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MONTANA
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THE FOREST PRODUCTS INDUSTRY IN MONTANA

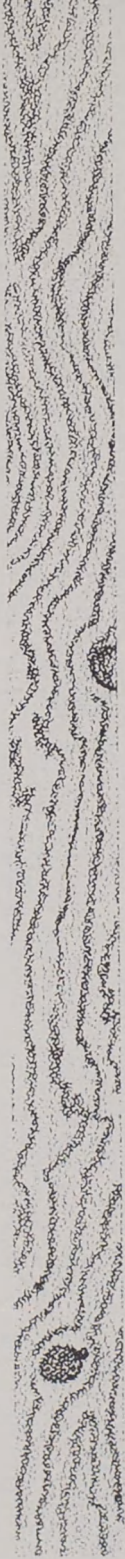
by

ARNOLD W. BOLLE
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and
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Publication designed by Elizabeth Hannum.

*Inside covers: Logging in the Blackfoot Valley in 1927—
photograph by Charles Foster (see page 16).*

**THE FOREST
PRODUCTS
INDUSTRY IN
MONTANA**

by

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and
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**Montana Forest and Conservation
Experiment Station**

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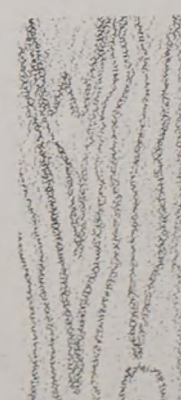
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Introduction

The following pages are a description of the forest products industry in Montana. Our objective is to offer a source of information for use by all segments of the public concerned with the industry and its place in the local, state, and national economy. By so doing we hope primarily to increase awareness of the difficulties encountered in developing and maintaining a viable industry in this region. Public knowledge of forest industry problems has for the most part been derived piecemeal from reports and incidents isolated from the structure of the industry as a whole and from its position in the broader economic pattern. These problems can only be solved if they are understood by everyone involved—businessmen, resource managers, economists, students, and laymen. If this study contributes to such understanding, its purpose will be fulfilled.

The years since World War II have been a time of unparalleled growth for the Montana forest products industry. This period has also been characterized by shifts in the relative importance of size classes of mills, modifications in operative technology, and the introduction of pulp and plywood as local products. Rapid expansion was abruptly halted in 1957, and since then there has been a leveling-off leading to readjustment within the industry. In order to comprehend the changes that have occurred and the further adjustments that may be anticipated, the study focused on several areas:

1. A detailed survey of the composition and operations of the industry from 1946 through 1963.
2. An investigation of how and why the

industry expanded and contracted as it did.

3. An examination of the conditions and management of raw material supplies.
4. An exploration of the extent to which individual firms, both large and small, might benefit themselves and the state by manufacturing new products or by using new or adaptive production and marketing techniques.

The study includes details of acquisition of raw materials, production, and marketing to primary outlets. No single aspect of the industry is given a profound and comprehensive analysis, since our aim is to outline major elements of the entire picture for the general reader.

The Montana industry was thoroughly sampled. We obtained information from reports and studies by many public and private organizations, agencies, and companies and from a large number of confidential interviews. Material was gathered from the operators and owners of all the large and medium mills in the state, most of the small-medium mills, and a representative sample of the small mills (Chapter I). Montana and out-of-state bankers, brokers, and others with direct knowledge of the industry were also interviewed.

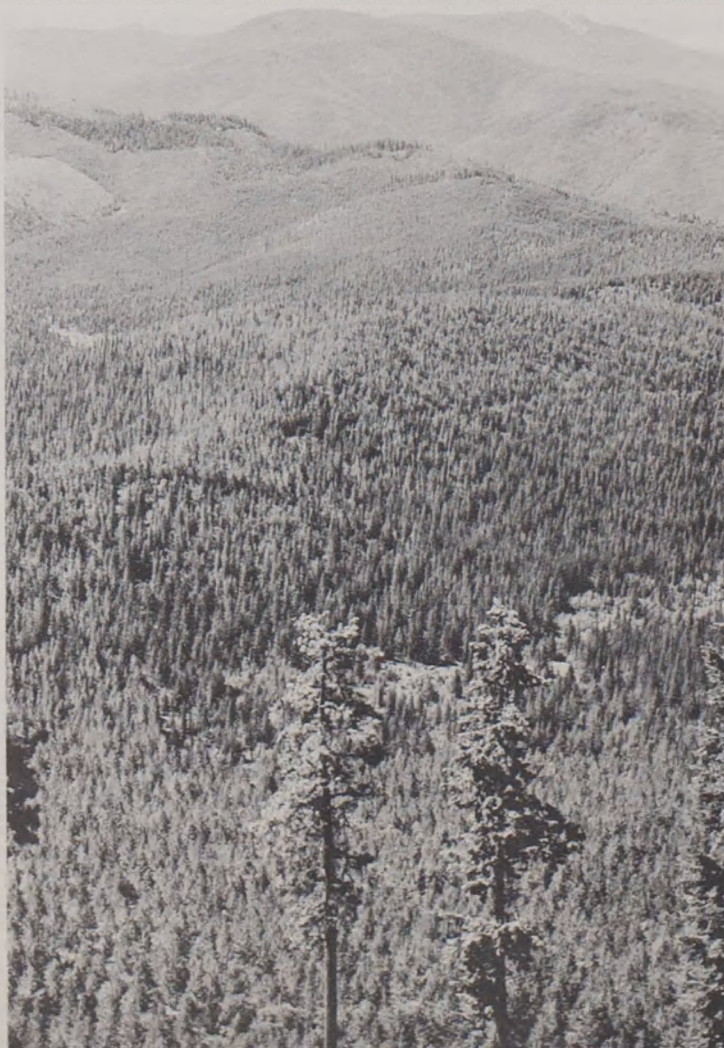
The examination of brokers' operations is preliminary, as is that of executive attitudes of financial institutions. The latter are only mentioned in passing context. The same applies to the investigation of logger operations. Logging is a large and complicated business that will require a study of its own. The problems of forestland uses other than for timber are not touched upon, excepting

some brief mention of recreation. Recreation in particular is the subject of several separate studies completed or in progress by University of Montana staff members¹¹ and others. A basic discussion of forest resource allocation can be found in *Natural Resources, the Economics of Conservation* by Anthony F. Scott,¹⁷ and Clarence W. Nelson's *The Timber Economy of the Ninth District West*¹⁴ is an excellent introduction to the forest products industry in Montana.

Several limitations of our own study and its methodology are apparent. Although interviews followed a prescribed format, our informants occasionally were unable (almost never unwilling) to provide the material sought. In other cases they were obviously

giving what they believed to be "representative" conditions of price-revenue and cost-output relations. Small contradictions appeared between interview data and the business records furnished by some companies.

The study is a reasonably complete survey of the dynamics of the industry over a critical period in history. Although a considerable amount of quantitative data have been accumulated, the qualitative responses obtained from personal interviews delineated the problems and prospects of the industry more significantly. The conclusions formed from a mass of diversified information are our own, for which we take full responsibility.



Montana timberlands.



I The Industry and the State Economy

Composition, location, and activities

The Montana forest products industry consists of perhaps 400 sawmills (including those not in continuous operation), six plywood and veneer mills, a pulp and paper mill, several pole-treating yards, some 30 or 40 post yards, an active Christmas tree industry, and a shingle mill. The major products are lumber, pulp and paper, and plywood. The lumber mills vary in size from the smallest portable mill, which produces only a few thousand feet of rough lumber annually, to the largest integrated mill at Libby, which manufactures more than 120 million feet of finished lumber a year in addition to plywood, poles, Stractan, and other products. For convenience in structuring and following this study, the sawmills are grouped by volume of annual output into four categories: (1) large—more than 50 million board feet; (2) medium—10 to 50 million board feet; (3) small-medium—one to 10 million board feet; (4) small—less than one million board feet. There are five large sawmills, about 45 each in the medium and small-medium categories, and probably several hundred in the small. All components of the industry are described in detail in Chapter IV.

Most of Montana's forest products industry is located in the forested areas of the western part of the state (Figure IV). The industry

is concentrated in the large milling centers of Missoula and the Kalispell-Columbia Falls-Whitefish and Libby-Troy complexes or in smaller centers such as Superior, Thompson Falls, Deer Lodge, Belgrade, Bozeman, Livingston, St. Regis, White Sulphur Springs, and Lincoln. Almost all of the large and medium plants in the state are in these centers, although there are numerous smaller mills wherever forests occur.

The industry converts timber into a variety of products for the local and national markets. It embraces three broad activities: harvesting of raw materials, primary manufacture into lumber and other products, and secondary manufacture of finished or partially finished products. Most of the logs cut in Montana are converted into products within the state; export of raw materials is minimal. Pulpwood bolts are shipped east from eastern Montana, and occasionally some logs are hauled to Idaho mills from the northwestern Montana border. (A larger volume of logs is hauled into Montana from Idaho.) Wood chips are shipped to Wisconsin pulp mills from some sawmills in eastern Montana and to Lewiston, Idaho, from a few mills in western Montana.

Almost the entire Montana industry is engaged in primary manufacture, for the most part rough and finished lumber, pulp, plywood, poles, and posts. The bulk of Mon-

tana's wood products export is primary manufacture to the Midwest and East. Some of the larger mills in the state engage in both primary and secondary manufacture.

Since all harvested timber is converted into another form for ultimate consumption, most of the secondary manufacture is consumer-oriented. Several products can be custom-built at the origin of supply: Missoula White Pine and Sash, a medium mill producing window frames and sashes, doors, and door frames is Montana's historic secondary manufacture plant, located near the Anaconda mill and other abundant sources of high-quality pine lumber. The trend toward more consumer-oriented products is slow in Montana for reasons to be discussed later, but today laminated beams, modular panels, molding, and even prefabricated houses are made in the state. Changing patterns of use have eliminated the manufacture of wooden boxes that existed in Montana in the past.

Importance to the state

Of Montana's traditional major industries—agriculture, mining, wood products, and transportation—only wood products has shown a substantial increase in income and employment since World War II. Montana

produced more than four times as much lumber in 1962 as it did in 1939.² Forest products stand third in regard to percentage of gross income to the state, with agriculture first and mining second (Table 1). The production value of most of the leading industries has either declined or remained fairly steady over the past two decades. Light manufacturing and recreation can be counted with forest products as having contributed to Montana's economic growth during the post-war period.

Accurate figures on income from forest products are difficult to determine because there is no central statistical agency in the state that keeps records from which these data can be computed. In the absence of such information, two different value estimates were computed for the years 1958 and 1963, the former based on various products and the latter on activities connected with the industry (Table 2). Although the two sets of data are not comparable, they do give an approximation of income generated.

In terms of employment, forest products are less important to the state, accounting for approximately three percent of Montana's active labor force in 1960. The industry had the greatest increase in employment in any

TABLE 1 GROSS BASIC INCOME IN MONTANA, 1950-51 AND 1954-62
(Items shown are in millions of dollars. Percentages shown are percent of gross basic income.)

Year	Agricultural cash receipts		Value of mineral production		Value of lumber production		Gross basic income
	value	percent	value	percent	value	percent	
1950	353.8	58.1	103.4	17.0	44.2	7.3	609.2
1951	439.7	57.4	126.2	16.5	50.0	6.5	765.7
1952	400.5	—	121.4	—	NA	—	—
1953	370.6	—	132.2	—	NA	—	—
1954	386.3	54.3	126.0	17.7	58.5	8.2	712.0
1955	365.5	44.9	167.2	20.5	73.9	9.1	814.3
1956	414.9	42.9	213.8	22.1	81.0	8.4	966.7
1957	400.9	46.8	191.8	22.4	61.3	7.2	856.5
1958	437.5	49.6	176.7	20.0	70.7	8.0	881.8
1959	426.1	47.5	167.3	18.6	86.0	9.6	897.4
1960	407.3	46.7	178.9	20.5	80.1	9.2	871.9
1961	362.3	43.2	184.2	22.0	79.9	9.5	839.0
1962	406.4	44.4	190.7	20.8	89.5	9.8	915.7
1963	403.8	—	182.0	—	NA	—	—

NA—Not available

Source: Cash receipts: U. S. Department of Agriculture, Economic Research Service, *Farm Income: State Estimates, 1949-1963*. Value of mineral production: U. S. Department of the Interior, Bureau of Mines, *The Mineral Industry of Montana in ———, Advance Summary, 1950-1963*. Value of lumber production: Estimated by the Montana State Planning Board based on data supplied by the Western Wood Products Association, Portland, Oregon. (Includes income from member mills only.)

manufacturing category between the 1950 and 1960 censuses, which helped to offset notable postwar declines in agriculture, mining, and transportation (Figure I). Since 1957, however, when the rapid growth trend in the timber industry was interrupted, employment figures have remained relatively stable.

Despite the employment stabilization, value production in the lumber industry is rising (Table 1), although at a slower rate than during the years between 1946 and 1957. This progression is reflected throughout Montana's economy: local trade and service operations in forested areas are expanding, and state transportation facilities, particularly the railroads, handle large volumes of industry freight. The level of production also creates an active market for logs, providing substantial income for owners of forestland, private as well as public. In numerous cases the period since 1946 has offered the first opportunity for revenue from private woodlands in many years.³ Recently established industries such as plywood and pulp are developing markets for new materials and services in Montana and bringing about greater use of energy resources, particularly electricity.

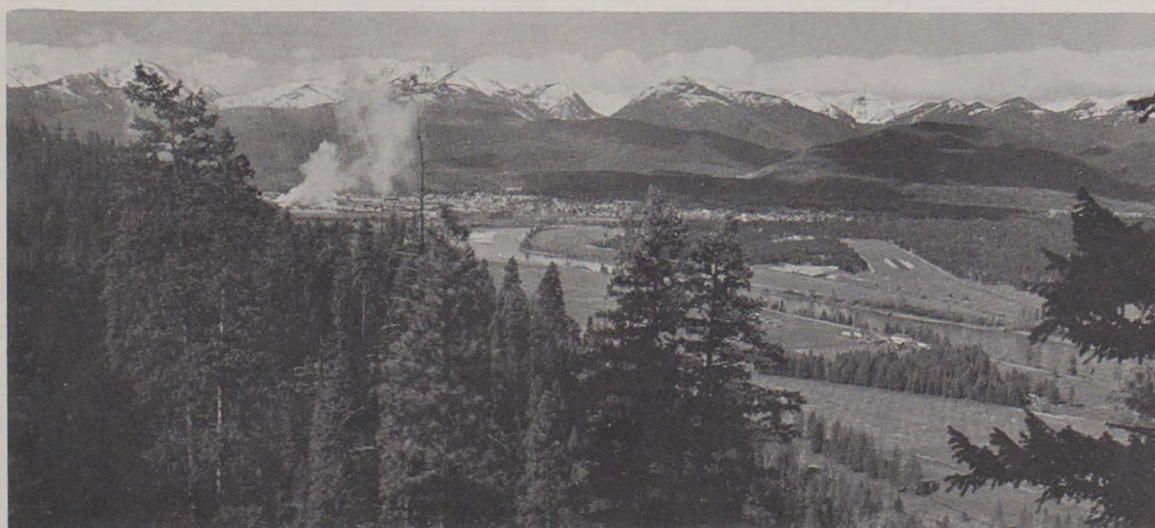
TABLE 2
MONTANA FOREST PRODUCTS INCOME

1958 ¹	
Product	Value
Lumber—942 MM ft. @ \$80/M	\$ 75,360,000
Veneer—8 MM ft. @ \$100/M	800,000
Large poles—30'—126,000 @ \$40/ea.	5,040,000
Small poles—30'—184,000 @ \$15/ea.	2,760,000
Pulpwood—27,000 cords @ \$20/cd.	540,000
Posts—724,000 @ 40¢/ea.	294,000
Fuel—180,000 cds. @ \$10/cd.	1,800,000
Christmas trees—3,600,000 @ \$1.50/bale (5 trees)	730,000
Pulp—250 T/day, 350 days—90,200 T @ \$85	7,667,000
Secondary manufacture—approximately 10%	9,498,000
Total	\$104,489,000

¹Compiled from information supplied by U. S. Forest Service, Western Pine Association, and others. (Includes all mills in state.)

1963 ²	
Activity	Value Added
Stumpage	\$ 7,235,000
Harvesting	51,368,000
Primary manufacturing	21,705,000
Secondary manufacturing	4,341,000
Construction	36,898,000
Transportation and marketing	28,216,000
Total	\$149,763,000

²Estimates are based on ratios developed from data included in Misc. Pub. 941, U. S. Department of Agriculture, Forest Service, *The Economic Importance of Timber in the United States*, and on 1963 stumpage values as reported by the U. S. Forest Service for Forest Service land and estimated for other ownerships.



A community traditionally dependent on the forest products industry—Libby, Montana, site of J. Neils Division of the St. Regis Company.

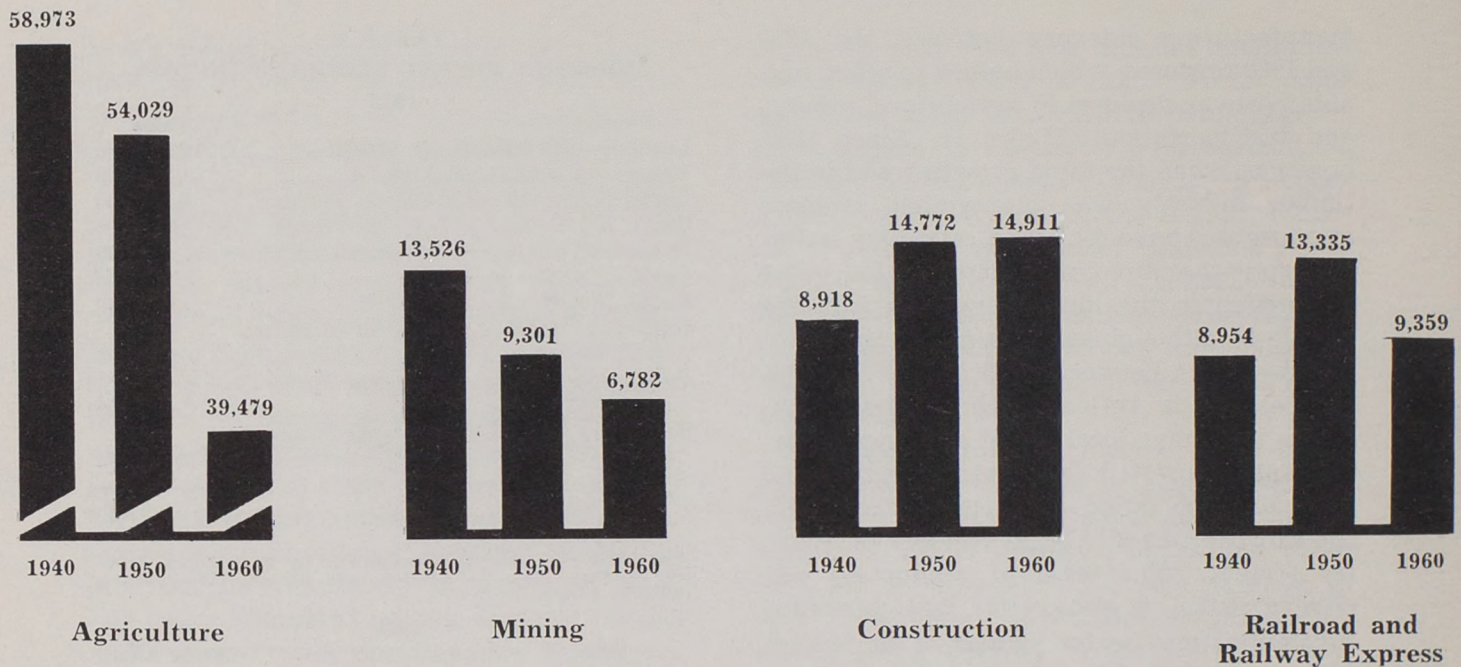


Figure I—MONTANA EMPLOYMENT TRENDS, 1940-1960

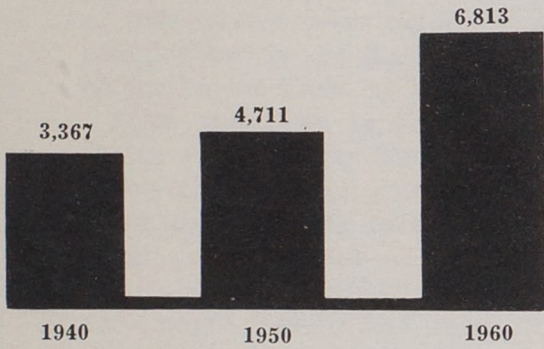
Source: U. S. Bureau of Census, *Population, Montana, 1960*.

An allied gain to the state from forest products derives from timber management on public lands, which leads to increasing employment by the U. S. Forest Service and the Office of the State Forester: the former agency alone had 1,302 regular employees in Montana as of December, 1964. Public employment figures are not shown in the industrial census, but each year the accelerating activity of these and other agencies, including the Bureau of Land Management, the National Park Service, the Bureau of Indian Affairs, the Fish and Wildlife Service, and the State Fish and Game Department, provides major job opportunities for Montana's college-trained personnel. This is true not only in timber management but in forest use generally. Recreation, range, wildlife, and myriad aspects of forest research offer especially good chances for career positions. Cooperative research projects supported by the public agencies, the state universities, and some of the large companies within the

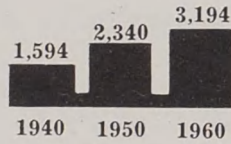
forest products industry are expanding the need for professional services.

Montana is challenged by the intensification and diversification of demand for its forest resource. The widening spectrum of opportunity for both local and out-of-state scientists and technicians obviously brings accompanying benefits to communities and to the state as a whole. If this almost unlimited potential is focused and directed, Montana may realize its best hope for a stronger and more viable economy.

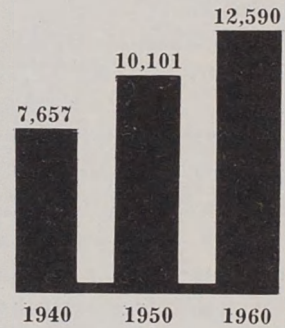
Returning to the forest products industry itself, postwar growth, despite its contribution to the state's economy, has brought about a number of problems. Because it produces mainly for residential construction, the industry is peculiarly susceptible to building fluctuations as well as to the national business cycle (Chapter VI). Certain parts of the industry are seasonal in nature and cause regular drops in employment. The shut-down of some medium mills and the erratic opera-



Wood Products



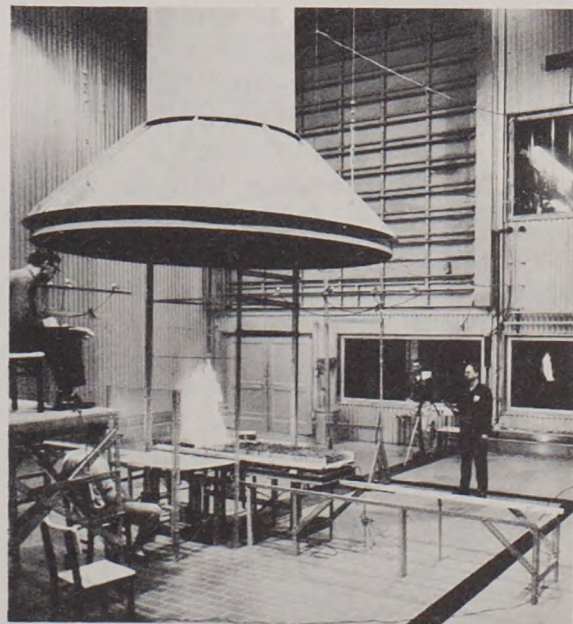
Trucking and Warehousing



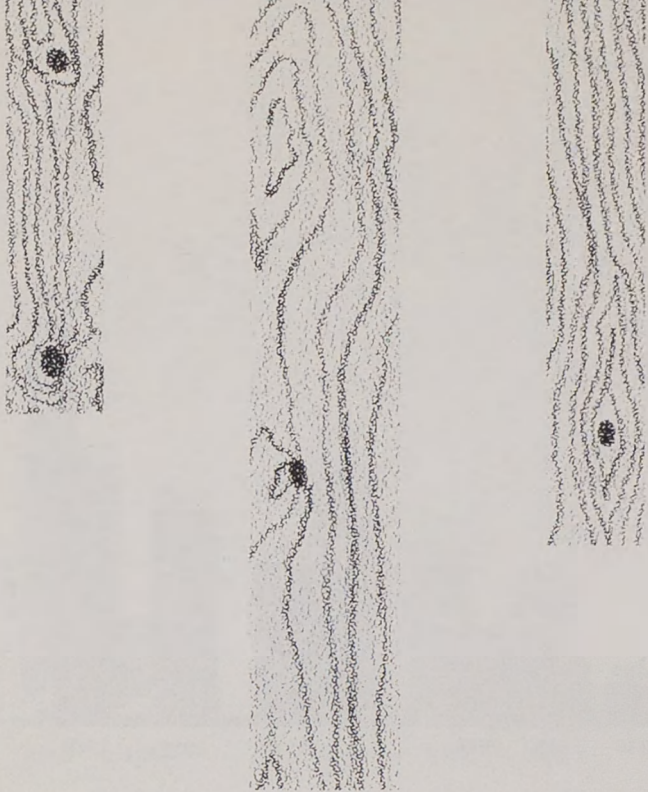
Public Administration

Includes
U. S. Forest
Service

tional pattern of many small mills also cause intermittent but perennial disruption of the labor situation. All the above factors create problems in communities that are especially dependent on the industry, and at times for the state's unemployment insurance program. These and other characteristics of the industry that inhibit its value to the state, including some aspects of the timber resource itself and marketing difficulties, will be examined in later chapters.



Research at Northern Forest
Fire Laboratory, Region 1,
U. S. Forest Service, Missoula.



II History and Development

The Montana forest products industry is part of the pattern of regional timber dominance over the past three centuries.^{5, 17} For many years, beginning with Colonial times, the center of the nation's timber industry was essentially migratory. Control of United States timber interests was held by the Northeast until the cutting of the Great Lakes states was completed in the 1890s. The Southeast followed as the foremost timber area and remained so until transcontinental railroads and the Panama Canal allowed comprehensive exploitation of the West Coast. The Pacific states, with the country's largest and most valuable timber supply and special freight rates to the East and Midwest, have maintained leadership from the time the industry was established there. The Rocky Mountain states, including Montana, were the last to develop as a major timber region. They have gradually assumed a position of importance, if not dominance, in the national industry.

Settlement and early land acquisition*

Montana's first sawmill was built at St. Mary's Mission in the Bitterroot Valley in 1842, 47 years before the territory joined the Union, with the original pitsaw fashioned from a wagon tire.¹⁵ For the most part, the

westward movement of white settlers in North America had leapfrogged the Great Plains and Rocky Mountains. The rugged mountain wilderness of western Montana at first offered little inducement to early homesteaders, and hostile Indian tribes on the territory's eastern plains virtually closed that area to settlement until the 1880s.

The forest products industry as such probably had its birth in Montana when gold was discovered near Bannack in 1862. This and later finds in the 1860s brought droves of disappointed miners from California into the western part of the territory. Prospectors from the Midwest and throughout the nation soon arrived to take part in Montana's gold bonanza. As ranchers and homesteaders followed the prospectors and settlements mushroomed in the mountain valleys, small sawmills powered by water or man were set up to supply the mines and the domestic needs of the frontier communities. Pack trains from south and west and from Fort Benton, the headquarters of steamboat navigation on the Missouri River, brought other necessities to the pioneer Montana settlements. Montana's first steam-powered sawmill was built at Fort Benton in the 1860s, using cottonwood from the river bottom to provide building mate-

*Particularly interesting accounts of the early development of Montana's timber industry can be found in *A History of Montana* by Merrill G. Burlingame and Ross K. Toole, Lewis Historical Publishing Co., New York, 1958 and in *Forest and Range Policy* by Samuel T. Dana, McGraw-Hill, New York, 1956.

rials for the growing town. This last note pinpoints the story of the early Montana sawmills, which repeated decades later the development pattern of the nationwide industry. The power progression from hand to water to steam had taken place in other parts of the country years before: steam was in common use in the East, the Midwest, and on the Pacific Coast by 1820.

From the 1860s to the 1880s Montana's timber industry was basically a service adjunct to the mining frontier. Lumber and mine stulls were the principal manufactured wood products, and as mining expanded, particularly around Butte, the demand grew accordingly. More and more timber was needed for mine construction and for the roasting of ore. The first large-scale logging operations in Montana were in the Butte vicinity.

The completion of transcontinental railroads opened the first national markets for Montana forest products. Until then the infant timber industry had been a purely local operation, with one or several mills in each population center taking care of the area's needs and reaching no further. The railroads took Montana lumber to the Midwest and East. Sawmills were installed far and wide along their routes. The railroads also, by acquiring huge amounts of land, joined the copper kings in taking virtual control of the timber industry and the territory.

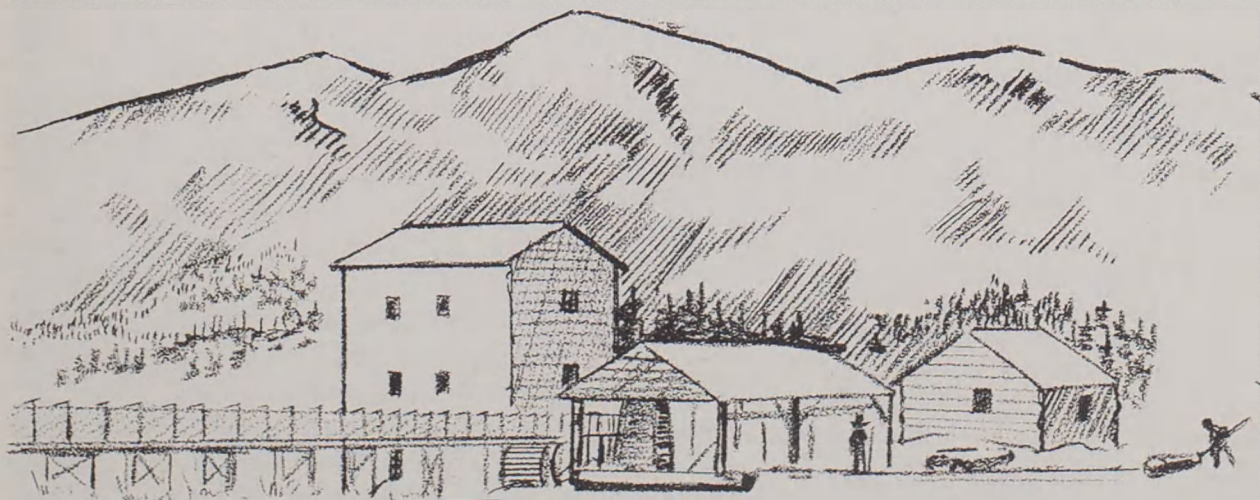
The Utah Northern was extended into Butte from the Union Pacific in 1881. The Northern Pacific was completed across

Montana in 1883. As land-grant railroads, these two were given alternate sections of land for a 20-mile strip on each side of the right-of-way as a means of supporting capital investment. The Northern Pacific, which was having financial difficulties, was given an additional 10-mile strip on each side and then permitted the selection of further land in another 10-mile strip in lieu of mineral lands in the original strip.

The Northern Pacific made profitable use of its vast holdings, which were more than adequate to supply its own needs and allow sales to a variety of purchasers. Land was sold to settlers outright, or as cleared land after the timber had been sold separately. Thousands of acres were sold to lumber companies and to eastern Montana ranchers. The largest single purchaser of land from the Northern Pacific was the Anaconda Company, which bought enormous tracts in northwestern Montana in the 1890s as a timber source for the Butte mines.

By the time the Great Northern Railroad was built across northern Montana in 1892, the government had repealed its policy of granting land. The company engaged in a vigorous program of timberland purchase in order to establish its own mills, buying land from the Northern Pacific as well as from settlers and other landowners.

Beginning in 1878, the Free Timber Act was in effect, legally permitting settlers to cut timber on public land for a variety of purposes without cost.⁸ The valley bottoms, where timber was close to settlements and



Montana's first water-powered sawmill, built at Fort Owen in the Bitterroot Valley in 1865. (Sketch based on original drawing by Peter Peterson Tofft, 1866.)

easy to manage with primitive equipment, were extensively cleared during this period. Some of the private companies also took timber from public land. Although commercial cutting of public timber was restricted to material used for manufacturing by the operator, this stipulation was not always observed. In the early years of the Act there were numerous uncontested incidents of illegal logging on public land, but by the 1890s the federal government was attempting to enforce the laws controlling commercial cutting more rigorously than before. One notable example of the power of the great private ownerships of that time was a legal battle involving the Montana Improvement Company. This organization had been formed in 1883 by Marcus Daly, one of the copper kings, and the Northern Pacific Railroad, ostensibly to clear land for farming on areas close to the railroad. In the clearing process, the MIC logged vast tracts of public lands, sold the timber to local mills, and was eventually sued by the government for violation of the Free Timber Act. An unusual precedent was established when a Montana Supreme Court judge decided the case in favor of the MIC.⁸

Exploitation of Montana timberlands such as represented by the MIC practices was restrained after the advent of Theodore Roosevelt, Gifford Pinchot, and the far-reaching conservation measures of the turn of the century.¹⁶ The national forests, which include most of the mountain timberlands, were established in 1897 and the years immediately following: the Bitterroot National Forest was the forerunner of 11 in the state. Creation of the national forests and attendant federal controls came at a fortunate time for Montana and the other Rocky Mountain states: unlike the Northeast, the South, the Great Lakes region, and parts of the Pacific Northwest, this area still had the bulk of its timber resource to reserve. The Rocky Mountain bottomlands had been largely cut over by the time the national forests were established, but the developmental and technological lags of this last timber frontier in the contiguous United States had protected its mountain forests for use by later generations.

Twentieth-century development

The turn of the century initiated Montana's great logging era. The mines and railroads, particularly the Anaconda Company and the Great Northern through its Somers Lumber Company, dominated the state's timber industry. The years between 1900 and 1930 were the closest to a monopoly period the Montana economy has known. By owning the transportation facilities and a large share of the total timber supply, the mines and railroads in effect controlled the region's market, although numerous independent firms were also engaged in logging and in manufacturing rough lumber for export. Despite some supply problems, new medium mills sprang up rapidly, particularly in the early 1920s, and small mills continued to fill local needs in many communities.

This was the time of the timber boom. Settlement of the plains, including eastern Montana, was at its height, and the wave of immigration provided a burgeoning market for Montana lumber. But in Montana, as opposed to the Great Lakes states, for example, land speculation was not included in the skyrocketing commercial activity. By virtue of the 19th-century acquisition previously noted, most of Montana's accessible timberland was already owned by the large private trusts, and major land sales were for the most part intercompany.

Despite the tremendous logging activity, the railroads, mines, and miscellaneous lumber companies were getting very little timber from the national forests during the early decades of the 20th century: the first of the few big public sales was from the Bitterroot National Forest around 1910. The reasons behind the low demand for national forest timber during those years lie in Montana's landownership pattern and the then-existing species preferences: by and large the accessible bottomlands were (and are) privately owned and the inaccessible mountain areas publicly owned; ponderosa and white pine (lowland types) were considered the prime species, while larch and Douglas-fir (mountain types) were not given much importance.



BRINGING
LOGS TO
A RIVER
CAMP-



LOADING
LOGS
HEADS
CAMP

Logging in Montana during the timber boom of the 1920s.

These photographs and that on the page preceding were taken by Charles Foster of Butte in January, 1927. They show ACM (Anaconda Copper Mines-Forest Products Division) activities in the Blackfoot Valley east of the company's present plant at Bonner. The original Bonner mill was established in 1885 by the Hammond Lumber Company, and taken over by the ACM around 1902.

Tractors were not used in Montana logging operations until 1923. The caterpillar at right was one of the first to replace horses in the Blackfoot.



CATERPILLAR
IN ACTION

The depression was a time of decline, collapse, and readjustment for Montana's timber industry, as it was nationally. Demand was severely reduced and profits were low or nonexistent. Massive railroad logging almost disappeared: the valley holdings had been thoroughly cut over and technology was still inadequate to log such mountain terrain as the railroads owned. The Somers Lumber Company, which had cut 64,853 thousand board feet in 1920,¹⁹ diminished its operations, and the railroads generally began to withdraw from the timber business.

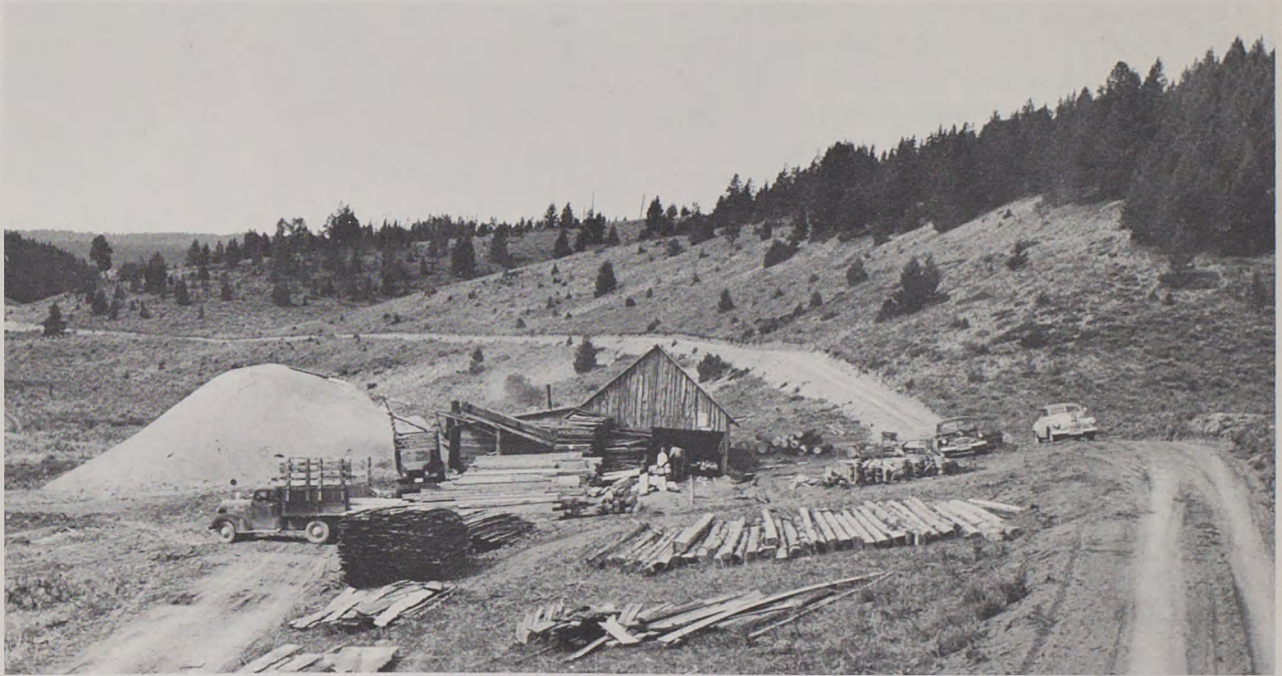
Some other mills—small, medium, and large—survived, although many shut down: 23 mills closed between 1928 and 1933.¹⁹ Meanwhile, essential aspects of Montana's timber industry were changing: raw material was becoming costly and difficult to obtain; finished lumber, planed and kiln-dried, was replacing rough lumber as the export item; and public agencies were applying concepts of sustained yield and allowable cut more intensively.

Demand rose again, slowly, in the late 1930s, and the Montana industry responded. Technological advances, including the switch from steam to internal combustion engines, improved road-building equipment, truck logging, and tractor skidding, made it feasible to log steep and previously inaccessible areas. The value of fir and larch was increasing, and so, consequently, was the economic importance of national forest timber. The Somers Lumber Company continued to decline, marking a fundamental change in the structure of Montana's timber industry. The shift was away from a virtual monopoly and toward a form of oligopoly in which several independent large mills shared leadership with the mines and railroads or, in the latter case, replaced them. The monopoly mills, due to reduced supply on their own holdings and the decline in export, lessened their scale of operations. Now that technology had made supply from public lands available, some of the medium mills expanded. Small mills continued to produce rough lumber for local consumption, but were cut out of a broader market as finished lumber became the chief export item.

Despite these changes, Montana's forest products industry continued as a lumber business limited for the most part to primary manufacture until after World War II. A period of significant growth began in 1946, and the present diversified pattern of sawmills, plywood mills, and the pulp mill is largely a phenomenon of the postwar boom.

This boom period was based on a national backlog of unsatisfied demand for housing and other construction—a lot of people with a lot of money were now able to build. The corresponding expansion of the Montana timber industry can be attributed to two main factors: the price increase for stumpage and lumber resulting from the construction boom of 1946-1957 and the depletion of timber in other regions, particularly on the Pacific Coast. Both influences made the use of Montana timber far more profitable than previously and improved the state's competitive position relative to the Coast.⁷

Growth of the Montana industry came about primarily through immigration of mills (notably plywood) into the state and through an increase in small-log production. Both developments were dependent, of course, on the accelerating rate of innovation in logging technology. Most of the lumber and plywood mills that came into Montana were from the West Coast. This movement occurred after 1950, and the majority of the companies gave a diminishing log supply on the Coast as their main reason for relocation. Some of them, seeking to establish new plants or replace obsolescent mills, also found the availability of credit more favorable in the Rocky Mountain region. Entry of plywood mills in particular was occasioned by the growing interest in western larch as a veneer species as well as by the shortage and rising cost of plywood logs in the Pacific states and the technological advances that made it possible to use small logs profitably. The pulp and paper plant was established as a pulp mill in the mid-1950s. This entry was an expansion of a Minnesota enterprise and again reflected a decline of available supply in the original locale and a heightened interest in Montana's raw material resource.



A small eastern-Montana sawmill in 1946. Many such mills, outgrowths of the postwar construction boom, did not survive the market decline of the 1950s.

The number of mills that migrated to Montana represents only a small portion of the total number that moved from the Pacific region, however. Many more West Coast plants relocated to British Columbia than to Montana. Also, in the late 1950s, two sizable Montana operators moved to Canada with their mill equipment, adding to the problems of Canadian competition.

The lumber industry itself changed considerably during the postwar boom. The plywood business not only raised the cost of large logs but took much of the market for one-inch boards. This change did not materially alter the demand for dimension stock (two-by-fours and larger), which remained relatively strong. The fact that small dimension, particularly studs (eight-foot two-by-fours), can be manufactured from small logs encouraged the development of stud mills. Most of the larger companies installed resaw facilities and took part in the overall increase of small-log production.

The same trend encouraged the rapid proliferation of small mills, which utilized

second growth on cutover lands, and caused several larger firms to establish plants in the lodgepole areas of eastern Montana, where the timber industry had never attempted to operate before. This particular expansion came at the peak market period of 1956 to 1957; some of the eastern installations were set up after the decline in price had started in 1957. The outlook at that time was toward a return to the favorable prices of the peak period rather than toward the continuing descent into a depressed market that actually occurred.

The postwar boom in the timber industry came to an end in the fourth quarter of 1956; the reservoir of unsatisfied demand from the war years had finally dried up. Prices took a sharp drop and have continued low ever since. Many Montana mills shut down in 1957: in Flathead County alone the number operating fell from 104 to 60 in one year. Most of the plants that closed were small or small-medium, although a few medium operations also folded. Several other mills in the state changed ownership or management.

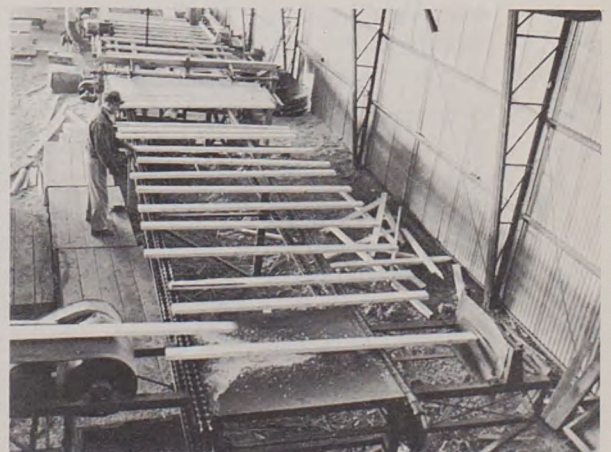
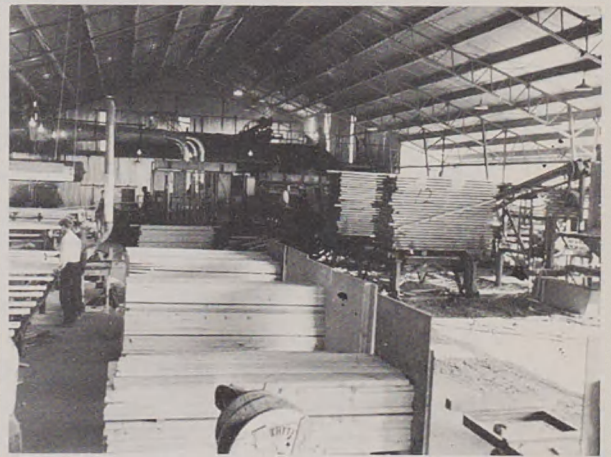
Since 1957 the consumers of wood products have become more selective, and this trend has had much to do with the successful survival of certain companies during recent years. The few Montana mills that knew their markets well were able to divert production to accommodate changes in consumer taste. Many mills, however, were still oriented to the postwar boom when anything they produced could be sold and the main problems were those of production. Most average operators were experienced in handling such problems, but when the emphasis changed to market they were unprepared to cope with the situation.

The pulp and paper mill has had a particular impact on the industry during this recent period. Using mill residues for supply, it is a complementary industry to the lumber and plywood mills. Because it provides a steady market for such residues, including chips and hogged fuel for its steam generation plant, the pulp mill has helped to stabilize the income of lumber mills: without the steady income from chips since 1957, several medium mills would probably have gone into bankruptcy. At the same time, with increased competition for logs, some producers have tended to bid away their extra income from mill residues. Advantages from the pulp and paper plant generally accrue to the large and medium sawmills: the smaller ones have been unable to afford the debarking and chipping equipment.

The development of high-speed stud mills has made production of dimension lumber a profitable operation for even the large integrated mills. In the better timber sites of western Montana the integrated mills can bring in small logs as part of their total operations. A number of specialized stud mills have had difficulties, however, especially in the lodgepole areas of eastern Montana. Several mills there have already closed, and others are reportedly planning to do so. They have not been able to solve the problems of costly harvest and transport, and the anticipated price rises for finished products have not yet materialized.

The net effect of the changes since 1957 has

been modernization and expansion of the larger Montana mills. Most of them have installed additional processing plants within the past six or seven years, and some of the smaller mills that have not shut down have become their subsidiaries. While profits are fairly low for everyone, flexibility and diversification have placed the larger mills in the most favorable position and account for the increased production without increased employment in the state's timber industry.



A specialized stud mill in operation.

Relation to other areas

As indicated in the foregoing pages, Montana's forest products industry was for many decades little more than a desultory lumber operation. Throughout the late 19th century and up until 1946 its growth was piecemeal, hampered by geographic isolation from population centers. Only since World War II has the state's timber industry moved into a competitive position with that of the Pacific Coast.⁷

The Coast still dominates the nation's industry, however, and although depletion and rising costs of raw materials there have propelled some segments of the industry eastward to the Rockies, Montana's position is essentially secondary. There is a dichotomy in this relationship: Montana both benefits and suffers from its proximity to the West Coast and its inclusion in the broad regional pattern of the Northwest. It takes advantage of established trade routes and markets, but at the same time Washington, Oregon, and California constitute its foremost national competition. Montana's timber supply is less expensive and labor costs are lower than those of the Coast. On the other hand, the coastal states have better timber and, with the exception of stumpage prices, lower production costs. The West Coast also retains its superiority through access to markets, operational "know-how" derived from long experience, and the numerous services available in a large industrial concentration.

As a subdominant in the national timber industry, the Rocky Mountain region has a healthier structure and potential than the Great Lakes states. There the timber supply has never recovered from the devastation of the 19th-century cut-and-get-out cataclysm, although there is an active pulp industry in Michigan, Minnesota, and Wisconsin, primarily dependent on aspen and spruce, and marginal lumber operators use what they can of the pine and other species that remain.

The Southeast is the nation's greatest producer of pulp and low-quality sawtimber. Although its vast quantities of southern pine make it the biggest timber-producing area in the country next to the Pacific Coast, Mon-

tana and the other Rocky Mountain states have been able to compete with it successfully thus far. Both the Rockies and the Coast sell to the Southeast but do not buy from it.¹²

A more detailed examination of the present Montana forest products industry must logically begin with a review of the resource itself. In the pages immediately following we will take a look at the composition and management of the biological factor, on which, in the long run, the future of the industry is based.

III The Forest Resource

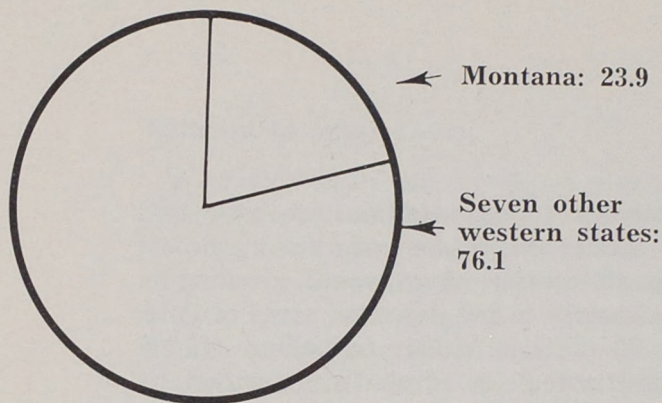


Montana's forests contain an estimated 55,770 million board feet of timber, almost exclusively coniferous softwoods, growing on approximately 22,300 thousand acres of land. About 70 percent of this forestland (15,727 thousand acres) is presently classified as commercial and amounts to about 16.8 percent of the total land in Montana (Table 4). The 30-percent noncommercial forestland consists of acreage in national parks and recreation areas, including wilderness, as well as low-producing stands, both public and private, that are not merchantable.

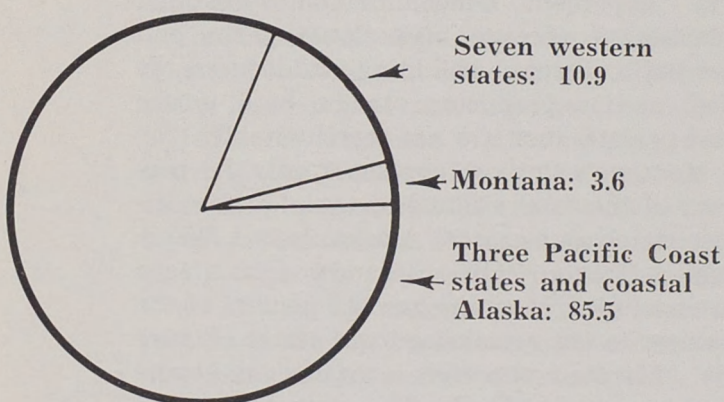
Montana's timber represents only 3.6 percent of the total volume in the eleven western states and coastal Alaska, but if Washington, Oregon, California, and coastal Alaska are excluded, Montana has 23.9 percent of the volume in the remaining eight states (Figure II). Montana therefore contains an important segment of Rocky Mountain timber, although it is a marginal area compared to the West Coast. About the same relative pattern exists for growing stock. Montana has only 5.5 percent of the growing stock in the 11 western states, but 26.8 percent in the Rocky Mountain region.

The Rocky Mountain states contain the last large stands of residual timber in the nation. This timber grows on steeper slopes, is of smaller size and lower quality, and offers a lesser profit margin than the former stands in the Pacific Northwest. As noted previously, however, its relative value tends to increase as the supply of large, high-quality timber on the West Coast is depleted.

Montana's forests occur where there is sufficient moisture for tree growth. An average annual precipitation of between 10 and 21 inches is about the minimum needed, depending on soil and exposure.⁴ The heaviest annual precipitation is on the state's western border. Geographically, precipitation decreases eastward; topographically, it increases with elevation. Consequently, the forests are heaviest in the western part of the state, where all the mountains, the smaller valleys, and parts of the larger valleys are,



Eight western states: 100



Eleven western states and coastal Alaska: 100

Figure II—SAWTIMBER VOLUME IN WESTERN STATES (percentages)

Source: American Forest Products Industries, *Montana Forest Facts*, 1960-61 edition; Guthrie and Armstrong, *The Western Forest Industry*, Johns Hopkins Press, 1961.

or once were, forestland. In central Montana the lower limit of trees rises with elevation until only the upper mountain areas are forested. Farther east, as the rain-shadow effect of the Rockies is offset, sparse timber stands occur in the broken lands at lower elevations. Cottonwoods are common along the river bottoms in all parts of the state. At high elevations the severity of the climate restricts tree growth. Timberline is about 8,500 feet above sea level in southern Montana; near the Canadian line it is about 7,500 feet.

Composition of the forest varies with the availability of moisture. (See Table 3 for a summary of Montana sawtimber volume and growing stock by species groups.) Ponderosa

pine generally has the lowest moisture requirements of Montana's timber species and grows at the lowest elevations. In western Montana the magnificent stands of ponderosa that were once prevalent in the mountain valleys and foothills were the focus of the early timber industry in the state. This species is still important to the industry, although the harvest is now coming from less accessible mountain areas. In eastern Montana ponderosa pine exists in scattered stands of low-quality trees and is used mostly to satisfy local needs.

Douglas-fir and western larch, which occupy intermediate slopes and extend into valleys where rainfall is sufficient, are now Montana's most important timber species, representing the major volume of both sawtimber and growing stock. The two species often occur together in western Montana. There is no larch east of the Continental Divide, but that area supports large stands of Douglas-fir.

Lodgepole pine appears erratically throughout the spruce and Douglas-fir zones as an intermingled species. More often it is concentrated in pure stands following forest fires or other disturbance. A small-diameter tree under any condition, it frequently grows in heavy, stagnated stands of little or no commercial value. Lodgepole is the principal timber tree in the mountains of eastern Montana and, as indicated previously, is the basis for much of the new timber industry there. The volume of lodgepole pine growing stock is second only to that of Douglas-fir and larch.

Engelmann spruce is found in the upper mountain zone to timberline. Vast stands of this species cover the higher mountain slopes of the state and also dip into the valleys on north slopes or where sufficient moisture permits growth at lower elevations. The true firs, whitebark pine, and other high-altitude species are scattered throughout the spruce zone. Western white pine, western red cedar, hemlock, and white fir generally occur only in the heavy-rainfall belt near the Idaho border, with greater eastward extension of their range in northwestern Montana.

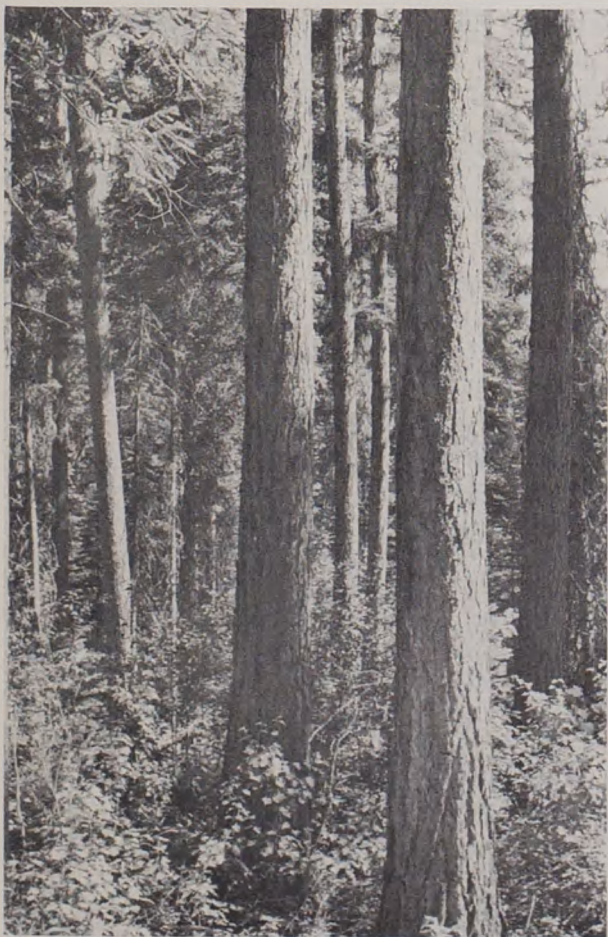
TABLE 3
SUMMARY OF MONTANA SAWTIMBER
VOLUME AND GROWING STOCK
BY SPECIES GROUPS

Species	Growing stock ¹ (million cubic feet)	Percent of total	Saw-timber ² (million board feet)	Percent of total
Douglas-fir	4,684	29.0	15,329	27.5
Larch	2,390	14.8	11,669	21.0
Ponderosa pine ...	2,231	13.8	10,969	19.6
Lodgepole pine ...	4,077	25.3	6,945	12.4
Engelmann spruce	1,384	8.6	6,913	12.4
Western white pine			1,093	2.0
White fir	422	2.6	1,002	1.8
Other softwood ...	707	4.4	1,155	2.1
Total softwood	15,895	98.5	55,075	98.8
Hardwood (all) ...	248	1.5	695	1.2
Total, all species	16,143	100.0	55,770	100.0

¹All trees 5" DBH to 11" DBH.

²All trees 11" DBH up.

Source: U. S. Department of Agriculture, Forest Service, *Timber Resources for America's Future*, Forest Resource Report No. 14, January, 1958.



Mixed stand of Douglas-fir and western larch in Flathead National Forest, western Montana.

Ownership (Table 4)

Most of Montana's commercial timberlands are in the western mountains and are publicly owned and managed. Except for acreage in original railroad grants, the private holdings are confined mainly to the valley bottoms. The ratio of total public to private forestland is approximately four to one. (By contrast, the ratio in the Pacific Coast states is one to four.)

The federal government is by far the largest public owner of commercial timberland in Montana, with over nine million acres in 11 national forests managed by the United States Forest Service under the Department of Agriculture. An additional 577 thousand acres are in public domain administered by the Department of the Interior's Bureau of Land Management.

Over 600 thousand acres of commercial timber are on Indian lands, notably the great Flathead Reservation west of the Continental Divide.

The State of Montana owns 608 thousand acres of commercial forestland, managed by the State Forester. Montana was given Sections 16 and 36 in each township under the federal grant for education (ordinance of 1785) when it attained statehood in 1889. Since then, by a judicious program of land exchange, the state has acquired several contiguous blocks of forestland west of the Divide, of which some 203 thousand acres are consolidated in seven state forests.

Private ownership of Montana timberlands is primarily vested in a few large companies. The Northern Pacific Railroad is the largest of these; its holdings include about 800 thousand acres of forest, and it is currently engaged in extensive harvesting operations. The Anaconda Company, with about 600 thousand acres, is the second largest; logs from its timber acreage supply its own mill needs, and the surplus is sold. The St. Regis Company at Libby owns a little over 200 thousand acres of timberland, most of which it purchased from Anaconda, and the Great Northern Railroad now owns and manages over 50 thousand acres.

TABLE 4
MONTANA FOREST ACREAGE

Total land in state	93,362,000	acres
Total forestland	22,330,000	acres
Percent forestland	23.9	
Total commercial forestland	15,727,000	acres
Percent commercial forestland ..	16.8	

COMMERCIAL FORESTLAND

Private		
Ownership	Acres	Percent of total
Farm	2,360,000	15.0
Forest industry	1,086,000	6.9
Other	1,411,000	9.0
Total	4,857,000	30.9

Government		
Ownership	Acres	Percent of total
Federal	9,585,000	61.0
Indian	602,000	3.8
State	608,000	3.9
County	75,000	0.4
Total	10,870,000	69.1

NUMBER AND SIZE OF PRIVATE OWNERSHIPS

Size	Number	Acres	Percent of total
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
Total	14,536	4,857,000	100.0

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

Although about 31 percent of the commercial forestland in Montana is in private hands, only about seven percent of it is owned by companies involved in timber production, principally the first three companies named above—Northern Pacific, Anaconda, and St. Regis. The remainder of the private commercial timberland is in over 14,500 ownerships, mostly small farms and ranches managed for livestock production. Almost all of these latter holdings have been cut over, and many of them contain poor stands of second-growth timber.

Management

Certain characteristics of Montana's timber resource present particular management problems. The forests are highly variegated, and the stands generally occur on soils of low productivity. Most of the timber sites are classified as fair and poor; much of the limited range of good sites has been cleared and converted to farm or pasture land in the valley bottoms. Montana timber is also subject to numerous hazards that cause further diversification. Although the areas of residual timber are vast, huge tracts within them have been ravished by fire, insects, disease, and windthrow. The first of these factors



Ponderosa pine on private land in the Bitterroot Valley of western Montana. Few such handsome groves are left in Montana's lowlands.



Burned-over lands in the Bitterroot National Forest. Natural reproduction is primarily lodgepole pine.

especially has had a profound influence on Montana's forest resource.

Under natural conditions, fires occurred regularly and cyclically with times of drought. During the period of settlement the number of uncontrolled fires increased and tremendous acreages were burned over. With the efficient control systems now in operation, however, the incidence of fire has been reduced to well below that of the natural situation before settlement.

Natural restocking of burned-over lands depends on a number of circumstances such as the severity of the burn, the state of the seedbed, the climatic conditions after the burn, and the availability of seed for the burned area. All these determining influences vary, and consequently the new stand may be well stocked, only partially stocked, or stocked too heavily for optimum growth. Where there was a second fire before the new stand was producing seed, and where the surrounding seed source was destroyed, there may be no reproduction. Unrestocked areas occur regularly throughout the natural for-

est; without artificial replanting they may take several generations to become productive.

The age distribution of Montana timber is poor, due to many severe fires in the early part of this century. Following are the major burns since 1900:

Montana Acres Burned

1910	1,146,761
1919	505,252
1926	136,085
1934	20,123
Total	1,808,221

Source: U. S. Forest Service, Region 1.

The primary age classes are for the most part over 120 years and under 40 years, with a gap of 80 years between young and mature stands. If there is to be sustained yield management and a continuous supply of timber for the local industry, the present merchantable timber must be stretched over the gap

until cutting of the younger stands can begin. This applies particularly to the forests of western Montana.

Forest insects are a ubiquitous problem. The rate at which these insects affect the timber resource varies tremendously, of course. Epidemics break out, causing fairly widespread damage, then subside to an endemic condition in which the harm is only sporadic and tree loss is negligible.

Historically, the spruce bark beetle, spruce budworm, and mountain pine beetle have been most significant in Montana. When disastrous hurricane winds struck the northern Rocky Mountains in 1949, the spruce bark beetle followed in their wake. The insects attacked the weakened timber, spread to epidemic proportions, and infested the surrounding stands of healthy trees. Prompt action was taken by the Forest Service and other owners to salvage the timber. Access

roads were built at government expense, and buyers were attracted to the timber by low stumpage rates. A promotion campaign to sell spruce lumber was launched, spruce products found favor on the market, and the price rose. Until that time spruce had been considered an unimportant timber tree; it is now recognized as one of Montana's major species (Figure III).

More recently, epidemics of spruce budworm have had a severe enough effect on Douglas-fir, the true firs, and western larch in Montana and adjacent areas to cause forest managers to apply extensive control measures, although the actual amount of budworm damage to merchantable timber has not been fully evaluated. A decade of repeated aerial spraying of insecticides has so far failed to control the budworm infestations.

Forest managers believe that with more intensive management the mountain pine

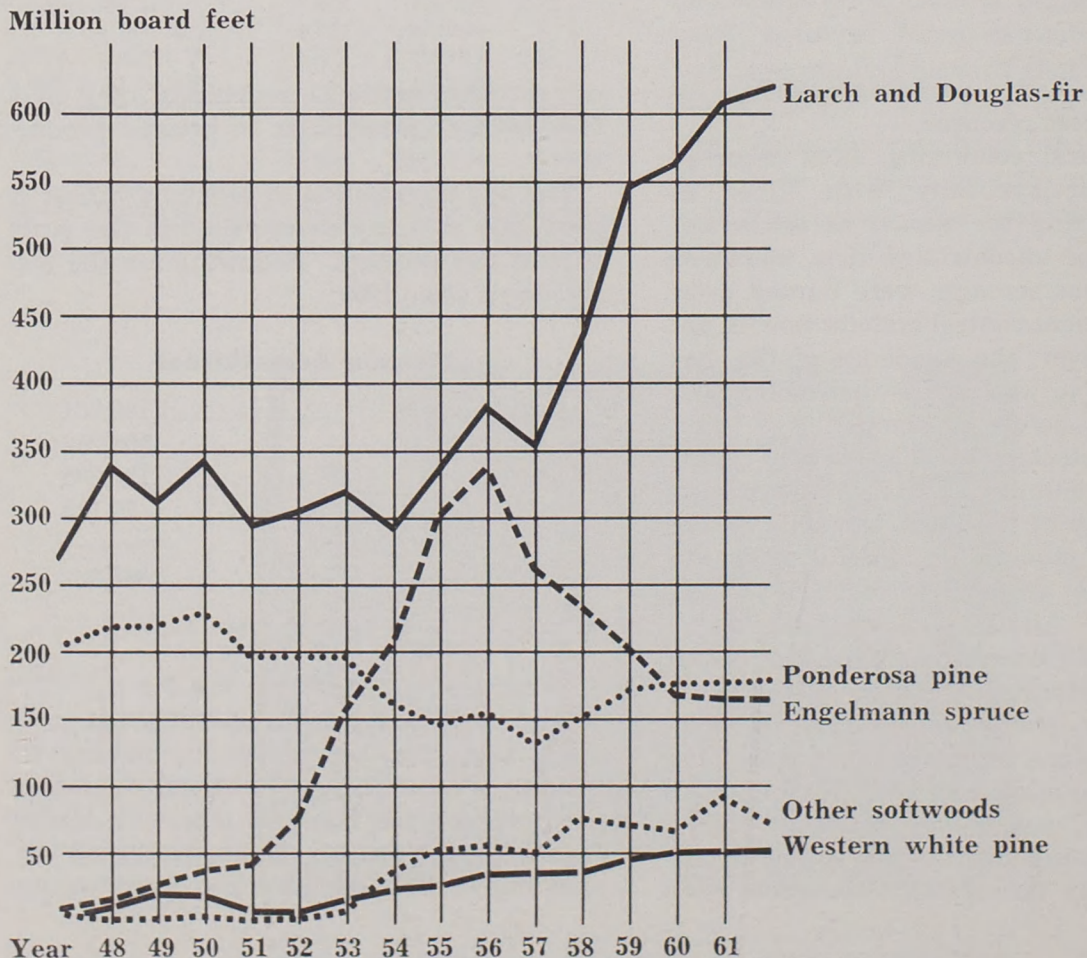


Figure III—MONTANA SOFTWOOD LUMBER PRODUCTION BY SPECIES, 1947-1962.

Source: American Forest Products Industry, *Montana Forest Facts*, 1964 edition.

beetle and similar bark beetles will become less destructive, and indeed this might apply to all forest insects, since they tend to concentrate initially on overmature timber, overstocked stands, and trees on poor or damaged sites.

Forest diseases, like insect attacks, are cyclic, and epidemics can decimate timber stands. Some of these diseases are simple pathogens that attack trees only, either by injuring the leaf tissues, the cambium tissues, or the roots. Other more complex organisms have life cycles in which they infect trees at only one stage, living the rest of the time on other plants in the forest ecosystem. In Montana the most notable example of the latter type is the white pine blister rust, which has severely reduced the amount of economically valuable western white pine.

Forest trees are subject to disease throughout their entire lives, although the susceptibility to certain diseases is more noticeable in the seedling stage or in overmaturity. Control is difficult, costly, and necessarily slow. Chemical sprays are used with varying degrees of success, and the elimination of alternate hosts from forest stands can inhibit the spread of diseases that depend on herbaceous plants for part of their life cycles. Intensive management that calls for cutting diseased trees and for growing timber in mixed and uneven-aged stands may also help to reduce the losses from disease.

Fortunately, the stands of the northern Rocky Mountains are mixed enough in age and species so that no disease has yet been able to destroy an entire forest. In Montana as elsewhere, however, dwarf mistletoes, needle blights, the aforementioned blister rust, and other diseases continue to diminish the volume and value of merchantable timber.

Windfall damage to forest stands is irregular and at present unpredictable. It occurs in two general patterns: annual small losses in isolated patches due to erratic winds in the mountains and an occasional large-scale loss resulting from tremendous gradient winds of hurricane force. Windfall not only constitutes a loss of growing timber but heightens the possibility of further and even greater



Budworm damage on Douglas-fir, central Montana.

loss from insects and fire. The uprooted or broken-off trees dry out and become an excellent environment for insect populations, which build up to such an extent that they attack green timber in the surrounding forest. The opening of the forest floor to the sun is conducive to fire spread, as are the concentrations of fallen, drying trees, which provide great amounts of additional fuel.

Intensive management often aids in the problem of windfall because areas can be promptly salvaged and because continuous opening of the forest a little at a time with logging operations may make it more wind-firm.

Severe windfall areas in Montana in recent years include the west side of the Swan Range near Flathead Lake, where over 1,000 acres of Douglas-fir and larch blew down in 1961, and a portion of the south-central Bitterroot Range, where wind destroyed 500 acres of Douglas-fir and lodgepole pine in 1959. Due to the mountain environment, all of the state's forestland is dotted with wind-throw areas of varying extent and density.

There appear to be two alternatives for handling Montana's 80-year gap in age classes

(page 25) and its accessory problems. One is to liquidate the old-growth stands by harvesting timber at an accelerated rate, recognizing that there will be a postharvest void before the present young stands are ready and during which production will be severely limited. Another is to attempt sustained yield management by reducing the rate of old-growth harvest and partially compensating for this reduction by using smaller materials, a choice that requires certain assumptions concerning the development of technology in order to use the smaller materials economically. At present, the Forest Service, the State Forester, other land management agencies, and all but one of the large private landowning companies are trying to regulate their cut according to the latter alternative, but whether current rates of old-growth liquidation will bridge the gap remains to be seen.

There is little management of any sort on the small private forestlands. The State Forester offers technical assistance to the small private owners, but since they are generally disinterested in timber production, the effect thus far has been negligible.

While the great stands of residual timber provide a backlog for the timber industry, the predominance of overmature timber increases the danger of loss from all natural mortality factors. There is therefore a high degree of uncertainty in an extended period of old-growth harvest.

Continuing construction of access roads by public agencies and private industry has made much of the timber supply accessible and has increased salvage possibilities. Most of the timber on burned-over or otherwise damaged areas is now salvaged before it deteriorates, and the losses from natural causes are considerably reduced.

Allowable cut: Volume and composition of forest timber have economic meaning only when converted to the amount of timber that can be cut. Under sustained yield management the annual allowable cut ideally should mean the amount of timber that can be harvested each year without reducing the capacity of the forest to produce; it should be equal to the annual growth of the forest. This ideal concept is essentially biological, however. In reality, annual growth is not harvested *per se*, but its equivalent is removed according to the current demand for commercial products—sawtimber, plywood, pulp, poles, posts, etc. Definition of the annual allowable cut therefore depends on the demand for products.

During the past two decades the estimated annual allowable cut has been doubled in many of Montana's forests;²⁰ Table 5 shows an estimate for 1959. The larger cut is not due to a sudden increase in growth but to changes in demand and technology, although part of the augmented estimate can be attributed to improved inventory techniques.



“. . . the state's forestland is dotted with windthrow. . . ." Blowdown in a mature lodgepole pine stand, Lewis and Clark National Forest, central Montana.

TABLE 5
ESTIMATED ALLOWABLE CUT, MONTANA
(All Ownerships)

Type of product	Estimated annual sustainable production
Lumber and dimension	1,065 MM b.m.
Veneer	128 MM b.m.
Large poles (over 30 feet)	450 pieces
Small poles (less than 30 feet).....	900 pieces
Pulpwood	2,218 M cords
Fiberboard	360 M cords
Fence posts	6,900 M cords
Fuel wood	180 M cords
Chemical wood	186 M cords
Christmas trees	6,500 M trees

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

Increases or changes in demand in Montana since World War II have raised the price and provided a market for stumpage of virtually all species of native timber. These factors have made it economically feasible to harvest smaller logs as well as lower-quality logs. The acceptance of spruce has already been mentioned, and a market for other "weed" species such as alpine fir and white-bark pine has also developed. Improved market prices also have made it profitable to harvest timber on steep slopes. Part of the credit here must be given to improved harvesting: modern road-building and skidding techniques allow procurement of logs

from all but the most precipitous ground, and there is very little forestland that is now considered inoperable. Improved hauling and milling also make it possible to transport logs greater distances, and to use smaller logs. The minimum harvestable tree has dropped from 14 to 11 inches DBH during the past 20 years.

Although foresters consider the present allowable cut to be maximum for the predictable future, it is possible that the amount could be greater. Additional roads that would permit salvage of more dying or dead trees would increase allowable cut, as would greater utilization of small material thinned from immature stands. Much of this material, especially trees that would succumb to competition for light or moisture, could be harvested without reducing future sawtimber cut. A market for pulp bolts would make available annually an additional volume of wood almost equal to the amount of sawtimber now cut (Table 6).

The annual allowable cut might also be decreased in response to changing market conditions. Reduced demand and price could make it uneconomical to use small logs, harvest steep slopes, or cut certain species. It appears that a contraction in annual allowable cut is taking place in some parts of the state now, particularly in eastern Montana.

Since World War II the annual allowable

TABLE 6 ESTIMATED ACTUAL AND SUSTAINABLE ANNUAL PRODUCTION
BY OPERATING UNITS, MONTANA

Type of Product	Western Montana		Southwestern Montana		Northeastern Montana		Southeastern Montana	
	Actual	Sustainable	Actual	Sustainable	Actual	Sustainable	Actual	Sustainable
Lumber and 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 ¹	0	200		80,000		40		40
Fence posts, M pieces	270	3,600	81	1,800	78	900	305	600
Chemical wood, M cords ¹	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

¹No current markets.

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



*Clearcut blocks in Swan River State Forest, western Montana.
Montana State Forestry Department Photo*

cut has been taken, with some fluctuation, in most parts of western Montana. In large areas east of the Continental Divide the annual harvest is still well below the reduced allowable cut.

The present utilization of raw materials for minor forest products generally falls so far short of available resources that allowable cut is irrelevant. This is not true for sawtimber. A balance sheet of Montana's forest condition (Table 7) indicates that more sawtimber is harvested or lost through natural mortality than is grown. This situation needs to be considered in the light of present timber stands as well as management goals. Old-growth stands are probably losing more volume through death and decay alone than is added in annual growth. This means that even though the old-growth stands are cut at a rate that attempts to bridge the 80-year

gap in age classes discussed earlier, annual loss will still exceed total growth until the difference is made up by young, fast-growing stands.

Silvicultural methods: Clearcutting is the usual harvest method for most of the timber species in Montana. Other procedures are sometimes employed, but the state's timber species are generally intolerant of shade and have developed as even-aged stands appropriate for clearcutting. For reproduction, they require a seedbed of exposed mineral soil and adequate sunlight. In the harvesting process, the few understory trees normally left after logging are those that are suppressed and defective, with no potential for good timber production. After the original logging of merchantable trees, another operation is necessary to remove these undesirable remainders as well as to eliminate slash and

TABLE 7
ANNUAL AVERAGE GROWTH, MORTALITY,
HARVEST, AND TIMBER BALANCE,
MONTANA, 1959

	Growing stock ¹ (M cubic feet)	Sawtimber only ² (M board feet)
Gross growth		
Softwoods	286,000	859,000
Hardwoods	9,000	18,000
Total	295,000	877,000
Mortality		
Softwoods	122,000	630,000
Hardwoods	1,000	3
Total	123,000	630,000
Net growth		
Softwoods	164,000	229,000
Hardwoods	8,000	18,000
Total	172,000	247,000
Harvests		
Softwoods	116,841	662,902
Hardwoods	847	832
Total	117,688	663,734
Timber balance	54,312	-416,734

¹Trees 5" DBH and over.

²Trees 11" DBH and over.

³Less than ½ million cut feet.

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

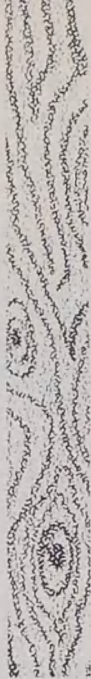
reduce fire hazard. This second operation may include burning the area broadcast or burning the piled slash and debris. Further scarification of the area may be necessary in order to provide a suitable seedbed. Seed trees may be left standing, or the cutover area may be restocked naturally from neighboring tree seed or planted artificially.

Objective: Management seeks to convert what is now a wild crop to full-production stands under regulated forest conditions. This conversion calls for a number of specific investments: (1) access roads to harvest the present merchantable timber and to allow continuing improvement practices such as thinning overstocked stands, replanting bare or understocked areas, and salvaging dead or dying trees; (2) protection against fire, insects, and disease; (3) research in environmental and economic factors.

Biologically, the management objective

calls for maximum growth on all sites in the shortest possible time. This goal is based on the assumptions that any investment is possible and justified and that under normal growth conditions all forest areas are well stocked. Realizable growth (approximately 70 percent of normal) occurs under ordinary circumstances. If all needed management practices are applied in the forest areas, allowable cut may equal normal growth at the end of the first timber rotation—100 to 130 years. This happenstance would increase allowable annual cut by about 50 percent over the present, other things being equal. Here again, however, the economic factors discussed previously may prevent the attainment of optimum biological management.





IV The Montana Mills

Supply

Boundaries and mill location: general

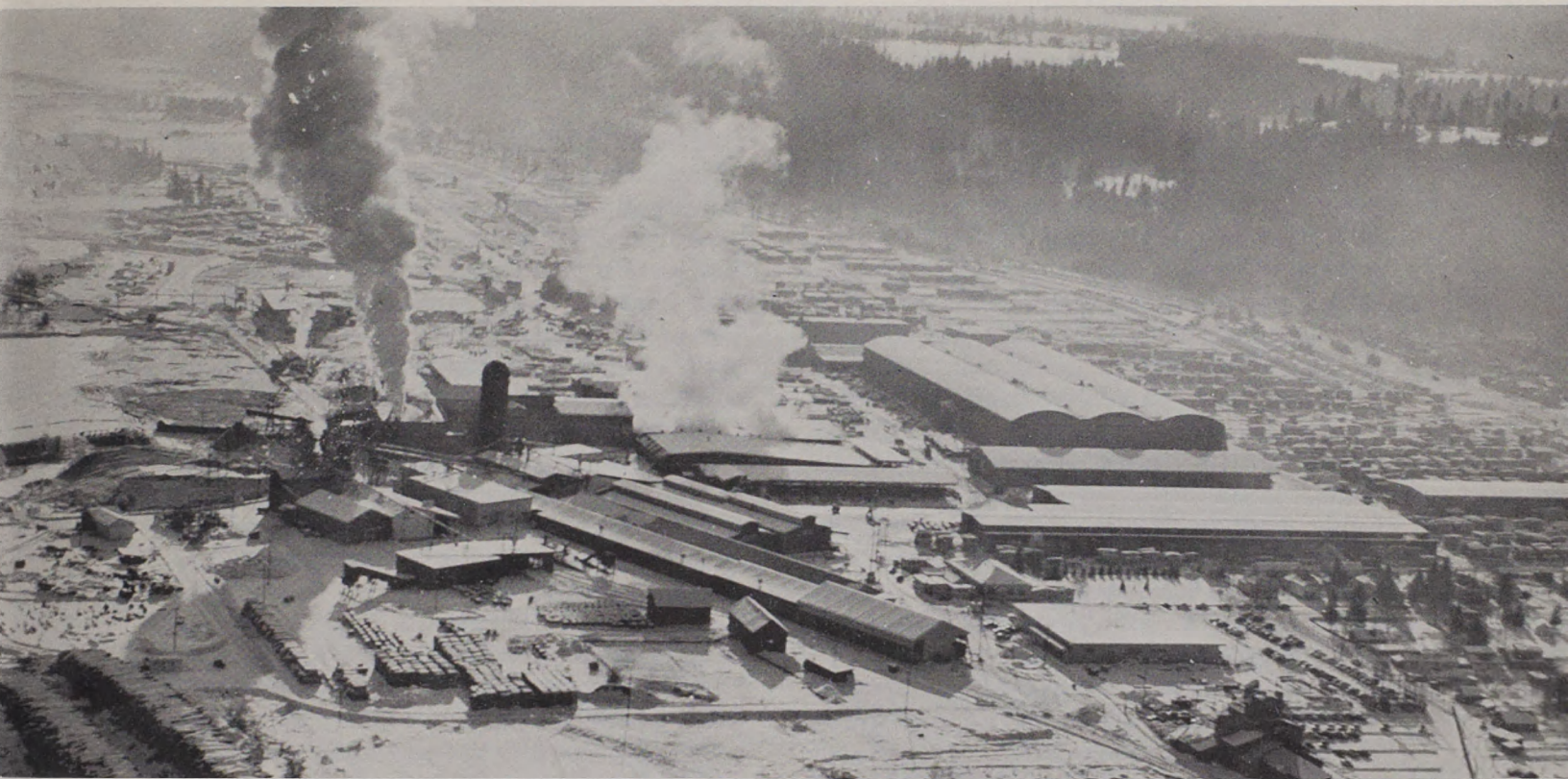
Montana's forest products industry is geographically oriented to its raw materials, but actual location relative to supply varies with mill size. The smaller mills usually are set up within their supply areas to keep log hauling to a minimum; the larger mills draw their supply from a 100-mile radius or even more. The latter are generally clustered in or around the main population centers in the forest regions, where a network of roads makes the raw material available and where there are main highways and railroad lines for shipment of products to market. Location in a city or town also offers housing for labor and proximity to necessary services. Since most of Montana's timber supply, both public and private, is in the western part of the state, the large lumber companies, the pulp and paper mill, and all the plywood mills are situated west of the Continental Divide (Figure IV).

The supply areas are not fixed and tend to expand and contract with demand. During the high-demand period before 1957, individual mills often bought timber from far outside their usual boundaries and there was

a great deal of hauling from one supply area to another. Since then, most mills seem to have returned to their normal zones. This situation is subject to change, however: competition for raw materials may lead to expansion of supply boundaries even in times of low demand and price. The plywood mills have recently been able to compete successfully for timber sales outside their usual areas, as have some sawmills in parts of western Montana where the headsaw capacity exceeds the annual cut. The flexibility of plywood supply boundaries is based on the fact that it is now profitable for these mills to use all the principal Montana species except ponderosa pine.

Of the large lumber companies that are also major forestland owners—Anaconda and St. Regis—only the former obtains virtually all its logs from its own land. St. Regis both has its own logs and, along with other sawmills of all sizes, utilizes public and outside private stumpage for its timber supply.

The supply for Montana's pulp and paper mill, located near Missoula, is obtained from edgings, slabs, and other mill residues that are purchased from as far away as White



One of Montana's largest mills—J. Neils Division of the St. Regis Company, Libby

Sulphur Springs. At the present level of mill operation, there appears to be enough residue to support one or two more pulp mills in Montana. Beyond this point, additional pulp mills will need to use roundwood, involving a higher production cost. There is a great amount of roundwood available for pulp, and when it does become economical to cut roundwood for this purpose, water, not timber, will probably be the limiting resource in pulp mill expansion in Montana.²¹

Selling timber

All of the public agencies, state and federal, follow the same general selling procedures. The public lands are managed for sustained yield on the basis of designated units. The agency tries to sell the computed allowable cut in each unit every year. Sales are planned far ahead to encourage road development and a proper distribution of the cut throughout the management area or working circle.

In preparation for a sale, the timber is inventoried and appraised according to prescribed agency methods. The appraised value is not based on the cost of growing timber but

is a residual price after harvesting and manufacturing costs are deducted (plus an allowance for profit and risk). To establish the residual value, the agency considers the selling price of lumber, the costs involved in harvesting and hauling (including road construction by the operator), and the milling costs of an average operator. The appraisal also includes a charge for cleaning up and regenerating the area.

After appraisal, the timber sale is advertised and put up for bid. Bids may be either oral or sealed. In most cases small sales are handled orally and large sales by sealed bids. The reason for this distinction is that there is often more competition for small sales, since small mills are usually eliminated from the bidding on large sales. The agencies believe that there is less possibility of collusion under the system of sealed bidding.²² Industry, however, generally urges that oral bidding be used on all sales. The agencies try to keep a good distribution of sale size in order to provide bidding opportunities for all mills.

The purchaser frequently is required to build the road systems needed to harvest the

timber. On large sales this involves a sizable investment in road-building machinery, which only the larger, well-financed companies can undertake. Road construction presents a problem even for these companies, for the high investment in equipment ties up capital that might be used for mill modernization or other necessary expenditures. Smaller mills are restricted to bidding on sales where a primary road system is already established.

An alternative would appear to be for the agency to build the roads. Since under the present system the cost of road construction is deducted from the price of the timber, the change would involve only a matter of timing; in either case the government is bearing the cost.

Recent increases in appropriations for road development will augment federal road building, but a considerable amount of actual construction will still need to be done by the operator. Operators contend that the standard of road required by the government is in excess of that needed for timber harvest alone and provides also for recreational and administrative use. It is argued that the cost of additional design for these purposes should not be borne by the timber industry.

The length of contract on a public timber sale varies by size: contracts covering the smallest sale run for one year; the typical contract for large sales on national forests is three to five years; on state forests it averages two to three years. Mills that are wholly or largely dependent on public timber therefore cannot foresee uninterrupted operation for more than a five-year period.

Although the regular offering of various-sized sales is part of the agencies' attempt to maintain a regular supply of timber for the entire industry, the large mills feel that there are not enough large sales available and the small mills take the same attitude regarding small sales. Despite such complaints, many of the mills in all size categories have been able to fill their timber needs from public lands for many years. (The continuing controversy over appraisals and reappraisals, bidding and hearing procedures, road-building costs, and public timber-sale policies in general is the subject of the Worrell Report,

published in 1963.²³)

The large private companies that sell timber usually negotiate sales on an individual basis rather than by competitive bidding. The price is established according to an estimated market price. In some cases private timber-owners have made agreements for up to 10 years with individual mills; in others, sales are on a year-to-year basis. Under the latter system the mills have no assurance of continuity. In a few instances, particularly in eastern Montana, mills have purchased timber from large ranches on exclusive long-term contracts, thereby guaranteeing an extended supply.

Timber on small private holdings is sold on a negotiated basis. The buyer usually offers a lump sum for the timber available. During periods of low demand, with little or no competition, the price is seldom based on unit and the buyer has the advantage.³ When competition increases, the landowner can insist on surveys and sale on a unit basis. Under these conditions he is able to obtain somewhere near the market price for his timber. Since this timber is often second growth of low quality, there may be no market at all except during periods of high demand. The landowner is usually not interested in producing timber, has little knowledge of its value, and tends to regard any price offered as a windfall. His main interest is to clear the land for pasture or other use and he is happy to have someone remove the timber for him.

Buying timber

In buying timber, large mills compete with those in all other categories except on large sales. The size of the purchase usually varies from one to 10 million feet. In a few rare cases large companies have bought 80 million feet or more in a single negotiation, but only one mill now operates on a purchase of this size.

Because there are relatively few mills in the larger categories, the number bidding against each other in any given supply area is generally limited. Although collusion in bidding has not been proved, it is perfectly possible for these mills to watch closely the

price policies of their competitors. The mills in one area will sometimes organize a single buyer for the group to avoid bidding against each other. The large mills are occasionally able to hold a weak oligopsony position toward supply and as a result can buy their timber for less than if competition were stronger. Any mill at any time, however, may decide to bid up the timber price in its own supply area in order to assure itself of raw materials, or a plant outside that area may invade it and bid up the price.

Competition has increased in western Montana because of the growing number of plywood mills; they can usually pay more for timber than can the sawmills and thus have generally raised the price of logs. Two of the large lumber companies have installed plywood mills, not because they needed to produce plywood or foresaw greater profits from it, but primarily to protect their competitive advantage toward raw material supply.

Efficient operators obviously have an advantage in being able to harvest their timber economically. By developing new products, they can produce more from the same supply of timber, and they also benefit from being able to utilize small logs. Since generally only the large mills are able to add new product lines, they will probably continue to hold a stronger position toward timber supply than the medium and smaller mills.

The price paid for an individual sale of timber is of particular importance to the small or small-medium operator, who may

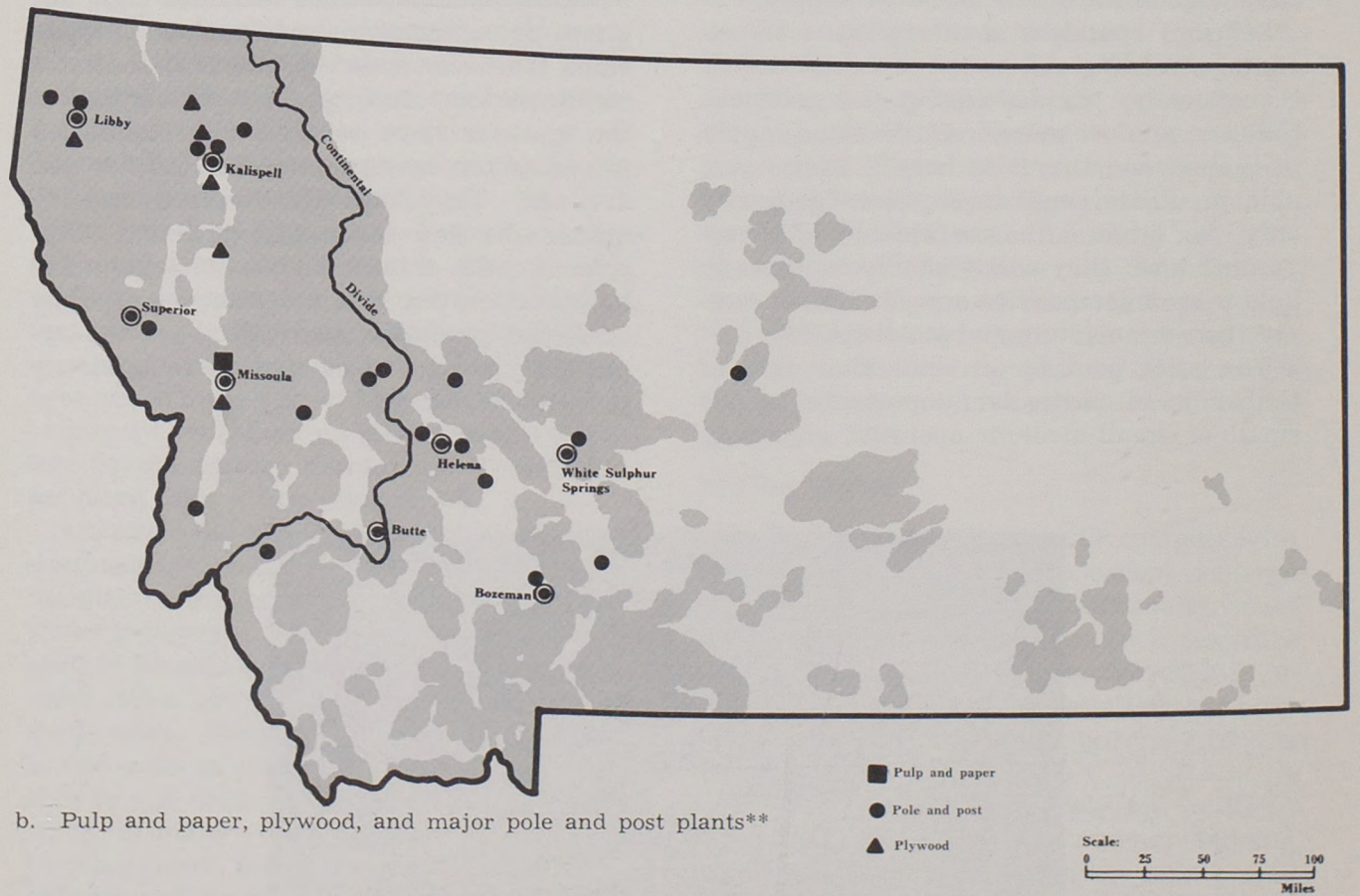
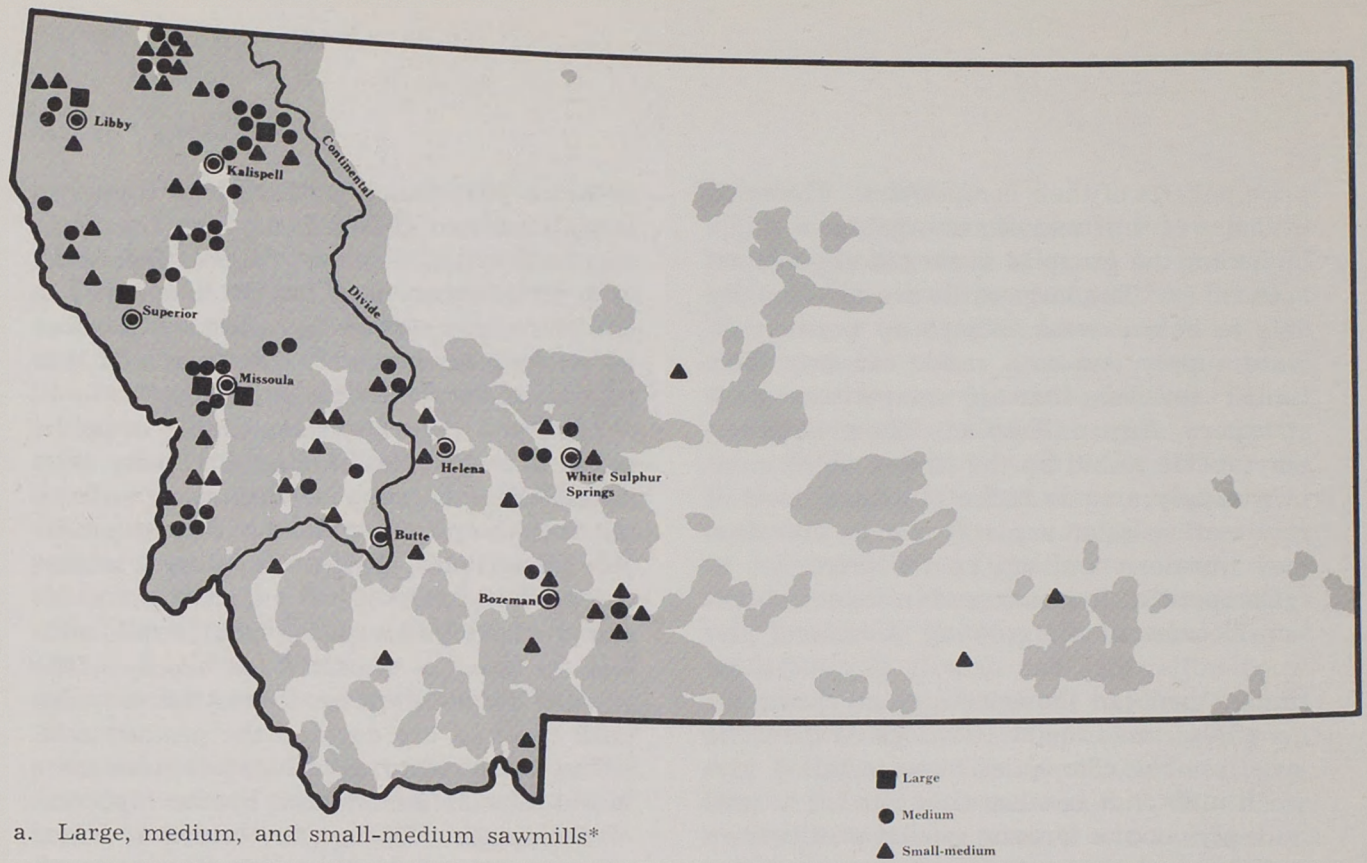
derive a year's supply of sawlogs from one large purchase. If he bids too high, the result may be financial disaster. On the other hand, a larger company may buy 20 to 30 sales in one year; high cost on one sale may be offset by low cost on another. This gives a further advantage to the larger mills.

The small mills buy some timber in public sales, but since in bidding for these they usually have to compete with other mills of all sizes, the price may be too high for profitable operation. Because they are seldom equipped to haul logs very far and not at all equipped to build roads, most small mills look to private woodlots for supply. The woodlot owner often has to wait for payment until the logs are cut and the product sold.

The delivered price of logs has risen since World War II, germinated by the high cost of stumpage. During the postwar boom, prices went up for both stumpage and boards. Prices for stumpage have remained high, but prices for dimension and lumber dropped when the boom ended in late 1956 and have continued low. In response to this situation, the agencies have reduced their appraised prices as the market price for lumber has declined. They have also lowered road requirements and other harvest costs. Appraisals still reflect high stumpage costs, however, and the fact that timber on public lands has generally sold well above the appraised price indicates that there is strong competition for supply.



Anaconda's Forest Products Division at Bonner—Montana's only major mill virtually independent of public timberlands for log supply.
ACM Photo



*Small mills (under one million board feet annually) not shown.

**Minor pole and post plants not shown.

Figure IV—LOCATION OF PRINCIPAL COMPONENTS OF MONTANA FOREST PRODUCTS INDUSTRY, 1963 (Shading indicates forested areas.)

Source: Directory of the Forest Products Industry, 1964 edition, Miller-Freeman Publications.

Production

Lumber

Montana's lumber industry consists of plants of many sizes manufacturing a variety of commodities that are more or less interchangeable. Although mills of all sizes operate from the same general timber supply and for the same general market, the characteristics of these mills differ greatly. The larger mills have high fixed costs and are tied to one location. Smaller mills have low fixed costs and are usually portable. As mentioned previously, large mills depend on transporting logs from an extensive supply area and small mills move into the supply area. The capital-output ratio may be as low as \$1,000 per man in small mills and as high as \$20,000 in the newest large mill. The following pages detail the operations of the categories of mill sizes outlined in Chapter I.

Large mills (more than 50 million board feet annually): Montana's large mills are comparable in capacity to the country's largest decentralized mills owned by the largest lumber corporations. The individual capacity of the large Montana mills is only about one fourth that of some of the centralized West Coast mills, however, which are the largest in the United States and may cut as much as one million board feet of lumber a day.

Montana has five mills in the large category, located at Libby, Columbia Falls-Pablo, Superior, Bonner, and Missoula (Figure IVa). Three of these—Diamond-Gardner, St. Regis, and Anaconda—are owned by national companies.

Large mills typically have integrated operations, with one or more band headsaws, small-log mills, auxiliary operations such as pole yards, facilities for secondary manufacture (laminating, modular paneling, finger-jointing, presto-logs, etc.), and chippers and debarkers. A distinctive feature of the large mills is their extensive warehousing and packaging facilities: the storage function has been moved back from the wholesaler to the manufacturer. These mills typically hold a large and varied inventory that permits custom loading to individual customer needs. Their production is strongly market-oriented in comparison to that of the smaller Montana

mills, with the output largely determined by the orders on hand. Some of the large mills have their own retail yards, usually operated independently, and all of them sell on the national market through well-established outlets.

All the mills in this group have made extensive changes within the past five years, either in plant modernization or the addition of new manufacturing lines. St. Regis and Plum Creek are the two companies mentioned earlier that have installed plywood mills, and others are considering such action. The five large mills have increased their capacity by almost 50 percent in the past five years and account for about one third of Montana's annual lumber production. Public corporations finance three of the large mills; the other two are operated by individual entrepreneurs financed by Twin Cities banks.

The large mills require highly skilled workers for the operation of equipment. Individual precision can mean a great deal in sawing, trimming, resawing, and sorting logs to obtain the greatest amount of high-quality lumber. By offering good salaries and year-round employment the large mills can get and hold the best skilled labor. Montana's large mills, with the exception of Plum Creek, are unionized. The convenience of living in town helps to encourage permanency in the labor force—the old roving lumberjack is a thing of the past here. Labor, along with the forest industry itself, has lost much of its migratory status.

The big companies are equipped with shops and spare equipment to keep their mills operating at high efficiency. They have expert filers to keep the saws sharp and maintenance men to keep the machinery in top condition. They maintain spare saws for immediate replacement of broken blades, and equipment companies give them extra service in emergencies.

Several of the large mills have their own equipment and crews to build harvesting and main-haul logging roads, and the companies do part of the harvesting and hauling themselves. All of them depend at least partially on contract, or gyppo,* crews for woods work.

*As used in the timber industry, this term applies primarily to independent logging contractors, but may also include small migratory sawmills. Its connotation is not derogatory.



A medium mill in St. Regis, western Montana.

The large companies will frequently buy timber, construct roads, and then contract for the logging, negotiating a delivered price for the logs. The gyppos, although independent, are usually closely associated with a particular large mill, which occasionally helps them with credit for buying equipment and other needs (see section on small mills, page 55). The large mills have generally moved away from an organization of woods crews and equipment under their own operation to the present contract arrangement in order to reduce fixed costs, overhead, and supervision.

These mills have sufficient capital to operate year round. They can accumulate enough logs during the logging season to hold a reserve for use in periods when supply is not immediately available, such as the spring break-up when road restrictions are invoked. Substantial capital is also necessary, of course, to maintain large lumber inventories

and to construct roads in advance of logging.

Medium mills (10 to 50 million board feet annually): There are approximately 45 medium mills distributed over the forested areas of the state, with the main concentration in western Montana (Figure IVa). All of them rely principally on public lands for their timber. The medium category includes some of the oldest plants in the state and most of the newest. Almost all of the recent immigrant mills are in this group.

Like the large mills, the medium firms generally produce finished lumber for the national market and are permanently located on railroads and highways near towns to facilitate procurement of raw materials and shipment of products. Their supply lines are as far-reaching as those of the large mills, and they too are often equipped to build their own road systems but rely almost entirely on gyppos for logging operations.

In certain other respects the medium mills differ from the large mills. They do not normally hold as large an inventory of finished lumber but try to sell it as soon as it is processed. While they must also have a strong enough credit position to hold large log inventories and to construct roads, their warehousing capacity is limited. As a consequence, the medium mills are more production-oriented than the large mills and are not integrated to the same extent. Although most of the former primarily produce finished lumber, some also engage in secondary manufacture of cut stock, molding stock, and fabricated components.

Many of the medium mills are now unionized. Far fewer had union contracts at the time of the 1962 strike by lumber workers on the West Coast. The price of lumber increased at that time to the benefit of the medium mills in Montana, and most of them stepped up production.

The medium mills generally are efficient and well equipped, using highly skilled labor on a permanent, year-round basis. They are large enough to own chipping and debarking equipment and gain the extra stabilizing income from mill residues. Medium mills are usually well financed and are able to weather normal market changes, but although they find it advantageous to continue operation during temporary set-backs, they are not as able as the large mills to withstand protracted recession.

Small-medium mills (one to 10 million board feet annually): There are some 45 mills of this size throughout the forested regions of the state (Figure IVa). They are notably different from the larger plants. Some of the small-medium mills may have band saws; more or them use circular head saws. A few have kilns, and others sell air-dried lumber. Some sell finished lumber, but more sell rough lumber to larger mills for finishing. The small-medium mills selling the rough product through this subsidiary arrangement are in a healthy condition relative to those that do not have such a market.

Mills in the small-medium category are too small to afford chippers and debarkers and so have no outlet for wood residues. They

are not strong enough financially to build log or lumber inventories or to construct extensive road systems. Consequently, they tend to operate seasonally and to shut down when the price drops. There are exceptions, however: included in this group are some vigorous operators who are growing and may eventually move into a larger class.

Small mills (less than one million board feet annually): Small sawmills are almost exclusively portable. Some are mounted on wheels and can be put into operation within minutes in a new location. Others require days to set up and are moved infrequently. There are several hundred of these mills in Montana; an accurate count is impossible. They are found primarily in the forested areas west of the Continental Divide. The small mills are set up near a log supply, most commonly on private land on a side road in the back country, although at times of high prices they are ubiquitous.

The small operator has frequently had years of experience in many phases of the industry, but his labor supply is generally less skilled and of necessity less stable than that of the larger mills. (Small mills are generally fresh-air plants that operate only during the summer season.) The mill consists of a circular saw and power unit, often old, for new machinery is costly and used machinery can be obtained for a minimal down payment. Equipment does not include a planer or dry kiln.

Small mills sometimes produce railroad ties and two-by-fours but more often sell rough lumber or cants to the larger mills for finishing. Their credit position does not permit them to accumulate a log supply or hold inventory. These mills sometimes sell to a broker who advances them short-term credit for the logs on hand and who collects, in addition to interest, a commission for selling the product.

Small operators are often attempting to meet payments on their equipment and supplies and are operating very close to the margin. Since a minor change in the price of a product or the cost of logs can put them out of business, they provide a very unsteady market for logs as well as only periodic em-



"... small mills ... are ubiquitous." These portable mills are sawing cants (above) and ties (below) in western Montana forests.

ployment. They may secure credit from brokers, as mentioned above, or from other private sources, including equipment companies, tie contractors, woodlot owners, and larger mills. Because of the risk involved, bank credit is usually not available to them except in a few cases where land can be used as collateral. As a result, the small mills are generally the most unstable sector of the timber economy.

A number of small mills operate with a measure of security, however. In some cases even the largest companies contract with a small owner to move his plant into a designated area to cut salvage timber or rough-saw scattered trees left after another operation. In certain portions of the state, particularly around Eureka, Thompson Falls, Townsend,

and White Sulphur Springs, a system such as exists for the small-medium operators has been worked out between a group of independent small mills and a larger plant: the latter agrees to buy the total output of the small mills at a negotiated price. As many as 25 small mills may produce rough lumber or cants for one central planing or finishing mill. The owner of the processing plant will sometimes extend credit to the millowners to purchase equipment or supplies. Under this arrangement small mills buy the logs, usually from private landowners; with an assured market they can plan for supply on a reasonably long-term basis. The advantage to the industry is the utilization of supply scattered over a relatively large area.

Plywood

Until 1955 there was but one small plywood plant in Montana. Five new ones have since moved into the state, and the original plant has been sold and greatly expanded. The plywood mills are located in Missoula, Polson, Kalispell, Whitefish, Columbia Falls, and Libby (Figure IVb). The last two are the previously mentioned additions to large lumber companies—Plum Creek and St. Regis. The other plywood mills often arrange sales of logs to lumber companies, with the small logs going to dimension mills. The plywood plant at Polson has purchased its own sawmill to use the small logs.

Most of the new plywood mills either came from the West Coast or are subsidiaries of companies there, although some are financed from the Twin Cities. When first established, the plywood mills planned to produce mainly high-quality construction-grade larch and Douglas-fir plywood, but changing markets and production difficulties have shifted as much as 90 percent of their output to interior sheathing and panel stock. These factors have caused the broader competition for timber species mentioned previously.

The plywood mills generally are large companies with high fixed costs. Their operation is continuous and to date shows considerable stability. Three of these mills are unionized.

Automation and a high percentage of recovery of material tend to decrease production costs of plywood. The mills have debarkers and chippers and sell their by-products to the pulp mill.

Although plywood and lumber are directly competitive, the overall effect of the plywood mills in Montana is beneficial to the wood products industry. The increased cost of logs due to plywood competition is indeed a distinct disadvantage to lumber producers, but nevertheless the plywood mills contribute to the growth and general security of Montana's industrial production and employment.

Pulp and paper

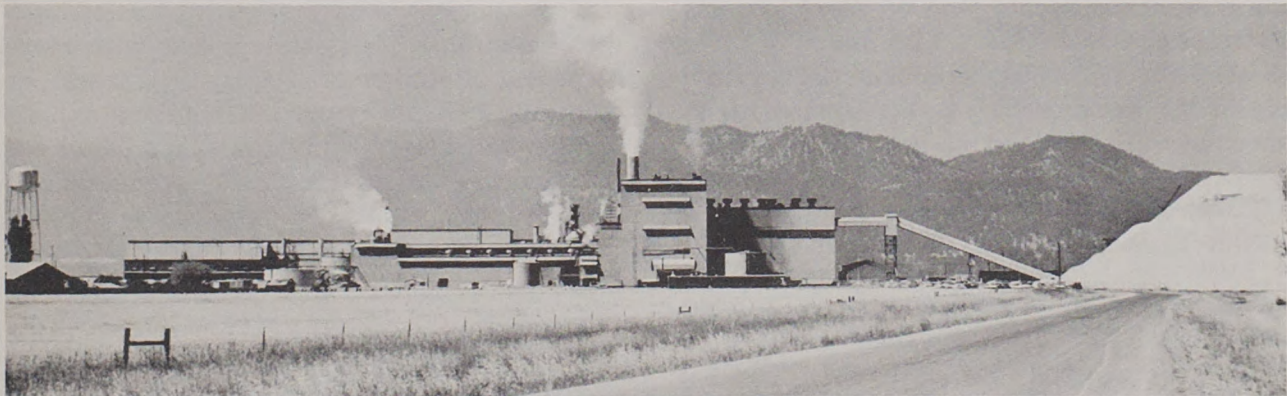
Montana's one pulp and paper plant—Waldorf-Hoerner—is on the Clark Fork River 13 miles west of Missoula (Figure IVb). This plant was established in 1956 on the basis of obtaining low-cost raw materials from mill residues in the immediate vicinity. It was originally a 250-ton mill built by the Waldorf Company, producing baled pulp that was

shipped direct to St. Paul, where it is made into paper used primarily for packaging frozen food.

Waldorf-Hoerner has contracts with nearly 30 Montana lumber mills. The price paid for chips has fluctuated very little, and the sawmill contract includes an escalator provision giving the operators the choice of relating any increase to the price of labor, the price of paper, or 50 percent to each. The mill-owners who chose the first have received the greatest increase. The pulp mill has recently installed steam generators and is using other mill residues (sawdust, bark, etc.) as fuel.

Minor products

Montana forest industries have produced poles, posts, mine props, ties, pulpwood, Christmas trees, shingles, and other miscellaneous products for a long time, mostly for consumption within the state. Some of these have recently become important exports to the national market. Companies affiliated with the larger sawmills produce a number of



The Waldorf-Hoerner pulp and paper mill, Missoula.

shipped to the Twin Cities for manufacture into paper. The Waldorf Company later formed a partnership with the Hoerner Company to produce kraft paper. The pulp mill has since been enlarged to over 650 tons, and its supply lines have been extended. Most of the pulp is used for paper that is shipped to the Midwest and manufactured into cardboard boxes. About one fifth of the pulp is

the items listed above. Other producers are independent operators.

There are 11 major pole and post yards and some 20 to 30 minor ones, all located in western Montana (Figure IVb). Most of the poles are cut by the Idaho Pole Company, which maintains a treating yard in Bozeman, and by the St. Regis Company at Libby. Both companies produce and export power poles

and barn poles. Long transmission poles bring the highest profits but are becoming scarce as the residual forests are cut. The most desirable poles are trees still in vigorous growing condition, since preservative penetrates best into the sapwood. Public agencies oppose the cutting of young trees of this type, however, because they are generally the dominant individuals in an immature stand and will make good future timber trees.

Post plants have increased in the state during the past decade. Interest in post production has been generated by the development of post-driving equipment for farm tractors, which has made it possible to satisfy a demand for sharpened, treated wood posts. Montana produces posts for local consumption and for shipment to the plains states.

The Anaconda Company makes most of the mine props in the state; other mills occasionally take contracts for special orders. The market for mine timbers is declining as Anaconda's operations turn to open-pit mining.

Ties are produced primarily for Montana railroads, although out-of-state contracts are sometimes obtained. One or more general contractors buy from sawmills, many of them small. The tie market is considered a prime outlet for these mills. In some cases mills specialize in ties and operate only during periods of high demand.

Pulpwood cutting was once a thriving industry, particularly in the lodgepole areas

east of the Continental Divide. This pulpwood was shipped to mills in the Great Lakes states. More recently, operators in that region have been buying chips and reducing their orders for pulpwood. Some pulpwood is still cut and sent east, however, and a small amount is shipped to a Spokane mill from the western border of Montana. Since Waldorf-Hoerner uses only residues, there is as yet no local market for roundwood.

Montana has become one of the chief exporters of Christmas trees for the national market. Eureka is the center of Christmas tree production in the state. The major species is Douglas-fir, although pine, true fir, and others are also used. Problems have recently beset this industry, however. Needle-cast fungus and defoliating insects have infested much of the growing stock, and cultivated trees have replaced native trees in many of Montana's traditional markets. It also appears that the greater part of Montana's prime Christmas tree crop has been cut and that the remaining wild crop is of lower quality. A number of growers are now trimming and cultivating to improve native stands. Even though total sales have been declining, it is possible that with more care and quality-control, Christmas trees can continue to be an important Montana export.

The state's only shingle mill is a small operation located at Troy. Its production is intermittent, usually in response to specific orders from individuals and larger firms.



Christmas trees are still a viable Montana industry.
Montana State Forestry Department Photo



V *Markets and Marketing*

Montana forest products are sold both locally and on the national market. This means Montana producers are competing with each other, with producers in other regions of the United States, with producers in other countries, and with manufacturers of products that can economically substitute for wood. Because the marketing of lumber presents problems that are common to all Montana forest products, lumber will generally be

used to exemplify the industry as a whole in the following pages.

Lumber marketing

Lumber consists of a number of species of wood, cut into many sizes and shapes. It is further classified by diverse grade standards. Most of the lumber produced in Montana is uniformly manufactured: the quality of a given grade and species does not differ significantly among individual mills. Nevertheless, the overall market is selective and changeable for specific wood products. Orders may be for carloads of one item, such as two-by-fours, or for one car containing more than 100 different items. This lack of conformity accounts for some of the differences in marketing practices among individual lumber producers.

There is, for instance, a distinct variance in marketing activities of Montana producers by mill size. Montana's large mills have well-established marketing procedures of their own. Most of these mills depend on middlemen for part of their sales, and a few also sell a considerable volume direct to retail dealers and contractors. Some of the large mills own their own retail outlets or have arrangements with independent lumber retailers. Servicing of these contracts requires a sizable sales staff.

The medium mills are usually not large enough to maintain a marketing staff and must depend almost entirely on middlemen. There are notable exceptions, however: a number of the medium mills are partially owned or financially controlled by middlemen who sell both their own products and those from other mills. In a few cases medium mills have contractual arrangements with the marketing organizations of large mills. (Our main interest here is in the activities of the large and medium mills, since they account for nearly all of Montana's export trade, although a few of the small-medium mills east of the Divide have developed specific marketing arrangements to the East.)

We found that a sizable portion of Montana's lumber is sold through independent distributors, most of them brokers located

on the West Coast. These are the brokers used by the medium mills. Almost all other middlemen important to both the large and medium mills are situated in metropolitan areas throughout the country.

Broker operation

The middleman has played a powerful role in Montana's lumber industry since the railroads opened eastern markets in the 19th century and small mills could not maintain sales forces to handle the widespread demand. Until then, transactions were carried on direct between owner and consumer, usually at the mill site.

Various arrangements now exist between Montana mills and brokers. A mill may use one or many brokers throughout the country. Some brokers operating in Montana live in the state, but most of those who sell Montana lumber have offices in Seattle, Portland, the Twin Cities, and Chicago. Each broker will operate, almost entirely by telephone, with a fairly large number of mills and many customers. He will have direct access to bank credit and will have one of several arrangements with the mill. The most common is the five-and-two system whereby the broker gets a five-percent commission on the sale and a two-percent cash discount for payment within a stipulated time period. Usually the broker will advance the mill the payment for lumber when it is loaded in cars at the plant and will be responsible for collection of accounts. In other cases the broker may purchase the lumber outright at the mill and sell it for whatever he can get. Another type of broker may represent several yards, possibly line (or retail) yards in the Midwest or East, and buy for them from one or several mills.

The number of regional brokers in the lumber business is declining nationally. At present most of the big West Coast companies have their own marketing organizations and do not use these brokers. Smaller mills on the Coast often sell through the marketing organizations of the large companies. The Inland Empire (eastern Washington) and the Rocky Mountain states are now the last major western areas still selling through regional brokers.

Product differentiation

Montana lumber producers, following the usual industry practices, may compete for sales by seeking specialized markets for native species, turning out products to meet specific needs, or offering special services. Individual mills do little or no national advertising, although they may contribute to such advertising through the National Lumber Manufacturers Association, the Western Wood Products Association, or other organizations.

It is difficult for any one company to establish species differentiation in the market place, although some Montana producers have found a specific market for western larch in the Southeast, where it is a substitute for bald cypress. The native cypress is in short supply there, and western larch has become known as "Montana cypress." A number of Montana mills ship almost all their high-quality larch lumber to Florida, Georgia, and Alabama.

Montana mills also benefited when Engelmann spruce came into high demand in the 1950s. Because of its small tight knots and ability to maintain a light color, the species has been widely accepted by the building trade for open decking in beam-type roof construction and for wall paneling. It is a desirable substitute for white pine for these uses, and for some years its abundance resulted in lower cost to the purchaser. Recently, however, the supply of insect-killed spruce has been declining. Increasing scarcity has led to a higher price and a drop in the quantity demanded by consumers. The fact that the plywood industry utilizes spruce for sheathing and paneling has also contributed to the recent curtailment of spruce lumber production (Figure III, page 26).

Several of the large and medium mills have strengthened their market position through the development of prefabricated products. These include custom items such as laminated beams, modular panels, molding boards, pre-cut materials of all kinds, and do-it-yourself kits. The Anaconda Company and the Mission Home Company manufacture prefabricated houses.

Almost all the larger mills provide special



A future crop of "Montana cypress." Larch regeneration in the Flathead National Forest.

services that offer savings as well as convenience to the customer, including packaging, lift-loading, cutting to exact length, and mixed loads. Labeling, end-waxing, and other special operations also help secure and maintain a better market. In addition, some Montana mills provide building plans, consulting services, or assistance in financing home repair through their market outlets. Finally, companies may hold a market advantage by long-standing service to certain customers.

Pricing

Price is, of course, the most important element in buyer-seller negotiations of interchangeable products. Although there is a certain amount of bargaining in all transactions, price cutting—the least desirable form of competition for the producer—is usually only undertaken in drastic circumstances, such as serious financial setbacks of an individual operator and/or a major market adjustment.

Trade associations report market prices weekly or monthly to communicate general changes in offerings to potential buyers. These listed prices are the starting point for bargaining between buyer and seller. The Western Pine Association indexes provide estimates of prices received by member mills. *Random Lengths*, a West Coast publication, offers general price and quantity information. Such estimates reflect Montana prices more accurately during periods of industry prosperity than during even mild recessions. When the latter situation exists, inventory liquidation leads to the selling of a substantial volume of lumber at 30 to 60 percent below listed prices.

Pricing decisions are seemingly made *ad hoc* when buyers and brokers communicate with mills by phone. Some buyers get in touch with several mills to negotiate the best price; others consider only one or a few large manufacturers and repeatedly purchase from a specific mill in order to acquire a reasonable price listing and a full line of products that can be delivered in mixed-car orders. The large mills and a few of the medium mills maintain their own published price lists.



a. Stands attacked by bark beetle. . .



b. Access roads built for salvage. . .



c. Storage at a large mill. . .

The spruce story:

This unique incident in Montana's forest products history could be subtitled "How an insect created a market." The epidemic of spruce bark beetle, described in earlier pages, occurred in the early 1950s. Despite the postwar construction boom, spruce had not been widely used as a Montana lumber source in preceding years, primarily due to lack of full consumer acceptance. But *Dendroctonus engelmanni* changed that situation: logging was the only means of controlling the plague, and so with remarkable speed the Forest Service built roads into the infested areas; logging operations were diverted to salvaging spruce stands; sawmills large and small manufactured spruce products; and spruce replaced western white pine as a popular construction material. Now, for various reasons (see page 44), this beetle-built lumber market is declining, but spruce will continue to be an important species in the forest products industry of Montana.



d. Lumber manufacture at a small mill. . .

Most of the medium mills use commercial lists and keep their brokers informed of their inventories. Pricing by these latter firms seems to be influenced strongly by need for cash revenues, types of finished goods on hand and in process of manufacture, and financial ties with brokers.

Freight

Freight costs represent an average of 20 to 40 percent of the final selling price of lumber. The cost of shipping by rail varies from about \$10 a thousand board feet from Missoula to Billings to more than \$30 a thousand east of Chicago. Costs of shipping by truck are higher, but are compensated for by shorter time in transit and better delivery service. Trucks are used mainly for shorter hauls, although there are some regular truck shipments as far east as Illinois.

Railroad freight rates for Montana are based on the comparative freight rates for lumber going to market from the Pacific Coast. Although Montana is closer to Chicago by 500 miles or more, its freight rates

are only \$.03 per hundred weight less. Montana also ships to the southeastern states on this basis. (Freight rates from the Pacific Coast and from Montana to the upper Atlantic states are identical east of Chicago.) The Pacific Coast has the additional advantage of shipping by boat at lower water rates to eastern ports, either through the Panama Canal or up the St. Lawrence Seaway. Furthermore, producers on the West Coast have direct access to Asian markets.

When railroad freight rates on lumber are established for Montana, the relationships between Montana producers and those on the West Coast or in the South are considered. Any shift in the freight rates of a single timber region has an immediate effect on the comparative position of other regions. Montana's position was improved in 1963 when freight rates for the state's lumber were reduced seven percent by Division 2 of the Interstate Commerce Commission.

Manufacturers of forest products new to the state, such as plywood, pulp, and paper, have demanded and in some cases received rates that allow profitable movement to market. There are similar arrangements for the movement of chips from Montana mills to the pulp mill near Missoula. Although railroads have also provided more wide-door cars, piggy-back truck hauling, and other services to facilitate loading and speed delivery, secondary manufacture within the state is still hampered by existing freight costs.

While much of the truck hauling in Montana is by established lines or in vehicles owned or leased by lumber companies, some deliveries are made by trucks on back-hauls, occasionally under the agricultural exemption or by other means of avoiding minimum-rate regulation. The railroads cannot compete with back-hauling truck service, due to federal controls over their own minimum rates. Although total rail shipments have increased in the past decade, the rate of increase in truck shipments has been greater. Nevertheless, shipping by rail is still the principal means of transporting Montana lumber.



e. Construction of dwellings. . .

Problems

Substitute products with lower installed costs have caused some trouble for the state's lumber industry. This is particularly true with regard to the market for construction materials. For instance, the cost of nailing plywood in place is roughly half the cost of nailing lumber. As a result of this substitution and the competition of other materials, the overall demand for lumber is weakening. Demand for dimension stock remains strong, but the market for one-inch boards is steadily declining.

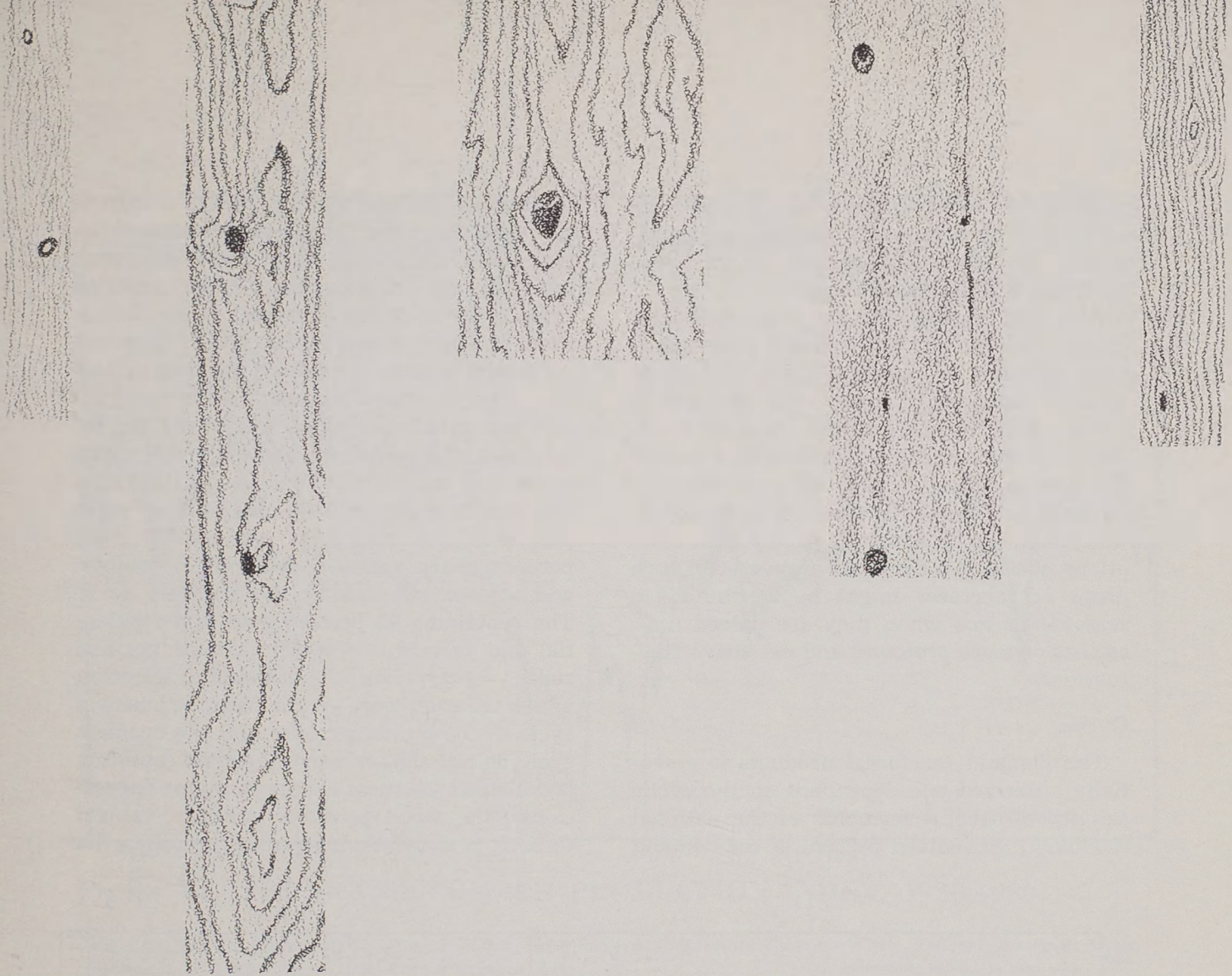
Broadly speaking, however, Montana's marketing difficulties are based on the fact that lumber manufacturers try to sell what they produce rather than produce for the most favorable market. Ideally, their whole operation should be geared to turning out the type of product that will bring the greatest profit, but for two reasons they are not doing this. One is the long production period from the cutting of trees to the final sale of the finished merchandise and the other is isolation from markets by distance. Not only does distance impose high freight costs, but by separating producer from consumer it leads to marketing through intermediaries. Dependency on brokers and wholesalers, more than physical distance *per se*, holds the Montana operator in a virtually colonial status. He cannot anticipate the products that will be in demand or those that represent the best profit opportunities. As a result, standardized production may leave some mills with a large lumber inventory and at the same time unable to fill orders for materials not in stock.

Most Montana lumber manufacturers, in short, are production-oriented rather than market-oriented. The cause is partially historic: during the postwar boom the market did take everything that could be produced, and there is an inclination to consider this the "normal" situation. The mill owners experienced in marketing have generally become the most successful operators by keeping in touch with the rapid shifts in demand, but they are the exceptions. Only a few of

the larger mills have their own marketing organizations; of the others it may be said that to a considerable extent the head sawyer still determines the products for sale.



"... some mills (are left) with a large lumber inventory . . ."



VI Cyclic Influences

The Montana forest products industry is subject to several types of economic change, all of which affect its structure and growth. Production is influenced by seasonal variations, recurring national business cycles (both major and minor), and the long-run economic trend. These fluctuations require certain adjustments by the industry. Depending upon individual circumstances, they may cause operational reductions or new opportunities for expansion.

Seasonal variation

There are changes throughout the year in wood products employment, shipments, and price. Seasonal variations in employment

are concentrated in the logging phase and are largely due to weather conditions that interrupt the operation of woods crews and smaller mills. Since these fluctuations are expected, they usually do not present serious production problems in the mills.

Seasonal market changes cause product inventories to vary, due to errors and uncertainties in forecasting volumes, prices, and types of items that will be purchased. Most timber species bring different prices at different seasons, and the mills need to hold good inventories of these products in order to sell at the highest profit. Mill inventories generally reach their peak during the assessment period in March, for purchasers arrange

their orders to have the lowest possible inventory at that time. The mills are consequently forced to hold and pay tax on inventory that the purchasers avoid.

Although seasonal variations in orders and prices are relatively uniform and predictable, they do tend to obscure the initiation of broader economic changes. For example, a sudden large drop in orders could be interpreted as the onset of a recession or a sudden increase as the indication of a general upswing, when in reality either of these conditions might be the result of purely local deviations in seasonal demand. Conversely, such drops or increases might be attributed to seasonal factors when they are indeed indications of more profound and extensive fluctuations.

Cycles

The demand for forest products is essentially a derived one dependent on the cyclic activity of several segments of the national economy.²⁴ Seventeen percent of the demand

for lumber comes from the marine construction industry and 10 percent comes from manufacturing plants. Both these industries are extremely susceptible to the business cycle. Fifteen percent of total production is used for farm construction, which does not vary with minor fluctuations but does reflect the larger business picture. Public construction accounts for eight percent of the lumber market and also follows the major economic cycles but not the smaller ones, as does railroad construction, representing another eight percent. Combined, these activities total 58 percent of the national demand for lumber, and all are affected by the business cycle. The remaining 42 percent goes into residential and private nonresidential building and repair—enterprises subject to building cycles, which are even more erratic than the business cycle. Since building cycles and the business cycle do not always move together (building lags behind business except in major depressions), the wood products industry, subject to both, is generally more uncertain than the

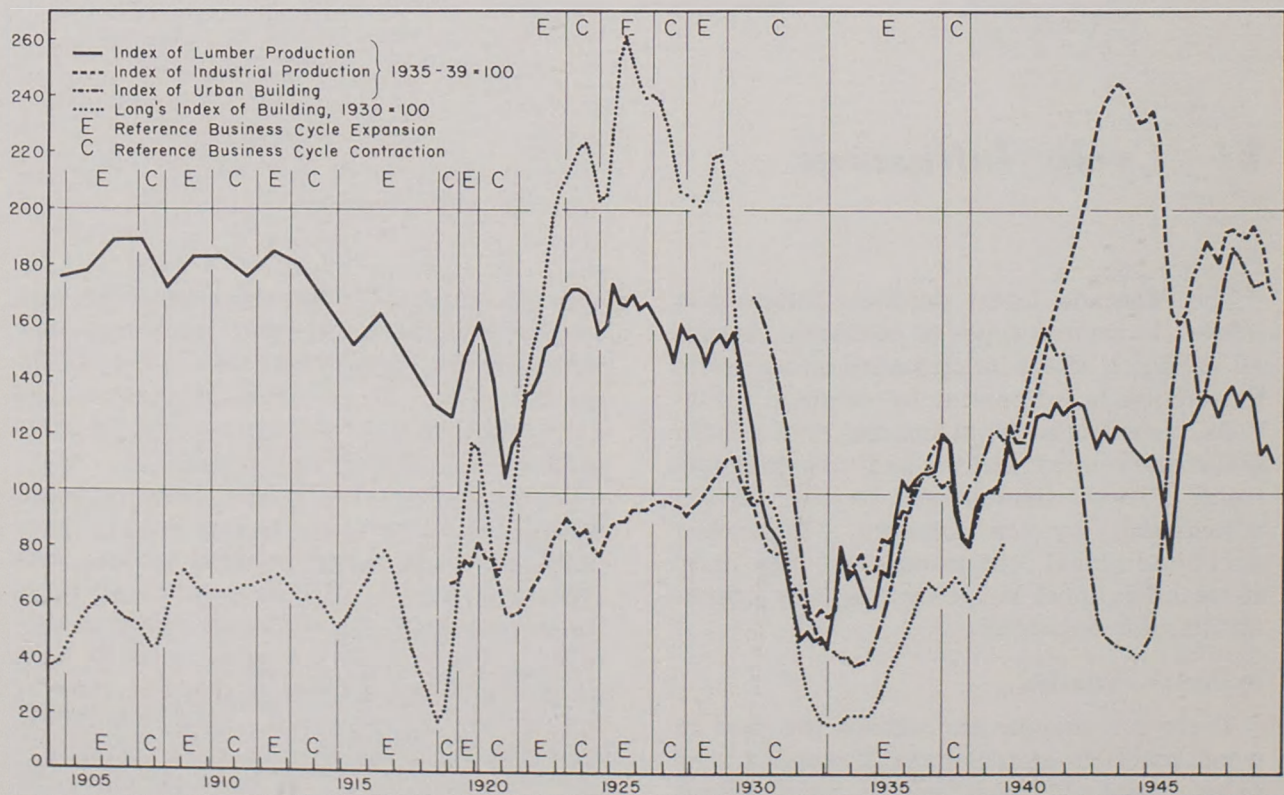


Figure V—BUSINESS CYCLES, BUILDING CYCLES, AND LUMBER PRODUCTION, 1905-1950.

Source: Zivnuska, John A., *Business Cycles, Building Cycles and Commercial Forestry*, Institute of Public Administration, New York, 1952.

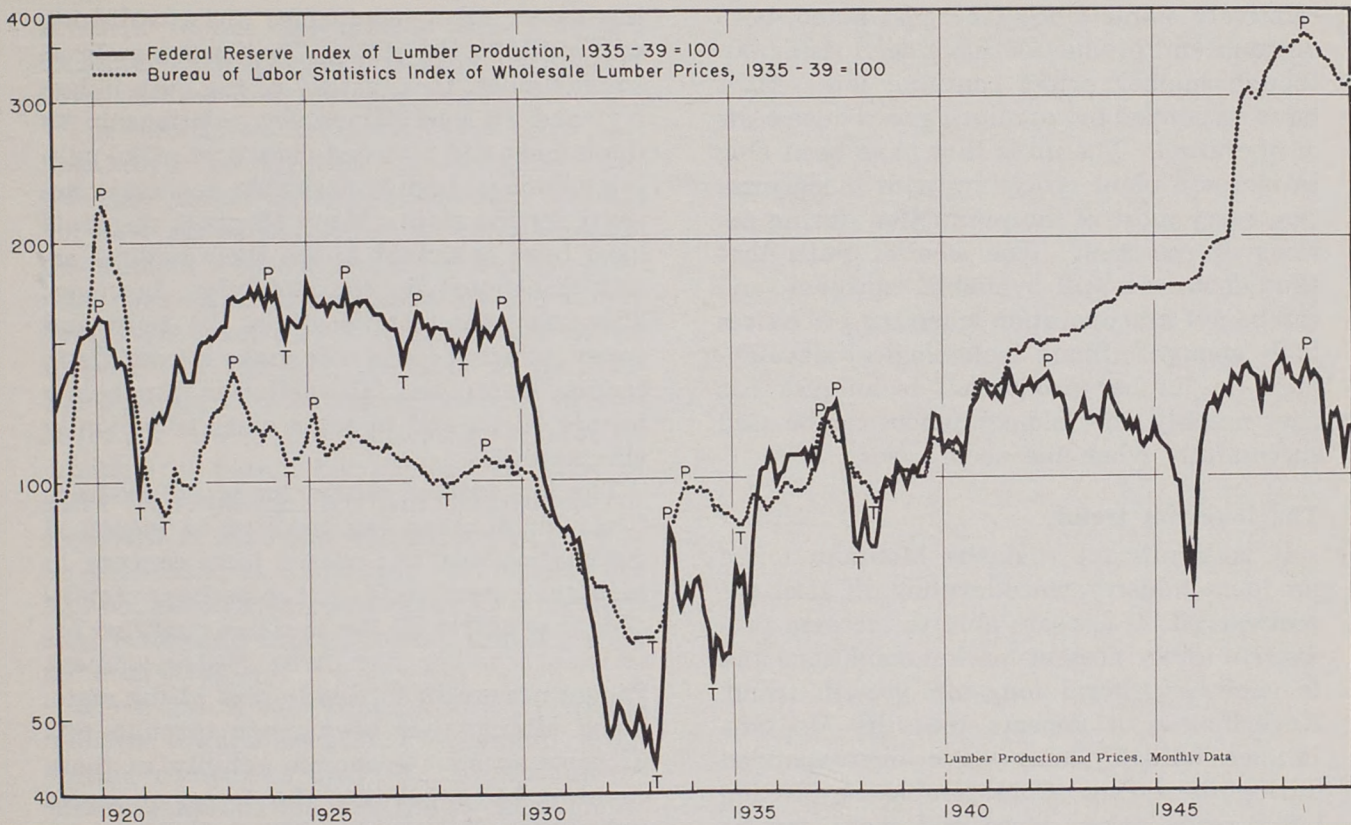


Figure VI—PRICE AND LUMBER PRODUCTION INDEX, 1920-1950.

Source: Nelson, Clarence W., *The Timber Economy of the Ninth District West*, Federal Reserve Bank, Minneapolis, 1963 (from U. S. Forest Service data)

majority of other industries (Figure V). In Montana specifically, except for pulp and paper, the forest products industry primarily produces softwood lumber and plywood for building. For this reason the Montana industry is more severely affected by building fluctuations than is the forest products industry as a whole.

Montana's lumber production peaks coincided with national housing and construction booms in 1912, 1922 to 1929, and 1946 to 1956. In each case the rise in lumber production was preceded by a rise in lumber prices, particularly after World Wars I and II (Figure VI).

Nationally, the lumber industry is plagued by chronic overcapacity. When demand is down, the larger mills continue production because of high fixed costs and in anticipation of an improving market. When the increase comes, idle capacity in other mills is

put into operation and the price does not go as high or stay up as long as it would without this reentry. In short, the market becomes saturated. The lumber industry is therefore characterized by long periods of high supply and low profits and short periods of relatively low supply and relatively high profits.⁶

Several factors have prevented the effects of market declines in the late 1950s from being as serious for the Montana forest products industry as those of previous contractions. The steady market for chips and other mill residues has provided a stronger basic income to the industry; the agencies have reduced stumpage prices and road requirements to minimum agency standards in many cases; railroad freight rates have been lowered; and the larger mills have been able to obtain the necessary credit to carry them over nonprofitable periods.

The price for forest products has remained

relatively stable since 1957. As noted, both demand and production have been rising, although lumber prices continue low. Mills have responded by attempting to reduce costs of operation. The mills that have been able to increase plant efficiency with modernization carry most of the production during periods of recession. The smaller mills that shut down are still available, however, and can be put into operation when the price rises high enough. Since technological development in lumber production techniques has been notably slow, old equipment can be used successfully when the need arises.

The long-run trend

It is significant that the Montana forest products industry, since leveling off after the postwar boom, appears able to increase production under present market conditions and to show a general long-run growth trend. Nevertheless, it appears that the Montana lumber industry may have overexpanded during the boom. Considerable contraction has already taken place and more can be expected if conditions remain unchanged, particularly in the marginal and small-log areas.

Although the central and southern Rocky Mountain states have never been considered serious competition to Montana's wood products industry, certain mill operators are finding that Colorado and possibly Wyoming timber can compete with the smaller timber east of the Continental Divide in Montana. Production costs may be no less, but the southern areas are closer to market and lower freight costs are an important advantage.

Technology in the plywood industry has made it economical to use smaller logs; therefore the volume of potential plywood supply in Montana has increased. Because the same thing is happening in other areas, this trend has benefited Montana only to the extent that the state's timber has maintained a competitive advantage. There is some evidence that the recent introduction of plywood mills in the Southeast has slowed the expansion of this industry in Montana and throughout the Northwest.

The success of Montana's lone pulp mill has

interested other companies in establishing pulp mills in the state. The large supply of small timber, the stability of the pulp industry, and its complementary relationship to the lumber and plywood industries make pulp production a highly desirable economic activity for the state. Many Montana residents have been reluctant to see their natural assets threatened by contamination, however, although new technology in the pulp and paper industry could now make it possible to reduce water and air pollution far below former levels and in some cases to virtually eliminate it.

The low rate of return for wood products firms in Montana has resulted in increased automation and has caused local concern in Montana communities. It is perhaps significant that nearly all the counties qualified for assistance under the Area Redevelopment Program were in forested areas of the state. Some attempt has been made through this program to spur economic activity in these counties by expanding the forest products industries. The problem here is that support to one company frequently threatens to upset the competitive relationship of other companies in the area. It was due to protest from lumber mills that an ARA loan to a plywood mill was refused.

The rapid growth of the particle-board industry in the United States¹³ combined with the lack of any producers in Montana has caused some firms to investigate the possibility of establishing a particle-board plant in the state. There are a number of processes for such manufacture already on the market, and technology is rapidly developing new ones to produce better-quality products at lower cost. In many ways particle board can be looked to as the building material of the future: it can be made from trees of any size, species, or quality; its manufacturing processes lend themselves well to automation; and it can be put up cheaply and quickly in construction. Competition from this type of material has had considerable effect on the lumber and plywood industries. Although complete substitution of particle board for other building materials is a slow process, even the gradual development of such a prod-

uct will reduce the effects of any future building boom and may already be holding down lumber and plywood prices.

The companies that have investigated particle-board possibilities in Montana have generally found physical production feasible but have also encountered an almost insoluble problem: a specialized product of this kind requires a marketing organization and advertising on a level that local industries cannot support. In addition, the bulk of particle-board production is concentrated in subsidiaries for use in the fabrication of specific products of parent companies. In view of these facts, plants for manufacturing particle board in Montana will evidently have to be established by a company that already has a national marketing branch or by a partnership between a local company and a parent national company.

The trend of the Montana forest products industry toward integrated ownership of operating companies could be a step toward further consolidation with the so-called giants in the nationwide industry. Expansion of productive capacity of individual firms has been difficult in Montana because the widely scattered supply of raw materials limited the size of plants and multiple ownership permitted the survival of many plants of all sizes. Nevertheless, contraction of national demand for lumber has resulted in the concentration of production and control of supply among fewer, larger, and more stable companies. In short, the Montana industry as a whole has been following the national trend toward centralization of the forest products industry.¹⁰



*“. . . trees of any size, species, or quality . . .”
Montana’s vast stands of stagnating lodgepole could
be a source for particle board.*



VII Outlook

Long-run projections hold promise for an increase in the nation's demand for forest products, but with continuing shifts among products. The projection for pulp and paper is toward a high rate of expansion, as is that for plywood. Although substitutes will continue to replace lumber for many uses, the demand in general will probably progress at a steady rate. New products such as particle board are expected to offer intensified competition with lumber, plywood, and pulp and will probably take more of the market in the future.

Automation will play an ever more important role in future production. The sectors of the forest products industry that can make the greatest use of automation will grow at the expense of the others. Pulp, plywood, and particle board will have a particular advantage over lumber in this respect. Within the lumber industry itself, standardized products such as certain dimension stock, which lend themselves to some degree of automation, appear to offer the best opportunities for successful competition with substitute products. The demand for high-quality lumber is not likely to be sufficient, however, to offset the higher cost of production for established mills.

The strength of any production area nationally will depend upon its lasting ability to compete with other regions. Montana's

forest products industry had its greatest growth during a boom period; it appears to be holding its own in a time of reduced demand. Competition from other regions, including Canada, is not likely to wane in the near future, but no marked shift by the industry as a whole to other production regions within the United States appears imminent. The establishment of new plywood mills in the Southeast will reduce the rate of expansion of the plywood mills in Montana.

Unless there is a major international or domestic upheaval, the price for wood products will probably continue at a low level relative to the postwar period for some time. The successful mills of the future will be those that can adapt their production for profitable operation under this condition. Mills that have been running at a loss in recent years will either have to adjust their operations or shut down.

The large mills have held an increasingly important position in Montana's forest products industry since 1957, and we can expect this trend to continue. Integration in the large mills, either as independent firms or through combination with large national companies, will accelerate. There may also be mergers among existing lumber and plywood mills and among pulp mills, if more are established in the state. Innovations, including the manufacture of new products, are likely to

come mainly from these large integrated companies.

Medium mills, especially those with a high level of efficiency in buying and delivering logs and in producing and marketing their products, also will continue in a strong position. They will probably develop some new product lines. Some medium mills may grow to large size and some may merge with larger companies, at least in such operational phases as marketing.

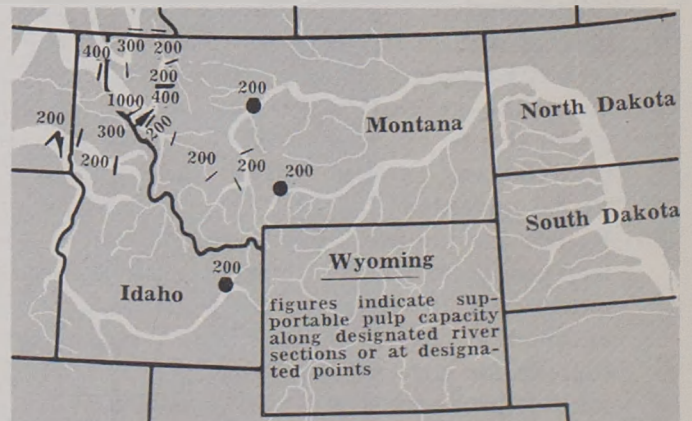
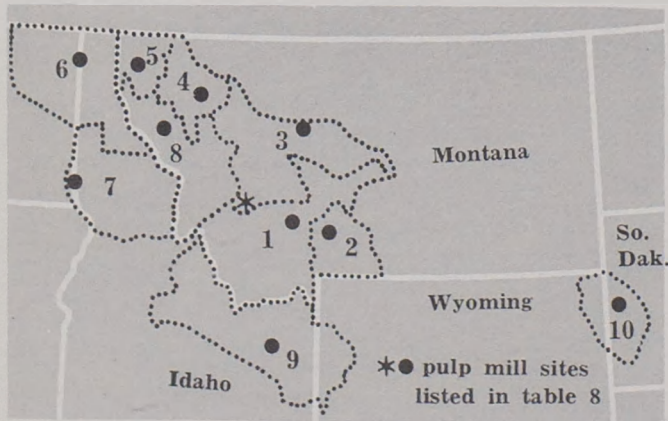
The number of small-medium and small mills is not expected to change a great deal. These mills are not likely to encounter another period as profitable as the postwar boom, although they may experience short periods of gainful operation under a contract for railroad ties or other specialty items. The main outlet for their rough lumber will continue to be the larger mills that will purchase it for refinishing. The battery of small mills producing cants and rough dimension for a larger finishing plant may perhaps increase, since this type of operation is apparently well suited to areas of scattered timber supply in Montana.

With the continuing demand for dimension lumber, technological development in the harvesting, manufacturing, and marketing processes could make production in the small-

log areas profitable once more. The utilization of large volumes of timber in eastern Montana could be economically feasible and so promote the growth of the state's lumber industry. Technology cannot be controlled by any one region, however, and the same developments would also influence production in the southern Rocky Mountain states, thereby increasing competition to the possible disadvantage of Montana.

Small timber is also a potential source of pulp, and it appears likely that there will be further development of the pulp and paper industry in Montana. The relation between Montana and the southern Rocky Mountain states, as described above in regard to dimension stock, exists here as well, but Montana has more water for industrial use. The Missouri River and other large watercourses are an important consideration in the future of the pulp industry in the state (Figure VII and Table 8).

The trend in production has been upward since 1957, with little or no increase in the labor force. In the future, if machinery substitutes for labor at a faster pace than production increases, there will be a drop in the number of people employed. Additional employment in Montana's forest products industry can be expected to come mainly from new



a. Possible pulpwood supply areas and pulp mill sites.

b. River systems and relative stream flow at potential pulp mill sites.

Figure VII—POSSIBILITIES FOR EXPANSION OF PULP INDUSTRY IN MONTANA.

Source: See source line for Table 8.



Water—the resource behind the resource. Though Montana is currently rich in natural water, allocation is a growing problem that may affect expansion of the forest products industry.

industries such as pulp and paper, plywood, and particle board or other secondary manufacture. Additional employment could also be created by changes in raw material requirements, such as the use of roundwood for pulp or more use of small logs in farm woodlots for lumber or other products. We can expect further unionization of labor, particularly as the larger mills assume a greater share of total production. There may be an attempt to counteract this by using more independent contractors and by placing more primary manufacture in small outlying mills.

Although the supply of timber in much of eastern Montana would permit a considerable increase in industrial production, the annual cut west of the Divide is presently at or beyond annual allowable cut.⁹ With more intensive management, allowable cut on public and some large private holdings will go up. Meanwhile, the supply of timber from other private ownerships is decreasing. These latter landowners appear to be interested primarily in immediate returns rather than future production on their lands, and industry to date has not encouraged them to manage for long-run production.³ Many of these private ownerships were once and can again become some of the most productive timberland in the state, but unless management is improved there will be a reduction in this

TABLE 8 DATA ON POTENTIAL PULP MILL SITES ILLUSTRATED IN FIGURE VII

Pulpwood source data	Hypothetical pulp mill sites	Annual sustainable pulpwood cut (thousand cords)	Sulfate pulping capacity that sustainable cut would support (tons)	Permissible sulfate pulping capacity based on streamflow (tons)
1	Three Forks	442	740	200
2	Livingston	127	210	200
3	Great Falls	172	290	200
4	Hungry Horse Dam	397	660	400
5	Libby	330	550	300
6	Albeni Falls	1,188	1,980	400
7	Mouth of Clearwater River	1,356	2,260	200
8	Paradise	507	850	1,000
9	Roberts	157	260	200
10	Deadwood	100	170	
1-3-8*	Anaconda-Warm Springs	120	200	

*Alternate possibility at vacated industrial site.

Source: Nelson, Clarence W., *The Timber Economy of the Ninth District West*, Federal Reserve Bank, Minneapolis, 1963 (from U.S. Forest Service data).

source of supply for Montana's industry. Such a loss may be offset, however, by increased supply from public holdings and from the intensively managed large private ownerships.

Operating capital for Montana's forest products industry comes primarily from local banks, while major investment capital is obtained from outside the state, for the most part from the Twin Cities. Operating capital as well as some investment capital has also been procured from brokers, from the Small Business Administration, and from warehousing concerns. Operating capital has generally been adequate for most Montana mills and will probably remain so for the predictable future.

Funds for capital investment have been scarce for the Montana lumber industry. Large mills have had corporate financing, and most of the medium mills that came into the state were privately financed. Recent closures among medium and smaller mills appear to have made such capital even tighter. Although the forest products industry is a high risk enterprise and credit for expansion will continue to be scarce and expensive, successful operators will find credit sources. New industry as well as major expansion will probably come almost exclusively from the larger mills that have access to corporate financing, however. Expansion by such corporations will be made on the basis of the relative rate of return that can be expected from investment in Montana over possible investment elsewhere.

Marketing will continue to be one of the major problems facing the Montana forest products industry. Distance from market will favor the use of regional brokers in the marketing process, at least for some time, although it appears to be in the best interests of the industry to break away from this arrangement as rapidly as possible. The smaller Montana mills may be able to form partnerships with larger mills in or outside the area that already have marketing organizations. It may also be possible for several medium mills to formalize their own marketing associations. Additional targeted research in marketing will prove profitable.¹

Montana's forest products industry will probably continue to be an important sector of the economy. It does not appear to offer the growth potential of the 1946-1957 period, but it could increase substantially in pulp and paper, plywood, and other wood products of relatively recent origin. The industry might also gain in the area of traditional products through more efficient competition for existing markets. New technology could produce a period of accelerated growth or, because of added competition, it could lead to a decline.

The concern of forest managers in the past has been toward stability in the industry. The concepts of sustained yield and annual allowable cut were considered to be the answer to the old cut-out-and-get-out policies of the earlier migratory timber industry. Now, however, with changing technology and changing demand, these concepts may produce conditions that generate community instability even though the resource base is unimpaired: the development of products with a strong market potential may be inhibited by the continued production of others for which the projected demand is low. Stability in the sense of sustained yield of the resource may not be as important as the industry's capacity to adjust to new production and marketing conditions. Unless the industry can function effectively in this way, it may find itself unable to compete on the market. Adaptation to the market has caused and will cause the greatest difficulties for Montana producers.

The wood products industry can expect to face increasing competition for the use of Montana's forestlands. Montana has beautiful mountain scenery, pure streams and attractive lakes, abundant wildlife, and, most important, space. These attributes are valued highly by its residents as making the state a good place to live and also as the foundation of a growing tourist industry. Montana communities are becoming more wary of industrial development that will detract from the state's recreational values and will probably require new industry to take all necessary precautions against contamination of

water and air. Antipollution laws will become stricter, and industrial costs may therefore become greater.

Forestland uses other than timber production, including recreation and water development, will demand greater consideration by the wood products industry. Recreation in particular may reduce the amount of land available for timber production or raise the cost of production. Government agencies will be under increasing public pressure to protect scenic features and improve recreational facilities. Much of the forestland can be used for several purposes: timber harvest and recreation are complementary over a fairly wide range. Conflicts will be inevitable, however, and it will be vitally important for the future of both industries that they work cooperatively toward the solution of land-use problems. Outdoor recreation will continue to grow rapidly and to gain politi-

cal strength. It has a tremendous potential and may well become the foremost industry in Montana. The forest products industry must recognize this for its own benefit and that of the state's economy.

The problems facing the Montana forest products industry are becoming more and more sophisticated, requiring greater understanding of the entire economic complex and of the relationship of local firms to regional, national, and international competition. In addition, all functions of the industry from harvesting through marketing must be examined in the light of changing trends in land use. Montana owners and operators must respond dynamically to the cultural pressures that confront the forest products industry as a whole. If sophisticated problems are met with sophistication, this last frontier need not become a lost frontier in terms of the forest resource.



Montana's recreational values are increasingly important.



References

1. Adair, Kent T. et al. *A Profile of Lumber Marketing in Western Montana*. Bulletin No. 30, Montana Forest and Conservation Experiment Station, Missoula, March 1966.
2. American Forest Products Industries. *Montana Forest Facts*, 1963 ed. Washington, D.C.
3. Bolle, Arnold W. *The Timber Industry and the Market for Woodlot Products in the Upper Flathead Valley*. Bulletin No. 16, Montana Forest and Conservation Experiment Station, Missoula, 1960. (Reprinted from Montana Business Review, XII, 4, April 1960.)
4. Curtis, James D. and Lynch, Donald W. *Silvics of Ponderosa Pine*. Misc. Pub. No. 12, Intermountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service, Ogden, 1957.
5. Defebaugh, J. E. *History of the Lumber Industry of America*. The American Lumberman, Chicago, 1906-7.
6. Duerr, William A. *Fundamentals of Forestry Economics*. McGraw-Hill, New York, 1960.
7. Guthrie, John A. and Armstrong, George R. *The Western Forest Industry, an Economic Outlook*, RFF by Johns Hopkins Press, Baltimore, 1961.
8. Ise, John. *The United States Forest Policy*. Yale University Press, New Haven, 1924.
9. Mead, Walter J. *Full Use and Development of the Timber Resources of Montana*. U.S. Department of Agriculture, Forest Service, Northern Region, Missoula, 1958.

10. ———. *Mergers and Economic Concentration in the Douglas-fir Lumber Industry*. Research paper PNW-8, Pacific Northwest Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service, Portland, 1964.
11. Merriam, L. C., Jr. *A Land Use Study of the Bob Marshall Wilderness Area of Montana*. Bulletin No. 26, Montana Forest and Conservation Experiment Station, Missoula, 1963. (In progress: Merriam, L. C., Jr. et al. (a) *A Study of Wilderness Management Standards*; (b) *A Study of Recreation Use of Montana Wildlands*.)
12. Moak, J. E., Suttle, A. D., Jr., and Leveck, H. H. *Economic Opportunities in Mississippi's Pine Lumber Industry*. Small Business Management, Research Reports, Mississippi Agricultural Experiment Station, 1961.
13. National Lumber Manufacturers Association. *Lumber Industry Facts, 1960-61*. Washington, D.C.
14. Nelson, Clarence W. *The Timber Economy of the Ninth District West*. Federal Reserve Bank, Minneapolis, 1963.
15. Palladino, L. B. *Indian and White in the Northwest*, 2nd ed. Wickersham Pub. Co., Lancaster, Pa., 1922.
16. Pinchot, Gifford. *Breaking New Ground*. Harcourt Brace and Co., New York, 1947.
17. Scott, Anthony F. *Natural Resources, the Economics of Conservation*. University of Toronto Press, Toronto, 1955.
18. U.S. Department of Agriculture, Forest Service. *Timber Resources for America's Future*. GPO, Washington, D.C., 1958.
19. ———. Northern Region. Pers. comm., 1959.
20. ———. Pers. comm., 1961.
21. U.S. Department of Health, Education, and Welfare, Office of Public Health. *Summary Report on Pulp Mill Sites in Relation to Mill Effluent Effects on Water Quality in Streams in Western Montana and Northern Idaho*. Washington, D.C., 1955 (Mimeo)
22. Weintraub, Sidney. *An Examination of Some Economic Aspects of Forest Service Prices and Appraisal Policies*. University of Pennsylvania Press, Philadelphia, 1958.
23. Worrell, Albert C. et al. *A General Review of U.S. Forest Service Timber Appraisal Policies and Procedures*. Report of Timber Appraisal Review Committee, U.S. Department of Agriculture, Washington, D.C., 1963.
24. Zivnuska, John A. *Business Cycles, Building Cycles and Commercial Forestry*. Institute of Public Administration, New York, 1952.



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