands (8.5 MBF).

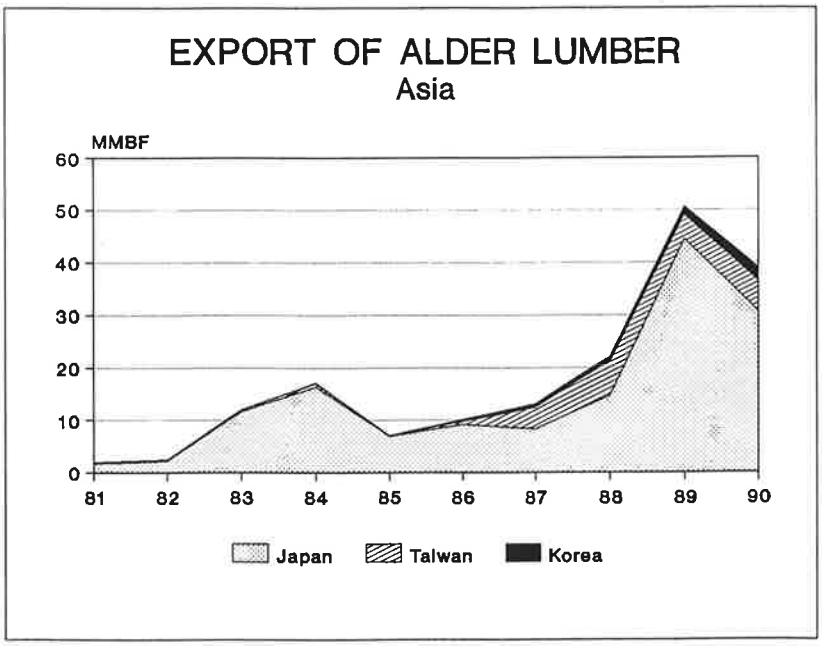

Figure 24. The export **volume** of western red alder **lumber** to Asia, including the three main buyers, from 1981-1990. The figures for 1990 are preliminary. 10 MMBF = 23,600 m^3 Source: USDA Forest Service, Forestry Sciences Laboratory.

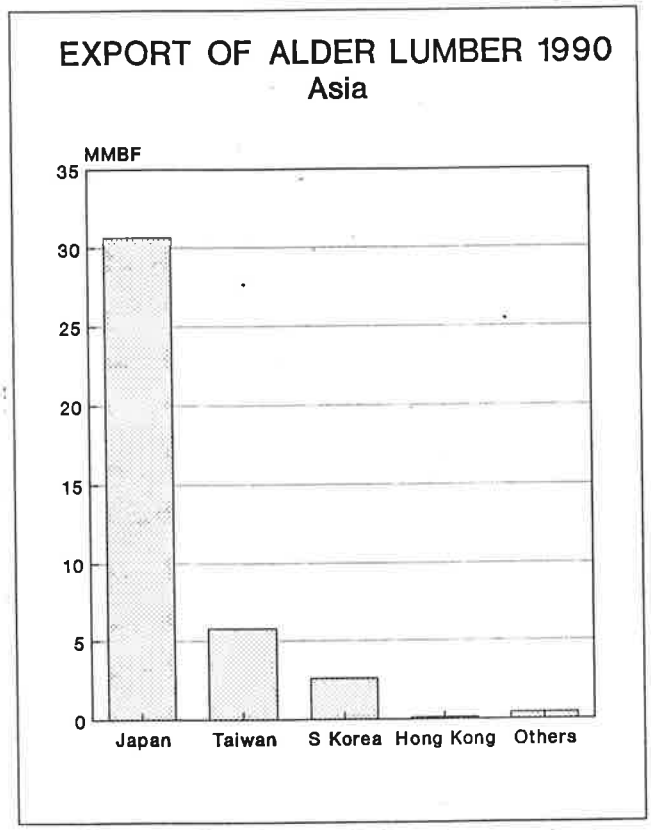

Figure 25. The export **volumes** of western red alder **lumber** to Asia 1990. The figures are preliminary. 10 MMBF = 23,600 m^3 Source: USDA Forest Service, Forestry Sciences Laboratory.

6.2.2 Unit Value for Exported Red Alder Lumber. Since the quality and finish of the lumber can vary, the unit value of lumber exported also differs. The difference between the lowest and the highest average unit price were substantial, with the highest price more than 2.5 times the lowest. The lowest unit value of exported alder lumber was $418/MBF for lumber sold to Indonesia.

The highest average price was paid by Italy at $1,084/MBF. The overall average export price on alder lumber, during 1990, was $850/MBF. In general the unit price for lumber sold to Europe was higher than that sold to Asia and North America. The reason for this price difference was that almost all the lumber purchased by European countries was of high quality, while lumber sold to other regions was of mixed qualities.

Export to Europe. The average price of alder lumber sold to Europe was $1,044/MBF. The highest prices, between $1,050 and $1,084/MBF, were paid by Italy, West Germany and Sweden. The lowest prices were paid by Ireland and Spain, paying $494/MBF and $527/MBF, respectively (Figure 26 and Appendix E). Most of the lumber sold to Europe were of high quality. This was in contrast to Asia, where large volumes of lower quality lumber were imported.

Export to Asia. The average price of lumber sold to Asia was $792/MBF. Japan and Saudi Arabia paid the highest price, approximately $870/MBF. The lowest prices were paid by Indonesia, Taiwan and Hong Kong, who paid between $418 and $527/MBF (Figure 27). The average price to Asia was lower than the average world price, which indicates that lower qualities were sold to Asia than Europe. Large quantities of high-grade lumber were sold to Japan, but since there was also lower-grade material sold, the average price was relatively low.

Export to North American countries.
There were lower qualities of lumber exported to Mexico than to Canada. For example, the average price for frame material sold to Mexico for use in furniture was $640/MBF. This was well under the world average price. The Canadian average lumber price was $845/MBF.

6.2.3 Total Values of Exported Red Alder Lumber. The total trade value of red alder lumber in 1990 was $48 million. The two main importing countries were Japan and Italy, together accounting for $35 million. More than 66% of the trade value was with Asia and about 30% with Europe this is in comparison with the volume shares which were 70% and 25%, respectively. This suggests that the lumber sold to Europe was of higher quality.

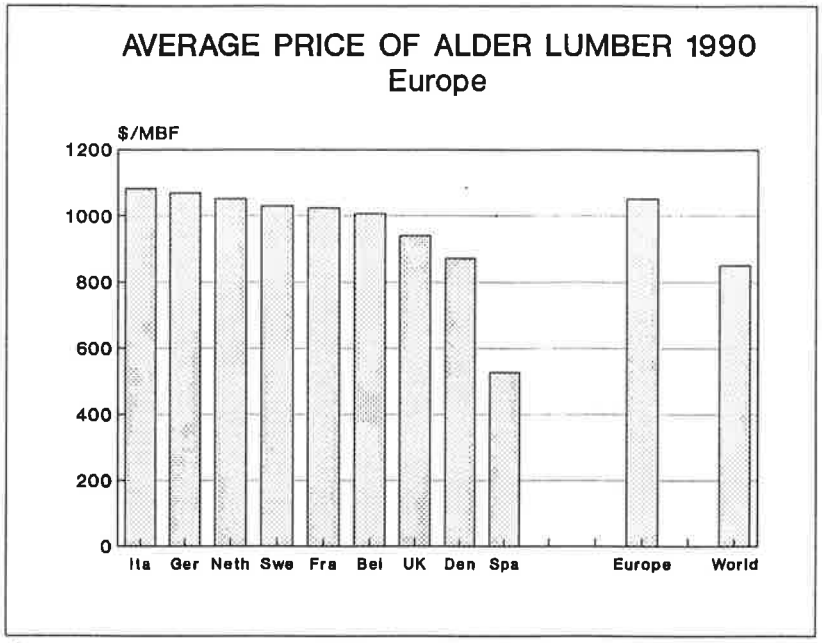

Figure 26. The **average price** of western red alder **lumber** exported to Europe 1990. 1 MBF = 2.36 m^3 Source: U.S. Department of Commerce.

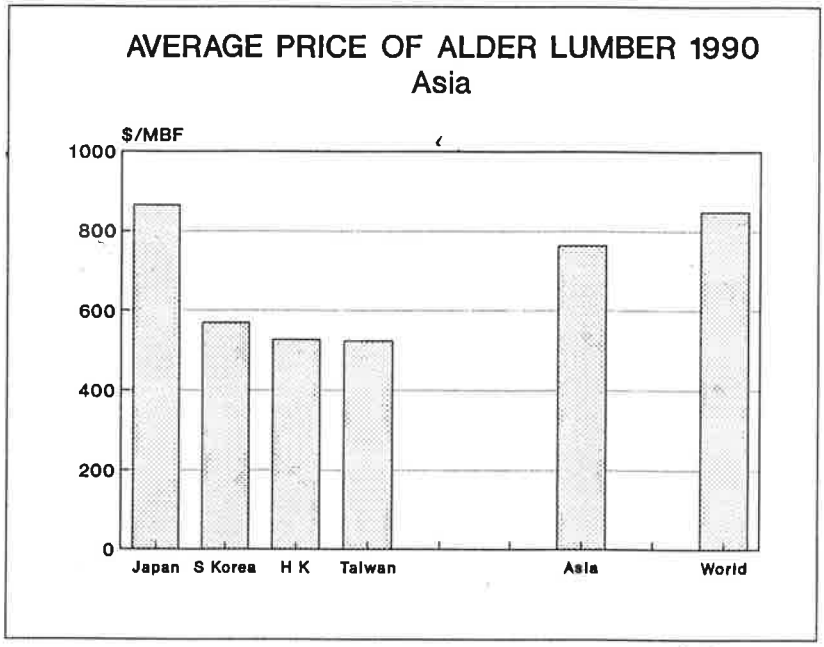

Figure 27. The **average price** of western red alder **lumber** exported to Asia 1990. 1 MBF = 2.36 m^3 Source: U.S. Department of Commerce.

Export to Europe. During 1990 European countries imported alder lumber from the United States worth $14.4 million. Italy, West Germany, France and Belgium were the main importers with a share of 91% of the value on the European market (Figure 28 and Appendix E).

Export to Asia. Asian countries purchased red alder lumber worth $31.1 million during 1990. There were eight countries importing lumber, most of them bought small quantities at a low average price. Japan, Taiwan and South Korea bought $26.5, $3 and $1.5 million, respectively, which was 99% of the total trade in Asia.

Export to other countries. Other markets except for Europe and Asia were comparably small, with a total sales value of $2.9 million. Most of these were sales to Mexico and Canada.

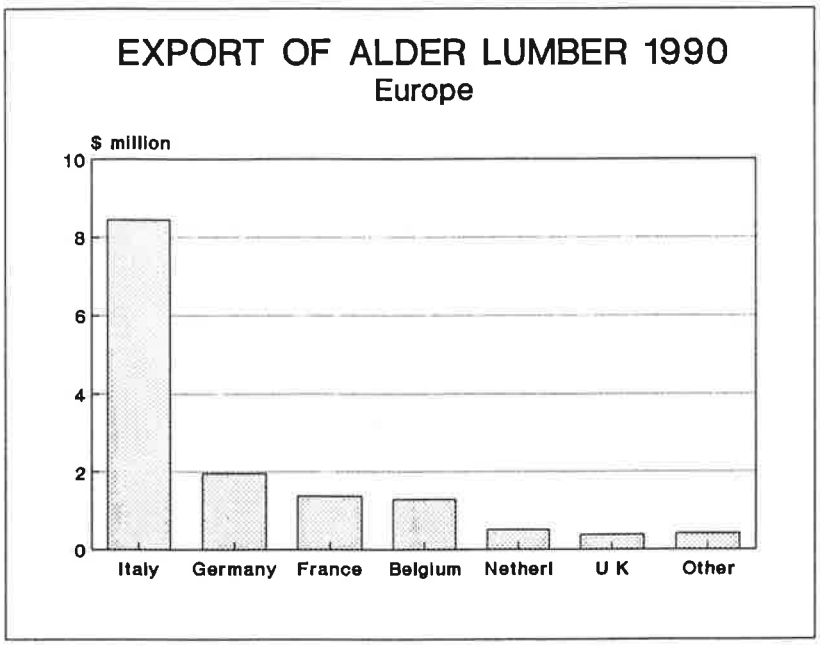

Figure 28. The export **values** of western red alder **lumber** to Europe 1990. The figures are preliminary. Sources: USDA Forest Service, Forestry Sciences Laboratory and U.S. Department of Commerce.

7. HARDWOOD TIMBER RESOURCE IN WASHINGTON STATE

7.1 Hardwood Sawtimber Supply

The resource statistics in this chapter are from the 1989 timber resource inventory in Western Washington. The data is preliminary and is also presented in a draft by MacLean, Ohmann & Bassett at the USDA, Forest Service, Pacific Northwest Research Station, 1991. In the statistics, Western Washington was divided into three areas: Puget Sound area, Olympic Peninsula and Southwest Washington. See Appendix F for the definition of each area.

Terminology used in this section is explained in Appendix F and a map of counties in the state of Washington can be found in Appendix G.

Almost the entire supply of hardwoods in the state is concentrated to the west of the Cascade Range. In this region 15% of the net volume of growing stock on timberland was hardwoods in 1989. In the northern part of the state, the share was 18%, while the area closer to the state of Oregon contained about 12% hardwood species. The total volume of hardwoods on timberland in Western Washington was 6.32 billion cubic feet. Red alder was the most common species (67%) and accounted, together with bigleaf maple and black cottonwood, for 95% of the hardwood volume (Figure 29).

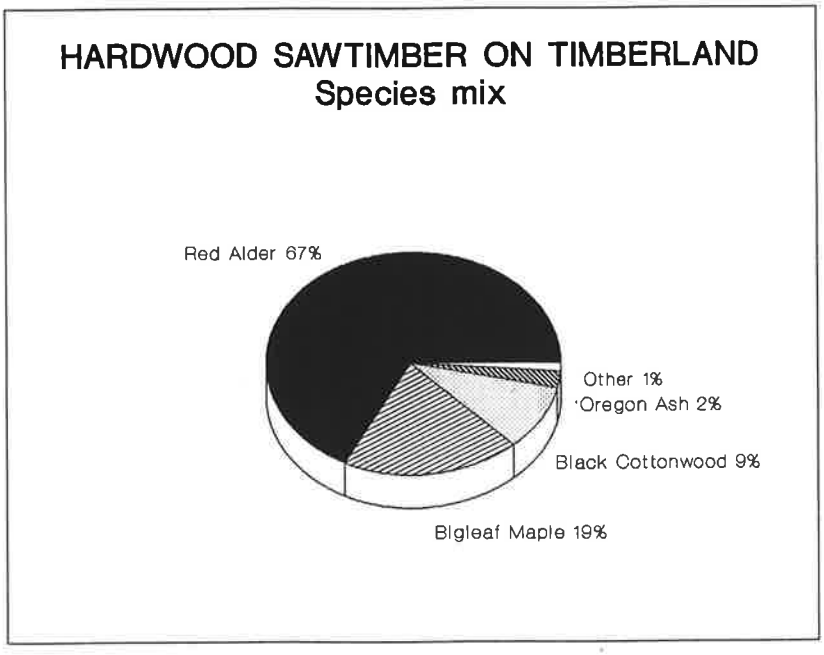

Figure 29. Species mix of hardwood sawtimber on timberland in Western Washington in 1989. The percentages may not add up to 100% due to rounding. Source: MacLean, Ohmann & Bassett, 1991.

The net volume of hardwood sawtimber on timberland in Western Washington was 21.8 billion board feet (BBF). Most of this volume, about 78%, grew on private land (Figure 30). The rest of the sawtimber volume grew on state land. On the Olympic Peninsula and in the southwest, most of the volume was owned by the forest industry, while in the Puget Sound area, a majority was owned by private owners other than the forest industry, for example farmers and Native Americans.

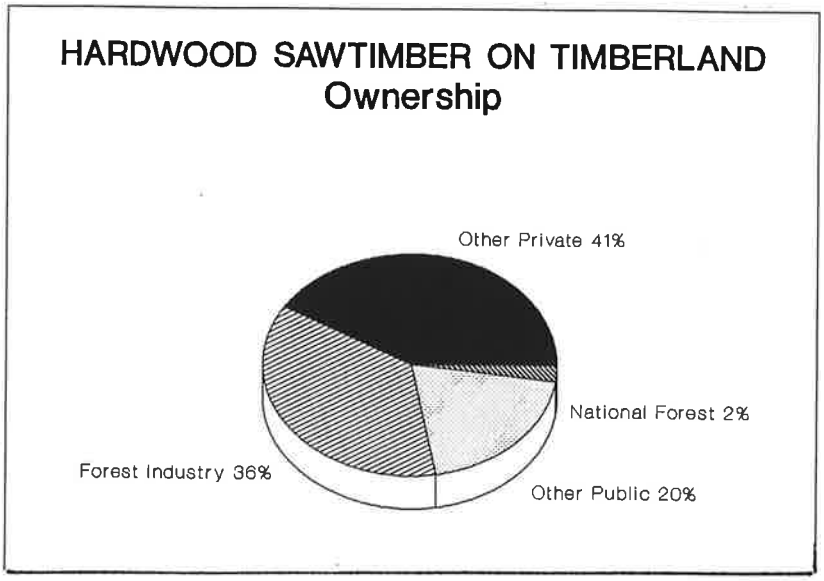

Figure 30. Ownership of hardwood sawtimber on timberland in Western Washington based on volume. The percentages may not add up to 100% due to rounding. Source: MacLean, Ohmann & Bassett, 1991.

7.1.1 Puget Sound area. Approximately half of the growing stock of hardwoods in this region is found in pure red alder stands. The second most common forest type was alder mixed with coniferous species (Table 3). This region has the largest volumes of red alder in the state, about 1500 million cubic feet in pure stands.

The Puget Sound area has the largest volume of hardwood sawtimber, 9.319 BBF, and also the state's highest volume per acre, 20.9 MBF. Most of this volume was in the diameter class 13 to 17 inches (Table 4), although the average diameter was 17.5 inches. The region had a large share of black cottonwood with diameters greater than 21 inches.

7.1.2 Olympic Peninsula area. Pure red alder and red alder mixed with conifer were the main hardwood forest types and accounted for 82% of the net volume growing stock (Table 5). Most of the red alder in the mixed stands was sawtimber, while the alder in the pure stands to a large extent was smaller than sawtimber size.

Table 3. Net volume of growing stock on timberland by forest type and stand size class in the **Puget Sound area**, Washington, 1989. Figures are preliminary. Source: MacLean, Ohmann & Bassett, 1991a.

Forest type	Stand-size class: Saw-timber	Pole-timber	Seedling-sapling	Total
	-------Million Cubic Feet-------			
Red Alder	1229	273	11	1512
Red Alder/Conifer	437	215	10	662
Bigleaf Maple	235	73	--	308
Bigleaf Maple/Conifer	122	--	--	122
Black Cottonwood	110	--	4	114
Western Paper Birch	40	42	12	94
Oregon Ash	37	--	--	37
Bitter Cherry/Conifer	--	20	--	20
Bitter Cherry	15	--	--	15
Pacific Madrone	--	12	--	12
Total	**2224**	**635**	**37**	**2896**

Table 4. Net volumes of sawtimber on timberland by species and diameter class in the **Puget Sound area**, Washington, 1989. Figures are preliminary. Source: MacLean, Ohmann & Bassett, 1991a.

Diameter class	Species: Red Alder	Bigleaf Maple	Other	Total	Share
Inches	----------MMBF Scribner----------				%
9 - 13	1448	283	141	1873	20.1
13 - 17	2677	596	227	3499	37.5
17 - 21	1082	511	392	1985	21.3
> 21	506	595	862	1965	21.1
Total	**5712**	**1985**	**1623**	**9319**	**100.0**

Table 5. Net volume of growing stock on timberland by forest type and stand-size class in the **Olympic Peninsula**, Washington, 1989. Figures are preliminary. Source: MacLean, Ohmann & Bassett, 1991b.

Forest type	Stand-size class			Total
	Saw-timber	Pole-timber	Seedling-sapling	
	-------Million Cubic Feet-------			
Red Alder	661	402	22	1085
Red Alder/Conifer	762	67	16	845
Bigleaf Maple	120	31	--	151
Bigleaf Maple/Conifer	73	46	2	121
Black Cottonwood	81	--	--	81
Oregon Ash	49	--	4	53
Pacific Madrone/Conifer	17	--	--	17
Other	3	11	--	14
Total	1765	557	44	2366

On the Olympic Peninsula, 90% of the hardwood volume was either red alder or bigleaf maple (Table 6). Other species that could be found in small quantities were black cottonwood and Oregon ash. More than 42% of the volume was in the diameter class 13 to 17 inches, with an average diameter of 16.8 inches. It is interesting to note is that almost half of the volumes of maple were greater than 21 inch in diameter.

Table 6. Net volumes of sawtimber on timberland by species and diameter class in the **Olympic Peninsula**, Washington, 1989. Figures are preliminary. Source: MacLean, Ohmann & Bassett, 1991b.

Diameter class	Species				
	Red Alder	Bigleaf Maple	Other	Total	Share
Inches	----------MMBF Scribner----------				%
9 - 13	1234	120	50	1404	22.6
13 - 17	2242	245	145	2633	42.4
17 - 21	749	222	167	1139	18.3
> 21	290	467	279	1036	16.7
Total	4516	1055	641	6211	100.0

7.1.3 Southwest Washington. This region had the largest sawtimber volumes of bigleaf maple, 391 million cubic feet, in pure and mixed stands (Table 7). Except from stands with alder and maple, there were few other forest types of hardwoods. The volumes of poletimber and seedlings, which are trees smaller than 11 inches in diameter, were small compared with other regions in the state. An explanation could be that since a majority of the pulp mills in the state are located here many whole log chippers process hardwood pulp logs into chips in this region. Also, most of exported hardwood chips are produced and shipped from ports in southwest Washington.

In addition to this, much of the forest land is industry-owned and they have traditionally been more active than other forest owners in herbicidal spraying of deciduous trees.

Table 7. Net volume of growing stock on timberland by forest type and stand-size class in **Southwest Washington**, 1989. Figures are preliminary. Source: MacLean, Ohmann & Bassett, 1991c.

Forest type	Stand-size class			Total
	Saw-timber	Pole-timber	Seedling-sapling	
	------Million Cubic Feet------			
Red Alder	815	357	31	1203
Red Alder/Conifer	537	66	1	604
Bigleaf Maple/Conifer	247	8	--	255
Bigleaf Maple	144	14	--	158
Black Cottonwood	46	--	--	46
Oregon Ash	26	22	--	47
Oregon White Oak/Conifer	10	--	--	10
Bitter Cherry/Conifer	--	13	--	13
Total	1826	479	32	2337

The total hardwood volume in southwest Washington was 6.241 BBF (Table 8). This part of the state had the lowest share of hardwoods with only 9.9% of the total sawtimber volume. This region also had the lowest volumes of hardwoods per acre, 16.6 MBF. The largest diameters of hardwoods in Washington were in southwest with an average diameter of 19.3 inches. The overall average for hardwoods in the state was 17.8 inches.

7.2 Hardwood Harvest

The harvest of hardwood timber has increased dramatically in the last five years, from 276 MMBF in 1984 to 512 MMBF in 1989 (Larsen, 1990). This is a trend that has been going on since the 1950's (Figure 31). Because of difficulty with collecting information about harvest volumes, the figures should only be seen as a trend, and not as actual harvest levels. The harvested volume in 1989 was 9.5% of the total harvest in Western Washington, up from six percent five years earlier.

Table 8. Net volumes of sawtimber on timberland by species and diameter class in **Southwest Washington**, 1989. Figures are preliminary. Source: MacLean, Ohmann & Bassett, 1991c.

Diameter class	Species				
	Red Alder	Bigleaf Maple	Other	Total	Share
Inches	----------MMBF Scribner----------				%
9 - 13	1008	159	47	1214	19.5
13 - 17	2089	306	69	2465	39.5
17 - 21	960	311	116	1387	22.2
> 21	398	423	356	1176	18.8
Total	4454	1199	587	6241	100.0

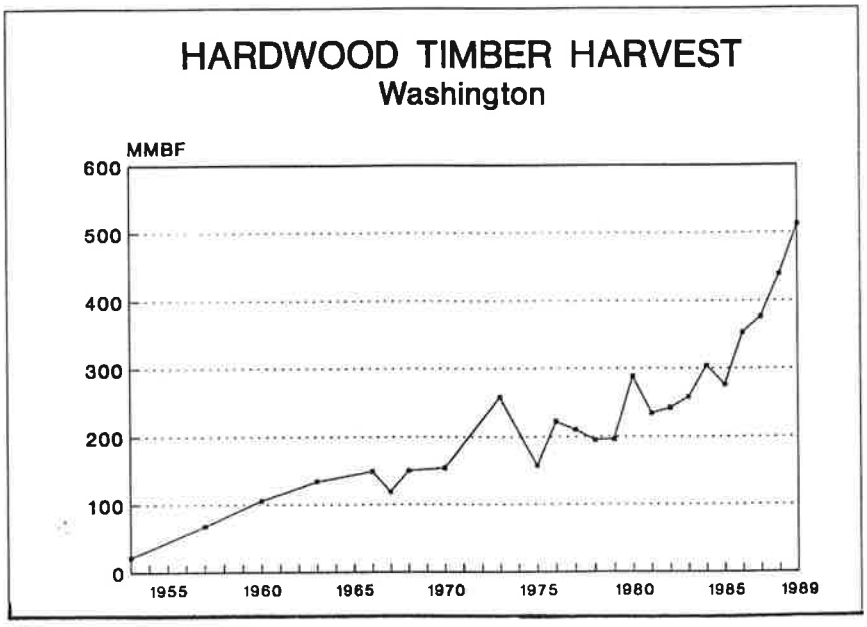

Figure 31. The total hardwood timber harvest in Western Washington 1953-1989. Sources: Larsen, 1990.

In the report of annual harvest (Larsen, 1990), the harvested trees are classified in four categories: old growth, young growth, cull/utility and salvage (see Appendix F for definitions). Old and young growth is material that can meet recognized log grades and can be utilized for lumber, while cull/utility logs usually are used as pulpwood. Most hardwoods harvested are categorized as young growth which can be seen from the following:

	MMBF	%
Old growth	1.4	0.3
Young growth	325.2	63.6
Cull/Utility	173.6	33.9
Salvage	11.9	2.3
Total	512.1	100.0

During 1989 almost 87% of timber of sawlog quality came from privately-owned land (Figure 32). Private owners having holdings of less than 1000 acres harvested 41% of the total hardwood harvest.

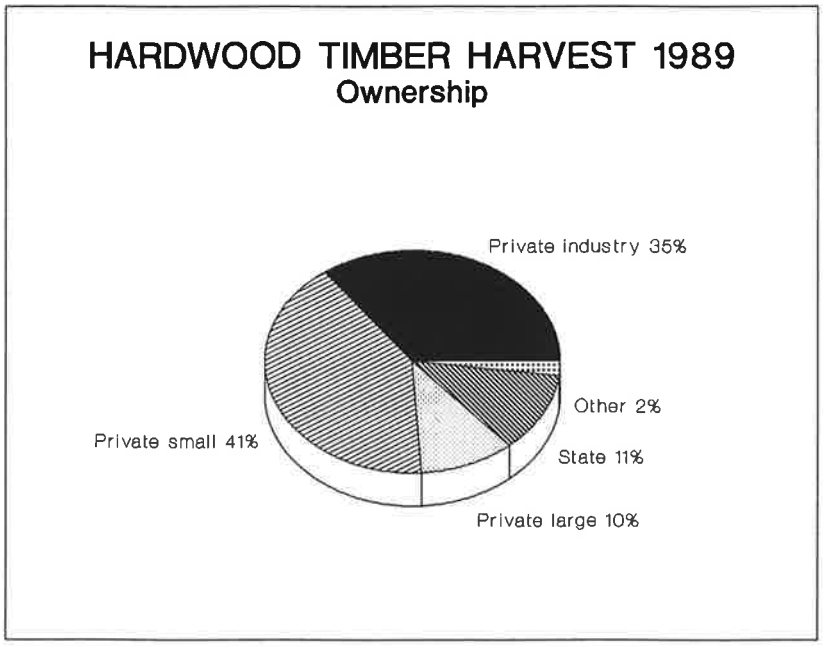

Figure 32. Ownership of the hardwood timber harvested in Washington in 1989. Young and old growth. The percentages may not add up to 100% due to rounding. Source: Larsen, 1990.

7.3 Hardwood Growth

The current net annual growth of hardwood sawtimber in Washington state is 1.13 BBF, which is 18% of the total annual growth in Western Washington (Table 9). Almost 42% of the hardwood growth is in the Puget Sound area. More than half of the growth of bigleaf maple and black cottonwood was also in this region.

Most of the hardwood growth, about 80%, was on private lands. Approximately 20% was on public lands and less than 0.5% on federal lands (Figure 33). This can be compared with the harvest of hardwoods on public lands, which was only 13% of the total hardwood harvest. The overall hardwood growth in the state was higher than removal on all ownerships.

Table 9. Current net annual growth of hardwood sawtimber on timberland in Western Washington in 1989. Sources: MacLean, Ohmann, and Bassett, 1991a,b,c.

	Region			
Species	Puget Sound	Olympic Peninsula	Southwest Washington	Total W. Washington
	---------- MMBF Scribner ----------			
Red alder	292.4	286.0	219.8	798.2
Bigleaf maple	102.2	38.4	60.5	201.0
Black cottonwood	64.2	23.3	16.1	103.6
Other	13.4	6.8	5.8	29.0
Total	472.2	354.5	302.2	1128.8

The average annual removal of hardwood sawtimber in the state of Washington has been about half of the annual growth during the 1980's. The difference between sawtimber growth and harvest was largest on state land. This was especially significant in the southwestern part of the state, where 6.8 MMBF has been removed, while the annual growth has been 70 MMBF (Table 10 and Figure 34).

The forest industry harvested almost the annual growth, with the exception of southwest Washington where the removal was 25% higher than the growth. Other private land owners were only cutting about a third of its growth.

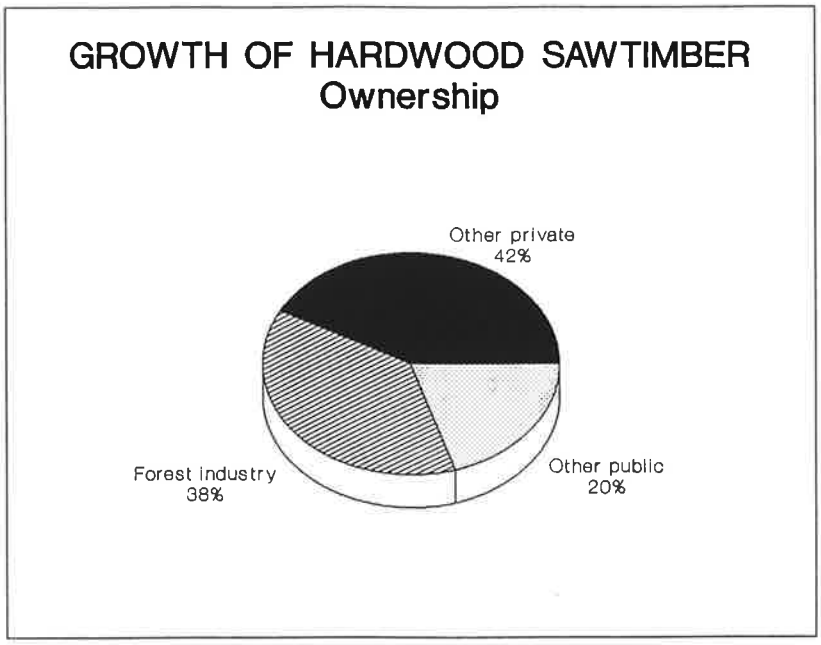

Figure 33. Current net annual growth of hardwood sawtimber on timberland by owner in Washington 1989. Sources: MacLean, Ohmann & Bassett, 1991a,b,c.

Table 10. Current net annual growth (Gro) and average removals (Rem) of hardwood sawtimber on timberland during 1980's. Removals are not available for National Forest land. Sources: MacLean, Ohmann & Bassett, 1991a,b,c.

	Other public		Forest industry		Other private		Total	
	Gro	Rem	Gro	Rem	Gro	Rem	Gro	Rem
	-----MMBF Scribner-----							
Puget Sound	80	21	105	74	284	72	469	167
Olympic Peninsula	77	17	188	153	89	64	354	234
SW Washington	70	7	129	162	101	37	300	206
Total	227	45	422	389	474	174	1123	608

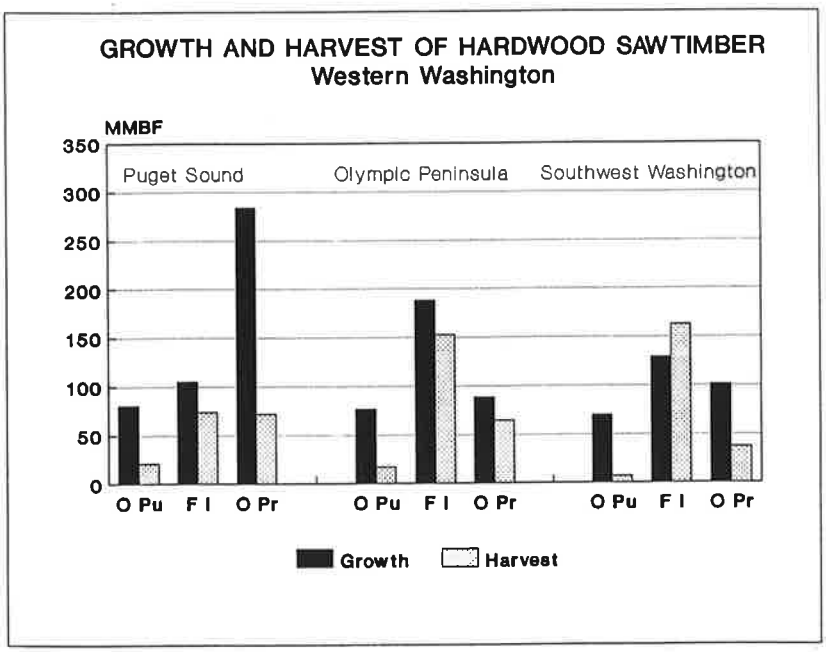

Figure 34. Current net annual growth and average removals of hardwood sawtimber on timberland during 1980's for Western Washington. OPu = Other public lands; FI = Forest industry lands; O Pr = Other private. Removals are not available for National Forest lands. Sources: MacLean, Ohmann & Bassett, 1991a,b,c.

8. CONCLUSIONS

The hardwood sawmill industry in Washington state has been quite successful in recent years. To a large degree, this is due to increasing demand for high-grade red alder lumber on the export market. It is important that the industry not become too comfortable with the current situation, however, because the demand is not static. It is always necessary to work on product and production improvements, and expend more effort on marketing.

There is little doubt that Washington state hardwood sawmills can be successful in the future. Several groups in the public and private sector can help ensure this success.

It is the opinion of this author that addressing the following key areas would yield long-term benefits to companies in this industry:

* Develop closer contacts with the end-user.
* Increase value-added production.
* Develop skilled and loyal labor force.
* Intensify quality control efforts.
* Increase research and development.
* Build awareness among forest owners of the value of hardwood timber.
* Maintain secure and stable timber supply.

Times have changed--or have they?

These words were written in 1926 in a bulletin from the U.S. Department of Agriculture (Johnson, *et al.*, 1926):

> An adequate local supply of suitable hardwoods is unquestionably essential to the fullest industrial development of the Pacific Northwest. Several of the wood-using industries of this region owe their existence largely, if not entirely, to the presence of such raw material. Their existence or further growth appears to depend in a large measure on the perpetuation of the supply of red alder, as the leading hardwood of the region.

The report continues:

> The increasing use of red alder by the expanding wood-using industries within its commercial range and the advance in stumpage values suggest that this wood will prove a profitable crop to grow. Whether this is so in

any given case will depend largely on the character and value of the land. Manifestly, mature stands of alder or stands approaching maturity should not be needlessly destroyed but rather protected until they can be disposed of profitably.

THE HARDWOOD RESOURCE

Inform all concerned about the value of hardwoods. It is necessary to inform forest owners, loggers and contractors about the value of hardwood logs and about the hardwood industry that is prepared to pay for the sawlogs. Those purchasing logs for sawtimber can often pay a higher price than chipping operators for logs with a diameter of eight inches and larger.

Since the harvesting of hardwoods often is driven by coniferous log production, hardwoods are seen as secondary or non-bid species with very low profitability. Traditionally there has been very little interest in hardwood logs which, in many cases, have only been utilized for pulp chips. Times are changing--both hardwood log prices and lumber production have increased over the last few years. This may provide the incentive for loggers to separate and sell more hardwood logs to the sawmills.

Improve the management of hardwood stands. Managing a hardwood stand, whether pure or mixed with conifers, can substantially improve the quality and increase dimension yield. Red alder, which is a fast growing species, can reach diameters of 15 inches within 40 to 50 years in unmanaged stands. In stands which are managed, both timber quality and growth can be greatly improved. Sawlogs and peelers can probably be grown in 28 to 37 years. Yields in managed stands are estimated to be about 40% higher than in unmanaged well-stocked stands (DeBell, *et al.*, 1978).

Interest in planting hardwood species for sawtimber in the Pacific Northwest is increasing. Both the US Forest Service and Weyerhaeuser Company, as well as smaller forest owners, are now planting hardwood seedlings in Washington and Oregon. This interest is also reflected in research in regeneration and management of hardwood stands at the University of Washington (College of Forest Resources) and Oregon State University (College of Forestry).

Don't cut tomorrow's sawlogs as today's pulplogs. From the perspective of a hardwood sawmill, it is important to inform forest owners about the value of their hardwood resource. If too many hardwood logs are cut and chipped today, the supply of sawlogs will be limited in the future. By letting a stand grow from "pulplog" size to "sawlog" size, a forest owner can earn much more money in just a few years.

The following two simple examples will show how it can be a better investment for a forest owner to save money in a hardwood stand than at a bank account.

Example 1

Assumptions:

- Species: Western red alder
- Diameter growth based on information from predominantly alder stands in Western Washington. (Chambers, 1983).
- Log prices as of September 1991 (see Chapter 5).
- Pulp log price: $21/ton, which is the average price for 1987 to 1991.
- Increase of log prices equivalent to inflation rate.
- Top diameter of the tree today is 7 inches.
- Stumpage price is equal to log price reduced by cut and haul costs.
- Costs of managing the stand are not included.

In this example, a tree is left to grow to "sawlog" size rather than cutting it down today and getting a "pulplog" prize. As can be seen in Figure 35, the value of the log (stumpage price) will increase between 114 and 161% in just three years if the tree is left to grow. By waiting another ten years the total value has increased by up to 210%. The value increase per year, or annual real interest rate, can be as high as 34% after only three years (Figure 36). After ten years the interest rate is approximately 11%.

Example 2

Assumptions are the same as in example 1 except:

- The stand is a managed short-rotation alder stand with yield table from DeBell, *et al.*, (1978).
- Price increase of logs is three percent per year more than the inflation rate.

After only two years the annual real interest can be as high as 54% (Figure 36). When the tree has a top diameter of approximately 15 inches, which is 15 to 20 years beyond seven inches, the interest rate is about 14%.

This example requires more intensive management with planting and thinning operations. It also requires that log prices will increase at the same rate alder lumber prices have increased for the last four years.

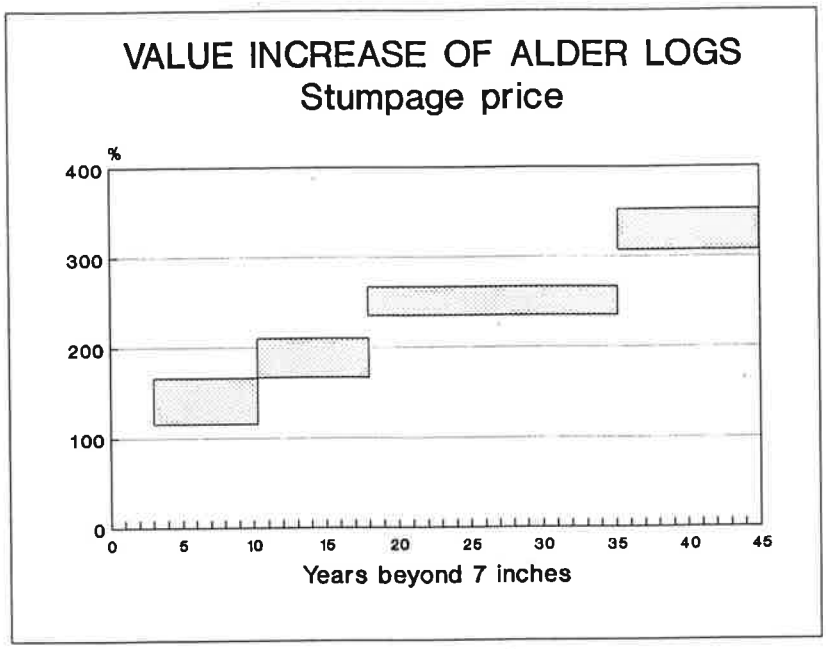

Figure 35. Total value increase of a red alder log (stumpage price), with the assumption that the tree will be left to grow to sawlog dimension instead of being cut as a pulplog with the diameter of seven inches.

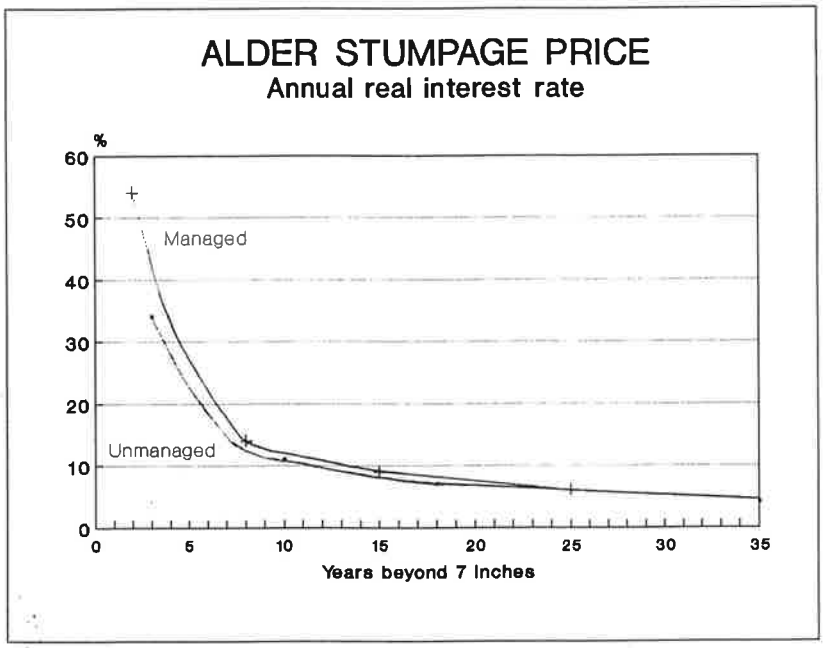

Figure 36. Annual real interest rate for a red alder log (stumpage price) in unmanaged and managed stand with the assumption that the tree will be left to grow to sawlog dimension instead of being cut as a pulplog with the diameter of seven inches.

The two examples above show that if a forest owner does not do anything with the alder stand, which is the most common silviculture method today, the annual real interest rate for an investment in the stand can be between 4 and 34%, depending on when it is being cut. If the forest owner chooses to manage the stand more intensively, the interest rate can be between 6 and 54% on an annual bases. As comparison, the annual real interest rate at a savings account has been on average 1.5% over the last ten years. The long-term average interest rates for other investments have been as follows:

Treasury bills (90 days)	1.5 %
Savings account	1.5 %
Treasury bonds (>10 years)	3.0 %
Stock market	7.0 %

More hardwoods can be cut on state land. The growth rate of hardwood species on state land in Washington is much higher than the current harvest rate. This is especially true for the southwest region of the state. According to data from the USFS Pacific Northwest Research Station, the net annual growth of hardwood sawtimber on timberland in western Washington during the 1980's, was 227 MMBF on land classified as "other public" land. This is land which is mostly owned and administrated by the state. During this same period only 45 MMBF was removed annually from "other public" land, which was approximately 20% of the growth. In the southwest region of the state the removal percentage is only ten percent of the growth.

The Washington State Department of Natural Resources (DNR) can and should increase the harvest of hardwoods from the land it administers. The DNR could become a bigger and more important timber supplier for the hardwood sawmills. The future timber supply is one of the greatest concerns of the hardwood sawmill managers.

More alder can be cut--even along river sides. Red alder, in pure or mixed stands, often grows along rivers. This is its favorite habitat and a place where it grows well, especially on moist sites. Forest owners and industry practitioners are concerned that large volumes of alder in these riparian zones will be set aside and protected from harvesting.

According to biologist Steven Keller at the Washington State Department of Fisheries, red alder is not the most preferred tree species to protect fish habitat (Keller, 1991). Large Douglas-fir and other conifers are preferred species to leave. Riparian zones and streams in managed forests often contain small conifers and many hardwoods, especially alder. It may be possible to remove alder along stream sides in some areas to release the conifers for growth, thus ensuring a better species mix, protecting or improving fish habitat, and recovering valuable hardwood sawtimber.

HARDWOOD PRODUCTS

Quality is more important than quantity. It is important for the sawmills to focus on quality control and to increase volume recovery. Increasingly important also is to utilize wood to a higher degree and to produce a higher-valued product than commodity lumber. This might result in fewer units produced at the sawmill, but instead the profit per unit may be higher.

Utilize the lower grades. Lower-grade lumber products, No. 1, No. 2 and No. 3 Shop, comprise about 45% of the hardwood sawmills production; these grades should be further utilized. No. 1 Shop together with No. 2 Shop lumber, which is the most difficult grade to sell today, could be remanufactured for dimension parts, edge-glued panels, finger-joint and edge-glued components.

Finding a niche can be profitable. For a secondary wood manufacturer it is easier to find substitutes for unprocessed lumber than for a unique value-added product of high quality. If a sawmill can find a niche, have close relations to the end-user, and sell direct, it may result in more stable, profitable and long-term deliveries. An additional result from this strategy may be stronger relations with fewer customers.

Use more alder locally in secondary manufacturing. Most hardwood lumber produced in Washington is leaving the state. Only seven percent of the alder lumber produced is currently utilized by secondary manufacturers in the state. The volume of hardwood lumber products flowing out of the state for further manufacture may suggest an opportunity for Washington remanufacturers and secondary manufacturers to expand their use of alder and other local hardwood species.

Develop a skilled and loyal labor force. To be more competitive, sawmills in the United States, with higher labor costs than many other countries now producing commodity lumber, should concentrate on manufacturing high-quality products. Low-quality products and "bulk-type" production can be made less expensively in other countries with lower salaries. Today the U.S. has a competitive advantage over Japan and many countries in Europe because of lower labor costs. To take advantage of the difference in labor costs, Pacific Northwest hardwood sawmills should concentrate more on value-added products that are now manufactured in Europe and Japan.

With a flexible and knowledgeable labor force the performance and recovery rates can be high. The skill level of the labor is particularly important when customers' specifications may be more demanding and there are more custom-made products and value-added processes required.

Industry cooperation may provide advantages to all. Since most of the hardwood sawmills in Washington state are relatively small, there are many advantages with

cooperation and coordination, in some areas between the mills. To meet large orders, specific custom orders, or orders for fast delivery, cooperation can be essential. More coordination can also increase timber utilization and decrease inventory of lumber.

The type of cooperation suggested is primarily related to export promotion. When red alder is promoted in trade shows, sending a person to represent all Washington hardwood sawmills instead of each mill sending its own person may offer advantages. This is particularly important considering the fact that often no representative is promoting hardwood products from the Pacific Northwest.

THE HARDWOOD MARKET

Capitalize on worldwide interest in temperate hardwoods. There is growing concern about use of hardwood species originating from tropical forests, this is particularly evident in Europe. As a result there is an increased interest among producers and consumers of furniture and cabinets in hardwood species originating from temperate regions. This creates a good opportunity for marketing red alder as an "exotic" species.

Red alder is an unusual species to be used in furniture in Europe, so by advertising the wood as exotic and originating from another continent, but from well managed and sustainable forests, the wood manufacturers may find it more attractive.

Set sights on Europe. Current exports of red alder lumber to Europe are approximately 25% of total alder exports. This share is increasing; for the first six months of 1991, European countries purchased 28% of the total volume of alder lumber exported from the Pacific Northwest. The European market also pays the highest average price for the lumber. In 1990 Asian countries paid an average of $792/MBF of red alder lumber, while the average price on the European market was $1,044/MBF.

If sawmills in the Pacific Northwest can deliver high quality lumber and components and follow and analyze customer demand, the European market will be much more important in the future. A trend is that many European manufacturers are asking for more custom-cut products and less commodity lumber.

The market for red alder in Germany is increasing. For the first six months of 1991, Germany imported the same volume of red alder lumber as it did for the entire year of 1990. The demand in Germany is expected to increase. Manufacturers of lumber in Germany have recently shown interest in custom-cut products rather than lumber. Since this demand from manufacturers is expected to grow, there are opportunities for the industry in the Pacific Northwest to deliver a higher-valued, semi-finished product.

On the German market the current price of red alder lumber is not the main concern; the main concern is consistency in dimension, quality, delivery time, and service.

Germany, Italy and other European countries are also interested in a stable, long-term supply from a dependable source. For many companies in Europe it is important to be assured that they can obtain sufficient volumes of wood on a long-term basis if they accept a new species in their operations.

The trend is light and natural. It is not only the increasing interest in temperate hardwoods that favors species like red alder. The vogue for lighter hardwoods is also favoring red alder's light color and fine texture.

In countries like Germany and Austria, there is now a growing concern in using particleboard for furniture and cabinets because of possible formaldehyde emissions. This results in increased demand for products made from solid wood. Alder should therefore be promoted in a environmentally conscious light.

Red alder products should be marketed at trade shows. Many furniture manufacturers in Europe have never heard about red alder from North America. By promoting red alder at trade shows and showing finger-joint components, edge-glued panels, furniture and other products, more customers will be aware of the good qualities of the main hardwood species of the west.

When promoting alder in Europe it is important not to see the region as one homogeneous market. Lumber and components can not be marketed and sold the same way in Italy as in France or Germany. It is better to focus on a few markets and try to perceive them well.

Explore new markets domestically and abroad. The export market is very important for the hardwood sawmills since most of the higher grade lumber is sold there. This market will be more and more important for the industry. Japan has traditionally been the main red alder purchaser, but the fastest growing market now is Western Europe. In addition to this market, eastern European countries like Hungary, Poland and Czechoslovakia may be interesting markets to pursue in the long-term.

Expand research and development efforts. Continuous development and improvements in quality control, lumber recovery, products and markets will benefit the industry and end-users alike. The industry should initiate and participate more in research and development projects and try to be informed about ongoing research.

Since hardwood sawmills often are small, it's not possible to accomplish all of their own research and development. Therefore, it is very important to use external resources. These resources can be found in universities, Forest Service Research Stations, or other

research centers. Close relations between the industry and universities can, for example, result in projects where students prepare their theses for Master's or Doctoral degrees in cooperation with industry. These studies can be of high quality and are also usually relatively inexpensive.

Look toward the future . The mills that will be successful in the future are the ones that are innovative and spend time and effort to learn more about markets and how to sell higher-priced products, especially on the export market. To meet market demands, investments today may be necessary. Therefore strong financial backing is critical.

Although these investments can be a heavy burden and expensive in the short-term, they will probably be essential and profitable in the long-term.

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Appendix A

SURVEY QUESTIONNAIRE

HARDWOOD SAWMILL SURVEY 1990 IN PACIFIC NORTHWEST

This survey is conducted by the University of Washington, College of Forest Resources in Seattle, Washington. The results from the survey will be presented in a form so that individual sawmills are not identified.

GENERAL INFORMATION

Mill name _____

Address _____

City _____ Zip code _____

County _____

Phone _____ Fax _____

Contact _____ Title _____

May we publicize the general information above together with species bought, facilities and products made in the hardwood sawmill directory which will be part of the result from this survey ?

[] Yes [] No

A. MARKETING PROFILE

1. How were the sawn products sold during 1990 (percent of sales volume)?

	Domestic market	Export
Direct to customer	_____%	_____%
Via a broker or intermediary	_____%	_____%
	= 100%	= 100%

2. Was there a difference in price of lumber (selects and better) exported compared with domestic sales ?

[] Yes, export prices were higher by approximately (please circle) :
1-20% 21-40% 41-60% 61-80% 81-100% >100%

[] Yes, domestic prices were higher by approximately (please circle):
1-20% 21-40% 41-60% 61-80% 81-100% >100%

[] No difference

Domestic sales

3. Where were your hardwood products sold in the US (as percent of total domestic sales)?

Washington	_____%	Oregon	_____%
California	_____%	Rocky Mountain states	_____%
Midwest	_____%	Northeast	_____%
Southeast	_____%	Alaska, Hawaii	_____%

Total = 100%

Export sales

4. To which countries did your company export hardwood lumber during 1990 and what was the main product (approximate share of total export)?

	%	Main product (specie, grade and dimension)
Japan	_____	_____
Taiwan	_____	_____
Italy	_____	_____
Germany	_____	_____
France	_____	_____
Mexico	_____	_____
_____	_____	_____
_____	_____	_____
Total	= 100%	

5. How much of the kiln-dry lumber production was exported during 1990? _____%

6. Did your mill export lumber in metric sizes during 1990 ?

[] No [] Yes, about _____% of total exports.

7. What was the species mix of your exports in 1990 (as percent of total hardwood export)?

Red alder	_____%
Bigleaf maple	_____%
Oregon white oak	_____%
Aspen/cottonwood	_____%
Other hardwoods	_____%
Total	= 100%

8. How were export sales initiated (please indicate as percent of total sales)?

_____%	Company visited foreign country to find customers
_____%	Foreign customer visited your firm
_____%	Trough trade lead or order initiated by customer

_____% Foreign agent visited your firm
_____% You contacted a broker expressing interest in exporting
_____% You contacted an association expressing interest in exporting
_____% Broker contacted you
_____% Other (Please specify) _____
= 100% Total

9. Please indicate for each attribute what you think is important to your customers.
1 = very important, 7 = not important

	Very important . . . . . Not important						
Your ability to provide high quality	1	2	3	4	5	6	7
Your ability to provide custom cut products	1	2	3	4	5	6	7
Your ability to provide kiln-dried lumber	1	2	3	4	5	6	7
Your ability to provide planed or surfaced lumber	1	2	3	4	5	6	7
Your ability to provide a variety of species	1	2	3	4	5	6	7
Your ability to deliver consistent dimension	1	2	3	4	5	6	7
Your ability to deliver accurate gradings	1	2	3	4	5	6	7
Your ability to provide protective packaging	1	2	3	4	5	6	7
Your ability to arrange shipping	1	2	3	4	5	6	7
Your ability to provide rapid delivery	1	2	3	4	5	6	7
Your ability to deliver on time	1	2	3	4	5	6	7
Your ability to fill large orders	1	2	3	4	5	6	7
Your ability to fill small orders	1	2	3	4	5	6	7
Your competitive pricing	1	2	3	4	5	6	7
Your personal relationship with customer	1	2	3	4	5	6	7
Your reputation	1	2	3	4	5	6	7
Your customers' previous business with your firm	1	2	3	4	5	6	7

B. FUTURE OUTLOOK

10. What do you think are the three key areas for a future successful hardwood sawmill industry ?

1. _____
2. _____
3. _____

11. Do you plan to produce more value-added products in the future ? If yes, what kind of products?

[] No [] Yes _____

12. What products will be most important for your mill in the future?

13. Do you expect to export more lumber in the future than today ? If yes, to what countries ?

[] No [] Yes, to _____

C. CURRENT ISSUES

14. What are some of the problems facing your firm <u>today</u>? Please circle the appropriate number for each issue:
1 = Serious problem, 4 = Some concern, 7 = Not a problem

	Serious problem			Some concern			Not a problem
<u>Raw material</u>							
Availability	1	2	3	4	5	6	7
Quality	1	2	3	4	5	6	7
Cost	1	2	3	4	5	6	7
<u>Production</u>							
Availability of skilled labor	1	2	3	4	5	6	7
Labor cost	1	2	3	4	5	6	7
Quality control problems	1	2	3	4	5	6	7
Cost of capital	1	2	3	4	5	6	7
Outdated production facility	1	2	3	4	5	6	7
Distribution problems	1	2	3	4	5	6	7
Size of firm is too small	1	2	3	4	5	6	7
<u>Other</u>							
Limited investment in R & D	1	2	3	4	5	6	7
Lack of customers	1	2	3	4	5	6	7
U S Government regulations	1	2	3	4	5	6	7
Washington State regulations	1	2	3	4	5	6	7
Taxes	1	2	3	4	5	6	7
Sales problems	1	2	3	4	5	6	7
Financial problems	1	2	3	4	5	6	7
Limited marketing expertise	1	2	3	4	5	6	7
Contacts on export market	1	2	3	4	5	6	7
Environmental issues	1	2	3	4	5	6	7
Others (please specify)							
_____	1	2	3	4	5	6	7
_____	1	2	3	4	5	6	7

D. PRODUCTION PROFILE

15. When was your mill established? _____

16. What is the annual capacity? _____ MBF (thousand board feet)

17. What is the capacity per 8-hour shift? _____ MBF

18. What was the actual production 1990? _____ MBF

19. What is the approximate recovery percentage at your mill (volume of lumber per volume of logs)?

_____, the unit is _____/_____

20. What was the number of employees 1990?

	Full-time	Part-time
labor	_____	_____
administration	_____	_____

21. What are the wood processing technologies employed in your plant?

Saw type:

[] Circular saw [] Gang saw
[] Band saw [] Reducer band saw
[] Frame saw

Other facilities are:

[] Trimmer [] Edger
[] Planer [] Finger joint
[] Edge gluing [] Dry kiln
[] Chipper [] Other _____

22. What are the three most important pieces of equipment that your company plans to purchased within the next five years?

1. _____
2. _____
3. _____

E. RAW MATERIAL CONSUMPTION

23. What was the consumption of raw materials during 1990? Please provide approximate volume in board feet.

Red alder	_____	Bigleaf maple	_____
Oregon white oak	_____	Aspen/cottonwood	_____
Oregon ash	_____	Western paper birch	_____
Other hardwoods	_____,	please specify	_____
Softwood, total	_____		

24. How are the logs measured ?
- [] Board feet scaling
- [] Cubic volume scaling
- [] By weight

25. How does your mill grade its lumber ?
- [] rules by NHLA
- [] own grading rules
- [] other, _____

26. What was the area of timber purchase 1990 ?

County/state	
_____	____%
_____	____%
_____	____%
_____	____%
_____	____%
Total	= 100%

27. What was the approximate lumber inventory turnover in 1990? _____weeks

28. What was the source of the hardwood timber ?

Industry owned land	_____%
Other private	_____%
Federal	_____%
State	_____%
Other public	_____%
Total	= 100%

29. Has the quality of hardwood timber changed the last five years?
- [] No
- [] Yes, lower quality now
- [] Yes, higher quality now

30. Did your firm import logs during 1990?
[] No [] Yes, from _____

31. What species were imported? _____

32. How big share of total hardwood consumption was imported? _____%

F. PRODUCTS PROFILE

33. What products did your company manufacture in 1990 (as percent of total production)?

Rough lumber, green	_____%	Rough lumber, dry	_____%
Surfaced lumber, green	_____%	Surfaced lumber, dry	_____%
Dimension, green	_____%	Dimension, dry	_____%
Pallet stock	_____%	Turning stock	_____%
Finger joint stock	_____%	Glued stock	_____%
Other, please list products _____			_____%
Total			= 100%

34. Please indicate the approximate quality of the sawn lumber during 1990 (as percent of total volume sawn).

	Selects & Better	#1 Shop	#2 Shop	#3 Shop	Frame	Pallet	
Alder	_____	_____	_____	_____	_____	_____	= 100%
Other hardwood	_____	_____	_____	_____	_____	_____	= 100%

35. What are the products sold from your mill used for (percent of total lumber volume of each species)?

	Alder	Maple	Ash	Birch	Aspen
Upholstered furniture	_____	_____	_____	_____	_____
Other furniture	_____	_____	_____	_____	_____
Cabinets	_____	_____	_____	_____	_____
Pallets	_____	_____	_____	_____	_____
Packing boxes	_____	_____	_____	_____	_____
Flooring	_____	_____	_____	_____	_____
Moulding	_____	_____	_____	_____	_____
Other,_____	_____	_____	_____	_____	_____
Don't know	_____	_____	_____	_____	_____
	= 100%	= 100%	= 100%	= 100%	= 100%

36. What was the sawmill residues used for (approximate percentage of volume)?

Plant fuel	____%
Sold for fuel	____%
Domestic pulp	____%
Export	____%
Unused	____%
Total	= 100%

G. ADDITIONAL COMMENTS

If you have any additional comments you wish to make please use space below.

THANK YOU VERY much for your cooperation in filling out this questionnaire.

Remember, all questionnaire responses are strictly confidential.

Appendix B

DIRECTORY FOR WASHINGTON STATE HARDWOOD SAWMILLS

ALEXANDER LUMBER MILL, Lewis County

Address: 1674 S.R. 508, Onalaska, WA 98570
Phone: (206) 978 4117
Contact: Dale Alexander, Owner and Manager
Annual capacity: Less than 10 million board feet
Species: Red alder, bigleaf maple
Products: Surfaced kiln-dry lumber, pallet stock
Facilities: Circular saw, band resaw, trimmer, edger, planer, dry kiln, chipper.

CASCADES HARDWOOD, Cowlitz County

Address: P O Box 269, Chehalis, WA 98532
Phone: (206) 748 3317
FAX: (206) 748 1052
Contact: Warren Bailey, General Manager
Annual capacity: More than 10 million board feet
Species: Red alder, bigleaf maple, Oregon ash
Products: Surfaced kiln-dry lumber, pallet stock, chips
Facilities: Band saw, gang saw, trimmer, edger, planer, dry kiln, chipper.

GOODYEAR NELSON HARDWOOD LUMBER CO., INC., Skagit County

Address: P O Box 71, Sedro-Wooley, WA 98284
Phone: (206) 856 0816
FAX: (206) 856 1454
Contact: Rod Remington, General Manager
Annual capacity: More than 10 million board feet
Species: Red alder, bigleaf maple
Products: Surfaced kiln-dry lumber, pallet stock, chips
Facilities: Band saw, trimmer, edger, planer, dry kiln, chipper.

NORTHWEST HARDWOODS, Snohomish County

Address: P O Box 7, Arlington, WA 98223
Phone: (206) 435 8502
FAX: (206) 435 9635
Contact: Dennis Thompson, Plant Manager
Annual capacity: More than 10 million board feet
Species: Red alder, bigleaf maple, Western paper birch
Products: Surfaced kiln-dry lumber, pallet stock, chips
Facilities: Band saw, gang saw, trimmer, edger, sander, dry kiln, chipper.

NORTHWEST HARDWOODS, Lewis County

Address: 3000 Galvin Rd, Centralia, WA 98531
Phone: (206) 736 2811
Fax: (206) 736 7793
Contact: Jerry Martin, Plant Manager
Annual capacity: More than 10 million board feet
Species: Red alder, bigleaf maple, Oregon ash
Products: Surfaced kiln-dry lumber, pallet stock, chips
Facilities: Band saw, gang saw, trimmer, edger, sander, dry kiln, chipper

NORTHWEST HARDWOODS, Cowlitz County

Address: 120 Industrial way, Longview, WA 98632
Phone: (206) 577 6678
FAX: (206) 577 7412
Contact: Mike Knobel, Plant Manager
Annual capacity: More than 10 million board feet
Species: Red alder, bigleaf maple
Products: Surfaced kiln-dry lumber, pallet stock, chips
Facilities: Band saw, gang saw, trimmer, edger, sander, finger-joint, dry kiln, chipper

PACIFIC HARDWOODS, Pacific County

Address: 819 Ocean Ave, Raymond, WA 98577
Phone: (206) 942 5525
FAX: (206) 942 5529
Contact: Tom McGough, General Manager
Annual capacity: More than 10 million board feet
Species: Red alder
Products: Surfaced and rough kiln-dry lumber, chips
Facilities: Circular saw, band saw, gang saw, trimmer, edger, planer, dry kiln, chipper

ROSS-SIMMONS HARDWOOD LUMBER CO., Cowlitz County

Address: P O Box 366, Longview, WA 98632
Phone: (206) 423 8210
FAX: (206) 423 6550
Contact: Juel Sheldon, President
Annual capacity: More than 10 million board feet
Species: Red alder, bigleaf maple
Products: Surfaced kiln-dry lumber, rough green lumber, pallet stock, chips
Facilities: Band saw, gang saw, trimmer, edger, planer, dry kiln, chipper

SMITH STREET MILL, Snohomish County

Address:	3600 Smith Street, Everett, WA 98201
Phone:	(206) 252 7179
Contact:	Bob Buse, President
Annual capacity:	Less than 10 million board feet
Species:	Red alder
Products:	Surfaced kiln-dry lumber, pallet stock, chips
Facilities:	Circular saw, band saw, edger, planer, dry kiln, chipper

APPENDIX C

LUMBER PRICE FOR RED ALDER AND BIGLEAF MAPLE IN 1991.

Prices are for kiln-dried lumber, surfaced two-sides and 1/16" off nominal, net footage basis ($/MBF). Source: *Weekly Hardwood Review*, September 1991.

Red Alder

	Sel/Btr	#1S	#2S	#2S*	#3S	Frame
4/4	965	515	280	330	200	305
5/4	995	530	305	340	215	325
6/4	1030	550	365	390	280	--
8/4	1050	570	375	420	320	--

* selected heart free stock--proprietary grade

Pallet stock	1*4	225
	1*6	225
	2*4	235

Bigleaf Maple

	Sel/Btr	#1S	#2S	#3S	Frame
4/4	885	520	360	260	355
5/4	895	535	370	265	365
6/4	920	570	410	270	--
8/4	930	580	420	345	--

Appendix D

EXPORT OF HARDWOOD LUMBER FROM U.S. 1990

Figures are preliminary. Source: USDA Forest Service, Forestry Sciences Laboratory

Species	Europe	Pacific Rim	Total
White oak	106839	24063	130902
Red oak	29676	44206	73882
Red alder	13792	39523	53515
Yellow poplar	24019	16783	40802
Ash	15029	18306	33335
Maple	3045	5982	9027
Cherry	6803	424	7227
Sap gum	4266	8	4274
Hickory	1529	480	2009
Other	2727	9933	12660
Tropical	1022	1093	2115
Not defined	26597	57588	84185
TOTAL	235344	218389	453733
TOTAL (incl inland)	**264361**	**218952**	**483313**

Appendix E

EXPORT VOLUMES, VALUES, AND UNIT PRICE FOR WESTERN RED ALDER LUMBER 1990.

Figures are preliminary. 1 MBF = 2.36 m^3. Sources: USDA Forest Service, Forestry Sciences Laboratory (volumes to Europe and Asia) and U.S. Department of Commerce (unit price and volumes to other regions).

Country	Volume (MBF)	Price per unit ($/MBF)	Value (million $)
Belgium+Luxemburg	1291	1005	1.30
Denmark	218	871	0.19
France	1326	1024	1.38
Germany, West	1837	1069	1.96
Italy	7799	1083	8.45
Netherlands	481	1053	0.51
Spain	324	526	0.17
Sweden	47	1029	0.05
United Kingdom	413	939	0.39
Other	56		
EUROPE, total	**13792**	**1044**	**14.40**
Hong Kong	114	526	0.06
Japan	30650	864	26.48
Korea, South	2586	571	1.48
Taiwan	5799	524	3.04
Other	374	661	0.25
ASIA, total	**39523**	**792**	**31.31**
Australia	9	897	0.01
Canada	355	845	0.30
Marshall Islands	8	708	0.01
Mexico	2298	637	1.46
Saudi-Arabia	215	866	0.19
OTHER, total	**2885**	**680**	**1.97**
WORLD	**56200**	**850**	**47.78**

Appendix F

TERMINOLOGY

Definitions and explanations for words used in Chapter 7 (in part from MacLean, Ohmann, and Bassett, 1991a and Larsen, 1990).

Cull/Utility: Wood volume that does not meet higher-grade standards or is specifically graded as cull or utility. As a general rule, a cull log is less than one-third merchantable as a sawlog, in terms of gross scale. A utility log does not meet the recuirements of peeler or sawmills grade logs but will produce not less than 50 percent of the gross volume in firm usable pulp chips.

Diameter class: A classification of trees based on diameter outside the bark measured at breast height, 4-1/2 feet above the ground. DBH is the common abbreviation for "diameter at breast height."

Forest type: Stands with 70 percent or more of the stocking in live deciduous trees are classed as pure hardwood types; stands with 50 to 69 percent of the stocking in live deciduous trees are classed as hardwood/softwood types.

Growing stock volume: Net volume in cubic feet of live sawtimber and poletimber growing stock trees from 12-inch stump to a minimum 4-inch top (of central stem) outside the bark.

Growth, current net annual: The net increase in volume of trees during a specific year. Components of net annual growth include:

	Increment in net volume of sawtimber and poletimber trees alive at the beginning of the year and surviving to the year's end
plus	Net volume of trees reaching poletimber or sawtimber size during the period
minus	Mortality, net volume of trees that died during the year

Hardwood species: Species growing in the state of Washington and mentioned in this report are:

Bigleaf maple, *Acer macrophyllum* Purch.
Bitter cherry, *Prunus emarginata* Dougl ex Eaton
Black cottonwood, *Populus trichocarpa* Torr. & Gray
Oregon ash, *Fraxinus latifolia* Benth.
Oregon white oak, *Quercus garryana* Dougl. ex Hook.
Pacific madrone, *Arbutus menziesii* Pursh.

Red alder, *Alnus rubra* Bong.
Western paper birch, *Betula papyrifera* Fern.

Net volume: Gross volume less deduction for rot and missing bole sections.

Old growth: Sound green or dead roundwood material 100 years old or older, meeting recognized log grade requirements except cull, utility or salvage.

Olympic Peninsula: Following five counties are included in this region: Clallam, Grays Harbor, Jefferson, Mason, and Thurston. See Appendix G for map of counties.

Other private lands: Private lands not owned by forest industry. Farmer-owned lands, Native American lands, and miscellaneous private lands are included.

Other public lands: Lands administrated by public agencies other than the Forest Service, U.S. Department of Agriculture.

Private industry: Companies and individuals operating wood-using plants with no acreage limitation.

Private large: Companies and individuals not operating wood-using plants but holdings of 1000 or more acres.

Private small: Companies and individuals not operating wood-using plants but holdings of less than 1000 acres.

Poletimber trees: Live trees of commercial species, of good form and vigor, that are at least 5.0 inches in DBH but smaller than sawtimber size.

Puget Sound area: Following eight counties are included in this region: Island, Kitsap, King, Pierce, Skaget, San Juan, Snohomish, and Whatcom. See Appendix G for map of counties.

Salvage: wood volume from snags, down logs, windthrow, and dead material.

Sapling and seedling trees: Live trees of commercial species less than 5.0 inches in DBH, with no diseases, defects, or deformities likely to prevent their becoming poletimber trees.

Sawtimber trees: Live hardwood trees of commercial species at least 11.0 inches in Dbh At least 25 percent of the board-foot volume in a sawtimber tree must be free from defects. Hardwood trees must contain at least one 8-foot saw log with a top diameter of not less than 8 inches inside the bark.

Sawtimber volume: Net volume of sawtimber trees measured in board feet. Net sawtimber volume equals gross volume less deduction for rot, sweep, crook, and other defects that affect use for lumber.

Scribner rule: The common board-foot log rule used locally in determining volume of sawtimber. Scribner volume is estimated in terms of 16-foot logs for hardwoods.

Southwest Washington: Following six counties are included in this region: Clark, Cowlitz, Lewis, Pacific, Skamania, and Wahkiakum. See Appendix G for map of counties.

State lands: Lands owned by State of Washington or administered by state agencies.

Timberland: Forest land capable of producing 20 cubic feet or more per acre per year of industrial wood, and not withdrawn from timber utilization.

Young growth: Green or dead roundwood material less than 100 years old and meeting recognized log grade requirements except cull, utility or salvage.

Appendix G

MAP OF THE COUNTIES IN WESTERN WASHINGTON