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ECONOMIC ANALYSIS OF THE MONTANA
FOREST PRODUCTS INDUSTRY

by

William K. Gibson

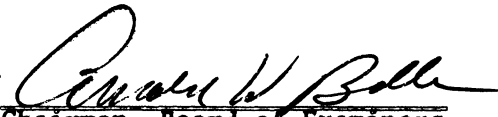
B.S.F., Montana State University, 1952

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requirements for the degree of
Master of Forestry

Montana State University

1962

Approved by:


Chairman, Board of Examiners


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To attempt to list all people who provided help in writing this study would be impossible. Industry was especially cooperative in the narrative phase of the investigation. Government and state agencies were very helpful in their phase of the raw material investigation.

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My thanks go to Dr. Richard E. Shannon of the Economics Department for his ability as a teacher. He brought the field of economics to life. Teachers such as he maintain one's faith in higher education.

Last, my thanks to my wife, Dinny. She was the bread winner during my graduate studies. When things looked bad, she kept me going. Thanks, also, to Professor Gerlach for providing tranquillity by loaning his office.

"Old doctrines never die; they only fade away, with a strange power of recuperation in an appropriate environment. The dominant opinion of any age, even if it has a flavour peculiarly its own, is, on analysis, a fricassee of the thoughts of all the ages, and the latest exponent of orthodox and accepted doctrine may to a later generation appear to have added at most one further ingredient or one choice condiment before passing it on."

ALEXANDER GRAY

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CHAPTER I

INTRODUCTION

Montana forest industry has played an important role in the state's development. Since the establishment of the first sawmill in 1840 in the Bitterroot Valley(12), the industry has managed to keep abreast of the state's economic progress. As the mining industry expanded, so did the demand for the production of wood products. Later, in 1883, the transcontinental railway was completed, providing Montana industry with a link to eastern markets.

Lumber has become the most important product of this industry. In 1864, mills were producing about 13 million board feet annually(12). This is a far cry from the 920 million produced in 1958(1). In the process of attaining this current level of production, the lumber industry progressed through three basic stages of economic evolution. Later in this study we will develop a fourth stage.

The first stage was the development of the small mills. These mills sprang up wherever a local need or demand for wood was evident. These producers were simple business firms that produced a relatively low-quality product. The major contribution made by these small mills was to complement in the economic development of the immediate vicinity. They were as much a part of the pioneer activity in this industry as the cowboy was to Montana ranching.

During the latter part of the 1800's, large mills appeared on the scene. These mills were scattered throughout western Montana and produced 75 to 85 percent of the entire state's production, which was sold

principally in intrastate regions(12). Each of these mills produced over 10 million board feet annually. The group of large mills dominated production until after the mid-thirties, when they began to face the problem of an ever-receding supply of available timber. Transportation facilities had not developed to the point where long hauls--those in excess of 50 miles--could be made to the mill.

During, and immediately following, World War II the production pattern of the mills changed materially. Smaller, more flexible mills were established closer to the supply of raw material. Between 1948 and 1956 the medium-sized mills dominated the state. After 1956 the number of small mills declined and the large mills began to regain their production status again. The basic reasons for these changes were the increased efficiency in milling on a large scale and new hauling and logging techniques that were instituted at this time.

While lumber is still the principal product of mills, other wood products plants are beginning to utilize Montana's timber resources. In 1951 the first pulp plant was established in Montana at Missoula. Since that time, three plywood mills have been established at Missoula, Polson and Whitefish, and entry of new processing plants has become more likely.

The so-called minor forest products--posts, poles and Christmas trees--have also taken part in the development of the over-all industry. For the past few years pulpwood has been shipped out of the state to midwestern markets. Montana has been noted for its position in the Christmas tree industry. In fact, Eureka has been called the "Christmas tree capital of the world". The pole market has fluctuated up and down

during the past 15 years. When lodgepole pine met pole requirements, there was an increase in pole plants. Currently, there are two major pole plants and three small ones in the state. Most of these sell posts as a side line.

The forest industry in the aggregate is a conglomeration of many types of wood-using techniques. Each has its own peculiarities and problems. Each makes a contribution to the over-all economy of the state. In the main, research concerning this industry and its operation is meager.

PURPOSE AND SCOPE OF INVESTIGATION

For nearly 80 years the forest products industry has been growing in Montana. Now, after three basic stages in the development, a fourth and perhaps more drastic change is taking place. This change is essentially a transition from one principal export product, lumber, to a more diversified product line. The product diversification has been pronounced. Small items such as laminated beams, window and door frames, toy stock, panel board, and prefabricated houses have been introduced. Other items such as pulp and paper and plywood extended product lines of some producers.

Because of cyclic conditions of demand for wood products, there has been a high mortality rate in the manufacturing firms, especially among the small firms. Postwar risks and uncertainties point out several public policy questions. What is this industry and how does it contribute to Montana's over-all economy? How does it function? What is industry's demand source? These are only several of the many

questions that need answers in order to find out more about one of Montana's largest manufacturing industries.

For the purpose of this study, the forest products industry will be considered to include all those operations which physically convert the wood resource into useable products.

The purpose of this thesis is to present the over-all examination of the forest products industry. It is realized that only a limited detailed analysis can be made, and it is hoped that more detailed studies of the industry may occur. Each major chapter is a study in itself. The treatment here is far from exhaustive. This thesis, then, is an economic analysis of the Montana forest products industry as it functions in the Montana economy.

METHOD OF ANALYSIS

The greater part of the necessary information is not available in library form. It was possible, however, to obtain a tremendous amount of raw data through personal interviews. In the process of gathering this data it was found that this personal contact system worked very effectively. Owners or operators of all the major mills were interviewed, as well as a majority of the medium-sized and small mills. Policy makers of the federal, state and county governments connected with resource management were questioned. Equipment dealers, bankers and brokers were visited. Any individual who might have knowledge of the industry was eventually contacted. The information gained through these interviews was placed on narrative reports filed in the Schools of Forestry and Business Administration at Montana State University.

While this information did not produce statistical data of major importance, it provided a wealth of other data never before assembled. The aims and goals of the industry, the attitudes and philosophies of resource managers, the problems of both industry and government in resource management, the economic aspects of market operation, the supply and demand situation for the raw material, and much other extremely interesting and necessary data were secured. All data not specifically cited in this paper have been obtained from these narrative reports.

As the result of a routine literature search, one fact was discovered. Very little work has been done in the analysis of the forest products industry in the past. There have been several studies concerning specific areas, but no analysis of the aggregate industry. Laber's(8) Economic Analysis of Ranch Forests as Operating Units examined the situation in Sanders county. Bolle(3) discussed the Flathead situation in his Multiple Use Management. The Forest Service(20) published a report in 1959 estimating the industrial potential from a supply standpoint. These sources provided a guide for this study, in that they provided many insights into the workings of the industry that could be further explored through additional interviews.

Statistical data of the industry were very sketchy. Montana has no central statistical information center. Data covering the forest products industry on a state basis are almost non-existent. National figures were adapted and used for state indicators. When Montana information was found, there appeared to be discrepancies between reports. While additional statistical information would certainly have been

desirable, a sufficient amount was available to provide trends in activities. This data would not be sufficient for a more detailed type of investigation.

CHAPTER. II

GENERAL SITUATION OF THE FOREST PRODUCTS INDUSTRY IN MONTANA

The forest industry on a national basis plays an important role in providing the wood products and wood-product derivatives for the nation.

The National Lumber Manufacturers Association states that:

". . . The forest products industries account for ten percent of all manufacturing employment in the United States; that the lumber industry, alone, is a \$4 billion industry in terms of the annual value of products shipped; and that more than one-fourth of the world's lumber is produced in this country."(13, Foreword)

This stresses the part that lumber plays in the national economy, but it also indicates the direct influence exerted by the entire forest products industry on a national basis.

When some imagination is used, one can soon picture the many indirect uses with which wood is now associated. These uses include paper, fiberboard and chemical derivatives of many types such as plastics. While these are basic raw materials for other industries, they do show some of the indirect impact of the wood resource in the national economy.

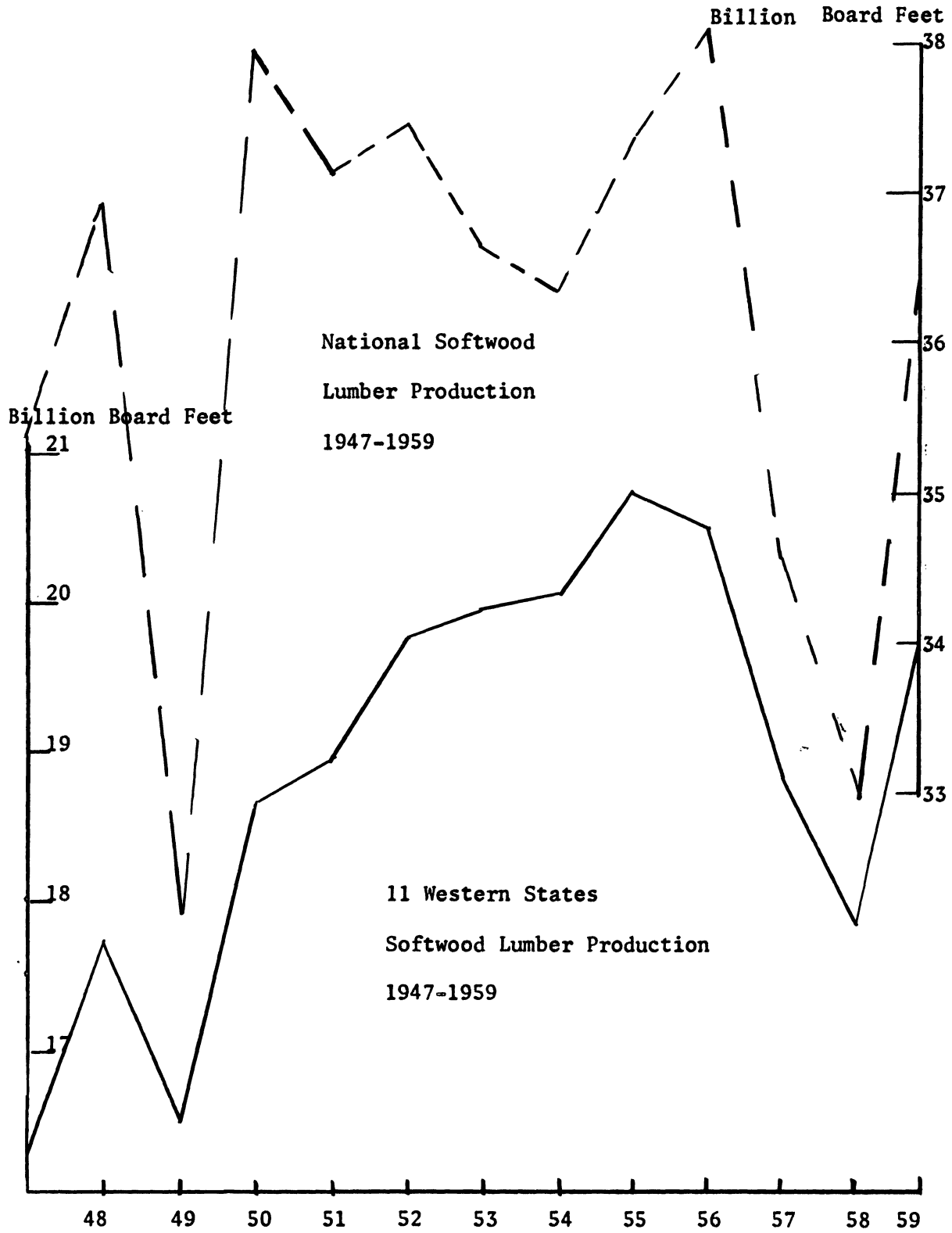
As one last example, the National Lumber Manufacturers Association estimates that the various forms of lumber are the second largest revenue-producing commodity class of freight carried by the nation's railroads. Their business provides a revenue income to the railroads of approximately \$1.3 billion in gross freight revenue, or a total of 15 percent of the entire freight revenue(13).

Where, then, is the position of the Montana wood resource in relation to the national economy? This is difficult to determine. Guthrie and Armstrong(6) class Montana with a grouping of the eleven western states (including coastal Alaska) as an economic unit described as the "Pacific Slope". This places Montana's resource in its proper perspective with a more homogeneous economic community, making possible a more complete treatment of Montana's industry.

Because there is only one pulp and paper mill in the state at this time, no comparison can be made with this type of wood use. Guthrie and Armstrong(6) feel, however, that any major expansion of the pulp and paper industry will be toward the Rocky Mountain states. Within this group of states, Montana holds a prime position. Apparently the demand for wood in Pacific coastal states has become exceedingly keen. This fact is borne out by the increasing number of coastal lumber companies that have migrated to Montana during the last several years. These companies have indicated that the major reason for leaving the coast was a lack of moderately priced stumpage.

The analysis of lumber production for the past twelve years will reveal the relative position of the Pacific Slope unit to the national production; then, in turn, Montana's production in relation to that of the Pacific Slope. In this manner, it will be possible to trace the national production trends through to Montana with some degree of accuracy.

Figure 1 shows the Pacific Slope in relation to the national production. Figure 2 indicates the Pacific Slope production in relation



Source: Guthrie and Armstrong, Western Forest Industry.

Figure 1

to the Montana production, and Figure 3 shows the composition of the Montana production by species produced.

NATIONAL AND REGIONAL PRODUCTION

In analyzing Figure 1, it is apparent that 1949 and 1958 were years of serious slump in the national production of lumber. These low points can be tied to recessions of the entire national economy, particularly by commercial residential construction industries. Generally, when there is a decline in economic activity, lumber sales in new construction contracts and output fell rather rapidly. The dependence of construction activity explains the largest part of cyclic changes in lumber production. Some firm production schedules may not follow this cyclic pattern, for reasons which will be treated later.

In Figure 1, the general trend of the Pacific Slope follows the national pattern; when there are recessions in the national production, there is a reduction in the Pacific unit. However, this was not the case between 1950 and 1956. During this period, production in the Pacific Slope area was gradually increasing while the national production was fluctuating or at least not stable. Why was this so?

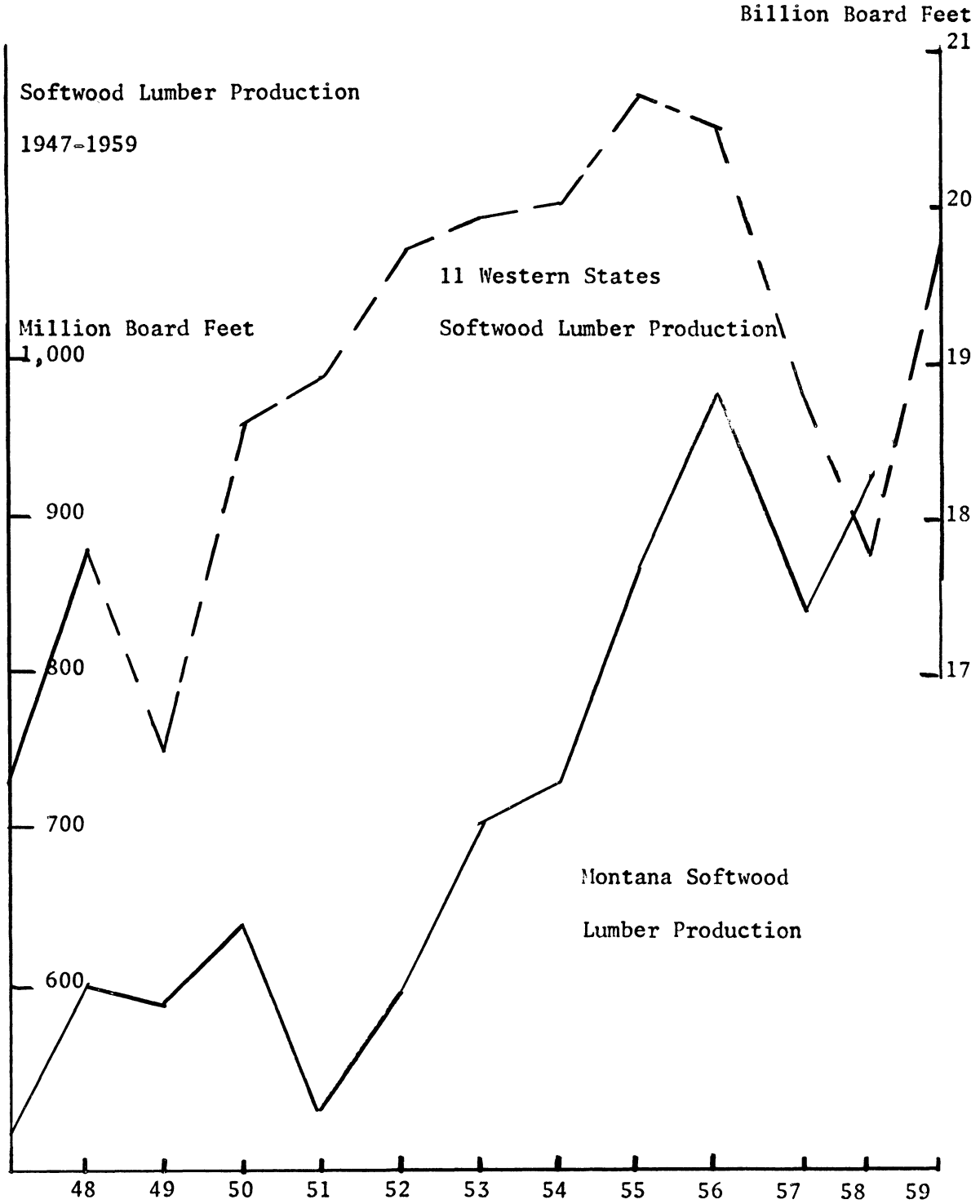
Guthrie and Armstrong(6) feel that this was due to a shift in resource allocation in the southern region. The lumber industry in the South was involved in some very stiff competition for stumpage with the pulp companies. As a result, stumpage prices rose and the lumber industry was priced out of the market. This opened the door for the west coast industry to increase its markets in the east and, as a consequence, increase its production to supply for the newly acquired markets. So

while the national production dropped, the Pacific coast production increased.

It will be noted that the Montana production peak was reached a year after the Pacific Slope peak. Two factors may play a role in the cause of this lag. First, Montana production was accelerating at a faster rate than the aggregate western unit because of the increased pressure to harvest spruce stands. This forced the industry to look for additional demand for its lumber. While these mills were processing as much spruce as possible toward the end of the period, normal timber sale activity was resumed. This added more timber to the market in Montana, and the mills absorbed this additional volume to try to get their production back to a normal composition.

The second factor hinges, indirectly, on the first. With the increase in logging activity, the Montana industry was forced to find new markets for its spruce, as it had saturated its regular markets. One of the major areas of encroachment of surplus spruce was in the white pine market. White pine lumber is expensive. Spruce lumber has essentially the same working characteristics as that of white pine, and the price for spruce was substantially lower. As a substitute for white pine, spruce virtually destroyed the white pine market.

When the western slope markets dropped as the result of a national decline, Montana was able to keep its newly acquired markets for an extra year. This was only a time lag in total market adjustment between an individual portion of the producers and the production in the aggregate.



Source: Guthrie and Armstrong, Western Forest Industry and American Forest Products Industry, Forest Facts, 1960-61 edition.

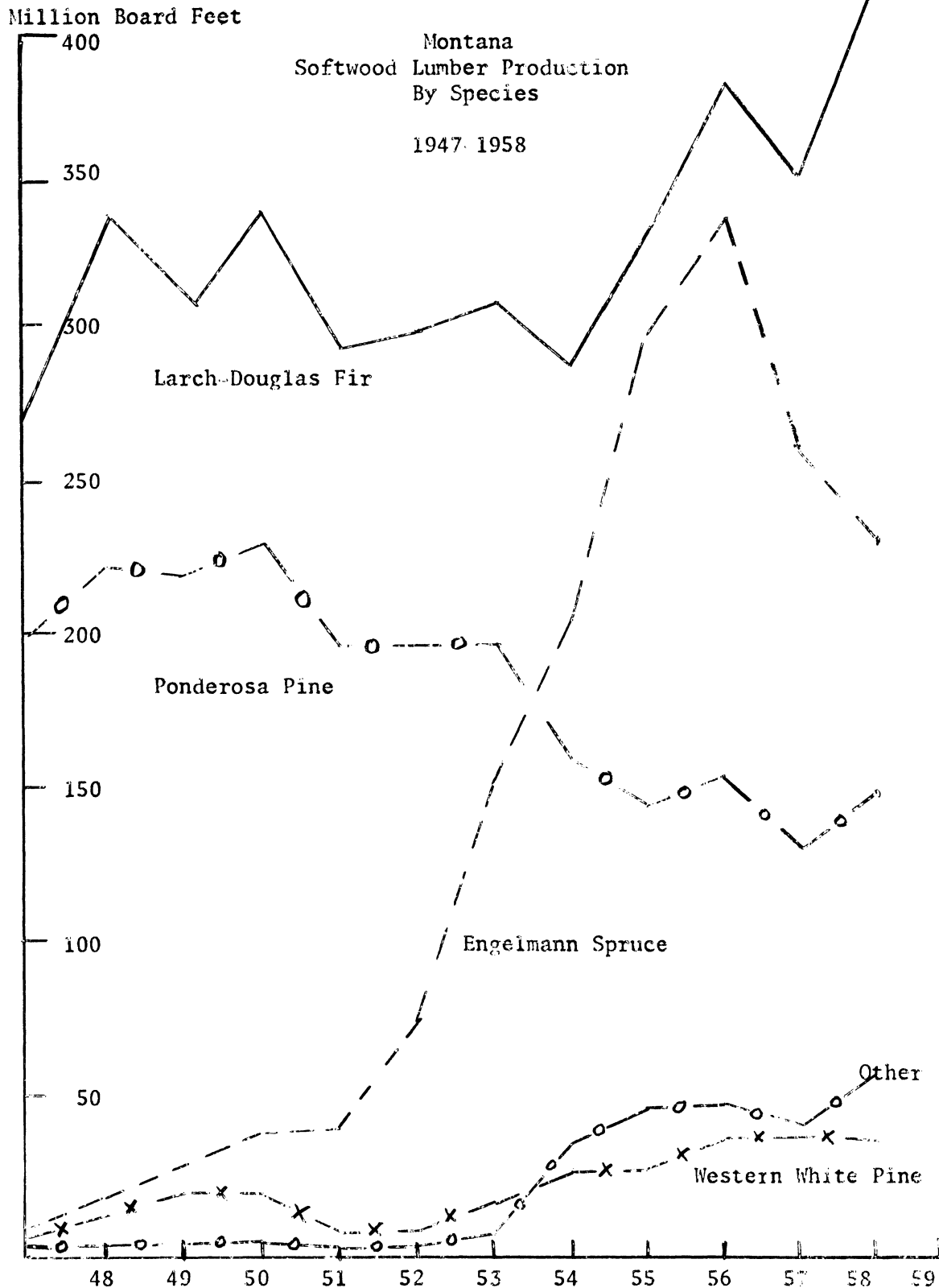
Figure 2

It will also be noted in Figure 2 that the Montana production started to increase in 1958, while the increase in the Pacific Slope commenced a year later, in 1959. This may be due to a regional island of economic activity to which the Montana markets responded earlier than the aggregate market of the Pacific Slope. In any event, the Montana lumber market can be tied rather closely to the national situation in the long run.

In Figure 3 the mechanics of the spruce bark beetle infestation can be clearly seen. In spite of minor fluctuations, the general production trends of the individual species were rising until 1950. After that date the control program for spruce bark beetle was instigated, and there was a major drop in all species except spruce. The decline in available stumpage was most noticeable in Ponderosa pine. There are two basic reasons for this.

First, Ponderosa pine is generally not associated with spruce in its growth requirements. It is a distinct and separate type. The sales activity was greatly reduced in the pine types, so available pine stumpage dropped off sharply. The principal sources were private ownerships.

Second, pine is not normally found in areas or in association with the spruce types, while the other species are. When large areas of spruce were cut, this would normally include a considerable amount of associated species, such as larch, fir, white pine and cedar. This provides some volume of other species along with the spruce and is indicated by a gradual decline of volume produced.



Source: American Forest Products Industry, Montana Forest Facts, 1960-61 edition.

Figure 3

By 1954, the other species started to rise. This was due, partly, to the pressure of industry for timber sales in areas that could be logged during the winter. With the emphasis on spruce logging, very little winter activity was possible. Previous contracts were being completed in the winter areas, so industry was concerned about future disposition of its supplies.

Another factor that contributed to the increase in volume of other species produced was the control of the beetle epidemic by 1954. Because of this, the landowners started to make adjustments to return to the established timber sale policies.

THE MONTANA ECONOMY

The Montana production has been, and will continue to be, sensitive to fluctuations in the national economy. However, this apparent correlation is not reversible on any large scale. The Montana forest products industry as a supplier of products has a minor influence on the national situation. This effect is more noticeable on the Pacific Slope unit, but still must be viewed with understanding and caution.

What, then, is the importance of the analysis of the Montana situation? The answer, of course, is obvious. What happens to the forest products industry in Montana has a very great impact upon the Montana economy. A few facts and figures will help explain this, and show how the forest products industry contributes to the over-all Montana economic situation.

First, it should be borne in mind that the resource itself contributes \$47.5 million, in value added to manufacture annually to the

Montana economy. The values considered here are in addition to the expenditures made for resource management and protection.

There have been many statements in the news media the last few years indicating the positions of the various Montana industries in relation to order by importance of their contribution to Montana's economy. The majority of the statements will not stand close scrutiny. The facts and figures are ambiguous and difficult to pin down. One statement often heard is that the tourist industry and the forest products industry are racing for second place in contributions to the economy.

Whether this is true or not, the forest products industry does make a substantial contribution to this economy. Minor fluctuations or readjustments in the industry have rather wide consequences.

In attempting to place the industry in some relative comparative position in the economy, there are many factors that tend to cloud the issue. The amount, type and degree of accuracy of the raw data is subject to question. Facts and figures on the size and scope of an industry, especially the forest products industry, are exceedingly difficult to find. Analytical data are found only in the Bureau of Census documents and other widely scattered state government publications. While intuitively it is known that the industry makes a substantial contribution to the Montana economy, it is difficult to determine how much.

We know that when analyzing any industry, the indirect contributions may be as great as the direct. These are always difficult to establish. For example, what goods and services are required by the

forest products industry? What is the dependence upon this industry by the goods and services facets of Montana business?

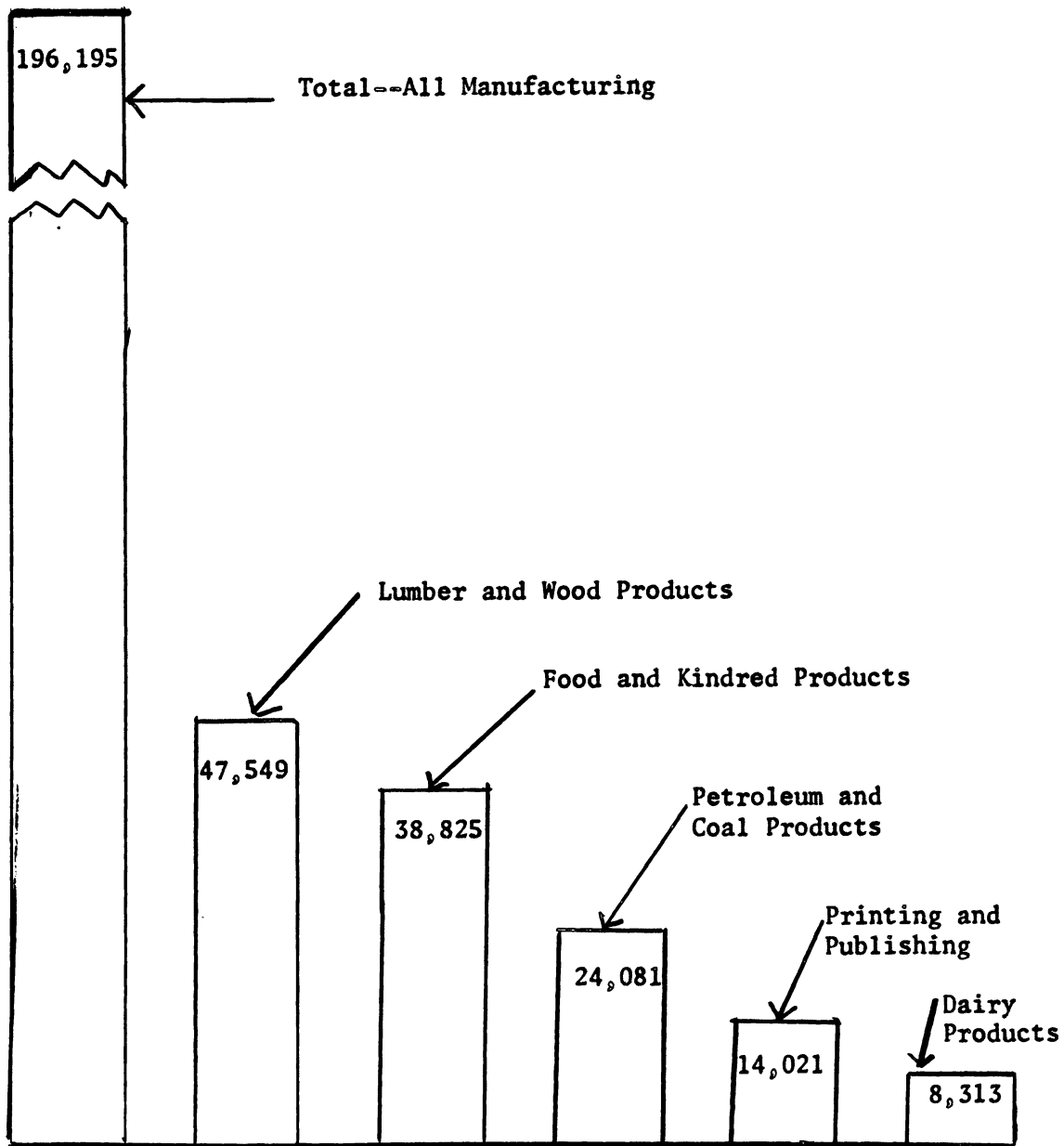
One of the most reliable estimates of the relation of the forest products industry to the over-all Montana economy is the Bureau of Census data(19, 20). Figure 4 will illustrate this. The total value added to manufacture in the state in 1958 was \$196,195,000. The forest products industry contributed some \$47,549,000. The industry leads the entire manufacturing enterprise in Montana by some \$8,724,000. Other selected Montana manufacturers are shown for comparison.

In addition to leading in value added to manufacture, the forest products industry leads in the number of people employed. Table I shows the comparison of number of employees by the leading manufacturing types in the state. The forest products industry employs 6,669 people with a payroll of \$29,213,000 annually, as compared to the next major producer, the food and kindred products industry, which employed 3,996 people with a payroll of \$16,929,000.

The forest products industry has maintained a steady increase in size since its origin in about 1864. There are numerous reasons for this constant increase. Several of the more apparent are the expansion of mining activities in the stages of industrial development; the link of the transcontinental railway system and utilization of the eastern markets.

In analyzing this growth trend in the forest products industry, Figures 5 and 6 will show the employment trends for selected Montana

MONTANA MANUFACTURING
(Value Added By Manufacture)
1958



Source: Table I

Figure 4

TABLE I
MONTANA^①

MANUFACTURING AND EMPLOYMENT - 1958

Industry	Number of Firms		All Employees		Production Workers		Value added by Mfg. (\$1,000)	Capital Expenditures New (\$1,000)	
	Total	20 or more	Number	Payroll (\$1,000)	Number	Man-hours (\$1,000)			
All Industry	925	174	20,197	94,090	15,762	30,190	70,428	196,195	21,693
Lumber & Wood Products	393	62	6,669	29,213	5,868	10,999	24,363	47,549	6,756
Food & Kindred Products	212	51	3,996	16,925	2,794	5,779	11,205	38,825	2,094
Petroleum & Coal Products	11	8	1,065	7,031	814	1,622	5,173	24,081	6,528
Printing & Publishing	113	22	1,889	8,741	1,152	1,988	5,666	14,021	1,362
Dairy Products	71	14	871	3,444	495	996	1,792	8,313	461

① USD Comm., Bureau of Census - Census of Manufacturers, Montana, 1958

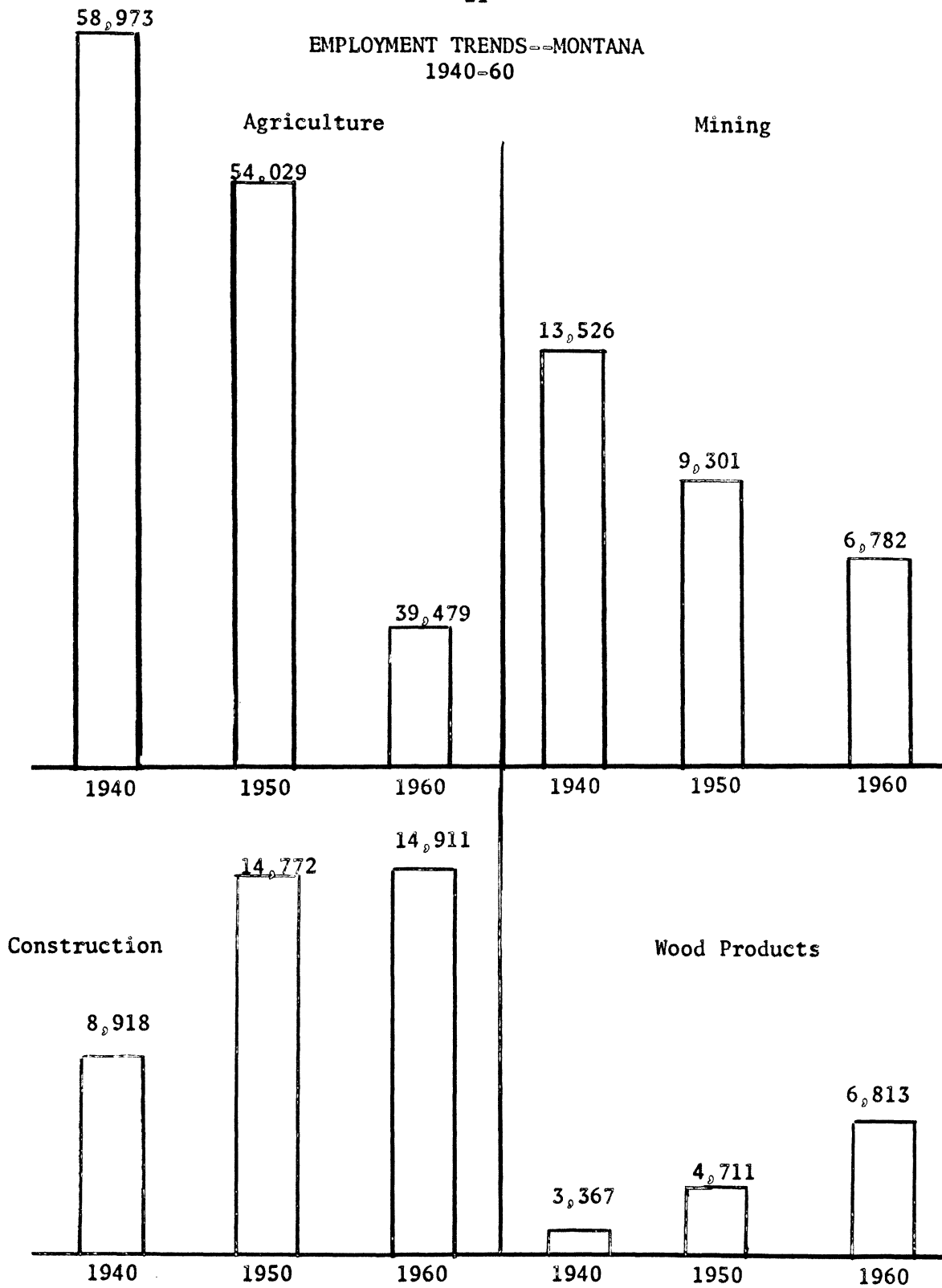
industries for the period of 1940 to 1960.¹ First, it will be noted that agriculture and mining have taken a decided drop in total employed, while construction, wood products, and public administration have increased steadily. Railroads have fluctuated. While there is no statistical, or experimental, proof, it appears that the forest products industry has absorbed some of the labor force released by the declining industries. It is obvious from the Figures that this has been on a limited scale only.

It is apparent that it is difficult to place the forest products industry in any numerical position in the Montana economy. These statistics have been provided to show not a position, but some relative idea of the importance of the industry, and still keep the discussion on a reasonably sound basis. It should be noted that in addition to the contributions made by the industry proper, there are many indirect benefits that are also contributed to the economy that cannot be accurately measured at this time. Further, it should be borne in mind that the resource itself makes a substantial contribution to the economy in the process of management and protection. When this is totaled up, it can be said that the forest products industry makes a very substantial contribution to the aggregate Montana economy.

In further chapters of this thesis, a more detailed analysis of the forest products industry will be made. The major purpose of this discussion is to provide some understanding of the industry in Montana,

¹The number employed in Table I and Figure 4 differ slightly with Figures 5 and 6 because of classification procedures. Table I and Figure 4 are based upon firms of 20 or more employees, while Figures 5 and 6 are total employed in the indicated fields.

EMPLOYMENT TRENDS--MONTANA
1940-60



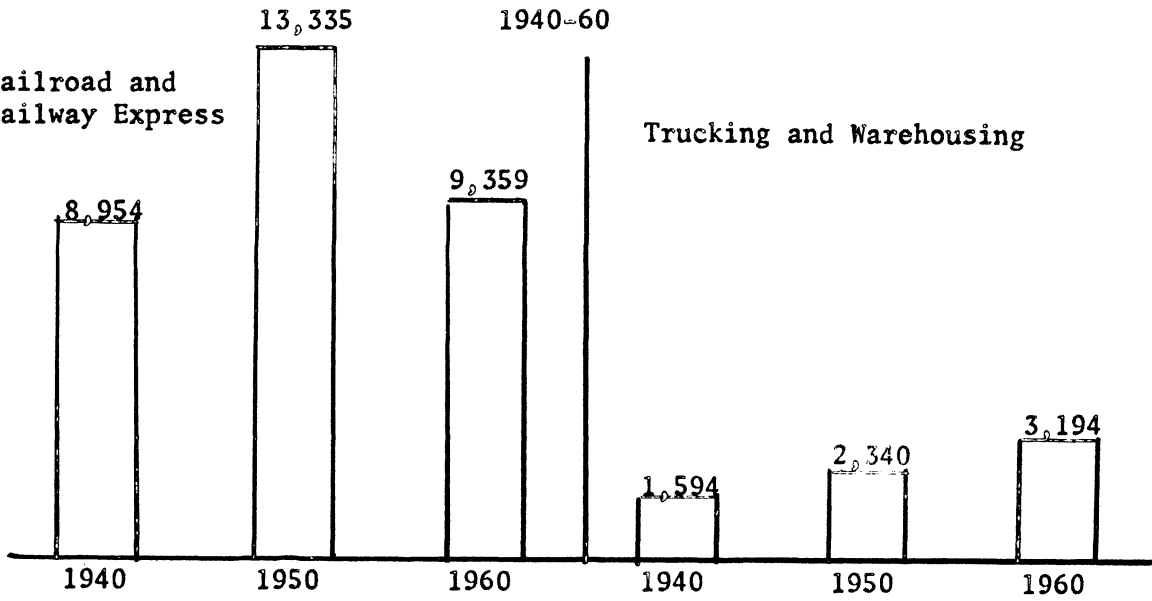
Source: U. S. Bureau of Census, Population, Montana, 1960.

Figure 5

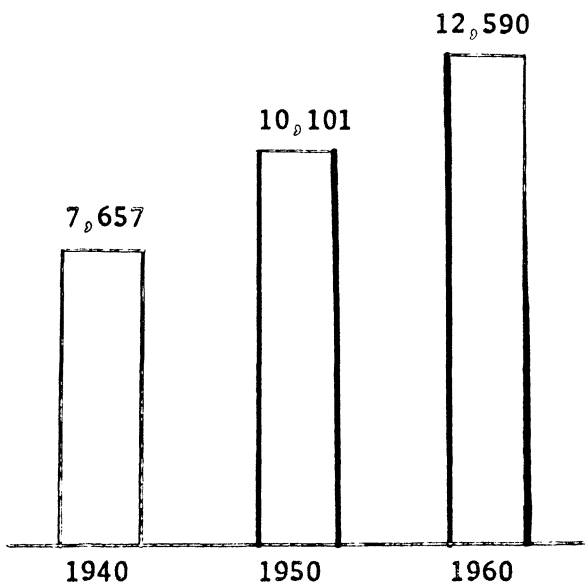
EMPLOYMENT TRENDS--MONTANA
1940-60

Railroad and
Railway Express

Trucking and Warehousing



Public Administration



Source: U. S. Bureau of Census,
Population, Montana, 1960.

Figure 6

in relation to the national situation. This will provide the necessary continuity for further analysis of the industry.

CHAPTER III

MONTANA'S FOREST RESOURCES

Montana, because of geographic location, has been blessed with an abundance of natural resources. These resources range from water to the rugged beauty of the numerous mountain ranges. Because of these resources, it is only natural that the economy has centered around the use, both directly and indirectly, of these resources.

One of the numerous resources available to the people of the state is forest land. The forest land consists of about 24 percent of the total land area in Montana (See Figure 7). From a use standpoint, there are many products derived from forest land; recreation, watershed, grazing and, of course, wood.

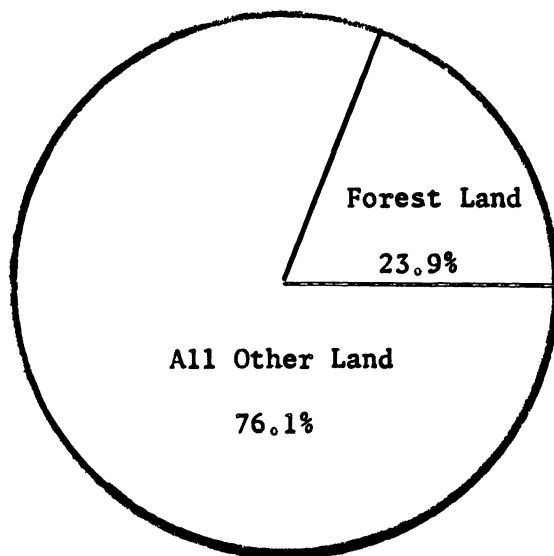
Although wood production is only one of many uses, it has an extremely important place in Montana's economy. In order to get a better orientation in respect to the amount and composition of the wood resource, it will be well to delve into a more detailed analysis of the wood resource.

OWNERSHIP

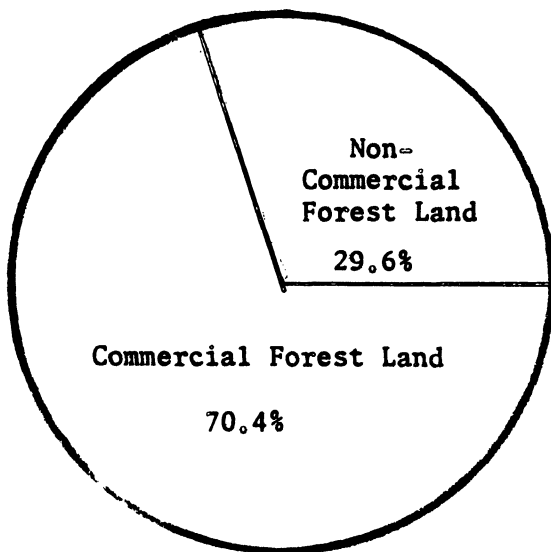
As stated, the forest land comprises about 24 percent of the total land in the state. Of this acreage (22,330,000 acres), 70.4 percent is classified as commercial forest land (Figure 7).¹ It is from this

¹The Timber Resources for America's Future(18) defines commercial forest land as "forest land which is (a) producing or physically capable of producing, usable crops of wood, usually sawtimber, (b) economically available now or prospectively, and (c) not withdrawn from timber utilization.

MONTANA FOREST LAND



ALL LAND



FOREST LAND

Source: Table II

Figure 7

70.4 percent (or 15,727,000 acres) that the production of wood products are derived. In terms of the relationship of land acreage of commercial forest land to total land acreage in Montana, this amounts to only 16.8 percent of the total state land acreage.

Because of the topography and climate, the bulk of the commercial forest land is located west of the Continental Divide in what is generally considered western Montana. As the standards of utilization change, land east of the Continental Divide will play an ever increasing role in the production of commercial wood, and the amount of commercial forest land in that particular area will increase.

Because of the dependence of the forest products industry on the supply of commercial wood, ownership plays an important role in the analysis of the wood resource.

Montana entered the Union in 1889, forty-nine years after the first sawmill was established in 1840. During this period of settlement the forests provided the local people timber needed to construct homes, barns and fences, and provided the necessary fuel wood supply. Since most of the land was Public Domain, no fee was charged for the wood utilized. Timber was cut in the valley bottoms because it was close to the demand and easy to handle with primitive equipment.

By 1883 the Northern Pacific Railroad was completed and Montana was linked to eastern markets. At this time the Montana Improvement Association was formed to purchase land along the railroad right of way. The Association's outward objectives were to clear land for farming on areas close to the railroad. In the process of clearing land, the Association logged vast areas of timber which it sold to local mills.

In 1897 the Bitterroot National Forest was created as a forerunner of eleven national forests throughout the state. Some semblance of order and regulation was slowly being placed on the public land. It was not until some time later that interest was shown by industry in national forest timber.

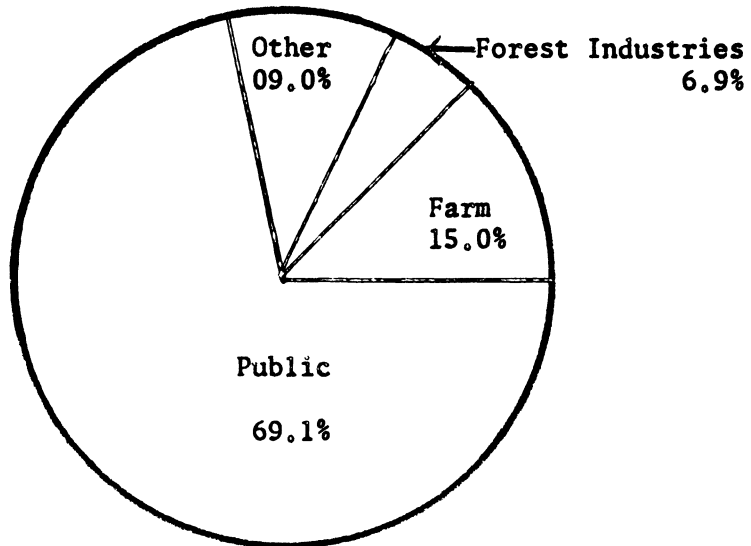
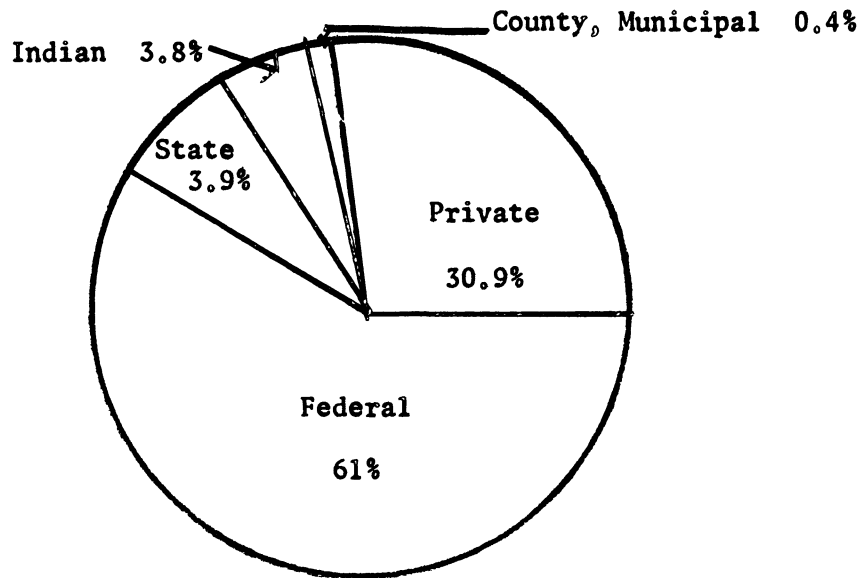
About the time when the accessible private timber had been cut heavily, technological advances in logging techniques had been developed to the degree where logging could be done on the steeper national forest areas. Development of roads in the national forests for fire protection aided in opening up large areas of public timber.

With the development of the national forests and the advanced logging and transportation techniques, public timber has become an important source of supply for the forest products industry. Public lands constitute the largest portion of commercial forest land in the state. About 69 percent (see Figure 8) of the total commercial forest land is under the jurisdiction of federal, state and local governments with the balance of 31 percent in private ownership.

Of this 69 percent, 61 percent is owned by the federal government and the bulk of this is administered by the United States Forest Service under the national forest program. Only small amounts are administered by other federal government agencies such as the Bureau of Indian Affairs (3.9 percent). The state government administers, through the Office of State Forester, only 3.9 percent of the total government commercial forest land, and the county and municipal governments own only a negligible amount. Table II gives a complete breakdown of land ownership by owners of public commercial forest lands. It is obvious

MONTANA
COMMERCIAL FOREST LAND

By Type of Owner



Source: Table II

Figure 8

TABLE II

MONTANA FOREST ACREAGE¹

Total Land in state	93,362,000 A
Total Forest Land	22,330,000 A
% Forest Land	23.9 %
Total Commercial Forest Land	15,727,000 A
% Comm. Forest Land (Total)	16.8 %

COMMERCIAL FOREST LAND

	<u>Private</u>		<u>Government</u>		
<u>Ownership</u>	<u>Acres</u>	<u>% Total</u>	<u>Ownership</u>	<u>Acres</u>	<u>% Total</u>
Farm	2,360,000	15.0	Federal	9,585,000	61.0
For. Ind.	1,086,000	6.9	Indian	602,000	3.8
Other	1,411,000	9.0	State	608,000	3.9
			County	75,000	0.4
<u>Totals</u>	<u>4,857,000</u>	<u>30.9</u>	<u>Totals</u>	<u>10,870,000</u>	<u>69.1</u>

NUMBER AND SIZE OF PRIVATE OWNERSHIP

<u>Size</u>	<u>Number</u>	<u>Acres</u>	<u>% Total</u>
Under 100 A	7,374	295,000	6.1
100 A to 500 A	5,471	840,000	17.3
500 A to 5,000 A	1,671	1,625,000	33.4
5,000 A to 50,000 A	16	222,000	4.6
More than 50,000 A	4	1,875,000	38.6
<u>Totals</u>	<u>14,536</u>	<u>4,857,000</u>	<u>100.0</u>

¹American Forest Products Industries - Montana Forest Facts, 1960-61 Ed.

that government plays an important role in the wood resource supply for the Montana forest products industry.

The private commercial land consists of 31 percent of the total forest land. The bulk of this land is located in the lower elevations adjacent to the valley bottoms. Ownership development patterns in the early days of settlement account for the location. The land near the major rivers and their tributaries were settled first because of the potential agricultural use and transportation facilities readily available. As a consequence, private forest land has generally a higher site class and a better productivity potential. It is interesting to note that 6.9 percent of the private commercial forest land is owned by the forest products industry directly and that is owned principally by three major wood products organizations and one railroad.

The remaining 24 percent of the commercial forest land is owned by a large number of small independent individuals who are not connected directly to the industry. These owners (14,532) control parcels of land from under 100 acres to 50,000 acres with the majority in the under 100 acre bracket by number of individual owners, but in the 500 acre to 5,000 acre bracket in the amount of acreage by size class.

It is apparent that the major part of the land in private ownership is not under direct control of the forest industry, but is widely distributed among numerous small landowners. These landowners are usually farmers and ranchers who are not especially interested in timber production as such. Obtaining the maximum sustained cut on these lands will be extremely difficult because of the size of the forest land holdings and the lack of interest by the landowners. The State Forester's Office,

through its service forestry program, provides assistance to the many small landowners throughout the state, but the total effect, as in many other states, is negligible.

TIMBER SUPPLY

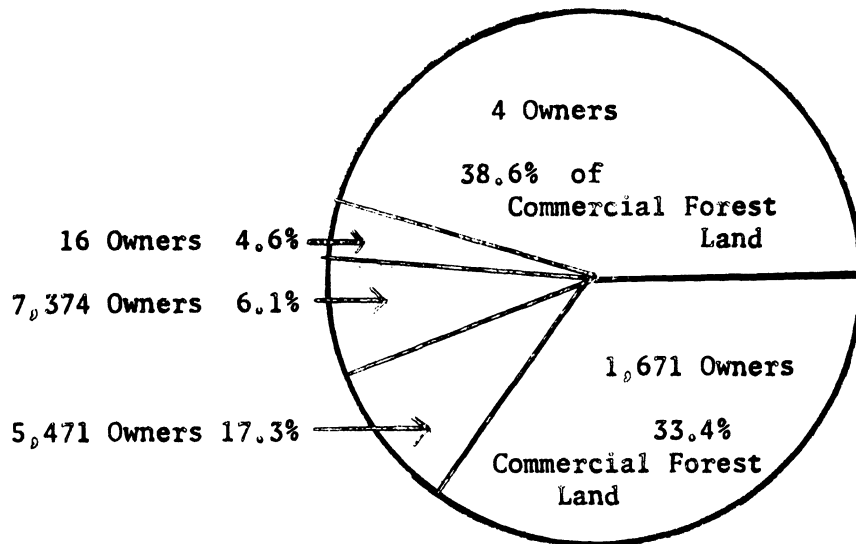
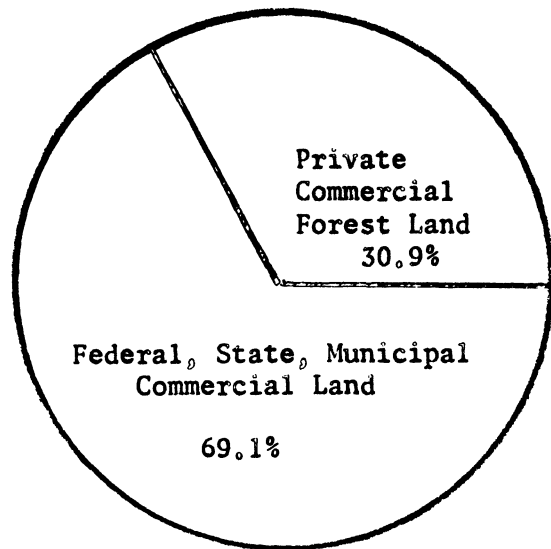
With a vast area of Montana in commercial forest land and with a large portion of the state's economy centered around this resource, and the resulting economic activity created from it, it is well to look at the composition of this timber resource from a volume standpoint.

Since volume of timber available is an important consideration for the industry, a comparison should be made between Montana's available sawtimber and the sawtimber available in other areas. This will show the relative position of Montana, from a raw available resource aspect, to other similar regions. Guthrie and Armstrong(6) placed Montana in an eleven-state area, including coastal Alaska and British Columbia. They deduced that this region, or economic unit, was relatively complete and similar from an economic analysis standpoint.

The eleven western states include Washington, Oregon, California, Idaho, Montana, Wyoming, Utah, Colorado, Nevada, New Mexico and Arizona. Of the total volume of sawtimber for the unit (named Pacific Slope by Guthrie and Armstrong), Montana has 3.6 percent (see Figure 10). When Washington, Oregon and California are omitted, Montana has 23.9 percent of the total volume in the eight remaining states. From an available sawtimber volume aspect, Montana does not contain sufficient volume to exert any major influence in the total supply for the western slope, but does have more influence among the eight inland western states. It

MONTANA
COMMERCIAL FOREST LAND

By Ownership



Source: Table II

Figure 9

TABLE III

MONTANA TIMBER SUPPLY

Sawtimber - Board Feet

<u>Species</u>	<u>Volume</u>		
	<u>Montana¹</u> <u>(Billion)</u>	<u>8 Western States²</u> <u>(Billion)</u>	<u>11 Western States^{2*}</u> <u>(Billion)</u>
Douglas Fir	15,329	49,000	531,800
Western Larch	11,669	---	---
Ponderosa Pine	10,969	62,100	221,000
Lodgepole Pine	6,945	22,700	30,100
Spruce	6,913	33,500	151,100
Idaho W. Pine	1,093	14,500	56,500
White Fir	1,002	21,500	183,700
Hemlock	---	2,300	172,000
Western Red Cedar	---	3,500	36,300
Redwood	---	---	36,200
Other	1,155	19,000	61,900
Total (Softwood)	55,075	228,100	1,480,600
Hardwood (all)	695	4,600	58,100
Grand Total	55,770	232,700	1,538,700

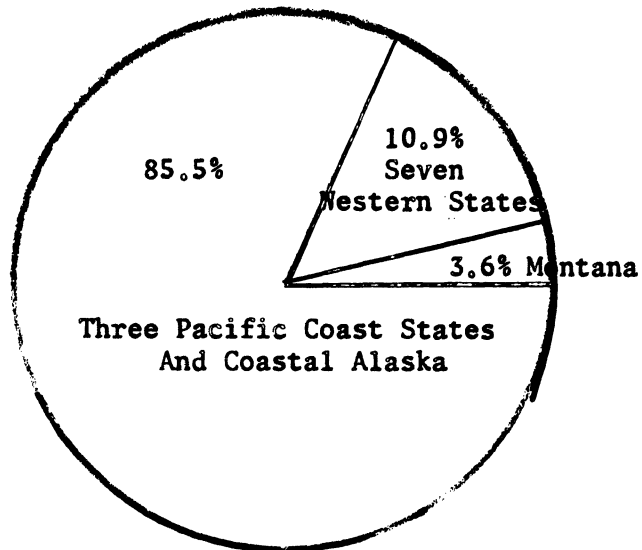
*including Coastal
Alaska

¹AFPI, Montana Forest Facts, 1960-61 Edition.

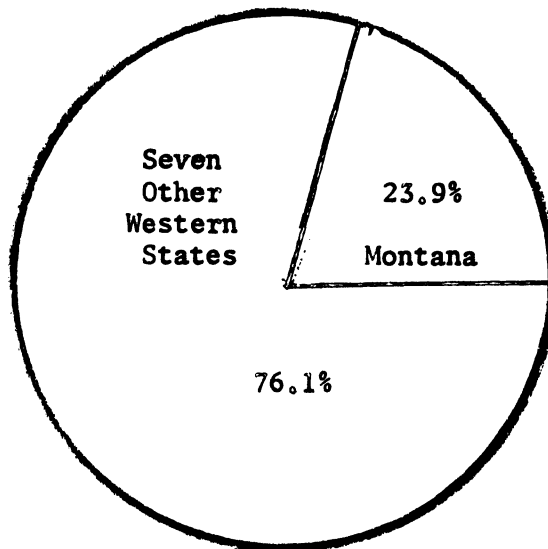
²Guthrie & Armstrong, Western Forest Industry, Johns Hopkins Press, 1961.

TIMBER VOLUME

SAWTIMBER



Eleven Western States(including coastal Alaska) 100%



Eight Western States 100%

Source: Table III

Figure 10

TABLE IV

SUMMARY OF TIMBER VOLUME
BY SPECIES GROUPS

MONMANTA

Species	Cubic Feet		Board Feet	
	*Growing Stock	%	**Sawtimber	%
Douglas Fir	4,684,000,000	29.0	15,329,000,000	27.5
Larch	2,390,000,000	14.8	11,669,000,000	21.0
Ponderosa Pine	2,231,000,000	13.8	10,969,000,000	19.6
Lodgepole Pine	4,077,000,000	25.3	6,945,000,000	12.4
Engelman Spruce	1,384,000,000	8.6	6,913,000,000	12.4
Idaho White Pine	-----	---	1,093,000,000	2.0
White Fir	422,000,000	2.6	1,002,000,000	1.8
Other softwood	707,000,000	4.4	1,155,000,000	2.1
Totals	15,895,000,000	98.5	55,075,000,000	98.8
Hardwood	248,000,000	1.5	695,000,000	1.2
Total - All Species	16,143,000,000	100.0	55,770,000,000	100.0

*All trees 5" DBH to 11" DBH

**All trees 11" DBH up

Source: USDA--FS. Timber Resources for America's Future.

should be noted here that of the 76.1 percent of the volume of the eight inland western states, most is located in Idaho, a neighboring state.

Annual growing stock shows about the same pattern of distribution. Montana possesses only 5.5 percent (see Figure 11) of the total growing stock on an eleven-state basis, but contains 26.8 percent of the growing stock on an eight-state basis.

There appears to be a better distribution of growing stock in Montana on a comparative acreage basis than sawtimber. This would indicate that the present sawtimber volume would have to be carried until this young growth became marketable, otherwise there would eventually be a gap in the available volume of sawtimber. This may be due, in part at least, to the large scale forest fires of the early 1900's that plagued the Rocky Mountain states. The young growth is just now being recognized in inventory procedures.

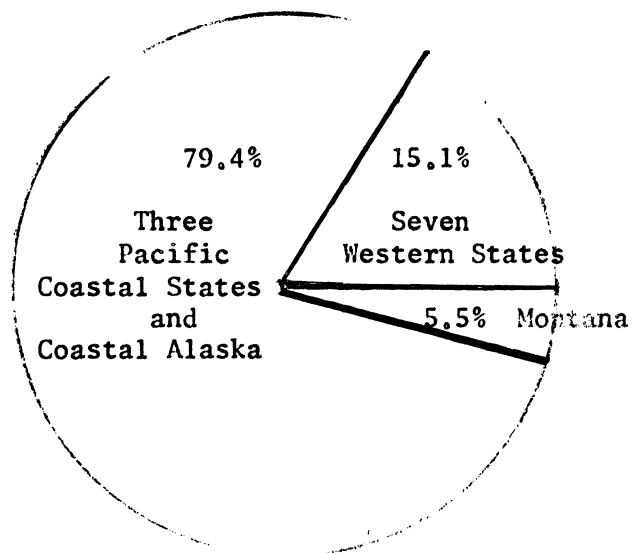
An example of the burn acreage for selected years will varify this conclusion. Old fire records indicate total acreage burned for selected fire years during the early days of national forest history in Montana:

1910	--	1,146,761 Acres Burned
1919	--	505,252 Acres Burned
1926	--	136,085 Acres Burned
1934	--	20,123 Acres Burned

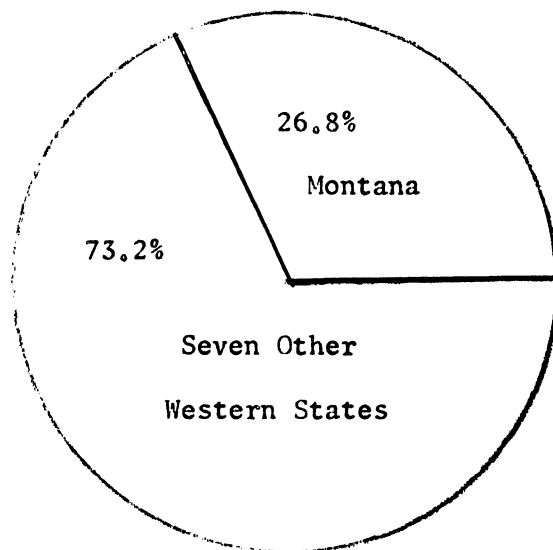
Source: Region 1, U. S. Forest Service

This trend is shown again in the relation of annual growth. Montana has only a very small portion of the total annual growth of the eleven

GROWING STOCK



Eleven Western States (including coastal Alaska) 100%



Eight Western States 100%

Source: Guthrie and Armstrong, Western Forest Industry.

Figure 11

western states. It does, however, contain a higher portion in relation to the total annual growth of the eight western states.

Montana, then, does not materially influence the over-all raw wood supply market, either regionally or nationally. It does, however, furnish local industries an ample supply of the raw material required for manufacture of all types of forest products.

Table V shows the estimated amounts and composition of the wood resource in Montana. It is interesting to note that the major portion of volume is in the larch-Douglas fir category, in both growing stock and sawtimber. Further, there is a considerable amount of Ponderosa pine in the sawtimber category, but a much less proportion in the growing stock. Lodgepole pine volume of growing stock is second only to the larch-Douglas fir category.

The large amount of lodgepole pine in the growing stock category appears to stem from the large scale fires originating in the early 1900's. It may be well to undertake an extensive research program in lodgepole pine utilization and marketing to be prepared to utilize the large volume coming into the commercial size class. The Forest Service has set the stage for research by establishing the Research Center at Bozeman for lodgepole pine management and utilization.

ALLOWABLE CUT

Total volumes and the composition of the stands mean very little until they are converted to some type of cut figures. Traditionally this has been done by foresters to estimate the volume which can be removed over a given period of time under conditions of proper stand treatment. The allowable cuts for the various federal and state

TABLE V
MONTANA TIMBER SUPPLY
GROWING STOCK¹

<u>Species</u>	<u>Volume (Million cuft.)</u>		
	<u>Mont.</u>	<u>8 Western States</u>	<u>11 Western* States</u>
Douglas Fir	4,684	12,240	97,473
Western Larch	2,390	3,699	5,355
Ponderosa Pine	2,231	13,725	42,527
Lodge Pole Pine	4,077	11,407	15,359
Spruce	1,384	7,384	8,101
Idaho White Pine	- - -	- - -	- - -
White Fir	422	5,329	37,706
Hemlock	056	562	43,267
Western Red Cedar	- - -	- - -	- - -
Redwood	- - -	- - -	6,373
Other	651	3,878	24,662
Totals (softwood)	15,895	58,224	280,823
Hardwoods (all)	248	2,111	10,794
Grand total	16,143	60,335	291,617

*Including Coastal Alaska

¹USDA, FS. Timber Resources for America's Future, Forest Resource Report No. 14, Jan. 1948, Table 10, p. 519.

TABLE VI
MONTANA TIMBER SUPPLY

ANNUAL GROWTH¹

Area	Sawtimber (Million Bd. ft.)			Growing Stock (Million Cu. ft.)		
	Hardwood	Softwood	Total	Hardwood	Softwood	Total
Montana	18	229	247	8	164	172
8 Western States	77	2,185	2,262	38	785	823
*11 Western States	265	11,041	11,306	149	2,628	2,777

* Includes Coastal Alaska

¹USDA, FS. Timber Resources for America's Future, Forest Resource Report, No. 14, January, 1958.

landowners have been calculated. This has not been true in the private ownership. Only the four largest private landowners have attained the degree of management that permits a reasonable calculation of allowable cut.

Before looking at the allowable cut established for Montana, a working definition of the concept of "allowable cut" must be made. There have been many attempts to define this concept. The Society of American Foresters defines allowable cut as "the volume of wood which can be cut, under management, for a given period"(15, p.24). While this definition does not actually state that allowable cut is based upon the annual growth, it does imply it and does not spell out the concept of the term allowable cut. It is certainly an ambiguous definition.

James(7) gives a better definition of allowable cut and its concept when he says the volume to be cut (allowable cut) over a pre-established period of time is set to enable the forester to build up, decrease or maintain the desired level of growing stock to meet established and specific growth goals. This definition of the allowable cut is not based upon growth dictates alone. It further takes into consideration other important factors such as the type and composition of the stands; the logging feasibility; and the economic factors that influence the sale of the resource. It should be clearly noted that an allowable cut is not necessarily correct when the established cut is identical with the annual growth of the area. Then allowable cut must consider the phase or stage of development of the particular area being treated.

Before analyzing the allowable cut established by the major landowners, one aspect should be made clear. These figures are very rough

and are, as a whole, extremely conservative. Bolle(3) cites an example in the Flathead area where the allowable cut on one ranger district was more than doubled.

The basic reasons for this rather marked increase were the changes in economic conditions and technology. Areas that were originally considered as unmerchantable were added to the total volume to be cut when industry's utilization standards changed to acceptance of smaller diameter timber. In addition, better logging techniques have been developed to enable industry to log areas not considered accessible when the original allowable cut was first determined. In this case, the allowable cut was used for too long a time period without major revision.

This points out the problems in using allowable cut data. All the agencies are constantly recalculating their cuts as more accurate information is obtained. The allowable cut data used here (Table VII) are estimates made in 1959 by the Forest Service(20) to survey the situation in Montana. This assumes that the allowable cut, when established, will actually be cut. This has not always been the case. Many indications show that even though the allowable cut was set, very often that amount of timber was not actually harvested.

In comparing the estimated aggregate state allowable cut with the actual cut, lumber production appears to be reasonably close (within 8.7 percent) to allowable. But this type of comparison does not indicate the situation for other products. In order to see how the situation actually is, a closer look must be taken at the comparison of actual production with allowable cut on an operating unit basis (see Figure 12). Table VIII provides this comparison by operating units.

TABLE VII
 Estimated Allowable Cut - Montana ^①
 (All ownerships)

<u>Type of Product</u>	<u>Estimated Annual Sustainable Production</u>
Lumber and Dimension	1,065 MM b.m.
Veneer	128 MM b.m.
Large Poles (over 30 feet)	450 M pieces
Small Poles (less than 30 feet)	900 M pieces
Pulpwood	2,218 M cords
*Fiberboard	360 M cords
Fence Posts	6,900 M pieces
Fuel Wood	180 M cords
*Chemical Wood	186 M cords
Christmas Trees	6,500 M trees

*New Markets to Establish
 Based Upon Following Criteria

- | | |
|--------------------------------------|---|
| (1) Close utilization of all species | (4) Prompt restocking of cutover lands & other TSI measures |
| (2) Establish a variety of outlets | (5) Protection of soil & site to keep lands productive |
| (3) Adequate fire and pest control | (6) Development of access to timber |

(7) Trade Promotion ^① Full Use & Dev. of Mont. Timber Resources
 Senate Document, No. 9

TABLE VIII
 Estimated Sustainable Annual Production and Actual Production
 By Operating Units

Type of Product	Western Mont.		S. Western Mont.		N. Eastern Mont.		S. Eastern Mont.	
	Est. Prod.	Sust. Prod.	Est. Prod.	Sust. Prod.	Est. Prod.	Sust. Prod.	Est. Prod.	Sust. Prod.
Lumber & Dimension, Mbm	812,000	750,000	56,000	180,000	20,000	75,000	54,000	60,000
Veneer, Mbm	8,000	80,000	- - -	16,000	- - -	16,000	- - -	16,000
Large Poles (over 30'), M pieces	97	250	29	100	- - -	50	- - -	50
Small Poles (less than 30'), M pieces	93	500	34	200	7	100	50	100
Pulpwood, M cords	4	1,234	10	550	13	261	- - -	150
*Fiberboard, M cords	0	200	- - -	80,000	- - -	40	- - -	40
Fence Posts, M pieces	270	3,600	81	1,800	78	900	305	600
*Chemical Wood, M cords	0	88	- - -	66	- - -	26	- - -	26
Fuel Wood, M cords	94	100	29	30	13	20	- - -	- - -
Christmas Trees, M trees	3,520	5,000	16.5	1,000	52	500	Local use	Local use

-44-

*No current markets

Source: Senate Document No. 9. Full Use & Development of Montana's Timber Resources, 1959.

Figure 12 shows the broad over-all operating units of the forest products industry. These are essentially based upon topographical features. Within each unit there are finer boundaries that tend to separate mill activity from a supply standpoint. The economic considerations concerning these units are covered in more detail in Chapter IV.

Figures 13, 14 and 15 show the general locations and distribution of the mills. They have been broken by mill size and type (see footnote, p.59). Only small mills that are permanent in nature have been included. Numerous small portable mills scattered throughout the state are not shown. These mills are almost impossible to locate because of their transitory characteristics.

None of the minor forest products firms are shown. There are pole and post plants in Kalispell, Arlee, Lincoln, Butte and Bozeman, however. While it is recognized that there is a concentration of sawmills in the southeastern portion of the state (from Billings east), this study does not cover this area.

It will be noted that by operating units the amount of sawtimber actually utilized and the annual estimated sustainable is virtually the same even by operating units. There appears to be very little room for expansion in this area. There can, however, be a large change in type of sawtimber users. Currently sawtimber demand is principally from lumber mills. If veneer production would undergo any major expansion, it would have to be at the expense of the lumber industry.

The large potential in supply of raw material is in the utilization of small round wood. In all cases, the actual production is below

MAJOR MILL OPERATING UNITS

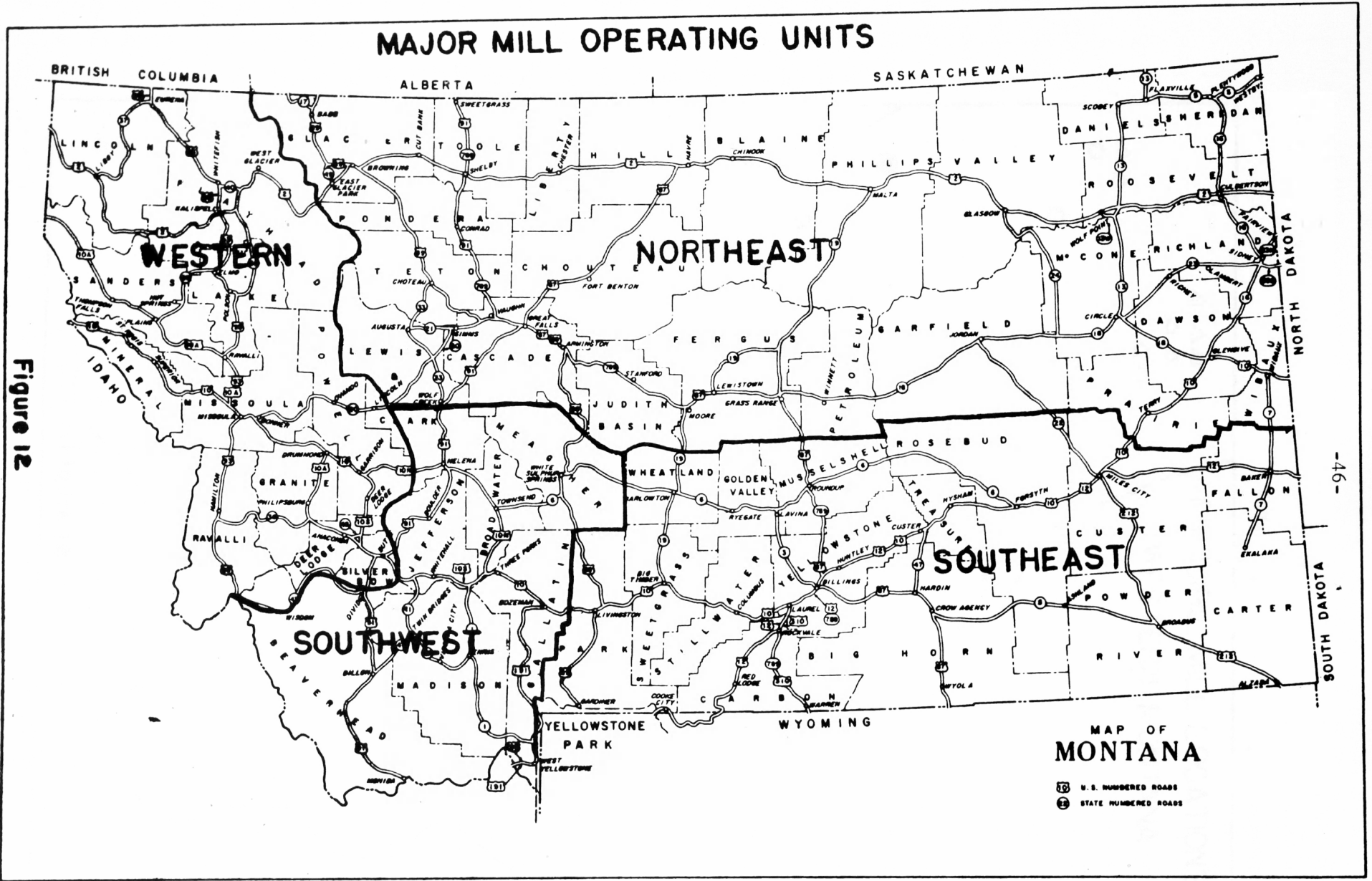
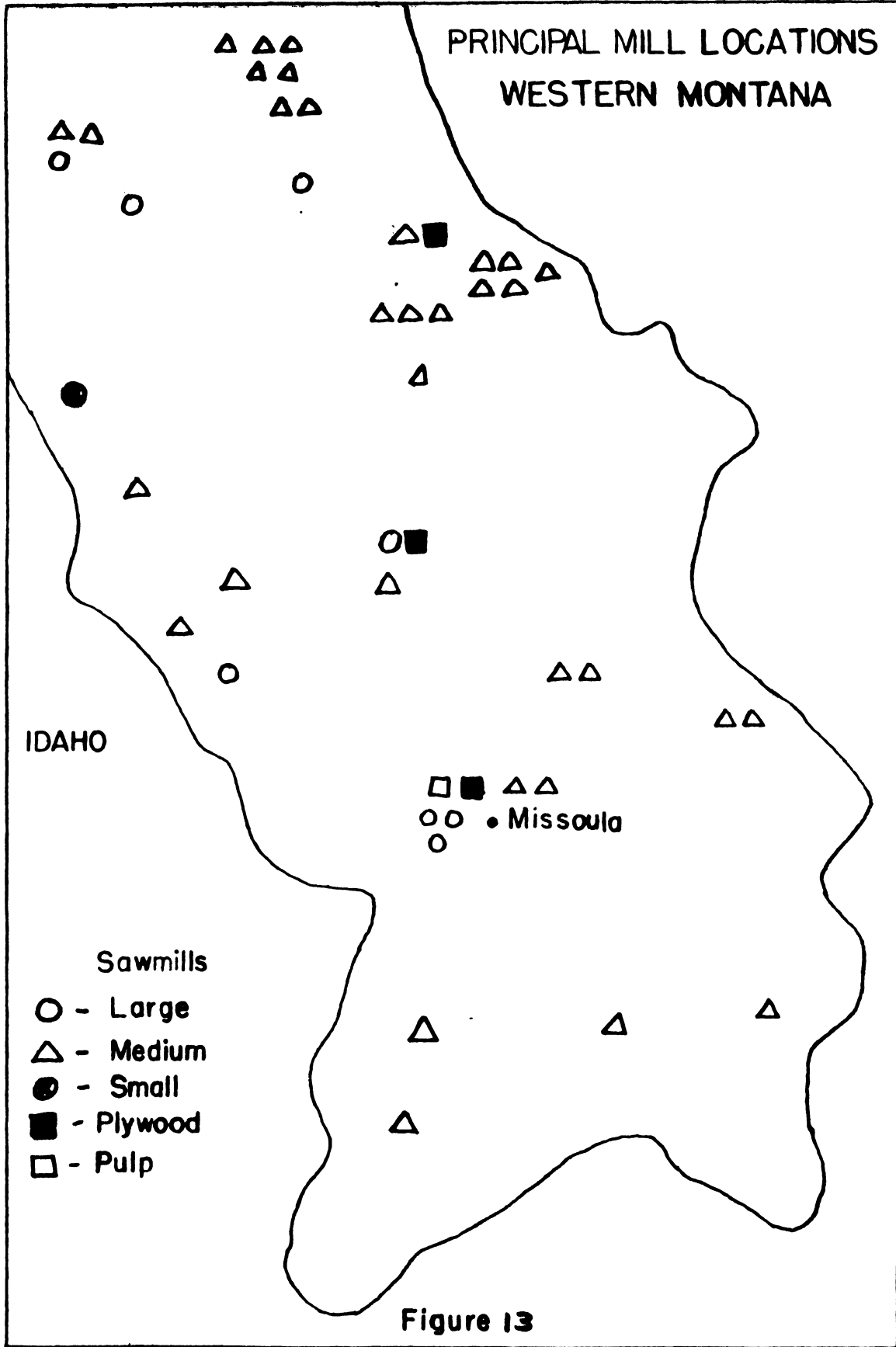


Figure 12

MAP OF MONTANA

U.S. NUMBERED ROADS
STATE NUMBERED ROADS



PRINCIPAL MILL LOCATIONS SOUTHWESTERN MONTANA

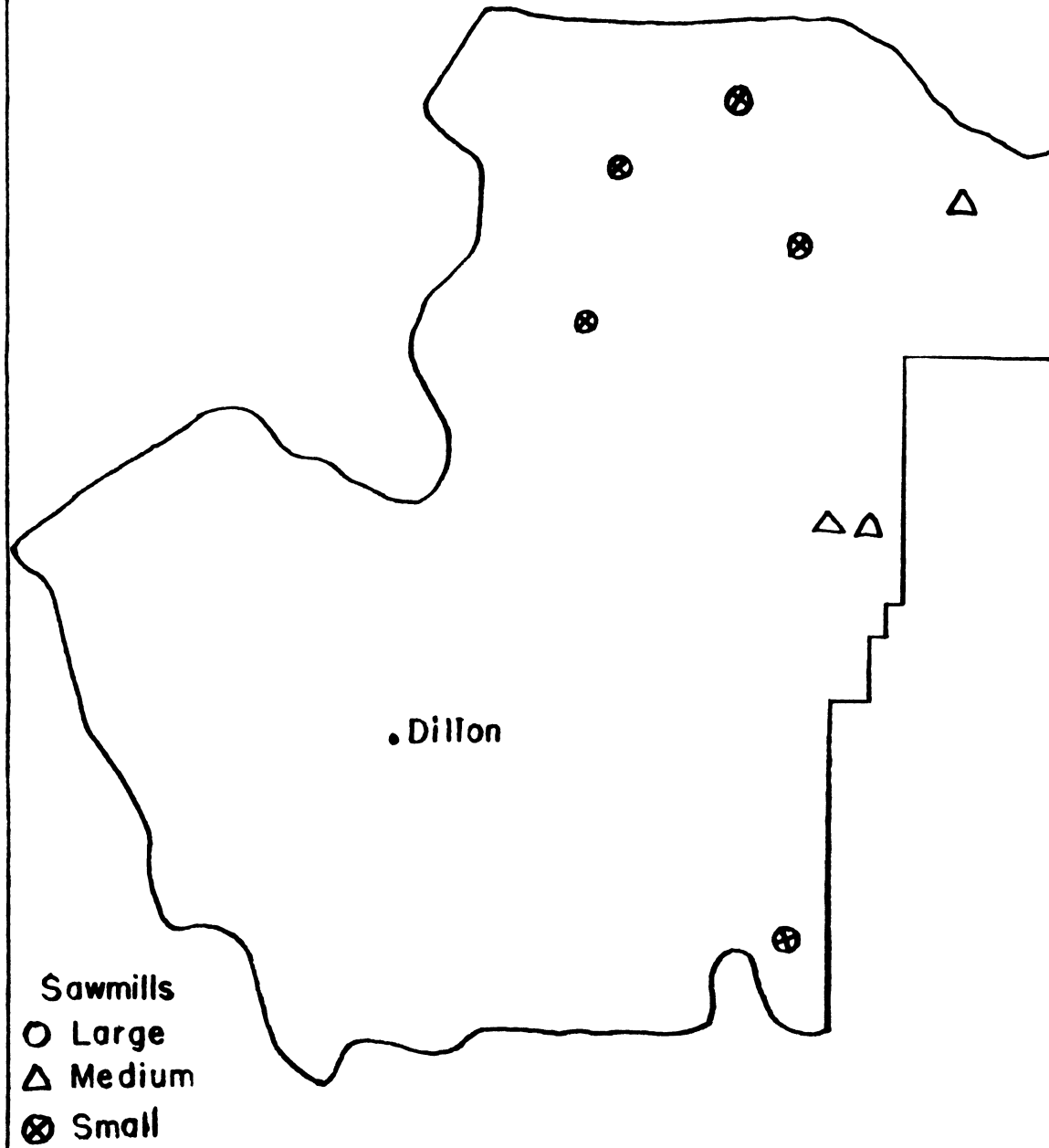


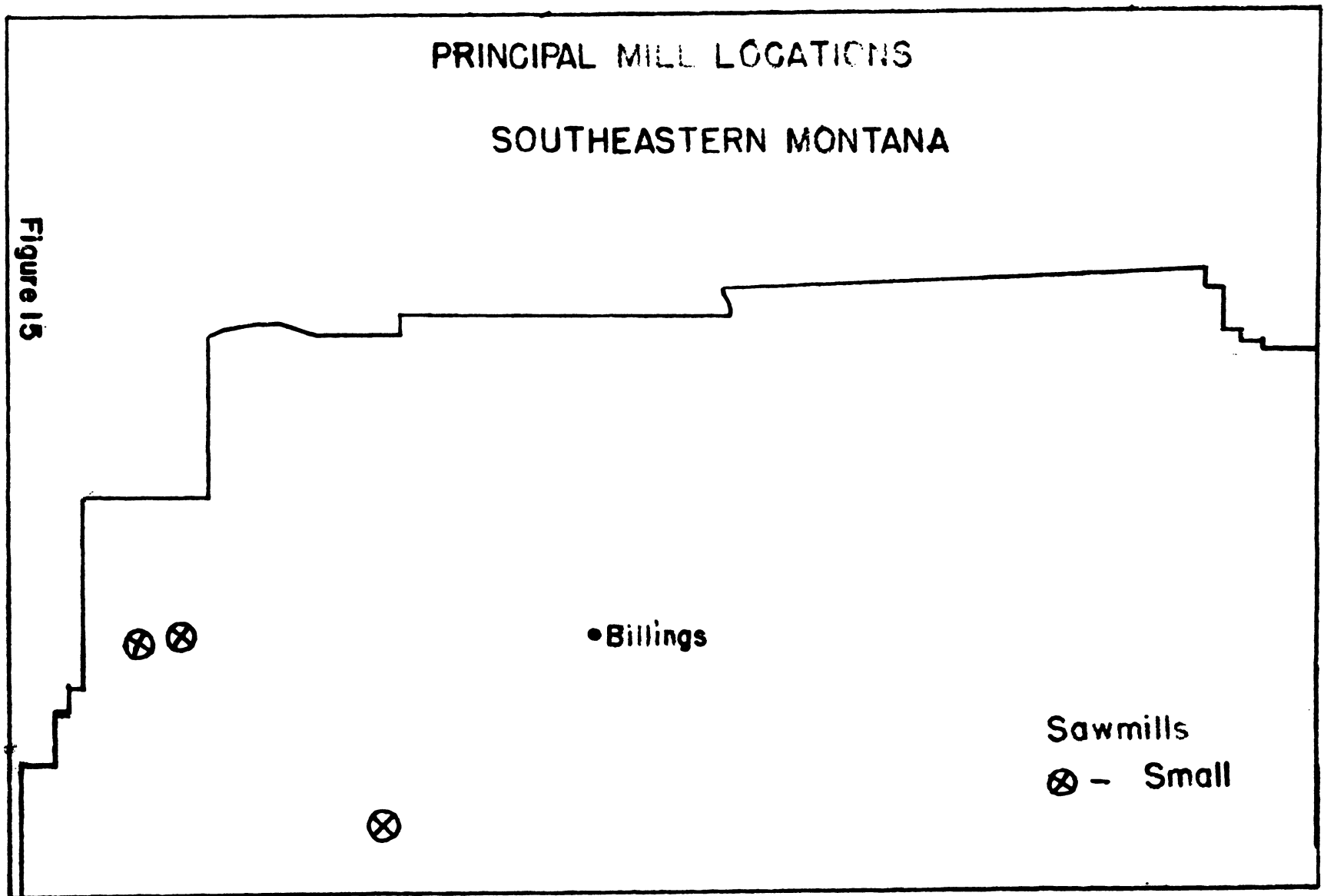
Figure 14

PRINCIPAL MILL LOCATIONS

SOUTHEASTERN MONTANA

Figure 15

-49-



that of the estimated annual sustainable in all operating units. If markets were readily available for poles, posts, pulpwood and Christmas trees, expansion along these lines would be almost unlimited. To date, no major markets occur for these minor forest products.

There appears to be no question about the availability of the raw resource for the manufacture of forest products within the state. This is especially true in the field of what is considered minor forest products. Elsewhere in this thesis a treatment of the demand or market for these products will be discussed.

PRESENT TIMBER-USE POLICIES

Lumber production has played a major role in the use of wood resources for a considerable time in Montana. During the first forty years of lumbering, all products were consumed locally. After completion of the railroad in 1883, the major portion of lumber has been shipped to other areas (mostly the midwestern and eastern markets). Slowly the development of other industries has taken place. In 1955 a pulp mill was established in the state, utilizing only mill waste as its source of raw material. Some pulp bolts and chips have been shipped to the Lake states from eastern Montana. As the industry expands and diversifies, more and different demands upon the timber supply will take place.

During the past few years the demand for forest products has changed. The traditionally strong production position held by lumber is giving way to a more diversified type of production. Firms once interested solely in lumber production are now seeking out new types

of products as supplements for lumber. As these firms initiate new product lines, plant integration must be undertaken.

As the demand for diversified products becomes more competitive, the large, highly integrated mill will have a definite advantage. Montana mills have been investigating the possibility of plywood production as a product line to complement their lumber production. This is one example of current diversification trends. This particular example also indicates a trend toward strengthening their supply position. The medium-sized mills are not able to undertake any major integration programs principally because of financial problems (discussed in Chapter V). This situation causes a further separation in the competition for raw material, especially for the high quality sales.

Current timber production policies have been geared toward large sawlog management. While this type of policy has been appropriate for many years, the change in industrial needs make it obsolete. The supply requirements of industry under highly diversified conditions may cause undue competition for raw material suppliers unless the rigid sawlog management policies are modified.

Timber management policies must be flexible to meet the needs of industry in an ever changing product market. No longer can the management policy be geared to only one type of product. Forest stand composition must be altered to obtain the maximum amount of flexibility. Only in this way can the type and amount of raw material be supplied to industry without undue competition for the supply.

This problem of supply has already started to show in the relationship of lumber and plywood. The plywood firms have a comparative

advantage price wise over lumber firms. They have succeeded in outbidding lumber firms on most of the more desirable sales. This has placed the lumber industry in a difficult price-squeeze situation.

SIDE BENEFITS OF THE WOOD RESOURCE

One of the more important side benefits of the timber resource is the contribution to the Montana economy by the services required to protect and manage the resource. Since the greater part of the commercial forest land is owned by the federal government, the management and protection require a large number of trained personnel to accomplish the job. Facilities must be provided for this staff and its income and expenditures provide a boon to Montana business.

To get some idea of the magnitude of this contribution, the Forest Service estimates that "about 1,100 federal, state and private foresters and their employees, with wages amounting to nearly \$7 million, were employed to manage the resource."(21, p.34) This amount alone has a very definite impact upon the Montana economy. This does not cover the physical plants required to keep this force in operation. When resource management and protection is considered in the aggregate, it makes a significant contribution to Montana's business economy. In addition, there are many goods and services, such as equipment, food, etc., that must be available to keep an organization of this size in full operation, especially during the field season.

As an example of total expenditures for a year for resource management, the State Forester estimates that \$1,363,159 was spent in the fiscal year 1961 for protection and management. This expenditure includes the protection and management of state lands, and the protection

of private lands through the three private protection associations and the contractual arrangements for protection of state and private lands to the various federal agencies.

The Forest Service, during the same fiscal year estimates that it spent \$10,974,707 in the process of managing and protecting the national forests in Montana. This figure includes all the normal activities of the Forest Service in this area.

From the resource standpoint alone, a sizeable income is poured into Montana's economy annually. It should also be remembered that the Indian Service and the Bureau of Land Management have forest resources within the state, and their management and protection activities also contribute to the economy. The main point is that aside from the resource itself and the forest products industry, the side benefits should be considered in the over-all look at Montana's forest resource.

CHAPTER IV

THE ECONOMICS OF SUPPLY AND DEMAND FOR THE RAW RESOURCE

The procurement of raw material plays a very important role in the process or processes of conversion of wood into useable products that will ultimately reach the consumer. This stage in the business of wood manufacturing brings the firms (or resource users) into contact with the landowners or resource producers. This relationship is maintained formally through the media of the market place.

THE FIRM

In order to fully understand the relationship of the producer to the user, certain policies and objectives of the firm must be discussed. Any standard economic text will provide the basic economic assumptions in relation to the general activity of the firm. Duerr(5) aptly states them from a wood-using industry point of view:

1. The firm is rational: that is, it is interested in maximizing its net revenue.
2. The firm is concerned with including in its revenue and costs, all aspects on which it places a value. This includes items other than just material inputs and outputs.
3. A firm acts as a unit. That is, it places the maximization of net revenues on the business as a whole, as contrasted to maximizing any one of the individual inputs. Thus, the firm will attempt to utilize the best combination of productive agents to maximize the total net revenue per unit of time.

It should be noted that the firm may not base its entire policy on maximization of profit alone. It may include certain social values into its policy formulation that, while in the strict sense are included in

the profit maximization criteria, are normally thought of as outside the realm of profit. No firm can operate on a cost-revenue basis entirely. In the Montana industry, the strict profit motive seems to be inversely related to size of operation. As the size of the firm increases, the calculation of this cost-revenue relationship becomes more complex.

THE PRODUCERS

The same general assumptions of the firm hold equally as well with the resource producer. There are, however, several exceptions to the strict interpretations of the firm's activities. No one would question the motives of the private landowners. These landowners, large or small, follow very closely the basic firm assumptions. The small landowner integrates his forest land into his over-all operations. The company-owned forest land is generally included as one of the factors of production. The large, private forest landowners follow the same pattern. Activities of the resource producers in the private sector are rather easily ascertained. Government resource producers' actions are more difficult to assess.

Only a brief discussion of the governmental agencies will be treated here. Since the largest producer of wood in the state is the Forest Service, it is well to commence with it. Although it can be considered as maximizing its profits in a rational manner in the strict sense, the concentration or emphasis must be placed upon the social aspects.

The Forest Service(17) is geared to the multiple-use concept. This requires a much more complex allocation problem. In addition to multiple use, it must consider the "public interest" in the management of

the wood resource. This ambiguous connotation carries with it such items as the stabilization of the industry through timber sale activity; complete impartiality in its relationship with industry; a fair, average price for the stumpage sold; and encouragement of a reasonable distribution of sales to all sizes of operators. Money revenue is of secondary importance in Forest Service timber sale policies.

Public agencies have a much more complicated set of objectives and goals than private firms. They are concerned with the social aspects of their actions, more than the pecuniary motives. Public planning requires long-range forecasting with attempts to balance certain social costs and priorities in this planning. In carrying out a timber sale program, public agencies must be able to fit it into the over-all land management program in accordance with the social objectives. This requires a great deal of intelligent long-range planning in addition to a specific set of goals and objectives.

The Bureau of Land Management now has a multiple-use concept in management of the Public Domain. However, it is concerned to a greater degree than the Forest Service with the amount of revenue brought in by sale activities. The Bureau of Indian Affairs approaches the industrial assumptions in the management of tribal forest land, tempered by public trust responsibilities. The higher the money revenue, the more money for the Indian population. It does, however, place rather stringent regulations on eligible bidders for tribal sales.

On the state level, the State Forester's Office(11) has specific policies governing the over-all management of state-owned forest land. It is principally concerned with the amount of money revenue from

timber sales. It, of course, must equate certain social costs in its net revenue maximization equation.

All the varieties in policies and objectives of the various government agencies in the field of wood production create a rather complex market situation from the supply side. Their influence is strong because they, as a group, are the largest unit in the production of the raw resource needed for the production of wood products.

Industry, on the other hand, has one major objective in the market. This may be classed as the procurement of the raw material as cheaply as possible, governed by individual needs. This objective plays an important part in analyzing the market actions.

Although the Forest Service is a federal agency with a socially oriented timber management program, its actions in the market for raw products have wide consequences. This strong influence is supported by the fact that it is the largest single producer of raw material in the state. In economic terms, the supply of raw materials is a weak oligopoly situation, with the Forest Service acting as price leader. However unintentional its actions, the volume placed on the market alone causes this situation.

Other governmental agencies and large private landowners have only minor influence in establishing the general price level of stumpage. The Forest Service (and other government agencies) attempt to minimize this situation by the distribution of sales. They generally attempt a fair and equitable number of sales in each size class to provide sufficient stumpage to all sizes of operators.

Even with this direct attempt to relieve market pressure, distribution of government timber through the industry is not always accomplished. The small operator feels he is being discriminated against because the sales are too large for him to handle. On the other hand, the larger operators feel that the sales are too small for them to adequately carry out long-range planning. These factors tend to compound and cloud the market position of the raw material producer.

Before proceeding to the purchase of the raw material, some mention should be made concerning large private landowners. Although they are few in number, they do play a part in the market for raw material. Private landowner policies approach closely the general assumptions of the firm. They are not especially socially oriented in their equation of the profit motive. They make concessions to provide selected industry raw material. They also may be as discriminating as they choose on price. One large landowner, through pricing policies, actually forced an increase in competition on the general market. Others provide long-term agreements with one or several operations at an established price.

THE INDUSTRY

The manufacturing industry, as contrasted to the raw material producer, conforms more to the traditional profit motive and profit maximization concept. As already stated, the extent of industry's market participation is to purchase stumpage as cheaply as possible. Their advantage in the national woods products market depends to a great extent on the price of the raw material. Although on a state-wide basis their economic position in the supply market place can be termed closely to a form of pure competition, this is not the case in point.

Because the mills in Montana are located as close to the supply of the raw material as possible, raw material markets often cannot be analyzed from a state-wide angle. The supply of timber varies from area to area, both in size and composition. As a result, mills generally tailor their operations to the type of timber in their immediate vicinity. The topographical characteristics of Montana also play an important role in defining these smaller subdivisions of the over-all state market. In addition to the location of supply and the topographical features, transportation systems also tend to restrict mill activities. Although these considerations are not absolute limiting factors for the economic activity of a subdivision of the market, they do cause a certain rigidity in raw material acquisition. This is especially true of the smaller mills¹ and true during slumps or plateaus in the product markets. When times are good, however, the larger mills violate these economic boundaries and their operating areas become much larger. Thus, you have a compounding effect upon the scope of the market--a two-level effect.

This effect increases the competition in both units (or several units). On one level you have the larger mills in competition with each other, transcending their normal purchasing areas. The small mills are not able to do this and must face the additional competition of the intruding larger mills. This tends to place the small (and sometimes medium) mills in a competitive trap. This situation may account for a

¹For the purpose of this study the Montana sawmills have been classified on Bolle's classification(3) on the basis of small, medium and large. Small mills produce up to 20 M/day; large mills produce over 100 M/day; and medium mills between 20 M and 100 M/day.

certain mortality in the smaller operations, even in the face of a good national market for products.

In summary, then, from the demand side of the picture for raw material, no general, meaningful market classification can be made. Each economical subdivision must be analyzed separately. Bolle(3) cites the relationship in the market in the Flathead Valley that is typical of the workings of stumpage procurement for a market subdivision. He found that the large mill enjoyed an oligopoly position in relation to the raw material, while the small mills generally were involved in a pure competition situation, giving a two-level effect. This is typical of many of the raw material units throughout the state. It should be noted here that there is a certain amount of vertical competition under a situation like this that tends to weaken the oligopolistic position of the larger mills.

As an example of another situation, one area was located in which there was actually a monopolistic situation in the purchase of the raw resource. Because of the nature of the timber and the location of the manufacturing plants, only one mill was able to compete for the available timber. This situation is of a transitory nature. As the mill flourishes, other mills will be enticed into the area on the basis of the first mill's success. This will be especially true if technology is devised in the small log production field for better and more efficient methods of handling volume, rather than quality.

ECONOMICS OF THE FIRM

Before proceeding on to the mechanics of procurement of the raw material, it is well to discuss briefly the relative economics of the

firm's operation. The individual firm has no direct influence on the national market for wood products. This relationship is a type of pure competition: that is, no individual firm is able to influence the market. These firms do, however, maintain certain advantages in the process, but this aspect will be treated later.

Since the individual firm has no control of its buyers and distribution channels, any fluctuations in price of its product will increase or decrease its profit ratio depending upon the direction of the fluctuation. Thus, the individual firm is highly sensitive to any fluctuations in the product market and consequent price changes. For a short period following World War II the profit ratio was high and the pricing of factors of production was not considered to be too critical. Regardless of factor cost, money could be made in producing the product. This was especially true for lumber, and this was Montana's major export product. These conditions gradually changed with the final stroke about 1961 (see Chapter III). Now, the market price has reached a plateau which appears to be somewhat more realistic and stable. As many industry people state, the "gravy train" is over.

How does this effect the industry from a factor of production standpoint? The firm is faced with three possible choices. First, to keep operations the same and have a large reduction in the profit ratio. Second, to reappraise its operations and recalculate the importance and priorities of its factors of production. Third, a combination of the first two; reduce the profit ratio and provide a reallocation of the factors of production on a new optimum basis(16).

The major portion of the sawmills in Montana has had to make this decision recently. The adjustment to the new product price forced large numbers of small mills out of production. Bolle(3) found this situation to be true in the Flathead area as early as 1957. The small marginal operations are the outfits that come and go with minor fluctuations in market price. They flourish when the demand is unlimited and prices are high.

In the process of returns to scale for the firm, how can the factors of production be altered to adjust to the new optimum position for the firm? There is no stock answer. These returns can be outlined and analyzed individually. It must be remembered, however, that they are completely interrelated and adjustment of any one may cause a reaction in another.

1. The mill must usually keep abreast of the latest technological advances in the manufacturing process.
2. It must keep the woods-to-mill cost as low as possible.
3. It must keep stumpage reasonable in relation to the other costs of production.

When these adjustments are made, certain economies of scale give the advantage to the large mill. Such items as credit, operating capital, technological advances, diversification of products and horizontal integration, all contribute to the relative ease with which the firm is able to return to scale.

TECHNOLOGY AND LOG MANUFACTURING

The technological aspects of production are often difficult to achieve and they are expensive. Most Montana mills are old and well established. Equipment has been adjusted to work efficiently for one

type of operation and rate of production. Changes in one piece of equipment usually require a long series of changes throughout the flow line. Under these circumstances, complete renovation is usually required to take advantage of a technological change.

The only major technical adjustments in the Montana mills have been in the large mills and new mills entering the state. The truth of the matter is that in the field of lumber production very little change in actual technique has been made in many years. This is not true for pulp and paper or plywood. The technological advances have not played an important role in firm readjustment in Montana.

The production factors that can be altered with the least effect and cost on the firm's part are the woods-to-mill costs. These costs are usually flexible to some extent and the firm may take good advantage of the situation. Most firms delegate these activities to contractors, commonly called "gypos" in the business. These gypos take different phases of the work independently, and on a piece basis. It is not unusual for a firm to contract the entire woods operation to a gypo at an established price. Other mills may contract the logging and hauling separately. Almost any degree and type of contracting is done by the firms. This system of contracting provides the firm flexibility in operation and a certain flexibility in pricing.

Since the operation of the wood products industry has, for a long time, been run on this basis, the firms have managed to build up a large supply of contract labor. These gypos are not organized labor, but a series of independent entrepreneurs, each doing a specific phase of the

operation. This works to the advantage of the processing firm. It is able to dictate prices for the contract job.

This type of monopolistic exploitation in contract jobs has been the tool of the firm for reducing costs. Because of the captive labor supply, the firm has no difficulty in accomplishing this exploitation. The degree of discrimination varies tremendously with the individual mill, and usually varies inversely with the size. This discrimination is practiced even in "good times", when a mill has bid too high on a timber sale and must cut costs to retain a reasonable profit ratio. This contract system is one of the more important tools for returns to scale of the processing plant. This is an excellent example of the actions required by the firm to maintain its profit maximization goal.

STUMPAGE

The last, and least flexible, factor of production of the firm is the purchase of the raw material. Since the largest seller of stumpage in Montana is the government, the firms are at the mercy of government sale policies. All government timber, except certain small sales that have no major effect on the industry in the aggregate, is sold at auction by either sealed bids or oral auction. The sales are advertised for an established time period, usually 30 days, and bids are accepted. There has been considerable disagreement among industry regarding the most desirable method of bidding. Some feel that oral auction is most desirable, while others feel that sealed bids are best. Throughout Montana both systems are followed. These methods of selling timber by government are traditional and are designed to give all interested parties equal opportunity to purchase the sale.

Although the attempt has been made to equalize bidding impacts for all firms, the outcome has not been entirely effective. Generally, the sealed bid keeps the stumpage price higher than it would under oral auction. The reason for this is that firms submitting bids on a sealed basis must compensate for the competition they think will take place. Oral bidding, on the other hand, permits the firm to raise its stumpage prices in smaller increments depending upon known competition. This system tends to temper the possibility of small firms submitting desperation bids upon timber at an excessive rate when actually it was not necessary.

The size of the sale appears to determine the selection of bidding procedure. Generally, timber sold in large parcels is handled on a sealed bid basis. This is done to reduce the possibility of collusion among bidders. Large sales are usually purchased by a limited number of large mills. By the use of sealed bids, a certain degree of aggressive independence among the bidders tends to reduce the possibilities of collusion. If prior arrangements have been made between firms, oral auction would tend to prevent any individual firm from departing from the agreement. The firm that violated the collusive agreement would have to make its move in front of the others during the bidding.

Small sales, on the other hand, are usually suited to oral auction. There are a relatively large number of small firms bidding and competition is keen. The large, well-financed firm, however, has a definite advantage in this type of sale, as it can eliminate the smaller bidders at minimum expense.

There have been rumors throughout the state of collusion in the industry on sale bidding, but no actual proof has been gathered, and any accusations along these lines have been vehemently denied by the industry. The ruthless individualism of the firm usually makes attempts at collusion abortive. Collusive agreements tend to be violated as individual firms strive for better position, even at the expense of others under the agreement.

The selling agency appraises each parcel of timber to be sold. This stumpage is the minimum rate at which the sale can be sold. Every attempt is made to appraise the timber on an average basis. This, theoretically at least, will penalize the inefficient operator, and allow a slight advantage to the efficient one. Most companies are able to calculate their cost to a reasonably high degree of accuracy and will submit a bid on the sale that allows them their established profit ratio.

Many factors of the firm are reflected in the firm's bid on the sales. From past trends, the bid price has been consistently higher than the appraised price. Some of the reasons for this are:

1. More efficient operation than allowed for in the appraisal.
2. Need for the raw material.
3. Quality and composition of timber sold.
4. Different profit margins by individual firms.
5. Desperation.

In many cases these factors are in combination to influence the firm in its final bid. This places the firms in a highly competitive position in respect to their raw material. Mills that have their own

forest land are at a definite advantage in this respect, because they are able to shop around for those sales that fit their needs.

There is, of course, a certain amount of timber available from private sources. There is no bidding procedure for this timber. Private timber is usually purchased on a personal contact basis. The company procurement employee contacts the landowner and "makes a deal" for the timber. In the past, this system of purchase has been highly lucrative for the company. Landowners have had no concept of value and volume of their timber, and consequently have sold at ridiculously low prices. The processing firms have taken advantage of this and made "hay while the sun shone". However, private landowners are slowly realizing the value of their resource, and are gradually making sure that they receive market value for their stumpage. In one area, the private stumpage was consistently running higher than the adjacent federal stumpage. This is a common situation because of the location and quality of private timber. However, in Montana, private timber is generally still used to counteract the high-priced stumpage on federal lands. It tends to take up the slack in the firm's struggle for the raw material.

In view of this discussion, the processing firm has very little control of the price of the raw material. The base price is established by the selling agency. The firm, through the market, must pay market rates for the stumpage. This in turn is governed by supply and demand in the market. About the only flexibility here is the firm's ability to make realistic analysis of the timber and keep its bid as realistic as possible, thus eliminating any excessive resource costs. It may be noted here that when a firm purchases excessively high stumpage, the

tendency is to pass this cost on to the contract phase through low rates from the woods to the pond.

SUMMARY OF THE SUPPLY OF RAW MATERIAL

From a supply aspect, Montana timber production has been basically a sawtimber economy. The largest single wood use in the state has been, and is currently, lumber. Naturally, with a single market, management of the wood resource has been geared to this type of product. There has been a small market for the various minor forest products such as posts, poles, and, to some extent east of the Continental Divide, pulpwood. These markets have fluctuated widely and contribute only minor amounts to the demand for wood. The supply for this demand has been handled easily by normal stand improvement measures. From a supply standpoint, there has been very little problem in maintaining an adequate supply of the raw material for the processing firms.

Until recently, there has been no major cry from the industry concerning this supply. About three years ago there seemed to be a movement by industry to increase the over-all cut from national forest land. This was further supplemented by action from the industry against the establishment of additional wilderness areas and even expansion of the existing areas. Industry's claim was that the demand for timber would require all potential commercial forest land to produce to capacity in order to provide an adequate supply of the raw resource. The major rumblings from industry were timed immediately after the "big lumber boom" had subsided.

Why, when the industry was involved in a retrenchment program, was the cry for more raw material? The demand for timber had reached the

peak and was apparently starting on the down swing. Construction, which creates a derived demand for lumber, was slowly declining. (Although the market for woods products in Montana will be treated in detail in the next chapter, some reference to demand can be made here without interference with the next chapter.) This appeared on the surface, at least, a contradiction of desires and needs.

In addition to an "educational program" by industry for the general public, concerning the resource needs of the industry, pressure has been placed upon the largest producer (the Forest Service) to re-evaluate its allowable cut calculations and increase its sale program to bring the annual cut on the national forests to the established level throughout the state.² This attitude by industry did not come as a "big front", but more on a piece-meal basis. Whenever the opportunity posed itself, industry took advantage of the situation.

There are several reasons, superficially at least, for industry's actions. In the first place, the actual demand for forest products on a national basis was actually not declining as fast as was thought. The price index had gone through a cyclic adjustment; one which the industry as a whole had to live with to survive. For many years the supply and demand had not equated to form an equitable price for both sides. There was a level at which the supply organizations could sell the products. This price level was not generally acceptable to the purchasers. This caused a "rat race" effect in the market. The last price adjustment

²This pressure was exerted by the entire western industry, but Montana only will be treated here.

generally equated supply and demand to a temporary, equilibrium position. The demand for Montana production had held.

Secondly, the number of firms in the Montana industry that would normally drop out of production with a price adjustment did not cease production. Actually, some mills did drop out, but mills from the west coast moved to Montana because of excessive competition for stumpage on the Pacific coast. The results of this price shift did not bring about the predicted demand for the raw materials.

The third factor that caused this pressure for more raw material was the increase in the plywood industry in Montana. During the last few years, three plywood plants have been established in Montana. In the aggregate they require a substantial amount of the raw resource. Their needs are in direct competition with the lumber producers. Plywood manufacturing requires large, high-quality sawtimber. Only the large virgin timber sales are desired by the plywood manufacturers. Product-wise this places a high competitive status between lumber and plywood for the more desirable sales. The high quality lumber is cut from larger, clear-bolled timber. The plywood companies have succeeded in outbidding the sawmills on many of the prime sales. This would indicate a higher profit ratio in plywood than lumber. This situation has become serious enough in western Montana for several sawmills to consider establishing plywood plants to place them in a better competitive position for the raw resource.

In summary, the supply and demand situation for the raw resource in Montana is complex. While there have been major adjustments in the lumber industry, the demand for the raw resource has not slackened.

In fact, plywood has actually increased the competition for this resource. The general attitude of the lumber industry has been to advocate an increase in available timber for sale. This, it is felt, would tend to flood the market and, as a consequence, reduce the competition; thus reducing the price. If this philosophy is correct, the lumber firms would be in a better position in meeting their returns to scale problem in adjusting to a new semi-equilibrium position. Plywood would also realize a certain economy of scale in its factors of production. Because of this, it may expand, or new industry may move in, neutralizing the effect so desired by the lumber industry. One thing is for sure, the lumber phase of the wood product industry in Montana will not solve all of its problems by a reduction in the price of raw material alone. Some of these other problems will be discussed in the next chapter.

CHAPTER V

INDUSTRIAL ORGANIZATIONS AND SUPPORTING ACTIVITIES

No treatment of the wood using industry would be complete without some mention of the basic organizational structure of the industry and its requirements for auxiliary services and supplies. The organizational structure of the firm gives an insight into its operations. The service requirements that must be furnished by the community are a key to a portion of the over-all efficiency of the firm. If the community is able to supply the needed services, the problems of industry are greatly reduced. If these services are not supplied by the community, the firms must establish their own or do without.

INDUSTRIAL ORGANIZATIONAL STRUCTURE

The manner in which a firm or industry is constructed plays an important part in its basic efficiency. Regardless of how efficient a mill can be from a technological standpoint, its basic organizational structure must function in a smooth manner or this technological efficiency is lost. Certain channels or hierarchal lines must be devised to keep the firm's inter-communication lines effective, clear and flexible. If these do not exist, then orders are misplaced, operations uncontrolled, production wasted and the general efficiency of the organization reduced.

While this not a thesis in corporate administration, the basic organizational structure is an interesting sidelight. There seems to be no set pattern of administrative organization in Montana mills, as it

ranges from a one- or two-man operation to the complex structure of the big corporation and its branch plants. There are owner-operators, owner-managers, and manager type organizations. Some of the firms have a board of director type organization to represent the stockholders, while others do not. The basic administrative structure depends upon the method by which the organization was formed. There seem to be three basic types of organization of the firms.

First is the branch of the larger corporation. This type of structure is usually a normal corporate organization with a branch manager and division managers down through the foremen. It is a complex structure with a set or established hierarchy. Sometimes elaborate administrative procedures are required to keep the communications free and efficient. The policies and goals of the organization are written and well known throughout the management level. The firm works well and efficiently. This type of organization reflects the latest techniques in corporate management. Not only does top management consist of capable people, but, through training programs, the production employees are also highly efficient.

The second type of organizational structure found in Montana mills is the multiple company operation. This type consists of several small organizations, each legally separate, operating under one head. This system seems to be used when firms expand. It may consist of a separate planing mill, several sawmills, a logging division, and a marketing or sales organization. All are managed as one, yet each is a legal entity. The basic reason for this legal separation of activities is for tax purposes. By forming each phase of the production process into separate

companies, tax write-offs are easier to handle. However, an organization of this type is difficult to control. Lines of communication are generally weak and tend to break down under pressure. There appears to be a high degree of independent action within the separate companies, in spite of the same board of directors for all. General over-all management is highly complex.

The third type of organization is the owner-operator type. This is the typical small business organization found throughout the country. It may be a single owner or a partnership type. It may include the planer, sawmill, and logging operations, or parts thereof. Usually this type of organization operates every phase under one cover. The policies and goals are not spelled out. Communications are simple. Most of the management activities are carried out by one individual. The operation is carried out on a day-to-day basis. The ability of the firm to produce depends solely on the qualifications of the owners.

It must be remembered that there are all combinations of organizational structure in Montana mills. The three listed represent the more typical types. The interaction between mills is cloudy. They have no direct contact on a state-wide basis unless it is through the Montana Lumber Manufacturers Association. There has been some rumor that on a unit basis, there is a considerable amount of cooperation between mills. Mills constantly exchange logs and help each other out in many other ways. While this is not a formal relationship, it is very common practice. When the chips are down, Adam Smith's invisible hand(14) usually supervises the transactions.

SUPPORTING ACTIVITIES

One important facet of industrial operations in an area is the availability of certain services contingent to the type of manufacturing process. These services in the aggregate are an absolute necessity to the industry and may actually determine the entrance, retention or termination of the industry. In this respect, Montana is no exception. Although it is not primarily a manufacturing state, the basic services are here. The problem is in the refinement of these services. The lumber industry developed gradually in Montana, and with this development the services and supply organizations expanded to meet the needs. This slow development presented no basic problems. The picture changed in the past ten to fifteen years with a rather rapid expansion of all activities. This placed a strain on most of the basic service organizations throughout the state.

To complete the general treatment of the forest products industry, a brief discussion of the requirements of the industry for services is necessary. While this discussion will only scratch the surface of the picture, it will provide some basic concepts of the importance of these auxiliary organizations. Some of the more important parts of auxiliary services and supplies that will be treated are sources of capital, labor, equipment, and general servicing agencies.

CAPITAL AND FINANCING OPERATIONS

Financial capacity plays an exceedingly important role in the industry's operations. They must have some source of ready money available to meet operational needs, plant renovation and expansion. There are many sources open to firms and several methods of acquiring the

funds for plant and operation expenses, depending upon the size of the firm's operation and its contacts. Corporate branches are usually financed through the parent firm.

The acquisition of funds can generally be classified in several broad categories. The first, and least used in Montana, is issue of stocks or bonds. This has been used on a limited scale because of the poor market for investment in the lumber industry in general. Individuals with available capital have been extremely reluctant to invest in any sawmill operation. Perhaps, because of the history of the industry, the risk is considered too high. There is some financing in this manner for renovation of existing mills to protect the committed investment. Very little, if any, capital is raised in this manner for expansion and none for operating capital.

The second and main method of acquiring capital is through bank financing. The amount and degree of this varies with the individual firm, both by size of operation and by available contacts of the firm. Even when these are optimum it has been difficult to get money for any major expansion of the firm. Most of the small- and medium-sized mills in Montana are under bank obligation now, so money for minor renovation, day-to-day operating expenses, and equipment replacement is not difficult to obtain once credit has been established.

A third and rather popular method of financing mill operations is by individual and group participation. Individuals or groups of individuals pool their capital to provide a firm with the requested amount. There appears to be no set number of individuals that pool or any set pattern for this type of arrangement. One Montana mill is financed by

a family, while another is financed by a group of four individuals. Individuals participating in this type of financing usually have capital available from other business enterprises. They need some type of outlet for reinvesting this because of tax purposes.

The size of the operation plays an important role in deciding where to finance. The small- to medium-sized mills are usually financed through local banks. If the loan requested is too large to be handled by one bank, a second bank may be called in to aid in this financing. Also, this bank may request aid from the "Minneapolis Wall Street". The credit preference with local banks depends almost entirely on the individual or firm requesting a loan.

The banks generally favor working capital type loans to loans for replacement. The working capital loans are short term, with either lumber or logs used as collateral. These items are saleable. Equipment is usually specialized and difficult to sell. If the bank must act upon a loan, it is generally easier to go in and manage the firm than to try to sell the equipment used as collateral. This raises the administrative costs of the loan for the bank and consequently the interest rates are higher. Currently, the interest rates run from six percent for a warehousing loan and seven and a half percent for an equipment loan.

Local banks use, in addition to equipment financing, two types of collateral. One is inventory, which covers a certain amount of lumber or logs placed by the mill for collateral. These items are impounded and designated. This method is termed secured financing or, commonly, warehousing. The product warehoused is not available to the mill.

It belongs to the bank. When the loan is paid, the bank releases the collateral. This method is by far the most popular financing system in Montana. Most firms use it to overcome their spring breakup problems. This type of financing allows the firms to build up a supply of logs to cover the period when no logging activity is being carried on, thereby eliminating costly shut downs.

Banks generally prefer logs, instead of lumber, as collateral because logs are easier to dispose of, and are anxiously awaiting a Supreme Court decision concerning loggers lien to determine what revisions in the warehousing program may have to be made. In addition to warehousing, banks make a very limited number of unsecured loans. These are determined individually and provided only for selected customers.

A second method of financing sometimes used is invoice financing. The operator requests a loan on the basis of an individual order. The procedure here is for the operator to show bank officials the sales invoice for the order, together with the bill of lading. The bank checks the purchaser's credit standing and makes the loan. Up to 80 percent of the value of the order may be loaned on this basis at 7 to 7 1/2 percent interest. Mills use this to pay off loans and release warehoused lumber or logs.

Most local bankers feel that more effort should be expended towards the demand side of the market. This involves new uses for lumber and more aggressive market operations. They also feel that current economic indicators point to larger, more efficient mills. These are some of the reasons for refusal of expansion loans to operators of medium- and

small-sized mills. They are, however, ready to do business with the industry. By loaning selected mills money, they also establish the business accounts of the firm.

While the small- and medium-sized mills obtain their credit from local banks, the large mills secure theirs primarily from outside the state. The majority of this financing is done in the Minneapolis banks. Loans secured from this source are handled essentially the same as the others. The banks in this case secure collateral through mortgages. These loans, of course, are long term and much larger than local loans.

Generally, these out-of-state loans are made on the basis of the ability of the manager. If he has a good reputation and has made money, he is able to secure almost anything he needs. However, loan preference may be based on the type of product produced. Plywood, for example, is a better product for security than lumber. The general policy of the Minneapolis banks is to work through a local bank when possible. This provides an organization closer to the operation; checking can be done more accurately and efficiently.

Capital resources for sound and established Montana industry are good. These mills are able to secure about anything they need. There is a trend in both local and out-of-state banks to examine lumber industry loans, especially for expansion, with a great deal of care. Credit on marginal operations is virtually out of the picture from banking sources.

SOURCE OF LABOR

Montana does not have a ready supply of available skilled labor. Chapter II discussed, in a general way, the trends and basic break-down

of this labor supply. The manufacture of forest products requires a large number of rather skilled laborers. In the lumber industry these skills have been acquired through a long period of gradual growth and expansion. As the industry grew, so did the labor supply. There has been a considerable exchange of employees among the older mills for qualified individuals over the years, but essentially it has now stabilized. In the non-skilled labor force, there is a high degree of movement, especially in the medium-sized mills. This, however, is not a serious problem. Most of the movement of both skilled and unskilled labor remains within the industry. Because of the nature of the work, very little re-education is necessary by the individual firms. Judging from the narrative reports, the supply of labor is not so good that the door is closed for a good skilled employee. This is the position in western Montana for lumber manufacturing.

Eastern Montana is another situation. Industry has moved into this part of the state only recently. It has had some very serious labor problems. Because of the scarcity of good labor from local sources, many of the mills have imported key personnel from the Pacific coast. This comes as no surprise because the majority of the mills in this area migrated to Montana from the coast. They have had to rely to some extent on local sources for their unskilled labor. This need has usually been filled by excess agricultural labor force. This accounts partially, at least, for the absorption of the excess agricultural labor supply noted in Chapter II.

An example will illustrate the situation. One mill recently established in the eastern part of the state imported its entire labor force.

This amounted to about 65 employees. The manager stated that it would have been impossible to place the mill in its present location on a local labor supply basis. He does, however, hire a certain amount of unskilled help locally and has found them unsatisfactory. This illustration points out a problem in any major expansion of the industry. Wages in the industry are relatively good. The rates run from about \$2.00 per hour for unskilled employees, to as high as \$3.25 for top skilled labor. The average wage runs in the neighborhood of \$2.50 per hour. These wages are fairly uniform throughout the lumber industry, although not all mills are unionized.

Montana industry is not a tight union area. The local unions are generally understanding and flexible. They know the problems of industry and will maintain a sensible relationship with management. They are willing to arbitrate with management over wage and benefit disputes when allowed to do so. They are not, however, allowed to do this on any large scale. The union headquarters usually dictates union policy and determines the action of the local unions. It decides how and when to strike and the bargaining techniques. The local vote appears to be on a token basis only. This type of operation has generally caused hardship on both labor and management in Montana. It is questionable whether the raise in wages granted labor or the increase in fringe benefits actually are tied to labor's productivity. If it is not, this places the firms in a position of increasing production costs and reducing a declining profit ratio.

The woods labor force is handled on a different basis than that of the mill. Almost all labor employed in the woods is on a contract or

"gypo" basis. They are paid on the amount of volume produced--usually by the thousand board feet hauled, cut, etc. When the industry was at the peak just after World War II, any individual who could run a power saw could find work in the woods. This mass influx of people in the woods presented a problem in quality control in woods operations. The skills in the woods work dropped considerably. Now, with a decline in production, there appears to be an excess supply in the woods. Industry is now very selective in choosing its gypo operators.

SOURCES OF EQUIPMENT

Equipment and equipment service plays an important part in the operation of any industry. Not only does industry require a source of equipment, but it also requires a good service organization to supplement the equipment. When a machine breaks down, this may shut down an entire mill, with a consequent loss in production. Repair service must be available to the industry on a reasonably fast basis.

There are several large equipment companies that have franchised dealers in Montana. There are members of the forest products industry on the board of directors of these equipment companies. There are also companies located in Spokane that do a large Montana business. One of the largest sources of business in equipment is the gypo operators.

Generally the gypo operators are small and have no real source of capital. The larger equipment companies will finance their purchases. The company generally requires a two- to four-year contract with the purchaser. Under these conditions, the purchaser does not receive title until the contract stipulations have been met. The purchase of new equipment usually requires a down payment of 20 to 33 1/3 percent,

depending upon the credit rating of the borrower. Purchases of used equipment usually require a higher down payment of 30 to 50 percent. A standard contract clause included in most contracts provides for a "skip" period which allows the logger to skip payments during that time when it is almost impossible to work in the woods, usually January through May. The rates of interest of these contracts run from 6 to 8 percent per year depending, again, upon the credit rating of the purchaser. The larger mills do not procure equipment on contracts such as these. They have established purchasing programs and deal in the conventional industrial manner.

Equipment dealerships have become a lucrative business in Montana. The ability of the equipment company to judge its purchasers reliability has become an art. While the degree of credit is not directly tied to the national market, local production and economic indicators are used. During the 1958 market slump, many of the dealers were caught with a number of equipment contracts outstanding, and purchasers were unable to make payments. Rather than repossess the equipment, they refinanced.

Many of the mills go outside the state for large equipment. The majority of these mills have moved from the coastal area but have retained their coast contacts. They feel that local equipment rates and services are too expensive and that they can do better outside the state.

OTHER SERVICING ORGANIZATIONS

Other service organizations are usually an established part of the community. They range from power supply to transportation and communication systems. While the standards of services provided do not usually

play an important role in the establishment of industry in Montana, they do cause minor irritations and dissatisfaction. These services have grown with the industry. This has been a gradual growth, based upon the requirements of the industry. With the increase in the number of large corporations, the services that were once considered adequate, now become obsolete. The larger organizations have a different concept of their importance and as a result, a different set of standards for adequate service.

One example is the telephone repair service. Although the phone system is adequate, the repair service is not. One company manager complained that when the phones went out, the telephone company was slow in servicing. They gave local home phone repair a higher priority. The company depended upon the phone service for contact with its brokers and markets. This is not a major factor, but it indicates that poor service facilities can cause irritation to the industry. Another example dealt with power supply. The mill had hooked into the local power supply as a primary source of energy for the mill. This was a rural line and they were having difficulty getting a consistent supply--another irritating problem in production.

While these problems are not often serious, they do cause irritation to the manufacturer. If the industry were to expand with any degree of speed, then the service facilities would undoubtedly be overextended until such time as they could expand.

CHAPTER VI

THE MARKET FOR PROCESSED PRODUCTS

The market for finished forest products is the final link between the processor and his ultimate goal--that of consumption. The steps of the Montana forest economy have been traced to this point in preceding chapters. It is realized that the market for raw material is located within the state. To a limited extent, the processing firms can and do exert a certain amount of influence on the price and quantity of this resource. It has also been established that the firm's very existence depends upon the position it holds in the finished-product market.

It has also been stated, or implied at least, that the Montana firms have had very little influence on the national market for wood products. What is this market and how does it operate? These are questions that have a great deal of significance to Montana industry, whether it be pulp and paper, plywood, or the old standby, lumber. The national market is important because the majority of the Montana mills use it as a source of outlet for their production.

In Chapter II the effects of fluctuating demand in the national market and the consequent alteration of Montana's production was discussed. This discussion generally set the stage for brief analysis of the national market for wood products.

Several points brought out in the discussion in Chapter II should be stated briefly before going on to the type of market Montana industry is faced with and some of its ramifications. First, the Montana industry has no appreciable influence on the national market. Second, the

major fluctuations in this national market have a very definite effect on Montana production. Third, Montana's advantage in the national market is located in the eastern United States. These facts are applicable to lumber, plywood, and pulp and paper.

WHAT TYPE OF MARKET

In relation to the national market in general, there has been considerable controversy concerning the economic classification. Duerr(5) describes it as essentially pure competition. Others have described it as monopolistic competition. It appears to this author that the market has gone through some serious changes over the past decade that have materially effected the classification. During the early period of market development, the industry was processing mostly lumber. The entire United States economy was developing rapidly and the demand for wood products was rising steadily with the aggregate economy. During this period, the substitutes for wood had not been perfected, and for most construction purposes wood served as the prime product. As other industries perfected good substitutes, the lumber economy dropped. There was competition, eventually, within the industry to further increase the relative position for lumber. During this period, the woods products industry had a national market under relatively perfect competitive conditions. The characteristics for this type of market may be brought to mind(16):

1. No one firm in the industry may exert any more advantage on the market than any other. This was characteristic of the woods products industry, especially lumber. This industry was composed of many small producers.

2. There was complete freedom of entry into the industry.
3. There was no product differentiation. Lumber was lumber, regardless of the producer.

This third characteristic brings about the controversy.

As the industrial position altered, the lumber industry was faced with a difficult competitive problem. Many of the original uses of wood, generally taken for granted, were being replaced by substitute items. The characteristics of lumber and its physical appearance remained unchanged. After World War II it was apparent to the industry that some drastic steps had to be taken to retain the current demand for its product. In Montana this was done through all types of services added to the lumber product. The actual product remained unchanged, although new uses for lumber were being stressed. This new service took the form of adding to the convenience of the user, rather than as price cuts. Shipments were tailored to contractors needs. Orders were held at the mill ready for shipment at the contractors request. Consulting advice was provided to help the individual obtain the most from his lumber. Do-it-yourself kits were made for home consumption, with free plans made up for all types of home projects. Financing was handled by many of the larger companies.

MARKET STRUCTURE

All these added attractions were designed to differentiate one product from another, and one firm from another. To help identify their products, most Montana mills end-stamped their product with the firm's name. While this was taking place in Montana, the remainder of the industry was following similar patterns. All this activity was designed

to create a product differentiation in the minds of the buyers. Apparently it was effective. Many Montana industry people have stated that they have acquired numbers of consumers who are definite and continual repeaters for their products. This creation of product differentiation has changed the market to one of monopolistic competition rather than the perfect competition found earlier in the development of the industry.

What affect has a change in market classification had? It has not only forced the mills into a more competitive position in the aggregate, but has caused a considerable increase in the competition between mills. Montana industry, then, is faced with keen competition for its market position, both from substitute products and from each other. This is one aspect that has caused the relative profit ratio in the industry to decline. Unfortunately, the actual workings of monopolistic competition have not been established to any high degree, although the model has been explained in detail by Chamberlin(4).

Unfortunately, a large part of the Montana industry has held a rather complacent attitude toward this market. In the process of interviewing mill operators, there was very little discussion of the market, and more specifically, the workings of the market. Only some of the larger organizations were aware of the market problems and were working toward their solution.

From this lack of basic interest of the industry in relation to the market operation, one would deduce that the demand for lumber products has been, and will continue to be, adequate. Lumber has always been sold and will always be sold. This may be the reason for

industry's complacency. Marquis(9) discusses this attitude as one of the fallacies in the treatment of the product market. He further states that underlying this philosophy of unlimited demand for forest products, is the basic premise of indispensability of wood. To temper this approach to demand, one has only to look into the many substitute materials that have succeeded in shaking the very foundations of the concept of unlimited demand and wood indispensability. Aluminum doors and siding for homes would be an example.

The wood products industry certainly is not unique among industries in this country as far as demand is concerned. It would be very difficult to conceive of a situation where there is not change in consumer tastes and needs. How and why the philosophy of sustained demand for woods products has persisted over so long a period of time would make an interesting study. The fact that a shift in the market structure has placed more emphasis on the market and the firms position in this market has brought to light a new concept, in the effort expended by the firm in building up its demand curve.

During the postwar period the lumber industry was in a relative boom period. Regardless of the quality of the product the firms had no difficulty in marketing their products. Most of the Montana mills were producing at capacity and still were not able to meet the demand requirements. There was no real concern about markets.

About 1950 the boom started to wane. Now the firms are beginning to realize that they must consider their positions in the market. In order to retain their optimum production the firms have to participate aggressively in the market. This requires a shift from an unlimited

demand concept to one of market orientation. Rather than produce just lumber, they must adapt their products to consumer tastes. They must sell their products. It must be remembered, however, that this new market structure is only in its infancy and not all firms consider this demand adjustment as being the normal pattern.

MARKETING

With this change in demand, the Montana industry must make adjustments to retain its relative advantage. Miller(10) advocates that the industry must become market oriented and not remain production oriented as it has been in the past. With a major adjustment in lumber prices, the firms must utilize every advantage at their disposal to make a profit. This means that the firms are in a price squeeze situation. Competition will prevent any major price rise, while the costs of production will probably rise slowly. This means that the firms will have to adapt their products to meet consumer demand. This may require a completely new approach to the manufacturing of lumber. In addition, this may also require firms to seek out other markets that will supplement the lumber product. This will require a high degree of vertical and horizontal integration in the mills. While the adjustment of the firms to this new market situation will not take place over night, it should certainly be contemplated now. Miller(10) indicates the steps required to accomplish this task:

1. The company must convert all policy-level executives to the market philosophy. This will provide a welcome climate for the marketing staff.
2. The marketing individual must be provided authority to carry out the program.

3. The marketing unit must be given complete control of all aspects of the job.
4. There must be functional integration of all activities of the firm. This is a relatively simple task in a small organization, but complicated in a large organization.
5. Company plans and policies must be tailored to fit the new marketing plan of the firm. This step may take considerable time to accomplish. Most firms are well oriented toward production and re-orientation is always a difficult task.

Once the firm has undertaken this approach to the problem of demand, many avenues to profit may evolve. While this is only a very brief treatment of the problem of market development, it does point out the necessity for a change in attitude toward the entire field of production. It places the industry in a positive relation to the market; a relationship which will maintain the profit ratio of the firm through active participation and insure a more healthful forest products industry for the future in Montana. When industry states that the gravy train is over, it is at the cross roads. It has two basic alternatives; to sit upon a declining demand (or price) market, or to become active and maintain its relative competitive position by creation of new products and increasing the sale of existing products.

OTHER FACTORS RELATIVE TO MONTANA'S MARKET POSITION

We have discussed the market structure, the general effect of this structure on the Montana industry, and the possible future trends of lumber, Montana's leading forest product industry. In addition, there are several other factors that contribute to the industry's position in the market. These other factors include such items as the present

selling organization of industry, the transportation of the finished products to market, and the relationship of demand cycles on production.

While there is very little pattern to the organization of industry in Montana as a whole, one system is rather consistent throughout. This is the use of brokers for lumber sales. Almost all of the firms contacted for this study employed brokers to some degree. Many types of arrangements are made between the brokers and the individual mills. Two of the most common arrangements will be discussed here.

Normally the brokers fees are set in a 5-2 arrangement. The fee is broken into a 5 percent charge on the value of the product (total prices for the sale less 5 percent) and the 2 percent is a flat handling charge. This figures out to be about 6.9 percent total brokerage fee for selling the product. In the lumber business the brokerage system has been traditional. One major type of brokerage operation is for the broker to purchase a certain amount of lumber and then sell it. When he sells, he makes his profit. This requires a cash outlay for the lumber and the broker is subject to losses due to market changes. Another method is for the broker to arrange contact between buyer and seller, without actually purchasing the lumber himself. The buyer and seller make the financial arrangements, and once the sale is consumated, the broker receives his fees.

Each mill has its own arrangement with the brokers. Some have one or two selected brokers to sell only their products; some use the entire brokerage system; and other mills have a combination salesman-broker arrangement. This varies through preference. One fact is clear, the use of brokers for sales is the rule in Montana. For the medium-sized

mills, this eliminates an expensive sales force; for the large mills, this supplements their sales forces. It provides a market contact for areas that would not support a regular salesman.

Montana is well situated from a transportation standpoint. Three railroads, Northern Pacific, Great Northern and Milwaukee, run across the state, connecting Montana points with all east-west points. In addition to the railroads, there are numerous trucking lines that run through the state which also connect with east-west points of the nation.

Forest products have generally been shipped by rail since the establishment of the railroad system. In fact, this was one of the principal factors in placing Montana in the forest products business. Although there are adverse freight rates, generally poor freight service, and lack of flexibility in delivery by rail, most of the lumber shipped to eastern markets has been shipped by rail. There is, presently, a definite trend toward utilization of trucking services. There are several reasons for this change in transportation.

First, the railroad freight rates do not provide an advantage to Montana mills, in spite of the fact that they are closer to the eastern markets than are the west coast mills. An example of the costs of one mill in western Montana--in the Kalispell area--will illustrate the point. Present rail rates from the Kalispell area to Chicago are \$1.35 per hundred weight. The west coast rate is \$1.38 per hundred weight; an advantage of \$.03 for the Montana mill. Beyond Chicago, the rates are the same, or \$1.48 per hundred weight. They do have a \$.03 advantage in the southeast.

Second, the railroads do not provide the flexibility in shipment that trucking does. To enhance their market position, some Montana mills deliver to the job on large orders for housing projects. This is not possible by rail. Some of the mill owners have found it more economical to load trucks than box cars. There have also been complaints that rail service is poor, cars are lost, and in-transit time is long.

Truck shipments have generally been on a back-haul basis. Empty trucks pick up loads on their way back to the east. There has been some complaint by industry of the dependability of this type of shipping. The trend, however, has been toward more truck shipments.

In Chapter III the market relationship was treated from a distance. The period of time covered years (see Figure 1). This method of analyzing the market is used to plot the general trends of the industry. There is another method of looking at the industry in a shorter time period. This is the business cycle and building cycle approach. Since the bulk of the forest products shipped to eastern markets constitute a derived demand, the production process is highly dependent upon the building cycle. The business cycle is dependent upon the general business activity or climate. While it is certainly an important aspect of analysis, it will not be covered.

According to Duerr(5), the building cycles average about forty months in length. They indicate the fluctuation of the market upon the general building activity. While these cyclic movements in building are independent of the lumber industry as a whole, they do have a definite influence on price and production. These cycles also have a direct

effect on the plywood industry which, in many segments of the forest economy, is competing with lumber.

Very little work has been done in the analysis of the building cycle and the Montana forest product production. This might give some important clues to the demand picture in Montana. It can be said, however, that building cycles have a direct influence on Montana production. How the industry reacts is unknown. Another comparison would be that of the Montana building cycles and business cycles in relation to state-wide sale of the products. These cycle effects can be traced all the way down the processing ladder to the resource and the management policies of this resource.

SUMMARY OF THE MARKET

As seen from the past discussion, the market for forest products is a complex one. Generally speaking, it is in the process of transformation. The general market picture for lumber is declining. Roughly, the per capita consumption has dropped during the past fifty years by about fifty percent. The industry has had to make serious adjustments in production techniques to compensate for a decline in profit ratios. These facts have been slow to hit home. In Montana there has been some realization of the seriousness of the situation. The larger organizations are in the process of re-orienting their concept of business from one of production to one of consumption. This re-orientation has been, and will be, slow and painful. It is necessary, however, for survival.

The plywood industry is generally in better shape. It has succeeded in capturing many of the lumber markets. While it is subject to

the same derived-demand conditions as the lumber industry, it has succeeded in maintaining a better market position through positive action in marketing. It has maintained a higher profit ratio through utilization of the latest technological advances in plants and equipment. Only three plywood plants are located in Montana at the present time, but individuals in the lumber industry are investigating this avenue as a possible source of horizontal plant integration.

Another factor enhancing the plywood industry's position is the fact that there is restricted entry into the industry. This is due to the relatively large capital requirements needed to establish a plywood plant. Only large organizations can afford to undertake such a venture. This fact may discourage large scale horizontal integration of plywood into lumber operations.

In the field of pulp and paper it is too early to tell what will happen. There is only one plant in Montana and it obtains its entire raw material from mill waste. The supply of this raw material seems to be adequate at present.

CHAPTER VII

OUTLOOK FOR THE FUTURE

SUMMARY OF FINDINGS

The forest products industry in Montana is going through a slow, but unmistakable transition period. The character and type of industry is changing from principally a lumber economy to one which is diversified. The rate of this transition will be governed by the rate of increase in competition for raw material. The recent influx of plywood companies is only a start. Pulp and paper operations will increase also. While this diversification process will cause a considerable degree of adjustment in lumber, eventually there will be a balance between all types of production.

One aspect is relatively clear. There is an adequate supply of the raw material in the state to satisfy the requirements of a rather large expansion program in the forest products industry. This is especially true of firms utilizing small diameter timber. This expansion program can take place under present allowable cut calculations. As noted before, these are subject to increase when more data become available. From a raw material standpoint, Montana is in good shape. With the extremely competitive stumpage situation on the Pacific coast, Montana's position is further enhanced.

Because of a series of rather critical price declines in the lumber market over the last ten years, the lumber industry is in serious trouble. In fact, it has been in trouble for a long time. Together with other purely competitive industries, lumber has been classed as a

sick industry. As noted in the body of this study, there have been trends in the alteration of the market structure or classification of the lumber market. These trends indicate a movement toward a monopolistic competitive structure. The movement is slow, but attempts to differentiate the individual product are clearly visible. This trend should grow in strength and stabilize the demand for lumber through the individual firm's marketing processes. This market alteration, coupled with the transitional nature of the forest product industry in Montana, will cause a certain mortality in lumber mills. From outward appearances, the smaller- and medium-sized mills will take the brunt of the losses.

There are no indications, however, that this mortality will be one hundred percent. Stud markets will tend to furnish some mills with outlets for their products, while tie contracts will carry others. Some of the large mills may continue to purchase rough green lumber from small mills. These demands for small- and medium-sized mill products will maintain a limited number of mills.

There are several reasons for a high mortality rate in this group. First, the availability of credit for expansion and renovation is very limited. Second, the ability of this size of mill to adjust to a market orientation is extremely difficult. These mills possess neither the ability nor the resources to compete with the larger, more efficient mills. Third, the competition for the raw material will become prohibitive to the small mills. This brings about a question in public policy. One questions the results of the Forest Service policy of community stabilization. Does catering to these small mills actually help the

situation? Is this policy actually a two-headed monster, prolonging the inevitable, or does it actually make the small mill competitive?

Because of the complexity of the motives and the social implications, this will not be treated here.

This transition period for industry will hurt some people and even some communities, but this is to be expected in any industrial readjustment. The long-term results will benefit the state's economy; it will tend to stabilize the forest products industry as a whole. It will also eliminate the operations that are not efficient; therefore reallocating this resource to a better or higher use.

With this discussion in mind, it is well to briefly summarize the indicators for Montana industry before discussing any predictions of what may come.

1. The national market is showing some indication toward a readjustment in character or structure--one from pure competition to one of monopolistic competition.
2. Montana industry is in the process of a transition from lumber production to more diversified products. This diversification is due, partly at least, to increased competition for raw material on the Pacific coast.
3. The raw material supply for forest product production is adequate for existing levels of production and perhaps more.
4. The current labor supply is adequate for current levels of production, but not for any major expansion of industry. This is especially true for skilled mill labor and woods workers.
5. The lumber industry is going through a change in philosophy. This change is from production orientation to market orientation. At the present time this philosophy change is basically located in the larger companies. The results of this "new" concept in wood-using industries tends to change the firm's operations--a readjustment in emphasis.

6. Montana industry is dependent upon the national market for demand. This demand fluctuates with the building cycles. The demand for local consumption is based upon local building cycles. Local demand is satisfied, generally, by the small mills, although one large mill is expanding its retail outlets in Montana.
7. The profit ratios in the lumber industry are low and declining. This ratio in plywood and pulp is still relatively high compared to other industry and high in comparison to lumber.
8. The raw material is essentially located on government land. The Forest Service is the largest landowner within the state. Its policies and procedures have a direct effect upon the industry. Its basic philosophy in land management is multiple use.
9. There are strong influences building toward adjustment of forest land use patterns. Pressure for recreational use of all parts of the forest has become increasingly strong. This, perhaps, will have direct influence upon the supply of commercial timber to industry.

There are many other minor points pertaining to the industry and its resources that have not been treated in detail. The relationship between the raw resource, the industry, and the economy of Montana is a complex one. There are no established, clear-cut patterns that make analysis simple. Operations, philosophies, and attitudes have been built over a period of many years. Methods of operation become traditional. Men, and their habits and desires, are complicated and constantly changing. Since the forest resource and its conversion must satisfy a human want, it is only natural that man's wants and needs must be considered in predicting future trends. Not only will the local wishes have an influence on both the resource and the industry, but the national attitudes that govern the wishes and priorities of public land use and consumer tastes play an important role. This study has not

attempted to analyze these attitudes in detail. It must be noted, however, that what happens in Montana is dependent upon them. No predictions can be made without considering them at least in the abstract.

OUTLOOK FOR THE FUTURE

When an author is placed in the position of making predictions about the future, he uses all the facilities available to him in making the decisions. In addition to the facts, figures, indicators and common sense used, there is involved a form of clouded binoculars. Since, in economics, the actions made are the results of human endeavor, no one can determine, with positive accuracy, the pattern of development in the future. One can only make logical assumptions on the basis of information available. If the analyst is fortunate, some of his observations may be borne out. If he is unfortunate, his work passes into obscurity. It is with this philosophy that these predictions of Montana's forest products industry are made.

In predicting future activities, there are several natural areas in which prediction can and must be made.

1. The area of consumer demand for Montana products.
2. The area of raw material supply in Montana.
3. The relationship of the many forest uses to commercial timber production.
4. The relationship of current policy to future development of the aggregate wood-using industry in Montana.

These have been arranged in order of importance, not from a problem magnitude aspect, but from a development aspect. The main problem of Montana industry is essentially one of demand first, with the others inter-related to the demand.

It has already been pointed out that the forest products industry is in the process of transition. This transition is of two basic types. First, the lumber market structure is changing from one of perfect competition to one of monopolistic competition. This, in effect, causes a change in the philosophy of the firm's actions regarding the market. As this trend gathers momentum, each firm will be forced toward a higher degree of competition with every other firm. This competition will not only appear in raw material acquisition, but in the national market, too. In fact, the main emphasis will be there.

In order for the firms to be competitive, they will have to participate to a much higher degree in marketing techniques. This, initially, will result in a lower profit ratio. Rather than participate in a national advertising campaign for lumber, each firm will carry on its own marketing program to seek out and hold markets for its products. The first signs of this change have been indicated by the fact that many lumber industry people are dissatisfied with the present national advertising association program. They are more concerned with their individual product differentiation in the market. It should be added here that other signs include a decline in broker use for marketing lumber on a national basis and the general decline in retail lumber yards as such.

What does this mean to Montana's lumber industry? First, it will ultimately tend to stabilize the industry after the initial readjustment period, provided that current trends remain the same. Because the firms will have to increase their costs to include a form of marketing function, the smaller- and medium-sized mills will be under strong competitive pressures both from the market and the raw material standpoints.

This situation will prevent any major formation of excess working resources for these firms. Any minor fluctuations in the market will tend to wipe them out. Any severe competition for the raw material will weaken their position. This type of competition is found now and will undoubtedly increase with time.

The end results for the lumber industry will tend to be a number of large, efficient sawmills. Their advantage in the market will be found in their diversification of products and their ability to secure and hold markets through a market oriented operation. This trend in industrial development is not new in many other industries. It has required a long period to mature in the lumber industry. One of the major reasons for this recent development has been the active, aggressive manifestation of the plywood portion of the wood-using industry.

The second phase of Montana's transition in the wood industries is the increase in number of plywood plants. During the past five years the plywood industry has moved into Montana. This migration to Montana has been caused essentially by the high competitive status of stumpage on the Pacific coast. There are three mills in the state now; all are located in western Montana. While their influence on the national market is negligible, it has had a terrific impact upon the lumber industry in Montana. These mills have been able to out-bid lumber mills on the west side because of their favorable profit ratios. It appears that there will be no major increase in the number of mills in the population centers, but mills may be established in the outlying areas. In the event more mills are established, the competition for the raw

material in western Montana will become intensified. Some of the lumber companies are aware of this possibility and are investigating the feasibility of integrating plywood into their lumber operations. The survival of the lumber industry may, in part, depend upon this type of integration. There appears to be only a remote possibility for establishment of many plywood plants in eastern Montana. Technical difficulties have hindered the use of small logs in plywood production and real problems arise in small-log logging.

A third source of demand for forest products originates, indirectly, from the pulp and paper industry. Currently there is one pulp plant in Montana. This plant purchases only mill waste from sawmills. This does provide an outlet for a limited amount of sawmill waste and consequently is a source of minor revenue for sawmills. Any expansion along these lines will greatly enhance the economic importance of Montana's forest products industry. From a raw material aspect, Montana has a virtually unlimited supply of pulp material. With the exception of the White Sulphur Springs area, the entire eastern portion of the state has been untapped for pulp development. In addition to this, western Montana provides an excellent source of supply. While it is too early to tell, pulp expansion may be possible in the near future to a limited extent. For any major expansion to take place, current public attitudes toward this type of operation must change.

In the field of minor forest products, the future does not appear especially good. The local markets for posts and poles, etc., is limited and it is doubtful that it will materially improve. Christmas tree production has been a flourishing business in Montana for some

time. The future for this industry is shaky. There has been a serious consumer taste change. Artificial trees have made strong inroads into the market. Many of the midwestern states have established plantations for the express purpose of Christmas tree production. Montana's wild trees must compete with these plantation trees, in addition to the artificial ones. Both quality and distance from markets are against the Montana trees. All outward appearances indicate a decline in the Christmas tree market for Montana.

In summary, the demand for forest products may remain the same or increase slowly in the next decade. There may be a marked change in the composition. The degree and momentum of this change in composition, and the increase in growth will depend upon two circumstances; the ability of the local industry to adjust to new situations, and the reaction of the national economy, especially construction. There appears to be no trends for substantial increase in the minor forest products. Pulp demand may increase, especially in eastern Montana, but it is too early to determine any basic trend.

In the realm of expansion of the raw material supply, one basic fact is apparent. The present estimates in volume and consequent allowable cut determination are exceedingly conservative. While a reasonable figure has been calculated on the government lands, very little is actually known about private land. When the forestry phase of the state-wide reclassification program has been completed, invaluable private forest land information will be available.

Under present conditions, there seems to be no raw material shortage. On the contrary, there is a surplus of some species, such as

lodgepole pine. Because of current market conditions for this species, only isolated activity has been carried out. There appears to be an unlimited supply available for pulp operations. While there has been a slight increase in past years in small log operations that will utilize this species, the surface has just been scratched.

When more intensive techniques have been adopted in analyzing the forest capabilities and potential, the total available raw resource should be much higher than present figures indicate. As better logging techniques are developed and stronger market conditions prevail, more noncommercial forest area will be reclassified and available for commercial purposes. In spite of current industrial beliefs to the contrary, the supply of raw material within the state is adequate and will permit major industrial expansion in selected fields of production. There certainly is no general timber famine in Montana, nor will there be for some time to come. Montana forest resource is still generally in the wild stage and most of the timber logged has been, and will continue to be, old growth or virgin timber. When the period of conversion has been essentially completed, a new look at the aggregate supply must be made. Under the conditions of a managed forest, perhaps some interesting problems may arise for industry.

The reference to adjustment of commercial timber acreage brings in the third portion of the outlook for the future. This is the problem of land-use allocation. In the realm of private land timber production, there has been no real problem to date. Isolated cases do appear, but they have been principally restricted to large company ownerships. The major conflict here, as well as in the government ownerships, has been

recreation of one form or another. The small landowners may prescribe land-use policies that are based solely upon their wants and desires. This is not especially true with the large company. The large company is highly sensitive to public opinion and generally attempts to include in its over-all use policies a certain degree of public wishes. As Whyte(22) says, it tries to maintain a desirable corporate image in relation to the company's actions. This has not been a serious problem in Montana to date, but every indication points toward more pressure in the area of public use of these forested areas. The problem of public use of company forest land has invaded the Pacific coast during the last decade and prevailed in the eastern United States for many years. With the present expansion of consumer tastes in the field of outdoor recreation, there is certainly no reason to believe that private forest land will not be affected.

Public lands are directly affected by public pressure. With the federal agencies participating in multiple-use programs, the pressure for all types of forest use is becoming extremely keen. The all-use concept of land management has become complex and, to some extent, confused. Throughout the history of public land management, the problem of the highest use has been subject to much discussion. Programs have been established by emotional dictates, and emphasis, in a few cases, has been misdirected. Montana state forests have not been materially affected by this redirection to any great extent until recently. Land use has been relatively simple to establish with very few actual conflicts arising. Now, with the development of a new concept of outdoor recreation and a relatively new mobility in the population, problems of

allocation of resources are fast becoming infinitely complex. The major problems appear to take the form of allocation of forest land on a priority basis according to the type and degree of use requirements. How much land must be set aside for recreation purposes? Will this reserved land reduce the amount of commercial timber available for the forest products industry? Is recreation, on any wide scale, compatible with commercial timber production? A detailed analysis has been made by Behan(2) of the complexities of multiple use management and its political implications. This investigation outlines the system by which multiple use decisions are made, and is outside the realm of this study. There are, however, the above questions that arise out of the multiple-use concept.

The answers are not readily available. With our system of government based upon pressure group action, only time will tell the true story. The relative position of commercial timber production on federal and state lands will depend upon the success or failure of the battle of interested pressure group politics, tempered by long-range planning by the responsible agencies. Outwardly at least, there appears to be no large scale threat to the present acreage of commercial forest land in government ownership. There may, however, be a reduction in the amount of land on which timber production is given first priority. Public sentiment seems to be in favor of recreational land use at the present time. Almost every citizen is interested in some form of outdoor recreation, while only a relatively few are engaged in wood manufacturing.

The final predictions are made in the area of policy and economic growth. The type and degree of policy made and carried out by Montana wood growers and users has a definite bearing upon the growth of the industry. The government timber sales and management policies may ultimately determine the expansion or contraction of the general wood-using industries. There are several points that merit mention here:

1. The size and duration of the timber sales.
2. The sale requirements or stipulations.
3. The type and composition of the sales.
4. The understanding and sensitivity of the governmental land administrating agencies to industry problems.

The ability of the landowners, especially the Forest Service, to intelligently carry out their timber activities has a definite influence upon industry's actions. The larger non-landowning mills are at the complete mercy of Forest Service policy. They must be able to obtain government timber in large enough parcels to make at least short-run plans. Without some reasonable assurance of stumpage, the mills can only have a day-to-day existence. This has been the case to date. No firm can possibly carry out short-run objectives without some assurance of timber supply.

Almost inseparable with the sale size and duration, are the sale requirements. When these are unnecessarily severe, the operating firm cannot log at maximum efficiency. The major criticism here is of the high standards for road construction. Presently, the bidders for government stumpage must be capable of building high standard roads to the areas to be logged. This makes large, expensive equipment a must

for any firm actively engaged in stumpage procurement. Sale administrators must understand industry's situation in forming the contract requirements for sales and not attempt to accomplish too many indirect goals through timber sale activities.

The types of sales play an important part in industry's planning. Every effort must be made by the stumpage selling agency to provide a variety of sales. A proper balance between winter and summer logging shows is a must if industry is going to maintain a continuous supply of timber in the pond and keep its woods crews on a relatively full-time basis. Concentrating logging in the summer to keep logs in the pond all winter can be costly for the mills, while winter shut-downs due to lack of log supply are also costly. Regardless of the mill's activity, fixed costs go on.

The formation of timber policies requires a great deal of understanding by the selling agency. Most of the above mentioned policy problems are automatically solved if the agencies have this understanding. Under multiple-use concepts, problems of land management arise. They can, however, be solved. Policy makers must possess a sound background in basic management. This comes only from their ability to recognize the problem and understand the alternatives to its solution. Too often this has not been the case. With the increasing pressure on forest land for other activities, timber management policy formulation will require even more foresight and understanding.

Industry, on the other hand, must take an active part in its well-being. Their past policies may not be sufficient to maintain them in the future. A great deal has already been said concerning this.

Trends indicate that industry must be aggressive in the market place. It must be able to adjust to new situations readily. It must always be alert to new and better methods of processing the raw material. It must be able to seek out and hold new markets. Rather than being complacent, it must be positive. Here, too, industry must possess an understanding of the basic problems--both its own and those of the resource producers. They must both work together in solving problems of mutual concern. No longer is it sufficient for industry to merely sit back and snipe at the government agencies to keep them on their toes.

The forest products industry in Montana has all the indications of a slow, but steady rate of growth during the next decade. This will not happen without adjustments in head-rig capacity. These adjustments will not be easy. The composition of the aggregate industry will change. The ease with which these changes take place will depend upon the ability of industry to recognize both its problems and alternative solutions. To take a positive attitude toward markets and to cooperate with all interested parties directly or indirectly involved with wood products and utilization, must be industry's "new look". There is no reason why this cannot be done, but present attitudes will have to change.

LITERATURE CITED

1. American Forest Products Industries of Montana, Montana Forest Facts, 1960-61 ed., Washington D. C., 1960.
2. Behan, Richard Warren, Pressure Group Politics and Multiple Use Administration, Masters Thesis, Montana State University Library, Missoula, 1960.
3. Bolle, Arnold W., The Basis for Optimum Multiple Use Management of Public Lands in the North Fork of Flathead River, Montana, Doctoral Dissertation, Harvard University, 1959.
4. Chamberlin, Edward W., The Theory of Monopolistic Competition, Harvard Economic studies, Volume XXXVIII, Cambridge, (7th ed.), 1956.
5. Duerr, William A., Forestry Economics, New York: McGraw-Hill, 1960.
6. Guthrie, John A. and Armstrong, George R., The Western Forest Industry, an Economic Outlook, RFP by Johns Hopkins Press, Baltimore.
7. James, Lee M., Opportunities for Economic Development in Michigan's Upper Peninsula, Committee Print, 87th Congress, 1st session, GPO, Washington, 1962.
8. Laber, Alfred N., Economic Analysis of Ranch Forests as Operating Units, Masters Thesis, Montana State University Library, Missoula, 1960.
9. Marquis, Ralph W., Bromides and Folklores in Forest Economics, Reprint from proceedings, Society of American Foresters' meeting, 1947. Washington D. C., 1959.
10. Miller, Charles J., Western Pine and the New Marketing Concept, Reprint of an address presented to the Western Pine Association annual meeting, March 2, 1962. Western Pine Association, 1962.
11. Montana State Forester's Office, Policy Manual, unpublished departmental manual, 1962.
12. Montana State University, Montana Almanac, 1959-60, Missoula, 1959.
13. National Lumber Manufacturers Association, Lumber Industry Facts, 1960-61, Washington D. C., 1960.

14. Smith, Adam, The Wealth of Nations, Random House: New York, 1937, Modern Library.
15. Society of American Foresters, Forest Terminology, Revised edition, 1950, Monumental Printing Company, Baltimore, 1950.
16. Stonier, Alfred W. and Hague, Douglas C., A Textbook of Economic Theory, Longmans, Green and Co., New York (2nd ed.), 1957.
17. United States Department of Agriculture, Forest Service, Development Program for the National Forests, Miscellaneous publication No. 896, GPO, Washington, 1961.
18. United States Department of Agriculture, Forest Service, Timber Resources for America's Future, Forest Resource Report No. 14, GPO, Washington, 1958.
19. United States Department of Commerce, Bureau of Census, Census of Manufacturers, Montana, 1958, GPO, Washington, 1958.
20. United States Department of Commerce, Bureau of Census, Population, 1960, Montana, GPO, Washington, 1960.
21. United States Senate Document No. 9, 86th Congress, 1st session, Full Use and Development of Montana's Timber Resource, GPO, Washington, 1959.
22. Whyte, William H. Jr., The Organization Man, Doubleday and Company, New York, 1956.