

CROSSING the California-Oregon line and proceeding northwards a great change takes place in forest life. The giant redwood gives way to the Oregon pine and the California post cedar to the red cedar. Tide-land spruce, hemlock, sugar pine and yellow pine also appear. Nearly all these species attain their maximum development between the Columbia River and Puget Sound, and each in its own peculiar environment may be found on Oregon, Washington, British Columbia and into Southern Alaska. Here they are crowded close to the coast, and northward and above them to the line of overlying snow extends the Alaskan cedar. The great forests of the North Pacific are nourished by the Japanese currents. Near the entrance to Puget Sound the rainfall averages nearly 100 inches annually. The climate is mild, snow seldom falling. The vegetation in very dense, valleys, hills and mountain ridges are one vast forest; the trees standing close and high. Beneath, covering the ground, are dozens of varieties of brush, large and small. Farther back from the coast, the rainfall decreases, the woods are less dense, and when the summit of the Cascades is reached open pine-lands replace dense fir forests. Of these varieties the trade known as the Oregon sugar and yellow pines, the red cedar and, to a slight extent, the tide-land spruce.

more attention to them. Last June A. J. Johnson, forestry expert of Oregon, for the United States Geological Survey, was sent East of the Cascades and he spent nearly six months investigating forest areas. He located and reported 1,900,000 feet of the timber the existence of which had not heretofore been known to the Government. The principal varieties of this discovery are yellow pine, tamarack, lodge-pole pine, white fir and mountain spruce. Much sugar pine is scattered over the buttes of Southern Oregon in districts visited by Mr. Johnson. There are hundreds of thousands of acres bearing nothing but juniper and mountain mahogany. These trees have value for fencing and fuel. The juniper is very durable and makes a good fence post. The mahogany grows to five or six inches in diameter and its value as fuel is said to be equal to nut coal.

So great is the demand for timber that timber lands have advanced in price 10 per cent in the past two years. Quarter sections which a few years ago could have been bought for \$5 an acre have advanced to \$10, while land for which \$25 was asked has risen in some instances to \$25. Prices range all the way from \$20 to \$450 per quarter section, according to the amount of timber the cruiser reports, together with its accessibility to navigable streams.

Washington's Merchantable Timber. The area of merchantable timber in Washington is little less than half of that of Oregon. While the wooded areas of the two states do not differ materially, Oregon's being 5,330 square miles and Washington's 4,700 square miles, a much larger proportion of the wooded area of Oregon is covered with timber of merchantable size and species. For example, the Cascade Range in Washington is much broader than in Oregon and at a much greater altitude, thus cutting out a large part of the wooded area. The Olympic Mountains also subtract another large part of the wooded area.

The lumber industry of Washington has, especially in recent years, attained a much larger development than in Oregon, consequently a more extensive area has been cut over. In 1890 the cut of Washington was more than double that of Oregon, the values of production standing at \$17,075,996 and \$7,965,415, respectively. Washington is naturally divided into two parts, which differ widely from each other in respect to timber growth. The line of division is the crest of the Cascade Range, running north and south through the state. West of the range the country is heavily forested, or was before logging operations began. In this part of the state the areas naturally devoid of timber are few and small, and altogether trifling in proportion to the total area. East of it the land is mainly without timber, and where timber exists it is sparse and its quality is inferior. Moreover, there is a vast difference in the species. West of the Cascades the prevailing species which forms nearly two-thirds of the entire forest is red or yellow fir. This, with cedar, hemlock and spruce, composes the forest. Fir is found in almost all parts of this region, and throughout the Sound valley little of any other species is found, the forests being almost pure fir. East of the Cascade Range the forest consists mainly of pine, principally yellow pine, though in the northeast corner of the state a little white pine is intermingled. Red fir is found scattered through the pine forests in considerable proportion, and in the northeastern part of the state larch is abundant. Small proportions of hemlock and cedar are found and a trifling amount of spruce and oak.

Of cedar there is scarcely any to be found on the islands and the west coast of Puget Sound, and but very little in the valley to the southwest. It increases westward towards the coast and reaches a maximum immediately upon the coast. The east coast of Puget Sound contains a large proportion of cedar, ranging from one-fourth to one-half of the forest, and the proportion diminishes as one ascends the Cascades. Hemlock is almost entirely wanting on both shores of Puget Sound and in the valley to the south. It increases westward and forms a noticeable proportion of the forests in the Cascade Range and in the northwestern part of the Olympic peninsula. It increases also as one ascends the Cascades, its habitat extending nearly to timber line.

Of cedar there is scarcely any to be found on the islands and the west coast of Puget Sound, and but very little in the valley to the southwest. It increases westward towards the coast and reaches a maximum immediately upon the coast. The east coast of Puget Sound contains a large proportion of cedar, ranging from one-fourth to one-half of the forest, and the proportion diminishes as one ascends the Cascades. Hemlock is almost entirely wanting on both shores of Puget Sound and in the valley to the south. It increases westward and forms a noticeable proportion of the forests in the Cascade Range and in the northwestern part of the Olympic peninsula. It increases also as one ascends the Cascades, its habitat extending nearly to timber line.

The following table shows the geographical distribution of timber in Oregon:

Region	Feet Board Measure
Coast Range	100,100,000,000
West slope of Cascades	5,783,000,000
East slope of Cascades	27,531,000,000
Eastern Oregon	17,233,000,000
Total	150,647,000,000

The following table gives the stand of timber of the species recognized by lumbermen, with the percentage which each bears to the total amount:

Species	Feet Board Measure	Per Cent
Red Fir	85,335,421,000	56.7
Cedar	16,209,423,000	10.8
Hemlock	14,343,230,000	9.5
Pine	6,588,520,000	4.4
Spruce	5,415,215,000	3.6
Larch	2,971,921,000	2.0
White Fir	2,550,000,000	1.7
Oak	1,700,000,000	1.1

West slope. East slope. per cent. per cent.

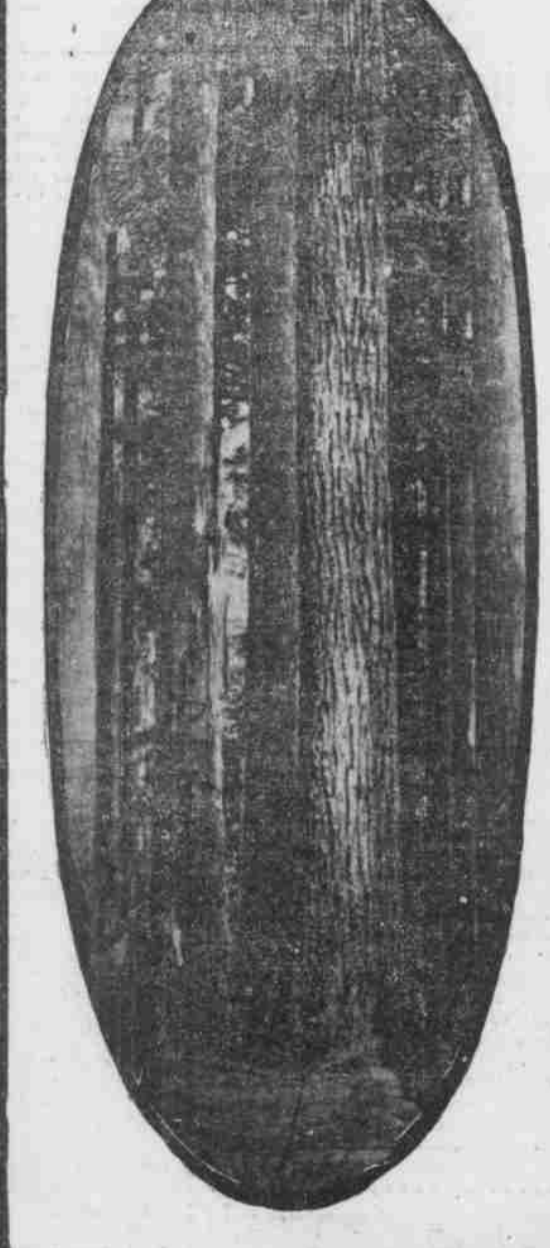
Yellow pine	27.1	63.
Sugar pine	1.1	.9
White pine	.38	.3
White bark pine	.05	.04
Lodge pole pine	6.3	22.5
Red fir	4.	1.22
White fir	5.4	3.7
Noble fir	6.3	.5
Alpine fir	.1	.0
Western hemlock	.2	.38
Alpine hemlock	6.3	.1
Engelmann spruce	.3	1.5
Incense cedar	.06	.75
Western juniper	.35	1.00
Total	100.00	100.00

The yellow pine easily ranks above all of the other species on the Eastern slope. The reason for this lies chiefly in the smaller precipitation on the sub-humid areas of the eastern slope. The large proportion of lodgepole pine is chiefly due to forest fire. At least 90 per cent of the species owes its growth to this cause. The age of the timber utilized in sawmill consumption varies from 100 to 250 years. Most of the yellow pine falls below 175 years. The higher limit is reached chiefly in the sugar pine. Most of the sugar pine in the region is of great and mature age. Comparatively little red fir is cut. It varies in age from 100 to 300 years, and some of the very large trees are believed to be older. The noble fir and white pine of mill-timber size varies in age from 100 to 250 years, most of it falling below 150 years. The alpine hemlock runs from 80 to 250 years. The white fir, with sufficient clear trunk development, varies in age from 75 to 130 years.

The most serious defect of the timber consists of fire scars in the yellow and sugar pines, usually occurring as spots in the lower third of the trunk denuded of the bark and with the wood charred or burned over or less deeply. These defects are very common in the yellow pine east of the Cascades, where the wood of the species is more highly resiniferous than west of the range and where in consequence, injuries of this nature are apt to extend over a larger proportion of the trunk. This defect often diminishes the lumber contents of the trunk in scaling by 10 to 30 per cent.

The most serious defect of the timber consists of fire scars in the yellow and sugar pines, usually occurring as spots in the lower third of the trunk denuded of the bark and with the wood charred or burned over or less deeply. These defects are very common in the yellow pine east of the Cascades, where the wood of the species is more highly resiniferous than west of the range and where in consequence, injuries of this nature are apt to extend over a larger proportion of the trunk. This defect often diminishes the lumber contents of the trunk in scaling by 10 to 30 per cent.

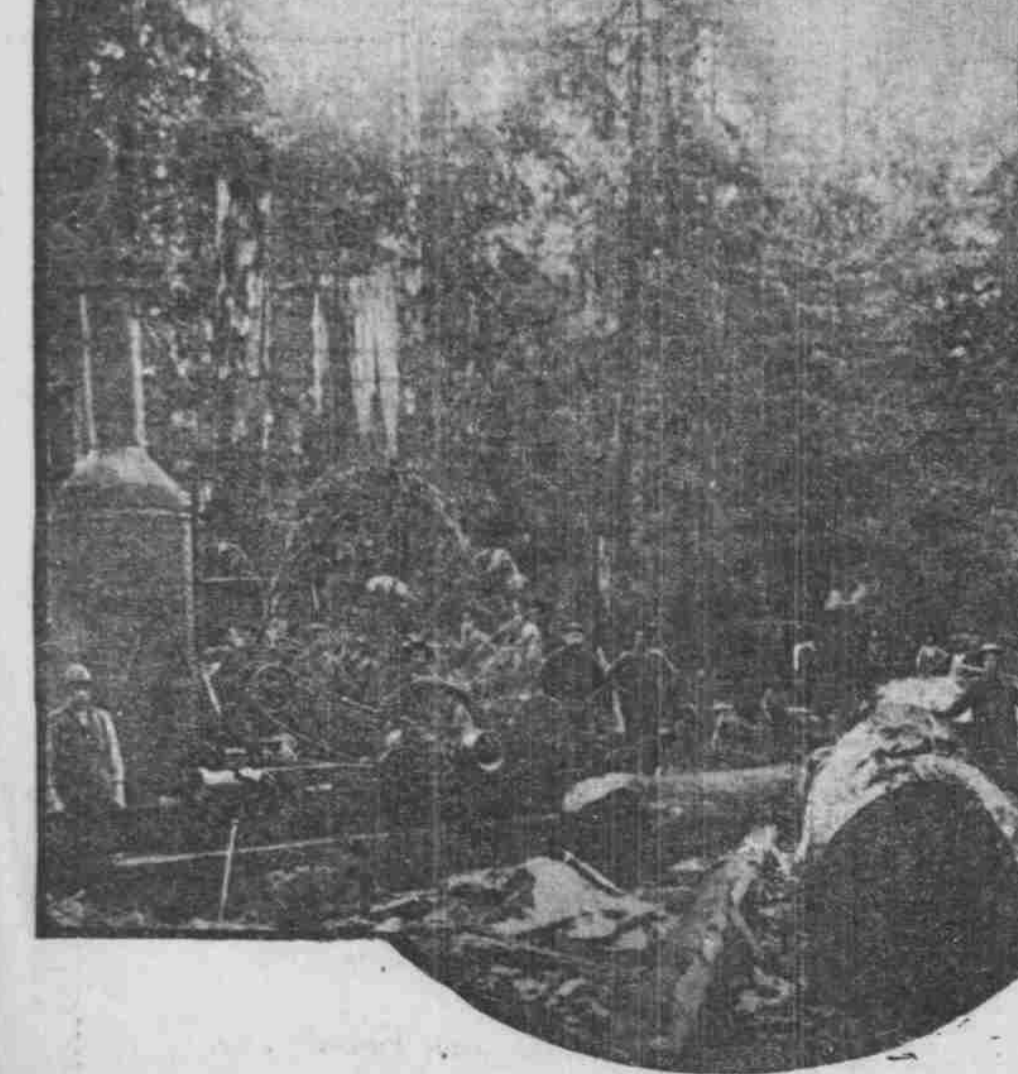
Large Sugar Pine Trees. Most of the very aged sugar pine and red fir have rotten covers or gum cracks in their trunks. The incense cedar on both sides of the mountains rarely has a sound center. It is seldom cut except for shingles. The alpine hemlock is usually sound, even where trees have attained a high old age, provided fire has not swept through the stands. The sugar pine west of the Cascades reaches a greater diameter than any other trees in the reserve, a maximum of 56 inches having been noted. The yellow pine varies from 14 to 56 inches in its base diameter, the white pine from 20 to 36 inches, red fir from 14 to 24 inches, while the other trees range all the way from 10 to 72 inches in base diameter. The red fir has the clearest trunk, often reaching a height of 120 feet before branching. The white pine reaches anywhere from 40 to 100 feet, the sugar pine from 15 to 70 feet, and the other trees range anywhere from the ground to 90 or 95 feet, according to the species.



Sawmill on Columbia River. Photo by L.J.HICKS.

Oregon Fir Timber near Columbia River. PHOTO BY L.J.HICKS, PORTLAND.

A Timber Claim Cabin. Photo by L.J.HICKS, PORTLAND.



There are no forests like those of Oregon and Washington. The Douglas fir, of these endless forests, is the most valuable for general merchantable purposes in the world.

A Run-way for logs in an Oregon Forest. Motive Power is furnished through long steel cables. FROM PHOTO BY L.J.HICKS, PORTLAND.

amounts to 22,822,500,000 feet, hemlock predominating.

NEW LUMBERING PROCESSES.

Steam has superseded animals at the Great Bridal Veil Camps. Steam has completely superseded cattle and horses at the camps of the Bridal Veil Lumbering Company. Bridal Veil, the name of a beautiful waterfall, is located on the line of the O. R. & N. Railroad 30 miles East of Portland. The Bridal Veil Lumbering Company's camps are located on Larch Mountain, a magnificent timbered section seven to ten miles out from the railroad station. Trees, many of them of tremendous diameter and height, thickly stud the mountain side. These trees are felled and cut into logs in the ordinary manner of these Western lumbering forests, after which donkey engines, mounted upon heavy sleds made purposely for them, rather than the product in from all directions. Long cables are employed for this purpose, and they can strip an acre or two of saw logs at a single setting. This process is called "yarding," and when a section has been cleared the donkey and sled are moved, by using the cables, to another place. "Bull" donkeys of greater strength than "yarding" donkeys, with their endless cables, haul the logs from the "yard" to a logging railroad, and this latter delivers them at the mill. The "bull" donkeys use a sled road, but the railroad, upon