

February 13, 1912

UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE  
WHITMAN NATIONAL FOREST.

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ANNUAL SILVICULTURAL REPORT.<sup>1</sup>

(Study of Western Larch.)

By Harold P. Gilkey

Western Larch (Larix occidentalis Nuttall) is not in its optimum range in the Whitman National Forest. This is due to a lack of moisture. According to Sudworth this tree demands an annual rainfall of from 20 to 30 inches, coming very largely in the winter and spring. In this Forest the rainfall is on an average 20.7 inches.

| <u>Place.</u> | <u>Location.</u>          | <u>Altitude.</u> | <u>Yrs.</u> | <u>Inches Rainfall.</u> |
|---------------|---------------------------|------------------|-------------|-------------------------|
| Granite       | Sec. 4, T.9 S., R.35 ½ E. | 4680 ft.         | 3           | 18.14                   |
| Ibex Mine     | Sec. 4, T.9 S., R.36 E.   | 6500 ft.         | 2           | 26.09                   |
| Susanville    | Sec. 8, T.10 S., R.33 E.  | 3459 ft.         | 2           | 17.35                   |

This is sufficient to permit larch to grow, but not enough to produce a vigorous and thrifty tree. As a result of insufficient moisture it is of slow growth and often dies early.

The forested area of the Whitman National Forest can be roughly divided into three types, these being due to the amount of moisture in the soil. The first and most important is the yellow pine slope type. This is characterized by a high per cent. (75 To 100%) of Yellow Pine in the stand. This type exists on nearly all dry south and west slopes up to 7,000 feet, and on dry benches. Beside the Yellow Pine one finds Western Larch and Douglas Fir and a few White Fir and Lodgepole Pine in places where

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moisture conditions approach those of the north slope type, such as ravines, pot-holes and at the foot of slopes. The following is a sample acre of the Yellow Pine slope type, obtained by averaging together the estimates of 240 acres of this type cruised on widely separated parts of the Forest, volume given being that of trees above 12 inches D. B. H.:

|  |                    |
|--|--------------------|
| Yellow Pine.....                         | 10,763 Bd. Ft.     |
| Western larch .....                      | 547 Bd. Ft.        |
| Douglas Fir .....                        | 1,130 Bd. Ft.      |
| White Fir ( <i>Abies grandis</i> ) ..... | 296 Bd. Ft.        |
| Lodgepole Pine.....                      | <u>000</u> Bd. Ft. |
| Total.....                               | 12,736 Bd. Ft.     |

In this sample acre the percentage of Douglas Fir is higher than it regularly is for this type. It would not ordinarily be more than 500 feet B. M. on an acre similar to the above.

The second is the north slope type, characterized by a preponderance of Larch, Douglas Fir, White Fir, and Lodgepole Pine in the stand. This type occurs on the more moist sites; north and east slopes, and moist flats, where it is possible to grow Yellow Pine. An average of 240 acres estimated in widely separated portions of the Forest show the following to be a sample stand on an acre of the north slope type.

|                     |                    |
|---------------------|--------------------|
| Yellow Pine.....    | 733 Bd. Ft.        |
| Western Larch ..... | 1,922 Bd. Ft.      |
| Douglas Fir .....   | 1,966 Bd. Ft.      |
| White Fir .....     | 2,068 Bd. Ft.      |
| Lodgepole Pine..... | <u>272</u> Bd. Ft. |
| Total.....          | 6,961 Bd. Ft.      |

This sample acre is not wholly typical. The greater portion of the north slope type has a heavier percentage of Yellow Pine in the stand. It may be as high as 75%. When Yellow Pine does occur in this type it is at its best. The increase in amount of water in this type enables the other species to compete and exclude a certain number of Yellow Pine from the stand.

The third, or transition, type occurs on moist sites and at high altitudes, where Yellow Pine does not grow. At lower altitudes on the north slopes where this type occurs its merchantable volume is largely made up of Larch with Douglas Fir as a close second. Although they may be more numerous, White Fir and Lodgepole Pine make up a small per cent. of the merchantable volume, owing to the large amount of defect in the former and the small size of the latter.

On the wet flats pure stands of Lodgepole Pine occur as a sub-type under the transition type. On these very wet sites Lodgepole is able to crowd out all other species. It seeds in very thickly and holds the ground. It is usually small and unimportant except for ties.

The sub-alpine form of the transition type comes in on slopes above 6,500 feet. It is composed almost entirely of limby Douglas Fir, Western Larch, White Fir and lodgepole Pine. In numbers lodgepole would equal over 50% of the stand.

A rough estimate made by Deputy Supervisor Merritt gives a total of Larch for the Forest of 855,131,000 feet B. M.

Larch does best on well-drained bottom land, near streams, where the roots can secure a plentiful supply of moisture. Where the drainage is poor and the soil soggy, Larch does not grow well. Owing to the increased moisture it is thrifty on slopes at an elevation of 6,500 feet and above. Here the tree is apt to be short and have a long crown, with relatively heavy branches. On lower slopes the crown is narrow and seldom more than 20 feet long, except where the tree stands isolated or over smaller trees. To produce trees more than 30 inches D. B. H. the Larch requires a plentiful supply of soil moisture, which is to be found only in draws, near streams or at the foot of benches. A medium amount of moisture will, however, produce trees from 15 to 30 inches D. B. H. The following table gives the relative demands for moisture of the associated species, beginning with the least exacting:

Yellow Pine.  
Douglas Fir  
Western Larch  
Lodgepole Pine  
White Fir (*Abies grandis*).

Moisture is the determining factor in size and distribution of Larch in this region. It is rare on the dryer Yellow Pine sites. Associated with Yellow Pine it seldom reaches a diameter exceeding 30 inches. In well-watered sites trees may exceed 40 inches, and some of 70 inches D. B. H. exist in very favorable places. Trees of such large size are usually stag-headed and are punky and shaky at the butt. On the more moist north slopes the dense stand of Lodgepole Pine, White and Douglas Fir crowd the Larch so closely that root and crown competition do away with much of the Natural advantage of the site. In such situations the Larch seldom reaches a diameter of more than 24 inches breast high. The rapid height growth of the inferior species during the sapling stage in such sites often prevents the Larch from coming in.

Larch is very intolerant throughout its entire life. The seedlings have a rapid height growth. As a result Larch starting with its associated species keeps above them from the beginning and avoids suppression, except on the more moist north slopes, as mentioned above. It has such a small top and thin foliage that any of the other species can grow up within a few feet of its trunk. Hence Larch often stands above dense growth of the firs and Lodgepole Pine. It seldom occurs in pure stands beyond the

pole stage. The following list shows the relative tolerance of the species, beginning with the most tolerant:

White Fir  
Douglas Fir  
Lodgepole Pine  
Yellow Pine  
Larch.

At all stages larch is very subject to the attacks of mistletoe (*Razoumofskya Douglasii laricis*). The saplings are frequently attacked when an inch or less in diameter. This disease is much more prevalent on dry than on the moist slopes. A total of several hundred trees in various parts of the Forest shows 79% of the Larch to be attacked on the dry slope types, while only 27% on the more moist sites. This parasite produces witches' brooms and swellings on the trunk. The parts affected become swollen and saturated with pitch, thus producing poor grades of lumber and sometimes, as in the case of the small trees shown in the accompanying pictures, blisters of pitch, streaks of discolored wood, and flakes of bark are included in the wood.

The most serious defect of the tree is found in the butt; from the base to a point about six feet above the ground. This portion of the tree is practically worthless, owing to the prevalence of ring shake, pitch seams and saturation with pitch. When sawed into lumber such butts frequently literally fall to pieces in the pile. In scaling 290 trees during logging operations 7% of the total volume of Larch within the limit of merchantable sizes was deducted owing to this defect. The accompanying table gives the amount of shake for various diameters. It was made up from the scale of 290 trees scaled by E. C. Erickson, scaler on the Baker White Pine Lumber Company sale 6/13/10.

Fungus diseases do not injure the Larch to any great extent, less than 1% of the volume being lost owing to fungus. Two kinds were found producing rot in fire-scarred butts. Specimens were sent to Washington for identification, but have not been returned. They are probably species of *polyporus* and *lenzeites*.

Although a large number of decadent trees were examined no insects could be found in living wood. Flat-headed borers working in the dead parts of this tree were found, but in every case they turn back at the edge of the living tissue. Officers of the Forest Service report that they have found borers in the living wood, but in several months' observation the writer has been unable to find a single case of insect attack in living wood.

Larch produces a very good quantity of seed after it has reached a diameter of six inches, or at an age of about 60 years. The cones remain on the trees until spring, releasing the most of the seed in

the late fall or on the snow in winter. Seedlings do not succeed well on the more exposed dry sites. They do best in a protected opening where one tree or a group of trees have been removed or on a clean burn. In such cases Larch saplings often form a dense thicket, excluding all other species over small areas. It does not, however, persist in pure stand. During the pole stage in such cases the Larch is very long and slender. The snow bends it over and the stand soon thins out, admitting the firs, which persist to maturity, growing under the canopy formed by the Larch.

In value, under present market conditions, in this region larch occupies third place. Both Yellow Pine and Douglas Fir are in most cases more desirable timber trees. It has been provisionally decided to cut the pine on a rotation of 240 years, with cutting periods of 60 years. Since the pine is by far the most valuable tree in the stand the Larch should be worked along with it. From the volume tables accompanying this study it is evident that Larch should be cut when it reaches a diameter of between 18 and 21 inches breast high.

After this size is reached the per cent. of defect increases very rapidly. From the table of growth based on age it is evident that the tree reaches this size between the ages of 167 and 196 years. A mean of these gives 181 years, at which time the tree should be 19.3 inches, breast high. Undoubtedly this diameter would be larger in moist situations and probably the tree should be left longer in such places, but the figures at hand do not show this to be true. The trees obtained in moist bottoms plot along with those on the medium dry sites.

In marking for cutting Larch should be considered as the timber tree occupying third place. Yellow Pine is a much more desirable tree. On the last large timber sale it brought on an average \$2.97 per thousand, while Douglas Fir and Larch were lumped together at \$1.14. While these two trees are close together in value the fir is more sound, commonly grows to larger size and has a more rapid growth. It is the more desirable of the two trees. White Fir and Lodgepole Pine are not considered as valuable trees in the stand. However, Larch should not be considered as a weed tree. In moist sites it is desirable and healthy trees up to 30 inches in diameter should be left, when they will not interfere with the best development of Yellow Pine in the stand. On the dry and medium dry sites healthy trees should be left up to a diameter of 19.3 inches. In marking Larch for cutting all merchantable trees above 16 inches breast high which are decadent or which will interfere with the growth of Yellow Pine before the next cut (60 years) should be marked. As market conditions improve smaller trees can be cut. On all site except the more moist, trees 19.3 inches breast high and over should be cut. Upon the moist sites all trees 30 inches and over breast high should be cut.

It will probably be necessary to butt off trees above 20 inches D. B. H. as far as they are shaky. This will average four feet. On large trees (40 inches D. B. H.) it may be as much as 16 feet. On 290

trees tallied, 7.3% was deducted for shake. In administering the large sales on this Forest the local office is willing the shaky trees be long-butted, but lumbermen have not yet been able to make satisfactory arrangements with the contract sawyers. At the present time the lumberman takes the entire butt log to the mill, where it is sawed and then shipped in the rough to the planning mill in the valley, a distance of 60 miles, where much is culled out and becomes waste. Many of the butts are so shaky that they later fall to pieces when the lumber is dried. The lumberman does not pay for this worthless lumber, but goes to the expense of handling it. In talking with lumbermen about this matter they express a desire to leave these butts in the woods. One man said he would rather pile and burn these logs in the woods after paying for them then to take them to the mill.

| DBH | Full Vol. | Diff | Merch. |      | % Merch | Shake |      | Height.                     |        |                           |        | No. Trees |
|-----|-----------|------|--------|------|---------|-------|------|-----------------------------|--------|---------------------------|--------|-----------|
|     |           |      | Vol.   | Diff |         | Ft.BM | %    | T 11 S 35 ½ E<br>Alt. 4800' |        | T 9 S 38 E. Alt.<br>6000' |        |           |
|     |           |      |        |      |         |       |      | Total                       | Merch. | Cr.Btm                    | Dr.Rdg |           |
| 8   | 10        |      | 0      |      |         |       |      | 49                          | 5      | 68                        | 41     | 1         |
| 9   | 30        | 20   | 30     | 30   | 100     |       |      | 55                          | 17     | 74                        | 46     | 1         |
| 10  | 52        | 22   | 52     | 22   | 100     |       |      | 60                          | 27     | 80                        | 51     | 2         |
| 11  | 78        | 26   | 78     | 26   | 100     |       |      | 65                          | 35     | 86                        | 56     | 1         |
| 12  | 106       | 28   | 106    | 28   | 100     |       |      | 70                          | 42     | 92                        | 60     | 10        |
| 13  | 136       | 30   | 136    | 30   | 100     |       |      | 75                          | 48     | 97                        | 64     | 10        |
| 14` | 168       | 32   | 168    | 32   | 100     |       |      | 79                          | 53     | 102                       | 68     | 7         |
| 15  | 202       | 34   | 202    | 34   | 100     |       |      | 83                          | 58     | 107                       | 72     | 13        |
| 16  | 238       | 36   | 238    | 36   | 100     |       |      | 87                          | 62     | 111                       | 76     | 22        |
| 17  | 278       | 40   | 278    | 40   | 100     |       |      | 91                          | 66     | 115                       | 80     | 27        |
| 18  | 320       | 43   | 320    | 43   | 100     |       |      | 95                          | 70     | 119                       | 84     | 23        |
| 19  | 367       | 47   | 364    | 44   | 99      | 2     | .6   | 99                          | 73     | 123                       | 87     | 18        |
| 20  | 418       | 51   | 410    | 46   | 98      | 8     | 1.9  | 102                         | 76     | 126                       | 90     | 19        |
| 21  | 474       | 56   | 458    | 48   | 97      | 16    | 3.3  | 105                         | 79     | 129                       | 93     | 19        |
| 22  | 535       | 61   | 509    | 51   | 95      | 26    | 4.9  | 108                         | 81     | 132                       | 96     | 14        |
| 23  | 601       | 66   | 563    | 54   | 94      | 38    | 6.3  | 111                         | 84     | 135                       | 99     | 26        |
| 24  | 672       | 71   | 621    | 58   | 92      | 50    | 7.4  | 114                         | 86     | 137                       | 102    | 15        |
| 25  | 747       | 75   | 684    | 63   | 91      | 65    | 8.7  | 117                         | 88     | 139                       | 104    | 13        |
| 26  | 827       | 80   | 753    | 69   | 89      | 76    | 9.1  | 120                         | 90     | 141                       | 106    | 6         |
| 27  | 918       | 91   | 829    | 76   | 88      | 88    | 9.5  | 123                         | 92     | 143                       | 108    | 8         |
| 28  | 1017      | 99   | 913    | 84   | 86      | 100   | 9.8  | 125                         | 94     | 145                       | 110    | 7         |
| 29  | 1135      | 118  | 1006   | 93   | 84      | 114   | 10.0 | 127                         | 96     | 147                       | 112    | 5         |
| 30  | 1273      | 138  | 1109   | 103  | 82      | 132   | 10.4 | 129                         | 98     | 148                       | 114    | 11        |
| 31  | 1435      | 155  | 1223   | 114  | 80      | 156   | 10.9 | 131                         | 100    | 149                       | 116    | 4         |
| 32  | 1610      | 175  | 1347   | 126  | 78      | 190   | 11.8 | 133                         | 101    | 150                       | 117    | 4         |
| 33  | 1808      | 198  | 1486   | 144  | 76      | 236   | 13.0 | 135                         | 102    | 151                       | 118    | 0         |
| 34  | 2080      | 272  | 1630   | 153  | 74      | 310   | 14.9 | 136                         | 103    | 152                       | 119    | 0         |
| 35  | 2520      | 440  | 1785   | 155  | 71      | 424   | 16.9 | 137                         | 104    | 153                       | 120    | 1         |

Volumes and reductions for defect obtained from the actual scale of 290 trees in T. 11 S., R. 35  
 ½ E., W. M., Whitman National Forest, by Mr. E. C. Erickson, Scaler, and Mr. H. P. Gilkey, Forest  
 Assistant.

| Age | DIB<br>Stump. | D.B.H. | Vol. Ft. B.M. |        | Increase<br>10-yr. period |        | Height. |        |
|-----|---------------|--------|---------------|--------|---------------------------|--------|---------|--------|
|     |               |        | Full          | Merch. | Ft. B.M.<br>Merch.        | D.B.H. | Total   | Merch. |
| 10  | .7            | .6     |               |        |                           |        | 4       |        |
| 20  | 2.0           | 1.8    |               |        |                           |        | 10      |        |
| 30  | 3.2           | 3.0    |               |        |                           |        | 20      |        |
| 40  | 4.3           | 4.1    |               |        |                           |        | 28      |        |
| 50  | 5.5           | 5.3    |               |        |                           |        | 34      |        |
| 60  | 6.5           | 6.3    |               |        |                           |        | 40      |        |
| 70  | 7.7           | 7.5    |               |        |                           |        | 46      |        |
| 80  | 8.8           | 8.6    | 20            | 15     |                           |        | 52      | 13     |
| 90  | 10.0          | 9.7    | 47            | 40     | 26                        | 1.2    | 58      | 25     |
| 100 | 11.2          | 10.9   | 77            | 71     | 30                        | 1.2    | 64      | 33     |
| 125 | 13.8          | 13.7   | 162           | 156    | 34                        | 1.0    | 77      | 51     |
| 150 | 16.4          | 16.5   | 257           | 251    | 38                        | 1.0    | 88      | 63     |
| 175 | 18.8          | 19.1   | 367           | 356    | 42                        | 1.0    | 98      | 72     |
| 200 | 21.0          | 21.2   | 492           | 472    | 46                        | .9     | 107     | 80     |
| 225 | 22.8          | 23.5   | 637           | 600    | 51                        | .7     | 114     | 86     |
| 250 | 24.4          | 25.7   | 802           | 741    | 56                        | .6     | 119     | 90     |
| 275 | 25.8          | 27.8   | 997           | 897    | 62                        | .6     | 123     | 94     |
| 300 | 27.2          | 29.6   | 1227          | 1071   | 70                        | .6     | 127     | 97     |
| 325 | 28.4          | 31.4   | 1504          | 1269   | 80                        | .5     | 131     | 100    |
| 350 | 29.5          | 33.3   | 1864          | 1509   | 96                        | .4     | 135     | 103    |

Average Tree.

D. B. H., 20.49 in.; total height, 101 feet; merchantable height, 75.2 feet; average merchantable  
 volume, 480 feet B. M.; total volume volume, 531 feet B. M.

Defects: fire, .1%; rot, 1.0%; shake, 7.3%; breakage, 1.2%

February 13, 1912.

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Approved:

*Henry Ireland*

Supervisor