ANNUAL SILVICAL REPORT

DESCHUTES NATIONAL FOREST.

1910.

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There is herewith submitted my first Annual Silvical Report for the Deschutes National Forest.

1. The Deschutes National Forest.

1. List of Trees – according to Sudworth

Pinus monticola Dougl.	Western White Pine, Silver Pine White Pine.
Pinus lambertiana Dougl.	Sugar Pine
Pinus albicaulis Englman.	White-bark Pine. Alpine pine.
Pinus ponderosa Lawson.	Western Yellow Pine, Yellow Pine and Bull Pine.
Pinus contorta Loud.	Lodgepole Pine, Jack Pine, Black Jack, Black Pine.
Larix occidentalis Nuttal.	Western Larch, Larch, Tamarack, Larch Fir.
Tsuga mertensiana (Bong.) Sargent.	Mountain Hemlock, Black Hemlock.
Picea engelmani Engelmann.	Engelmann Spruce, Spruce, Water Spruce.
Pseudotsuga taxifolia (Poir.) Britt.	Douglas Fir, Douglas Spruce, Red Fir
Abies lasiocarpa (Hook.) Nuttal.	Alpine Fir, Balsam Fir.
Abies grandis Lindley.	Grand Fir, White Fir.
Abies concolar (Cord.) Parry.	White fir. Cedar
Juniperus communis Linnaeus.	Dwarf Juniper, Juniper.
Juniperus scopulorum Sargent.	Rocky Mountain Red Cedar, Red Juniper.
Juniperus occidentalis Hooker.	Western Juniper, White Juniper.
Salix sessilifolia ? Nuttal.	
Salix fluviatilis ? Nuttall.	

Salix	American Willow.
Populus tremulodies Michaux.	Aspen, Quaking Asp, Popple.
Populus balsamifera Linnaeus.	Balm of Gilead, Balm, Cottonwood.
Populus trichocarpa, Torrey and Gray.	Black Cottonwood, Cottonwood.
Betula fontalis Sargent.	Mt. Birch, Birch.
Alnus tenuifolia Nuttal.	Mountain Alder, Alder.
Castanopsis chrysophylla (Hook.) A de Candolle.	Western Chinquapin, Chinquapin.
Cercocarpus ledifolius Nuttall.	Curl-leaf Mahogany, Mountain Mahogany, Mahogany.
Amelanchier alnifolia Nuttall.	Western Service Berry, Sarvice.
Crataegus douglasii Lindley.	Black Haw, Thorn.
Prunus emarginata (Dougl.) Walpers.	Bitter Cherry, Wild Cherry.
Prunus demissa (Nutt.) Walpers.	Western Choke Cherry, Choke Cherry.
Sambucus glauca Nuttal.	Blue Elderberry.
Sambucus arborescens Torrey and Gray.	Red Elderberry.

2. Complete List of Shrubs (As far as has been found out to date)

(Shrubs found in the tree List not included in this list.)

Arctostaphylos manzanita.	Manzanita.
Arctostaphylos uva-ursi. Sprong.	Kinnikinnick.
Artemisa rigida A. Gray (Nutt.)	Scabland Sagebrush.
Artemisa tridentata Nuttal.	Common Sagebrush.
Berberis nervosa Pursh.	Oregon grape, Oregon Holly.
Bigelovia graveolens Gray.	Rabbit Sagebrush.
Ceanothus velutinus Douglas.	Snowbrush, Sweet Laurel, Buckbrush, Slickleaf, Balm, Myrtle.
Ceanothus prostratus Benth.	Squaw Carpet.
Cornus stolonifera var. (Coloradensis?).	Red Osier, Red Willow.
Kunzia tridentata (Pursh.) Sprong.	Black Sage.
Lonicera involucrata Banks.	Honeysuckle.
Pensternon ?? schouleri?	A Fox Glove.

Phlox	A blue flower.
Purshia tridentata	Bitter brush, Chemise.
Ribes cereum Dougl.	Coyote Berry.
Ribes divaricatum Dougl.	Gooseberry.
Ribes laxiflorum Pursh.	Gooseberry.
Ribes sanguineum Pursh.	Red flowered Currant.
Ribes bracteosum ? Dougl.	Black Currant.
Rosa gymnocarpa (Nutt) Torr, & Gray.	Wild Rose.
Rosa nutkana Presl.	Wild Rose.
Salix. A list of the Salix shrubs to be added later.	
Sarcobatus vermiculatus (Hook.) Torr.	Greasewood.
Sedum.	A mossy plant on Lookout Mountain.
Sorbus Occidentalis. Greene.	Mountain ash. Sometimes called Sumac.
Symphoricarpos racemosus Michx.	
Viburnum pauciflorum Pylaie.	
Vaccinium ovalifolium Smith.	Blue Huckleberry.
Vaccinium parviflolium Smith.	Red Huckleberry.

3. Fundamental Forest Type.

Blue Mountains Unit.

Barren Lands, treeless areas.
Above an altitude of 7,500 feet altitude. These areas comprise the tops of the highest Mountains on the Forest.

Alpine Type, Non commercial Trees.
This type is a belt around the Several high mountains from an altitude of 6,000-6,500 up to timber line.

Transition Type.
This type occupies a belt along the divide of the Blue Mountains about down to an altitude of 5,500 feet. Altitude here plays the important part in the limits in specie distribution.

Slope Type.
The remainder of the Forest below the Transition Type is the Slope Type and is largely yellow Pine.

Paulina Mountains Unit.

Barren Lands.
This type comprises the exposed top of Paulina Peak and area of no importance.

Alpine Type.
A belt of timber above 5,500 feet altitude, non commercial.

Transition Type.
Small broken patches of the Transition Type are found merging in to both the Alpine Type above and the Slope Type Below.

Slope Type.
From the first bench land up to an altitude of approximately 5,500 feet.

Lowland Type.
This Type occupies a strip along the Deschutes varying in width from ¼ mile to 4 and nearly 5 miles. This Type occupies all the land where the table water lies near the surface that is within a few feet of the surface. This includes many little draws and depression between the hills.

Juniper Woodland.
This included the semi arid lands around and including a part of the desert. The sage brush country. The low rolling hills chiefly of volcanic formation.

Prairie Land.
This area is treeless but would grow trees, however it is more valuable for the grass raised on it. This type comprises practically a single narrow strip of land, slightly depressed, forming a natural drainage for a greater part of the so called Walker Basin. On this Prairie, called Long Prairie, an the small SIX Bit Prairie the water from the melted snow hangs on till late in the Spring.

4. General Silvical Description of each Type.

Paulina Mountains Unit.

Barren Lands.

Approximate Proportion of the Forest. Less than ½%. This area treeless and barren, of Volcanic Formation chiefly sandy pumice and lava rock and of rather rough and jagged topography. This belt lies above 7,500 feet.

Alpine Type.

a. Approximate proportion of the Forest – 3%.

b. The rough steeper slopes above the altitude of merchantable tree growth and occupying a belt above 5,500 feet altitude and below 7,500 feet. A cooler site where the snow on the north slope clings until late in the Summer season. The soil on this portion of the Forest is all a volcanic ash.
c. Forestal Characteristics. This type is composed of Black Hemlock, Lodgepole Pine, Western White Pine, White Barked Pine and some White Fir. The Lodgepole is usually found in small pure area and has come in thru fire largely at the expense of the true alpine species. The White Bark Pine is nearly pure at the highest elevations and as one goes to the lower elevations the Black Hemlock forms almost pure thicket in places. Then down next to the Transition Type, of which there only a trace, in many places the Western White Pine comes in and with it a little Fir and now and then a Yellow Pine.
d. External Influences. Continual Fires in this region have caused the Lodgepole to increase at the expense of the true Alpine Species. Storms and winds have in this Type and at this elevation caused the stunted and distorted Growths made by the several Species. There is no grazing in this District.
e. Recommendations for silvical management. None practical.
f. The division into sub Types does not seem necessary for this Type.

Transition Type.

a. Approximate proportion in the Forest 1%.
b. Physical Conditions of site. There merely a trace or very broke belt of this type and is practically confined to the Paulina Mountain. This Type occupies only a few feet in width and elevation and is composed chiefly of Mountain sub Type of Lodgepole. Here is found some ground cover of Vaccinium and Prunus emarginata also a little Amelanchier. A little of a poor quality of humus is found in this type. Here again it is quite probable that fir and possibly has given away to the more persistent Lodgepole Pine after the Continued fires. I would recommend no sub Types for this Type.

Slope Type

a. Approximate proportion in the Forest 70%.
b. Physical Conditions of this Site. This Type occupies all the Slope and Rolling land after leaving the first bench land at the River (Deschutes) except the depressions and draws among the Hills. The soil is of Volcanic Ash and is very dry and the Table Water is a considerable distance from the surface.
c. Forestal Characteristics. This Type is in the main a pure Yellow Pine Type with a little intermingling of the Lodgepole. At Cresant

and the surrounding Buttes and also at Indian Butte is found a deal of Sugar Pine varying in its proportion of the stand to from 2-25%. There is very little ground cover ??? except Manzanita and inn the ???? The ground is very dry and parched in Summer and what few higher?? leaves as fall are soon burned by the intense heat of the Summer. The stand are Even aged.

d. External Influences. Fire has prayed on this type for so many years that between the Seedling and small Sapling stage and the Veterans there is hardly any trace of the intermediate stages. In some part of the east side of the Deschutes Unit the intermediate Stages of tree growth are found. Grazing has had no effect on this type in the Deschutes Unit. Storm has had chiefly an indirect effect in that it has upturned the trees upturned and weakened by Fire.
e. Silvical Management. It is recommended that this Type be treated under the Selection System cutting to a diameter limit and the leaving of seed trees.
f. A sub Type of the over mature Veteran Stage that should demand immediate attention, should be made. This sub type comprises the greater part of the Forest. The second sub type should compose the younger growth.

Lowland Type.

a. Approximate proportion in the Forest. 16%.
b. This type occupies the region known as the Walker Basin and is land that is usually known as bench land. It is a Volcanic Ash (a Pumice) and the table water lies very near the surface. Confined to level and very gently rising ground borders meadows, the prairies and the River. Altitude about 4,300 feet.
c. Forestal Characteristics. This type is almost pure Lodgepole Pine with now and then a little yellow pine. In this Type there are both even aged and uneven aged stands, but the bulk of the type is even aged stands.
d. External Influences. Fire has here continually devastated this type until at present there is very little mature Timber.
e. Silvical Management. Clean cutting and burning (Clear Cutting) is recommended for this type since the Lodgepole reseeds so readily after a burn and since the species is an abundant seeder.
f. Sub Types. This species should be divided into sub types of even aged stands and of uneven aged stands also into sub types of three age classes.

Prairie Land.

a. Approximate proportion of the Forest – 1%.

b. This Type is soil of a fine alluvial Volcanic Dust and lies north and south as a natural drainage for the Walker Basin. This area it is believed would grow trees but is needed badly for Agricultural purposes.

Juniper Woodland.

a. Approximately proportion in the Forest. 9%.
b. Physical Conditions. This type occupies the semi arid region near the desert. The Topography is very varying smooth, rolling and rough. The soil is rich but dry and parched. There is much lava rock and often little soil on the lava Beds.
c. Forestal Characteristics. Constitutes a pure stand but very open of Juniper both the Red Juniper and the White. The ground cover is Sage Brush and very luxuriant in growth in some places.
d. External Influences. Fires and lightning destroy a great many individual trees on this Type.
e. Recommendations for Silvical Management. The growth of Juniper should be increased and encouraged as far as possible and even artificial methods should be tried at least experimentally. Too large opening should never be made in the juniper and as far as the supply will go the cutting should be confined, for the time being to the dead and dying timber.

Blue Mountain Unit.

Barren Lands.

a. Approximate proportion in the forest 10%.
b. Physical Conditions. This area comprises all the Land above timber line and the exposed Lava outcropping that are treeless. These lavas are found all along the Divide of the Blue Mountains.

Alpine Type.

a. Approximate proportions in the Forest – 3%.
b. This Type is found only on the highest peaks in this Unit and begins at about 6,000 feet elevation and extending up to Timber Line. Because of high altitude, great exposure, most of the species are non merchantable species and the other species as they grow in this type are non merchantable.
c. Forestal Characteristics. This type contains chiefly the Balsam Fir (Abies lasiocarpa), White Fir and Lodgepole. Sometimes a little Yellow Pine climbs up in to this altitude, seed having been buried, probably, by a rodent.

d. External Influences. Storms in this type together with exposure to the high winds distorts and dwarfs the trees.

Transition Type.

a. Approximate proportion in the Forest. 12%.
b. Physical Conditions. This type occupies the north slopes of the elevations above 5,000 feet and also a strip either side of the Blue Mountain Divide varying in width from a mile to three miles. Topography often steep and broken. The soil of a poor quality varying from a sandy loam to a poor clayey soil.
c. Forestal Characters. This Type is the Fir Type containing A. grandis, A. concolar, Pseudotsuga taxifolia and also Larix occidentalis. These species are found in mixture except in a few small areas where the Larch or Tamarack is found in almost pure stands. Here the stands are so dense that Ground Cover is crowded out for want of light. There is a fair amount of good humus but not in good quantity.
d. External Influences. Fire, grazing, and storm have little if no effect on this Type.
e. Recommendations Silvical Management. The only tree considered of commercial importance is the Larch but as yet no method of treatment is possible as the timber in the most part is inaccessible.

Slope Type.

a. Approximate proportion in the Forest. 75%.
b. Physical Conditions. This Type occupies the bulk of the commercial portion of the Forest. This Type starts in at the Forest Boundary and extends up to the Transition Type (Approximately 3,300 feet elevation. This Type contains all of the Best soil on the forest the best sandy loams and the clayey soils.
c. Forestal Characteristics. This Type is almost a pure Yellow Pine Type with Engelmann Spruce, climbing up the cool canyons and also the Douglas Fir climbing up the more humid canyons. The most of the Yellow Pine is in even aged stands. The Ground Cover is chiefly confined to edges of meadows. There is a light duff on this slope type but no Humus.
d. External Influence. Over grazing at present has been detrimental to Reproduction on many parts of the Yellow Pine Type. Grazing properly regulated in years past however has lessen the fire danger in this Type and by so doing has increased reproduction. This is a condition that is very noticeable in the Blue Mountains. The reproduction of Yellow Pine dates back to the time when white man began to graze in the Mountains. Thus grazing is interlocked with fire, both working in opposite directions, but over grazing tends to

be as detrimental as fire on the Reproduction. Except that the detrimental effects of grazing are much more limited in area.

e. Recommendations for Silvical Management. Since so much of this Type is mature and over mature it ought to be cut as fast as possible under the Seed tree Method and a diameter limit. In most cases like, that of the same type in the Deschutes Unit, the brush can safely be scattered and by so doing aid as a moisture conserver, and not increase the fire danger too great an extent.

f. Sub Types. The overmature and rapidly declining veterans should be considered in one sub type and treated first. Then the even aged mature stands, which should have the same treatment as soon as conditions of the market make it possible. The other type should be over the young growth and which comprises a small part of the Forest.

Prairie Lands.

a. In this Unit the Prairie Lands so called are the mountain meadows, small opening in the timber watered by a small creek. This land is treeless and grows a good sod of Mountain Meadow Grass. Approximate proportion in the Forest. 1/3%.

Approximate proportion in Deschutes National Forest.

Barren Land *	9%
Alpine Type	-3%
Transition Type	6½%
Slope Type	68%
Lowland Type	8%
Prairie Land	-1%
Juniper Woodland	4½%
Total	100%

* This includes barren land not capable of bearing tree growth and also barren land that appears to or has evidence of having had tree growth on it.

II. SILVICS OF EACH SPECIES.

Pinus monticola Dougl. Western White Pine.

1. Habit.

This pine is found in the Alpine type associated with fir and lodge pole pine. The tree has quite a tall and slender shaft with symmetrical crown. Less than one third of the trunk is clear. The height is from 50 to 80 feet, and its diameter 1½ to 2½ feet. The bark has the striking characteristics attributed to White Pine. Small trees, pyramidal shaped crown. Foliage is bluish green and leaves average 1½ inches to 3 inches in length. The roots are rather shallow, lateral.

2. Occurrence.
   Occurs locally around Paulina Lake at elevation of 6000 feet, approx., it is associated with fir and lodge pole, chiefly, some yellow pine. It is in a quite exposed position. The tree is not of commercial importance. The soil is loose fine pumice. The trees area chiefly found on banks of Paulina Lake within easy access to much soil moisture.

3. Soil & Moisture.
   Grows best near shore of lake in moist, porous soil. Found only in Sub Alpine region. Atmospheric moisture essential.

4. Tolerance of Shade.
   Endures a great deal of shade while growing, but with increased age like P. strobus and P. lambertiana requires abundance of light. Less tolerant than any of its associates except yellow pine. Does not recover well after suppression. Does not grow in dense stands at all and will stand dense shade only a short while.

5. Growth and Longevity.
   It is a long lived tree and grows here very slowly yet faster than yellow pine. Some very old specimens over 300 years old have been found.

6. Reproduction.
   Apparently not at all prolific in seeding, but seed more frequent every second or third year, as judged from cones on ground and those on the trees, also from seed reports of Rangers for last few years. Seed evidently doesn't germinate well. Only the oldest trees have cones on them. Seed disseminated chiefly by wind, squirrels and other rodents. Seedling reproduction best on exposed moist, mineral soil.

7. Susceptibility to Injury.
   Wind and exposure tend to retard luxuriant growth. No effect from frost, lightening and fire were noted in any case. There is no grazing in this vicinity except by a small number of cattle and they, apparently, have had no effect on this species. No fungus or insect infestation were noted on this species.

Pinus lambertiana Dougl. Sugar Pine.

1. Habit.

   The Sugar Pine in this region is about the size of the Yellow Pine averaging from three to four feet in diameter, and a height of 150 feet. The trunks are straight and with little taper. The bark is very characteristic of the species. The crown is long and cylindrical, but not so long as in its range of best development. The forked like tops of the Sugar Pine make it distinguishable from the Yellow Pine for a long distance. The tree has a shallow lateral root system. In the sapling and pole stage the tree grows in distinct whorls and the bark is smooth resembling in both cases the P. strobus. But as it gets to the standard stage the branches of the crown become more rigid and conspicuous.

2. Occurrence.

   This tree occurs only locally on the buttes just east of Cresent and on Indian Butte. In most cases it is found on the North and East Exposures and at an altitude of over 5,000 feet. Growth in volcanic ash and loose sand. It is associated only with Yellow Pine in the Region around Cresent. On Indian Butte it is found Yellow Pine, White Fir, Lodgepole.

3. Soil and Moisture.

   The chief characteristic in soil requirement is a well drained, loose soil. Atmospheric moisture is essential and is found almost invariably on the cool North Slope.

4. Tolerance of Shade.

   When Young requires quite a degree of shade but as it grows older it requires more/less??? tolerant than Yellow Pine Its chief associate. Does not recover readily from suppression, as far as I have been able to determine.

5. Growth and Longevity.

   Does not grow as rapidly as in the region of Optimum Development, nor to its maximum size in this region. Grows when young faster than yellow Pine its associate. It is long lived, attaining an age of 350-400 years or more.

6. Reproduction.

   Seed found only trees only. Erratic in seed production and not very prolific. Best seed trees found on northern exposures. Seed germinates poorly in this region and is disseminated chiefly by rodents. Seed fall about the middle of September. Seedling not capable of getting a very good hold in this kind of soil. Seedling Development. The seedlings require a deal of shade, and there is little shade on these exposed Buttes, due chiefly to the stand being mature Yellow Pine and Sugar Pine. The reproduction has been burned of so repeatedly for many years and no, or

practically no intermediate stages of tree growth are found. On Indian Butte in the shade of fir and Lodgepole more reproduction is apparent.

7. Susceptibility to Injury.
   Resists Fire nearly as well as Yellow Pine at maturity but not so well when young. There is no grazing in this Region. No instances of insect attack or fungus noted. Tree generally considered to be quite free from fungus growth. Rodent are very fond of the seed and are the next to the worst enemy of the seedling growth fire having been the greatest.

Pinus albicaulis Engelman. White Bark Pine. Alpine pine.

1. Habit.
   This tree is found only on Paulina Peak on the Deschutes National Forest. Has a low branched often twisted trunk. Rarely attains a height of 25 feet in height with a diameter from 8-20 inches. The trees here have generally very straggly branches with more or less dense foliage. Root System fairly deep for the size of the trees. No seedlings were found.

2. Occurrence.
   Found only on the North slopes of the Paulinas and the top of Paulina Peak. Grows generally in the open and in the wind swept exposed Places. It is associated with Juniper and Black Hemlock and Lodgepole.

3. Soil and Moisture.
   Enjoys a short growing season, and in this region grows in pumice soil and apparently demands little moisture.

4. Tolerance of Shade.
   Apparently quite intolerant but in so scattered a stand that I could not safely determine its tolerance.

5. Growth and Longevity.
   It is a very slow grower but apparently attains considerable age, and usually sound and vigorous.

6. Reproduction.
   Not apparently a good seeder in this region. No cones visible on trees this year and very few cones old cones found on the ground. Although seeds are wingless dissemination is dependant chiefly on the agency of the wind. Seedlings in this locality were very rare and I as unable to obtain any results as to the best conditions for the germinating of the seed and the ultimate growth of the seedling.

7. Susceptibility to Injury.

Wind and exposure seriously stunts and distorts the trees. Grazing is not carried on in this locality. This species is apparently not liable to insect and fungus attack.

Pinus ponderosa Lawson.

1. Habit.
   This is the largest and most important tree on the forest. Trunks smooth and cylindrical with little taper till the large crown branches are reached. Height 100-150 feet and a clear trunk of 30-60 feet, diameter 3'-4' feet, some trees attain a considerable greater diameter and a height of 170 feet. Crown – commonly has a large full crown. In the most rapidly growing timber the poles have a pyramidal shaped crown, and as it become mature has a flat, dome shaped crown with large branches. Root System – As a seedling the tree sends out a strong tap root longer than the stem above ground. A seedling sometimes attain a root ten inches long in one season. As the tree matures it sends out very strong widespreading lateral roots that extend into the ground very obliquely. (An instance is sited {*cited}* where a 22 inch top, left after logging, in a distance of two feet tapered so fast that the taking of another log was impossible. This is very true of a great deal of this timber.

2. Occurrence.
   Yellow Pine, the chief timber tree of this Forest, is the Slope Type and is found in the forest from 3,300 feet to above 6,000 feet. Yellow Pine is found on the dry well drained slopes and usually absent in draws and flat places where the table water lies near the surface, giving away to Lodgepole Pine. This tree withstands great Seasonal and daily changes of temperature. It is commonly associated, when found mixed, with Lodgepole. In the Blue Mountains it is also found with larch on the north slopes and in the canyons and gullies the Douglas Fir is found, also in the deeper and cooler canyons the Engelmann spruce is found mixed with Yellow Pine. In its highest range it mingles only slightly with the White Firs.

3. Soil and Moisture.
   Not fastidious either in soil or moisture requirements. Appears to make good growth in very dry soil. Best growth is found in a belt along the Ochoco Creek where the soil is deeper richer and more moist. The tree seems to do fairly well in semi arid districts.

4. Tolerance of Shade.
   Next to Sugar Pine, Yellow Pine is the most exacting and fastidious of all the species on the Forest in its demands for light, not only for the tops but likewise for all sides of the crown. It would seem as if the few trees per acre would indicate a poorly stocked stand, but this is not the case since

Yellow Pine must have abundance of light for the entire tree. Dense stands do well upward of 15-18 years, but then they rapidly thin out naturally. Seedling do not withstand the heat and drought of these semi arid regions nor the excessive frost heaving of the soil and as a consequence it is a clear case of the "Survival of the Fittest." Appears to be a deal more tolerant in the more moist situations.

5. Growth and Longevity.

   Here Yellow Pine is a very slow grower for the first fifty years but live to a very old age, upward of 450 years. The average annual growth in m the most rapidly growing stage is about ten inches in height growth.

6. Reproduction.

   All records of the forest got to show that, in this forest the Yellow Pine is a very poor seed producing tree in point of quantity at least. From an examination of the cones they show that about ever third year the best crops occur. This year was a very poor year for seed and what seed was examined was of a poor quality and infested with a weevil. No specimens were taken. This tree does not bear seed early in life and this is particularly true of the tree in the forest form but in the open the seed is borne by the tree earlier in life. The seed is large and is greatly sort after by rodents. The winged seeds are disseminated both by the wind and the Rodents. Seedlings – The seedlings do best in the more moist situations. They often occur in bunches upward of fifty in a bunch caused both by the burying of the cone and the seed itself in quantities. In the greater part of the soil where the Yellow Pine is prevalent the soil heaves so in the Spring that only a few after having survived the drought of summer live thru the heaving processes of the following Spring.

7. Susceptibility to Injury.

   Fire is the worst enemy of the Yellow Pine in all stages of its life, in spite of the fact that a mature tree resists fire very well, the constant reoccurrence of fires undermines the trees and they soon fall with the storms and winds. In the loose Pumice soil the tree, although usually considered wind firm, is often uprooted by the winds. Frost plays its part in it work with the Seedlings. Lightning is the cause of many fires in this forest as fire reports go to show and many Yellow Pines show signs of having been killed by lightning when no fire resulted. Grazing has effected this species by aiding reproduction, directly and indirectly, i.e., grazing aids in the trampling in of the seed in the soil and also the eating off of the bunch Grasses tends materially in keeping down the forest fires. Over Grazing, however, has had detrimental effect on the forests in several portions. Much has been killed and eaten but also a great deal has been seriously distorted and stunted. Several instances were noted where continuous bedding on the same place had left good reproduction eaten to the stock or stem of the small saplings and the seedlings, up to three feet in height.

Fungus. "Blue rot" attacks this species after cutting if allowed to remain standing. The tree is also attacked by a saprophytic Polyporus. The Mistletoe has attacked this species to a considerable extent but as to the extent of the Damage I can not yet state accurately. This attack appears worse in the sapling stage but have not yet been able to determine whether or no the tree survives this early attack or whether the mistletoe is beginning to do more effective devastation. This attack usually effect the limbs only but in many cases, and this is especially true in the young sapling stage, effects the trunks as well. This is, to me a very interesting problem and much time has been devoted to its study but as yet am unable to make definite conclusions. Porcupines - Not only do the Porcupines do a consider damage to the seedling and saplings but also cases are noted where the tender bark in trees 30-50 feet in height is removed by the Porcupine. The large massive limbs are often pruned off by the winds and storms of winter. Insects. Several Insects are serious enemies of the Yellow Pine in this Forest. Single trees are often killed by Dendroctanous brevicomis Western Pine Destroying Beetle. The Pine Butterfly (Microphasia menapia was seen in many section of the Forest this Summer and Autumn. Also a twig boring insect is working in the twigs of this species. The work of the species D. valens Red Turpentine Beetle has been noted in several parts of the Forest.

Pinus contorta Loud. Lodgepole Pine.

1. Habit.

   Pinus contorta offers many variable characters and surprising adaptations. In the open it is a short and full crowned tree, but in dense stands it has a long linear pole very straight and quite free from limbs. In the Walker Basin Area the Lodgepoles are often forked with from 2-3 slender trunks. The dead branches remain on the trunks for a long time. Lodgepole is the smallest tree of this Forest except the non merchantable trees of the Alpine Type. It rarely attains a height of one hundred Feet and usually is a tree between 60-70 feet in height in the average stand s the trees average less than 16 inches in diameter. Root System. – Root of the seedling is not so deep or as long as that of the Yellow Pine. As the trees mature they even up pretty well with the Yellow Pine.

2. Occurrence.

   Lodgepole Pine is found at all altitudes from the lowest to the highest, on this Forest. It apparently divided itself into two sub types the Mountain Type and the Valley or the Bench Type. Very little Lodgepole is found on the Slope Type. It occurs in pure stands and sometimes with Yellow Pine but when with Yellow Pine the Yellow Pine appears to stand in an open well in the Lodgepole. It is apparent that Lodgepole requires a deal more moisture than does Yellow Pine. When found in the Alpine Type it usually occurs in thickets and stops abruptly where the other species begin.

3. Soil and Moisture.

   This tree is found on every type or class of soil, apparently preferring less the fine, semi alluvial soil of the so called prairies and the Slope Type conditions. It occurs and reproduces equally as well on the driest Pumice stone flats and the more moist lands. The tree when mature demands more soil moisture than is necessary for reproduction.

4. Tolerance of Shade.

   Lodgepole Pine is medium in tolerance, endures much more shade than any of the trees on the Forest except the Firs, Spruce and the Mountain Hemlock. When pure and in Even aged Stands grows in very dense thickets, often impassible for a horse, but will not grow except sparingly under other species, this going to prove that the species demand some top light. Seedlings will grow or better survive for several years under a dense thicket of saplings and poles but unless eventually opened up will finally die.

5. Growth and Longevity.

   Not a very rapidly growing tree except under the best conditions for growth. At early stages of life grows much more rapidly than Yellow Pine. It is a very short lived tree and rarely reaches an age of 125 years. When attaining an age of over a hundred years it is seldom sound.

6. Reproduction.

   This tree bears cones at a very early age. They bear a good deal of seed every year but the best seed year come every two or three. The seeds are ripe early in September to the first part of October. The cones are persistent and remain on the tree for many years but, as is usually considered, the cones do not seem to be as serotinous as this species is generally considered to be. Few unopened cones are found on this forest but the cone rarely entirely open. The part of the cone opening, however, contains the best quality of seed. Seed is easily disseminated by the wind but the squirrels and other rodents are very energetic in the burying of the seed. Seed germinates the best on the freshly burned areas and if the area is not of too great an acreage it will quickly reseed. On very large burns that are badly wind swept the process of reseeding is very slow and often results in vast barren Sand Flats with here and there a stray Lodgepole. Seed will germinate readily in rather moist soil.

7. Susceptibility to Injury.

   Fire.- The bark of the Lodgepole is very thin and a slight ground fire will often kill even the largest trees and because of the frequency of these fires, the trees seldom reach maturity before they fall prey to fire. (An interesting Silvicultural Problem presents itself in nearly every fire in Lodgepole country. This was particularly noticed in going over the Paulina

Mountain Fire 1908 and the Hewitt Burn Fire 1910. Even in the densest of thicket the Lodgepole seldom is all entirely killed but here and there are left a group or single trees and these are a natural and quick aid in the reseeding or restocking of the Forest. After being fire killed the poles are quickly wind thrown, decay sets in and soon a vast deadening is formed. Frost. – Frost affects the seedling as it does the Yellow Pine by heaving. In the mature trees "Brown Rot" occurs making them a prey to winds and storms of winter. Many trees are wind thrown at an early age. Insect. – Throughout the forest the work of Dendroctanous brevicomis and monticola is very prevalent. This work is the most serious in the regions of Trail Ranger Station and Mount Pisgah. On the East Side of Pisgah and between it and Badger Creek Ranger Station, are hundreds of acres infected with D. monticolae, and over 80% of the timber is dead and dying. In the thickets of Lodgepole Pine, its natural growth, little grazing land is found. However on Stock Driveways instances were noted where sheep ate off reproduction as high as they could reach.

Larix occidentalis Nuttal. Western Larch.

1. Habit.
   Average diameter 3 feet maximum diameter 4 feet. Average height 125 feet. A very tapering trunk clear of branches for over two thirds of it height. Often the crown is narrow and of a short pyramidal shape. The root system is rather deep rooted.

2. Occurrence.
   Found chiefly on the Cooler mountain slopes where there is an abundance of soil moisture and not found on tops of mountains nor in the canyons. This tree is most abundant on the north slopes of the Blue Mountains. In favorable localities it is sometimes found in almost pure stands, but is usually found with Yellow Pine the White Firs and Lodgepole Pine. Demands cool moist slopes but is found scattered on the drier slopes of the south side of the Blue Mountains.

3. Soil and Moisture.
   Prefers a porus, moist well drained soil, but will grow in the swampy places. It demands a cool moist atmosphere.

4. Tolerance of Shade.
   Very intolerant throughout life demanding even more light than Yellow Pine, but because of small crown surface occurs in much thicker stands. The tree is less tolerant on drier soils than on the North Slopes. It attains a rapid height growth in the early part of life, thus attaining its position above the associated species and holding its own with the more tolerant species.

5. Growth and Longevity.

Long lived tree, the oldest tree counted 300 years but apparently grows to a much greater age. It is not a very fast grower in any stage of life.

6. Reproduction.
   A prolific seeder, the seed of fair germinating power, seed disseminated by wind. Ripens its seed in August. Seedlings – Seeds germinate best in bare mineral soil, and the seedlings from the start are very intolerant. Develops best on burnt over areas.

7. Susceptibility to Injury.
   The tree is very wind firm and free from the action of frost. Reports show that the Larch is very often struck by lightning due to its columnar habit. Grazing has no apparent affect on the larch. The Bark Beetle works in the Larch but I have not yet determined which one. The Mistletoe works on this species.

Picea engelmani Engelmann. Engelmann Spruce.

1. Habit.
   A small tree as found on this forest rarely averaging over 90 feet in height, and 18 inches in diameter. No large trees noted. Branches usually found very low on the tree. Branches dripping. A very conical crown and atotaper??? Bole. Root System - Very shallowy rooted.

2. Occurrence.
   A tree of the higher altitudes preferring moist cool canyons. Found only in the canyons where creeks are of considerable size, in the Blue Mountains. Does not occur any where in dense stands on this Forest. Is found in the more moist but often shallow soils. Always found in sheltered places. Associates with Lodgepole Pine, Douglas Fir, and some Yellow Pine.

3. Soil and Moisture.
   Shown little preference of soil if sufficiently moist but as soon as the soil begins to get well drained it give way to Douglas Fir and Lodgepole.

4. Tolerance of Shade.
   Very tolerant of shade. This tree is more tolerant than any of its associates. After years of suppression will start to grow at a very rapid rate. Even more tolerant when young for at it matures it demands a little top light.

5. Growth and Longevity.
   Long lived under any condition of situation. And all trees of small diameter are very old.

6. Reproduction.
   A prolific seed bearer, cones confined, generally, on the tops of the trees. Seed more abundant at intervals of about three years as it appears from the cones on the ground. Seed not of high germinating power. Seedlings require openings both in the soil and the crown to start readily.

7. Susceptibility to Injury.
   Sensitive to fire but, of course is protected by its position in moist localities. Is wind firm and is not often struck by lightning because of its associates are taller in habit.

Tsuga mertensiana (Bong.) Sargent.

1. Habit.
   This tree is Distinctly Alpine. Bears branches general to the ground and is very brushy appearing tree. In its highest altitude it is very stunted. Often attains a Diameter of 20 inches but is rarely 50 feet in height. The trees are strongly bent toward the incline on the steeper slopes. Root System. The roots are rather shallow, wide spreading lateral roots making it very wind firm.

2. Occurrence.
   Often occurs in thickets often with White Bark Pine and with scattering Lodgepole. Is found also in small pure thickets. Found only on the north slopes of the Paulina Mountains in exposed places where the snow lays until late in the Summer.

3. Soil and Moisture.
   Endures great daily and seasonal changes. Requires a deal of atmospheric moisture, it is not fastidious in soil requirements, but does best on a loose coarse, moist one.

4. Tolerance of Shade.
   Very tolerant surpassing all its associates. Often grows so dense that seedlings of the same species will not grow under the mother tree. Appears to obtain a foothold in the Lodgepole and often forms an understory. Seedlings and Saplings bear very long suppression and very rarely die.

5. Growth and Longevity.
   Slow grower and not a timber tree. It grows to a very old age.

6. Reproduction.
   A prolific seeder, seeding at a very early stage in life. Seedling start more readily under cover of its associates. Trees bear more seed some years than others. Seed germinates readily on mineral soil.

7. Susceptibility to Injury.
   Endures great exposure, but is dwarfed and deformed by the winds and storms. Apparently not affected by season changes. No grazing is carried on in this region. No fungus or insect infestations noted.

Pseudotsuga taxifolia (Poir.) Britt.

1. Habit.
   Douglas fir assumes more the Rocky Mountain Type than the Pacific Coast Type. It is a very inferior tree, which is very knotty and branchy and does not attain any great height or diameter. Average diameter 2½ feet Maximum about 4 feet. Height 125-150 feet. Root System. Very spreading roots of no great depth. The tree is however very wind firm.

2. Occurrence.
   Found only in the canyons and up the creek bottoms of the Blue Mountains. Associated species Lodgepole, Yellow Pine, and the White Firs.

3. Soil and Moisture.
   Prefers a moist cool climate, demanding more humidity in the atmosphere than do the White Firs. Demands a cool, moist, well drained soil.

4. Tolerance of Shade.
   More tolerant than Yellow Pine and less than the White Firs. This tree becomes less tolerant with age. Partial shade and shelter necessary in the early life of the tree. Not found in pure stands in this Forest.

5. Growth and Longevity.
   On this Forest, a very slow growing tree as compared with the trees of the Coast. It attains a considerable age. Trees 3-4 feet in diameter are often 150-200 years old.

6. Reproduction.
   The tree is a prolific seeder, seeding more abundantly every other year. This year there was scarcely any seed on the Douglas Fir. Seeds readily eaten by birds and Squirrels. Seeds germinate best in mineral soil, and come in well on burns.

7. Susceptibility to Injury.
   Less resistant to fire than Yellow Pine and Larch. This tree is attacked by a fungus and by Dendroctanous pseudotsuga. The Mistletoe a species that has no fruiting body as far as I can ascertain, attack the Douglas Fir. Grazing is practically null in the region of Douglas Fir.

Abies lasiocarpa (Hook.) Nuttal.

1. Habit.
   A small Alpine tree with an average height of 60 feet rarely 80 feet and a diameter of less than 22 inches. A narrow conical crown terminating in a spire like point. Crowns extend to the ground. The top needles or leaves of the tree are somewhat sharp as contrasted with the leaves on the bottom of the trees.

2. Occurrence.
   Occurs above 7,000 feet altitude, but often down to 6,500 feet. Associated with Douglas Fir, White Fir, Yellow Pine and Lodgepole.

3. Soil and Moisture.
   At lower altitudes it grows in moist cool places at the heads of streams but at the higher altitudes it grows in cool dry and exposed places. Sub alpine Situations. Found in regions of great snowfall.

4. Tolerance of Shade.
   Slightly less tolerant of shade than Engelmann Spruce. Maintains long suppressed reproduction under its own shade, reproduction quickly responding after being released.

5. Growth and Longevity.
   Does not attain great age, seems to die at an early age. Growth is not very rapid except as an Alpine species.

6. Reproduction.
   Moderately prolific seeder but many cones do not mature. Many seed are abortive. Seems to produce cones every year equally as well, as far as could be learned. Seedlings grow very well under the shade of the mother tree giving the tree an appearance unique in its self. This appearance can best be described in this way. Place a Red Juniper in the midst of a clump of Juniperus communis and one will get the idea of the almost general appearance of the Balsam Fir as usually found on this Forest.

7. Susceptibility to Injury.
   This species seems to withstand the winds and storms of the higher altitudes with not much apparent affect except for the slowness in growth.

Abies grandis Lindley. Grand Fir.

1. Habit.
   As found on this Forest it is a very inferior tree almost equally as poor as Douglas Fir. Height 80-125 feet high with a diameter of from 18-30 inches. The tree as it grows here is often full crown with branches clear to

the ground thus making it a poor timber tree. In full stands, rarely found, the pole are tall and straight with a crown coming down usually over half way. Root System rather shallow out spreading roots.

2. Occurrence.
   Found only in the Blue Mountains and above the commercial timber line to any great extent. It with A. concolar and Larch or Tamarack with some Douglas Fir forms the Transition Type. Occurs on the cooler and higher slopes of the Blue Mountains.

3. Soil and Moisture.
   Prefers a deep loose well drained soil and fairly moist. It demands less humidity than Douglas Fir and is often found down in the Slope Type, very scatteringly with Yellow Pine.

4. Tolerance of Shade.
   Moderately tolerant of shade, slightly more so than the Douglas Fir but the least tolerant of the true Firs found on this Forest. The Seedlings endure a considerable shade.

5. Growth and Longevity.
   Not a very long lived tree and not very rapid in growth.

6. Reproduction.
   Not much seed on the trees this year and I am told it is usually a poor seeder on this Forest. Seed germinates best in the open. A small amount of humus is advantageous to the best reproduction.

7. Susceptibility to Injury.
   White Fir not very resistant to fire but fire seldom occurs in the type where Fir is found. Not any grazing to speak of in the Fir Type. This species is liable to the work of the Mistletoe.

Abies concolar (Cord.) Parry. White fir.

1. Habit.
   As it grows on this Forest is a very inferior tree and hardly merchantable. Height 80-100 feet. Diameter 20-30 inches. In most cases the crown extent nearly to the ground, young trees have very luxuriant, symmetrical crowns.

2. Occurrence.
   Found more abundantly on the North slopes. Found on the North slopes of the Paulina and on both sides of the Blue Mountains. Its requirements are very similar to the A. grandis. It does not do so well, however in the dryer regions. It is associated with the same species as the A. grandis.

3. Soil and Moisture.
   Thrives on moderately moist soils, best on fairly deep rich moist humus soil. Requires less air and soil Moisture than the other Firs.

4. Tolerance of Shade.
   Very tolerant in all stages. The most tolerant of all its associates except Abies lasiocarpa. This does not apply to the few places where it is found with the Engelmann Spruce. Young growth survives long Suppression.

5. Growth and Longevity.
   For the first forty years grows in height and diameter very rapidly. Does not remain sound above 8-10 inches D.B.H., and begins to grow more slowly.

6. Reproduction.
   Is a slightly better seeder than A. grandis this year was also a very poor year for seed of this Species. Seed often abortive and of a very low germinating power. Seed production best during the period of rapid height growth. White Fir not fastidious as to seed bed fairly abundant amount of moisture required.

7. Susceptibility to Injury.
   This tree is not very resistant to fire especially when young. The tree is not at all wind firm after it begins to mature since at an early stage the punk rot sets in. This species is also attacked Mistletoe infestation. Not much grazing in the Fir any no damage was noted.

Cedar.

Specimens taken to the District Office for identification.

Juniperus communis Linnaeus. Dwarf Juniper.

1. Habit.
   This Juniper is found in its usual habit, a shrubby growth, rarely attaining 4 feet in height.

2. Occurrence.
   Occurs above 6,500 feet altitude on Paulina Peak and in a few places in the Blue Mountains above the same elevation. Grows on high, dry, exposed and often very rocky places where there is practically no soil whatsoever. On this Forest its nearest associate is the White Bark Pine.

3. Soil and Moisture.

Not fastidious as to soil or moisture requirements, as found on this forest soil and moisture almost a negligible quantity.

4. Tolerance of Shade.
   A very tolerant species where ever found.

5. Growth and Longevity.
   A very slow grower and attains a very old age for its very small size.

6. Reproduction.
   A prolific seeder but few seeds are found to germinate, that is it is very rare to find a young juniper.

7. Susceptibility to Injury.
   Endures ???? from the wind and storms.

Juniperus scopulorum Sargent. Red Juniper.

1. Habit.
   As found on the Forest it rarely attains a height greater than 40 feet. In the canyons near the forest boundary the tree attains a height of 80 feet and three feet in diameter.

2. Occurrence.
   Occurs in the semi arid country in very open pure stands or with the Western Juniper. Is also found on the Mahogany Ridges with the Mountain Mahogany. Occurs on the dry exposed soil of all kinds. Also on the open Table land and the high desert.

3. Soil and Moisture.
   Thrives in the Semi Arid regions on very little soil moisture, has much more luxuriant growth in more moist situations.

4. Tolerance of Shade.
   Tree found only in very scattered stands.

5. Growth and Longevity.
   Grows very slowly and lives to a very old age.

6. Reproduction.
   This year both junipers seeded very heavily and it appears that this species is a prolific annual seeder. Have not found much reproduction.

7. Susceptibility to Injury.

This tree is often struck by lightning and many trees are destroyed, by herders, by setting fire to them. This species is attacked by fungus growth but have not yet found any fruiting bodies.

Juniperus occidentalis Hooker. Western Juniper.

1. Habit.
   Grows in the higher elevations and in a very brushy forms often the branches reach to the ground that is remain green to the ground.

2. Occurrence.
   Occurs in open scattered pure stands or in mixture with Red Cedar and Mountain Mahogany.

3. Soil and Moisture.
   Not fastidious grows in all soils but chooses the higher altitudes. Grows on the open high desert under semi arid conditions.

4. Tolerance of Shade.
   Always grows in the full light, never found in dense stands.

5. Growth and Longevity.
   A very slow grower and very long lived. In the more moist and protected canyons grows more rapidly and to greater size.

6. Reproduction.
   This year was a very good seed year for the Western Juniper. Reports show that is a prolific annual seeder.

7. Susceptibility to Injury.
   This tree is often struck by lightning and killed by camp fires. The tree is greatly infested with Mistletoe, probably Arecuthobium ?? occidentate.

Salix

There are several willows growing along the streams or creeks of this Forest, both of the shrub and the tree form but because of the lateness of the season when working in the Willows I was unable to get the fruiting bodies or the amets?? {*aments}* for identification. The silver leaf Willow Salix sessilifolia and the fluvitalis also a willow called the American Willow are found in tree form. A supplemental report will follow this report after the spring flowering of the Willow.

Populus tremulodies Michaux. Aspen Quaking Asp.

1. Habit.

On this Forest a very small tree. Height rarely over 50 feet, Diameter scarcely over 12 inches. Straight trunk, smooth bark with about one half the trunk to one third clear of branches. The bark is seldom broken even near the ground.

2. Occurrence.
   Occurs locally along the Little Deschutes. At the heads of streams and creeks of the Blue Mountains and down the creek bottoms of those in the higher altitudes. Usually occurs in small pure thickets in moist situations.

3. Soil and Moisture.
   Prefers the richer and moist well drained soil of the banks of the creeks.

4. Tolerance of Shade.
   Very intolerant of shade throughout life, but grows in very dense stands when young since its foliage is very sparse and the light easily penetrates the crowns.

5. Growth and Longevity.
   A fairly rapid grower but at best a short lived tree.

6. Reproduction.
   A prolific seeder annually, Seeds germinate best in a bare mineral soil. Seedlings often come up very densely.

7. Susceptibility to Injury.
   Like all hardwood easily killed by fire. Appears to be more free from rot and fungus than the Aspen is usually considered to be. Sheep browse on the young growth to some extent.

Populus balsamifera Linnaeus. Balm of Gilead, Balm, Cottonwood.

1. Habit.
   This tree found very scattered along some of the creeks of the Blue Mountains. A tree of about 70-90 feet in height and about 20-35 inches in diameter. Has a straight stem and clear of branches to a height of about 30 feet.

2. Occurrence.
   Occurs only along the creeks in moist deep alluvial soils. Mixed with cottonwood, usually isolated trees.

3. Soil and Moisture.
   Moist sandy and gravelly soils.

4. Tolerance of Shade.

Have not had much chance as yet to study this tree. It grows very scatteringly and I have only noted isolated trees.

5. Reproduction.
   Probably a prolific seeder. No reproduction found.

6. Growth and Longevity.
   A fairly rapid grower, but not a long lived tree.

Populus trichocarpa, Torrey and Gray. Black Cottonwood.

1. Habit.
   This tree has a tall straight trunk and few branches, short crown. Branches thicker than those of the Aspen.

2. Occurrence.
   Along stream bottoms usually in association with willows and alders.

3. Soil and Moisture.
   Requires a good deal of soil moisture and does the best in the richer alluvial soils.

4. Tolerance of Shade.
   Very intolerant thruout life.

5. Growth and Longevity.
   A very rapid grower and attains an older age than the other Popples of this region.

6. Reproduction.
   Prolific annual seeder. Reproduction good in very wet places.

7. Susceptibility to Injury.
   Similar to that of Aspen.

Betula fontalis Sargent. Mountain Birch.

This species merely noted on the Forest along the Little Deschutes. Not found in tree form on the Forest. In the Mitchell country noted outside the Forest in the tree form.

Alnus tenuifolia Nuttal. Mountain Alder, Alder.

1. Habit.
   Seldom a single stem usually in clusters of several. Height 8-15 feet and under 5 inches in diameter.

2. Occurrence.
   At the heads of the mountain creeks and along the stream bottoms. Associated species Willows and Popples also Crataegus.

3. Soil and Moisture.
   Wet mucky soils and alluvial lands along the creeks.

4. Tolerance of Shade.
   Endures a deal of shade when young but demands a deal of top light when older.

5. Growth and Longevity.
   Not long lived probably rarely over 50 years. Not a very rapid grower as compared with the other alders.

6. Reproduction.
   Abundant annual seeder.

7. Susceptibility to Injury.
   It is attacked by a conk fungus.

Castanopsis chrysophylla. Western Chinquapin.

1. Habit.
   Found only as a low shrub rarely 5 feet in height.

2. Occurrence.
   Occurs on the West slopes of the Paulinas associated with Manzanita and some snow brush. Exposed places.

6. Reproduction.
   A fairly prolific seeder, seed much sort after by the rodents.

Cercocarpus ledifolius Nuttall. Mountain Mahogany.

1. Habit.
   A brushy tree 12-18 feet high and 6-10 inches in diameter. Has short more or less crooked trunks with large limbs very low on the trunk. A rather low and dense crown.

2. Occurrence.
   Occurs with Juniper on the dry exposed Mahogany Ridges. Found in very poor dry rocky soil.

3. Soil and Moisture.
   Arid ridges with little soil.

4. Tolerance of Shade.
   Grows in very sparse stands and appears to be very intolerant of shade in all stages of growth.

5. Growth and Longevity.
   An exceedingly slow growing tree. Some trees show great age.

6. Reproduction.
   Produces a great deal of seed but reproduction is scarce and it appears that the soil must be sufficiently moist for germination to take place.

7. Susceptibility to Injury.
   Browsed upon by wild Game.

Amelanchier alnifolia Nuttall. Western Serviceberry.

1. Habit.
   Rarely attains a tree form on this Forest but is found as a shrub.

2. Occurrence.
   Occurs along the creeks of the Blue Mountains, on the shores of the Paulina Lakes and found at Indian Spring in the Deschutes unit also along the Little Deschutes.

3. Soil and Moisture.
   Best on alluvial and moist soil.

4. Tolerance of Shade.
   Endures a deal of shade throughout life. When in shade bears little fruit. Does best with some top light.

5. Growth and Longevity.
   Not a very long lived tree and not a fast grower.

6. Reproduction.
   Very abundant seeder. Seedlings quite numerous in the more moist places.

7. Susceptibility to Injury.
   The fruit of the Sarvice is quite prevalently stung by a fly causing abortive growth. A witch broom growth also occurs.

Crataegus douglasii Lindley.

Black Haw not found in tree form on this Forest. A very bushy shrub up to 18 feet in height. This shrub is found in the richer alluvial flats. It is apparently not an abundant nor an annual seeder.

Prunus emarginata. Bitter Cherry.

1. Habit.
   Varies from a small shrub to a slender tree 20 to 30 feet in height and up to 6 inches in diameter.

2. Occurrence.
   Occurs along the cold canyons of the Blue Mountains also on the banks of the Paulina Lakes (here only in shrub form). Associated with choke Cherry, alder, and Sarvice.

3. Soil and Moisture.
   In the lower altitudes in the cool moist soil as it grows up in the higher altitudes it grows in the cooler and drier places.

4. Tolerance of Shade.
   Intolerant of shade throughout life.

5. Growth and Longevity.
   A slow grower and does not grow to a very old age.

6. Reproduction.
   Abundant seeder and seedlings quite numerous.

Prunus demissa. Western Choke Cherry.

1. Habit.
   A low shrub to a small tree 15-20 feet high.

2. Occurrence.
   Most often along the streams and creeks of the Blue Mountains. Shrubs found on the shores of the Paulina Lakes.

3. Soil and Moisture.
   A fresh moist cool soil and a cool atmosphere.

4. Tolerance of Shade.
   Intolerant of shade in all stages.

5. Growth and Longevity.
   A slow grower and very short lived.

6. Reproduction.
   A prolific seed or fruit bearer.

Sambucus glauca. Blue Elderberry.

1. Habit.
   Usually found in tree form. This species merely noted in wet places near springs.

Sambucus arborescens.

I am pretty sure that this is the variety of the red Elderberry that is found on this Forest scatteringly in the tree form, but is usually a shrub.

III. SILVICAL PROBLEMS.

1. The Reforestation of the Open Lavas of the Blue Mountains.

2. The Reforestation of the Huge Sand Flats of the Paulina Unit.

3. The Increasing of the Yellow Pine in the temporary mixture of Yellow Pine and Lodgepole Pine.

4. The Increase of Yellow Pine in the Pure Stands of Mature timber.

5. A study of the Treeless Conditions of the Prairies of the Deschutes Unit. Long Prairie, Six Bits etc.

6. The effect of Over Grazing both on Reproduction and the germinating power of the tree.

7. The Damage done by Mistletoe on the several conifers of the Deschutes National Forest.

8. Why single trees in the pure Lodgepole Pine often are not burned even in the case of a Crown Fire, also small patches of trees.

Remarks –

This Report does not include Districts 1, 6, and a part of District 5. I was unable to visit these Districts for lack of time during the open field season.

{*initials stamped*} R.R.C.
Forest Assistant.

DESCHUTES NATIONAL FOREST DECEMBER 29, 1906

BLUE MOUNTAINS FOREST RESERVE (WEST)

DENDROLOGY.

Of particular interest sufficient to warrant notice is the occurrence in uncommon abundance of mountain mahogany, Cercocarpus ledifolius, which grows on the dry, exposed situations often forming thickets so dense and impenetrable that detours around them when traveling horseback must be made. With it is associated the western juniper, J. occidentalis which occurs in scattered stands on the lava rock mesas. Western birch, black alder, narrow leaf cottonwood and several willows are prevalent along streams on north slopes especially in the lower country bordering on the edge of the reserve.

The usual commercial conifers abound. These are yellow pine, red fir, tamarack, lodge pole pine, Engelmann spruce, white fir (Abies grandis), Alpine fir and Alpine pine P. albicaulis.

{*signed*} M.L. ERICKSON
Assistant Forest Inspector.