

Malheur Reports
Annual Silvical

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Lumbering

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SILVICULTURE

THE LUMBER INDUSTRY IN ISOLATED DISTRICTS
OF EASTERN OREGON.

A Silvical Report
Submitted to the
Supervisor of the Oregon National Forest.

Date: January 16, 1915.

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Forest Assistant

Approved: January 16, 1915.

Forest Supervisor.

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THE LUMBER INDUSTRY IN ISOLATED DISTRICTS
OF EASTERN OREGON

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I. THE REGION

The region which will be discussed is, specifically, that included in, and near to, the Malheur National Forest; but it is typical of all the forested areas of Eastern Oregon where the timber is so isolated from railroads that it is cut only or principally for local consumption. The principal industry is the grazing of cattle and sheep.

II. THE FOREST

1. Where located.

Within this region moisture is the controlling feature determining the occurrence of timber growth. Only at elevations where the winter's snowfall is sufficient to maintain the water level near enough to the surface to supply the tree roots throughout the greater part of the growing season can a forest ever be maintained. Roughly, this dry timber line is 4,000 feet, below which level tree growth is rarely found except along the stream courses.

2. Dendrology.

Within the forest the most important tree is the western yellow pine, which forms from 85 to 90 per cent of the total stumpage. It grows in almost pure stands, except on north and east slopes and even here it is usually the

predominating species. On the north and east slopes where the moisture conditions are more favorable, the Douglas fir and western larch come in. Together they may form 80 per cent of the stand, but rarely more than 50 per cent. These two species may be found in almost equal numbers, or one species may greatly predominate over the other. Also each species may grow in small groups to itself or they, with the yellow pine, may be thoroughly mixed together. On this same site and in the same manner, but to a much less extent, are found white and grand fir. At higher elevations (above 5,000 feet) in a few sheltered nooks with good soil are occasional small groups of white pine. Also Engelmann spruce will sometimes be found along streams at this same elevation.

Lodgepole pine grows at any elevation above the dry timber line. On moist, poorly drained flats at lower elevations it forms dense thickets of small poles, while on drier and higher sites the trees are less dense and of larger size. In the alpine zone are found dwarf juniper, whitebark pine and alpine fir.

Below the dry timber line, in the lower valleys along the banks of the streams are found several species of willows, also Balm of Gilead, black cottonwood, and hackberry. On the upper tributaries are the quaking aspen, bitter cherry, choke cherry, mountain birch (*B. fontinalis*) and white and mountain alder (*A. rhombifolia* and *tenuifolia*). Upon the bench or table lands is western juniper (*J. occidentalis*) and in

parts of the country red cedar (*J. scopulorum*). These are scattering at first, but nearer the mountains they become more frequent and the mountain mahogany (*C. ledifolius*) comes in.

3. Silvicultural Description

Yellow pine is the species most suited to this region. It does best on the dry, sandy soil and has less defect than the other species. The Douglas fir has about 25 per cent defect and white fir 60 per cent, while yellow pine has less than 8 per cent. Less than .5 per cent of the yellow pine has been killed by the *Dendroctonus* beetle. The only other species attacked by this beetle is the lodgepole pine, of which 3-5 per cent has been killed. Eighty per cent of the yellow pine stumpage is over mature. (These figures were obtained in making timber sale examination on the Malheur National Forest.)

4. Reproduction.

All species reproduce abundantly. Frequently after a fire, and often after a logging operation, the yellow pine second growth comes in, in dense thickets (See photographs No. 8 & 9). A large part, probably 70 per cent of the virgin timber area, has sufficient reproduction to replace the old stand, should it be logged over now.

5. Management.

The Forest Service manages its sale areas in this region under the Group Selection Method based on 180 year rotations with 60 year cutting cycles. For the first cutting they mark from 65 to 75 per cent of the volume of the stand.

They remove all defective, decadent, over mature and mature timber and leave only the healthy, sound, thrifty, young trees, which are capable of making a material growth during the next sixty years. Trees of this class will also insure ample reproduction. The Forest Service favors the yellow pine for the future stand and discriminates against the Abies with a view toward its final extermination. Douglas fir and western larch are also encouraged, as they have certain local uses for which they are preferred over yellow pine.

The private timber owner has no conception of forest management. His object is to cut all merchantable timber. He leaves all defective, diseased and decadent trees and those below fourteen inches D.B.H. He also leaves most of the undesirable species, as the Abies, which gives them an undue advantage over the yellow pine in reproducing the next stand.

The Forest Service requires that the buyer of Government timber pile the brush and then they themselves burn it later. The private owner frequently piles his brush also, but rarely burns it unless he desires to clear the land for agricultural purposes.

6. Cut over lands

Cut over areas within the National Forests are left to produce a new stand, except where the land is determined to be more valuable for agriculture, when it is classified as such and settlement may be made thereon. Cut over private holdings serve the same economic purpose. If suitable for agriculture,

the owner either cultivates it himself or sells it for that purpose. Cut over areas, both of private land and land within the National Forests, when not suitable for agricultural purposes is used for grazing cattle, horses and sheep, and while being grazed a new forest is being formed. Cattle and horses do not impair the growth of the new stand. Sheep are more disastrous to reproduction, but are not necessarily fatal. The Forest Service excludes sheep from grazing newly cut over areas for the first five to ten years.

7. Stand per acre

Yellow pine timber in this region runs from 2 to 20 M feet per acre, with an average of 10 M. There is on an average 35 to 40 trees per acre over 10 inches D.B.H. which average 18 inches in diameter. The average mature tree is 100 feet in height and the volume of the average tree is about 300 board feet. These figures are taken from timber sale examination work on the Malheur National Forest.

8. Stumpage prices and taxes.

Yellow pine stumpage has been very inactive on the market for the past three years. When purchased for speculation it has sold in the past for \$1.25 to \$1.50 per M but it is doubtful if one could push it on the market now for more than \$1.00 per M. In case of timber tributary to a mill where it could be cut immediately and turned into money, the purchaser would probably be willing to pay \$2.00 per M, and usually has to do so. The Forest Service charges from \$2.00 to \$2.50 per M

for its stumpage, depending on amount, accessibility, and market.

Timber land in Grant County is taxed on a valuation of \$6.00 per acre and the State and County tax for 1914 is 19 mills. School and Road taxes vary with the individual districts.

9. Ownership.

The ownership of the timber land within this region is divided as follows:

1. National Forests	73%
2. Large private holdings	20%
3. Small holdings	7%

The large holders got their timber by:

1. Purchase of homesteads and timber and stone claims.
2. Purchase of school land.
3. Original grants from the Government for special service performed, as road construction.

The small holder generally got his land by homesteading it or under the Timber and Stone Act.

The National Forests were created in 1902 and include practically all timber land not taken up prior to that time.

III. TOPOGRAPHY AND CLIMATIC INFLUENCES.

The topography of this region is well adapted to the small logger. It presents to him no serious obstacles and permits him to do his work with a small capital. But he must adjust his operations to the seasons. From May 15 to October 15 he runs his mill and delivers his lumber directly to the consumer within a radius of fifty, or, in rare cases, up to one hundred miles of

his mill. At this time of the year the roads are at their best and the rancher finds time to do his building. About October 15 the mill is usually shut down and in a short time the woods operation begins. First the trees are felled and bucked; then when the snow becomes solid enough the operator yards and hauls his logs to his mill. This is usually completed in February, and from then until May the work is shut down entirely.

IV. MANAGEMENT.

1. Status of Mill Man

In order to be a little more concrete, I will now describe conditions as they are on and near the Malheur National Forest. Within a radius of sixty miles there are now twelve small mills operating. They are so situated that each operator has from three to five competitors. In most cases immediately adjacent to the mill the operator has no competition, but as his radius of business increases he comes in contact with the mills about him.

Of these twelve operators six owned timber to start with. Usually it was only a homestead; in a few cases the mill man started in when he was able to get a timber claim of his own also. Two of the operators have been able to add to their holdings by purchase until they own about 20 million feet of timber apiece. The other ten are dependent upon the Forest Service for their supply and all have purchased more or less Government timber in the past. Of the twelve operators mentioned, eight run a few cattle, and ranch a little on the side. This

always brings in a little money without much outlay of cash or effort. Grazing land of their own or Government land is always accessible and they are able to put up a few tons of hay every year.

Only two out of the twelve operators have proven successful and four are in bankruptcy. The others run irregularly and it is hard to arrive at their exact financial status. A successful mill man for an operation of this kind must be very versatile, as he cannot afford to hire any experts in any line of work. He must be a good business man, a good woodsman, a good mechanic, a good foreman, for he handles the men himself, and he must be thoroughly conversant with every detail of his operation.

2. Capital Invested.

The capital invested in an operation of this kind, exclusive of timber holdings, varies from five hundred to ten thousand dollars. A man may purchase a worn out portable mill for \$250, a wagon and team for a like amount and then proceed to saw two or three thousand feet per day and deliver to the consumer. But the successful operator will have five or six thousand dollars invested in equipment, distributed about as follows:

Saw Mill:

Building	\$800	\$1500		
Engine	450	650		
Boiler	300	400		
Planer	200	300		
Carriage	250	300		
Saw	350	500		
Edger	100	150		
Cut off	5	10		
Rollers	10	25		
Pulleys	10	25		
Trucks	15	50		
	<hr/>	<hr/>		
	\$2680	\$3890	\$2680	\$3890

Logging Operation:

Horses at \$100-\$150	\$800	\$1000		
Harness at \$50 per set	150	200		
Trucks at \$125	250	375		
Felling and bucking tools	50	75		
	<hr/>	<hr/>		
	\$1250	\$1650	\$1250	\$1650

Other buildings:

Cook house and equipment	\$150	\$ 300		
Bunk house	100	200		
Barn	250	1500		
Other buildings	-	500		
	<hr/>	<hr/>		
	\$ 500	\$2500	\$ 500	\$2500
			<hr/>	<hr/>
			\$4430	\$6040

3. Annual Cut.

The annual cut of an operator in this region depends most of all on the number of days he operates his mill during the working season, ~~for~~ during which period many of the mills average only one or two days per week. The maximum daily capacity of the individual mills varies from 3 to 22 M ft. but most of the mills average about 8 and 10 M feet. The annual cut varies from

300,000 to 1,000,000 feet, though some few mills cut as little as 40,000 feet in a season.

4. Accounting Methods

Most of the mills keep no cost data whatsoever and none of them have a systematic and satisfactory method of accounting. Their methods of book-keeping correspond to that of the average rancher and of the small country merchant.

5. Cost of Production.

To obtain very exact figures on the cost of production is impossible under the circumstances. The figures given here were obtained by observation and through conversation with the operators and with Forest rangers who handle sales of this nature.

Cost per M.

Felling and Bucking	\$.75	\$1.00
Skidding and hauling	1.00	2.50
Sawing and piling	3.00	4.00
Surfacing 25%-50%	.75	1.50
Interest, depreciation, fire risk and maintenance	2.00	2.10
Overhead and Misc. Expense	.65	1.00
Stumpage	2.00	2.50
	<u>10.15</u>	<u>14.60</u>
Operator's salary	2.50	5.00
	<u>\$12.65</u>	<u>\$19.60</u>

Some of the mills are able to contract the felling and bucking at \$.75 per M feet, in which case those taking the contract furnish all equipment and tools. In other cases the mills superintend the work themselves, in which case it usually costs from \$.90 to \$1.00 per M feet. The cost of skidding and hauling to the mill depends upon the length of the haul and

and whether the logs are hauled on sleds or on trucks. About twice the load can be hauled with sleds as with trucks, thereby decreasing the cost from 33 to 50 per cent. To skid and then haul logs one and one-half miles on trucks costs about \$2.00 per M. With same conditions but hauling from one-fourth to one-half miles reduces the cost to from \$1.00 to \$1.25. The cost of sawing, piling and surfacing does not vary greatly.

Interest, depreciation, fire risk and maintenance have been arrived at by figuring on an investment of \$10 for every thousand feet cut during a season, 10% interest, depreciation at fifteen years, insurance 3% and maintenance 3%, which figures \$1.96 per M feet. Overhead charges, miscellaneous expenses and operator's salary varies inversely with the annual cut of the mill. Finally, the cost of production normally should be between \$12.65 and \$19.60, or if we exclude the operator's salary, \$10.15 and \$14.60. To average the maximum and minimum, including operator's salary, the cost of production would be \$16.12.

6. Prices:

Only three grades of lumber are cut, which run about as follows: 25% clear, 45% No. 1 common, 30% No. 2 common. From 25% to 50% of this is usually dressed. The prices at the mill for rough lumber is from \$10 to \$15 and for dressed lumber from \$18 to \$30, depending on the quality. Three separate operators on the Malheur Forest figure that an average thousand feet retails as follows:

P. -

750	ft. rough	@ \$15	\$11.25
100	" dressed	@ \$25	2.50
150	" "	@ \$20	3.00
			<u>\$16.75</u>

C. -

600	ft. rough	@ \$12.50	7.50
100	" dressed	@ 28.00	2.80
300	" "	@ 20.00	6.00
			<u>\$16.30</u>

B. -

400	ft. rough	@ \$11.00	4.40
150	" dressed	@ 25.00	3.75
450	" "	@ 18.00	8.10
			<u>\$16.25</u>

This makes an average price of \$16.43 to compare to average cost of production, \$16.12.

7. Market

This report is confined to those mills where the timber is so isolated from railroads that it is cut only, or principally for local consumption. There are some mills, chiefly in Grant, Baker, and Lake Counties, which depend principally on local trade but who do export some lumber. They find that they can haul their No. 1 clear finish lumber thirty or thirty-five miles to a railroad point and then ship it to eastern points. Occasionally they do this. Usually, as in Baker County, they sell to a larger local mill, located on the railroad, who make up carload lots and market the lumber. But the principal market of these mills is local and reaches the consumer in wagon load lots. It is optional to the

consumer whether he or the mill delivers the lumber. If the mill man delivers, he charges the consumer at the rate of from \$6.00 to \$7.50 per day for a driver and four horse team, and adds this to the price of the lumber. A four horse team and one wagon can haul 2 M feet from twenty to twenty-five miles a day over existing roads.

An operator's market is within a radius of anywhere from thirty to sixty miles. Operators in northern Harney and in Lake County sell to consumers at a distance of one hundred miles.

8. Camps

As a rule the logging operations are within walking distances of the saw mill and in such cases there is but the one headquarters for the whole outfit. Where separate logging camps are necessary, all the buildings are rough and temporary in character. Tents are frequently used to furnish the necessary accommodations. The first building to be built is a shelter for the horses and the feed, then a cook house and mess room. Finally a bunkhouse completes the necessary improvements. But as a rule the logging operators and the saw mill have a common headquarters or camp. The factors governing the selection of a suitable site for such a headquarters are, first, water; second, accessibility to a good road; third, a little agricultural land or meadow.

Part or all of the following buildings will be erected here:

Mill
Planer
Owner's residence
Office
Bunk house
Cook house
Barn
Blacksmith shop
Various store houses and sheds.

The mill and planer may or may not be under one roof. The owner's residence and office are quite likely to be in the same building, and the name applied will depend on which is the predominating factor. The cook house and bunk house may be one, or if the owner has a residence or "house", the meals will probably be cooked and eaten there. In the latter case there will be a separate bunk house. The barn and the blacksmith shop usually have a separate building to themselves. Then there may be various store houses and sheds for the supplies and equipment. There may be a dry shed for piling dressed lumber also. The buildings are usually rough box houses, built with undressed lumber and set up as cheaply as possible. The mill, barn, and owner's residence are the first buildings which will be erected, and are the ones most likely to be will built with a view to permanency.

The owner will probably have a small commissariat consisting of tobacco, handkerchiefs, overalls and gloves.

Most of the employees of an operation of this kind are single men, but those who are heads of families must provide shelter for them. In such cases the mill owner ordinarily furnishes the employee with cull lumber for the erection of a

box shanty, should the latter care to build one.

Supplies to camp are brought in when possible on return trips in the wagon used for hauling lumber to the nearest town. Special trips for supplies are frequently made but this is one of the cost items never recorded.

9. Laborers

The laborers employed are chiefly Americans. One class always drawn upon is the local homesteader, who may want to earn a little ready money. Others are ex-miners, ex-cowboys, and men who have worked in the woods or mills elsewhere. The men are hired by the day or the month and at wages varying from \$2.50 to \$5.00 per day, and from forty to sixty dollars per month, the latter including board. The men work ten hours per day as a rule but the hours may be longer in summer and shorter in winter. Men who pay board are charged 25 cents per meal and the owner figures to just break even at that figure. The men sleep in the bunk house, furnish their own bedding and are charged no fees.

The following is the scale of wages:

Sawyer and millwright	\$3.50	to	\$5.00	per	day
Engineer	3.00	"	4.00	"	"
Planer man and carpenter	3.00	"	4.00	"	"
Ratchet man	2.75	"	3.25	"	"
Edger man	2.75	"	3.25	"	"
Teamsters	45.00	"	50.00	"	month&Board
Fallers, buckers, swampers and unskilled labor	40.00	"	45.00	"	" " " "

The wages paid depend upon the size of the mill and class of workmen, the larger mills being able to secure the better workmen by paying the better wages. The size of the mill crew

depends on the capacity of the mill. One small mill turns out 2.8 M with two men and 4 M with three men. One mill cuts 8 M with five men and another 20 M with eight men.

V. THE OPERATION

A. Logging.

1. Season:

The logging operation is usually conducted from November 1 to February 1, after the mill work has shut down, and largely by the same crew. But the operation may be conducted any time during the year, depending upon the necessities of the owner's business.

2. Felling and bucking:

The felling and bucking is conducted in three men crews and with the following equipment:

- 1 cross cut saw - 6½ ft.
- 2 double bit axes
- 1 bottle kerosene
- 1 sledge and two wedges
- 1 measuring stick

Two men fell the tree and buck the logs, using one saw. One man trims the tree, swamps to the logs, and piles the brush for burning. If it is customary to snipe the logs, the axman does this also. The logs are never barked in this region. In felling the crew starts the under cut with a saw, cuts it out with an axe and then drops the tree with the saw. Trees are fell parallel to the contour and parallel to each other, care being taken not to crisscross them or to fell them across rocks, which would break the trees. Care is also taken

to protect the reproduction. Loss by breakage in this region is small because of the usual regular topography and the scattering stand.

The buckers measure the logs themselves, giving six inches allowance to each. When special length material is desired, they receive special instructions. As a rule very little care is taken to divide the log lengths so as to minimize the waste due to crook and defect. Very few logging operations are sufficiently large to keep one man occupied filing the saws. This is generally done by some general utility man or by the sawyers themselves. In sawing kerosene is freely used to cut the pitch, which would otherwise gum the saw.

The merchantable trees average between 600 and 700 feet and sixteen foot logs average 200 or 225 feet each. Logs are usually cut in sixteen foot lengths but range from twelve to thirty feet in length. In Forest Service sales they require that trees be cut to a ten inch top and that the maximum stump height be eighteen inches. If private timber, the trees are cut to a twelve or fourteen inch top and stumps are rarely left over twenty-four inches.

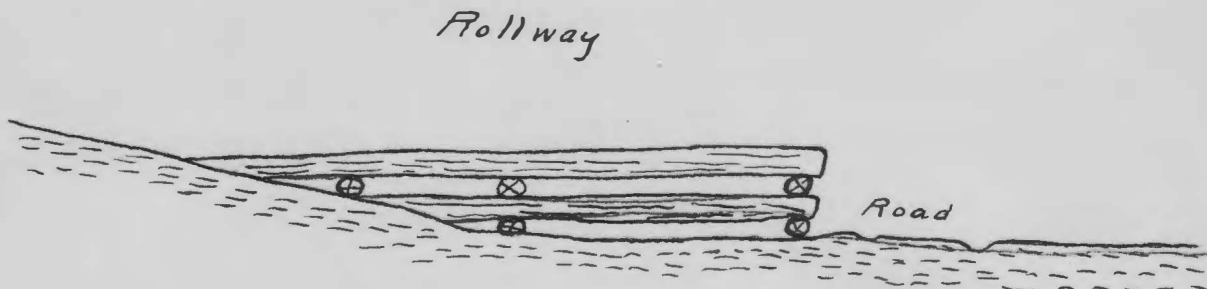
On more favorable logging chances felling and bucking can be contracted for 75 cents per M. When this is not done, the men are paid \$40.00 or \$45.00 per month and board. A three man crew average 8 M feet per day.

3. Yarding:

On some operations the logs are not yarded but are loaded directly onto a sled or truck and hauled to the mill. This is only done where the topography permits the sled or wagon to go anywhere in the forest. In these cases the logs are loaded with the use of the "cross haul".

On other operations the logs are snaked to a convenient rollway for loading onto sleds or trucks. The rollways are located at frequent intervals along a road and usually at the lower levels so that the logs can be snaked down grade to them. For snaking, peavies, skidding tongs, stretchers, and a two horse team are used.

The rollway (see photograph No. 14) consists of logs cribbed as in the illustration.



It is built so that the logs will be parallel to the road and so that the end fronting on the road will be slightly higher than the rest, and higher than the sled or truck bunks so that a portion of the load can be loaded with peavies. In yarding the logs are snaked up back of the rollway and rolled and piled with peavies.

The average maximum haul from the stump to the rollway is from 600 to 1000 feet and 10 M feet is considered a good day's haul with a two horse team. At prevalent wages this would be 82 cents per M.

4. Loading:

The logs for the first part of the load are loaded by hand with peavies and the remainder of the load is placed by means of the "cross haul".

5. Hauling:

When snow permits, sleds are used for transporting the logs from the woods to the mill; otherwise four-wheeled logging trucks are used. (See photograph No. 15) A four horse team and logging truck can haul 1000 to 1200 feet a trip, while the same team with snow and sled can haul twice that amount, thereby decreasing the cost from 33 to 50 per cent.

Very little money is spent in building and maintaining roads for hauling logs. The topography lends itself to cheap passable roads and the operators are usually satisfied with these.

The following is the equipment and cost.

Logging trucks	\$125.00
Sleds - hand made	50.00 - 75.00
2 sets of harness	100.00
4 horses	500.00
Tie chains	20.00

Hauling one and a half miles, a four horse team can make six trips per day; hauling six or seven thousand feet at a cost of \$1.25 to \$1.50 per thousand.

B. Lumber Manufacture

1. Log Storage:

The mills depend upon rollways for their log storage. These are corduroyed with the corduroy at right angles to the carriage in the mill and the logs are placed on the carriage by means of the "cross haul" or with a peavy. A few mills have small ponds which they rarely use.

2. Sawing:

In these mills the carriage is propelled by cable power and is controlled by the ratchet man who works on the carriage. Circular rather than band saws are used. They range from 46 to 56 inches in diameter. Sometimes a top saw of about 28 inches is also used. All the saws cut a quarter inch kerf and they may or may not have removable teeth. The mills ordinarily cut logs only up to 24 inches in diameter and from ten to twenty feet long. Most mills cannot handle a log shorter than ten or twelve feet, but many can cut them up to forty feet long. Also with a top saw they can cut from 48 to 52 inch logs when necessary to do so. "Sawing Around" is the method of sawing used here, sawing three or four slabs off each side until a cant is sawed out and then it is sawed straight through and through. Very little extra trouble is taken with defective logs.

These saws require from 15 to 25 H.P., more usually the latter. The sawyer ordinarily files his own saws.

Many mills have no edger, using the main saw for that purpose. Where an edger is used it is usually 18 inches in diameter, cuts a quarter inch kerf and has removable teeth.

These mills have no trimmer, but the best equipped use a cut off for squaring the boards. A few small mills use a cross cut saw for this purpose.

3. Yards and Conditioning Lumber:

In the mill the boards are loaded onto two wheel trucks or four wheel tram cars and transferred to the yard. The trucks are run on a narrow platform or even just on boards, while the trams are run on narrow iron or "two by four" wooden rails. (See photograph No. 16) The lumber is then placed in rather promiscuous piles on either side of the platform or track. The yards contain from 50 to 200 M feet. Some yards have dry sheds for storing the dressed lumber, while in other operations it is piled in the mill itself.

The lumber receives little conditioning other than yard drying. None of the mills have dry kilns. One cheap and popular method of drying green lumber is racking it as shown in photographs Nos. 17 & 18 and this method seems to give satisfactory results.

4. Planer:

In some places the planer is under the same roof as the mill and is run with the same engine, although rarely in such cases do they attempt to run the planer and saw at the same time. When operated thus the sawyer is usually also the planerman. In a few places the planer is separate from the mill and it has its own crew, a planerman, an offbearer and an engineer.

5. Power:

Engines of 15-40 H.P. are used for either the mill or the planer or when both are operated by the same power, as in such cases both are not run at the same time. The boiler is usually of larger horse power than the engine, 25-50 H.P. Slabs are used for fuel.

6. Disposal of Waste:

The sawdust is disposed of in one of two ways. The most common is by a small box flume, built of one inch undressed lumber, inside measurement, ten by six inches. The flume cuts in on some ditch or creek for its water supply. The flume then runs under the mill, collects the sawdust, then transfers it out to a sawdust pile. It is contrary to state game laws for the operator to deposit his sawdust into lakes or running streams. Most of the flumes are poorly constructed and the sawdust collects at some low point and clogs the flume until some one cleans it out. The second method is to wheel the sawdust out to the burner in a huge wheelbarrow. The burner is only an open fire, there usually being no protection. The excess slabs are burned here also and help to keep the sawdust ignited.

7. Crews:

One mill in this region cuts 3 M per day with a two men crew - a sawyer and a ratchet setter. One of these goes around to the engine occasionally to poke up the fire, while the other removes the cut lumber. They cut 4 M per day when they can have a third man to serve as fireman and off bearer.

Another mill cuts 8 M per day with a crew of five men, an engineer, a sawyer, an edgerman and two offbearers. A third mill cuts up to 20 M per day with eight men, an engineer, a sawyer, a ratchet setter, an edgerman, two off bearers, a log hoist man and assistant to the ratchet man, and a sawdust and utility man. The sawyer does his own saw filing and the millwright work, and is often the owner also.

8. Other Products:

Very few, if any, of the mills are able to sell slab or cordwood. None make lath. A few make yellow pine shingles which sell for \$3.50 per thousand.

P H O T O G R A P H S

Taken on Malheur National Forest.



No. 1. Open Stand of Western Yellow Pine.



No. 2. Western Yellow Pine near dry timber line.



No. 3. Large Burl on Western Yellow Pine.



No. 4. Lodgepole Pine used by sheep for "shading up" in
the heat of the day.



No. 5. White bark pine at elevation of 9,000 feet.



No. 6. Western Juniper and sage brush below the dry timber line. Used for grazing cattle and horses.



No. 7. Mountain mahogany mixed with yellow pine above dry timber line.



No. 8. Dense Yellow Pine Reproduction following a fire.



No. 9. Dense Yellow Pine Reproduction following a fire.



No. 10. Home of A forest ranger who administrates small timber sales.



No. 11. Hamilton, Oregon, sixty miles from a railroad. Market for local sawmills.



No. 12. Sawmill Plant, capacity 8 M feet per day, showing mill, yard and 100 M. feet, dry shed, bunkhouse and owner's residence.



No. 13. Sawmill Plant, capacity 4 M per day, showing mill, yard, owner's house and barn. Located at dry timber line.



No. 14. Cut-over area showing brush piled for burning, rollway and logging road.



No. 15. Logging truck.



No. 16. Sawmill Plant showing mill, tramway, yard, and lumber racked for drying.



No. 17. Lumber racked for drying.



No. 18. Lumber racked for drying, also showing dry shed, owner's house and bunkhouse.