MARKETING HARDWOODS

FROM

ALASKA'S SUSITNA VALLEY

by

Michael R. C. Massie
Forest Economist
and
Assistant Research Professor

McIntire-Stennis Cooperative Forestry Research Program
Marketing Alaska's Timber Products

Institute of Social, Economic and Government Research
University of Alaska
College, Alaska 99701
SEG Report No. 9 November 1966

PREFACE

The continuing research program conducted by the Institute of Social, Economic and Government Research of the University of Alaska includes a range of studies in the development of natural resources. Currently, one element of the program is directed at improving the utilization of Alaska's valuable forest resource. Dr. Michael R. C. Massie has primary responsibility for the Institutes forestry research program.

The recently completed study, A Survey of the Alaskan Forest Products Industry, provided a review and analysis of the growth and development of the Alaskan pulp and lumber industry. This study, Marketing Hardwoods from Alaska's Susitna Valley, focuses attention on utilization in a particular geographic area and emphasizes the investigation of markets and marketing procedures. Studies now underway include the investigation of forest utilization alternatives for specific Alaskan locations and the impact of using wood-chips as a pulpmill raw material input supplemental to the traditional log form of input.

The forestry research program has been funded from many sources. Major support is provided by McIntire-Stennis cooperative forestry research monies and State of Alaska matching funds. Additional support grants have been received from the Bureau of Land Management, United States Department of the Interior, and the Forest Service, United States Department of Agriculture.

Victor Fischer, Director
Institute of Social, Economic
and Government Research

ACKNOWLEDGEMENTS

The author wishes to thank his colleague Professor R. C. Haring for a constructive review of the manuscript. Also, the cooperation and assistance of a great number of other individuals, firms and agencies in contributing information was appreciated. Agencies that assisted directly in the collection of data are listed below and they are deserving of a special measure of gratitude.

Alaska, Division of Lands
Office of the State Forester, Anchorage

Furniture Manufacturers Association of California,
Los Angeles

Thomas A. McKenzie and Associates
Seattle, Washington

U. S. Department of Commerce
Office of Field Services, Anchorage

U. S. Department of Interior
State Office, Bureau of Land Management,
Anchorage

U. S. Forest Service
Office of the Regional Forester, Juneau
Northern Forest Experiment Station, Juneau
Southwest Forest and Range Experiment Station,
Berkeley

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

I

INTRODUCTION

This report points out past marketing and utilization trends in the Susitna Valley and describes present circumstances which are detrimental to increased use of the forest resource. Marketing and utilization problems inherent in the Alaskan economy as well as problems resulting from Alaskan forest conditions are discussed. The scope of this report does not permit time to research all aspects of a marketing program, even for a particular valley. Thus, priorities were placed on specific areas of marketing investigation. Many alternative possibilities for marketing and utilizing Susitna hardwoods are open to future investigation.

A marketing framework (frequently called the marketing chain) for a forest product is exemplified very simply below. Interest was focused at the secondary market level (i.e. secondary manufacturing, inputs) in this report. However, if "Marketing Hardwoods" is an ultimate objective, then the effects studied at the secondary level must be traced back through the framework to fully understand marketing at the resource level.

Marketing Framework - Wood Resource Base

(A Simplified Model)

Supply - i.e. the resource base, timber

Initial Transfer - i.e. logging, hauling

Primary Manufacture - i.e. sawmill

Secondary Transfer - i.e. lumber shipment, agent services

Secondary Manufacture - i.e. furniture manufacture

Tertiary Transfer - i.e. furniture shipment, agent services

Consumer Outlets - i.e. merchandizing firms

Ultimate Transfer - i.e. sales, delivery

Consumption - i.e. consumer demand

The study is presented in ten chapters. Following this introductory chapter, the "Summary and Conclusions" are presented in Chapter II. Chapter III provides background information on the Susitna Valley. Chapters IV through VIII describe the present situation and possible development with regard to the above "Marketing Framework" from the resource base to secondary manufacturing. The next to last chapter (IX) discusses costs and prices in an order similar to the framework for all components. The final chapter (X) is an addendum estimate of returns for the primary manufacture of lumber. Since much of the potential for increased primary manufacturing is dependent on secondary market needs, some readers might prefer to read Chapters VII and VIII concerning product specifications and hardwood markets before reading Chapter VI on primary manufacturing.

Information presented in this monograph indicates existing and potential market areas for Susitna Valley hardwoods, and procedures whereby the hardwoods might enter these markets. Emphasis was also placed on quantitative and qualitative criteria for other hardwoods in use where Alaskan hardwood has a high potential as a substitute. However, this report can only offer a calculated estimate, not fact, on whether the barriers to entry in various markets for Susitna hardwoods can be overcome. Trial and error procedures in the past have frequently indicated negative results. Research on changing resource and economic conditions can indicate areas with a high probability of success.

II

SUMMARY AND CONCLUSIONS

This report describes the hardwood forest resource in Alaska's Susitna Valley. It discusses the various markets presently using similar hardwoods in a variety of manufactured forms drawn from other equally distant regions. The report then suggests potential industry development that would be compatible with the resource and the markets. Alaskan hardwood products could compete in several markets provided difficulties in production and transportation are overcome and if problems in communication, knowledge and technology can be resolved to develop the specified products desired by the market.

The Forest Resource

The mature hardwood timber resource of the Susitna Valley is comprised mainly of Alaskan paper birch and low elevation balsam poplar, locally known as cottonwood. For the most part, accessible stands are located on state selected lands. Large stands of presently non-accessible paper birch also exist, primarily west of the Susitna River. Past utilization has resulted in the harvesting of less than one million bd. ft. An annual cut of some nine million bd. ft. of birch and six million bd. ft. of cottonwood could be taken from accessible mature stands. In the future, assuming increased access to stands and more intensive forest management, additional annual volumes should become available.

Mature bottomland balsam poplar commonly attains heights that give a merchantable stem of some 50 feet and diameters of 18 inches and up. Paper

birch is a small tree having a low average diameter of some 11 inches and a merchantable height of some 24 feet in mature stands. A high incident of decay in older stands frequently decreases merchantability. Low average volumes per acre are an additional hindrance to harvesting and utilization. Over extensive stand acreages, only some 3,000 board feet per acre on the average can be expected in useable diameters. The strength and related physical properties of Alaskan paper birch appear to be equal to or better than eastern paper birch, but according to wood products manufacturers, not as desirable as those of eastern yellow birch.

Initial Utilization

Stumpage for firms wishing to harvest hardwoods can be easily obtained from the Alaska Division of Lands at a low cost relative to the costs of logging, hauling and primary manufacture. Sales of less than 500 M bd. ft. per firm per year can be negotiated and are not open to bids. Harvesting practices must comply with basic forest management principles.

Harvesting procedures employed by small firms are not adequate at the present time. Considering climate, terrain, and the nature of the resource, inappropriate equipment and the misuse of equipment frequently coupled with the inefficient use of labor have incurred high logging and hauling costs. In general, operators interviewed indicated a lack of appropriate knowledge and skills. Access to technical information and possibly credit arrangements for financing appropriate equipment seems to be key points. A lack of adequate measurement criteria for paper birch based on inherent Alaskan characteristics seems to provide a barrier to the standardization necessary for communication between Alaskan firms and market-orientated firms handling birch. Investigation in regard to log rules and grades as well as lumber grades might be appropriate.

Markets

The national market for hardwood products in terms of production and consumption appears to have been relatively stable over the past several years, though per capita consumption has declined. The Pacific Coast Region, even as a small component of the national market, has greatly increased its hardwood consumption. Much of this increase has been in furniture and related manufactures, particularly in California. Production is centered in the Los Angeles area. The largest wood use segment of the industry, wood household furniture, is divided into upholstered and nonupholstered furniture. While both segments use large quantities of red alder, but particularly the former, the latter segment shows a marked preference for light colored hardwoods, especially birch and maple. Together they consumed about 58 million bd. ft. of fine hardwood lumber in 1962. Included in the total were some 22 million bd. ft. of alder, 10 million of birch and 10 million of maple. All furniture manufactures in California in 1962 were estimated to have consumed over 130 million bd. ft. of hardwoods, and many more millions of feet were consumed in addition to this in allied uses such as millwork, interior house finishing and cabinetry work.

The furniture industry is composed of a complexity of parts and component manufacturers, assemblers and finishing plants. Wood raw materials are usually purchased through wholesalers and generally under the conditions of a relatively stable supply and exacting specifications. Purchases of birch frequently reflect quality and availability considerations to a greater degree than competitive price with other species that might be used as substitutes. However, this does not apply for other varieties of birch as opposed to eastern yellow birch, particularly if quality and specifications are not as desirable. While resistance to acceptance is far less than that for new species, price considerations with regard to accepted species that might be used as substitutes come into consideration.

A somewhat smaller market for hardwoods exists in the Pacific Northwest. Total consumption in 1965 was estimated at about 48 million bd. ft., including some 30 million bd. ft. of red alder and 15 million bd. ft. of birch. Imported hardwoods move eastward from seaports in this region and wholesale firms are relatively abundant. In the future, there might be some possibility of funneling Alaskan hardwoods into this eastward movement. This area is a large producer of red alder and the price of this species in comparison to imported hardwoods bearing transportation costs is relatively low. Apparently one of the only species that has desirable enough attributes to be used in lieu of alder is birch. Precision manufactured birch lumber in the higher grades commands much higher market prices relative to alder. However, the desirable attributes of birch lumber can be negated by poor quality, inexact manufacture, and unstable supply. Substitution by alder, or pricing comparable to alder then comes into play.

In Alaska a small but developing market for hardwood lumber and plywood is becoming centered in the Anchorage area, but industry expansion on this basis without additional export markets cannot be justified. Japanese wood imports are heavily orientated toward the raw material form rather than processed forms. However, estimates of future wood needs indicate that a potential market for hardwood chips might develop. Investigation concerning the increased use of cottonwood cants and the possible export of birch cants should be encouraged. Birch and cottonwood veneer production should also be considered in regard to an expanding Japanese hardwood plywood market as well as western United States markets.

Product Specifications

Sawn birch products appear to have better market capabilities than sawn cottonwood products at the present time. Small dimension and furniture parts,

turning squares, furniture blanks, and quality lumber have a good market potential. Rough lumber, and particularly lumber of mediocre quality has only a limited market potential. Particular attention should be given to specifications desired by the markets in question. In general, light colored birch is preferred and segments of the market desire a wide and long average board indigenous to eastern stands of yellow birch rather than Japanese or Alaskan sources. Several manufacturers that have used or tested Alaskan birch lumber indicated common inadequacies were: (1) lack of grade standards, (2) excessive low grade in mill-run shipments, (3) color irregularities, (4) excessive knots, (5) poor manufacture (in regard to desired specifications), (6) excessive short lengths and narrow widths and, (7) unstable and discontinuous supply.

Primary Manufacture

Primary manufacturing in Alaska should be based on the characteristics of the resource and the products and specifications required by the markets. This fact has frequently been overlooked by Alaskan manufacturers. Precision equipment, preferably new, should be used for sawn products and band sawing should take preference where possible over the use of circular saws. Hardwood finishing and drying facilities will be necessary if shipment direct from Alaska to secondary manufacturers is to occur. Small operators might consider "mini-kilns" in this regard. Many small operators with used or portable equipment should seriously consider the possibility of manufacturing cants rather than a product like lumber which requires a higher degree of manufacture. Any firm contemplating veneer manufacture should thoroughly investigate the use of modern equipment designed specifically for small logs.

Difficulties will be encountered in regard to the effective utilization of the hardwood resource. Few, if any, markets presently exist for low quality timber. The future development of hardwood forest industries will be highly

dependent on integrated utilization and markets for lower quality wood. The potential for lower quality products, such as pallets, should be investigated. Similarly, the potential for pulp chips should be considered, particularly from the viewpoint of utilizing low quality timber directly from the woods rather than from mill waste. If markets can be developed in the latter regard, increased and more efficient utilization will be possible and benefits will accrue in managing the forest for improved quality and yields.

Costs and Prices

This report supports the hypotheses that firms in interior Alaska are incurring high costs in logging, hauling and primary manufacture. A portion of these costs can be traced to high labor charges and Alaskan inflationary tendencies in general. However, cost reductions would be possible under the following conditions: (1) increased knowledge and skills for operators, particularly in regard to planning efficient operations, effective use of equipment, and efficient cost allocation; (2) improved road planning; (3) the acquisition of newer and more appropriate equipment by operators; (4) more continuous and stable production; and (5) more efficient use of labor (i.e. skilled versus unskilled, less intermittent employment and specialization).

Shipping costs for transporting wood products to continental markets are not entirely adequate although recent improvements have occurred. Presently, rates are orientated toward forward hauling. Wood product shipments are relatively large, of a high value, and have undergone weight reductions through drying. Considering the present stage of hardwood manufacturing in Alaska, back-hauling would be more apt to develop if tariffs were orientated toward smaller shipments of lower value, less weight reduced by drying, wood products. Per car rates for cants as well as milling-in-transit rates should also be considered. Conversion tables to establish weight relationships with other

measurement criteria for Alaskan wood products would be a useful area for supporting research.

Price conditions in hardwood markets on the west coast of the continental United States are generally favorable for Alaskan birch, but emphasis should be placed on the fact that Alaskan paper birch will not be able to command prices similar to those in effect for eastern yellow birch. However, after market acceptance, improvements in quality of manufacture, adherence to specifications, and when stable supplies are developed Alaskan birch should bring prices that are higher than those for other hardwoods. In the interim period, particularly for medium quality material, prices offered can be expected to be closer to those for alder and eastern maple.

Information compiled in this report was used in the last chapter to estimate the cost of producing rough hardwood lumber in the Susitna Valley under present conditions and the possible returns accruing to operators given current west coast market prices and present transportation rates. The estimates are approximate. Thus, their primary usefulness will be as a basis for additional research and not as a means of comparing or judging present standards.

III

THE SUSITNA VALLEY

Topography and Climate

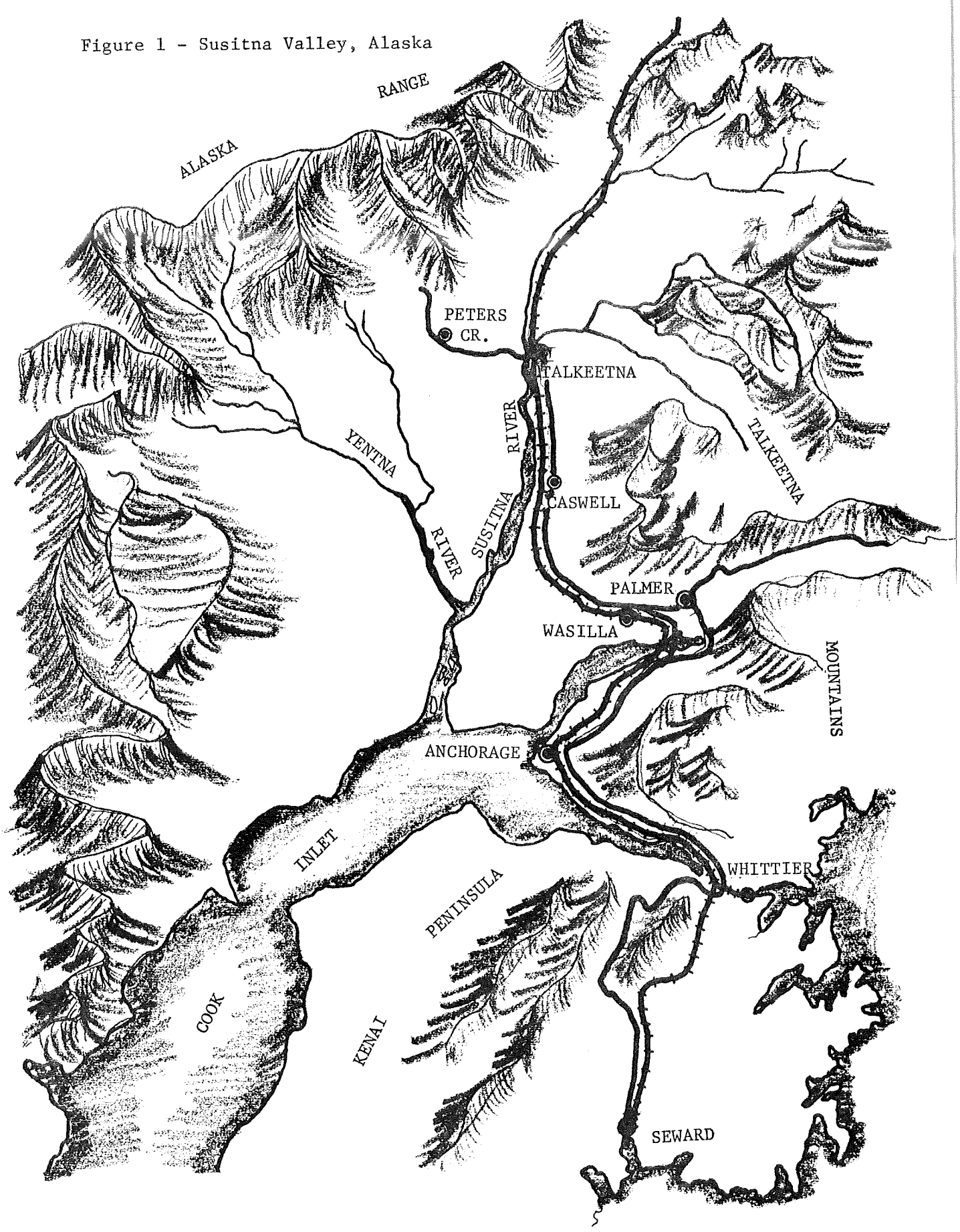
The Susitna Valley (Figure 1) forms a wedge of plains and lowlands, generally less than 500 feet above sea level, that are bounded by the Talkeetna mountains on the east, the Alaskan range on the west and Cook Inlet on the south. The Susitna River provides the main drainage with a major tributary, the Yentna River, entering from the west. Proportionally, the lowland area of the valley is greater west of the river. Local relief is usually 50 to 250 feet. The surface of the lowland is covered by glacier and stream formed deposits (e.g. alluvium). The soil is composed of unstratified glacial drift including silt, clay, sand and gravels covered in general with a light layer of humus, mull and litter. Streams at low elevations and the Susitna River are typically meandering. Lakes and muskeg are scattered throughout the valley. "Benches" or flat areas of moderate elevation between the river lowlands and the more vertical rise of the mountains frequently support as good forest cover as lowland areas.[1]

The climate of the Susitna Valley exhibits characteristics of both an interior continental climate and a coastal maritime climate. In general, temperatures are more moderate than the interior, but the accumulation of snowfall is frequently greater and in specific locations can be several feet in depth. Yearly precipitation is usually between 20 to 28 inches, with a growing season rainfall of between 12 and 20 inches. The more northerly

---

1. U. S. Geological Survey (54), Crank (67).

Figure 1 - Susitna Valley, Alaska



portions of the valley, on the average, have a growing season of just less than 100 frost-free days, while the southern portions have slightly over 100 frost-free days. For January the mean maximum temperature is about 18°F. and the mean minimum temperature about -4°F. In July the mean maximum temperature is about 67°F. and the mean minimum about 48°F.[2]

Economic Conditions[3]

The Matanuska - Susitna area covers some 23,000 square miles, 50 to 200 miles north of Anchorage. In 1960, taking Election District 7 as an approximation of the area, total population was some 5,200. The largest town, Palmer,[4] contained nearly 1,200 inhabitants, but the other settlements of Jonesville, Wasilla and Talkeetna had populations of less than 200.

The area is primarily a farming center, but coal is mined at Jonesville. Agricultural production was valued at over $3,000,000 in 1964. There is little manufacturing in the area. A few very small sawmills and log-turning mills supply rough lumber and house logs mostly for local consumption. There are two cement block plants and a few other minor construction industries' suppliers. One dairy plant is in operation, and a mill for the manufacture of chicken feed is under construction. A plant to freeze vegetables is in the planning stage. Also, the University of Alaska maintains an agricultural experiment station at Palmer.

According to the 1963 Census of Business, there are 50 retail trade,

---

2. Funsch (15), Watson (56)

3. Derived from various statistical data on file, Institute of Social, Economic and Government research.

4. For specific information on Palmer, see: Alaska State Chamber of Commerce, Standard Industrial Survey (Palmer), Burford Building, 111 Fourth Street, Juneau, Alaska.

42 service, and three wholesale businesses in the area. These included five general merchandise stores, seven food stores, three apparel stores, eight service stations or garages, four automotive dealers, 17 eating and drinking establishments, 11 amusement and recreation service enterprises, and 13 hotels.

The area's financial needs are served by the Matanuska Valley Bank in Palmer as well as by a few branches of some of the larger Anchorage banks. There is a local credit union, and institutions dealing in farm loans such as the Alaska Rural Rehabilitation Corporation.

The Matanuska Telephone Association supplies telephone service to the area, and electricity is supplied by the Matanuska Electric Association, a Rural Electric Association cooperative. Rates are higher than Anchorage, but lower than those of other rural cooperatives, such as the Homer Electric Association and the Golden Valley Electric Association in Fairbanks. A mine-mouth power plant, to be constructed at Sutton starting in 1967, should act to reduce rates. Palmer is the only town in the area with public water and sewage facilities.

The Alaska Railroad runs from Anchorage through Palmer (a spur connects to the coal fields at Jonesville), Wasilla, and Talkeetna. The Glenn Highway connects the Matanuska Valley and Palmer north to the Alaskan Highway and Fairbanks, and south to Anchorage. Presently a highway is being constructed up the Susitna Valley which will be a more direct link with Fairbanks. The section from Palmer to Talkeetna is complete, but the following McKinley Park section is not. The area is readily accessible to the business community and labor market of Anchorage.

Existing minor industries are mostly unionized and wages in the area are similar to the rest of South-Central and Central Alaska. Agriculture is not

unionized and this non-wage and salary classification accounted for some 35 percent of total employment. Government wage and salary employment accounted for another 22 percent of total employment, and trade and services an additional 16 percent.

In 1964 the total civilian workforce in the Palmer - Wasilla - Talkeetna Election District averaged some 1,950 persons. Maximum employment occurred in September with some 2,230 persons being employed and minimum employment occurred in January with about 1,460 persons being employed. Average monthly unemployment was slightly less than 200 persons. Employment in manufacturing supported some 80 to 90 persons in 1964 and in construction some 130 to 230 persons. The average monthly wage for manufacturing-supported employees was some $670 to $730 and for construction-supported employees some $1,190 to $1,340. The latter form of employment was responsible for the highest monthly wage rate, while manufacturing was responsible for a wage rate very close to the median for all types of employment in the District.[5]

---

5. Alaska Department of Labor, Statistical Quarterlies - 1964 and Yearly Summary of Work Force, 1964.

IV

THE FOREST RESOURCE

(Author's note: Estimates concerning the forest resource base as presented in this section were derived from a variety of sources. Major references are footnoted. Information collected in the field and from forestry personnel were used in making several revisions. Accurate quantitative and qualitative measurements of the forest resource in the Susitna Valley are incomplete to date. Valid extensive estimates are being developed by the U. S. Forest Service in their Forest Survey. Intensive estimates by State forestry personnel, through ground cruising, give sound figures for small specific areas, usually when a sale is contemplated. High accuracy estimates to fill the gap in between concerning specific areas within the valley have yet to be developed. The estimates presented here are intended for interim use until more accurate figures become available. Inherently they should be conservative.)

Forest Areas

The Susitna-Matanuska Valley covers an area of over five million acres. Commercial forest land[1] covers at least 1.3 million acres of the land area, but much of this is not accessible at the present time. The highest potential for development occurs east of the Susitna River from the Knik Arm of Cook Inlet north to the vicinity of Talkeetna and west of the river across from Talkeetna, adjacent to the Petersville road. Some 500 thousand acres of commercial forest land can be reached or is traversed by rail or road in this area.

The majority of the volumes occur on state land, but lesser volumes are on private land and on land administered by the Bureau of Land Management. White spruce (Picea glauca (Monench) Voss) is the only softwood species of

---

1. Land capable of producing an annual forest increment of 20 cu. ft. per acre.

comparative commercial value. Commercial hardwood potential exists primarily for paper birch and cottonwood. Paper birch (Betula papyrifera Marsh.) is represented by two varieties--Kenai birch (Betula papyrifera var. kenaica Evans) and Alaska white birch (Betula papyrifera var. humilis (Regel) Fern. and Raup). The latter is considered to be dominant in the Susitna Valley. The name cottonwood is applied locally in the valley to both balsam poplar (Populus balsamifera L. or Populus tacamahaca Mill.) and to northern black cottonwood (Populus trichocarpa var. hastata Henry). Difficulty in distinguishing the two species in the field has led to a divergence of opinion on which species predominates along streambeds and on lowland sites in the valley. Small size "cottonwood" on better drained higher elevated sites is readily distinguishable as balsam poplar. Aspen (populus tremuloides Michx.) occurs on some sites in the valley, but is small in size and lacks commercial potential without an established pulpwood market.

Spruce occurs on a variety of sites throughout the valley. The heavier concentrations of cottonwood occur on the alluvial bottomlands and along streams and rivers on moist sites. Birch usually is found on well drained sites and on the benches parallel to major rivers but at somewhat higher elevations. About 200 to 800 ft. seems to be the preferred elevation. In general, stands classified as commercial occur well below 1,500 ft. in elevation.

Timber Volumes

Commercial timber volumes in the Susitna Valley are estimated to be at least 3.6 billion bd. ft.[2] Preliminary Forest Survey estimates for the valley show about 30 percent birch, 35 percent spruce and 35 percent Populus species.

2. International 1/4-inch log rule.

This would mean 1.1 billion ft. of birch, 1.25 billion ft. of spruce and 1.25 billion ft. of Populus species.[3] Previous estimates indicated that the proportion of birch might have been as high as 50 percent.[4] One possible explanation for the difference would involve a greater percentage of mature birch stands being located in accessible areas that are more easily observed. Conclusions reached on this basis might not apply west of the river in inaccessible areas.

Considerable interest has been shown by State agencies and private firms in regard to relatively pure stands of mature birch. The total volume in these stands is estimated by the Forest Survey to be at least one billion bd. ft. in trees 10 inches D.B.H. and up. However, not all of the stands are accessible at the present time. Table 1 indicates the presently accessible stands. Other areas where mature birch stands have been reported cannot readily be described. One such area is immediately south of the Peters Creek Road stands. This region from the Susitna River west to the Yenlo Hills and south to the 62° parallel or slightly beyond is believed to include over 125,000 acres of birch and spruce stands. The volume of birch should exceed 250 million bd. ft. However, areas of specific birch concentration are not known. Widespread intermingling with other forest types and non-forest land is noticeable from aerial observation. Mature birch stands have also been reported for the Shell Hills north of the Skwentna River (approx. T21,22N;R12W). Some of the other areas where "large" birch has been reported include: along the Tokositna River west of the Chulitna River at the base of the mountains, the basin north of Beluga Lake, and the vicinity of Mt. Susitna. Acreages and volumes are unknown, and these areas are presently considered as not

---

3. Preliminary estimates of the Forest Survey, Northern Forest Experiment Station, Juneau.
4. Falkner (69)

TABLE 1 - Known mature paper birch stands in the Susitna Valley, location, accessibility, acreage, and volumes

Name	Location (approx.)	Accessibility	Ownership	Acreage (approx.)	Volume (Gross, M bd. ft.)
		A. Southern Portion Some 20 mi. of woods road needed.	State	7,000	20,000
Knik Stands	Primarily West of Goose Bay on the Knik Arm of Cook Inlet. (i.e.T14N, R4W,T15N,R4W)	B. Northern Portion of stands bisected by woods roads. Access via Big Lake or Knik.	State and Private Intermingled	23,000	65,000
Talkeetna Stands	Primarily East of the highway & railroad above the Kashwitna River to Talkeetna. Parallel & below the 1500 ft. contour line of the Talkeetna Mts. (i.e. T22,23,24,25,26N; R4W,R3W)	Via trails & poor quality woods roads from highway. Short access roads would be needed.	Mainly State (minor private along highway)	80,000	160,000
Peters Creek Rd. Stands	Adjacent to, and South of the Peters Creek road from Talkeetna west to Peters Hills (i.e. T25,26,27N;R5,6,7, 8,W)	Scattered tracts accessible from points along Peters Creek Road	Mostly state; private immediately adjacent to road	100,000	200,000

SOURCE: Derived by the author from unpublished reports on file, Institute of Social, Economic and Government Research; references (64), (65), (69), and field study, July 10 to August 15, 1965.

accessible. The locations of the more prominent stands discussed above are shown in Figure 2.[5]

Annual Cut

Without accurate inventory information and detailed field investigation, annual cut can only be discussed in broad, conservative terms. Forestry research on forest types and site, volumes, regeneration, growth and yield, etc., should be available before detailed annual cuts and sustained yield plans are formalized. However, to have a large and extensive mature forest resource which will not improve with age, and to not commence cutting this resource on a conservative basis means that present economic benefits will be foregone. Thus, in regard to current use, annual cuts must be based on present knowledge in regard to broad, not detailed and specific, forestry principles. Plans should be extensive in nature and extremely flexible. Utilization and management should undergo frequent revision as knowledge becomes available until a balance is obtained perpetuating both the resource and the economic activity depending on it.

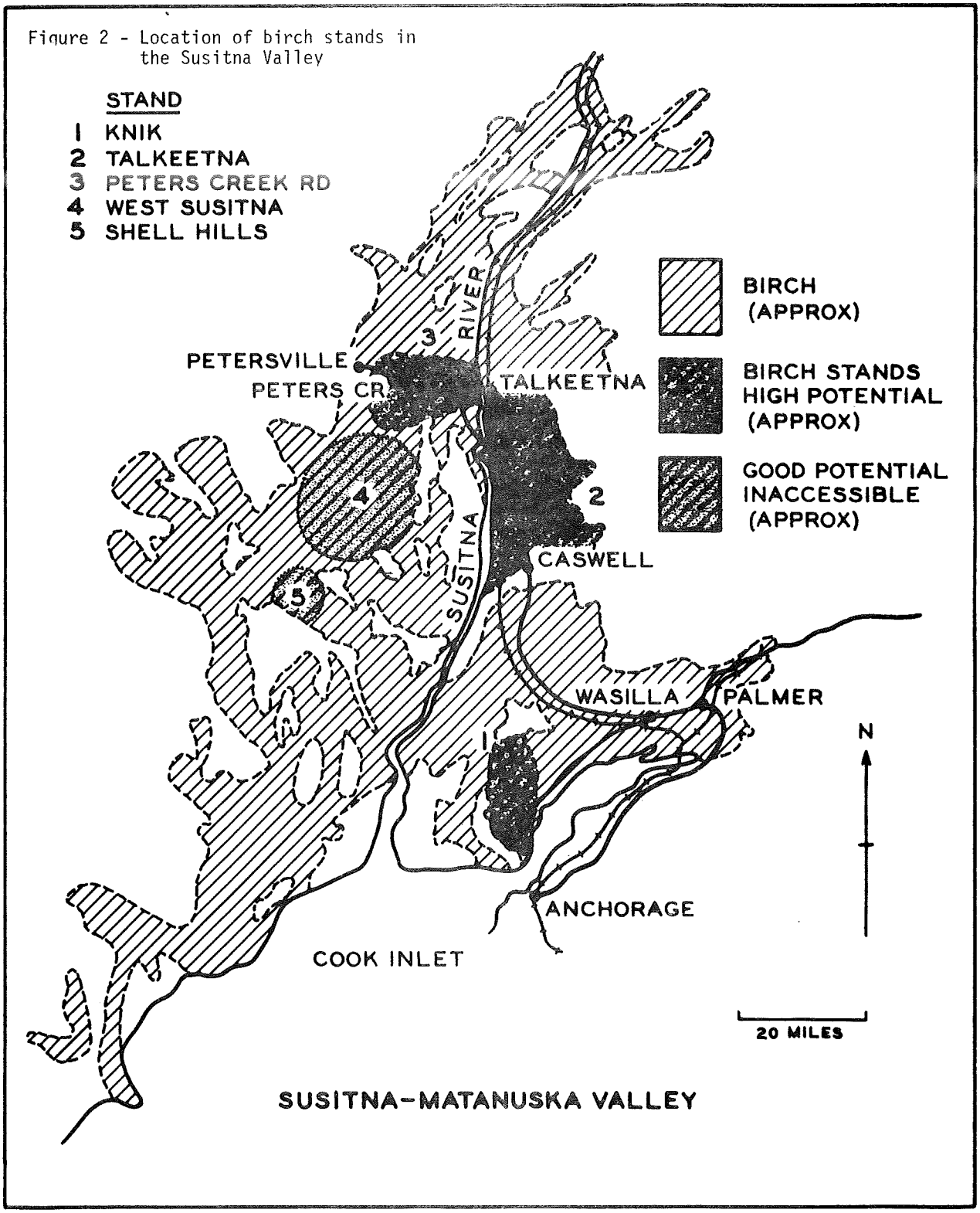
A suggested starting point might be the area control concept as suggested by Davis.[6] In essence, this procedure involves cutting on an acreage as opposed to a volume base. Over large areas, this concept has an added advantage in the Alaskan Interior situation. Volumes per acre are low relative to forest conditions in many of these areas (i.e. a few thousand bd. ft. per acre) and thus volume on an extensive basis is highly dependant on acreage. In short, acreage can be used as a cutting control, but can easily be related to volume for forest management uses and supply estimates for utilization.

---

5. Information presented in this paragraph relies heavily on interviews and supporting field reconnaisance, July 10 to August 15, 1965.

6. Davis (11).

Figure 2 - Location of birch stands in the Susitna Valley



One very important point in the preceding concept is the establishment of a rotation age - more simply, the time lag to regrow the forest to maturity on an area once cut. On an area concept, if regrowth to maturity takes 100 years, total stand acreage is divided by 100 for the annual cut each year. In Alaska, however, two factors now come into play which present difficulties. One, rotation ages for various species on various sites under various management conditions are not known. Second, acreages are not precisely known; but more important considerable acreage of mature timber is presently inaccessible.

For North America, in general, white birch is considered a fairly rapidly maturing tree. Hutnik and Cunningham[7] indicate: "Paper birch is considered a short-lived species. Trees mature in about 60 to 75 years. Few live longer than 140 years." -- and that "Trees in mature stands average about 10 inches in diameter and 70 feet in height." The Forest Products Laboratory[8] reports on white birch in Alaska: "Trees 80 to 100 years old on the more favorable sites attain a height of 60 to 70 feet and a diameter of 12 to 14 inches, although the average diameter breast high is from 8 to 10 inches." The latter would seem to indicate that trees mature at a somewhat older age in Alaska, and is in line with a limited sampling in the Talkeetna stand where 8" to 12" trees averaged about 80 years in age. Also, limited field investigation by the author in mature stands in the Susitna Valley indicates somewhat lower heights (i.e. 55 to 65 ft.) but a somewhat higher average diameter (i.e. 11 inches D.B.H.). Lutz,[9] in his work on the ecological effects of fire, comments on the birch - spruce succession in Alaska. He indicates that at about 80 years of age spruce becomes prominent in the understory. At 100 to 120 years of age,

---

7. Hutnik and Cunningham (26).
8. See U. S. Forest Service (48).
9. Lutz (31).

the paper birch declines and the spruce increases. Defect becomes high in birch at about 100 years of age, and at 130 years it is likely that spruce has succeeded.

Mature cottonwood on moist lowland sites in the Susitna Valley commonly attains diameters of 18 to 36 inches and heights of 70 to 90 feet. One hundred to 200 years is required to produce trees of this size. Quaking aspen at maturity seldom exceeds 10 to 12 inches in diameter, and is frequently less than 10. Heights are usually from 50 to 60 feet, but on better sites can run 65 to 75 feet. Stands mature in from 60 to 90 years, depending on site conditions. Aspen stands 100 years or older are usually decadent.[10]

Based on the preceeding evidence, it would seem that hardwoods in the Susitna Valley (with the possible exception of large river-bottom grown cottonwood) can reach maturity in 100 years or less. This should be particularly true for the better sites under forest management. However, a somewhat lower rotation age is recommended for an interim period of several years. Something of the order of 65 years (i.e. cut 1/65 of accessible mature stands per year) on an area control basis is suggested. The following reasons are noted for assuming a shortened or lower rotation period for mature hardwood stands:

(1) the valley has vast acreages of mature and over-mature forests that will not improve with age;

(2) much of this timber, if harvested within a few years, can be a source of economic benefit to the state;

(3) highly productive sites can be quickly regenerated and managed, thus insuring future supplies of timber;

(4) large reserve areas of unaccessible stands, as they become accessible, can be used if rotations on previously accessible areas need to be lengthened;

---

10. Lutz (31), U. S. Forest Service (48).

(5) if acreage and volume figures prove to be under-estimated the error is compensating for a longer rotation; and

(6) estimates of acreages and volumes discussed in this report are primarily for mature stands only; not total productive hardwood forest land or land under forest management.

Area control is particularly suited to even-aged management. The latter most assuredly needs considerable investigation in regard to Susitna hardwood forest stands as many are mature and even-aged. Also, accessible stands with a high site index (where known) should be cut first. In this way, primary intensive management assumed after cutting would occur on the sites where the potential for growth and yield was the highest. This would bring about future supplies of wood possibly in greater volume, but at least within a shorter time period.

Assuming a 65 year interim rotation period and an area controlled cutting program, estimates for annual removals are shown in Table 2. This is approximately the same as cutting 1.5 percent of present total estimated inventory per year in mature stands. Both acreages and related volumes are indicated. The annual cut cannot be expected to increase significantly for several years under the assumption of converting to a longer rotation age on an area control basis as new forest areas become accessible. However, it is entirely possible that better inventory data in future years will show that supply estimates were too conservative and that allowable cuts can be increased. Even a very rough approximation of total annual cut for the whole valley is not easily justified when a major portion of the stands are not accessible. However, assuming area control and an average rotation of 100 years,[11] the annual cut can be estimated to be at least 36 million bd. ft. Caution: no assumptions are made concerning availability and specific usability by industry.

---

11. Considers slower growing spruce and no reserve areas to balance heavy initial cutting; thus 100 years rather than 65 years is assumed.

TABLE 2 - Estimated annual allowable cuts, accessible[1] stands, Susitna Valley, 1966

Location	Species	Annual acreage (approx.)	Annual Volume (M bd. ft.) (approx.)
Knik stands	birch	450	1,275
Talkeetna stands	birch	1,200[2]	2,400
	spruce		225
Peters Creek Rd. stands	birch	1,500[2]	3,000
	spruce		750
All accessible stands (including above)	birch	3,625	9,250
	spruce	1,250	6,250
	Populus sp.	1,250	6,250
Total accessible	All species	6,125	21,750

1. Accessible stands are broadly defined in this report as those being within 20 miles of the railroad or a presently useable road.

2. Spruce combined with birch; no separate estimate available.

SOURCE: Derived by the author from data on file, Institute of Social, Economic and Government Research.

Past Cutting Activity

The harvesting and utilization of timber in the Susitna Valley is not highly developed. Spruce for local use has been centered in the lower Susitna Valley and the Matanuska Valley. Two uses predominate; the peeling of spruce for cabin logs, and the manufacture of rough and semi-finished spruce lumber for local use. Markets are small and undeveloped. Competition with imported lumber is minor as kiln drying facilities and modern finishing equipment are not available.

Hardwood utilization is even less stable than that of spruce. Some cottonwood has been cut intermittently but this has been on a specific need and use basis. Local as well as regional markets are essentially absent for this species. Paper birch utilization, while sporadic, has been a topic for discussion and speculation for some two decades. Only minor markets exist for primary manufactured birch products, both in the valley and adjacent areas of the state. Past attempts at utilization have always faced the additional hazard of long-distance shipping to attain access to non-Alaskan birch markets. Also, the primary manufacturing facilities used have not been able to match technical specifications existing in these markets.

The acquisition of Alaskan birch stumpage or timber per se does not indecate a criterion denoting successful primary manufacture. Many firms in the past have failed to realize the nature of the Alaskan paper birch resource in planning utilization.[12] Similarly, they have failed to investigate their intended markets, particularly in regard to specifications. In general, for any individual firm both of these cannot be varied and are beyond their control. The variable they can control, however, has been frequently misused in the past.

---

12. See the next section for characteristics and quality implications.

In short, marketing and utilization procedures must be a compliment to the resource base, and to the secondary market. Inadequate marketing and utilization procedures frequently bring the firm to the ultimate dilemma that they cannot effectively compete in desired markets. For the short run facing any firm, the resource base cannot be altered, the secondary market cannot be altered, but marketing and utilization procedures can. Firms not recognizing the above for Alaskan paper birch have, to date, not been successful in utilization and development.

Table 3 shows past utilization of the Susitna birch resource at a supply level. A careful comparison between sale volume and cut volume shows clearly the lack of recognition by firms of the resource base with which they are dealing. Relative to utilization at the primary manufacturing level the resource is the constant and the technology applied must vary to meet it. The reverse simply curtails or eliminates supply!

Table 3 indicates firms anticipated utilizing some three and one-third million bd. ft. of Alaskan paper birch from the Susitna Valley. They actually utilized less than three-quarters of a million bd. ft. One possible explanation--they did not know what they were buying! A more plausible explanation--they had limited knowledge on what they were buying but hoped it would be adequate for already purchased, planned or assumed marketing and primary manufacturing facilities.

Characteristics and Quality

Much controversy has developed in regard to the quality of Alaska hardwoods. Most of this concerns birch when investigated for development purposes. Little if any written comment pertains, for instance, to the quality implications for cottonwood or aspen. The former, based on very limited evidence,

TABLE 3 - Sale and cut, and location of paper birch timber in the Susitna Valley to January 1, 1966[1]

Sale Volume (M bd. ft.)	Actual Volume Cut (M bd. ft.)	Location
276	46.5	Sec. 5&6 T15N,R3W,SM[2]
287	.7	" 16 T18N,R3W "
892	114.8	" 9-17 " " "
400	0.0	" 13&24 T24N,R5W "
288	41.2	" 23&26 T24N,R4W "
500	97.0	" 4 T15N,R4W "
300	300.0	" 9 " " "
102	87.4	" 7 " R3W "
75	9.9	" 16 T17N,R1W "
50	50.0	" 13 T24N,R5W "
500	9.1	" 9 T15N,R4W "
Totals 3,670	756.6	Accessible portion of valley

1. A natural time lag exists between sale and cut. However, as of July 1, 1966 only minor volumes of timber remain to be cut on previous sales.
2. SM - Seward Meridian, Alaska.

SOURCE: Alaska Division of Lands, Office of the State Forester.

appears to be favorable in quality with cottonwood from other areas of the United States. However, until a market develops for this species, specific quality implications will not be widely reported. Aspen presents a similar picture, but due to its smaller size more emphasis is liable to be placed on future markets such as pulpwood or pulp chips rather than lumber. Quality of aspen pulpwood will not be as important as quality of aspen sawtimber. More interest will, however, be reflected at the forest management level as mature aspen stands in Alaska are reported to become decadent very rapidly.[13]

Alaskan paper birch has undergone tests by several firms in the continental United States. Unfortunately in many cases the sample logs obtained and shipped to these firms were not representative of many of the mature stands of birch in the Susitna Valley. Frequently samples were obtained from easily accessible areas near farms, and along the Alaskan railway. Open grown Alaska birch, similar to white birch in other regions, does not readily shed lower branches, and derived veneer and lumber is severely down-graded by the presence of excessive numbers of knots. "Pin" knots, the result of poor natural pruning, are also a defect in primary products where the birch grows in a relatively open association with white spruce. Some areas in the Talkeetna stands are reported to fit this situation.[14] The problem is of lesser importance in the Peters Creek Road stands and in the Knik stands. Most certainly, while there is no question of the existance of "pin" knots, the problem is not of the magnitude suggested by the primary manufacture of past sample logs.[15]

Branch stubs, conks, frost cracks, fire scars, and other minor defects are present in the birch stands. However, their incidence does not appear

---

13. Lutz (31).
14. Crank (67).
15. Alaska Development Board (62).

to be severe, especially in stands that are not over mature. Older stands exhibit a fairly high prevalence of pathological disturbance. Trunk and heart rot are the most common afflictions. Frequently decay consists of heart rot surrounded by a highly discolored reddish area referred to as "red heart." The heart rot-red heart combination usually is found in older trees, although the latter appears fairly frequently in some of the smaller trees (i.e. dia. 10-12"). Severity of the center defect seems to increase with diameter. The problem appears to be critical only in over-mature stands, and in many cases after felling where center defect is noticed to be a cull causing factor, the problem can often be rectified by butting the stem from one to three feet. Samples were not confirmed, but the causitive agents are or resemble Fomes ingarius, Poria obliqua, and Torula ligniperda.[16]

Cull or defective, non-usable, timber or wood can refer to different conditions in a forest when utilization is contemplated. First, it frequently is used to denote the percentage of trees above some minimum diameter in a mature forest, or one ready for a harvest cut, that are not acceptable for utilization. In this case the cull distinction is that the tree is so defective that returns from utilization would not adequately cover costs of cutting, removal, and manufacture. Secondly, cull can also refer to defect in trees that are acceptable for utilization. Here some percentage of the volume of the stem is considered as non-useable or waste without positive value. Thus, if a volume estimate is made in a harvestable forest for all trees above a specified diameter (i.e. gross volume) and an allowance is deducted for both cull trees and for defective wood in useable trees, the residual is the net or merchantable volume.

---

16. Bureau of Land Management (65), Crank (67).

Frequently a "lumping" of the above two types of cull can be misleading depending on the emphasis, or lack of emphasis, placed on the two components. Also, the accuracy of estimation can vary widely depending on the actual stand, the means employed, and the firms or agencies involved. Public agencies as sellers of timber tend to favor minimum deductions for cull. They are interested in the removal of as much defective material as possible due to the adverse effect in managing for an improved recurring crop. Private agencies as buyers of timber tend to maximize cull deductions. They are interested in the removal and purchase of as little defective material as possible. Readers have been subjected to the preceding explanation so that they will exercise caution in interpreting the figures presented in Table 4. The allocation of cull between non-merchantable trees and merchantable but defective trees could not be derived. However, a "total" cull deduction should not exceed the range shown in the third column. Also, the means and accuracy of estimation are unknown and thought to be ocular in some cases, while in others acceptable forest management procedures were used but sample size might not have been adequate. Estimates shown include both those by public and private agencies.

Mature birch stands in the valley do not produce trees with diameters or heights comparable to birch in the central or eastern United States. On the average, diameters range from 8 to 15 inches, but a very close approximation of the average diameter for all mature stands would be 11 inches at breast height (4-1/2'). Similarly, merchantable height is low by comparison. In general, recovery in mature stands will be something of the order of one and a half 16 foot logs! Limited sampling by the Bureau of Land Management (Figure 3) indicates the general relationship. However, specific variation, particularly in the 10", 11", and 12" diameter class certainly indicates that

TABLE 4 - Estimated cull deductions for selected stands of mature paper birch in the Susitna Valley

Stand	Average Gross Volume/Acre (birch only - bd. ft.)	Range, Gross Volume/Acre (bd. ft.)	Cull Deduction[1] (percent)	Net Volume Per Acre[2] (birch only - bd. ft.)
Knik	2890	1150-4700	30 - 50	1445-2020
Talkeetna	2700	200-5500	26 - 53	1270-2000
Peters Creek Rd.	N.A.	400-3200	N.A.	up to 2000

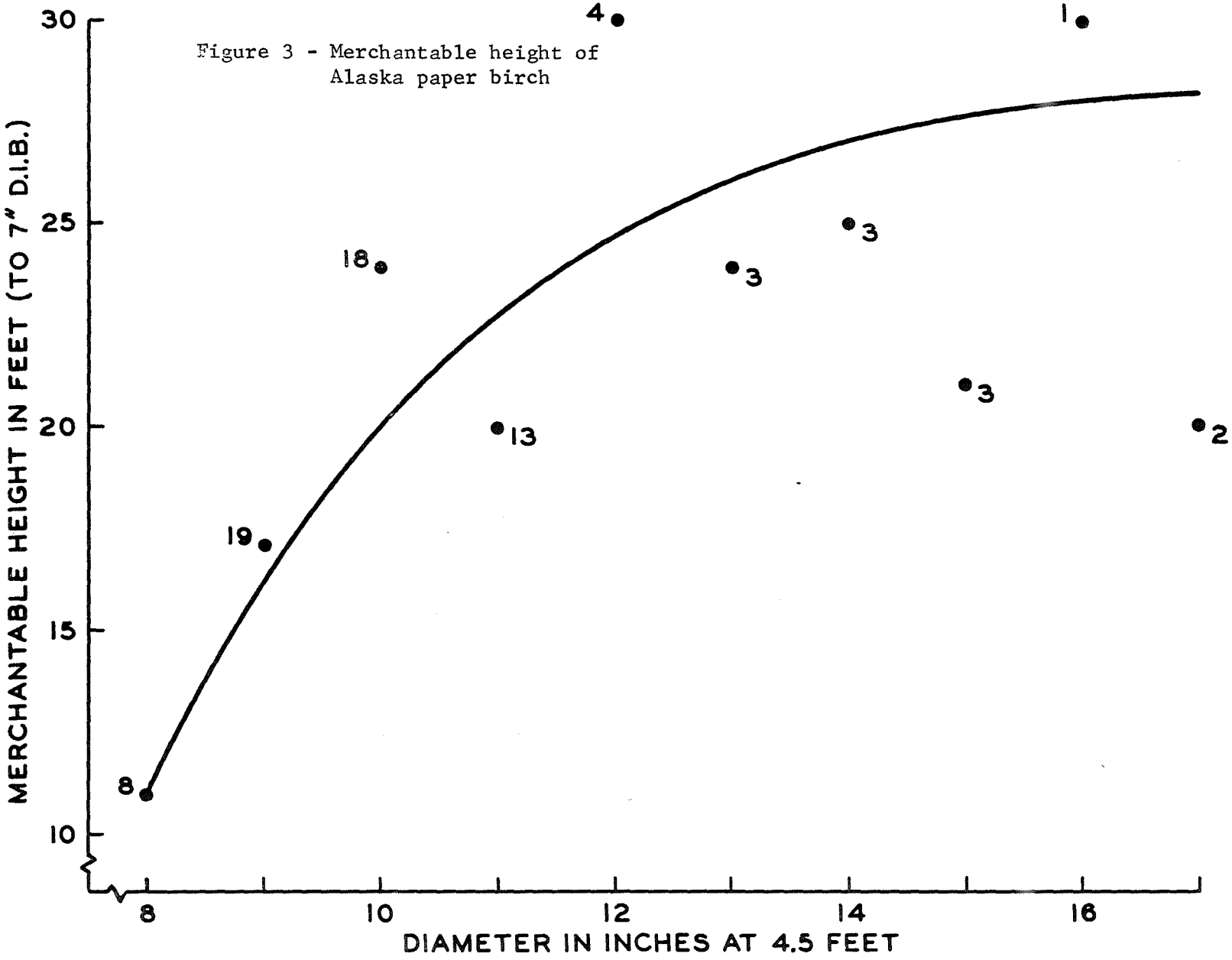
N.A. - Not Available

1. Deductions for trees two-thirds or more defective and for defect in merchantable trees; as a percent of gross volume.

2. Based on average gross volume per acre and cull deduction as shown for stands of widely varing density from 30,000 to 100,000 acres in size.

SOURCE: Unpublished reports, Institute of Social, Economic and Government research.

Figure 3 - Merchantable height of Alaska paper birch



further investigation and greater sampling is necessary. A volume table for paper birch is shown in Table 5. Based on average diameter and merchantable height, recovery per tree should be approximately 55 bd. ft.

A recent grade recovery study conducted by the U. S. Forest Service[17] gives an indication of hardwood lumber recovery from mature paper birch and balsam poplar logs in the Knik area of the Susitna Valley. Results are based on 162 birch logs and 174 balsam poplar logs cut and sawn under the supervision of technical personnel. The study included the full merchantable length of each sample tree to an eight inch top. Logs were designated by Forest Service Standard Hardwood Log Grade Specifications as Factory Lumber Logs 1, 2 and 3, Construction Logs, and Local-Use Logs.[18] The last two classifications are for low quality logs and cull logs which may or may not be economically feasible to manufacture in any specific commercial operation. Lumber recovered was graded according to the National Hardwood Lumber Association rules.

The average log diameter for birch was 11 inches (d.i.b.) small end and for balsam poplar 13.5 inches. Birch logs averaged 40 bd. ft. per log net and balsam poplar 83 bd. ft. net. Some seven percent of the birch logs failed to qualify as factory lumber logs and fell in the construction and local-use class. For balsam poplar the figure was 10 percent. Also, only three percent of the birch logs qualified as No. 1 logs. This was mainly not a result of low quality (i.e. defective material) but a result of low average log diameters characteristic of Alaska paper birch, which are not compatible with the minimum diameter requirement for a No. 1 log in the Standard Specifications. For

---

17. Swanson (77).
18. Ostrander (36).

TABLE 5 - Alaska paper birch volume table (international 1/4" rule)[1]

Tree D.B.H.	Number of 8 foot logs (7" top D.I.B.)					
(inches)	1	2	3	4	5	6
8	10	20	30	40	50	60
9	15	25	35	50	65	75
10	15	30	45	60	80	95
11	20	35	55	75	95	115
12	20	45	65	90	115	135
13	25	50	80	105	135	160
14	30	60	90	125	155	190
15	35	70	105	145	180	215
16	40	80	120	165	205	255
17	45	90	140	185	230	280
18	50	100	155	200	260	315
19	55	115	170	220	290	350
20	60	125	190	255	320	385

1. Volume to nearest 5 bd. ft.

SOURCE: Derived from Bureau of Land Management (65).

balsam poplar, some 12.6 percent of the sample fell in standard log grade No. 1. Standard log grade No. 3 contained 56 percent of the birch logs and 44 percent of the balsam poplar logs.

Lumber grade recovery is shown in Table 6 for Alaskan species and comparable recoveries are shown in Table 7 for several species from other regions. Additional insight into the overall recovery of quality lumber from Alaskan species as compared to species from other regions is provided in Table 8. This table indicates the percent of No. 1 common and better lumber recovered. The limited evidence presented supports the contention that recovery in Alaskan paper birch by log grade is not inferior to recovery exhibited by Minnesota paper birch, yellow birch and red alder. Caution is urged in comparing the results from log grades No. 1 and 2 for Alaska paper birch. The low average diameter of Alaska paper birch precluded a large sample of No. 1 logs. Many small diameter but clear logs then fell in Grade No. 2. The effect of this shift in any comparisons between regions would be a log grade No. 2 sample heavily weighted with small clear logs being compared to a log grade No. 2 not exhibiting this characteristic. The evidence presented on Alaskan balsam poplar supports the contention of inferior recovery compared to eastern cottonwood and yellow poplar. However, the U. S. Forest Service sample of 174 balsam poplar logs could be considered non-representative of many balsam poplar stands in the valley. Many stands adjacent to the Susitna River and its tributaries have a much larger average diameter. Due to the relative uniformity of mature birch stands, the birch sample could be considered somewhat representative in regard to other stands.

The technical properties of Alaskan hardwoods vary slightly from similar species in other regions. Only very minor variation occurs in regard to the Populus sp., but Alaskan paper birch does differ in many respects from eastern

TABLE 6 - Lumber grade yields for Alaska paper birch and balsam poplar logs

Log Grade	Lumber Grade (in percent)				
	FAS	Sel.	No. 1C	No. 2 C	No. 3C and poorer
Alaska Paper Birch					
No. 1	10.3	11.7	41.4	18.4	18.2
2	5.3	13.4	30.5	18.4	31.4
3	0.1	4.3	19.7	26.8	49.0
1, 2 and 3	3.4	9.3	26.4	22.1	38.8
Construction	0	2.3	7.0	15.5	75.2
Local-Use	0	5.1	3.3	28.2	63.4
Alaska Balsam Poplar					
No. 1	13.3	8.3	34.0	28.5	15.9
2	3.2	3.9	29.3	38.5	24.8
3	0.1	0.2	7.7	40.2	51.8
1, 2 and 3	4.7	3.7	23.5	36.1	32.0
Construction	0	0	6.8	36.2	57.0
Local-Use	0	0	0	13.0	87.0

SOURCE: Swanson (77).

TABLE 7 - Lumber grade yields for comparible hardwood species from other regions

Log Grade	Lumber Grade (in percent)				
	FAS	Sel.	No. 1C	No. 2C	No. 3C and poorer
Paper Birch (Minnesota)					
No. 1	20.0	28.2	25.3	12.4	14.1
2	10.1	19.3	21.9	24.1	24.6
3	0.6	7.4	12.2	23.5	56.3
Yellow Birch					
No. 1	36.3	7.5	26.5	10.6	19.1
2	8.3	4.6	29.6	20.8	36.7
3	.7	.9	11.6	19.3	67.5
Red Alder					
No. 1	15.1	10.6	42.6	21.2	10.5
2	5.7	3.9	31.8	39.1	19.5
3	2.5	3.6	24.4	41.0	28.5
Cottonwood					
No. 1	34.4	6.4	31.1	23.7	4.4
2	8.0	3.9	39.9	40.3	7.9
3	1.3	1.0	30.5	59.2	8.0
Yellow Poplar					
No. 1	7.9	19.1	45.7	21.9	5.4
2	1.7	4.3	40.6	41.8	11.6
3	0.4	0.6	18.9	56.3	23.8

SOURCE: U. S. Forest Service (78), (49), and Pfeiffer (38).

TABLE 8 - Yields of No. 1 common and better lumber from Alaskan and comparable species, by standard log grade

Species	Log Grade No. 1 (yield of No. 1C and better in percent)	No. 2	No. 3
Alaska paper birch	63.4	49.2	24.1
Alaska balsam poplar	55.6	36.4	8.0
Paper birch (Minn.)	73.5	51.3	20.2
Yellow birch	70.3	42.5	13.2
Red alder	68.3	41.4	30.5
Cottonwood	71.9	51.8	32.8
Yellow poplar	72.7	46.6	19.9

SOURCE: Swanson (77).

yellow birch and in some cases variation is noticeable from eastern paper birch.

Cubic foot weight relationships are shown in Table 9. Alaska paper birch is noticeably lighter than yellow birch, but comparable to eastern paper birch. Lumber and log weight relationships (Table 10) follow the same pattern. Specific gravity and shrinkage values are reported in Table 11. Alaska paper birch specific gravity is similar to eastern paper birch but less than yellow birch. Alaskan balsam poplar has a low specific gravity relative to cottonwood and aspen. Shrinkage values are reasonably uniform with the exception that Alaska paper birch has a high degree of tangential shrinkage. Strength properties for Alaskan and related hardwoods are shown in Table 12. Here it is of particular importance to note the superior strength properties of Alaskan paper birch in comparison to eastern paper birch. Recognizing that yellow birch is a species much sought after in the manufacture of fine wood products and that paper birch is frequently considered as a substitute when yellow birch is scarce, Alaskan paper birch appears to have a much higher degree of substitutability than eastern paper birch. In comparison to all the woods listed in Table 12, Alaskan paper birch ranks second to yellow birch in strength properties. However, in regard to hardness, more variation occurs. In some respects, it is comparable to eastern white birch while in others comparable to red alder.

TABLE 9 - Cubic foot weight relationships for Alaskan and related hardwoods

Species	Weight per cubic ft.				
	At Felling	Green	15% M.C.	8% M.C.	Oven Dry
			(lbs.)		
Alaska Paper Birch	----	----	38.8	38.0	----
Paper Birch	55.2	50.0	38.9	38.2	31.9
Yellow Birch	59.2	57.0	43.4	42.4	35.0
Black Cottonwood	----	46.0	24.5	23.8	----
Balsam Poplar	49.0	----	----	----	23.1
Quaking Aspen	48.6	43.0	27.0	26.1	23.8
Red Alder	----	46.0	28.8	28.0	----

SOURCE: Flann (12), Forest Products Laboratory (13), and U. S. Forest Service (48).

TABLE 10 - Lumber and log weight relationships per M bd. ft. for Alaskan and related hardwoods[1]

Species	Lumber in General (Approx.)		20% M.C.	15% M.C.		8% M.C.	Logs (12 inch)
	Green	Air Dry	Rough	Rough	Dressed[2]	Rough	Green
Alaska Paper Birch	----	(3200)	----	3230	2370	----	----
Paper Birch	----	(3210)	3280	3240	2370	3180	(11,600)
Yellow Birch	4850	3600	3680	3620	2650	3530	13,200
Black Cottonwood	----	2010	2080	2040	1490	1980	----
Balsam Poplar	----	----	----	----	----	----	(10,900)
Quaking Aspen	3500	2250	2310	2250	1650	2190	10,800
Red Alder	----	(2370)	2450	2400	1760	2330	----

1. Figures in parenthesis are derived approximations.
2. Assuming 1" x 8" to 25/32" x 7-1/2".

SOURCE: Flann (12), Forest Products Laboratory (13), International Harvester Corp. (73), Rasmussen (39), and U.S. Forest Service (48).

TABLE 11 - Specific gravity and shrinkage values for Alaskan and related hardwoods

Species	Specific Gravity[1]		Shrinkage Values[2]		
	(Green)	(12% M.C.)	Radial	Tangential (percent)	Volumetric
Alaska Paper Birch[3]	0.49	0.55	6.5	9.9	16.7
Paper Birch	.48	.55	6.3	8.6	16.7
Yellow Birch	.55	.62	7.2	9.2	16.7
Black Cottonwood	.32	.35	3.6	8.6	12.4
Balsam Poplar[3]	.30	.34	4.0	8.7	13.0
Quaking Aspen	.35	.38	3.5	6.7	----
Red Alder	.37	.41	4.4	7.3	12.6

1. Based on weight when ovendry and volume when green and at 12% M.C.
2. Shrinkage from green to ovendry condition, based on dimensions when green.
3. Reported near Anchorage, Alaska.

SOURCE: Flann (12), Forest Products Laboratory (13), Rasmussen (39), and U. S. Forest Service (48).

TABLE 12 - Strength properties for Alaskan and related hardwoods

Species	Static bending			
	Fiber stress at proportional limit	Modulus of-		Impact bending, height of drop causing complete failure (50-pound hammer)
		Rupture	Elasticity	
	(psi.)	(psi.)	(1000 psi.)	(in.)
Alaska Paper Birch, Green	3,800	7,100	1,350	37
12% M.C.	7,800	13,800	1,900	40
Paper Birch, Green	3,000	6,400	1,170	49
12% M.C.	6,900	12,300	1,590	34
Yellow Birch, Green	4,200	8,300	1,500	48
12% M.C.	10,100	16,600	2,010	55
Black Cottonwood, Green	2,900	4,800	1,070	20
12% M.C.	5,300	8,300	1,260	22
Balsam Poplar, Green	2,100	3,700	700	13
12% M.C.	4,600	6,800	1,190	14
Quaking Aspen, Green	3,200	5,100	860	22
12% M.C.	5,600	8,400	1,180	21
Red Alder, Green	3,800	6,500	1,170	22
12% M.C.	6,900	9,800	1,380	20

TABLE 12 - Continued

Species	Compression parallel to grain-maximum crushing strength (psi.)	Compression perpendicular to grain-fiber stress at proportional limit (psi.)	Shear parallel to grain-maximum shearing strength (psi.)	Hardness: Load required to embed a 0.444-inch ball to 1/2 its diameter — End (lb.)	Hardness: Load required to embed a 0.444-inch ball to 1/2 its diameter — Side (lb.)
Alaska Paper Birch, Green	3,030	430	920	550	560
12% M.C.	7,510	830	1,420	860	840
Paper Birch, Green	2,360	340	840	470	560
12% M.C.	5,690	740	1,210	890	910
Yellow Birch, Green	3,380	530	1,110	810	780
12% M.C.	8,170	1,190	1,880	1,480	1,260
Black Cottonwood, Green	2,160	200	600	280	250
12% M.C.	4,420	370	1,020	540	350
Balsam Poplar, Green	1,660	180	490	210	200
12% M.C.	4,230	350	750	360	290
Quaking Aspen, Green	2,140	220	660	280	300
12% M.C.	4,250	460	850	510	350
Red Alder, Green	2,960	310	770	550	440
12% M.C.	5,960	540	1,080	980	590

SOURCE: U. S. Forest Service (48).

V

HARVESTING HARDWOOD TIMBER

The investigation of stumpage acquisition and the harvesting of timber products in the Susitna Valley is not intended to be a major ingredient of this report. However, the functions, transactions and services rendered between the resource base and primary manufacturing must be evaluated for their effectiveness as a component of the total marketing chain. The position taken in this report is one of ascertaining if they are adequate, and if not, to point out major areas of failure and research needs.

Stumpage Acquisition

This brief section is limited to a few comments on how timber producers usually procure stumpage in the Susitna Valley. Concern is placed almost entirely on state selected lands as private holdings contain only a small portion of total timber volumes and are not utilized extensively. On occasion timber from these lands is marketed locally. Due to the state selection program, Bureau of Land Management administered lands are now chiefly in the inaccessible areas. Small sales were made in the past on a negotiated basis for less than 250 M bd. ft. to fill local needs. The U. S. Forest Service does not administer any land in the valley.

Timber sales on state land are presently the major source of timber products. Such sales are governed by the Alaskan Administrative Code.[1] Typically, two procedures are followed; small negotiated sales and larger sales which call

1. Alaska Department of Natural Resources (61).

for advertising and bidding. Sales under 500 M bd. ft. can be negotiated, but only one sale may be made to the same purchaser in any one year. Sales larger than 500 bd. ft. are considered competitive. These are advertised and bids are called for in consideration of the volumes, species, location, etc. of the timber. To date, due to the very limited forest products manufacturing in the valley the former method of sale has been most prevalent. Many of the sales are for white spruce in small volume amounts to supply local needs for small saw and cabin log mills. Some sales have been made for white birch and a few for cottonwood.[2] Purchases are usually made by individuals scattered throughout the valley. Rarely are purchasers specialists in timber production or milling, and frequently alternate occupations consume much of their time. Seasonality of occupation is prevalent and timber production intermittent.

On the basis of limited investigation it would seem that provisions are adequate for interested parties to acquire stumpage. More pressing needs are apparent in timber production after acquisition.

Methods of Harvesting

The limited harvesting done in the Susitna Valley is accomplished by small intermittently operating producers who lack the necessary skills and knowledge, and who are frequently engaged in alternate occupations both simultaneously and intermittently on a seasonal basis. Part of this can be attributed to inherent Alaskan conditions and the present stage of underdevelopment. However, the situation is not conducive to the rapid growth of a forest products industry. Forest products industries can provide steady employment (relative to many other Alaskan occupations) with only minor fluctuations in seasonal

---

2. Sales of white birch of any significant size as of January 1, 1966 are reported in Table 3.

employment,[3] but this is contingent upon adequate inputs of timber and hence seasonality of operation of timber producers. The industries can hold inventories to carry-over short periods of producer inactivity, but excessively intermittent supply or no supply for long periods of time will seriously hamper production. To maintain a developing forest products industry timber producers will have to operate much less intermittently and for most of the year, with the possible exception of the most severe winter months and the spring break-up.

Harvesting procedures presently in use would not be adequate to sustain a forest products industry. Producers lack both the knowledge and the equipment to produce timber products efficiently at low cost. Part of this situation can be attributed to the lack of markets for timber and a lack of interest in timber production in general. However, part is also due to interests in alternate and conflicting occupations rather than any specialization. Combined with a lack of capital this results in the wide use of dual purpose and older adapted equipment which can be used for a variety of jobs. Increased interest in logging, technical assistance in the use and application of modern equipment, and the availability of credit and equipment suppliers will be needed. Perhaps, for some initial period, firms producing forest products will have to participate in the acquisition and harvesting of their own raw material in order to attain inputs efficiently at a low per unit cash outlay.

Timber producers interested in supplying logs to hardwood sawmills, dimension mills or veneer mills will need increased orientation in bucking the felled tree for grade. Also, log and lumber grades applicable to Alaskan hardwoods,

---

3. For an analysis of this point see Haring (23).

particularly white birch, are necessary as national standards without modification are not suitable considering the characteristics of the resource.[4]

Skidding, loading and hauling will become increasingly more of a problem in regard to hardwood logging in Alaska without modern equipment and improved techniques. Increased attention will have to be given to planned logging. Proper skid-trail and landing location as well as appropriate equipment for the job will be important. Both research and technical assistance will be necessary to develop logging operations suited to Alaskan timber, topography and climate. Inefficient practices such as the use of farm and construction equipment in lieu of specialized machines should be discouraged. Similarly, the use of heavy duty road and construction bulldozers to skid small logs is not feasible in most instances, and the need for modern specialized logging equipment is great. A variety of machines should be tested for applicability. Two types with a high potential for the Susitna Valley would be the new specialized rubber-tire equipment for the more level, well-drained sites, and the track or crawler equipment found to be exceedingly effective on wet terrain or in deep winter snow. The latter has proved very successful in Eastern Canada under almost similar conditions.

Trucking equipment and hauling could be termed adequate under current conditions. Emphasis in the future to support an expanding forest products industry should be on specialized hauling equipment to fit the situation rather than adapting presently owned or locally available trucking equipment to the job. The present road system in the Susitna Valley provides access to several stands of mature hardwood timber that are currently not being

---

4. See the next section for suggested improvements in timber product standardization.

utilized to their full potential.[5] Additional roads to presently inaccessible stands cannot be justified without an expansion in the forest products industry. Future road development will have to take into consideration the low volume per acre relationships discussed in Chapter IV as well as current values per unit of volume for timber products tributary to a given area. As the forest products industry develops specific access roads to stands having a high per acre volume and value relationship can be considered on an individual basis. If a multiple-use road is contemplated, those uses in addition to timber removal must justify any costs incurred for a higher road standard. Careful planning is important as dual purpose roads are liable to use conflicts. Roads constructed under a partial completion per year plan should be minimized if the primary intent is efficient low cost access to timber and the desired result is to be effective supply and increased utilization of programmed annual cuts.

Timber Product Standardization

National hardwood log and lumber rules are not suited for widespread use in Alaska. The two main reasons against their application are (1) the physical characteristics of the main hardwood resource (i.e. white birch) are not the same as those for which the rules were designed, and (2) the rules are too complex for use in an area just developing forest products industries where persons do not fully understand their use and application and still lack sufficient knowledge to properly apply complex rules.

Mature stands of Alaskan birch on the average do not contain trees which can provide logs or derived lumber that are applicable to part of the rules.

---

5. See Figure 2 and "Past Cutting Activity", Chapter IV.

Modifications could be made in the rules, but this would increase their complexity which is already a deterent to their use. Loggers and sawmill operators in areas of the continental United States who have a much higher degree of knowledge and easier access to technical assistance, have not instituted the use of log grades because the system is too complicated.[6] A very simple log grading system designed for Alaskan birch would assist in developing the forest based economy. A complicated but highly accurate system such as was developed by the U. S. Forest Service[7] provides too much differentiation for the small sawmill and the timber producer, particularly where payment by log grade is contemplated as well as felling and bucking for grade difficulties. On the other hand, the use of woods run material frequently makes for unequitable payment depending on knowledge and market power as well as having the effect of lowering log quality and hence endangering the quality of output of the sawmill upon which profits depend.

National hardwood lumber grades could be used with only slight modification for the marketing of Alaskan birch. This would involve the recognition that while sound clear lumber can be produced, the small diameter, short stemed Alaskan birch on the average will not produce wide boards, or boards of long length. Hence, the higher grades for Alaskan birch must of necessity include narrower and shorter lumber than national grades. This does not mean that, if modified Alaskan rules are recognized, market pricing patterns should remain the same. On the contrary, some divergence in pricing with a different grade system would be natural and expected under present market conditions.

---

6. For an analysis of this situation see Cobb (7).
7. See Ostrander (36) and U. S. Forest Service (49).

A log grading system to adequately differentiate quality and yet be simple enough to gain acceptance should be based primarily on diameters by log lengths, both of which should be correspondingly smaller for top grades than national standards which were designed for larger diameter timber easily reduced to longer log lengths and particularly the commonly accepted 16 foot length. Less attention should be placed on surface defects and particularly surface defects located with respect to the log faces. The grades should be primarily a differentiation based on a combination of diameter and length where the primary purpose is to buck the stem in such a manner that major defects are removed. The intent would be to produce short straight logs (i.e. 8 to 12 feet) without any major defect. With major defects removed, minor residual defects would either be acceptable or not acceptable on some designated basis. Without the possibility of changes in log grade due to a variety of minor defects on three or four faces and their position in regard to length on longer logs a fairly simple set of specifications could be developed which have a good potential for acceptance.

If national hardwood log rules are applied to Alaskan birch, besides the difficulties in overcoming acceptance due to their complexity, sound, clear, small logs in general would fall into a number two grade. For Alaskan birch then the number one log becomes most inappropriate as the average diameter of mature stands is less than that required by the grade. This effect is carried over into lumber production where clear sound material cannot fall into top categories on the basis of shorter average lengths and widths. Short lengths of lumber are necessary because of the difficulty in obtaining long logs from short stem height trees when the stem must be cut in two or three places to

maximize receipt of sound, clear, straight material.[8] The practice of attempting to cut 16 foot logs as a standard, which is gaining some acceptance in hardwood logging in Alaska, should be terminated. More marketable material can be obtained more easily with the use of short logs and a very simple grading system. The markets for which Alaskan white birch is best suited for competition are those which do not necessarily require broad width and long length in product specification. Modified national lumber rules are suggested which recognize a lower average width and length of board, and a log grade system is recommended that is based on a small log. The basis for log grades should take into consideration (1) diameter, (2) diameter in relation to log length, and (3) the removal of easily recognized defect by cutting short 8 to 12 foot logs.

8. See Figure 3 for diameter, stem length, implications.

VI

PRIMARY MANUFACTURING

The development of primary wood products manufacturing facilities in the Susitna Valley will be heavily dependent on the characteristics of the resource to be utilized and the available product markets that can be entered profitably. Various small firms will probably continue to produce a variety of rough products for local consumption. They will use both softwood and hardwood species and will move frequently into and out of production, depending on changes in a variety of socio-economic factors.

Paper birch utilization in the Lake States in past years has been based primarily on a pulpwood market. The use of the smaller average sized paper birch (relative to other hardwood species) in sawmilling is not very prevalent. In the 1950's some 60 percent of the utilized paper birch was in the form of pulpwood. However, quality veneer bolts and small sawlogs were differentiated and 40 percent of the total utilization went into veneer or sawn products. Veneer accounted for about 29 percent and sawn products 11 percent. The latter was mostly turning squares for the furniture industry; very little was marketed as lumber.[1]

The Alaskan situation is interesting in comparison. Paper birch in the Lake States did not compete to any extent with other hardwoods in sawmilling. Alaska, on the other hand, does not have large volumes of other hardwoods - paper birch is the most prevalent species. Also, the Lake States has a pulpwood market and Interior Alaska does not. Average tree size is

---

1. Davis (10)

somewhat similar; that is, smaller than other hardwoods with market acceptance. For these reasons development of a hardwood forest products industry in Interior Alaska is likely to differ in some respects from that in the Lake States. Based on the Alaskan resource characteristics, present social and economic conditions in and adjacent to the Susitna Valley, and forseeable markets, this section of the report attempts to analyze primary manufacturing development, and to point out areas with a high probability of success.

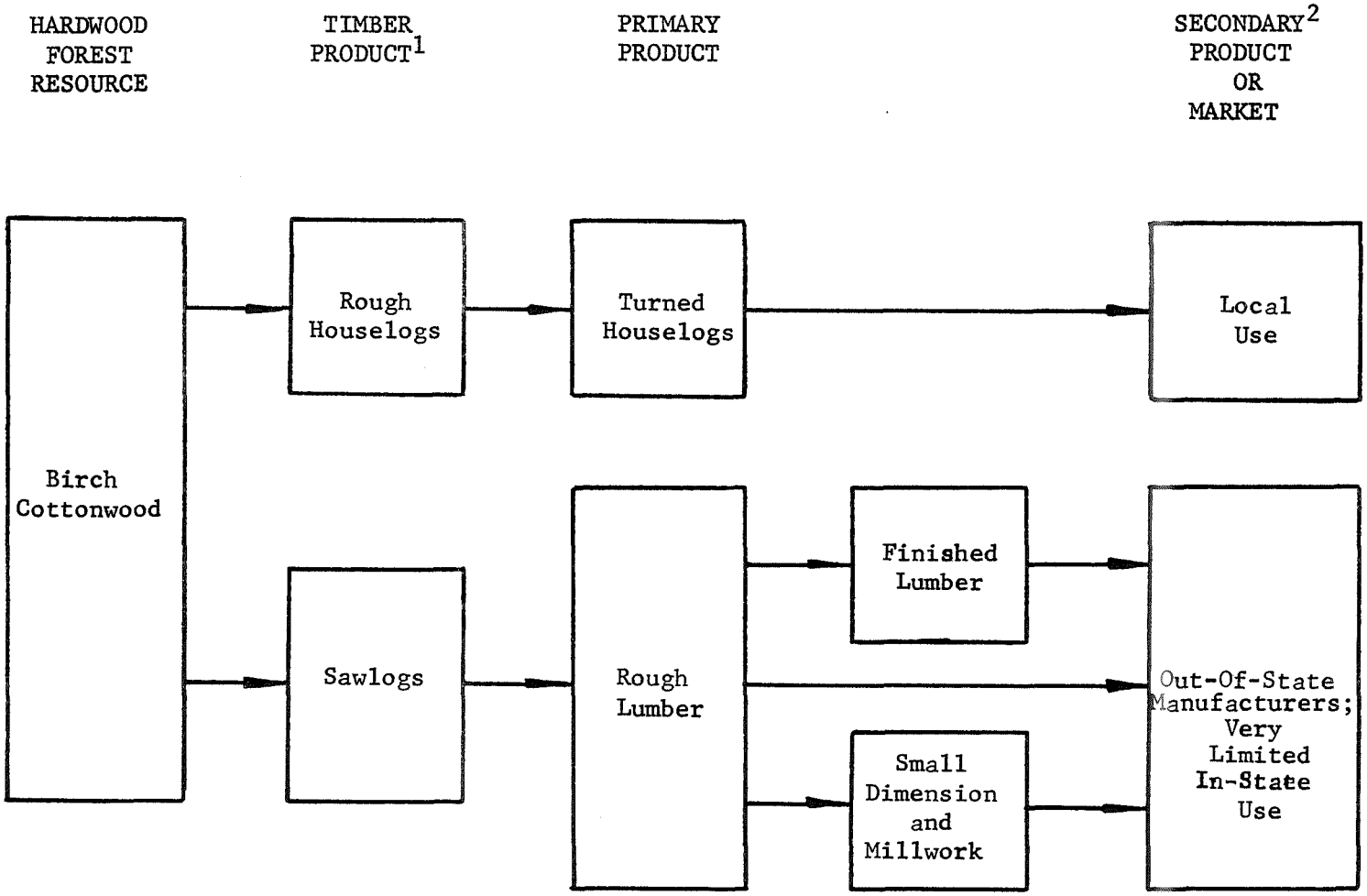
Figure 4 indicates present hardwood products flows. The small firms currently operating produce mainly for local consumption. Intermittently, shipments of rough birch lumber are made to markets on the west coast of the continental United States. Figure 5 depicts the products and product flows that could develop from a hardwood forest resource such as the one located in the Susitna Valley. Markets for secondary products are very limited in Alaska because of the low level of population. For this reason a consumer oriented secondary manufacturing complex is not likely to develop without substantial population increases. A high potential exists for the development of primary manufacturing, and some primary products can fill local use needs as well as compete in non-Alaskan markets.

Small Hardwood Firms

Small hardwood mills in the Susitna Valley are, or potentially can be, of three types: (1) turning mills producing cabin and house logs for local consumption, (2) circular sawmills, predominently portable and without modern equipment, and (3) possibly small modernly equipped hardwood sawmills in the future.

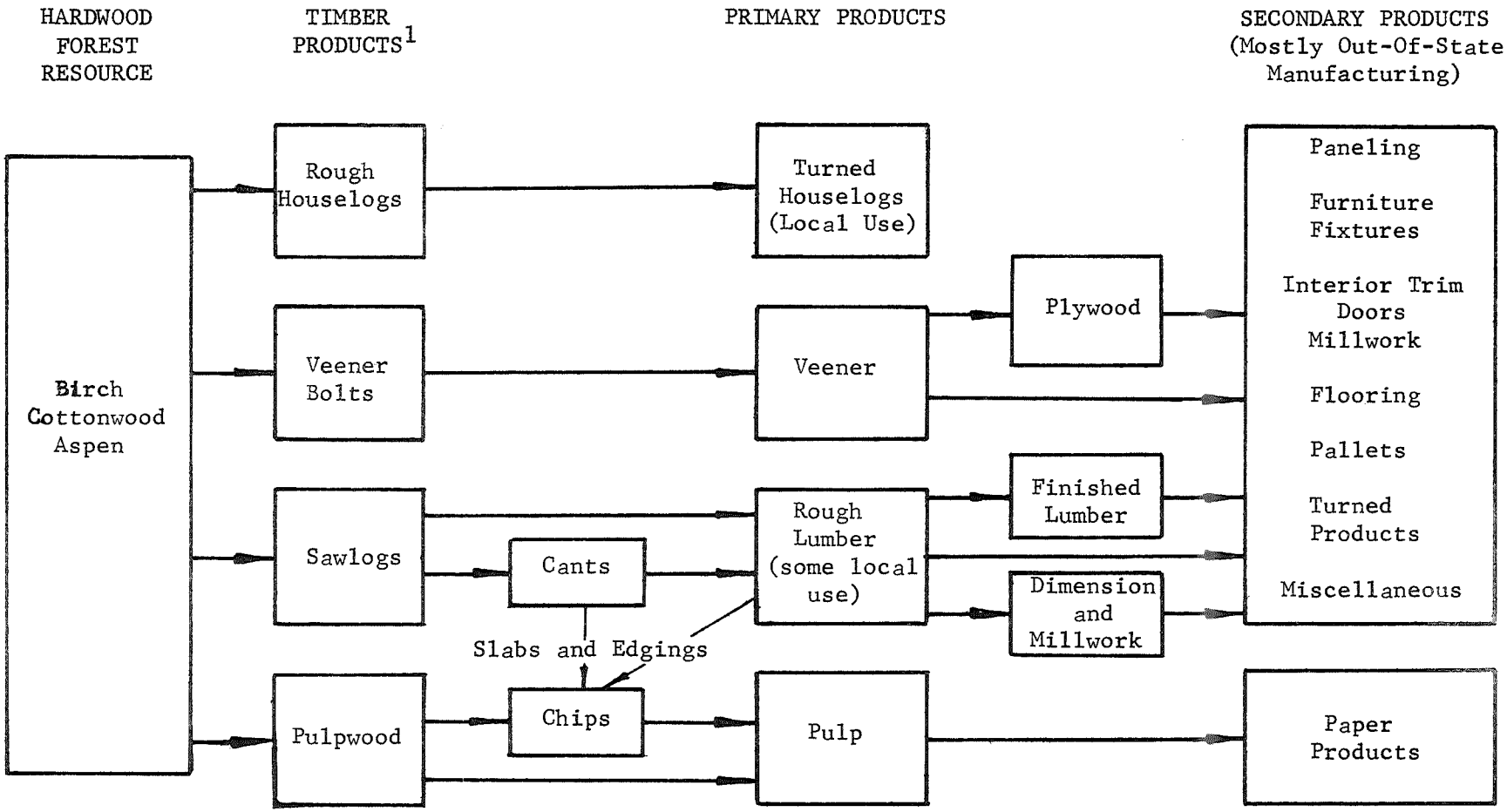
Houselog production is based primarily on local use. Favored species

FIGURE 4 - Present hardwood products commodity flows
for the Susitna Valley, Alaska



1. (a) Cottonwood for houselogs.
   (b) Birch for sawlogs; only very minor use of cottonwood.
2. Secondary markets to date receiving small intermittent shipments of birch lumber.

FIGURE 5 - Present and potential hardwood products commodity flows for the Susitna Valley, Alaska



1. Houselogs - cottonwood
   Veneer bolts - birch and cottonwood
   Sawlogs - birch and minor use of cottonwood
   Pulpwood - aspen, birch, and cottonwood

are white spruce and more recently poplar or small cottonwood. Significant increases in the use of poplar or cottonwood by this means is unlikely. Some minor benefits accrue to the state in that where these houselogs substitute for imported lumber the flow of out-of-state consumer expenditures is lowered ever so slightly.

Several very small portable circular sawmills operate in the Susitna Valley. Some of these mills are not necessarily designed as true portable mills, but are so small that relocation by disassembly, trucking or skidding rarely presents a problem. Many cut spruce lumber for local consumption, but several at one time or another in the past have attempted to cut rough birch lumber for local use and intermittenly for export. Movement into and out of production is frequent; equipment is neither specialized nor modern and changes in ownership and location are frequent. The potential for mills of this type, cutting a few M bd. ft. of lumber annually, is very limited. Beyond local markets, difficulties in meeting product specifications and transportation problems and expenses indicate a low potential for increased development. However, one possible alternative might have merit. This would be the export of birch cants[2] for those mills located adjacent to the Alaska Railroad to Japan or the continental United States where both markets and the necessary manufacturing and finishing equipment is available to produce products acceptable in specific secondary markets. Cants can be considered a better alternative in the present Alaskan situation than rough, green lumber for the following reasons:

(1) inability of much of the presently existing machinery to cut the desired exacting specifications;

---

2. Cants are sawn logs where bark is removed by sawing (i.e. slabing) either two or four sides of the log.

(2) the high risk of deterioration in shipping green lumber considering kiln drying facilities are not available and the fact that air drying presents difficulties in locking up the limited capital of the small producer together with the fact that small producers are relatively unfamiliar with air drying, and air drying under Alaskan climatic conditions;

(3) for operators that have limited knowledge on what is desired in the market and how to produce it, cants would be easier to produce and handle; and

(4) present rate structures of shipping tariffs do not favor the shipping of partially manufactured products of moderate value (i.e. rough green lumber).

Final manufacturing and supply stabilization has been suggested for other areas to promote the utilization of hardwoods. Normally this is in regard to rough lumber rather than a finishing process based on cants.

Grobey, in his analysis of the hardwood industry of Western Washington comments as follows:

> "The establishment of re-manufacturing mills associated with concentration yards would open a market for rough, green hardwood lumber produced by small, portable, mills which do not have the ability to produce kiln-dried, finished lumber. Sufficient inventories might then be built up to absorb seasonal and short-run fluctuations in demand. If users were assured that sufficient inventories were on hand to fill their orders promptly and reliably, market preferences for local hardwood species would likely develop."[3]

Market acceptance of Alaskan birch in the past has been unfavorable. In the west and particularly in California in the furniture industry, other varieties of birch lumber and lumber from other species has gained acceptance, even with boards of short average width and length. However, quality, specifications, and finishing were excellent. Irregular shipments of rough Alaska birch of mediocre quality and questionable specifications will definitely hinder future market acceptance.

There is a potential in future years for modern small permanent sawmills

---

3. Grobey (19) p. 93.

given the following conditions:

(1) market acceptance of Alaskan birch in out-of-state markets;

(2) improved tariff rates on southbound lumber shipments;

(3) increased knowledge on birch stands locations, volumes, and characteristics;

(4) improved access roads; and

(5) increased knowledge on the availability and use of modern equipment in Alaska.

Until the above points are overcome, small sawmilling enterprizes have only a very limited chance of success. Small scattered sawmills would not produce sufficient volumes to initiate widespread market acceptance and to stably supply specified volume shipments timed to arrive when the manufacturing purchaser wants them. After acceptance was attained by remanufacture or possibly by one or two strategically located larger mills as explained in the next section, small sawmills could more easily funnel their limited production through the established channels. Also, with widespread market acceptance and the movement of a relatively continuous and fairly large volume of product, wholesalers would be better able to absorb the risk in stabilizing the small irregular shipments of little mills. Southbound shipping rates should decline with increased rate and mode competition and increased volumes of goods being transported to and from Alaska. Also it would be expected that these mills would be producing a high value quality product which proportionally can absorb a greater shipping charge than low value products. On the other hand, both weight and volume will be reduced by drying and finishing, and hence tend to lower shipping costs. Inadequate knowledge of the forest resource is a hinderance to the location and raw materials supplying of small mills. Efforts to complete forest inventories and other research is alleviating this problem. Access roads will be needed

as small operators will be unable to finance these individually on their limited capital. This does not necessarily mean logging roads, but access to a stand of timber or timber-shed for mill location and the outbound passage of lumber to major handling points for transhipment to distant markets. The same applies to developing home markets as these would be concentrated in or near Alaska's major population centers. It is entirely practical to assume that small sawmills would also turn to supplying local markets as they developed, with the option of marketing high revenue returning products in more distant markets. Firms that manufacture modern sawmilling equipment, their representatives, and their advertising media are not prevalent in South Central Alaska or in reaching and communicating with the present producers. Nor possibly should they be, given the present volume of business as a basis. This situation will improve with all types of forest products development and with the increased dissemination of information by consultants, state and federal personnel, and by the equipment manufacturers themselves as soon as a potential market realization for their products is recognized.

Locally produced Alaskan lumber has frequently not been able to compete with imported lumber because it is green and not dried. However, hardwood dry kilns are not yet established in Alaska, mainly because of the production volumes required to use conventional kilns at full capacity and the large capital investment involved. Small producers may be able to alleviate this problem by the use of mini-kilns which have recently gained acceptance in the continental United States and other parts of the world.

These kilns take a much smaller charge than conventional kilns and require only a fraction of the capital investment. They are available for inside building erection as well as in all weather models for outside

assembly. Similarly, prefabricated models are available with or without direct technical assistance in erection. Sizes and prices vary widely. A small Alaskan producer should be able to purchase an adequate facility for less than $10,000. Models taking a lumber charge of about 500 cu. ft. are common, but capacities to 1500 cu. ft. are readily available.[4]

Medium Sized Firms

A medium sized[5] modern hardwood sawmill could establish and operate in the Susitna Valley contingent upon the following conditions:

(1) The mill should be modern, equipped with new hardwood machinery, and preferrably be a "band" mill.

(2) The mill must be strategically located with reference to access roads to stands of timber and should be located on or adjacent to easy access to both the Alaskan Railroad and the Valley's major highway.

(3) The mill should have as its operational manager or supervisor an experienced hardwood mill man familiar with the sawing of birch, beech, maple and other Eastern species. A man with training in hardwood sawmilling from the Lake States, Northeastern United States or Eastern Canada would be preferable to a man familiar with the Western United States or Alaska.

(4) The mill should have modern hardwood planing and kiln drying facilities. The dry kiln should have effective and precise humidity control. Provisions should be made for inventory control and specialized finishing in order to produce a maximum value product even considering short board lengths and widths (a condition necessitated by the characteristics of the raw material). Special grade rules for selling Alaska birch lumber might be appropriate as discussed in Chapter V.

(5) The firm should be prepared to either finance a complete logging program or assist independent loggers with the financing of appropriate equipment and training programs on logging to mill specifications. In the latter case, any purchasing of logs f.o.b. mill should be on a grade, differentiated price, basis.

---

4. Cubbage (68), Moore (76).

5. Medium sized here would mean a cut of about 20 M bd. ft. a day, operation for some 250 days a year, or an annual cut of some 5 million bd. ft.

(6) The mill must have adequate storage areas to hold large log inventories for reasonably long periods of time. Log cleaning facilities would most likely be necessary; probably de-barking considering Alaskan winter temperatures and the inherent problems in handling water.

(7) The availability of and access to sufficient stumpage for a time period long enough to amortize the investment should be arranged previous to establishment.

(8) Reasonable southbound or backhaul shipping rates for the lumber products should be negotiated in advance of establishment contingent upon sufficient evidence to prove establishment and some minimum annual level of production.

(9) A final prerequsite to the establishment of a medium sized hardwood sawmill would be that the owners of such a mill either establish themselves or, with another reputable company, develop means of utilizing low grade material that is of questionable worth to process into lumber. This will be a major task and could be responsible for delaying the establishment and operation of a hardwood sawmill of this size in the Valley. A hardwood chip market does not exist in Alaska, but the possibility of entering foreign or other domestic hardwood chip markets should be thoroughly investigated.

Arthur D. Little, Inc.[6] suggests a somewhat smaller mill (i.e. 2 - 2.5 million bd. ft. of annual capacity) could be established by 1970. This report suggests a somewhat larger capacity based on an appraisal of the raw material available and the need for a production level that will give economies of scale in finishing and shipping. Also, if the manufacture of hardwood chips is considered as a major component of production, volumes will have to be fairly substantial in order to adequately service a chip market.

Another medium sized mill for which the valley has an adequate hardwood supply would be a veneer mill. Alaska paper birch could be used for face stock (i.e. the high quality exterior layer in hardwood plywood) and also for back stock or the lower quality exterior layer.[7] Cottonwood would be an

---

6. Little (29).
7. Fleisher (70).

excellent source of core stock or interior layer in hardwood plywood and also possibly for back stock or the lower quality exterior layer. Assembly into plywood in Alaska is not suggested at this time due to limited markets and the fact that an integrated operation would present additional problems in establishment and operation. A plywood operation could easily be added at a later date should favorable conditions arise. Dried veneer, possibly pre-cut to desired specifications, should be readily saleable in the western United States to wholesalers and secondary manufacturers.

Similar to the medium sized sawmill previously mentioned, any establishment of a veneer installation in the valley would require an outlet for low grade material.[8] Chipping would seem to be one of the few alternatives with a high potential for market development. Without markets for low grade material, a sawmill or veneer mill attempting to establish in the valley would have difficulty in obtaining sufficient inputs of the quality raw materials needed, considering that the average stumpage purchase contains both high and low quality material. The majority of timber lands in the valley are state selected. Stumpage purchases are readily available, but buyers must comply with basic forest management measures designed to provide for and sustain future stands. Sales are made on a merchantable basis, with reasonable allowances for material of questionable value. However, purchaser selection of specifically desirable material under a blanket "any or all

---

8. A fairly small mill might be able to obtain all or a major part of its raw wood by locating adjacent to the railway and purchasing or contracting for veneer bolts f.o.b. rail sidings. However, here the danger is high, even with the use of short length, small diameter, material that the incident of the problem of what to do with low grade material that would occur in most timber sales is merely passed along to the small producer or contractor. Local use and such dubious markets as firewood are not sufficient to solve the problem on any reasonable industrial volume basis.

timber" type of agreement is not allowed. Integrated utilization is considered in the next section. Stand quality has previously been discussed in Chapter IV.

Several types of modern veneer equipment are available. However, equipment manufactured in Finland and designed specifically to cut small birch veneer bolts might be of particular interest as resource characteristics and regional conditions are very similar.[9] This type of equipment is especially adept at cutting four or five foot bolts of small diameter (i.e. 8" - 12"). A mill with this equipment could cut some 20 - 25 M bd. ft. of bolts per day for an annual capacity of about five to six million bd. ft. Capital investment for such an enterprize is estimated to be between $300,000 and $700,000 depending upon type of plant building, drying facilities, possible chipping facilities, and accessory equipment. Mill location, unlike the sawmill situation need not be so highly raw material location oriented. Adequate access to raw material is necessary, but this could be brought in by rail or road. Access to skilled labor, shipping facilities, low cost electric power, natural gas, and developed community services would be very important.

Market outlets for intended products should be investigated and confirmed preliminary to locating either a modern sawmill or veneer mill in the valley. Transportation alternatives and shipping rates should be carefully considered and lastly, adequate stumpage committments for a mill of any size should be acquired in advance for a period of time sufficient to amortize the mill.

---

9. Lahden (74).

Integrated Utilization

This section is concerned with that portion of the annual cut and potential annual cut of timber which for reasons such as quality or size is not acceptable for utilization in a product form like lumber or veneer. Large diameter, quality trees can be utilized by both present and interested new firms, and markets are available for their products. However, smaller sized, low quality material intermingled with the former and an integral part of the allowable cut is presently not marketable. Individual firms can rarely afford to appreciate this situation as they must pursue specific short term objectives in regard to raw materials. The forest manager, however, must face the problem. In order to sustain and improve the forest resource for long term benefits he must remove an annual cut based on forestry principles and not just the timber readily marketable or desired by local firms. It is this situation in the Susitna Valley that hinders a more rapid expansion of the forest products industry. To cut only the presently desirable or marketable timber would provide short term economic benefits, but would seriously subtract from long term benefits including an expanded and more diversified timber based industry at a later date. The problem then is to attract industry or manufacturing that will utilize that portion of the potential annual cut not readily desired or marketable to presently interested firms. In a developing area the alternative of the forest manager is to hold the annual cut as inventory, foregoing short term gains, until a portion of that inventory has appreciated to the point where interested firms consider taking the undesirable in order to acquire the desirable. Forest management objectives such as timber stand improvement are satisfied but industry and community economic problems can develop if the previous undesirable material is not put to a productive use. Also, economists become worried in this situation because firms tend to

become integrated[10] or subsidiaries increase, and there are tendencies toward monopolistic competition. Two trends usually develop in this kind of situation. One involves locating a manufacturer for the presently undesirable part of the cut by going to extremes on incentives (i.e. long term stumpage guarantees at low prices and tax concessions, etc.) and the other involves the previous plus negotiating and timing to the extent that the firm is supported in a monopolistic situation but usually only for a limited number of years.

In the Susitna Valley there is presently no forest products manufacturing outlet for small size, low quality, hardwood timber. A few small firms may utilize a very minor amount in the future in the form of either small furniture dimension or possibly pallets. However, utilization on an extensive basis can only be attained by supplying a volume use such as a board or paper mill. Unfortunately, South Central Alaska or the Interior, while having adequate volumes of timber, do not have the other conditions necessary to attract a pulp mill at the present time. The problem might be solved, however, through the increasingly prevalent practice of moving pulpwood in chip form long distances to pulp mills. Alaska's position with regard to Japan here could be very important. The Japanese are very interested in acquiring chips for their mills, and are adding rapidly to a fleet of specially constructed ocean ships designed to transport this material to Japan. Loading, storage, and handling facilities at a South Central Alaskan port-rail terminus might prove the key to forest products development in the area. In 1965 Japanese imports of wood-chips mounted to some 182 million bd. ft. This is expected to increase to 4.5 billion bd. ft. by 1975.[11] The implication is clear. Japan plans to expand its pulping capacity

---

10. In an economic sense; that is acquire ownership or control of suppliers of materials they use and/or firms marketing their products.

11. See "The Japanese Market", Chapter VIII.

tremendously by 1975, and that portion of the new capacity based entirely on imports of chips is roughly equivalent to sustaining at least 20 medium sized pulp mills. If conditions are not satisfactory for pulp mill establishment in South Central and Interior Alaska now and possibly for the next 10 years or so, the alternative use of timber in chip production for Japanese markets would seem appropriate.[12]

In addition to immediate economic benefits in income and employment two other points are noticeably important: (1) utilization of the smaller sized and lower quality timber - based on a Japanese market - would assist the expansion of other manufacturing segments using the larger sized, higher quality material, and (2) with increased utilization at the pulpwood level the necessary knowledge and understanding of both managing and harvesting for pulpwood would be attained by Alaskans in the South Central and Interior areas previous to the location of an actual pulp mill. This could assist in obtaining location in the area in future years.

Integrated utilization in the Susitna Valley would be most benefical in the form of a complex of mills using all the annual hardwood cut from a portion of the valley in producing several products. These could be formally related

---

12. The location of a chipping plant independent of a sawmill or other primary manufacturing concern is open to question. The Alaskan Administrative Code, Title II, Division I, Section 406.104 indicates that primary manufacture requirements for pulp ventures "means separation of the wood fibers, but that--chips made from timber processing wastes shall be considered to have received primary manufacture." No provision is made for classifying low quality timber harvested in conjunction with supplying primary manufacture that is of questionable profitability to process. This is a key point in furthering the development of the forest products industries in South Central and Interior Alaska by increasing the utilization of low quality small sized timber with very limited market potential. Also, the volumes needed to adequately serve export markets would not be available from timber processing wastes alone.

in ownership, or operate independently. Three types of complex may be applicable. First would be the product integrated mill. The mill would be responsible for all raw material inputs, but produce a combination of products at one location. This could be, for example, a hardwood sawmill producing at one location high grade dimension lumber, plus a lower value product such as pallets or possibly pulp chips depending on markets and transportation facilities. Advantages result from economies of scale in production and logging and differentiation in the form of a high value product and a low value product (i.e. an outlet for low quality raw material).[13]

A second type of complex would comprise an interdependent group of forest industries. This could involve independent ownership but close physical proximity. Advantages would be forthcoming from cooperating in the procurement of raw materials and markets as well as in the purchase of equipment and supplies.[14] This type of complex usually would be more profitable with a wood-chip operation to utilize low grade wood. Other production segments might include a sawmill and/or a small dimension mill and a veneer mill. The latter mills also might have small chipping installations to utilize waste and add to the production of the main chipping unit. Additional types of mills may be feasible in the complex as well.

A larger more complicated complex has been suggested for fairly large geographic areas.[15] Essentially this is an expansion of the previously mentioned second type of complex. Many more products are proposed and all processing facilities might be owned by one corporation. In many situations this could also

---

13. For a description of a product integrated mill see Koch (28).
14. Tennessee Valley Authority (44).
15. For a detailed analysis of this type see: U. S. Department of Commerce (47).

include timberland ownership. However, the latter possibility has little if any application in the Susitna Valley as most timberland is in public ownership.

The utilization complex as applied to the Alaskan situation would provide the primary advantage of utilizing all the timber in the annual cut designated for one area. One major difficulty would be the large amount of capital investment needed. Other difficulties would involve the complex business agreements and arrangements needed between ownership parties and production business factions in sharing the annual cut.

Specialized Manufacturing[16]

The three remaining manufacturing enterprizes to be discussed in terms of potential for the Susitna Valley are small hardwood dimension and/or turning squares, edge glued hardwood blanks, and pallets. The first two are suggested as potential suppliers to the west coast furniture industry. The last is suggested as a local commodity contingent upon market development, as a possible saleable product in the shipping centers of the Northwest depending upon transportation costs, or as a product applicable for military use in the transshipment of supplies within Alaska from major military supply points.

A small dimension or turning square firm could manufacture these products from purchased rough dry lumber or from timber sawn themselves to their desired specifications. In either case the "lumber" or sawn product used in making the dimension or squares would not have to meet grade specifications for hardwood lumber. Short lengths or cuttings and narrow widths could be used, allowing for the more efficient utilization of small logs. The lower limit on the number of

16. These firms could be classified as either primary or secondary manufacture depending on their methods of raw material acquisition; frequently they participate in both functions.

small cuttings taken from a log would depend on handling and kiln drying efficiency. Dry kilned wood is recommended because furniture manufacturers need rather exact moisture content specifications and are particularly anxious to avoid variation in moisture content between shipments received. Also, in Alaska knowledge concerning air drying is limited, the possibility of down grading material is high and small producers would have to carry large inventories with a long time lag on needed returns. One of the new small prefabricated dry kilns at much less capital cost than a standard sized kiln should be within the reach of the small producers.

Although a large integrated mill[17] producing a variety of dimension products might have application in future years, the small firm is suggested for initial development for the following reasons:

(1) inadequate knowledge of the quality, quantity, location and availability of total hardwood timber resources;

(2) the wide difference in capital investment needed to establish a large integrated mill;[18]

(3) the lack of an adequate Alaskan market for the production of a large mill combined with uncertain shipping and handling channels to distant firms on a volume basis; and

(4) the total size of the west coast market and its competative characteristics are largely unknown.

A small mill producing rough dimension that would consist of material sawed and ripped to specific sizes would have several advantages. Capital requirement

---

17. A small mill, as opposed to a large integrated dimension mill, is broadly defined as one processing a maximum of a few thousand bd. ft. per day. Large integrated mills usually exceed 15 M bd. ft. per day and occasionally 50 M bd. ft.

18. Capital requirements for a large mill are estimated to be $500,000 and up with very large mills exceeding one million dollars. Capital requirements for small mills vary widely depending on sawmilling and dry kiln needs as well as actual dimension cutting, shaping, and finishing equipment. Very limited production could be attained by adding a few thousand dollars worth of equipment to a small sawmill and dry-kiln operation. A new installation, however, might cost some $100,000.

would not be excessive for Alaskans with limited capital wishing to manufacture a product such as this. A small portable sawmill could supply lumber or cuttings directly, or low grade lumber purchased from existing sawmills could be re-cut into dimension after drying. A small mill might need the following equipment: a shortlog circular headrig, a gang edger or stripper, cutoff saws, ripsaws, banding machine, forklift truck, and dry kiln. Refinements in manufacture (i.e. sanding and trimming) might also require surfacing equipment and band saws.

Adequate raw materials are presently available to support one or two small mills and a limited but developing market in Anchorage is available for a portion of the output. Additionally, small shipments can be adjusted to shipping and handling channels until a stable method of supplying non-Alaskan markets is established and market acceptance increases. Even small producers must be able to meet the requirements of furniture manufacturers. To enter and hold a share in the market the Alaskan producer will have to maintain the quality of his manufacture and adhere to customer specifications, provide proper seasoning of the product, and deliver a steady supply. Birch is a widely accepted species for the manufacture of small dimension and turning squares. Generally, common specifications range from one to three inches in width and thickness and from six to 48 inches in length. Purchases are frequently made by the furniture manufacturers on an order basis through a wholesale agent for a specified number of pieces per each size desired. Also, turning squares are frequently purchased in bundles of a specified number, and payment is commonly made per 100 pieces.

The manufacture of Alaskan birch furniture "blanks" might be an additional enterprize that could be located in the Susitna Valley. A firm of this type would be feasible only in conjunction with a hardwood sawmill or after the establishment of a hardwood sawmill and a small dimension facility. Actually a

"blank" plant would be a logical addition to a small dimension mill after establishment and successful operation has been maintained for a reasonable time.

Furniture "blanks" can actually be considered a product that is made from small dimension. Small, clear cuttings of dimension frequently one inch in thickness, some three or four inches in width, and from 12 to 78 inches in length but commonly about four or five feet are edge glued and sanded to form a prefabricated unit used in furniture manufacture. Both wholesalers and manufacturers reported clear, light colored birch blanks were difficult to obtain and that presently offered prices in the market were high. Payment is usually made on a square foot basis. Production would be contingent upon a good supply of clear dimension, capital investment of several thousand dollars in gluing and sanding equipment, and the acquisition or training of skilled labor.

Another manufacturing enterprize which might have potential in the Susitna Valley would be a pallet mill. Commonly this manufacture is an integrated component of a hardwood sawmill. Of particular importance would be the thorough investigation of in-state market possibilities as there is a high probability this low value, high bulk-weight product could not absorb the shipping costs involved in transporting it to non-domestic markets. An increase in sales of bulky but relatively high value products by manufacturing firms in the Anchorage area to increasingly distant markets might provide a market for pallets. Similarly, the dissemination of military supplies from the Anchorage area as well as the regular movement of goods to Fairbanks and the Interior might provide a market for pallets. A low delivered market price is necessary for a pallet firm to gain and hold markets. Thus, three factors are very important to this type of enterprize: (1) nearness to markets, (2) efficiency of labor, and

(3) availability of low-cost lumber.[19] The latter point has application in Alaska primarily in regard to volumes of low grade birch lumber for which only very limited markets presently exist. Wood pallets as an outlet for low grade hardwoods have been successfully manufactured in areas of the United States surrounding or adjacent to points of concentration in manufacturing activity, where many of the manufacturing firms required (1) savings in labor through less loading and unloading and less repeated handling, (2) savings through better utilization of vertical warehouse space, (3) savings through reduction of damage to articles moved, and (4) savings in time.[20] The Anchorage area adjacent to the valley might provide a similar situation.

Annual Cut Limitations on Manufacturing

This chapter was not intended to suggest the establishment of all the primary manufacturing possibilities discussed. Considerable emphasis was placed on utilization alternatives for the paper birch portion of the hardwood resource which currently has a greater market potential than cottonwood. Present annual allowable cut estimates for birch can only support some of the possibilities mentioned; particularly where fairly large mill capacities are concerned. If, in the future, increased annual cuts of birch become available then additional manufacturing would be appropriate. This could result from more precise volume estimates indicating larger volumes of birch, as well as increased access to birch stands presently not accessible.

A larger manufacturing base could also be justified if markets become available for cottonwood products and an increased use of the annual allow-

---

19. U. S. Forest Service (52), p.15.
20. As an example see Warner (55).

able cut for cottonwood in lieu of birch were contemplated. Lastly, if timber products (i.e. logs) for use by industry establishing in the Susitna Valley were to be imported from an adjacent geographic area such as the Tanana Valley, this supply supplement would be a basis for considering increased capacity or a greater diversity of manufacturing.

Inadequate estimates of annual allowable cuts can result in an unstable forest industry. Permanent and productive industry development must involve a careful consideration of the quality and quantity of accessible timber available for use in a given time period. Continued forest survey research of a nature that will give basic information useable for both forest management purposes and utilization by private enterprize would benefit the Susitna Valley.

VII

PRODUCT SPECIFICATIONS AND SHIPPING ALTERNATIVES

This section deals primarily with birch rather than cottonwood and lumber is emphasized. Only limited local utilization of cottonwood exists and non-Alaskan markets within reach of the Susitna Valley are not highly developed. Furthermore, the pricing of this product at the present time is at levels where it is extremely doubtful whether Alaskan producers could accept the shipping charges to place cottonwood in non-Alaskan markets. One additional possibility is the establishment of a veneer plant in Alaska. In this circumstance, cottonwood would make excellent veneer core stock. This could be shipped in conjunction with birch veneer (i.e. face and back stock) for assembly in plywood plants outside the State, or should a hardwood plywood plant become established in Alaska a birch exterior-cottonwood core plywood could be manufactured readily within the State.

Secondary Market Specifications

There is both a developing Alaskan market for hardwood plywood and a substantial market in the western United States. Birch plywood is a high value product and is frequently distributed in world markets. Finland supplies large quantities of birch plywood to the United States. Commonly used thicknesses range from 1/8" to 3/4". Lengths are usually fairly short with 48", 50", 51" and 54" being more common than 58", 60", 61", 62" and 72". Widths usually range from 48" to 62". Long length birch plywood, particularly panel size (i.e. 48" x 96"), is secured primarily from Canadian producers rather than Finnish producers.

Turning squares are a product for which a large market exists in the Los Angeles area. These "squares" are frequently about 2" x 2" or 3" x 3" in width and thickness. Desired lengths are usually from 6" to 32". Commonly, sales are made in lots of 100. Birch is a highly preferred species for this use as is western alder.

Small hardwood dimension is another product for which a large market exists. These are usually small parts or components made from hardwood lumber by finishing to desired specifications. On occasion edge gluing to attain desired widths is included. However, this product is usually then referred to as "blanks". Dimension can be purchased by the M bd. ft. or by the piece.

Furniture "blanks" or small edge glued panels cut to specific sizes are also widely used by the furniture industry. Again, birch and alder are important species. Thickness is frequently specified as 4/4". Clear material is highly desirable and the blanks are usually edge glued from 3", 4" or 5", wide material to panel width of from 12" to 78". Lengths vary, but 4 or 5 feet is a common size. Payment is usually made on a per square foot basis, with light, clear material commanding a higher price. Birch squares and blanks in general bring higher prices than alder. Both in regard to squares and blanks, furniture manufacturers are interested in a finished product dried, properly cut, and sanded to exact specifications. They do not desire any additional finishing responsibilities for squares or blanks not prepared for other than their individual specifications.[1]

---

1. The Los Angeles area furniture industry has the highest wage rates for labor of any segment of the U. S. furniture industry. In general, firms in the Los Angeles area consider it highly undesirable to use wood material inputs that require additional manufacture and finishing, and hence additional high cost labor charges. Usually wood inputs are desired in a finished to specification form. For industry wage rate comparisons see: U. S. Bureau of Labor Statistics (45).

Birch lumber, particularly 4/4" but also some larger thicknesses, in the better grades has a ready market in the Los Angeles area. A smaller but still substantial market exists in the Pacific Northwest. The local or Alaskan market is not highly developed, but the demand seems to be increasing for cabinet stock, and kitchen fixtures, trim, moulding and paneling particularly in the Anchorage area.

Secondary manufacturers were questioned in regard to desirable specifications and current needs in hardwood materials currently being utilized. Hardwood lumber was the most widely used wood primary product input. Considerable variation in specifications was noted depending on type of firm and geographic location. However, it was very obvious that many of the needs and desires of a variety of firms in the western United States were quite similar.

The following comments apply to secondary manufacturers in general, but are particularly applicable to furniture manufacturers.[2] Both alder and birch were preferred species used in varying amounts depending on specific needs. In some cases quantities used are pretty well set by the variety of furniture being produced and volumes purchased show only minor fluctuations. However, in other cases a large degree of substitutability exists. If, on an individual firm basis, a price-quality relationship developes between birch and alder that makes one more attractive than the other substitution occurs. Usually, the case in point is that birch is considered superior and preferred by many firms, but if the desired price-quality relationship for this specie becomes adverse in comparison to alder, the latter can be substituted by many firms in some components and products. In general furniture manufacturers

---

2. Many of these comments are based on information supplied by members of the Furniture Manufacturers Association of California.

indicated that quality, price and supply are the prime factors considered in substituting one hardwood species for another. This also applies to varieties of birch or to birch from different geographic regions. Several furniture manufacturers indicated that they would use a great deal more if they could obtain an adequate and stable supply, and good specifications, at a "reasonable" price (i.e. closer to the price of competative species). Other more specific points mentioned by furniture manufacturers indicated a marked preference for light color in birch. White or near-white is by far preferred over brown or red hues. Also, exactness of desired specifications (i.e. dimensions, degree of finishing, etc.) was very important. Lastly, stability of supply in desired quantities was frequently mentioned as being very important.

Comments were supplied by many firms in regard to Alaskan birch, Japanese birch and birch from the eastern United States and Canada. Most firms considered all varieties of birch substitutable depending on quality, specifications and price. One possible exception being species tending to be markedly red in color as "whiteness" was a highly desirable characteristic.

Japanese birch lumber is highly desirable because of its excellence of manufacture and its relatively easy availability on the west coast. Quality was considered very satisfactory (i.e. some firms indicated that No. 1 common and better lumber frequently ran 50 percent No. 1 common and 50 percent selects and FAS). A few firms indicated that a lower moisture content than the Japanese "shipping-dry" (i.e. 30 percent) would be more desirable. Also, a few indicated that short average widths (i.e. 6" and larger, frequently averages 7-1/2") were a problem. A tendency toward redness in color was also considered unsatisfactory by several firms. By far the most serious complaint against Japanese birch, particularly by millwork and related firms, was short lengths. Evidently, commonly marketed lengths are 6 to 11 feet, averaging 7-1/2 feet. This attribute

was considered the most serious drawback of Japanese birch lumber.

Birch lumber from eastern Canada and the United States is highly desired because it can be obtained in long lengths. Some firms indicated that long lengths (i.e. 14 to 16 feet) and wide boards (i.e. 10 to 12 inches) were very important. Shipments averaging 11 and 12 feet in length were particularly important to many firms. Quality and specifications are considered excellent. Some dissatisfaction was noted in regard to stability of supply and price fluctuations, particularly for birch from the eastern United States. Birch lumber from more southerly areas of the United States was not considered very acceptable in general because of the tendency to be red in color.

Alaskan birch has been tested or used by a number of firms. Where it was supplied in sufficient quantities and where both quality and specifications were those desired by the firm, it was highly acceptable. However, in many cases quality, specifications and irregular availability of supply (both quantities and timing) subjected Alaskan birch to a good deal of criticism. While the whiteness in color was highly desirable, this was partially offset by a less distinct grain character, and a marked color change frequently appeared between heart and sapwood. The latter was partially a result of improper manufacture. Excessive knots in some shipments of lumber were also considered highly undesirable, as were excessive amounts of lumber that would have graded No. 1 common and poorer. Lastly, short lengths and widths were considered to be a major problem.

Birch is a preferred species for many secondary wood products manufacturers and commands a premium price compared to many other hardwood species. The desirable natural characteristics of birch however, only justify a premium price if quality and specifications are of the very highest standards.

Intermediate grade lumber or mill-run lumber manufactured to poor specifications does not command high prices. In fact, alder with slightly less desirable natural characteristics is substituted at lower prices primarily because it can be obtained in desired qualities at desired specifications. Thus, Alaskan birch in short lengths and widths and of only mediocre quality and barely acceptable specifications frequently cannot compete with birch from other regions, and meets heavy competition from alder in west coast markets. Alder is available in known qualities and specifications with stable and dependable supply sources, and at prices generally lower than many other hardwoods in the western market area. In summary, any or all of the following points can be a serious detriment to the marketing of Alaska birch lumber in western United States:

1. short lengths and widths
2. excessive low grade material as a component of mill-run or ungraded shipments
3. poor quality associated with color irregularities and knots
4. poor manufacture and inexact specifications
5. lack of shipments based on NHLA rules or on new rules specifically designed for Alaska birch as was done for western alder
6. lack of stable and continuous production (i.e. supply)
7. high shipping costs to western markets plus the fact that without improvement in previously noted points prices received cannot be expected to be comparable to birch imported from other regions

For Alaskan birch lumber point (1) can be changed relatively little. Points (2) and (3) can be improved by the primary manufacturer, which would be more easily accomplished with outlets for the low grade material (i.e. the advent of chip a market). Point (4) must be improved by the primary manufacturer. Point (5) is a concern of various private firms and public agencies concerned with the utilization of the resource. Point (6) is the concern of primary manufacturing, and point (7) is both the concern of primary manufacturers and relevant shipping and transportation agencies and firms.

Shipping to Secondary Markets

Primary manufacturers of forest products located in the Susitna Valley are connected to Anchorage and the Port of Anchorage by a major highway. Also, as the Alaska railway runs north-south up the valley, connections by rail to the Port of Anchorage on Cook Inlet, the Port of Whittier on Prince William Sound, and the Port of Seward on the Gulf of Alaska are available.[3] Shipping alternatives available through the services of major transportation companies to the continental United States fall into three categories. The first or most conventional method would be truck or rail shipment to the Port of Anchorage and hence by cargo ship to the west coast of the United States. Most traffic is routed through the Port of Seattle. Unfortunately, no direct scheduled service is available between Anchorage and Los Angeles. This would be an important development possibility if Susitna Valley birch is to be channeled into the Los Angeles furniture manufacturing market in any significant volume. Trans-shipment by railroad through the Port of Seattle would not be as effective. The second shipping alternative, depending upon the primary product shipped and other factors including value, might be the use of vans or containers that can be taken by rail or highway to Anchorage for shipment on specialized ocean carriers. These containers could be loaded mill-side or in Anchorage for shipment to the secondary manufacturing site. Advantages here involve direct shipment of the container without intermediate handling of the material and a reasonably rapid transit time under weather-proof conditions. The third alternative would be rail shipment involving the use of rail-barges which transport the rail cars between the Alaska Railroad and continental lines in western Canada and the United States.

---

3. See Figure 1.

Essentially this alternative amounts to direct shipment by rail from a spur loading point in the valley to the spur receiving point of the secondary manufacturer.

With the possible exception of a direct water link with the southwest coast of the continental United States shipping facilities that can handle primary products from the Susitna Valley are readily available. However, effective use of these facilities will not come about without modifications in present tariff structures. Many basic rates now in effect were designed for the movement of relatively high value products with a high degree of manufacture from the Northwest United States to Alaska. Tariffs structured on the basis of moving lower value products with a lower degree of manufacture from Alaska to the continental United States are needed. Modification of present tariffs on the basis of forward haul or back haul can provide some relief. However, if transportation companies wish to develop substantial back haul traffic to relieve the situation where empty carriers must be returned from Alaska in order to maintain forward haul traffic capacity, they must develop tariffs which recognize different degrees of manufacture and different values. Present tariff commodity shipping costs are discussed in Chapter IX of this report.

VIII

HARDWOOD MARKETS

National Hardwood Markets[1]

Hardwoods as primary products find their greatest use in manufacturing while softwoods are frequently used in the primary form directly (i.e. as lumber for construction and framing). Hardwood lumber, veneer, plywood[2] and other miscellaneous primary products are usually manufactured into secondary products such as furniture, paneling, cabinetry, interior fixtures and trims, and other fine products. The demand for hardwoods is related to this secondary manufacturing and hence markets differ in both location and characteristics from those for softwood primary manufactures.

Hardwood lumber production in the United States has remained fairly stable since 1950. A slight downward trend occurred in the late 1950's and early 1960's, but production increased again in 1963 and 1964. Similarly, exports and imports have remained relatively constant. Exports amount to some two or three percent of production, while imports amount to some four or five percent of production. Total consumption has not decreased significantly in recent years but per capita consumption has declined with expanding population and an increased use of metal and plastic.[3] On a regional basis production has not shifted greatly and all regions, with the exception of the Mountain Region, have increased production. The Pacific States have more than doubled production from 1958 to 1964,

---

1. Detailed supporting information on national hardwood markets is presented in tabular form in Appendix A.
2. Plywood is sometimes considered a secondary product in that it is made from veneer.
3. See Tables A1 and A2.

although volumes are small in comparison to other regions.[4] Southern states are leaders in the production of hardwood lumber and oak is by far the most prevalent species.[5] By comparing Tables A5 and A6 it can be seen that a relatively small proportion of the oak goes into furniture production, whereas a major portion of the lumber production of maple, birch, ash and alder is used in the manufacture of furniture. Thus, for Alaskan white birch serious consideration must be accorded the furniture industry as a high degree of factor substitution of species, based on wood characteristics, exists within the group.

The major forms of hardwood use (i.e. lumber, bolts, veneer, and plywood) are shown by industry class for woods that are similar or substitutable with Alaskan hardwoods in Tables A7, A8, A9, and A10. Alder lumber is used primarily for furniture. Maple lumber is preferred to birch lumber by many industries, but birch lumber is still widely used in many kinds of manufacture. In 1948 some 186 million bd. ft. of hardwood lumber were used in millwork. This increased to 193 million bd. ft. in 1960. Birch lumber as a component of the total increased from 17 million bd. ft. to 22 million bd. ft.[6] In addition to use in the lumber form birch is the preferred species of those listed for bolts, veneer, and plywood manufacture. A considerable volume of birch veneer and plywood is produced in the United States and adjacent eastern Canada, but imports from Finland are particularly noteworthy both because of volume and because this birch is a "white" or "paper" birch very similar to the Alaskan variety. As can be seen from Table 13, over 92 million square feet of this material was imported into the United States in 1964.

---

4. See Table A3.
5. Tables A4 and A5.
6. Gill (17).

TABLE 13 - Imports of hardwood veneer and plywood from Finland to the U. S., 1964

Commodity	Volume (square feet)	Value (dollars)
Veneer (birch)	415,320	$ 14,084
Plywood	91,986,585	8,824,088
Birch	91,952,092	8,818,392
Other	34,493	5,696
Wood-Veneer Panels	5,040	1,021

SOURCE: U. S. Department of Commerce, Bureau of the Census, U. S. Imports for Consumption and General Imports - 1964.

Tables A7, A8, A9 and A10 indicate the importance of the furniture industry as a market for hardwood lumber and plywood with reference to Alaskan and comparable species. This industry, relative to many other hardwood consuming industries, produces a very high value product and large sums are spent for inputs of select wood raw materials. The value of shipments for hardwood flooring, as well as dimension stock and furniture parts, are shown in Table A11. By 1963 the latter had exceeded the former in value of shipments in the United States. Considerable values are involved in shipments of wood household furniture. As shown in Table A12, values exceeded 500 million dollars in 1963 a considerable increase from 1958. Continued expansion of this industry will no doubt affect the supply of quality hardwood materials and place even more emphasis on the seeking out of suitable domestic hardwood timber. This situation might be favorable to Alaska with large stands of unutilized white birch, particularly if integrated operations solve the problem of what to do with the low quality material in these stands.

The Pacific Northwest, but particularly California, are deficit areas for birch and similar species used in the manufacture of quality hardwood products. Birch is imported into this area from the eastern United States, Canada, and Japan. However, a considerable volume of Japanese birch landed in Seattle and Portland is in transit to mid-western United States markets. Red alder produces a fine wood that is used by several industries, but a lack of other species with desirable characteristics (given favorable specifications and price considerations) places the region in the position of being an importer of hardwood materials.

Some hardwood dimension and flooring are produced in the region, but the furniture industry is one of the key users of hardwood products. The number of establishments and establishments with over 20 employees are shown in Table A13 for the largest wood using segment--household furniture. The Pacific Region is

responsible for about 15 percent of the total United States establishments with over 20 employees making wood household furniture, and California alone accounts for about 13 percent. The California market area, and particularly Los Angeles County, accounts for the major portion of the west coast furniture industry. Other sections in this report discuss the problems involved in Alaskan producers reaching this market and the difficulties they face in competing on the basis of quality, specifications and price.

The Alaskan Market

Statistics reporting forest products produced in the state, received from the "lower 48" or imported, together with data on consumption are very limited. Usually aggregate figures that lump primary and secondary products and hardwoods and softwoods are the basis upon which the limited information is available. Various products shipped into the state are frequently reported on a weight basis (i.e. tons of lumber and plywood). Thus, data are not available to directly indicate the size of the Alaskan market for hardwood forest products. Some approximate estimates and indicators are presented in this section in order to place the Alaskan market in perspective with others described in this report.

Alaska has a total population of some 253,200 persons, and only two large metropolitan market areas - Anchorage (94,516 persons) and Fairbanks (45,370 persons).[7] Population figures of the magnitude indicated can only mean limited markets for primary and particularly for secondary wood products. Actually, by national standards one large mill in any segment of the forest products industry could supply the present needs of the entire state. Small local firms have a high potential for producing and competing with imports into the state for a

---

7. Alaska Department of Labor, Current Population Estimates, Alaska, by Election District, 1964.

share of the Alaskan market. Large firms must remain heavily dependent on markets in other regions. Shipping costs and facilities will thus play a major role in determining plant capacity, especially for the establishment of larger firms.

The wholesale market for forest products in Alaska has 13 supplier firms located within the state. Five of these dealers concentrate on lumber and millwork, while eight concentrate more on construction materials including brick, stone, and steel. All but one of the firms are incorporated, and 10 are merchant wholesalers who actually take title to the goods they sell. Average annual sales are estimated to be about $729,000 and the average payroll about $51,000. The comparable national averages are sales, $975,000 and payroll, $65,766.[8] The retail market for wood products in Alaska is somewhat more complex. Census data indicates there are 47 lumber and building materials dealers in the state. Average yearly sales amount to $284,340. Of these firms, 27 can be classified as lumber yards and 20 as building materials dealers. Eight lumber yards and 13 building materials dealers are not incorporated. Firms classified as lumber yards on the basis of sales appear to be nearly twice as large as the building materials dealers. Average sales and payroll for the former in 1963 were $362,000 and $42,000; for the latter, $180,000 and $20,000. Comparable national figures indicate lumber yards sales average $282,689 and payroll $35,100 and building materials dealers sales average $168,887 and payroll $21,358. Thus retail lumber yards on the basis of sales are not only considerably larger than building materials dealers in Alaska, but are also considerably larger than the average retail lumber yard in the United States.[9] Four types of wood products

---

8. 1963 Census of Business, Wholesale Trade, Alaska.
9. 1963 Census of Business, Retail Trade, and Retail Trade, Alaska.

are estimated to account for over two-thirds of the total sales of retail lumber yards. In 1963 average sales of lumber per yard came to approximately $107,000, plywood $96,000, kitchen cabinets $22,000, and other millwork $41,000.[10] Remaining sales are mainly miscellaneous wood products, building materials, and hardware.

In Alaska the furniture and home furnishings market consume fairly large quantities of fine wood products. Volume estimates are not available, but sales by the nine wholesale furniture, home furnishing firms averaged about $546,000 in 1963. Also, retail sales by the 23 retail furniture and home furnishing stores averaged about $294,000. These figures do not include sales from the continental United States, miscellaneous foreign import sales and lesser sales values from Alaskan products not channeled through wholesale and retail dealers.[11]

The flow of wood products into Alaska is shown in Table 14. In total nearly 100,000 tons of manufactured wood products were imported into the state in 1964. In addition, based on 1961 figures, some 25 million bd. ft. of the Alaskan production of lumber was consumed within the states.[12] A very approximate estimate of total consumption can be made by converting the imported tonnage to M bd. ft. and adding the additional 25 million bd. ft. of locally consumed lumber.[13] This would place total consumption in the neighborhood of 90 million bd. ft. annually. Separating out hardwood, as opposed to softwood, is very difficult. National consumption of hardwood lumber has been estimated by the U. S. Forest Service

---

10. 1963 Census of Business, Retail Trade Merchandise Line Sales, Pacific States.
11. 1963 Census of Business, Wholesale Trade, Alaska; Retail Trade, Alaska.
12. Bones (3).
13. Basis for conversion, 1 M bd. ft. of wood products equal approximately 3000 pounds.

TABLE 14 - Domestic receipts and foreign imports of major wood products, Alaska, 1964

Product	Foreign Imports	Domestic Receipts	Total Imports and Receipts
		(short tons)	
Lumber and Shingles	5,519	72,473	77,992
Plywood, Veneer, and Container Material	957	10,439	11,396
Wood Manufactures, N.E.C.	155	10,169	10,324
All Products	6,631	13,081	99,712

N.E.C. - Not Elsewhere Classified

SOURCE: Waterborne Commerce of the United States, 1964. Part 4, Department of the Army, Corps of Engineers.

at 17 percent of all lumber in 1962 and consumption of hardwood veneer and plywood at 23 percent of all veneer and plywood.[14] If Alaska were following the national trend, which is not entirely realistic due to a variety of socio-economic differences, present consumption should be about eight and a half million bd. ft. of hardwood lumber and three million sq. ft. of hardwood plywood annually.

The Japanese Market

The Japanese market for wood raw materials has great potential in regard to the Alaskan situation. Japan imports large amounts of wood raw materials and exports large amounts of finished wood products to numerous national markets. In this situation, Japan then provides a good market for logs or cants but a relatively poor market for lumber. For hardwoods, this situation is exemplified in Table 15. In addition to logs and cants, imports of veneer to be manufactured into plywood for direct use, or used as an input for assembling other fine products is expected to increase for certain species. Table 16 indicates that veneer imports increased substantially from 1964 to 1965 for Canadian and American species, but declined for other species. Alaskan birch and cottonwood veneer might possibly enter this expanding market. Plywood imports have also increased, but this is primarily west coast softwood plywood for construction or additional product manufacture.

In recent years the advent of supplying wood raw material to pulp mills in the form or chips rather than round wood has had a beneficial effect on timber utilization. Also, advances in transporting and handling wood-chips have greatly increased both the distance this type of pulpwood can be transported from forest to pulpmill, and the number of geographic forest locations that can be drawn upon. Japan with a rapidly expanding per capita consumption of paper and paper products, and limited supplies of domestic pulpwood, is rapidly

14. U. S. Forest Service (53)

TABLE 15 - Japanese imports of hardwood logs and lumber from the U.S.A., Canada, and the U.S.S.R., 1965

Origin	Hardwood Imports	
	Logs	Lumber
	(1000's of bd. ft.)	
Canada	506	157
U.S.A.	26,735	2,337
U.S.S.R.	29,729	---
Total	56,970	2,494

SOURCE: Japan Lumber Journal, Volume 7, Number 12, June 25, 1966.

TABLE 16 - Japanese imports of veneer and plywood, 1964 and 1965

	1965		1964	
Origin	Veneer	Plywood	Veneer	Plywood
	(1000's sq. ft.)		(1,000's sq. ft.)	
Canada	125	---	16	---
U.S.A.	659	2,768	141	412
Other	456	1,418	572	2,366
Total	1,240	4,186	729	2,778

SOURCE: Japan Lumber Journal, Vol. 7, Number 8, April 25, 1966.

gearing to utilize chips as the main source of raw material in an expanding pulp and paper industry. A government ship building program is underway to provide a fleet of special ships designed to import this raw material to Japan. The program calls for the construction of five ships per year until 1970.[15] A large portion of the chips are expected to come from North America and imports from Canada and the United States jumped from negligible amounts in 1964 to very substantial volumes in 1965. This increase is shown in Table 17a. The estimates for future expected imports are shown in Table 17b. Volumes shown indicate a tremendous market expansion for this product in Japan by 1975. Considering that Alaska has vast reserves of timber and is far from utilizing the potential annual cut available[16] this market possibility should be throughly investigated in regard to both softwoods and hardwoods.

California Furniture Industry Markets[17]

Ivan Block and Associates[18] in their market study for red alder indicates that the total market for this species amounts to some 120 to 140 million bd. ft. per year, and that 65 percent of this volume is marketed in California. The Los Angeles area is most important as some 74 percent of the western furniture industry is located within that one county, with about 1,000 establishments buying hardwoods. The importance of market intermediaries is noteworthy as only about 20 percent of the users receive their supply in direct mill shipments.

---

15. Japan Lumber Journal, April 25, 1966.

16. See Chapter V of Haring (23) for a discussion of the unutilized annual cut in Alaska.

17. Much of the data for this section were supplied by the Pacific Southwest Forest and Range Experiment Station, Berkeley, who sampled and studied a major portion of the industry in 1963.

18. Ivan Block and Associates (27).

TABLE 17a - Japanese imports of wood-chips from the U. S. and Canada, 1964 and 1965

Origin	Imports of Wood-Chips	
	1965	1964
	(1000's of cu. meters)	
Canada	184	10.4
U.S.A.	246	.7
Total	430	11.1

TABLE 17b - Estimates of Japanese imports of wood-chips, 1965-1975

Year	Estimated Imports of Wood-Chips
	(millions of bd. ft.)
1965	182
1967	1,047
1970	2,502
1975	4,560

SOURCE: Japan Lumber Journal, Volume 7, Number 8, April 25, 1966.

Grobey[19] in his study of the hardwood industry of western Washington also stresses the importance of the Los Angeles area indicating that the county is the single largest production center for furniture in the United States. He indicated also that the need for flooring, cabinets, doors, millwork and paneling in new housing for California's expanding population as well as for furniture is increasing the demand for hardwood. Western Washington ships some 60 percent of its production to California (supplying about eight percent of the Los Angeles market) while 25 percent is manufactured locally and 15 percent goes into other western or national markets.

This section is mainly concerned with the consumption of hardwood lumber and plywood by the furniture industry in the greater Los Angeles area.[20] Birch and substitutable species are of particular interest. Pertinent market information is noted, particularly the sources, flow, and acquisition of the industry's wood inputs.[21]

Investigation of the industry pertinent to this report has revealed some notable differences and similarities between the industry in California on the Pacific and the industry in New England on the Atlantic.[22] In New England, material cost is the major cost item to the industry. Some 30 to 50 percent of the total cost of manufacture is for wood. In California less emphasis is placed on wood except in the nonupholstered household furniture category. Birch is the favored species in New England, whereas in California only in unupholstered household furniture is this species preferred. Western red alder has

---

19. Grobey (19).
20. For a more detailed analysis of the industry see Frazier (14).
21. For a discussion of the feasibility of establishing and locating wood household furniture manufacturing in a state and county see Morris (34) and Peterson (37).
22. Wickman (57).

come into extensive use in other categories. Both areas indicate a need for quality lumber. New England manufacturers are particularly worried about this problem as they placed great emphasis in the past on local supplies of rough lumber. Recently these local supplies have decreased in quality, if not quantity. Given lower labor costs, New England manufacturers frequently purchase rough lumber and finish it to their specifications. With high labor costs and frequently high shipping costs, manufacturers in California prefer to purchase quality material cut to exact specifications.

Wood Consumption

Manufacturers of wood household furniture, upholstered and nonupholstered, together with furniture parts manufacturers are the largest users of primary wood products in the California furniture industry. These three segments of the industry (shown in Table 18 as S.I.C. 2511 and 2512, with parts manufacturers included in 2499) consumed nearly 100 million bd. ft. of lumber and over 19 million sq. ft. of plywood in 1962. Lumber consumption for the entire industry was estimated to be some 130 million bd. ft. Manufacturers of unupholstered wood household furniture, the largest segment of the industry, used over 50 percent of the lumber and 90 percent of the plywood. Industry lumber consumption was estimated to be 58 percent hardwood and 42 percent softwood. Plywood was 86 percent hardwood and 14 percent softwood.

Los Angeles wood household furniture manufacturers and wood parts manufacturers used about 58 million bd. ft. of hardwood lumber in 1962. Volumes by major species were estimated to be alder 22 million bd. ft., birch 10 million bd. ft., maple 10 million bd. ft., ash 6 million bd. ft., walnut 2 million bd. ft., and miscellaneous 8 million bd. ft. Different segments of the industry indicated a preference for different species. Upholstered furniture manufactureres

TABLE 18 - The classification of establishments in the Los Angeles-Long Beach area by Standard Industrial Classification number (S.I.C.), 1962

S.I.C.	Description	Number of establishments	Percent of establishments by employee size class		
			1-19	20-49	50 & over
2511	Wood household furniture, unupholstered	255	72	15	13
2512	Wood household furniture, upholstered	205	62	25	13
2514	Metal household furniture	53	57	11	32
2515	Matresses and bedsprings	83	69	11	20
2519	Household furniture, not elsewhere classified	12	75	17	8
2521	Wood office furniture	18	67	22	11
2522	Metal office furniture	21	43	19	38
2530	Public building and related furniture	33	69	18	13
2541	Wood partitions, shelving, lockers, and office and store fixtures	104	72	22	6
2542	Metal partitions, shelving, lockers, and office and store fixtures	36	86	6	8
2591	Venetian blinds and shades	37	86	8	6
2599	Furniture and fixtures, not elsewhere classified	31	55	29	16
25--	Orange County not classified	30	--	--	--
2499	Wood products, not elsewhere classified	147	82	12	6
	TOTAL	1,065	70	17	13

SOURCE: U. S. Department of Commerce, Bureau of the Census. County Business Patterns, First Quarter, 1962, Part 10, Pacific States.

preferred alder and used about twice as much of this species as the next preferred species maple. Nonupholstered furniture manufactures preferred birch and used about one-third more of this species than alder or ash. These furniture manufacturers also consumed large amounts of plywood. Preferred species were Philippine mahogany, walnut, and birch. Consumption is difficult to estimate on an industry segment basis by species, but over two million sq. ft. of birch plywood was known to be consumed by nonupholstered wood household furniture manufacturers in 1962.

The largest segment of the furniture industry (S.I.C. 2511, wood household furniture, not upholstered) is the major user of hardwood lumber and plywood. Birch is the preferred species although ash, maple, and alder are widely used. Alder is typically more preferred by upholstered furniture manufacturers (S.I.C. 2512) the next largest segment of the industry.

Additional lumber markets are available in the Los Angeles area as the furniture industry is estimated to buy only some seven percent of the lumber sold by lumber distributors in the area.[23] These markets are primarily for softwoods, but significant volumes of hardwoods would be included. One particular market would be for kitchen cabinets not produced on a factory basis.[24] Also, molding, trim, and other interior finishing and millwork would be important. Birch is widely used for these purposes.

It is not difficult to understand why the Los Angeles area provides a large market for lumber. California leads the nation in population and Los Angeles

---

23. Frazier (14).
24. Kitchen cabinets produced on a factory basis are included in wood household furniture, not upholstered S.I.C. 2511.

County is the most populated area in the state with over 6,700,000 residents as of July, 1964. Also, this county was the nation's number one homebuilding metropolitan area during the early 1960's.[25]

Market Characteristics

The furniture industry is a complex, highly specialized secondary manufacturing industry. Four categories were prominent in southern California: manufacturers of cut stock, manufacturers of parts, sub-assembly of parts, and final assembly and finishing. Some of the larger firms carry out all four manufacturing operations, but many smaller firms operate only in one category or at most two. Additionally, suppliers of cut stock and parts as well as sub-assemblers frequently supply a specialized segment of the industry.[26]

Suppliers of wood raw materials to the furniture industry provide many services. Two of them are very important: the maintaining of appropriate inventory, and providing the package or combination of wood materials desired.

For the purpose of this report the manufacture of unupholstered wood furniture (S.I.C. 2511) is the segment of the industry that is of primary importance.[27] Fifty-eight manufacturers of this type reported to the Pacific Southwest Forest and Range Experiment Station on the sources of their wood raw materials. All but 11 purchased birch. Shipments of lumber ranged from one M bd. ft. or less for 15 firms to over 20 M bd. ft. for 20 firms. Shipments of plywood ranged from one M sq. ft. or less for 20 firms to over 20 M sq. ft. for 15 firms. Shipments of veneer usually were in amounts of 20 M sq. ft. or more. Firms averaged between 33 and 40 shipments per year from about six or

---

25. See Los Angeles Home Furnishings Mart News (30).
26. Frazier (14), Part 1 - Organization of the Industry.
27. See previous section "Wood Consumption", par. 3.

seven different suppliers. Lumber was most frequently purchased from wholesalers, but considerable volumes came from mill representatives. Similarly, plywood was most frequently purchased from wholesalers, but large amounts of foreign plywood (primarily Philippine mahogany) were acquired from importers. Veneer usually came from wholesalers.

Two hundred twenty three lumber and plywood suppliers reported on their markets. Responses by brokers and mill representatives were inadequate to report separately. However, these agents in general reported that they did not handle birch. Also, import firms were not sampled in sufficient depth to report on in detail. In general, most handled more foreign plywood than lumber, and nearly all handled birch. Sales were primarily to wholesalers, furniture manufacturers and to other manufacturers that produced doors, millwork, etc. Table 19 gives a brief summary of some of the more important characteristics of the market suppliers. These agents frequently handle hardwood lumber and plywood as well as softwood products, and those that do handle hardwoods in a majority of cases handle birch. Retailers, as might be expected, are prominent sellers to consumers and small building construction contractors. Wholesalers are the largest suppliers to the furniture industry and to other manufacturers that produce doors, boxes, and millwork, etc. These latter firms are also important users of birch.

While Alaskan white birch is not really a "new" wood, it does have some characteristics that differentiate it from other species of foreign and domestic birch[28] This poses somewhat of a dilemma. Middlemen in general tend to resist "new" species. They are costly to promote, and require that large stocks of new inventory be carried at considerable risk. Middlemen look to suppliers

---

28. "New" here refers to a particular kind of wood, usually a Genera but sometimes a species that is being introduced into the market and has yet to be widely accepted.

TABLE 19 - Summary of market characteristics reported by sampled lumber and plywood agents, Los Angeles 1962

Characteristic	Retail	Retail - Wholesale	Wholesale	Mixed[1] Firms
		(number of firms)		
Responses	72	46	73	32
Handle Hardwood Lumber	37	19	23	9
Handle Hardwood Plywood	22	15	9	10
Handle Birch	40	19	21	11
Sold Mainly to:				
Consumers	60	27	N.	4
Retailers	28	26	50	16
Retail - Wholesale	N.	N.	19	10
Wholesale	N.	14	36	18
Importer-Exporter	N.	N.	N.	4
Furniture Manufacturer	6	8	28	12
Building Construction Contractor	62	34	14	5
Other and Millwork	11	17	42	18

N. - Negligible

1. Either retail, retail-wholesale, or wholesale; together with broker, mill representative, importer and/or producer functions.

SOURCE: Derived from data supplied by the Pacific Southwest Forest and Range Experiment Station, Berkeley.

for high performance in regard to quality and stability of supply. Unfortunately, all too frequently this happens during the initial period when the producer has just recently begun operation and is not yet producing smoothly and efficiently. Thus, lack of market acceptance together with supply difficulties aggravate the situation. With Alaskan birch this is not necessarily the case. Minor mechanical and physical characteristics of the wood can be fairly quickly ascertained by manufacturers and, as long as there is no significant difference compared to the widely accepted and desirable birch presently being used, they shift the emphasis to quality and supply. Thus, for Alaskan birch, the main barrier to market entry is not acceptance but rather quality and availability in comparison to presently used birch primary products. This natural advantage over a "new" species is important. Comments from a paper describing the market for hardwoods in the California furniture industry enforce this point:

> Individuals in all segments of the industry - designers, manufacturers, and suppliers - stated that before they would even consider a new species they must be assured that adequate supplies are available of both lumber and veneer stock through recognized and operative trade channels.
>
> They also agreed that before the producer attempts to sell his species he must have substantiated facts about dimensional stability, cutting, and machining properties, finishing characteristics, gluing properties, and appearance in use. Such information must be available from an authoritative and recognized source.[29]

The problem presented in the above paragraph is eliminated to a great extent by the fact that birch with minor variations in physical and mechanical properties in various species and varieties is already accepted in the market. The real problem is presented in the first paragraph. Manufacturers will not turn to alternate woods until "adequate supplies are available." This includes stability of supply, quality, and specifications.

---

29. Frazier (71), p. 10.

Pacific Northwest Markets[30]

Interviews were conducted with some 30 percent of the major buyers and users of hardwood in the Northwest who handled some 60 percent of the volume of birch and similar substitutable hardwoods. The most important hardwood manufacturing centers are the Seattle-Tacoma area and the Longview-Portland area.

The Northwest area handles a much greater volume of hardwoods than it consumes. Production of primary hardwood products (mainly lumber) was estimated at 140 million bd. ft. in 1965, whereas overseas imports of similar and substitutable hardwoods were estimated at some 560 million bd. ft. Thus, supplies tributary to the area amount to some 700 million bd. ft. Most of these supplies are in transit to other markets. Field data indicates only about 48 million bd. ft. of hardwood lumber were used or remanufactured during 1965 in the Northwest. This consisted of approximately 30 million bd. ft. of red alder, 10 million bd. ft. of Japanese birch, five million bd. ft. of eastern birch (primarily, yellow) and about three million bd. ft. of western and eastern maple.

Red alder accounts for about 85 percent of the Pacific Northwest lumber production.[31] Alder lumber is produced in some 200 different west coast sawmills, but about 12 large and continuously producing mills with kiln drying, surfacing, and finishing facilities are responsible for much of the production. The western red alder market for lumber in 1963 was estimated at 120 million bd. ft. with approximately the following regional components: California 80 million bd. ft., Northwest 27 million bd. ft., Southwest two million bd. ft. and other 11 million bd. ft. The western furniture and fixture industries consume about one-half of

---

30. Much of the data and supporting analyses for this section and the section "Secondary Market Specifications", in Chapter VII, were supplied by Thomas A. McKenzie, Forest Economics Consultant, Seattle, Washington.

31. See Grobey (19).

the red alder lumber produced. In the Northwest some 80 percent of alder lumber sales were to furniture manufacturers.

Supplies of red alder sawtimber are not likely to decrease in the immediate future, and competition to supply primary wood products to the furniture industry should remain keen. Table 20 indicates the estimated volume, growth, and cut for hardwoods in the Northwest. In addition to considerable reserves of sawtimber, annual growth exceeds annual cut by formidable amounts. Also, considering that lumber production totaled only 140 million bd. ft. and local secondary manufacture used less than 50 million bd. ft., large export markets for both logs and lumber seem practical. Volumes of sawtimber for the three principal Northwest hardwood species are shown in Table 21.

Nearly 20 billion bd. ft. of alder and some seven billion bd. ft. of cottonwood and maple reserves indicate plentiful future supplies of wood for manufacture. However, stability of supply might present some problems as much of the alder is in stands classified mainly as coniferous, where conflicts of interest in purpose and methods of harvesting frequently are detrimental to the alder understory. In short, coniferous logging and alder logging are frequently not compatible and the former, if it takes precedence, can frequently destroy the value of the alder. On the other hand pre-logging for alder is not economically feasible or desirable in many cases depending on available logging technology and the timber owners objectives. An additional factor of importance to consider is that some 65 percent of the alder volumes are on private lands, and much of this is in small ownerships. Again, supply stability implications are evident.

If Alaskan paper birch products are to compete in Northwest markets with products from such species as alder, three important factors must be considered: (1) the price of Alaskan birch will have to be more oriented toward alder

TABLE 20 - Volume, growth and cut of hardwood sawtimber on commercial forest land, Western Oregon and Western Washington, 1962

Region	Volume[1]	Growth	Cut
	(million of bd. ft.)		
Western Oregon	20,335	335	128
Western Washington	14,007	456	251
Regional Total	34,342	791	379

1. As of January 1, 1963.

SOURCE: Derived from Gedney (16).

TABLE 21 - Volume of sawtimber, principal commercial hardwoods, Western Oregon and Western Washington, 1963

Species	Western Oregon	Western Washington	Regional Total
	(millions of bd. ft.)		
Red Alder	9,823	9,355	19,178
Black Cottonwood	393	998	1,391
Bigleaf Maple	3,240	3,516	6,756
All Species	13,456	13,869	27,325

SOURCE: Derived from Metcalf (32).

pricing rather than Japanese or eastern yellow birch, (2) the birch should be directed to those market areas where superior strength, hardness, and the woods' natural color and surface character are considered highly desirable, and (3) quality and primary manufactured specifications will have to meet reasonably high standards.

IX

COSTS AND PRICES

This section is concerned with the costs of raw materials and specific supporting operations for primary industry such as logging. Similarly market prices for primary products and transportation costs to reach these markets were investigated. The primary objective of this section is to approximately estimate the margins existing for some operations which as yet have not been established for Alaska. These margins then can be considered from the point of view of being adequate to promote utilization, or not adequate and thus indicate that adjustments are necessary in the production-marketing components, as far as costs or prices are concerned, before utilization is to occur on an increased scale.

Stumpage Costs

The actual cost of purchasing standing timber in the Susitna Valley relative to both other regions and other operating costs is very reasonable. Previously the Bureau of Land Management, and now the State Division of Lands negotiate small sales for charges of under $5 per M bd. ft. Small private holdings, advantageously located, on occasion have involved higher values, but these are only of minor significance. It would be reasonable to assume that the state, under the present situation of fostering resource development, will not change the pricing policy for small negotiated sales. Also, should larger sales be made to establishing industry on a competitive bid basis, the stumpage price would not be expected to increase in the pioneering situation. Presently in the valley, small operators are paying about $3.50 per M bd. ft.

for white birch. Also, in some cases, stumpage fees are further reduced for services in kind in the maintenance and construction of state roads during timber removal and the sale time period. On some sales, in kind services valued up to $2.50 per M bd. ft. of timber removed may be deducted from stumpage charges.

Road building costs are not generally considered separately in analyses of this kind. Access to timber stands in Alaska do, however, sometimes require operators to build and maintain lengths of logging and hauling road. Frequently a lower charge for stumpage or adjustments as to stumpage charges in negotiation prodedures compensate for road building costs. In Alaska small operators sometimes find themselves faced with unexpected road building costs. Inadequate investigation of the timber sale area previous to stumpage negotiation is the causative factor in many cases. The cost of road building depends on terrain, seasonality of road, and many other conditions. One important factor basic to cost control in logging operations is to consider a standard of access road in relation to the volume of timber to be removed on it and particularly in terms of the volume of timber per acre tributary to the road. The latter point is very important in assigning costs on a per unit basis (i.e. per M bd. ft.) for the timber product removed. Investigations concerning road costs were not considered to be within the scope of this report. Research in this area is lacking, and in fact could involve a major research project in itself.

Logging roads, depending on terrain and standard necessary, can cost from $1,000 to $3,000 per mile in non-coastal Alaska. Wide variance in volume of timber per acre can be responsible for per M bd. ft. unit costs of from $1 to $4.[1]

---

1. These figures are based on a very limited sample of reported costs. Their applicability to other specific cases is unknown.

Logging Costs

Logging in hardwood timber types and in the interior of Alaska is relatively undeveloped. An estimation of costs is only of very limited value in the present situation as the basis for reporting is scattered, intermittently working operators who are relatively unskilled, use old or adapted equipment and who can provide at best only rough estimates of the costs involved in logging. For this reason the figures reported for logging operations, and other operations where similar conditions apply, should be used with caution. However, they might have value as a starting point from which to consider more realistic estimates of logging costs, given further investigation and improvements in equipment, technical skills and knowledge.

Logging costs consist of the total cost for three operations: (1) felling, (2) bucking, and (3) skidding. The latter represents a major portion of logging costs in Alaska due to a combination of both high machine costs and high labor costs.[2] Reported total logging costs for the limited operations investigated in the Susitna Valley ranged from $15 to $40 and averaged approximately $24 per M bd. ft. of timber. Be means of comparison, local producers in the Lake States reported logging costs for hardwood timber of about $13 to $15 per M bd. ft.[3] In most cases, volume per acre, terrain, technical skill, and equipment can be considered slightly more favorable in the Lake States situation. However, a higher average cost for Alaska might be explained in terms of a significant difference in the cost of labor combined with a higher cost of machinery and its operation and maintenance, as well as possible lower efficiency of operation.

---

2. See Table 22, p. 111.
3. Massie (75) p. 195-199.

Hauling Costs

Timber hauling costs cannot be estimated with reference to a wide range of distances at this time because of insufficient hardwood timber utilization activity to date upon which to base estimates, and particularly activity where hardwood logs have been transported for more than a few miles. Several operators hauling both hardwood and softwood logs short distances in the Susitna Valley reported estimated hauling costs per M bd. ft. These dozen or so operators indicated loading and hauling costs for one to five miles came to about $11 per M bd. ft. and about $15 for five to ten miles. Insufficient operating experience precluded estimation for distances between ten to twenty miles, but a few operators indicated hauling costs as high as $25 to $35 for distances of 25 miles or more. These same operators indicated that a major factor in this relatively large increase involved traveling greater distances over very poor roads rather than a short haul on a poor road together with a long haul on a high standard road. The latter case is more applicable in the Lake States where hauling costs for hardwood sawlogs have been estimated to be about $8.25 for a one to ten mile haul, $10.75 for an 11 to 20 mile haul, $12.25 for a 21 to 30 mile haul, and up to $16 for hauls over 30 miles.[4]

Besides differences in roads and hauling equipment a major contributing factor toward the different cost situation is labor charges. This would apply to both short and long hauls, but longer hauls could have an added contributing time factor for going a far greater distance slowly on very poor roads. Data are not available to directly reflect wages for hardwood loggers. However, some indication of the higher wage scales in Alaska for production workers and forestry related employment is shown in Table 22. In some cases wages

---

4. Ibid., p. 199-206.

TABLE 22 - Selected average hourly wage rates, Alaska and other states, 1964

Type of Employment and State	Average Rate (dollars per hour)
Production Workers	
All Manufacturing	
Alaska	3.54
Washington	2.98
California	2.96
Oregon	2.85
Manufacturing	
United States	
Sawmills and planing mills	1.96
Millwork, plywood and related	2.26
Paper and pulp	2.77
Alaska	
Logging, lumber and pulp	3.88-4.13[1]
Contract Construction	
United States	3.55
Alaska	5.93-6.64

1. Average for low month and high month, 1964.

SOURCE: Dept. of Labor, Bureau of Labor Statistics; Employment and Earnings, Alaska Dept. of Labor, Statistical Quarterly, Employment Security Division, Fourth Quarter, 1964.

are almost double the average rate for the United States. Contract construction rates, which are high in Alaska, must be taken into consideration as this is one alternative open to persons who also might produce timber. Similarly, operators of heavy equipment frequently used in contract construction receive a high average wage, which means that alternative uses of heavy equipment (i.e. logging) might also have high operator wage rates.

At the present time, due to limited timber harvesting activity in the valley, prices for timber products cannot be effectively reported on a delivered to the mill basis. In general, spruce cabin logs delivered to small peeling mills on the main highway system are sold for about $50 per M bd. ft. In the few cases where hardwood logs have been delivered to highway mill sites in the past, the yard price depending on quality was slightly higher.

Sawlogs can be delivered to mills along the railroad in the valley from more distant locations on the Alaska Railroad. Thus, any mill locating railside in the Susitna Valley would also have access to timber from the Tanana Valley in the Interior. A summary of the rate structure for transporting sawlogs by railroad within Alaska is shown in Table 23.

Costs of Primary Manufacture

The primary manufacture of forest products to date has mainly been concerned with rough spruce lumber for local construction. Some mills have planing facilities, but the small operators do not own or have access to kiln drying facilities.[5] Several operators indicated that the production of rough lumber costs from $15 to $30 per M bd. ft. Additional finishing costs $15 to

5. One dry kiln is located in the valley, but recently it has not been operating.

TABLE 23 - Summary of the Alaska Railroad fuelwood or sawlog tariff (between any two points, 42'-6" car, @ 120,000 lbs.)

Distance[1] (miles)	Rate per Car (dollars & cents)
less than 10	$ 38.45
10-15	39.53
15-20	40.59
20-25	41.68
45-50	45.98
70-75	50.27
95-100	54.57
145-150	63.16
195-200	71.77
240-250	80.17
290-300	88.47
340-350	96.87
390-400	106.27
440-450	114.67

1. See Alaska Railroad Tariff 16-G, Section 5, for complete rates by five mile interval (under 200 miles) and by 10 mile interval (over 200 miles).

SOURCE: Alaska Railroad, Anchorage.

$20 per M bd. ft. Relatively little cost information is available on the primary manufacture of hardwoods. Two or three operators who have cut white birch indicated an initial sawing cost of some $25 on a portable mill basis for rough conversion. A somewhat lower cost would be expected on a permanent installation cutting greater volumes. Additional finishing for hardwoods, such as edging, planing, and kiln drying, would cost more than the figures reported above for softwood finishing in order to produce a hardwood product acceptable in out-of-state markets. On the other hand, if cants are to be shipped to out-of-state facilities for precision manufacture, the sawing cost for them should be somewhat less than the reported $25 figure.

Transportation Costs

Transportation rates between Alaska and domestic markets in the Pacific Northwest and California for hardwood lumber and dimension stock are the main topic of this section. Rates for other primary products would have to be considered as needs arose.

Historically, Alaska is linked to Seattle for supplies of manufactured goods. These goods usually came by ship to various ports in Alaska. More recently rail shipment has been established as a means of supply. Goods are rail-barged from Seattle, Washington or Prince Rupert, B.C. where tugs tow railcar loaded barges from these continental terminals to the South-Central Alaskan ports serviced by the Alaskan railway. Also, container vans are now moved by ship from Seattle to Alaskan ports serviced by rail or road where the van units complete their journey on the Alaska Railroad and by truck haul. Lesser amounts of goods, tending to be of higher value, lower weight and less volume are trucked over the Alcan highway or received by air freight. As shipments by ship and rail-barge increase, the problem of empty carriers

returning from Alaska has increased. The state does not produce large volumes of goods to fill these carriers on their return trips. In the past canned salmon could easily be handled by returning supply ships. Gold and other precious metal concentrates required relatively minor carrier space. Military supply shipments also do not provide any back haul capacity. More recently tourism has developed, and while this requires improved transportation systems it does not require much change in freight services.

The previous comments tend to support why the rate structure for the movement of goods between Alaska and Seattle is heavily oriented toward the forward haul to Alaska on the basis of shipping goods with a relatively high degree of manufacture and value. Commonly, rates are based on dollar and cents charges per 100 lbs. One of the difficulties presented by this situation is that the limited quantities of goods shipped from Alaska south to the continental United States come under the same charges. This situation itself is not necessarily inequitable, but it presents problems. One basis for economic development in Alaska is through forest products industries. These industries as they develop frequently concentrate on the lower degrees of manufacture and correspondingly lower values, particularly when home markets are somewhat limited and are historically supplied from large efficient industries in the continental United States. Further development depends heavily on the shipment of primary wood manufactures into more distant domestic markets or foreign markets, and these lower value primary products cannot absorb high transportation rates. Usually they are bulky and heavy, and water followed by rail are preferred methods of shipment. If transportation facilities which serve Alaska are developing excessive empty back haul capacity, primary manufactures in forest products might be ideally suited to fill this capacity. However, the rate structure will have to be such that it complements the

value of the primary manufactures to be shipped. Forward haul rates previously in effect, and some presently in effect, are more compatible to moving secondary products or higher value products and, until secondary manufacturing develops in Alaska, this type of rate is not conducive to back-hauling primary products.

The present rate structure for the southbound movement of timber and primary forest products is covered by a variety of tariffs.[6] Several of these tariffs have changed or lapsed, but many are currently in effect, together with recently adopted ones. In general, tariffs are being adjusted downward. Currently, birch hardwood lumber can be moved to Seattle from the Susitna Valley for 73 cents or 88 cents per 100 lbs. depending on such factors as method of shipment, shipping point, and size of shipment. These rates are an improvement over previous rates, including a more recent rate of $39 per M bd. ft. if the lumber is shipped on a dried rather than a green basis. A log rate of $37 per M bd. ft. and a cant rate of $39 per M bd. ft. have been used. Logs have also been shipped for $300 to $325 per car depending upon car size. Currently log rates are not as important due to Federal and State policies concerning primary manufacture within Alaska. However, a low rate to allow the shipment of hardwood cants to the Pacific Northwest for further manufacture with highly specialized equipment could be very important in the development of markets for Alaskan birch and cottonwood. This would be particularly effective if a milling in transit rate could be established for cants where the final products are to be moved on to Los Angeles. Any rates established for cants should recognize the fact that the per M bd. ft. value of cants is

---

6. Rates presented in this section were taken from various Tariffs on file in the Institute of Social, Economic, and Government Research, University of Alaska, and from information supplied by the Port of Seattle, the Alaska Railroad, Puget Sound Alaska Van Lines, and the Furniture Manufacturers Association of California.

considerably less than the per M bd. ft. value of hardwood lumber. Further lowering of rates for lumber might be justified, assuming the various carriers can operate profitably. These rates should take into effect empty capacity being backhauled and profit margins, as well as the value of the lumber being transported and the shipping rates for competitive lumber from other regions being directed into the same markets. Similarly, comparable rates for lumber from other species, where rates are effective by species, should be implemented if markets are developed for them (i.e. cottonwood).

Two markets available for Susitna birch lumber are centered around Seattle and Los Angeles. Rates for birch lumber per M bd. ft. depending on moisture content to reach these markets are shown in Table 24. The rates presently in effect to Seattle (i.e. those designated I and II in Table 24) are not excessively high, particularly if the lumber is dried. Also, in comparison to alternate sources of birch for the Seattle market as shown in Table 25, the rates are somewhat favorable even if green material from Alaska at a lower value is compared to air dry material coming from the east. However, a serious problem exists in that a lack of kiln drying facilities or incentives and conditions to air dry exist in Alaska, together with the fact that Seattle in comparison to Los Angeles has only a limited market for birch lumber. Hence, green lumber or cants at a lower value and higher weight than westbound air dried eastern lumber are in need of a slightly lower shipping rate if additional manufacturing charges are to be incurred before they can be placed in the market. On the other hand if lumber manufacture, drying and rough surfacing occured in Alaska the present rates are favorable.

Los Angeles, not Seattle, is the major market consuming birch lumber. Hence, reaching Los Angeles at a competitive rate, rather than Seattle, is a major factor of importance (Table 26). If cants or rough green lumber are to

TABLE 24 - Estimated effective and alternative rates for shipping Susitna birch lumber[1]
July, 1966

Species and Condition (rough lumber)	Rate to Seattle[2] I	II	III	IV
	(dollars per M bd. ft.)			
White Birch				
Green	39.60	32.85	29.25	22.50
Air Dry	28.42	23.58	21.00	16.15
Kiln Dry	27.28	22.63	20.15	15.50
	Rate to Los Angeles[3]			
White Birch				
Green	74.25	67.50	63.90	57.15
Air Dry	53.29	48.45	45.87	41.02
Kiln Dry	51.15	46.50	44.02	39.37

1. See tariffs for details on shipment size and handling, etc. Conversion weights per M bd. ft. approximated from Table 10.
2. Rate basis as follows: I 88¢/100 lbs., II 73¢/100 lbs., III 65¢/100 lbs., IV 50¢/100 lbs. Rates I and II are currently in effect.
3. Rate to Seattle plus 77¢/100 lbs. from Seattle to Los Angeles.

SOURCE: Derived by the author from various reported tariff rates, and tariffs on file, Institute of Social, Economic and Government Research, University of Alaska.

TABLE 25 - Estimated rates for shipping white and yellow birch from the east to Seattle[1]

Species and Condition (rough lumber)	Rate to Seattle from:[2] Chicago	St. Paul, Minn.	New York
	(converted to dollars per M bd. ft.)		
White Birch			
Green	$ 60.30	$ 53.55	$ 63.45
Air Dry	43.28	38.44	45.54
Kiln Dry	41.54	36.99	43.71
Yellow Birch			
Green	64.99	57.72	68.39
Air Dry	48.51	43.08	51.04
Kiln Dry	47.30	42.00	49.77

1. See footnote 1, Table 24.
2. Rates in effect April 1, 1966; Chicago $1.34/100 lbs., St. Paul, Minn. $1.19/100 lbs., New York $1.41/100 lbs.

SOURCE: See Table 24.

TABLE 26 - Estimated rates for shipping white and yellow birch from supply points in Canada and the eastern U. S. to Los Angeles[1]

Species and Condition (rough lumber)	Rates to Los Angeles from:[2] Vancouver	Quebec	Chicago	Michigan
	(converted to dollars per M bd. ft.)			
White Birch				
Green	41.06	73.35	55.80	58.05
Air Dry	29.47	52.65	40.05	41.67
Kiln Dry	28.29	50.53	38.44	39.99
Yellow Birch				
Green	-----	79.06	60.14	62.56
Air Dry	-----	59.01	44.89	46.70
Kiln Dry	-----	57.54	43.77	45.54

1. See footnote 1, Table 24.
2. Rates in effect April 1, 1966: Vancouver 91½¢/100 lbs., Quebec $1.63/100 lbs., Chicago $1.24/100 lbs., Michigan $1.29/100 lbs.

SOURCE: See Table 24.

be shipped rates must recognize shipment to Seattle and trans-shipment on to Los Angeles. Additional manufacture could effectively be carried out in the Seattle area, and a milling in transit rate might be a very effective approach. Direct shipment by water to the Los Angeles area would, of course, be ideal and would be particularly effective if drying and finishing could be done in Alaska. However, while the Los Angeles area does not have extensive advantages in finishing and drying, some yards and wholesalers are available to complete manufacture of unfinished lumber to market specifications. Rail and/or van shipments under existing conditions are not very favorable. Green lumber shipped through Seattle would need to absorb additional drying charges; staining and deterioration in transit might be a problem; and alternate sources of lumber can reach Los Angeles at far cheaper rates. Perhaps the best comparison is on the basis of dried lumber. Shipping via Seattle would involve charges of about $46 to $53 per M bd. ft. This rate would be competitive with imported Japanese birch as shipping charges for this substitute run some $45 per M bd. ft. with an additional cost of some $10 or so for duty and handling to the distribution yard or manufacturer. Also, this is for finely manufactured quality material. White birch can be brought in from western Canada and the Lake States at lower rates but presently is not sold extensively in out-of-region markets. Yellow birch, a favored species widely used in furniture manufacture, is commonly imported from eastern Canada or brought from the eastern United States or the Lake States. Rates from Quebec exceed comparable ones from Alaska, but it must be remembered this is for a well established species, usually of high quality in long lengths and wide widths. Yellow birch from the Lake States, while still of high quality but possibly with an average board of less length and width, has a slightly lower rate advantage.

Alaskan paper birch, while competing with yellow birch and Japanese

"Imperial" birch, in some cases may have to compete with white birch from British Columbia which can be shipped to Los Angeles for about $29 per M bd. ft. under present rate structures. Also, in some cases competition with western red alder occurs. Alder can reach Los Angeles from Seattle for about $18 per M bd. ft. and from Portland for about $15 per M bd. ft.[7] Considering these factors a somewhat lower rate for shipping Alaskan birch to Los Angeles might be justified. If shipping via Seattle is necessary in lieu of other alternatives and a lower rate for the Seattle to Los Angeles segment cannot be implemented, then rates similar to those shown as III and IV in Table 24 will be necessary to meet competition. Rate III would approximate the rate for Japanese birch without handling charges, etc., and also come close to the rate for Michigan birch. Similarly rate IV would meet birch coming from slightly closer distribution points like Chicago, Illinois.

Without additional investigation on lumber manufacturing costs in Alaska, and the costs and possibilities involved in drying and finishing lumber to various alternative specifications, as well as investigating the cost, profit and "back-haul" position of various carrier firms, recommendations on shipping rates cannot be made at this time. However, in the author's opinion, based on a limited investigation of market prices and Alaskan manufacturing costs, together with a close look at the present Alaskan situation with regard to competing hardwoods from other regions, little incentive will develop to ship lower value green lumber or birch cants to Seattle without a tariff structure

---

7. Based on the following rates: Seattle to Los Angeles 77¢/100 lbs. Air Dry, $18.48/M bd. ft. -- Kiln Dry, $17.94/M bd. ft. Portland to Los Angeles 64½¢/100 lbs. Air Dry, $15.42/M bd. ft. -- Kiln Dry, $14.97/M bd. ft. (Weight basis: Air Dry 2,400 lbs. per M bd. ft. Kiln Dry 2,330 lbs. per M bd. ft.)

recognizing a rate of $20 or less per M bd. ft. Similarly, for Los Angeles, but on a dried basis, little incentive will exist until rates fall below $40 per M bd. ft.

The present rate structures for shipping from Alaska tend to favor large, dried lumber shipments rather than small shipments of green lumber. In an area just currently developing its forest resource based manufacturing potential this is not proper timing. The latter should be favored now and the former at a later date when the industry is more developed.

In summary, adjustments in rate structures for shipping Alaskan hardwoods should consider (1) the profit position of the various carriers in relation to empty back-haul capacity, (2) the combined factor of weight and value of the product being shipped and (3) the competitive rates at which substitute products may enter the market in question.

Secondary Market Prices

If limited development in the manufacture of Alaskan hardwoods occurs on a completing manufacture basis between Alaska and secondary markets, the price for rough primary products will have to be negotiated by the Alaskan producers with the firms buying these products. These firms will then be responsible for cant remanufacturing, the finishing of rough lumber and/or drying green lumber, and finally the placement of higher value products in the market place at relatively higher prices. In order to trace possible values that might be applicable in Alaska some secondary market prices are available which can serve as a starting point for estimation. These secondary market prices would also have application in estimating possible prices to be received for finished Alaskan primary products that entered the market directly.

Lumber

Hardwood lumber in the eastern United States is frequently quoted rough surfaced and air dry f.o.b. major distribution points such as Chicago, Illinois; Wausau, Wisconsin; and Johnson City, Tennessee. A summary of the price range for eastern birch on this basis, for the summer months of 1965, is presented in Table 27.

TABLE 27 - Price range for birch lumber, f.o.b. mills in the eastern U. S., 1965

Lumber Size (roughly surfaced and air dry) (thickness in inches)	Price Range by Grade (dollars per M bd. ft.)			
	FAS	SEL	FAS-1F	No. 1 Com.
4/4	285-330	292-310	265-275	168-190
5/4	290-335	297-315	275-280	173-200
8/4	300-360	297-340	280-290	180-230

SOURCE: Derived from June-September issues of Hardwood Market Report and National Hardwood Magazine.

Manufacturers on the west coast in the Seattle and Los Angeles areas using eastern lumber face additional charges for any added manufacturing, for freight and handling, and also frequently for brokerage or commission fees. Some birch is imported from eastern Canada. In general, prices are somewhat lower, but additional freight and duty charges also come into effect. However, much of the Canadian birch lumber is used because it can be obtained in wide widths and long lengths, and this material commands premium prices, especially in the higher grades.

The price ranges for hardwoods facing manufacturing firms on the west coast are shown in Table 28. Additional variation is noticeable because of both competition between geographic areas for the same type of lumber (i.e. birch) but also because of competition between substitutable species. Essentially the price of birch lumber in Chicago and Los Angeles for example should differ by the cost of handling and transfer charges from Chicago to Los Angeles. Also these charges, other than percentage commissions on value, should be fairly uniform per M bd. ft. regardless of lumber value. However, eastern birch in west coast markets appears to command a proportionately higher price in the quality grades than in the lower grades rather than a somewhat uniform increase for handling and shipping charges. This difference for FAS appears to be about $95 to $100, for SEL about $78 to $90 and for No. 1 common about $32 to $60.[8] One possible explanation might involve scarcity in the better grades. In order to get birch lumber shipped west away from competing eastern markets a higher price is offered. Similarly, if lower grade No. 1 common is readily available, western markets can call forth this lumber at low prices; probably at the actual eastern market price, plus handling and transfer costs.

Hardwood Plywood

Fairly large amounts of hardwood veneer and hardwood plywood, but particularly the latter, are consumed in the furniture and related industries. Price information was inadequate to report on veneer and U. S. birch plywood, but some prices for Finnish birch plywood and Japanese birch plywood are available. Finnish birch plywood generally comes in short lengths (i.e. 48"

---

8. The ranges shown might be slightly high in that a small price level increase should be considered in comparing mid-1965 prices to first quarter 1966 prices.

TABLE 28 - Estimated price range of 4/4 hardwood lumber used for furniture manufacturing, f.o.b. Seattle and Los Angeles areas, first quarter, 1966

Lumber Grade[1] and Condition	Birch			Red Alder	Eastern Maple
	Eastern	Japanese	Alaskan[2]		
	(dollars per M bd. ft.)				
FAS (rough, dry)	380-430	340-390	270-290	-------[3]	320-390
SEL (rough, dry)	370-400		250	-------	300-320
SEL and better (rough, dry)	-------	320-360	260	170-250	310
(rough, green)	-------	-------	-------	150-170	-------
No. 1 com. (rough, dry)	200-250	175-200	150-170	130-160	-------
No. 1 com. and better (rough, dry)	250-260	-------	200	150-160	-------
No. 2 com. (rough, dry)	150	100	-------	90	-------
No. 2 com. and better (rough, dry)	-------	-------	-------	90-130	-------

1. Standard grade rules only approximate for some reports on Japanese and Alaskan birch and for red alder.
2. Reported price, 1965-66.
3. Not reported or not typically sold.

SOURCE: Derived from interview reports of responding mills, wholesalers, and manufacturers.

to 72"). A few west coast manufacturers indicated that this disadvantage, together with the fact that in their opinion quality in relation to price per M sq. ft. was not satisfactory, induced them to make minimum use of this material. Prices varied widely by length and width but in general, recognizing this by reporting on a price range basis and using "high quality" to denote "face" grades and "low quality" to denote "less-than-face" grades, prices to manufacturers in dollars per M sq. ft. were estimated as follows:

Thickness	Low Quality	High Quality
1/8"	$ 70-90	$ 100-135
3/16"	115-125	125-195
1/4"	130-145	160-205
3/8"	180-195	225-315
1/2"	240-250	280-395

Japanese hardwood plywood is marketed in the Los Angeles area and birch plywood prices are frequently quoted in the Japan Lumber Journal. A summary of Exporter's f.o.b. prices is shown in Table 29. Sufficient information to provide a quality comparison with Finnish birch plywood was not available.

Furniture Dimension Stock

Small furniture dimension stock or semi-finished parts, turning squares, and edge glued blanks are made from a variety of species. Red alder is currently favored by many manufacturers, and birch is evidently used in fairly large volumes for the higher quality lines. Machined furniture dimension stock is frequently finished to manufacturers parts specifications and purchases are commonly made on a piece basis, although some manufacturers buy more or less standard sizes of small dimension on a per M bd. ft. basis. Prices for birch

TABLE 29 - Japanese birch plywood prices, first quarter, 1966
(Exporter's f.o.b.)

Product Description	Price Range (U.S. dollars per 1,000 sq.ft.)
Doorskins	94-95
Stock Panel - 1/8"	96-101
Stock Panel - 3/16"	99-150
Stock Panel - 1/4" (un-selected)	102-111
Stock Panel - 1/4" (red)	147-170
Stock Panel - 1/4" (white)	157-170
Stock Panel - 1/2"	173-185
Shina Lbr. Core - 3/4" (un-selected)	253-263
Shina Lbr. Core - 3/4" (red)	311-323
Shina Lbr. Core - 3/4" (white)	315-321

SOURCE: Japan Lumber Journal, Price List of Hokkaido Plywood, February 25 and April 11, 1966.

finished to parts specifications vary widely for different lengths, widths and thicknesses. Small pieces--for example 25/32" or 4/4" in thickness and from 2" to 6" in width--bring a manufacturer price of from 20 cents to one dollar each depending on desired lengths which can run from several inches to a few feet. Similarly, widths of 12" or so combined with lengths from two to five feet command a price of over $4 upwards to $7 or $8. Specifications for pieces of these values can involve special working and machining, specific color, clear faces, and specified surfacing. Where prices are considered by the piece, delivery to the manufacturer is usually included.

Turning squares are usually sold either by the M bd. ft. for more standard sizes, or by the 100 pieces for more demanding specifications. Japanese birch turning squares made from rough kiln dried stock in a 2½" x 2½" size for various lengths bring some $350 to $375 per M bd. ft. Similarly American birch, rough and kiln dried, in 2" x 2" or 3" x 3" sizes by various lengths bring $275 to $300 and $375 to $425, respectively, per M bd. ft. Where purchases are made by the 100 pieces an estimated range for alder and birch, based on a wholesale delivered Los Angeles area price, would be as follows:

Size	Alder	Birch
	(dollars per 100 pieces)	
2" x 2" x 6-8"	5.00- 7.00	5.75- 7.75
2" x 2" x 12-18"	10.50-15.75	11.50-17.35
2" x 2" x 25-36"	21.00-30.50	23.00-33.75

Furniture blanks or small edge glued panels are another product widely used in furniture manufacture. Alder is a preferred species on the west coast but birch is frequently used in large volumes by some companies. Price is usually considered on a per square foot basis for delivered blanks cut to

specified widths and lengths. One clear surface or face is often specified and frequently individual firm requirements on surfacing and sanding must be considered. Length requirements do not usually exceed four or five feet and width requirements are inherently overcome by the edge glueing process. Actual physical wood quality and clarity of surface are important to this product. Small size but premium dimension is thus necessary for manufacture. Early 1966 prices reported for the Los Angeles area indicated that alder blanks cost furniture manufacturers from 35 to 50 cents per square foot, depending on length, width, and individual company specifications. Birch blanks, similarly, brought from 50 to 70 cents per square foot.

X

ESTIMATED RETURNS FOR LUMBER MANUFACTURE

(The Hypothetical Case)[1]

At present the primary manufacture of hardwood products in the Susitna Valley is mainly limited to small sawmills producing rough lumber. The intent of this section is to estimate the average cost of primary manufacture of hardwood lumber and by comparing this cost with prices offered in Seattle and Los Angeles determine if the margin is large enough to cover both the transportation costs to place the lumber in these west coast markets and leave an adequate residual for profit.

Average costs are estimated to be as follows:

Designated Allocation	Cost (dollars per M bd. ft.)
Roads (some construction and maintenance)	$ 2.50
Stumpage	3.50
Logging (felling, bucking and skidding)	24.00
Hauling (for a distance of some 20 miles)	25.00
Manufacturing (a) Initial sawing	25.00
(b) Additional finishing[2]	15.00
Rough lumber, f.o.b. mill	$ 95.00

1. Many of the figures used in this section are averages based on widely varying figures reported by several firms who operate in the valley. Also, some firms indicated a lack of knowledge concerning fixed and variable costs and the allocation of costs. Caution is thus urged in interpretation with respect to any individual firm or situation.
2. Includes edging, air drying, and additional handling.

In addition to adding the shipping costs to Seattle and Los Angeles, any mills not located adjacent to a transportation terminus will face additional charges in transporting their lumber from the mill to the point of loading for southbound shipment. In most cases in the valley, mills not located adjacent to the railroad are within a few miles of it. Limited evidence indicates that the local movement of lumber for short distances costs about $10 per M bd. ft. Costs of shipping air dry lumber to Seattle are estimated to be $28 per M bd. ft. and $53 to Los Angeles. Thus, the estimated cost of Alaskan birch lumber per M bd. ft. f.o.b. Seattle should be about $133 and about $158 f.o.b. Los Angeles.

The problem of lumber grade suitable for the market has to be considered. The furniture industry is primarily interested in grades of No. 1 common or higher in quality. Also, limited sales of No. 2 common lumber indicate a price which, when compared with the above cost figures, would leave no margin for profit and risk (i.e. less than $150 per M bd. ft.). This means Alaskan suppliers would have to ship lumber of No. 1 common, or better quality. Without outlets for low grade lumber in Alaska, problems in utilization and waste will be incurred. Some easing of the problem might occur with mill owners negotiating for small tracts of timber of better than average quality, but larger operations will not have this advantage. Since only a portion of the mill production can be sold, profits will be highly dependent on the percentage of No. 1 common and better lumber produced.

No. 1 common and better birch lumber from Alaska should bring about $200 per M bd. ft. f.o.b. Seattle or Los Angeles based on reported and comparable birch prices. This leaves a margin based on the previous estimated costs of $67 shipping to Seattle and $42 shipping to Los Angeles.

This indicates a profit ratio on a per unit sale basis of 34 percent and

21 percent respectively.[3] These returns to timber production and primary manufacture can be considered adequate on a per M bd. ft. basis. However, quantities shipped will be the important determinent of revenues, and hence profits, on an annual basis. Many small mills in the valley have a daily capacity of only a few M bd. ft. and operate intermittently for only a few days a year. Frequently production by any one mill does not exceed 100 M bd. ft. per year. Even at this level of production, for example, profits on an annual basis would only be some $4,200 to $6,700 for lumber placed in the Los Angeles or Seattle market. Increases in production, and more stable production, will be necessary to increase revenues and provide acceptable profits on an annual basis. Unfortunately, under present conditions increased production without markets for low quality lumber will only magnify the grade recovery problem involved if only the No. 1 common and better lumber is to be shipped.

---

3. Profit ratio is the ratio of the margin (i.e. price received minus total costs including delivery) to the price received.

APPENDIX A

Tables Pertaining to
NATIONAL HARDWOOD MARKETS

TABLE A1 - Volume of U. S. hardwood lumber production 1950-1964

Year	Volume (million bd. ft.)
1950	7370
1951	7710
1952	7230
1953	7180
1954	7070
1955	7560
1956	7970
1957	5800
1958	6006
1959	6381
1960	6254
1961	5953
1962	6362
1963	7154
1964	7275

SOURCE: West Coast Lumbermen's Association, Statistical Yearbook, 1959-1960. Current Industrial Reports, Bureau of the Census, Lumber Production and Mill Stocks, 1958-1962, 1964.

TABLE A2 - Hardwood lumber production, exports, imports, and domestic consumption 1950, 1955, 1960-64

Item	Year						
	1950	1955	1960	1961	1962	1963[1]	1964[1]
	(million bd. ft.)						
Production	7374	7565	6254	5953	6359	6725	5891
Consumption[2]	7350	8258	6252	6521	6486	6695	6440
Exports[3]	111	189	173	159	139	135	159
Imports[3]	283	266	291	244	309	308	309

1. Preliminary: See Table A1 for production.
2. Represents shipments and net imports.
3. Includes box shooks and railroad ties (sawed).

SOURCE: Statistical Abstract of the U. S., 1965.

TABLE A3 - U. S. regional hardwood lumber production, 1958 and 1964

Region	1958	1964
	(million bd. ft.)	
Eastern U. S.	5921	7114
Northeast[1]	725	862
North Central[2]	1208	1426
Southeast[3]	1620	2072
South Central[4]	2368	2754
Western U. S.	86	161
Mountain[5]	20	9
Pacific[6]	66	152
U. S. Total	6007	7275

1. Me., N.H., Vt., Mass., R.I., Conn., N.Y., N.J., Pa.
2. Ohio, Ind., Ill., Mich., Wisc., Minn., Iowa., Mo., N.D., Nebr., Kan.
3. Del., Md., D.C., Va., W. Va., N.C., S.C., Ga., Fla.
4. Ky., Tenn., Ala., Miss., Ark., La., Okla., Tex.
5. Mont., Ida., Wyo., Colo., N.M., Ariz., Utah., Nev., S.D.
6. Wash., Ore., Cal., Al., Haw.

SOURCE: Current Industrial Reports, Bureau of the Census, Lumber Production and Mill Stocks, 1964 and 1958.

TABLE A4 - Hardwood lumber production by the leading states, 1961, 1963, 1964

State	1961	1963	1964
		(million bd. ft.)	
Virginia	508	627	588
Pennsylvania	292	414	430
N. Carolina	357	533	422
Tenessee	501	436	N.A.
Arkansas	333	425	405
Louisiana	319	395	396
West Virginia	293	378	395
Mississippi	355	397	376
Alabama	346	348	362
Georgia	260	375	333
Kentucky	N.A.	295	N.A.
Michigan	222	293	314
Wisconsin	189	178	248
New York	189	220	242
Texas	195	201	229
Ohio	173	232	210

N.A. - Not Available

SOURCE: Current Industrial Reports, Bureau of the Census, Lumber Production and Mill Stocks, 1964 and 1961.

TABLE A5 - Hardwood lumber production by species preference, 1960, 1961, 1963, 1964

Species	1960	1961	1963	1964
	(million bd. ft.)			
Oak	2789	2817	3170	3417
Misc. Eastern[1]	593	564	738	889
Yellow Poplar	592	541	644	645
Maple	602	526	556	642
Block and Tupelo Gum	292	281	418	381
Sweet Gum	331	316	398	380
Cottonwood and Aspen	206	167	200	205
Elm	195	181	192	204
Beech	195	166	166	176
Western Hardwoods[2]	116	125	179	161
Ash	125	103	143	136
Birch	126	103	107	121
Basswood	92	63	92	69

1. Includes sycamore, hickory, chestnut, mixed woods, and woods not specified by kind.
2. Includes alder (predominently), birch, cottonwood and aspen, maple, oak, mixed woods, and woods not specified.

SOURCE: Current Industrial Reports, Bureau of the Census, Lumber Production and Mill Stock, 1964 and 1961.

TABLE A6 - Lumber used in the manufacture of furniture, by species, 1948 and 1960

Species	1948		1960	
	Volume (million bd. ft.)	Percent	Volume (million bd. ft.)	Percent
Maple	219	11.2	362	16.0
Oak	210	10.8	314	13.9
Yellow Poplar	332	17.0	283	12.5
Tupelo	92	4.7	140	6.2
Sweetgum	300	15.4	124	5.5
Alder	31	1.6	93	4.1
Birch	131	6.7	86	3.8
Ash	48	2.5	79	3.5
Cherry	17	.9	48	2.1
Beech	57	2.9	45	2.0
Elm	31	1.6	41	1.8
Pecon & Hickory	4	.2	41	1.8
Basswood	14	.7	29	1.3
Cottonwood	13	.7	27	1.2
Walnut	14	.7	23	1.0
Other Hardwoods	78	4.1	119	5.3
All Hardwoods	1,591	81.7	1,854	82.0
All Softwoods	324	16.6	362	16.0
Foreign woods	33	1.7	45	2.0
Total All Lumber	1,948	100.0	2,261	100.0

SOURCE: Gill (17).

TABLE A7 - Hardwood lumber used in manufacturing, selected species and industries, 1960

Type of Product[1]	Alder	Aspen	Cottonwood	Birch	Maple	Mixed Birch Beech & Maple
				(M bd. ft.)		
Tobacco, Food, Textiles, etc.		92	576		65	
Lumber and Wood	5,838	40,361	134,885	73,911	250,269	15,592
Furniture and Fixtures	90,450	8,612	20,601	81,772	297,895	
Paper and Related		7,726	127	105	1,752	
Chemical and Related		876	105	2,302	6,559	
Leather				1,152	4,050	
Stone, Clay and Glass		2,372	3,009	269	345	561
Primary Metal		200	1,258	92	4,622	254
Fabricated Metal		949	1,934	915	3,744	758
Machinery		2,765	6,313	2,484	7,858	905
Electrical Equipment	706	1,381	301	486	5,588	616
Transportation		1,884	128	141	1,031	
Instruments			101	1,799	9,811	
Miscellaneous Manufacture		578	5,002	8,649	64,169	
Manufacture not shown	17	471	10	906	222	76
Total	97,011	68,267	174,350	174,983	657,980	18,762

1. Major groups of the Standard Industrial Classification, Bureau of the Census.

SOURCE: Gill (17)

TABLE A8 - Hardwood bolts used in manufacturing, selected species and industries, 1960

Type of Product[1]	Aspen	Cottonwood	Birch (M bd. ft.)	Maple	Mixed Birch Beech & Maple
Lumber and Wood	32,545	932	70,402	33,212	4,095
Furniture and Fixtures			201	52	
Paper and Related	9,000				
Leather			1,047		
Stone, Clay and Glass				253	
Fabricated Metal				214	
Machinery			1,200	13,714	
Miscellaneous Manufacture	134			390	
Manufacture not shown	20		15	9	
Total	41,699	932	72,865	47,844	4,095

1. See Table A7

SOURCE: Gill (17)

TABLE A9 - Hardwood veneer used in manufacturing, selected species and industries, 1960

Type of Product[1]	Aspen	Cottonwood	Birch	Maple	Mixed Birch Beech & Maple
		(M sq. ft. surface measure)			
Lumber and Wood		177,106	159,425	86,525	505
Furniture and Fixtures		559	33,317	27,604	
Leather			164		
Primary Metal				2,122	
Machinery			227		
Instruments			553	4,225	
Miscellaneous Manufacture	99,222	27,018	51,861	16,224	
Manufacture not shown	14	27	92	56	
Total	99,236	204,710	245,689	137,556	505

1. See Table A7.

SOURCE: Gill (17)

TABLE A10 - Hardwood plywood used in manufacturing selected species and industries, 1960

Type of Product[1]	Alder	Cottonwood	Birch	Maple	Mixed Birch Beech & Maple
		(M sq. ft., 3/8 inch basis)			
Lumber and Wood		474	110,498	7,668	14,578
Furniture and Fixtures	378	248	67,171	21,200	77
Paper and Related			212	278	
Rubber and Misc. Plastic		669	92		
Leather		791	878		
Stone, Clay and Glass			592		
Primary Metal			364		288
Fabricated Metal			796	275	
Machinery			192	206	
Electrical Equipment			653		
Transportation			15,492		
Instruments			170	1,634	
Miscellaneous Manufacture			10,425	84	
Manufacture not shown		22	28	298	6
Total	378	2,204	207,563	31,643	14,949

1. See Table A7.

SOURCE: Gill (17).

Table A11 - Value of shipments for the hardwood flooring and dimension stock industries, by geographic region 1958 and 1963

Product and Region	Value 1958 (thousands of dollars)	1963
Hardwood Flooring		
Northeast[1]	3,623	4,231
North Central	18,036	18,080
Southeast	30,646	27,978
South Central	94,505	103,908
Not Classified	1,563	---
U. S. Total	148,373	154,197
Hardwood Dimension and Furniture Parts		
Northeast	18,866	28,643
North Central	17,490	32,455
Southeast	20,259	33,115
South Central	39,360	68,591
West	6,920	7,002
U. S. Total	102,895	169,806

1. See Table A3 for states included in each region.

SOURCE: 1963 and 1958 Census of Manufactures, Bureau of the Census, Major Group 24.

Table A12 - Value of shipments for the wood household furniture industries, by geographic region, 1958 and 1963

Product and Region	Value 1958 (thousands of dollars)	1963
Radio, Phonograph, & T.V.		
Northeast[1]	27,814	32,392
North Central	56,840	90,066
Southeast	8,020	(
South Central	17,213	(32,883 (
West	2,207	3,037
Not Classified	1,917	---
U. S. Total	114,011	158,378
Other Wood Living Room		
Northeast	46,530	59,425
North Central	73,836	80,445
Southeast	50,624	96,615
South Central	33,611	51,557
West	16,667	27,358
Not Classified	1,180	---
U. S. Total	222,448	315,400

TABLE A12 (continued)

Dining Room and Kitchen		
Northeast	37,743	57,189
North Central	25,542	34,330
Southeast	81,509	142,093
South Central	11,915	22,366
West	9,854	16,279
Not Classified	69	---
U. S. Total	166,632	272,257
Kitchen Cabinets		
Northeast	50,547	65,818
North Central	48,002	67,095
Southeast	30,753	40,764
South Central	77,669	24,614
West[2]	43,000	51,792
Not Classified	---	---
U. S. Total	189,971	250,083
Outdoor Furniture		
Northeast	14,708	16,267
North Central	9,049	8,725
Southeast	8,497	4,540
South Central	5,609	6,003
West	12,680	15,689
Not Classified	2,365	---
U. S. Total	52,908	51,224

TABLE A12 (continued)

Upholstered Furniture		
Northeast	136,890	132,509
North Central	167,841	177,524
Southeast	159,596	258,712
South Central	126,183	169,214
West[2]	88,442	127,567
Not Classified	12	---
U. S. Total	678,964	865,526
Furniture Frames		
Northeast	N.A.	17,807
North Central	N.A.	10,565
Southeast	N.A.	11,239
South Central	N.A.	9,343
West	N.A.	4,447
Not Classified	N.A.	---
U. S. Total	N.A.	53,401
Bedroom Furniture		
Northeast	55,696	53,287
North Central	39,148	42,865
Southeast	248,648	335,797
South Central	80,414	104,154
West	32,134	42,133
Not Classified	1,175	---
U. S. Total	457,215	578,236

TABLE A12 (continued)

N.A. - Not Available

1. See Table A3 for states included in each region.
2. Includes "Mountain" states.

SOURCE: 1963 and 1958 Census of Manufactures, Bureau of the Census, Major Group 25.

TABLE A13 - Number of establishments, wood household furniture and hardwood dimension and flooring industries, Pacific Region, 1963

Industry and Geographic Area	Number of Establishments	
	Total	With 20 or more employees
Wood Furniture Not Upholstered		
Washington	55	10
Oregon	43	11
California	479	109
Pacific	588	135
Total, U. S.	3,063	992
Wood Furniture Upholstered		
Washington	26	5
California	229	119
Pacific	337	128
Total, U.S.	1,785	713
Household Furniture N.E.C.*		
West	18	5
Total, U.S.	75	30
Hardwood Dimension and Flooring		
Washington	8	2
West	28	4
Total, U.S.	642	317

*N.E.C. - Not Elsewhere Classified.

SOURCE: 1963 Census of Manufactures, Bureau of the Census, Major Group 25 and Major Group 24.

APPENDIX B

Selected List of Alaskan Loggers,
Primary Manufacturers and
Secondary Manufacturers Applicable
to Hardwood Utilization, 1965-66

Loggers and Small Primary Manufacturers[1]

*Alaska Wood Products Company
Arnold Oxford
Box 743
Wasilla, Alaska 99687

Birdsell Contracting Company
Russell Birdsell
Star Route
Wasilla, Alaska 99687

*Buzza, Walter
Rainbow Lounge
Wasilla Highway
Wasilla, Alaska 99687

Carlson, Boyd C.
1462 W. 26th Street
Anchorage, Alaska 99501

Clark, Don H., & Sons
Construction Company
International Airport Road
Box 4-1392
Anchorage, Alaska 99504

Crawford, Frank
Wasilla, Alaska 99687

*Deming, Walter
Mile 36, Star Route
Palmer, Alaska 99645

*DeVilbiss, Ralph
Box 919
Palmer, Alaska 99645

Downes, Gary B.
Palmer, Alaska 99645

Driggers, Carlos
Severns Building
Palmer, Alaska 99645

Estes, E. R.
Moose Pass, Alaska 99631

Galliet & Associates
1675½ East 5th Street
Anchorage, Alaska 99501

*Hitchcock, James M.
Box 641
Palmer, Alaska 99645

Hunt, Douglas
Box 1261
Palmer, Alaska 99645

*Kendrick, Harry W.
Box 182
Palmer, Alaska 99645

*Koppenberg & Sons
Box 664
Palmer, Alaska 99645

Konikson, Ivor
Girdwood, Alaska 99587

Lake Sand Logging Company
Red Smith
Moose Pass, Alaska 99631

*LeTourneau, O. A.
Talkeetna, Alaska 99676

Lucus, Leo
Palmer, Alaska 99645

*McKechnie, Loren
Box 154
Palmer, Alaska 99645

Missall Timber Company
Box 146
Chugiak, Alaska 99567

*Nash, John D.
Box 649
Palmer, Alaska 99645

*Rippy, John
Star Route
Palmer, Alaska 99645

Sanderlin Logging Company
R. W. Sanderlin
Elmore Road
Anchorage, Alaska 99501

*Sellens, Walter
Box 30
Willow, Alaska 99688

Sneed, Gene E.
Campbell Airstrip Road
Anchorage, Alaska 99501

Williams, Robert A.
Star Route
Palmer, Alaska 99645

1. Entries marked with an asterisk (*) are known to have some milling facilities. Frequently operation is intermittent.

Primary Manufacturers

Alaska Hardwoods Company[1]
Wasilla, Alaska 99687

Barnhardt, W. D.
Box 682
Palmer, Alaska 99645

Evans Lumber Company
Seward Highway
Anchorage, Alaska 99503

Kenai Lumber Company
Box 65
Seward, Alaska 99664

Petersons House Log Mill
Palmer, Alaska 99645

Two Brothers Lumber Company
Whittier, Alaska 99501

Wollf Lumber Company, Inc.
2606 Seward Highway
Anchorage, Alaska 99503

1. Not operating September 1, 1966.

Secondary Manufacturers

Alaska Glass and Millwork
2601 Artic Boulevard
Anchorage, Alaska 99503

Alaska Truss & Mfg. Company, Inc.
4800 Harding Drive
Box 4-R
Spenard, Alaska 99503

Alaska Venetian Blind Company
Leslie E. Shuff
403 East Fireweed Lane
Anchorage, Alaska 99503

Anchorage Bedding & Furniture Company, Inc.
931 East 6th Avenue
Anchorage, Alaska 99501

Anchorage Furniture & Mfg. Company
Spenard and Wyoming Drive
Anchorage, Alaska 99503

Glass Sash and Door Supply
605 East 4th
Anchorage, Alaska 99501

Lewis and Metzger, Inc.
4204 Needle Drive
Anchorage, Alaska 99504

Mastercraft Kitchens & Fixtures, Inc.
Helmut Wetzel
2520 Tudor Road
Anchorage, Alaska 99502

Millwork Supply
5001 East Tudor Road
Anchorage, Alaska 99502

Poppert Milling and Cabinet
Box 193
Wasilla, Alaska 99687

Venzina Furniture Mfg. Company
3116 Mt. View Drive
Anchorage, Alaska 99504

APPENDIX C

Selected List of Wholesalers and
Secondary Manufacturers of Hardwood,
Seattle - Portland Area, 1966

Architectural Woods, Inc.
1501 Taylor Way
Tacoma, Washington 98421

Balcom Wood Carving Company
542 - 1st South
Seattle, Washington 98104

Barton Wood Products
P. O. Box 67
Lynwood, Washington 98036

Buffelin Woodworking
P. O. Box 1595
Lincoln Avenue & Taylor Way
Tacoma, Washington 98421

C P I Veneers
Central Building
Seattle, Washington 98104

Carr, J. H., Furniture Mfg. Company
130 - 1st West
Seattle, Washington 98119

Coast Wood Products Company
1120 N. W. Ballard Way
Seattle, Washington 98107

Dana Industries
121 Boren N.
Everett, Washington 98202

Educators Mfg. Company
P. O. Box 1216
3401 Lincoln
Tacoma, Washington 98421

Emerson Hardwood Company
2279 N. W. Front Avenue
Portland, Oregon 97209

Erlich - Harrison
60 South Spokane
Seattle, Washington 98134

General Hardwoods Company
800 Milwaukee Waterway
Tacoma, Washington 98421

Great Northern Products, Inc.
3516 S. W. Macadam
Portland, Oregon 97201

Hardwoods Incorporated
751 Northlake Way
Seattle, Washington 98103

Harroldson Industries
Parrmac Park
Kirkland, Washington 98033

International Paper Company
P. O. Box 1079
Longview, Washington 98632

John, B. P., Furniture Corporation
5200 S. W. Macadam
Portland, Oregon 97201

Junior Line Furniture
1017 East D
Tacoma, Washington 98421

Lock, Alfred, Incorporated
7315 N. E. 27th
Portland, Oregon 97211

Lyle, Donald W.
951 Canal
Tacoma, Washington 98421

Lynch Manufacturing Company
822 South 3rd
Kent, Washington 98031

Magna Design
5804 - 204th S. W.
Lynwood, Washington 98036

Magnuson Furniture Mfg. Company
1122 S. W. Spokane
Seattle, Washington 98134

Mathews Hardwoods
1158 N. W. Leary Way
Seattle, Washington 98107

Mauk Seattle Lumber Company
2940 Fairview East
Seattle, Washington 98102

McCoy Door and Hardwood Company
7400 S. W. Macadam
Portland, Oregon 97219

North Pacific Lumber Company
1505 S. E. Gideon
Portland, Oregon 97202

Northwest Chair Company
2201 S. Tacoma Way
Tacoma, Washington 98409

Pacific Coast Hardwoods, Inc.
4044 North Suttle Road
North Portland, Oregon 97043

Ross - Simmons Hardwood Company
Longview, Washington 98632

Seattle Box Company
401 South Spokane Street
Seattle, Washington 98134

Specialty Woodworking Company, Inc.
7400 S. W. Macadam
Portland, Oregon 97219

Tacoma Box and Lumber Company
923 East 26th Street
Tacoma, Washington 98421

Tacoma Plywood Inc.
801 East 25th Street
Tacoma, Washington 98421

Totem Wood Industries, Inc.
457 North 34th
Seattle, Washington 98103

Western Dry Kilns
2555 East 11th Street
Tacoma, Washington 98421

Western Wood Mfg. Company
6348 S. W. Macadam
Portland, Oregon 97201

APPENDIX D

Selected List of Wholesalers and
Secondary Manufacturers of Hardwood,
Los Angeles Area, 1966

California Furniture Shops
6241 Telegraph Road
Los Angeles 90022

Cal-Wood Manufacturing Company
1541 West 132nd Street
Gardena 90249

Carlson Furniture Industries
6262 Regent Street
Huntington Park 90256

Cherman Furniture Mfg. Company
5607 Santa Fe Avenue
Los Angeles 90058

Evans Products Company
P. O. Box 6908
7000 East Slauson
Los Angeles 90022

Gillespie Furniture Company
3011 East Pico Boulevard
Los Angeles 90023

Harbor Furniture Mfg. Company, Inc.
8670 Atlantic Avenue
South Gate 90281

Home Furniture Mfg. Company
2330 Santa Ana Boulevard
Los Angeles 90059

Inland Lumber Company
P. O. Box 325
1846 South Riverside Avenue
Rialto 92376

L. A. Period Furniture Mfg. Company
1755 East Santa Barbara Avenue
Los Angeles 90058

Mahogany Importing Company
19506 South Alameda Street
Compton 90221

Morris Furniture Mfg. Company
4433 South Alameda Street
Los Angeles 90058

Neiman-Reed Lumber Company, Inc.
13301 Burbank Boulevard
Van Nuy 91409

New England Shops
13152 Saticoy Street
North Hollywood 91605

Osgood, Robert S., Inc.
Lumber & Veneer
P. O. Box 75735 Station "S"
3315 West 5th Street
Los Angeles 90005

Penberthy Lumber Company
5800 South Boyle Avenue
Los Angeles 90058

Plywood & Door Western Corporation
1555 Santa Fe Avenue
P. O. Box 9191
Long Beach 90810

Salem House
8730 South Crocker Street
Los Angeles 90003

Sandberg Furniture Mfg. Company
5705 Alcoa Avenue
Los Angeles 90058

Southwest Plywood Corporation
19800 South Alameda Street
Compton 90221

Stanline, Inc.
P. O. Box 54132
Los Angeles 90054

Tarter, Webster & Johnson, Inc.
4200 Bandini Boulevard
Los Angeles 90023

SELECTED REFERENCES

Published Literature

1. Berg, Richard A., A Summary of Alaska's Transportation, 1964, Alaska Department of Economic Development and Planning, Juneau, Mimeo., 17 p., August 1964.

2. _____, Alaska Transportation Facilities, Alaska Department of Economic Development and Planning, Juneau, Mimeo., 17 p., May 1965.

3. Bones, James T., Wood Processing in Alaska - 1961, Northern Forest Expt. Sta., Res. Bul. NOR-1, 1963.

4. Brown, Nelson Courtland, Logging, John Wiley & Sons, Inc., New York, 1950.

5. Chiang, Tze I., Hardwood Dimension Stock A Manufacturing Opportunity in Georgia, Engineering Experiment Station, Georgia Institute of Technology, 1965.

6. _____, Wooden Pallets A Manufacturing Opportunity In Carroll County, Georgia, Engineering Experiment Station, Georgia Institute of Technology, 1963.

7. Cobb, Bennie C., A Simple Grading System for Hardwood Sawlogs, Journal of Forestry, November 1962, p.799.

8. Coolidge, L. D. and J. R. Pfeiffer, Cost Estimating for Wood Industries, Oregon Forest Products Laboratory, Information Circular No. 9, 1956.

9. Darwin, W. N. and A. K. Thurmond, Good Management Key to Successful Sawmilling, Southern Lumberman reprint, 1951.

10. Davis, E. M., Paper Birch Utilization In the Lake States, U. S. Forest Service, Forest Products Laboratory, Report No. R1953, Reaffirmed 1959

11. Davis, Kenneth P., American Forest Management, McGraw-Hill Book Company, Inc., New York, 1954.

12. Flann, I. B., Some Conversion Factors and Related Information, Department of Forestry, Canada, Tech. Note No. 26, 1962.

13. Forest Products Laboratory, Wood Handbook, U. S. Forest Service, Handbook 72, 1955.

14. Frazier, George D. et al, The Los Angeles Furniture Industry, 1 - Organization of the industry, 2 - Lumber and Plywood Consumption, 3 - Wood, Style and Innovation, Western Furniture Manufacturing, reprint, Oct., Nov., Dec. 1964.

15. Funsch, Robert W., A Summary of Seasonal Temperature and Precipitation Data for the Interior Forested Area of Alaska, Northern Forest Expt. Sta., U. S. Forest Service, Res. Note NOR-9, December 1964.

16. Gedney, Donald R., Newport, Carl A. and Dwight Hair, Pacific Northwest Economic Base Study for Power Markets: Forest Industries, Pacific Northwest Forest and Range Expt. Sta. for U. S. Department of the Interior, Bonneville Power Administration, Vol. 11, Part 6, 1966.

17. Gill, Thomas G., Wood Used in Manufacturing Industries, U. S. Forest Service, Stat. Bul. 353, February 1965.

18. Gray, James R., Economics of Sawmill Operation in New Mexico, Agri. Expt. Sta., New Mexico State University, Bul. 465, 1962.

19. Grobey, John H., An Economic Analysis of the Hardwood Industry of Western Washington, Washington State Department of Commerce and Economic Development, December 1964.

20. Haas, Raymond M., The Manufacture of Hardwood Dimension Stock in West Virginia - A Feasibility Study, College of Commerce, West Virginia University, Economic Development Series, No. 2, 1964.

21. Hagenstein, Perry R., The Location Decision for Wood-Using Industries In the Northern Appalachians, Northeast Forest Expt. Sta., U. S. Forest Service, Paper NE-16, 1964.

22. _____, Timber Industry Opportunities in Selected Areas of West Virginia, Northeastern Forest Expt. Sta., U. S. Forest Service, Res. Paper NE-28, 1964.

23. Haring, Robert C., and Michael R. C. Massie, A Survey of the Alaskan Forest Products Industry, Institute of Social, Economic and Government Research, University of Alaska, Res. Mono. No. 8, 1966.

24. Ho, Y. H., Small Lumber Companies in Western Oregon, University of Portland, Small Business Administration Report, 1963.

25. Holland, I. I., and G. G. Judge, The Spatial Structure of the Lumber Industry: Estimated Interregional Flows and Price Differentials, Agri. Expt. Sta., University of Illinois, 1962.

26. Hutnik, Russell J. and Frank E. Cunningham, Silvical Characteristics of Paper Birch (Betula papyrifera), Northeast Forest Expt. Sta., U. S. Forest Service, Sta. Paper 141, 1961.

27. Ivan Block & Assoc., Western Markets for Red Alder from Specified Counties in Oregon and Washington, for U. S. Area Redevelopment Administration, October 1964.

28. Koch, Peter, Using Low-Grade Hardwood A Proposed Integrated Plant Design, Department of Forest Products, Michigan State University, Extension Bul. 460, undated.

29. Little, Arthur D. Inc., Alaska's Forest Resources As A Base For Industrial Development, Report to the State of Alaska, 1961.

30. Los Angeles Home Furnishings Mart News, Southern California Home Furnishings Industry Business Outlook, winter, 1966.

31. Lutz, H. J., Ecological Effects of Forest Fires in the Interior of Alaska, U. S. Forest Service, Tech. Bul. 133, March 1956.

32. Metcalf, Melvin E., Hardwood Timber Resources of the Douglas Fir Subregion, Pacific Northwest Forest and Range Expt. Sta., U. S. Forest Service, Res. Bul. PNW-11, 1965.

33. Meyer, Arthur B., (edit.) et al, Alaska Forest Resources, Journal of Forestry, June 1960.

34. Morris, George W. Jr., Wood Household Furniture A Manufacturing Opportunity in Georgia, Georgia Institute of Technology, Engineering Expt. Sta., 1963.

35. National Hardwood Lumber Association, Rules for the Measurement and Inspection of Hardwood Lumber, Chicago, 1963.

36. Ostrander, M. D., and others, A Guide to Hardwood Log Grading (revised), Northeastern Forest Expt. Sta., U. S. Forest Service, 1965.

37. Peterson, J. R., Wood Household Furniture A Manufacturing Possibility for Elbert County, Georgia, Georgia Institute of Technology, Engineering Expt. Sta., 1965.

38. Pfeiffer, J. R. and A. C. Wallin, Red Alder Log and Lumber Grading, Oregon Forest Products Laboratory, Corvallis, Report G-3, 1954.

39. Rasmussen, Edmund F., Dry Kiln Operator's Manual, Forest Products Laboratory, Agri. Handbook No. 188, March 1961.

40. Row, Clark, Changing Role of Retail Dealers in Lumber Marketing, Southern Forest Expt. Sta., U. S. Forest Service, Res. Paper SO-7, 1964.

41. Simmons, Fred C., Logging Farm Wood Crops, U. S. Department of Agriculture, Bul. 2090, revised 1962.

42. Stoddard, Charles H., The Small Independent Firm's Role in the Forest Products Industry, Select Committee on Small Business, U. S. Senate Report 240, 1959.

43. Telford, C. J., Small Sawmill Operator's Manual, U. S. Forest Service, Forest Products Laboratory, Handbook 27, 1952

44. Tennessee Valley Authority, Hardwood Utilization Centers, Division of Forestry Development, Norris, 1964.

45. U. S. Bureau of Labor Statistics, Industry Wage Survey, Wood Household Furniture - Except Upholstered, Bul. 1496, Washington, May-June 1965.

46. U. S. Department of the Army, Military Handbook Lumber and Allied Products, Defense Supply Agency, No. 7A, Washington, 1962.

47. U. S. Department of Commerce, A Forest Industry Processing and Marketing Complex for Eastern Kentucky, A.R.A. Report prepared by Macdonald Associates Incorporated, 1963.

48. U. S. Forest Service, Characteristics of Alaska Woods, Forest Products Laboratory, Res. Paper FPLI, January 1963.

49. _____, Hardwood Log Grades for Standard Lumber, Forest Products Laboratory, Madison, Report No. 1737, 1959.

50. _____, Air Drying of Lumber, Forest Products Laboratory, No. 1657, Madison, reaffirmed 1961.

51. _____, Hardwood Log Grades for Standard Lumber (Pocket Edition), Forest Products Laboratory, Report No. 1737-A, Madison, 1961.

52. _____, Forest Industry Opportunities In Rural Development, Bul. 222, 1960.

53. _____, Timber Trends in the United States, Resource Report 17, Washington, 1965.

54. U. S. Geological Survey, Mineral and Water Resources of Alaska, Report to the Committee on Interior and Insular Affairs, United States Senate, April 1964.

55. Warner, John R. and D. R. Cowan, Wood Pallets In The Minneapolis-St. Paul Area: An Outlet for Low-grade Hardwoods, Lake States Forest Expt. Sta., U. S. Forest Service, Sta. Paper No. 43, 1956.

56. Watson, C. E., Climates of the States: Alaska, Weather Bureau, U. S. Department of Commerce, No. 60-49, September 1959.

57. Wickman, Kenneth Paul, Economic Aspects of the New England Furniture Industry, Gederal Reserve Bank of Boston, Res. Report 24, 1963.

58. Wonnacott, Ronald J., Manufacturing Costs and The Comparative Advantage of United States Regions, Upper Midwest Economic Study No. 9, University of Minnesota, 1963.

59. Wood and Wood Products, Classified Buying Guide, October 1964.

60. Worthington, Norman P. et al, Red Alder its Management and Utilization, U. S. Forest Service, Publ. No. 881, 1962.

Unpublished Materials

61. Alaska Department of Natural Resources, Timber Sales Regulations, Alaska Administrative Code, Division of Lands Mimeo., undated.

62. Alaska Development Board, White Birch in Alaska, Juneau, Mimeo Memorandum, 5 p., October 1, 1952.

63. Alaska Division of Lands, Economic Aspects of Establishment and Operation of Hardwood Industry in Western Alaska, Anchorage Mimeo., 6 p., undated.

64. _____, Estimate of Allowable Annual Cut Susitna Valley, Anchorage, Mimeo., 2 p., undated.

65. Bureau of Land Management, Talkeetna Birch Inventory, 1954-55, Anchorage, Mimeo., 20 p., undated.

66. _____, Talkeetna Birch Stand, 1954-55, Anchorage, Mimeo., 4 p., undated.

67. Crank, Alton G., The Talkeetna Birch Problem, Bureau of Land Management, Anchorage, Mimeo., 23 p., May 1958.

68. Cubbage, Sidney (Engineers) Ltd., Prefabricated Drying Kilns - Series 2, High Wycombe, England, 1966.

69. Falkner, Edgar H., A Summary of Information Concerning Alaska's Timber Potential, Alaska Division of Lands, Anchorage, Mimeo., 21 p., May 1964.

70. Fleischer, H. O., Use of Small Logs for Veneer, Forest Products Laboratory, U. S. Forest Service, Mimeo., 6 p., 1951.

71. Frazier, George D., The Market for Western Hardwoods in the Southern California Furniture Industry, Pacific Southwestern Forest and Range Expt. Sta., Berkeley, Mimeo., 18 p., undated.

72. Hallock, Hiram, Report and Recommendations on the Alaska Hardwoods Company of Wasilla, Alaska, U. S. Forest Service, Forest Products Laboratory, Madison, Mimeo., p.14, February 1962.

73. International Harvester Corporation, Handbook of Log Rules.

74. Lahden Rautateollisuus, "Rau-te" - Veneer and Plywood Mill Machines, Equipment Technical Series, Lahti, Finland.

75. Massie, Michael R. C., Marketing Timber Products in Selected Areas of the North Central Region, Ph.D. thesis, Michigan State Univ., 1965.

76. Moore Dry Kiln Company of Oregon, Moore Mini-Kiln, Bul. 6512, 1 p., undated.

77. Swanson, Carl W., Amount and Grades of Lumber from Alaska Paper Birch and Balsam Poplar Logs, U. S. Forest Service, Regional Office, Juneau, prelim. report, April 1966.

78. U. S. Forest Service, Dry Lumber Grade Yields and Overruns for Red Lake Paper Birch (Minnesota), Central States Forest Expt. Sta., Mimeo., undated.