ANNUAL SILVICAL REPORT
For the
IDAHO NATIONAL FOREST

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by

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3. Types

The Idaho National Forest may be naturally divided into the following seven types:

1. Yellow Pine Type.
2. Yellow Pine and Red Fir Type.
3. Lodgepole Pine Type.
4. Balsam-Spruce Type.
5. Alpine Type.
6. Grass Land Type.
7. Barrens.

YELLOW PINE TYPE.

The yellow pine type is characteristic of the lower elevations and drier soils. On some of the drier slopes and benches from 3000 to 5000 feet in elevation it occurs pure, and is optimum at an altitude of about 4000 feet. On the more moist situations red fir is associated with the yellow pine and at the higher altitudes white fir, balsam fir, and spruce are found in the mixture.

YELLOW PINE AND RED FIR TYPE.

This is found on the shaded hillsides and moister slopes up to an elevation of about 5500 feet. At the upper limit white fir, balsam fir, Engelmann spruce, and lodgepole pine take possession of the soil.

LODGEPOLE PINE TYPE.

This is a temporary class that sometimes takes complete possession of extension areas. It is found on a very wide range of soils and from the lower altitudes up to over 8000 feet. Its occurrence is dependent upon some factor, such as fire or heavy cutting, which will remove the stand already on the ground and upon moisture rather than chemical composition of the soil. With the lodgepole is usually associated the quaking asp. On the wetter locations the latter occasionally forms pure stands to the exclusion of the lodgepole. These stands are of such small extent, however, that it is considered unnecessary to make a separate aspen type.

BALSAM – SPRUCE TYPE.

These species are characteristically found on the permanently moist soil along the borders of sluggish streams, in poorly drained swales, and at the higher elevations (6000 to 8000 feet) where the late melting of the snow in spring does not allow the ground to dry out deep before the fall rains begin.

ALPINE TYPE.

This class is characterized by the appearance of pinion pine in the stand, and lies chiefly above the 7000 feet contour. This species is most common in occurrence on dry, rocky summits.

GRASS LAND TYPE.

The grasses and herbaceous weeds composing this class are found at their best on deep, rich, loamy soil in elevated basins and along the banks of streams from 6500 feet to the summits of the mountains. They also clothe the sides of some of the higher canyons and lower meadows. The grassy parks and hillsides where they are found furnish the chief feed for about 140,000 head of sheep annually on this Forest. Many of these grass covered meadows at the lower limit of this type produce, when seeded, an excellent crop of timothy hay.

BARRENS.

Under this heading are included all of the nonproductive areas of the Forest, whether sheer rock walls, rock slides, or exposed bed rock on the summits of the higher peaks.

4. General Silvical Description.

THE YELLOW PINE TYPE.

Occupies approximately 7% of the Idaho National Forest, or 84,849 acres. This type is found from the lowest levels of the Forest up to an elevation of a little over 5500 feet. The best stands, cutting about 500,000 feet to the forty are found between 4000 and 5000 feet. Yellow pine is pure or nearly so and that is the distinguishing characteristic of the type. Where mixed, red fir is its chief associate, with lodgepole and quaking asp, where accident has caused an opening. The average age of mature yellow pine stands is about 225 to 275 years. The typical forest is open and park like with a ground cover of pine grass and, scattered through it, a sprinkling of service berry, willow, pin cherry, huckleberry, ceanothus, snowberry, and quaking asp. The humus layer is very shallow.

Reproduction on the drier southern and western slopes, where exposed to the greatest heat of the sun's rays, is confined to the north and east of the seed tree and within a radius of about forty feet from its base. In general, bare mineral soil makes the best germinating bed for yellow pine. In locations subject to rapid drying out of the surface layers, the shade afforded by tufts of grass and windfalls is beneficial in helping the rootlets of the seedling to keep ahead of the desiccation of the soil. A too heavy cutting

of yellow pine will favor the growth of grass and weeds and cause a deterioration of the Forest.

The yellow pine is best managed under the selection system, using a diameter limit of about 20 inches. Care must be taken not to open the stand enough to cause grass and weeds to take possession of the soil. Too little regulated cutting has so far been done on this Forest to draw definite conclusions as to the proper severity of thinning but probably the old rule, of leaving one third of the stand, will be found satisfactory. It is also too early to know from experience what is the best method of brush disposal. It is probable, however, that the advantage in cost and in shading young growth, from lopping and scattering will outweigh the greater fire protection secured by piling and burning tops and limbs.

YELLOW PINE AND RED FIR TYPE.

Within the range of the yellow pine, in the shaded canyons and at the higher elevations where there is increased precipitation, Douglas fir is found associated with the pine in sufficient quantities to warrant making a distinct type of these two species. They largely predominate but are usually associated with white fir and lodgepole and, with increased elevation, an increasing percentage of the two latter and Engelmann spruce and balsam compose the stand. Tamarack, in small pure stands and occasional scattered trees, is found on the wet benches and canyon slopes. About 10% of the Forest is covered by this type. The two main species in this class are nearly equally distributed with the pine predominating on the drier and red fir on the fresher situations. This type is less open and park like than the typical yellow pine stand, causing a greater accumulation of limbs and needles on the ground, and their decomposition forms a deeper humus layer than is found in the former class. The deeper root system of the yellow pine gives it the advantage on the drier situations, while the greater tolerance of the Douglas fir enables it to gain possession of the soils having most moisture. The average age is the same as of the previous type.

A moderate cutting, that will leave a fairly dense shade, will increase the proportion of the Douglas fir at the expense of the yellow pine. A clean cutting where there are no seed on the ground or a severe fire, when the cones and seeds have dropped off the tree, will result in a pure temporary stand of lodgepole. When this forest matures and the crowns begin to thin out the yellow pine and Douglas fir will gradually take possession of the site again.

Management in the Douglas Fir-Yellow Pine Type should favor the latter in situations adapted to it, because it is commercially more valuable than the fir. The selection system, using a diameter limit of 20 inches breast high for yellow pine and 18 inches for Douglas fir, is the one best suited to this type. This system should be varied slightly to meet the conditions on each sale. Where a strict adherence to the rule would result in too heavy cutting, trees above the prescribed limit should be reserved for seed. All defective trees below the limit that can be used at the time of the cutting but would not last over a whole rotation, should be marked for removal.

LODGEPOLE PINE TYPE.

This species, with a scattering of aspen interspersed with occasional small patches of tamarack in wet swales, covers about 33% of the Idaho National Forest. The average age of lodgepole forests here in close even aged stands probably does not exceed 75 years.

Characteristically this class of forest is composed of pure even aged lodgepole of dense stand. In the sapling and pole stages this species often forms such dense thickets as to make walking through them very difficult. As the stand becomes older some of the trees fall behind the rest in height growth, and the competition for light chokes them out and the stand opens up. The soil in which the lodgepole is optimum on this Forest is the gray granite gravel of the hillsides which has but a small amount of humus. The ground cover is generally bear grass, blueberry, and fireweed, and a scattering of elderberry, with pine grass at the lower altitudes. After the forest has established itself the falling needles and dead grass form a layer of humus sometimes an inch or so in depth.

Reproduction for this species is best on the bare mineral soil, but light and moisture are the factors limiting its distribution. The lodgepole is extremely intolerant and will not develop under even the moderate shade of a pure stand of aspen. The most favorable condition for the establishment of a lodgepole forest is a severe fire when there is a heavy crop of cones on the trees. Such a fire will clear the ground of existing growth, and the presence of seed on the trees will insure the establishment of lodgepole on the tract. A hard fire is also beneficial in ridding the ground of the vermin that usually consume immense quantities of seed.

Its great intolerance of shade makes this type only temporary and as soon as it begins to thin out with age other species, notably yellow pine and Douglas fir at the lower and balsam, Engelmann spruce, and white fir at the higher elevations begin to spring up, ultimately replacing the lodgepole in the stand.

The even aged character of the typical lodgepole forest and its intolerance make it best adapted to a system of clear cutting. Its shallow root system makes it subject to windthrow so, in the more exposed situations, the strip method would be advisable. The cutting should be in strips run at right angles to the direction of the most violent wind storms and their width governed by the greatness of danger from this cause.

BALSAM - SPRUCE.

About 20% of the Forest is included in this type. The growth is very heavy, sometimes running up to 25,000 feet B.M. to the acre. Here we find the densest stand and heaviest shade. The species composing the stand, the two firs (Abies concolor and Abies lasiocarpa), and Engelmann spruce are tolerant and make a type that is permanent on the soils containing sufficient moisture. The dense shade in this type

chokes out most of the undergrowth, and maintains good forest conditions with humus sometimes a foot deep. All ages are represented in this class of forest. Fire is the great converting factor in this type. The presence of all ages in the forest results in a crown cover reaching to the ground and this and the inflammability of the needles and resin blisters of the balsam, make fire more severe and harder to control in this than in any other type, and it usually kills the entire stand as far as it runs.

This type is commercially unimportant on this Forest at present, because of the accessibility of the more valuable Douglas fir and yellow pine in quantities sufficient to meet the demand. Tamarack is sometimes associated with this type in groups where it must, because of its intolerance, having started first. Where it is found management should, by one of the systems of clear cutting, favor this species. In general the type is most important as a protective forest and, when cutting is to be done, care must be taken not to make it heavy enough to disturb forest conditions and dry out the soil. Spruce is, next to tamarack, the most valuable species in this type, and cutting should remove the less valuable firs, as far as conditions will allow, in order to increase the proportion of the spruce.

ALPINE TYPE.

This class occupies only about 2% of the Forest. It is non-important in the production of timber and is valuable only for its sheep range and the protective covering that it affords. It will be a long time before conditions will warrant a system of management being applied to it. This, like the previous, is an all-aged type.

GRASS LANDS.

This type contains much valuable agricultural land that will be taken up, under the Act of June 11, 1906, for ranches. Where it occurs above the range of agricultural crops it furnishes forage for sheep and is more valuable in this capacity than as a producer of timber. About 20% of the Forest is of this type.

BARRENS.

No system of management is applicable to this type, which covers approximately 8% of the Forest.

2. Silvics of Each Species.

Pinus ponderosa.

DESCRIPTION

This species attains an average maximum diameter of 50 inches and height of 135 feet.

The crown is long and narrow, becoming open with age. It is formed of large branches that reach, in close stands, about half way to the ground.

The root system of the yellow pine is very large, being both deep and spreading, enabling it to grow on nearly any kind of soil and making it very windfirm as a species. The depth of its root system under the surface protects the yellow pine roots against injury by fire.

HABITAT

The yellow pine is found in a great variety of soils, from good deep moist agricultural land to dry rocky hillsides. It is found in loam and in the soil formed by the decomposition of volcanic rock. It is most common on sandy soils and optimum on the Idaho National Forest at an elevation of about 4000 feet. It occurs on all exposures but is most characteristic of the drier situations, as a result of competition rather than choice. Its deep root system gives it the advantage over its competitors, enabling it to thrive on soils too dry to support them. This tree is found in the lowest portions of the Forest and also reaching to an elevation, along the Elk Creek wagon road, of over 7000 feet. In its range the temperature varies from about 30^{o} F. in winter to 100^{o} F. in summer. The average annual precipitation is about 27 inches in the neighborhood of Meadows, and increases towards the upper limit of its range.

GROWTH

The age of average trees in mature stand on this Forest is 225 to 275 years, and the trees are about 35 to 40 inches in diameter at breast height. This species reaches an age of about 400 years.

REPRODUCTION

Full crops are borne every three to five years, though a few cones are produced nearly every year. Seeds germinate about one month after the disappearance of the snow, April along the South Fork of the Salmon River and June in the vicinity of McCall.

Exposed mineral soil is the best seed bed for germination and growth of seedlings. Old mine dumps and tailings, where there are seed trees in the locality, almost invariably become clothed with a dense young growth of yellow pine. Although this species does well, when started, on dry situations there must be moisture enough in the soil to allow the roots of the seedling to penetrate faster than the ground dries out.

Seedlings do best in a light, partial shade. As they grow older they require an increasing amount of light until, at maturity, full overhead light is necessary.

A heavy shade or thick mat of grass on the ground are very unfavorable for germination and seedling development.

Yellow pine reproduces entirely by seed.

DANGERS AND DISEASES

Damage by wind is very slight to the yellow pine. Sometimes when the ground is soaked and loose in the spring a few trees may be thrown on the more exposed locations during a severe storm. This injury is very local in character and confined to small tracts. Occasional trees may be found scattered through the Forest that have been wind-thrown but in general, the yellow pine is very windfirm and the damage from this source is negligible.

Sufficient investigation has not yet been made of the injury caused by frost on this Forest to be able to know its extent. In other regions it has been found to do considerable damage to unprotected seedlings, and it is probable that such is also the case here. Old trees are not affected by it.

Snow does no appreciable damage here to yellow pine.

On the upper South Fork of the Salmon River bark beetles have done considerable damage to yellow pine timber. They attack and kill healthy green trees.

The thick bark on trunks of mature trees, the depth of the root system, and the open character of the typical yellow pine forest all provide protection against fire. The bark of young saplings is so thin that the cambium is killed by ground fires and the needles of seedlings are scorched off.

Grazing has done little damage to yellow pine here, except along the stock driveways. Where sheep enter and leave the Forest they trample out the small seedlings and keep them from getting established. Cattle and horses have been grazed in the neighborhood of Meadows for over thirty years, but no dense growths of saplings are coming on, showing that little or no damage is being done by the stock.

Both animals and birds eat very large quantities of seed annually. Squirrels cut cones off, as soon as the seed is mature, and cache them under logs, in springy places, and in clumps of bushes. Ground squirrels store the clean seed for winter use. Birds, notably jays, live largely upon yellow pine seed during the period of dissemination. Several killed in the fall of 1911 had their corps entirely filled with the seed of this species. Woodpeckers do a great deal of good in picking worms out of the bark.

Pinus murrayana.

DESCRIPTION

The average maximum diameter for lodgepole is 14 to 18 inches and height 65 feet. The bole is full and cylindrical and clean from 25 to 40 feet in close stands, with branches coming within a few feet of the ground on trees in the open. The crown is

narrow and pyramidal. The root system is superficial and spreading. The shallow roots are injured by ground fires, and the tree is subject to windthrow. Bark of the species is thin, about one inch in old trunks.

HABITAT

Found on nearly all exposures from the lowest elevations to the tops of all but the highest mountains. Does best on borders of mountain meadows, benches, and moist slopes. It occurs on all grades, from level meadows with very little drainage to steep mountain sides. To do best it requires a considerable amount of soil moisture, more than Douglas fir and yellow pine. Least abundant on exposed south slopes and most common on north and easterly exposures.

This species is found under the same conditions of temperature and rainfall as the yellow pine and also extending up into the mountains much higher where the snowfall is very heavy, reaching a depth of 20 feet along the Warren mail route on Secesh Summit.

In ordinary mature even aged stands it is about 60 to 75 years old, though under favorable conditions trees may reach 200 years. The lodgepole has a very rapid growth, in comparison with its associates, during the juvenile stage. Stump analysis on the edge of a marshy meadow showed an average diameter of 12 inches and age of 55 years at a height of 26 inches. The sap showed an average width of 30 rings. These counts were made at an elevation of about 5000 feet. Towards its upper limit the tree is smaller, the average diameter not exceeding eight to ten inches at breast height.

REPRODUCTION

The lodgepole begins to bear seed very early and bears abundantly nearly every year. A tree cut on this Forest with one mature cone, showed but 13 annual rings. The cones open very slowly, disseminating their seeds over a long period of time. A fire, instead of killing the seed, while still inside the cone, helps to liberate it. This ability of the cone to resist extreme heat is a great factor in restocking burns with lodgepole. The seeds maintain their vitality for years.

SEEDLING DEVELOPMENT

The time of germination of lodgepole here is not accurately known.

Seedlings come up in very dense stands. A count on one square rod showed 175 saplings of an average age of sixteen years, 5 to 8 feet in height and averaging one inch in diameter.

Under favorable conditions the stand remains crowded and dense until the pole stage when competition for crown space becomes so keen that many of the trees are killed and a decided thinning out results. This species reproduces only from seed.

DAMAGES AND DISEASES

The superficial root system of this species affords but slight protection against wind, and windthrow is common, especially after a ground fire has weakened the roots. Frost and snow do not injure the lodgepole appreciably.

Locally, in the vicinity of McCall, subject to attack by bark beetles. Injury from fungi is slight.

Fire, while the chief factor in extending the range of the species and in establishing young growth, is very injurious to standing trees. The thin bark offers but slight protection and the roots lies so close to the surface that a ground fire will kill many of them. On the other hand, by killing off the associated species, fire leaves the ground in condition to be reseeded by lodgepole.

Animals and birds do but slight damage as is proven by the excellent character of reproduction where the conditions are favorable.

Pinus flexilis.

DESCRIPTION

The average maximum diameter of this tree is 26 to 30 inches and height 40 to 45 feet. The crown is spreading and rounded on top, with stout branches extending well down the tree. The bole is short and thick. The root system spreading.

HABITAT

Confined to the higher altitudes, where it is found growing under widely different soil and moisture conditions and on all exposures. It grows on dry, stony ridges having a southern exposure, and in moist soil along little streams near the tops of the mountains. One individual was found on the bank of Payette River at the inlet to Payette Lake at an altitude of 5000 feet. Gradient and soil composition seem to be of no consequence. It is very intolerant and always grows either isolated or in small clumps.

GROWTH

Little study has been made of the growth of the limber pine. One stump seven inches in diameter, twenty-eight inches high showed seventy-four rings. The species attains a maximum age of 250 to 300 years.

The tree because of its inaccessibility has no commercial value.

REPRODUCTION

Apparently no cones produced in 1911 on the Idaho Forest, and the very slight accumulation of old cones under the trees indicate a very light and infrequent seed crop.

A bare mineral soil makes the best germinating bed. Because of its limited seed production seedlings are very scarce and more study is required before the time of germination can be given. The tree is of slow growth throughout its life.

Reproduction is by seed exclusively.

DANGERS AND DISEASES

Wind, frost, snow, fungous diseases, insects and fire have little effect upon this species. The seeds are eagerly eaten by birds and rodents.

Larix occidentalis.

DESCRIPTION

The maximum average diameter of this tree here is 40 inches, and height 140 feet. The crown is narrow and pyramidal, composed of short horizontal slender branches with but little foliage. The bole is the most cylindrical of our trees on this Forest and is clear of branches for about half its height. The bark on old trees is very thick, near the base sometimes measuring three inches. The root system is shallow, having large laterals and a poorly developed tap root. The species is generally windfirm. Roots are deep and spreading. Blackened scars on many trees still vigorous demonstrate its ability to withstand fires.

HABIT

Chief occurrence on north and west slopes and on flats. It is found usually from 4000 to 6000 feet in elevation.

GROWTH

The tamarack is a rapid grower in height during its juvenile stage, but it rapidly slows down. It reaches great age – trees of this species 500 years old and more having been found.

It does not appear in the Idaho Forest in sufficient quantities to be commercially important. Its durability in contact with the soil, and its straight cylindrical bole make it a tree well adapted for use as a telegraph pole or railroad tie. A sapling 1.2 inches in diameter inside the bark had 23 annual rings. Its rapid height growth enables it, when started first, to keep its crown above that of its associates.

This species will remain sound up to 500 years in age. It is capable of producing a telegraph pole 10 inches in diameter at the butt, when 90 years old.

REPRODUCTION

Reproduction is entirely from seed. It is a good annual seed producer, bearing full seed crops at intervals of two or three years.

Seedlings mature only on moist seed beds. The great intolerance of the tamarack makes but a bare burn of sufficient soil moisture a very favorable situation for reproduction. On such a site 200 seedlings have been counted within a radius of 50 feet of the parent tree. A heavy shade or dry germinating bed are fatal to the larch.

DANGERS AND DISEASES

The small light crown of this species affords but slight resistance to the wind and injury from this source and from snow and frost is slight. Small damage from bark beetles, larch canker, windshake, and dry rot have been observed on this Forest.

The very thick bark of old trees is remarkably fire resistant, allowing this species to increase its proportion in the stand in a location where fires are prevalent.

No damage by grazing has been noticed on the larch in this Forest.

Picea engelmanni.

DESCRIPTION

The average maximum diameter is about 2 feet at breast height, though in some locations trees of 3 feet and over may be found. The average maximum height is 100 feet.

The crown is narrow and spire like, composed of short lateral branches with pendulous branchlets, that make it very dense. On exposed situations the branches persist nearly to the ground, but in crowded stands it prunes itself to nearly half its height.

The root system is very superficial and spreading, many of the roots lying on top of the mineral soil in the deep layer of humus found in the balsam - spruce type. In very dry seasons fire may burn off this layer, killing and exposing the roots, making the trees an easy victim of the next severe wind storm. When uninjured by fire the tree is generally windfirm.

HABITAT

Its high moisture requirement limits the distribution of the spruce to springy soils, swales, slopes kept moist by ground seepage, northerly exposures and high cool coves.

At high altitudes, where heavy snow fall and short summers keep the ground from drying out, it is of most common occurrence.

GROWTH

A tree of great age and slow growth. More study is required in this respect. It is slower than limber pine. It reaches 550 years of age. Has no demand yet commercially here, because of the availability of sufficient supply of fir and pine to meet present demands.

REPRODUCTION

A heavy seed producer. Bears every year, with full crops at intervals of three years.

Little is known about the time of germination and the development of spruce seedlings on this Forest. The tree is very tolerant at all stages, and an abundant seed producer but seedlings are not, as would be expected, very numerous. Where they do occur it is usually on small patches of bare mineral soil. A deep humus layer is unfavorable to gemination.

DANGERS AND DISEASES

Except where weakened by fire, little subject to windthrow. As it is optimum in a region of great snowfall and where frosts occur every month in the year, snow and frost are shown to do but very little injury to the spruce.

Pseudotsuga taxifolia.

DESCRIPTION

The Douglas fir in mature stands attains an average maximum breast-height diameter of 3 feet and height of 115 feet, though specimens 4½ feet through and 135 feet tall occur.

The crown, pyramidal in youth, becomes rounded with age. In the open it extends to within 10 to 15 feet of the ground, but in close stands it prunes itself for about half its length. The trunk is cylindrical, holding its size well in forest grown trees, above the swelling at the base. Open grown trees are tapering.

The deep, spreading root system of this species is not injured by fire.

Bark thick on old trees, 1½ to 2 inches, and very fire resistant. Young trees easily fire killed.

HABITAT

Soil moisture and tolerance are the factors limiting the distribution of this species. It is not at all fastidious as to the chemical composition o the soil, being found on all kinds.

In moisture requirement it lies between the white firs and the yellow pine, and the same is true of its tolerance.

GROWTH

Stump analysis show that in ordinary stands in the Douglas fir – yellow pine type this species will reach 30 to 33 inches in diameter at breast height in 150 to 175 years. The growth and vigor of the tree begins to decline at 200 to 250 years ordinarily. Trees of 18 inches diameter, the limit prescribed for cutting, can be secured in 90 to 100 years.

REPRODUCTION

On this Forest some trees begin to produce seed at 35 years. It bears good crops of seed almost every year. Seeds eaten by birds, squirrels, chipmunks, and insects.

Seedlings usually germinate in June. The most favorable conditions for germination are a moist bed of bare mineral soil, or with a slight humus layer. On hot, dry slopes and on a heavy layer of humus reproduction is poor.

DANGERS AND DISEASES

Usually free from the attacks of insects and fungi. Little damaged by wind and snow. Two little study has been made of the matter to state whether or not frost injures seedlings. Fire does very little damage to mature trees but will kill seedlings and saplings, as their bark is too thin to withstand much heat.

Abies concolor.

DESCRIPTION

A tree reaching large size but having, in this locality, no commercial value. A tree 100 feet high and 13' 9" in circumference was found on Brundage Mountain trail at about 5400 feet elevation. Average maximum mature trees 2 feet in diameter and 80 to 90 feet tall. Crown round topped in old age, extending about two thirds of the length of the tree. Trunk full and cylindrical. Bark thick and rough, hard and flinty.

Little is known of its root habit in this region, but it is ample to secure it against windthrow.

HABITAT

Thrives best on moderately moist soil where its great tolerance allows it to hold its own against its associates. Not found on dry exposed sites.

GROWTH

Has a great power of recovering after a long period of suppression. More growth study is required for this species. A tree 13 inches in diameter and 60 feet tall showed 90 annual rings breast high. It reaches an age of 300 years at least and trees 4 feet and more in diameter are probably much older.

REPRODUCTION

Cones borne every year, at the top of the tree. A prolific seeder but the seeds are comparatively low in fertility.

Within its range, it produces a dense crop of even aged seedlings on bare humus. A plot taken in a 20 year old stand of this character showed 77 saplings averaging 5.5 feet in height.

DANGER AND DISEASES

This tree is subject to punk rot, and windshake. Damage from frost and snow but slight. Fire, while killing white fir in the seedling and sapling stages, clears the ground of other species, making conditions favorable for its reproduction.

Abies lasiocarpa.

DESCRIPTION

20 inches is the average maximum diameter of this species and 65 to 75 feet its height. It has a very acute tipped narrow crown. Its spire like appearance is very characteristic. The crown generally reaches close to the ground. The bole is usually smooth with a rapid taper.

The bark is thin, and contains numerous resin blisters.

Its roots habit is spreading and the roots are injured by fire.

HABITAT

Limited in occurrence to high, cool coves, northerly aspects, springy hillsides and borders of streams. Except for its dependence upon moisture in the soil its tolerance would give it a much wider distribution than it now has.

GROWTH

Its growth is slow – one tree 20 feet high and 8½ inches in diameter being 75 years old. More study is necessary to determine the age of the larger trees. They are known to exceed 200 years.

The balsam has no merchantable value in this locality.

REPRODUCTION

The alpine fir is a good seed producer, the cones being borne erect at the top of the tree. The seed will germinate on a variety of seed beds, not requiring as much soil moisture as its usual associate the spruce. It is not known at what time seedlings germinate on this Forest. It is, with the possible exception of the spruce, our most tolerant tree.

DANGERS AND DISEASES

The balsam is a hardy tree, suffering little from the attacks of insects and fungi. Like the spruce, its occurrence in the region of heaviest snow and frosts shows that they have no injurious effect upon this species.

Fire is the greatest enemy of the balsam. The resin blisters and its foliage reaching to the ground makes fires worse here than in any other type of forest on the Idaho.

Populus trichocarpa.

DESCRIPTION

This tree attains a maximum average diameter of 2½ feet and a height of 90 to 100 feet. It prunes itself well and has a short, wide crown. Branches grow upward and are thick and strong.

The bark is thick on old trunks, up to about 2 inches. Its bole is long and has little taper when the tree is found in a close stand.

More study of the root system is required. The tree is rarely windthrown but this may be due as much to the sheltered canyons where it is most abundant as to its root system.

HABITAT

The black cottonwood is most commonly found on a sandy or gravelly loam bordering streams. It requires moisture in the surface layer.

GROWTH

A tree 3 inches in diameter at breast height had 11 annual rings and was 25 feet tall.

REPRODUCTION

Seed crops are borne every year. This species also reproduces by means of sprouts.

The seeds germinate soon after reaching the ground like the rest of the Salicaceae. Reproduction best on bare mineral soil, especially that having loam, but it is good on sandy bars. The seedlings need full light from the start.

A shaded seedbed having a slight moisture content is very unfavorable to germination and seedling development.

DANGERS AND DISEASES

This tree is limited in its occurrence on this Forest to small widely separated groves along some of the streams. Where noticed, it appeared to suffer but slight damage from insects, fungi, and the elements.

Populus tremuloides.

DESCRIPTION

Usually, on the Idaho Forest, not over 6 to 8 inches in diameter but running up to about two feet in rare trees. Occasional specimens are 75 feet in height but, as it usually occurs, it is not more than 30 to 40 feet.

The crown is open and light.

Root system shallow and spreading, offering poor support against strong winds. Their superficial character also exposes them to severe injury by ground fires.

HABITAT

For best development the aspen requires a moist fertile soil. It is able, however, in stunted form, to exist on fairly dry sandy hillsides. Altitude and exposure have but slight effect upon this species. It occurs from the lowest portion of the Forest high onto the mountains. It is our most widely distributed American tree, being found from the high mountain ranges down to sea level and from Hudson Bay to Mexico.

GROWTH

On the drier situations it may remain practically a shrub in size and, on the sites most favorable to its development, attain a diameter of over twenty inches breast high, and produce a long, clean cylindrical bole.

A tree 10½ inches in diameter at breast height and sixty-five feet tall showed 57 annual rings.

When about 60 to 70 years of age the tree usually falls a victim to fungous attacks and is soon killed.

At present, except to make an occasional single or double-tree or cinch hook, there is no demand for quaking asp in this region.

REPRODUCTION

This tree is a vigorous seed bearer. It produces heavy crops of very short lived seed every year. The seeds are usually produced in June and germinate within a few days after dissemination. To take root they must fall on bare soil as their rootlets are unable to penetrate undecomposed leaves or grass.

The best condition for germination and seedling development is a moist seed bed of mineral soil exposed by a recent fire, where the seedling may enjoy uninterrupted light from the beginning.

Adverse conditions are a heavy shade and undecomposed humus layer.

The quaking asp sprouts readily from the stump and also sends up suckers.

DANGERS AND DISEASES

Frost has apparently no injurious effect on the aspen. On sites exposed to heavy winds it is badly thrown. Heart rot, caused by one of the Fomes (probably igniarius) is prevalent in overmature trees. Few insects feed upon it and not many trees are killed by them.

Concerning the silvics of the following nonimportant species little is known.

Juniperus communis.

On this Forest simply a low shrub of no commercial value. It rarely stands over 4 feet above the ground and is confined to the higher mountains.

Taxus brevifolia.

When noticed here, this was a tree only about 20 feet high and about 6 inches in diameter, and was found growing in a moist canyon on a stream bank.

Betula fontinalis.

This species does not occur in large enough bodies or reach sufficient size to have a commercial value. Its observed maximum size is about 7 inches in diameter and 30 feet in height. It is found along stream banks and in moist canyons.

Alnus tenuifolia.

A small tree 2 to 3 inches in diameter and usually 6 to 15 feet in height found in wet soil on hillsides kept wet by seepage and along streams.

Sorbus scopulina.

A tree rarely over 1½ to 2 inches in diameter or 8 feet in height found, widely scattered, in damp soil.

Crataegus douglassii.

Is found on shaded moist hillsides. It is valuable solely for its protective covering. It rarely exceeds fifteen feet in height on this Forest. The haw is a very tolerant tree. It occurs most commonly along the banks of streams and canyon sides in moist soils.

Cercocarpus ledifolius.

The bark of this tree is occasionally used on the Idaho Forest to make a solution for tanning hides. Maximum about 15 to 20 feet in height and about 6 inches in diameter. It occurs in the open on dry soils.

Rhammus purshiana.

The bark of this tree, which is usually shrubby, has strong laxative qualities for which in some regions, though not yet here, it is collected. It sprouts from the stump. Found along streams where it sometimes grows to 6 inches in diameter.

Amelanchier alnifolia.

A slender tree reaching a maximum average diameter of about 1½ to 2 inches and a height of about 15 feet.

It grows on nearly all classes of soil but is best on moist benches along streams.

The cherries are small shrub like trees of no economic importance, found under a wide variety of soil and moisture conditions, but optimum on rich moist soil. Rarely over 10 to 15 feet in height.

The willows are low shrubby trees, as found on the Idaho Forest, of no economic importance. They occur singly and in groups on moist hillsides and along high mountain streams, attaining their best development on black, mucky soil.

Scale of Soil and Moisture Requirements –
Most exacting species first.

1. Alnus tenuifolia
2. The Salicaceae

3. Betula fontinalis
4. Picea engelmanni
5. Abies lasiocarpa
6. Abies concolor
7. Pyrus sambucifolia
8. Populus trichocarpa
9. Larix occidentalis
10. Taxus brevifolio
11. Acer glabrum
12. Prunus demissa
13. Prunus emarginata
14. Rhamnus purshiana
15. Amelanchier alnifolia
16. Crataegus douglasii
17. Populus tremuloides
18. Pinus murrayana
19. Pinus flexilis
20. Pseudotsuga taxifolia
21. Pinus ponderosa
22. Cercocarpus ledifolius
23. Juniperus communis.

Tolerance and shade of Important Species.
Scale of Tolerance.

1. Very tolerant
   Picea engelmanni
   Abies lasiocarpa
   Abies concolor

2. Fairly tolerant
   Pseudotsuga taxifolia

3. Intolerant
   Pinus ponderosa

4. Very intolerant
   Pinus contorta var. murrayana
   Pinus flexilis
   Larix occidentalis
   Populus trichocarpa

The effect of tolerance upon the occurrence of each species in the forest has been discussed as each tree was taken up.

The criteria used in making up the scale were: Presence of thrifty young growth in shade of different densities, density of foliage, persistence of branches in the crown, and the density of typical mature stands.

Species most Subject to Injury by Lightning.

The species most commonly struck by lightning in the order of frequency are:

Struck and Shattered.	Struck and Ignited.
1. Pinus flexilis 25%	1. Pinus flexilis 25%
2. Picea engelmanii 20%	2. Pinus ponderosa 25%
3. Pseudotsuga taxifolia 20%	3. Picea engelmanii 20%
4. Pinus ponderosa 15%	4. Pseudotsuga taxifolia 15%
5. Abies lasiocarpa 10%	5. Abies lasiocarpa 5%
6. Pinus contorta 5%	6. Pinus contorta 5%
7. All others 5%	7. All others 5%

GRAZING.

The damage from this cause is almost wholly done by sheep, at the higher elevations, and is the result of trampling rather than of browsing. As has been said the injury to the Forest at the lower elevations from cattle and horses is immaterial.

The best grazing areas for sheep are in the balsam - spruce and lodgepole types above 5500 feet in elevation. The balsam–spruce type is more moist and has a larger percentage of humus in the soil than a typical lodgepole stand. We find, therefore, that damage is by packing the ground hard rather than by causing it to erode, in the former case. In the latter the soil is loosened, the ground cover is destroyed and in many places this is followed by erosion. On bedding grounds and badly overstocked areas sheep trample out seedlings and do not allow reproduction to take place. Where there is an insufficient supply of forage plants, they will nip off the tops of young trees and sometimes girdle lodgepole pine and quaking asp. Sheep should be bedded in the open and on rocky hillsides, well back form streams and springs.

No sample plots have as yet been established on the Idaho National Forest.

Condition of Reproduction on Cut-Over Land.

But one timber sale of sufficient size to afford data on reproduction, the H.T. Hoff sale of October 21, 1910, has been made up to the present. It is of too recent date to show the success or failure of the system used – selection using a diameter limit of 18 inches, and lopping and scattering brush.

PHOTOS (not copied; originals still at National Archives)

Reproduction of yellow pine at an altitude of about 5000 feet. Easterly slope, Idaho National Forest.

Dense reproduction of white fir on old burn. Elevation about 5500 feet. Northerly slope. Idaho National Forest.

Typical mountain meadow in the balsam–spruce type. Elevation about 6500 feet. Idaho National Forest.

Dense stand of spruce and balsam in moist canyon, Idaho National Forest.

Yellow pine and red fir along South Fork of Salmon River, showing scattered stand on dry south exposure. Elevation about 3000 feet.

Valley of the South Fork of Salmon River, showing red fir and yellow pine stand under proper moisture condition.