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RELATIONSHIP OF YELLOW PINE AND DOUGLAS
FIR IN THE YELLOW PINE TYPE
H. Work

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ANNUAL SILVICIAL REPORT

1913

RELATIONSHIP OF YELLOW PINE AND DOUGLAS FIR

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GEOGRAPHY

RELATIONSHIP OF YELLOW PINE AND DOUGLAS FIR

IN THE YELLOW PINE TYPE.

Annual Silvical Report

Salmon National Forest

by

Herman Work

January 17, 1913.

UNIT OF
CALIFORNIA

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Elevation is a factor in determining the purity of

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ANNUAL SILVICIAL REPORT

1912

RELATIONSHIP OF YELLOW PINE AND DOUGLAS FIR IN THE YELLOW PINE TYPE.

GEOGRAPHY

The Yellow Pine Type occurs north of the Salmon River in a broad irregular band extending from Fourth of July Creek to the western extremity of the Forest, below Horse Creek.

This band is cut by high ridges on which fir and other species occur and by barren and grass areas. The best stands of yellow pine occur on Fourth of July, Wagonhammer, Anderson, Hughes, Sage, Squaw, Boulder, Owl and Colson Creeks. Below Colson Creek the stands are immature. Big Creek has large bodies of yellow pine timber on its lower tributaries and valuable stands occur on Lorphyry and Silver Creeks at its head. The Middle Fork country is not well known but it has been estimated that the region has 150,000 M feet of mature yellow pine timber.

The type is pure in various places throughout this range, notably in the lower, rolling lands of Ditch, Ransack, Squaw and Owl Creeks. On most of the Creeks the type is pure on the lower southerly slopes.

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GEOGRAPHY

The Yellow pine type occurs north of the Salmon River in a broad irregular band extending from north of July Creek to the western extremity of the forest, below Hope Creek. This band is cut by high ridges on which fir and other species occur and by barren and grass areas. The best stands of yellow pine occur on fourth of July, Wagonhammer, Anderson, Hughes, Sage, Squaw, Boulder, Owl and Colson Creeks. Below Colson Creek the stands are immature. Big Creek has large bodies of yellow pine timber on the lower tributaries and valuable stands occur on Lophry and Silver Creeks at its head. The Middle Belt country is not well known but it has been estimated that the region has 150,000 M feet of mature yellow pine timber. The type is pure in various places throughout this range, notably in the lower rolling lands of Witten, Ranssaw, Squaw and Owl Creeks. On most of the creeks the type is pure on the lower southerly slopes.

ELEVATION

Elevation is a factor in determining the purity of

the Yellow Pine Type. For instance, the lower bottoms of Ditch Creek and Owl Creek have large pure stands that become mixed further up the streams, although slope, exposure and other factors remain much the same in the case of Ditch Creek. Fourth of July and Wagonhammer Creeks are higher than the Creeks just mentioned and pure stands are much less extensive. At these places, however, the factors of slope and exposure are favorable to Douglas fir. But Silver and Porphyry Creeks have excellent pure stands of yellow pine at elevations greater than on Fourth of July and Wagonhammer Creeks, namely at 6,000-6,800 feet (estimated). Thus it is evident that elevation is not of greatest importance.

On Lick, Fourth of July, Wagonhammer, Hughes and many other creeks the moderate northerly slopes show strong competition between yellow pine and Douglas fir while the southerly exposures are usually pure yellow pine. This condition is especially noticeable on Hughes Creek where the southerly exposures have pure yellow pine up to elevations of about 5,000 feet; the higher slopes show Douglas fir entering, to predominate at about 5,500 feet; the northerly slopes, which are steep, have pure Douglas fir, merging into mixture with lodgepole pine and alpine species at the higher elevations; while pine and fir compete on the lower moderate slopes facing the north and northeast. The steeper the slope, the harder are conditions for yellow pine,

The Yellow Pine type. For instance, the lower bottoms of Ditch Creek and Owl Creek have large stands that become mixed further up the slopes, although along exposures and other factors remain much the same in the case of Ditch Creek. In July and August, the Yellow Pines are higher than the Green Pines mentioned and pure stands are much less extensive. At these places, however, the factors of slope and exposure are favorable to Douglas fir. But Silver and Norway Spruce have excellent pure stands of yellow pine at elevations greater than 10,000 feet (east of July and August). The Yellow Pine elevation is not of greatest importance.

On Ditch Creek, north of July, August, and many other creeks the moderate northerly slopes show strong competition between yellow pine and Douglas fir while the southerly exposures are mainly pure yellow pine. This condition is especially noticeable on higher Green Pines where the southerly exposures have pure yellow pine up to elevations of about 10,000 feet; the higher slopes show Douglas fir entering to a large extent at about 8,500 feet; the northerly slopes, which are steep, have pure Douglas fir, merging into mixture with lodgepole pine and spruce species at the higher elevations; while pine and fir come in on the lower moderate slopes facing the north and northeast. The steeper the slope, the better are conditions for yellow pine.

doubtless due in large part, to the lack of sunlight, for the species persists on very steep slopes that face the sun. A concrete example of the effect of exposure is found on the ridge between Hughes Creek and the west Fork of Hughes Creek. Here yellow pine extends to the top of the ridge, occurring on very steep, dry ground, facing south. It becomes more dense and vigorous on the moderate slopes near the top. Yellow pine is absent from the steeper part of the northern side of the same ridge and is not important on any part of this exposure.

SOIL

Mr. Gilbreath describes the Forest in general as a sea of eruptive rocks with "islands" of sedimentary character. He observes that yellow pine follows the eruptive formations while Douglas fir is most successful on water-laid rocks. He cites the remarkable isolation of areas of yellow pine on Silver and Rorphyry Creeks at high elevations, in a region where the general geological character is reversed; i.e. where eruptive rocks occur in the small "islands" of the watersheds just named. Yellow pine occupies these eruptive islands. The neighboring region is made up of Douglas fir and lodgepole stands with considerable grass areas.

It is quite probable that the loose texture of volcanic soils, favoring rapid drying, is of greater importance than chemical differences in affecting forest composition.

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Mr. Gilbert describes the forest in general as a ... of eruptive rocks with "islands" of sedimentary ... He observes that yellow pine follows the eruptive formations while Douglas fir is most successful on water-lain rocks. He notes the remarkable fact that in areas of yellow pine on Silver and Murphy Creeks at high elevations, a region where the general geological character is reversed; i.e. where eruptive rocks occur in the small "islands" of the watershed just named. Yellow pine occurs in these eruptive islands. The ... Douglas fir and lodgepole stands with considerable grass areas. It is quite probable that the loose texture of volcanic soils, favoring rapid drainage, is of greater importance than chemical differences in affecting forest composition.

The demand of yellow pine for good drainage is everywhere evident. Douglas fir comes in wherever there is much moisture, sometimes occurring with spruce as on the low stream banks of Ditch Creek and Little Ditch Creek. Moisture conditions are undoubtedly of great importance in determining the composition of the mixture of Douglas fir and yellow pine but the thrifty growth of the species on the well watered and well drained banks of ditches as well as on very dry south slopes would seem to indicate that variation of moisture supply is less effective in limiting the type than is variation in sunlight.

GROUND COVER

The characteristic herbaceous ground cover of pure stands is heavier than that of mixed stands. Bunch grass, lupine, small sunflower and painted cup are characteristic herbs in the pure type and they are much less plentiful or entirely absent in mixed stands, due to their demand for abundant sunlight. Fine grass occurs in half-shaded places throughout the Forest. The mixed stands usually have considerable brush, notably alder, and willows. Huckleberry and snow drop are common over most of the yellow pine country while ceanothus, cherry and service berry occur in openings and ninebark, willow alder, aspen, red dogwood, rose, elder and thorn follow the streams and seeps.

Cover probably exerts no considerable influence over reproduction except in barring entrance to the soil for the seeds. Repeated examples might be cited, showing that both

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GROUND COVER

The characteristic herbaceous ground cover of pure stands is heavier than that of mixed stands. Rough Grass, lupine, small amaranth and painted dry are characteristic herbs in the pure type and they are much less plentiful or entirely absent in mixed stands, due to their demand for abundant sunlight. The grass occurs in half-shaded places throughout the forest. The mixed stands usually have considerable brush, notably elder, and willow. Huckleberry and snow drop are common over most of the yellow pine country while sassafras, cherry and service berry occur in openings and near banks, willow, elder, sassafras, red dogwood, rose, elder and thorn follow the stream and sassafras.

Cover probably exerts no considerable influence over reproduction except in bearing entrance to the soil for the seeds. Ripped openings might be cited, showing that both

yellow pine and Douglas fir are easily able to come up through ceanothus and other common shrubs. Squirrels like to cache their cones in willow and service berry clumps but reproduction is usually absent from such places, unlike many of the old down-tree caches.

REPRODUCTION - VIRGIN STANDS.

Young growth is more plentiful in mixed virgin stands than in pure old yellow pine. Hundreds of acres of open yellow pine on Hughes Creek have little young growth, while mixed stands in the same region have abundant reproduction. This condition is easily attributed to the absence of moisture in the surface soil and to the herbaceous cover that prevents seeds from entering the ground in open stands. The mixture favors Douglas fir except in places where the forest has been opened. Here yellow pine is able to overshadow the fir by reason of its quick growth. In short yellow pine seems usually to require an opening in the forest and a breaking of the surface soil as necessary preliminaries to reproduction, while fir is able to grow under shade and makes a continuous advance, which is at a slower rate than in the case of pine.

The question of seed years in relation to reproduction is open for study. Bearing on this question is the case of Ransack Creek where wonderful reproduction is coming in under a virgin stand. The trees are mostly 12 years old, corresponding in age with those of the adjoining Grouse Flat where abundant

Yellum pines and Douglas fir are essential to the growth of

oak and other common species of the Pacific Northwest.

There is a marked difference in the growth of these species

in the different regions of the Pacific Northwest.

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THE GROWTH OF THE PINE

The growth of the pine is affected by many factors, such as

the amount of light, the amount of water, the amount of

nutrients, and the amount of air.

The amount of light is a very important factor in the

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reproduction followed cuttings of 14 to 16 years ago. In both cases the work of squirrels is evident in the frequent occurrence of 5 to 12 seedlings coming from single spots where cones had been buried. However, the squirrels can hardly be given credit for such wholesale seeding as is found on Ransack, since the Ransack area is more evenly covered with young growth than the cutover land of Grouse Flat. This difference is attributed to better general moisture conditions on the gentle north slopes of Ransack. Grouse Flat is rather dry and has little north exposure. The seedlings are in groups at the Flat, many of the groups evidently coming from old squirrel caches located in down tree tops. It is hard to believe that the small areas of Ransack Creek and Grouse Flat were favored with an unusually good seed year while the large adjoining country had barren trees. It is reasonable to suppose that unknown soil conditions in the Ransack region were exactly favorable to reproduction and that these conditions were strictly local.

In the mixed stands of little Ditch Creek, above the sawmill, small firs are much more numerous and healthy than the pines, the shade being too dense for the latter species.

CUT-OVER.

Cuttings seem to be almost invariably followed by fair to excellent pine reproduction. The most striking instances of reproduction following old slashings are found on Grouse Flat, parts of Ditch Creek, and Sawmill Gulch. In the first two cases the trees are most abundant on rolling land,

reproduction followed cutting of 14 to 16 years ago. In both cases the work of agriculture is evident in the present occurrence of 5 to 12 seedlings coming from single spots where cones had been buried. However, the sprouts are hardly to be given credit for such wholesale seeding as is found on Kanasa, since the Kanasa area is more evenly covered with young growth than the other land of Grouse Flat. This difference is attributed to better general moisture conditions on the gentle north slope of Kanasa. Grouse Flat is rather dry and has little north exposure. The seedlings are in groups at the base of the groups evidently coming from old sprout cones located in down tree tops. It is hard to believe that the small areas of Kanasa Creek and Grouse Flat were covered with an unusually good seed year while the large adjoining country had barren trees. It is reasonable to suppose that unknown soil conditions in the Kanasa region were exactly favorable to reproduction and that these conditions were strictly local. In the mixed stands of Little Ditch Creek, above the sawmill, small trees are much more numerous and healthy than the pines, the shade being too dense for the latter species.

OUT-OVER.

Cuttings seem to be almost invariably followed by fair to excellent pine reproduction. The most striking instances of reproduction following old slashings are found on Grouse Flat, east of Ditch Creek, and Sawmill Gulch. In the first two cases the trees are most abundant on rolling land,

pine being much better represented than fir, except on a few gentle north slopes bordering Grouse Flat. Here the fir is putting up a good fight, but is hardly likely to drive out the pine, which seems to have started a little later in this instance. On Sawmill Gulch a fairly steep north slope has a covering of light brush that is almost obscured by a very dense stand of fir and pine reproduction, following the cutting of a mixed stand some fifteen years ago. It is too early to tell what the composition of the resulting forest will be, but the pine would seem to have the advantage, judging from comparative growth rates at other places. In the instances mentioned the reproduction is so dense that the development of the stand will be retarded to a marked degree unless some market can be developed for thinnings.

BURNS:

The influence of severe burns on the mixed type may be seen at the head of Little Ditch Creek where ceanothus with occasional firs and groups of pine have followed an old fire. This one instance does not indicate much, however, except the difficulty the forest may have in re-establishing itself. The 1910 fires seem to have been as injurious to fir as to pine young growth. The bunch grass of open stands serves to carry the fire as well or better than the brush and little of mixed stands, but the damage is usually much less severe in pure stands. Whether fires have a good effect in opening the ground to seed in the

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the damage is usually much less severe in pure stands. Whether
fires have a good effect in opening the ground to seed in the

open yellow pine country has not been determined, but nothing has appeared to indicate that this is the case. A close study of the Hughes Creek burns during the coming field season may indicate something as to the effects of burns and also as to the results of a good seed year (1912).

SILVICULTURE:

Fir does not seem to reach its best development in mixture with yellow pine, the trees being stunted and more limby than in pure fir stands. At best, the fir is inferior to pine, except for rough planking or exposed uses, such as flumes, siphons and bridge work. The natural fir country supplies plenty of this rough timber and the effort in the yellow pine type should be to restrict the fir as much as possible, in order that the yellow pine production may be at the maximum rate.

Outover lands on Fourth of July, Wagonhammer and Hughes Creeks seem to indicate that the real essential factor to the reproduction of the yellow pine type is the occurrence of cutting that will break the ground cover. A good seed year following closely on such breaking should almost inevitably result in good reproduction. It is impossible to show from observations just how much cover should be left for each acre, but judging from seed distribution last fall one large tree or two or three small ones per acre should supply plenty of seed and in places where there is brush, no provision need be made for shading the young trees. The pine seems to do well even in places that are free from shade, at least after a few years start has been made.

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DISCUSSION:

Fir does not seem to reach its best development in mixture with yellow pine, the trees being stunted and more limby than in pure stands. At best, the fir is inferior to pine, except for rough planting on exposed areas, such as bluffs, gullies and bridge work. The natural fir country supplies plenty of rough timber and the effort in the yellow pine type should be to restrict the fir as much as possible, in order that the yellow pine production may be at the maximum rate.

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At any rate, there seems to be no reason whatever, silviculturally, for leaving fir trees, except in breaks where more desirable seed trees are too far distant and fir must be allowed to remain in preference to non-forest growths. In actual timber sale management, however, the desires of the purchaser usually run directly counter to the idea of cutting the fir and it is evident that many years must elapse before the timber market is sufficiently urgent to warrant the practice of strict silviculture. In many cases the production of the forest may be materially increased even without the expensive discrimination against fir, by getting new stands of young growth started in place of mature or overmature trees. Timing the cuttings, in order to have the ground broken for each seed year, is another obviously impracticable idea, but the shelterwood system would seem to be most promising for the time when conditions will warrant the protected cuttings involved in that scheme. In fact, this system would be possible in some instances at the present time, but the market is so uncertain that neither the operator nor the Service would be wise in leaving large trees other than seed trees, for subsequent cuts. In case of large sales extending over five or six years, and not involving railroad logging, the shelterwood system might be used to the advantage of the Service without much loss to the operator.

The question of diameter limits depends considerably on the quality of the site, but most trees under 18 inches have good possibilities for rapid growth, and many trees on the best lands show continued rapid growth even after a diameter of two feet

At any rate, there seems to be no reason whatever, individually, for leaving the trees, except in places where more desirable seed trees are too far distant and the wood must be allowed to remain in preference to non-forest growth. In normal timber sale management, however, the desires of the purchaser usually run directly counter to the idea of cutting the timber and it is evident that many years must elapse before the timber market is sufficiently liquid to warrant the practice of strict silviculture. In many cases the production of the forest may be materially increased even without the expensive discrimination against fire, by getting new stands of young growth started in place of mature or overmature trees. Thinning the cuttings, in order to have the ground broken for each seed year, is another obviously impracticable idea, but the shelterwood system would seem to be most promising for the time when conditions will warrant the protected cutting involved in that scheme. In fact, this system would be possible in some instances at the present time, but the market is so uncertain that neither the operator nor the service would be wise in leaving large trees other than seed trees, for subsequent cuts. In case of large sales extending over five or six years, and not involving railroad log-ging, the shelterwood system might be used to the advantage of the service without much loss to the operator.

The question of diameter limits depends considerably on the quality of the site; but most trees under 18 inches have good possibilities for rapid growth, and many trees of the best lands show continued rapid growth even after a diameter of two feet

has been reached. The practical management of diameter limits is usually dictated by accessibility, the limit being larger in places where there is a good possibility of further sales than in places where the demand is not likely to be repeated.

Lopping and scattering of brush seems to be indicated for the yellow pine type and for most mixed stands as well. Unusually dense mixed stands may require piling because it would seldom be wise to leave a continuous covering of slash even though such a protection would probably be unusually favorable to reproduction.

Watershed protection need be given very little thought in the yellow pine type, because fires constitute the only real danger to the waterholding capacity of the land.

Respectfully submitted,

HERMAN WORE,

Forest Assistant.

January 17, 1915.

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Respectfully submitted,

HIRSH WOLF

Forest Assistant

January 14, 1916.

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