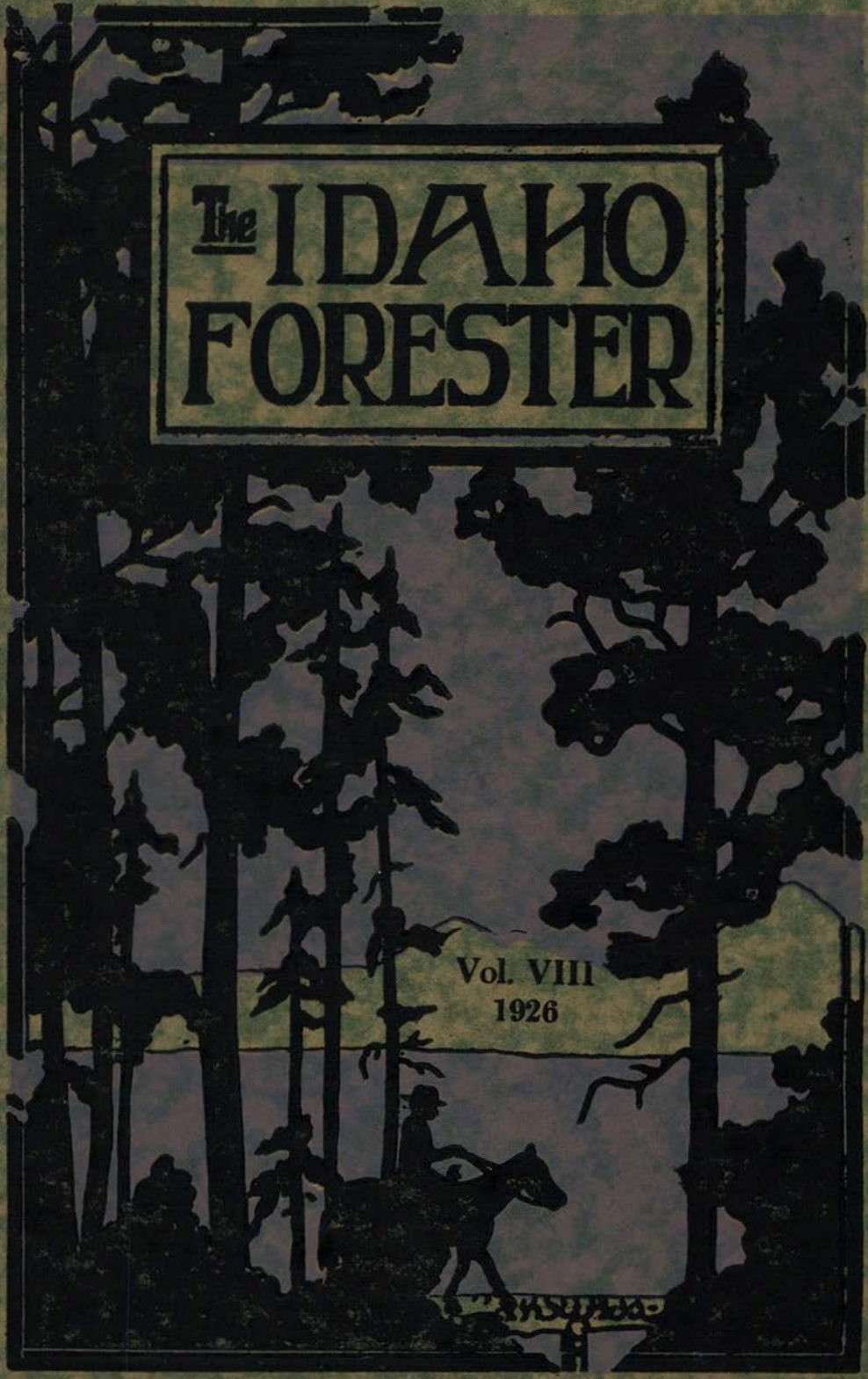
The IDAHO FORESTER



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To

HON. LLOYD A. FENN

In recognition of his contributions to the advancement of Forestry in Idaho the 1926 edition of the Idaho Forester is respectfully dedicated. In particular as a member of the State Legislature Mr. Fenn has always stood consistently for progressive forestry legislation, and he was largely influential in securing the enactment of the Idaho Forestry Law.

IDAHO'S TIMBER TAX PROBLEM

By LLOYD A. FENN, '11

The fundamental rights of the state to raise revenue through taxation, either directly or indirectly, is not open to question, however, the method used in making property subject to levy is one that may well be discussed when the arguments are confined to the limitations imposed by the constitution and are prompted by a desire to conform to the spirit of the law in providing the greatest good for the greatest number.

Property, both real and personal, is subject to taxation or exemption in limited ways as the will of the legislature may direct when so defined by statute as to be in conformity to the purview and meaning of the constitution. That forest lands, or the timber thereon, comes within the classification of property under our law there is no conflict of opinion.

To seek the aid of the legislature in having timber lands, or the growing timber thereon, whether of present or potential value, placed upon the list of property wholly exempt from taxation is imposing upon the good offices of our law makers for the reason that such action would amount to a prayer for a violation of the spirit of the law in that the timber owner is not one to whom the legislature could with propriety offer such relief. However, to seek an equitable adjustment of the present form of taxation is not without merit and may well be pleaded to the end that the state may be properly compensated and the owner made secure in his endeavor.

One important factor in any discussion of the timber tax problem must always be kept in mind. It is, that while an attempt is being made to correct the present evils in our method of taxing timber, it is absolutely necessary that sufficient funds be made available to maintain the local community or rural taxing unit, in which the larger bodies of timber are situate, in accord with present expectations from this source, to the end that no additional burden will be levied against other existing property. Certainly no effort should be made to impair the obligations of such taxing units where this property is now on the rolls and computed in the valuation upon which they were incurred. A large majority of the timber tax laws in force in other states were apparently placed upon the statutes to temporarily reduce this tax burden or postpone it in the hope that reforestation would thereby be encouraged and this was done without apparent consideration of the necessity of a continuous tax being raised annually to meet current expenses, or fulfill obligations.

Where the forest stands are mature the question does not present itself so vividly. Yet, the moment the mature or marketable timber is removed and the cut-over lands show forth,, a very different situation arises. Here the taxable value is practically gone and years of waste land assessments stare the community in the face. This statement is made to apply only to potential forest land and not to the possible agricultural uses which may somewhat change the condition. Idaho is just now experiencing the unfortunate effects of having thriving communities practically desolated by the withdrawal of timber activities which in the first instance brought them forth. Such communities should be continued just as it is hoped that a sustained timber yield may be effected. To equalize this economic difficulty is fundamental to a correct solution of the timber tax conditions, that is, that the local phase be taken care of in any solution which is presented. Were it feasible for the state to assume temporarily, with proper assurance of reimbursement, this burden of equalizing the revenue over the timbered areas it would be possible to offer a graduated tax scale on the severance basis that would meet the situation.

Assume that the sustained annual cut, which it is hoped will be maintained by the operator, was made equal to the annual growth. In such an event the severance tax coupled with the tax on the land, for the purpose for which it is used, would present to the communities a revenue of a constant nature. Fortunately in Idaho there is a state board of equalization which could well care for this particular item in our tax system and so arrange the equalization as to provide the local unit with a just and continuous return and at the same time give a healthy impetus to the timber industry.

The practical method of taxation used by this state in determining the amount of revenue to be derived from the mining industry

suggests a partial solution to the problem confronting the state in its desire to equitably tax the timber within its limits, to the end that the industry may be perpetuated and a taxable wealth maintained.

As the state exacts a revenue from the net proceeds of the mining industry, based upon the previous year's operation as well as a return from the surface valuation, so should the state devise a method whereby the timber lands and the output therefrom be taxed separately in justice to the owner who maintains a property subject to a variety of hazards unknown to mine owners. By this reasoning it would appear that the state should tax the timber lands, but in a manner that would grant the taxing units a reasonable return in proportion to the value of the land for its crop purposes, also there should be a tax on the timber but at a time when the owner could with business prudence obtain a financial return, that is, when the crop was ripe or in part marketable because of thinning requirements or other silvicultural demands.

Just here a distinction should be drawn in the matter of the permanency between ore in place and the condition of the forest stand. A body of ore, undeveloped, is a permanent thing. A forest, in every condition, is a perishable crop. Only an act of God can dislodge or remove the precious metals from their present lodgement and thereby suffer the ore body to lose its financial attraction to man and a revenue loss to the state. With a forest stand, from the day of its birth to the time of harvest, there is an ever increasing hazard to its life through both divine and human agencies. In the first case the likelihood of destruction is remote, in the latter it is a present menace.

Were all forest lands covered with a mature stand of virgin timber the tax problem would be relieved of many of its vexing features. While maintaining an annual tax on the surface land valuation for timber raising purposes the state would receive a revenue from the marketing operations and such revenue could be so adjusted by a commutation plan as before suggested to provide a return to the state in approximate evaluation to that now received from the timberland tax and thereby suffer no loss to its present revenues from this source and, at the same time relieve the timber owner of the unwarranted burden now borne. Unfortunately this Utopian condition does not exist. In Idaho is to be found every imaginable forest condition from the recently cut-over aras to the mature stands of virgin timber. Age classes of every type and species natural to this region can be had in varying quantities and the persistent hand of the operator, overshadowed by the devastation wrought by destructive agencies, continue to disrupt the ideal situation and make the problem more complex.

With cut-over lands constantly reverting to the state by reason of non-payment of taxes, with the depletion of taxable timber wealth through destructive agencies, with the abandonment of potential timber lands to the state because of impossible financial advantage, all coupled with the constant inroads upon our virgin stands by the operator, what is the prospect for the future? Ruin to the industry that now lays the golden egg unless it be nurtured by just legislation tempered with a vision to the future.

Confronted with the oft repeated statement that the farmer should be relieved from taxation if the timber owner is to have such treatment, it is correct to reply that no reduction of taxes can be sought against the land where the valuation is based upon the use to which the land is adapted or converted. In addition to paying a just tax upon the land the timber owner should pay a tax upon his crop, a requirement that the farmer is not asked, to the end that the timber owner properly compensate the state for the production he receives and, such payment be placed at a figure commensurate with the liabilities assumed by those in other industries or occupations.

Can the State of Idaho, under its present admirable policy of disposing of its public lands, with propriety permit a tax method which will compel an ever-increasing addition to the state holdings by reason of the acquisition of cut-over or otherwise devasted potential timber lands through delinquent taxes? Certainly such acquisitions are in direct conflict with the established policy which apparently has the whole-hearted approval of the citizenry of the state.

True it is, that the county, not the state, receives title to the land. But where lies the distinction? If the state as such is in no position to acquire and hold these lands, how can it be expected that a legal subdivision could finance a business that the state can not see its way clear to assume? The present method

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ENGINEERING ASPECTS OF FORESTRY

By RAPHAEL ZON
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Forestry involves knowledge of biology and of engineering science and skill. A forester, like an agriculturist, is a biologist when he deals with timber crops as growing plants. A forester depends upon engineering skill when he harvests the timber crops, transports logs from the stump to the mill, lays out logging roads, builds sawmills and pulp and paper plants, and converts logs into lumber, paper, and other commodities.

In the final cost of lumber, the cost of transportation is probably not less than 75 per cent. A carload of lumber averages about 20,000 board feet. To transport some 34 billion feet of lumber annually cut in this country requires some 1,700,000 cars.

Forest products form not less than 200 million tons of freight annually. Only bituminous coal exceeds forest products in tonnage. The tonnage of forest products exceeds the combined tonnage of all agricultural products. The railroads' revenue from carrying forest products is over $103,000,000—nearly double that received from transporting grain. These figures give an idea of the enormous transportation problem involved in harvesting and distributing the products of the forest.

The transportation of logs from the stump, often in mountainous and inaccessible places, to the mill taxes the ingenuity of the engineer to the utmost. It involves in some places the construction of overhead cables, chutes, flumes, dams, donkey engines, and many other engineering works.

The sawmill machinery, and its adaptation to special uses such as the large logs of the Pacific Coast, is another field in which engineering skill of the highest grade is involved. The laying out of logging railroads, the improvement of drivable streams, all are the work of an engineer.

It is, however, not only the civil and mechanical engineers that are concerned with the use of the forest. The water power engineer, the electrical engineer, the chemical engineer, and the landscape engineer deal more or less with the forest, either directly or indirectly. The phenomenal growth of the lumber industry and the opening of inaccessible regions for logging could never have been accomplished without the skill of the engineer.

Unfortunately, however, the engineering skill of the past, in its relation to forestry, was largely destructive to the forest. The forest was looked upon as a mine to be abandoned as soon as the virgin timber was removed. The engineer's skill was applied to remove this virgin timber as cheaply and efficiently as possible, but without regard to the future of the land in its relation to public welfare.

A new era is coming in which the forest engineer's skill will be applied not to wrecking the forest but to re-creating and perpetuating it.

In the utilization of the forest as a permanent resource, the field for the engineer is even greater than it was in the period just past when he contributed largely toward the rapid removal of the forest. In the forest that is to be regrown and used forever as a permanent resource, permanent roads to make the forest accessible are the first requirement. The development of logging machinery, adapted to logging the new timber crops with the least injury to the remaining young trees, is a task that is still before the American engineers.

The mammoth sawmill is passing out of existence. New types of sawmills and wood-using establishments are coming in its place. The one mammoth sawmill, which sawed only lumber and burned what could not be made into lumber, is being replaced by groups of wood-using plants which supplement each other, and in which one plant works with material that the other cannot use.

The forest is essentially a diversified crop. In a forest one finds trees of different kinds. Some are best adapted to be sawed into lumber. Others can best be used for pulp and paper making. Still others are turned into toothpicks and clothes pins. Even the same tree may yield different products. The lower part of the tree is suited for sawlog material, while the upper part may be used for pulpwood, and the tops and even the branches for chemical wood. Therefore, only a group of

wood-using plants that can utilize the different products of this diversified timber crop can engage in profitable timber harvesting.

What would you think of a packer who would utilize only bacon and hams and throw away the rest of the hog, or of a farmer who was producing milk, beef, pork, corn, wheat, and truck products, yet could sell only wheat, thus making wheat carry the entire farm. This has been exactly the case in the past with our forests and it has made lumbering unprofitable or much less profitable than it might otherwise have been.

A forest that is worked only for the choicest veneer logs and nothing else cannot be indefinitely a paying proposition. It is only when each part of the tree or each kind of tree is put to its best use that timber cropping becomes a profitable enterprise.

Another type of sawmill which has a promising future is the small plant driven by electricity, generated by water power, which cuts only the annual growth of the tributary timber and therefore, will have a permanent life. Many a forest has been wrecked before logging has even started because the sawmill built by engineers was far beyond the capacity of the forest to sustain by annual growth. To feed the sawmill, not only the growth but the entire forest had to be cut and the forest capital was destroyed in the process. The timber owner built a Moloch and then had to bring as a sacrifice the present and the future of the forest.

Another type of sawmill that is coming to claim the attention of engineers is the portable sawmill. This type of sawmill is of particular interest to small woodlot owners or farmers. In many localities, like the New England States, where many an abandoned pasture has come up to second growth white pine, it is the most efficient means of harvesting the crop. This portable sawmill, however, may be a blessing and it may also be a detriment to the owner of the small woodlot.

A small portable sawmill, usually equipped with a circular saw, produces large proportions of rough lumber of inferior grades. As a matter of fact, the product of a portable sawmill is seldom graded, and therefore, brings only a low price on the market. When a woodlot owner has some fine old timber of oak, hickory, and other valuable species, and it is sawed up by a portable sawmill operator, the chances are that the product coming from high grade logs is greatly degraded.

It is, therefore, important for every woodlot owner to carefully consider, when he has timber to sell, whether it would pay him better to sell his high-grade logs to an efficient sawmill or to have them sawed by a portable sawmill and try to sell his ungraded lumber in the open market. My own experience shows that a farmer can do much better in such cases to sell his logs to an efficient sawmill, as he will get a higher return by selling the logs than by having them sawed by a portable sawmill and then selling the lumber.

On the other hand, if a farmer needs some rough lumber for a barn or some other rough construction and he has timber of his own, it might be cheaper for him in the long run to have a portable sawmill saw his timber than buy lumber at a retail lumber yard at high prices.

An individual owner of a woodlot, however in every case is at a disadvantage in comparison with a large timber owner. The solution for the woodlot owner lies in cooperative marketing of his woodlot products. If cooperatize marketing is essential for the farmer in his agricultural products, it is even more essential in the case of his woodlot products. As a rule, a farmer knows better the value of his hogs, his corn, or his wheat, than he knows the value of his timber crop. He is likely to be cheated in many ways.

There are 44 different log rules by which timber may be estimated. Some of them give high values for large timber and very low values for small timber. Others are more advantageous to the buyer than to the seller. Sometimes the farmer may receive apparently a high price for his logs, yet when the underrun of the log rule is considered, he obtains but a small price for his total product. Sometimes, the farmer may have a few trees, such as black walnut or yellow poplar or oak, but yet not enough to ship to a distant sawmill because it does not make a full carload. If farmers of a certain locality would pull together and handle their woodlots on a cooperative basis, they could hire a reliable man who could advise them as to the kind of log rule to use so as to get the greatest value from their timber and the best use for which they could sell it. I have seen many splendid white oak logs, that would saw out high grade

veneer and bring high prices, sold for bolts to be made into tight stave cooperage which brings but a few cents. By cooperative marketing in carload lots, each individual farmer could get a much higher value for his product and, through the advice of the expert, have his woodlot left in a much better growing condition than it was before.

Therein lies a distinct obligation on the part of the engineer to devise a portable sawmill or a method of transportation for the farmer's woodlot products that would net him the highest possible return on his woodlot crop. The agricultural engineering departments at many of our colleges give a great deal of attention to agricultural machinery,—separators, ploughs, threshers, and what not. How many agricultural engineering departments have given a thought to the portable sawmill, particularly adapted to the needs of farmers in a given region? This is a field which so far has received but scant attention on the part of agricultural engineers and a field in which our county agents can be of immediate and direct benefit to the farm woodlot owners.

Engineering skill is involved in the utilization of forest products. Within the last few decades there has been a phenomenal growth of the chemical wood industry, in the use of wood either for the production of pulp and paper or for the chemical by-products, like acetic acid, methyl, and quite recently ethyl alcohol, acetone and others. The chemistry of cellulose is still in its infancy and the field is practically unlimited.

The water power engineer has a direct interest in forestry since the forests regulate stream flow and protect the watersheds.

The sanitary engineer, especially if he is concerned with municipal water supply, finds in the forest the best purifier and protector of the water.

Wood is such an important construction material that the construction engineer and the architect are vitally interested in wood, whether for bridges, buildings, derricks, ties, or for any other purposes.

Finally, the forests are a most important landscape feature and trees are often the basis of landscape engineering. A landscape engineer who has a keen appreciation of the beauties of the natural forest can learn to use it to secure the finest aesthetic effects.

Forestry plays an intimate part in agricultural engineering. I need to mention only a few examples. Forest planting is one of the most potent means of fixing shifting sands which in many localities are a distinct menace to agricultural crops, as, for instance, on the Pacific Coast, and on the shores of the Great Lakes. A forest growth is the best binder of the soil, and in localities where gullies are a grave menace to farm lands, it is a tool which in the hands of a skillful engineer may become the means of stopping erosion and reclaiming eroded land to productive use. The forest as a windbreak for protecting buildings and crops against dry, hot winds in summer and cold blasts in winter and especially as a means of uniform distribution of snowfall, is a useful tool in the hands of the skillful engineer. Windbreaks in such states as North and South Dakota, by preventing the drifting of the snow into gullies and then distributing it more evenly over the fields, contribute to the useful work of the snow water in the spring. It tantamounts to increasing the precipitation in such states.

There are in the northern portions of the Lake States, Michigan, Minnesota, and Wisconsin, vast areas of swamp lands. Some of these lands are just open bogs or muskegs. Others are covered with forest growth of rather inferior development. At present these areas are considered as waste land. A great deal has been said about draining the swamps for agricultural use. In some places the draining of such swamps, far in advance of agricultural needs, has proved a great burden upon the community. In the Northern part of Europe, Finland, Scandinavia, and Russia, from vast areas of swamp forest lands the excess water has been removed by superficial ditching, and the timber growth increased from two to three times, making those lands profitable for timber growth.

The drainage for improvement of forest growth is not the same as drainage for agricultural purposes. It is a fairly cheap method. It does not involve bone-dry drainage. It does not increase the fire menace in dry peat bogs. It does not destroy the habitat of wild life. On the contrary, by making the forest growth more vigorous and the cover denser, and by encouraging forest growth where no growth at all existed before, it increases the area

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SOME PRINCIPLES TO GUIDE THE MARKING AXE IN WESTERN YELLOW PINE IN THE NORTHWEST*

By R. H. WEIDMAN
Director, Northern Rocky Mountain Forest Exp. Station

When a forester marks a stand of western yellow pine for timber sale cutting on the national forests he leaves his record in the woods for half a century. Not only his contemporaries but succeeding generations of foresters will judge him by this record. If his work is not done well, the condition of the stand will betray it so that he who runs may read. The evidence will be plain that there was little more than a perfunctory swinging of the marking axe, a mere mechanical operation of putting blazes on trees. On the other hand, if the marker's work is good—if it is compounded of intelligence, judgment, ideals, and an appreciation of the silvicultural possibilities—the results on the ground will be a noble monument to his handiwork.

Objects of Marking—

The essential reason for marking a stand of trees is to harvest the mature timber in such a way as to secure a second crop by natural means. The underlying principle is continuous forest production. To guide the marker, it is necessary to list certain specific objects of marking. In the western yellow pine type these are:

1. To harvest the ripe timber.
2. To release advance reproduction and encourage its development as the basis of the second crop.
3. To secure new reproduction following cutting, wherever advance reproduction does not already exist.
4. To accelerate the growth of trees left standing in the form of seed trees or reserved trees.
5. To reduce the chances of future loss by windfall to a minimum.
6. To make the logging operation a profitable one, consistent with the above objects.

The Importance of Advance Reproduction

Above all things, perhaps, the marker in this type should understand the importance of advance reproduction. Second growth in western yellow pine does not spring up as a crop of new seedlings immediately after logging, as in the case of Douglas fir and western white pine. Nor is the seed stored in the ground. In the open yellow pine stands, seed germinates under the mature trees soon after it falls to the ground. This results in a cover of advance reproduction. It is important to bear in mind that this is not the result of one seed crop, but the combined result of a number of years of seeding, germination and establishment of seedlings. There are several reasons for this long period of regeneration. One is that yellow pine bears a little seed from year to year, good seed years come only at intervals as great as 5 to 8 years. Another is that it furnishes a most attractive food for rodents, and because the forest is so pure over large areas, the meager annual seed crop is probably largely consumed by these rodents. The most important reason, however, is to be found in the severe drouth and killing frosts which are a regular part of the summer climate of the yellow pine region. Thus. even though successful germination following a good seed year may give rise to an adequately stocked cover of seedlings, severe frosts and droughts in the first two or three years may cause so heavy a mortality among the tender seedlings that only a small proportion will survive. Under these difficult conditions of establishment it requires a number of years—sometimes as much as 20 or 25 years—for the seedlings which survive from year to year to make a satisfactory crop of young growth. Although the forest reproduces itself almost entirely by this slow method, advance reproduction is fairly abundant over most of the yellow pine region of the Northwest.

Fire is the worst enemy of advance reproduction, both before and after cutting. On old cut-over areas, where fire did not run over the ground either before or after cutting, there are dense stands of reproduction composed, for the most part, of advance reproduction well established before cutting. Where fire ran over the ground and destroyed the advance repro-

(1) Although this article contains no serious differences with existing Forest Service marking policy, it is best to state that it expresses primarily the author's views and experiences.

duction, the cut-over areas have a very scant or scattered young growth, or none at all, even in cases where two or three seed trees per acre survived the fire. Why this is so is apparent from the fact that advance reproduction is established under a full stand of seed-bearing trees in the virgin forest; whereas reproduction, originating after cutting and burning, is established under a very few seed trees.

Character of Stands

The age condition of a stand, is of considerable importance as far as marking is concerned. Several typical conditions in this respect can be recognized in this region. The most common is that of pure yellow pine in which the stand is characterized by uniformly large, yellow-barked mature trees with an abundant cover of advance reproduction on the ground. There is here a noticeable deficiency of the intermediate-aged poles and bull pines. What young trees or bull pines there are, occur chiefly as widely scattered groups of ¼ to 1 acre in size. Rarely there are small pole stands of 10 to 20 acres. There is a very distinct lack of individual poles and bull pines scattered throughout the older timber. Here the relation of young and old trees is exactly the reverse of that in a true selection forest where the young trees should greatly outnumber the old ones. Another typical condition is that of the mixed stand in which white fir, Douglas fir, and larch are the most common associates. Although these stands contain a large amount of mature and overmature trees, there is usually a good representation of young trees, poles and reproduction, due largely to the presence of the tolerant species. A less typical stand condition in pure yellow pine is one in which the overwood of mature and overmature trees is quite open, owing to stag-headed trees and trees that have died through decadence during the past century. In the openings are found bull pines and large groups or patches of pole age-classes, and in the case of the more recently made openings, excellent stands of advance reproduction. Although this condition is not desirable from a pathological standpoint, it is the nearest approach to a balance of the age classes such as should be had in a selection forest.

It is important that the marker learn to recognize these conditions, and others that may be found, and that he base his marking on the character of the forest as he finds it. For example, if the typical condition of a body of large mature trees with good advance reproduction is found, the indicated treatment would be to mark rather heavily, leaving the minimum required for a second cut. The aim would be to get a two-story forest. On the other hand, if the stand condition is one containing a good representation of intermediate-aged young trees, poles and saplings, the indicated treatment would be to mark only the mature trees and secure a true selection forest of the remaining age classes.

Character of Individual Trees

The characteristics of the tree, which the markers should consider, are its age, size, crown, bark, bole, injury and location with regard to windfall. With regard to age, the tree which is left standing should not, in general, exceed the age at which it can produce seed and make a profitable volume growth. In size, great height in trees to be left must be avoided, in order to safeguard against windthrow. Large diameters, approximately above 22 or 24 inches in the northern part of the region and 30 inches in the southern part bordering on California, should be avoided, for the reason that they usually go with great height or old age. The crown of a tree offers the most and best indications of its fitness to be left in marking. Its shape indicates whether it is dominant or suppressed, and whether it is growing rapidly or slowly. The length, color, and density of the foliage indicate the health and vigor of the tree. These latter factors together with cones on the tree or under it, indicate the tree's seeding capacity. The color and thickness of bark indicate age and vigor.

The best sort of tree to leave as a seed or reserved tree is characterized by a pointed or slightly rounded crown of dark green, dense foliage, reddish brown bark in ridges, or thick yellow bark in plates, and a straight bole without injury. The crown should occupy preferably a third of the length of the trunk. Thin, open crowns or very small, tuft-like crowns are worthless for reserved trees or for seeding purposes. Crowns badly infected with mistletoe, which sometimes present a very dense and luxuriant appearance, are also worthless for reserved trees. Thin, scaly bark of a reddish or purplish hue indicates an old and very slow-growing tree which, as a rule,

is unprofitable to leave for the purpose of seeding or increased growth.

Where it is desired to maintain a selection stand after cutting, the marker should select his individual trees so as to secure the maximum accelerated volume growth. To be able to do this, the marker must have some knowledge of the subject of increased growth due to liberation. A group of trees is like an unthinned hill of corn. The latter as planted contains a large number of small slender-stemmed talks. If we leave one of these hills unthinned, containing possibly 12 stalks, and thin another, leaving only two or three stalks, we have an excellent example of accelerated growth due to liberation. The thinned hill will eventually support large thick- stemmed and vigorous stalks, while the unthinned hill will produce much smaller and slenderer-stemmed stalks of corn.

Studies in stands which have been liberated for a number of years show that the trees remaining made an increased volume growth of 100 to 300 per cent. Any timber marker may see examples of this accelerated growth himself by using an increment borer in trees left on old timber sales or private cuttings. The occasional use of an increment borer, by the way, will prove not only interesting to the marker himself but will improve the quality of his work. It would be very desirable, in fact, if the increment borer had a much wider use than it has at present. The chief point in securing accelerated growth is to free each reserved tree as much as possible. For example, a stand which is cut so as to leave fairly evenly-distributed trees will make better increased volume growth that one where the reserved trees are left in groups. The effect of liberation is felt as far as 50 feet; that is, if two trees are standing 50 feet apart and one is cut the other shows a little increased growth.

There is a common fault in the selection of individual trees to which some markers are subject. In leaving a selection stand, it is the object as much as possible to leave a nice, even distribution of reserved trees. In the zeal to do this the marker leaves, sometimes unconsciously, either trees which are too large or too old, or trees with poor, thin crowns. This was more commonly a fault of the early days, but there are still examples of it to-day.

Seeding

It is well for the marker to know something about the frequency of seed years, and to observe for himself regarding them. Although it is not yet definitely known how often good seed years occur in the yellow pine type in this region, studies indicate that one fairly good seed year may be expected every 5 to 8 years. Annual examinations of seeding and reproduction on a large permanent sample plot on the Whitman National Forest, show that there was, in that locality, an exceptionally good seed year in 1912 which was followed by poor and indifferent seed years until 1921 when the seed production was classed as fairly good. The results on this particular plot agree fairly well with the ranger seed crop reports for all parts of this national forest for the same number of years. In considering seed years, it is well to keep in mind that good seed years are not always general over a whole region. In 1912 there was a good seed crop all over the Whitman National Forest, but in one or two instances since then there has been a fairly good seed crop in one small section of the Forest and poor seeding on the remainder of the Forest.

The very important point with regard to seeding, which the marker should know, deals with the size of seed-bearing trees. Observations show that young trees, under 17 or 18 inches d. b. h., in this region, cannot be depended upon as satisfactory seed-bearers for a number of years. Any forest officer can observe this for himself, by visiting a cutting 15 or 20 years old and examining the reproduction and particularly the old cones under trees of various sizes. Cones of various seed years can be recognized by their state of weathering and decay. In this region very few old cones will be found under trees less than 17 or 18 inches d. b. h. The lesson, of course, is not to depend too much on trees less than this size for seed production.

Insects

An elementary knowledge of the habits of bark beetles is necessary to good marking. The particular point in mind, in this connection, is the difference in the work of the yellow pine beetle (Dendoctonus brevicomis) and the turpentine beetle (Dendroctonus valens). The former kills trees and the latter as a rule, does not. The presence of the former can be recognized by pitch and frass exudations found anywhere on the trunk of the

tree, the pitch exudations containing a little hole or tube. The presence of the turpentine beetle is recognized by pitch exudations, without holes, on the lower part of the trunk, occuring rarely higher than five feet above the ground. At present when a marker sees pitch and sawdust exudations on the lower part of a tree trunk, he either pays no attention to this at all or he marks the tree because he sees it is infested with some kind of a beetle and assumes that it will die anyway. Such a tree may be a healthy one which he would ordinarily leave as a seed tree or reserved tree. The lesson here, of course, is that he should mark such a healthy tree infested with the dangerous bark beetle and not the one containing only the turpentine beetle. The marker's observations in this respect may be checked by examining the immediate neighborhood for evidence of beetle-killed or dying trees.

Diseased Trees and Snags

In the early years of timber sales in the region, close attention was given to the marking of fungous-infected and mistletoed trees, whether they were merchantable or unmerchantable. Later the practice grew up of emphasizing the removal of snags as of more importance than the felling of diseased, unmerchantable trees. There was a dangerous fallacy in this, which it is believed the latest marking rules have corrected. In the yellow pine type of the Northwest the number of trees that are unmerchantable because of disease is rarely great enough to make their elimination prohibitive in timber sale operations.

Windfall

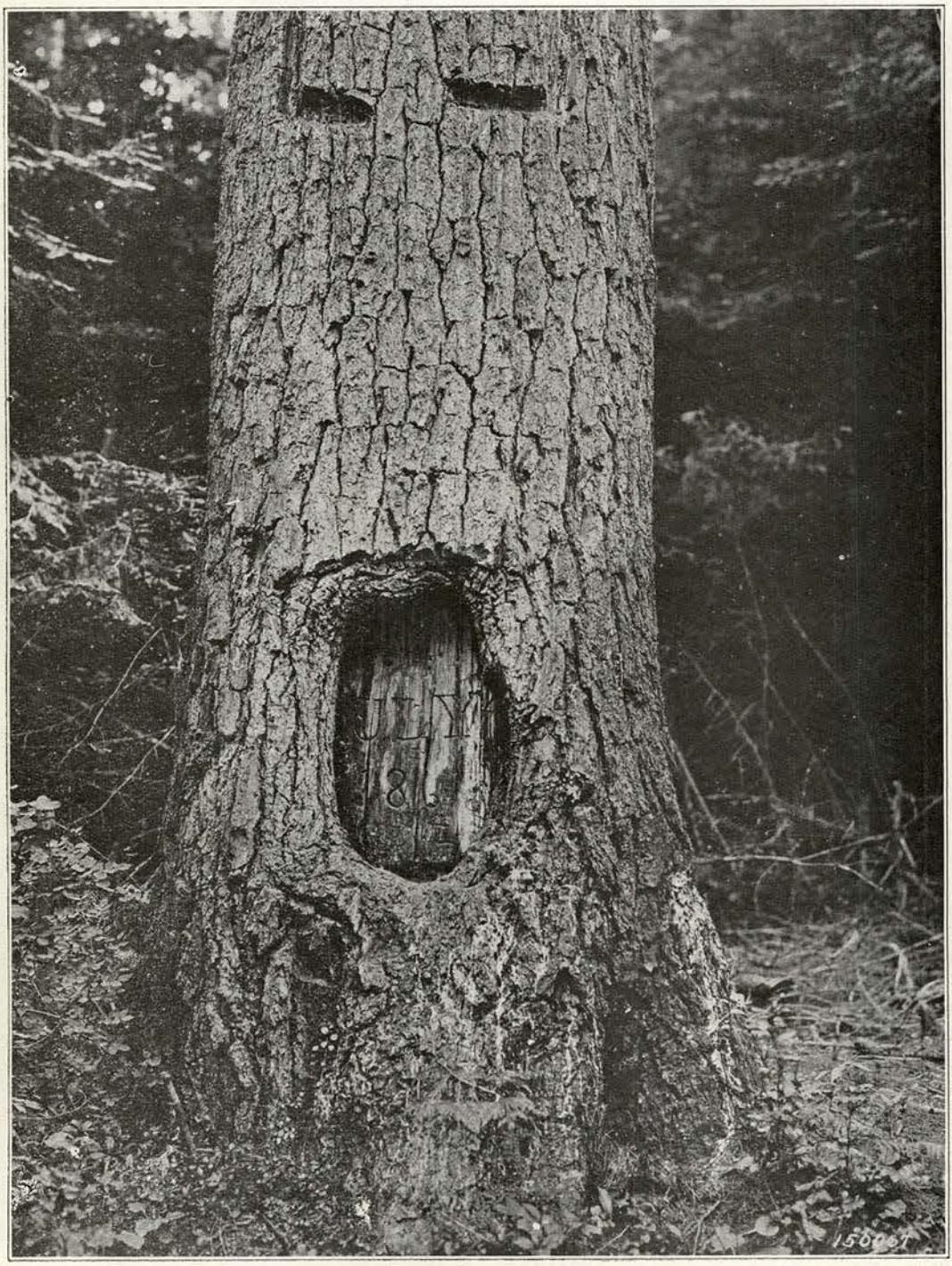
Windfall is an especially important problem for the timber marker in the Northwest. Violent wind storms occur periodically throughout the region. The weather records for 25 years at Baker, Oregon, show 15 storms in which the wind velocity exceeded 35 miles an hour and frequently was as high as 45 and 50 miles. The record of disastrous windfall shows that there may be expected, somewhere in the region, once in every two years, violent storms capable of throwing down timber. On May 26, 1913, and September 18, 1914, there were two storms on the Whitman National Forest which together blew down nearly a million feet of timber on two sale areas, or 17½ per cent of all the timber that had been reserved. On February 7, 1915, and March 17, 1918, two heavy storms on the Crater National Forest each blew down several hundred thousand feet on several timber sales. In November 1917, a number of seed trees were blown down on a Douglas fir sale on the Umpqua National Forest. On April 2,1920, another storm on the Crater National Forest threw down 5½ million feet of yellow pine timber on a number of sales, and in virgin timber. In January, 1921, the most disastrous windfall experience of the region was felt in the Olympic Peninsula, where altogether over 6 billion feet of timber were withthrown.

The violent storms, as a rule, do not cause damage generally throughout the region. They are catastrophic only in spots. Along with the catastrophes, however, which hit here and there every few years, there must be expected a normal loss from windthrow. Studies of old cuttings, 25 years old, show that this normal loss in stands left after cutting occurs at the rate of about ¾ of a tree per acre each decade. The total loss due to all causes including insects, fungi, lightning, and windfall, was shown to be about one tree per acre per decade.

Although the whole of the Pacific Northwest seems to be subject to the catastrophe of heavy windfall, normal windfall loss is often concentrated in spots within a timber sale unit. Such particularly exposed spots may be recognized by the marker in the virgin forest by windthrown trees of various ages on the ground at such points. Such spots and their immediate vicinity should, of course, receive a different treatment in marking than the remainder of the area.

Where windfall appears to be a constant danger, it is believed the practice should be followed of marking heavily in the danger spots and leaving more than would ordinarily be left on the protected areas. The result of this practice will be to maintain the desired percentage of reserved trees on the unit as a whole. The present practice too often is to mark heavily everywhere, regardless of areas which may be comparatively safe. The idea is to leave on the latter areas some trees which the marker is not willing to take the chance of leaving on the exposed spots. In selecting trees to withstand windfall, the marker must consider several factors. The tree should not have great height or an excessively large or top-heavy crown. It should not be in very shallow soil. The best type of tree to withstand windthrow is one of

(Continued on page 37)



The Mullan Tree

THE MULLAN TREE

By C. K. McHARG, JR, Forest Supervisor, Coeur d'Alene National Forest.

In the late fifties the need for a route of communication through the Inland Empire from the head of navigation on the Missouri at Fort Benton, to Fort Walla Walla near the Columbia, was pressing. Congress appropriated funds and Lieutenant John Mullan, afterwards Captain Mullan, was assigned to the task of constructing a military road between the two points; 450 miles of wilderness, much heavily timbered mountain slopes, the continental divide and the Bitterroots to cross.

The vicissitudes of the undertaking are chronicled casually in Captain Mullan's letters and reports. The trials, dangers, difficulties and disappointments were accepted with true pioneer spirit. The suspicion of the Indians was overcome by fair dealing and straightforward diplomacy.

During construction, exploring parties were continually looking for better routes to make as long a season road as possible. The overflow of the lower Coeur d'Alene and St. Joe Rivers every season was a severe handicap and the feasibility of lowering the level of Coeur d'Alene Lake by blasting out a new channel at the "Little Falls of the Spokane," (now Post Falls) was considered.

On October 12, 1860 Lieutenant Mullan wrote to his commanding officer from Fort Walla Walla in part as follows:

> "In obedience to your verbal instructions of the 13th of September I left the Mission," (the old Mission at Cataldo), "and proceeded as far as the Wolfs Lodge Prairie which is the first camp ground from the Spokane Trail".

Thus Lieutenant Mullan traversed for the first time on September 14th, 1860, what was to be the location through this section of his military road and what now is the site of the only virgin white pine type through which the transcontinental highway passes.

It was customary to mark the Military Road with the insignia "MR". One of these markers was established and remains today where Lieutenant Mullan journeyed on that day nearly 66 years ago. It was fitting that an Idaho white pine, the Mullan Tree, was selected to bear this mark, "MR July 4, 1861."

From that date the canyon which the road followed received its name. Now "Fourth of July Canyon" is known to all who travel the Yellowstone Trail.

Motor transports demanded a high speed highway so that the new grade bears a little to the east of the Mullan Tree, but for 55 years traffic passed over Mullan's Military Road at this point. Today the traveller can follow the old grade for 200 yards joining the new Yellowstone Trail at both ends.

Vandals carved initials on the tree and souvenir hunters chipped the bark. To overcome this the local communities of Coeur d'Alene, Wallace and Kellogg have built an iron fence for protection.

An area of about 160 acres surrounding the tree has been set aside from the Coeur d'Alene National Forest and dedicated to public use as a camp ground. Here, on historic ground, one may spend a few hours or days in camp, with the conveniences of fireplace and pure water. Surrounded by timber, so typical of North Idaho and of North Idaho only, almost unchanged in aspect from Lieutenant Mullan's day to this, with the Mullan Tree bearing silent witness to pioneer days now gone, one can well feel the spirit which carried civilization into the Inland Empire.

POTLATCH LUMBER COMPANY TO SURVEY ITS CUT-OVER LANDS

A study of more than usual significance is to be conducted this summer on the cut-over lands of the Potlatch Lumber Company. The study will be made under the immediate direction of Norman G. Jacobson of the Western Forestry and Conservation Association, Portland, Oregon.

In this study the cut-over lands will be divided into three classes—those carrying residual stands of timber, that is, trees which were just below merchantable size at time of logging; lands bearing reproduction which had started when logging took place; and lands which have reproduced since logging.

The state, at the same time, will make a similar study of such of its cut-over lands as are intermingled with the company lands, since these two classes of holdings logically constitute a unit.

This study is being made by the Potlatch Company as a first step looking toward the possibility of putting its operation on a sustained yield basis.

THE CLARKE-McNARY LAW PROGRAM

By RUSSELL N. CUNNINGHAM, '17
In charge, State Cooperation in Fire Control, District One, Forest Service.

There seem to be two fairly distinct schools of thought on the matter of a forest policy for the Nation. One is what might be called the Pinchot group, which believes that direct federal control of fire protection and even lumbering is the only solution of the forestry problem of the United States. The other group whose policy is pretty well expressed in the Clarke-McNary forestry bill, believes that more substantial progress can be made by the Nation co-operating with the state, and the state co-operating with the private interests and so on; all trying to work out a solution together.

The Capper Bill which was introduced in the Senate a few years ago outlines the program of the federal control advocates. Substantially the same bill is again being introduced this year. Its general scheme can be seen from the manner in which it regulates lumbering. A tax of $5 per thousand feet is placed on all logs as they are cut. The law provides, however, that a rebate up to $4.95 will be made if the operator conforms to certian rules which are made for each operating district. In the white pine region, this would doubtless mean piling and burning the slash and probably leaving some seed trees or other silvicultural measures which are consideded desirable.

The immediate aim of the Clarke-McNary program, according to the report of the senate committee, which sponsored it, is:

(1) To remove the risks and handicaps from private timber-growing as far as practicable. (Fire protection and taxation are stressed.)

(2) To extend public forest ownership in areas where special public interests or responsibilities are involved; and also where the natural difficulties, costs, and hazards attending reforestation render it impracticable as a private undertaking.

Its Method is "Co-operation With the States."

The program consists of:

(1) A co-operative study to devise a plan of adequate fire protection for each state.

(2) Financial co-operation to put such a plan into effect.

(3) A co-operative study of forest taxation.

(4) Co-operative planting on farms.

(5) Extension work in forestry to bring good forestry practices into wider use among farmers.

Four sections of the Act deal with enlargement of the national forests. Taken with cestion one of the Weeks Law and various land exchange laws, machinery is available to extend these public forests by adding a large acreage of suitable land now in public ownership and to acquire by purchase, gift or exchange, other large areas of privately owned land. Purchases are limited, however, to certain designated districts and land exchanges to areas within the present national forest boundaries.

The Clarke-McNary Act is but one more step in the state co-operative plan—not necessarily the final step. The real starting point for this program was the Weeks Law of 1911, which initiated co-operation with the states in fire protection. The Clarke-McNary Act goes considerably farther in fire co-operation than the Weeks Law, and takes up other important phases of the problem. Taxation is recognized as one of the main obstacles to proper handling of privat eforests. The place of farm woodlots in the national program is acknowledged for the first time.

Accomplishments

In fire protection, the Weeks Law has undoubtedly been a great stimulus to the timbered states in providing suitable patrol. During the thirteen years of its operation, the number of co-operating states rose from 11 to 29, the area protected increased threefold, and the combined expenditures of states and individuals on still greater proportions. During the first year of operation of the Clarke-McNary Act which has now replaced section two of the Weeks Law, four additional states have joined in the program. The greatest annual appropriation under the Weeks Law was $400,000. This fire co-operation program has resulted, not in adequate protection, but in very substantial progress as is shown by these figures.

The Nation's fire plan in round numbers is about as follows:

Adequate fire protection for all state and private lands is estimated to cost $10,000,000.

The federal government should eventually

stand one-fourth of this total or $2,500,000. Owners and the states should bear the rest.

This is the basis for the authorized appropriation of $2,500,000 in the Clarke-McNary Act. The first appropriation, however, was only $660,000, which permitted the federal government to give each state with which it is co-operating 7.4% of the amount necessary to give adequate protection. (Idaho received $24,780.) The states were asked to use this money to extend or intensify protection, not to replace funds already supplied by the state or by individuals. (In North Idaho, it was divided between the associations after each had agreed to patrol the cut-over lands within its boundaries.)

Legislation

State forestry laws have a close relationship to the Clarke-McNary forestry program, as have likewise the extension and betterment of fire protective associations. While much of the progress along these lines cannot be said to be a result of any national forestry laws, still the Clarke-McNary plan may be said to be a success if without anything else, the states and associations develop laws, policies and practices which satisfactorily meet the situation.

Twenty-six of the 42 states which had legislative sessions last year adopted 71 important forestry laws. These laws most frequently deal with the fundamental problems of taxation and fire protection. Idaho's forestry law was probably the outstanding example of legislation dealing with nearly all angles of the problem. It aims at permanent and adequate protection for all of the forest land, it provides for removal of the slashing menace and it prevents unregulated use of fire during the dangerous season. It does not deal with taxation, but by creating a representative forestry board it provides machinery for handlling such delicate problems in the future.

Planting and Farm Forestry

Twenty-five states have applied for co-operation or have indicated that they wish to apply in the project of supplying tree seed and planting stock to farmers. The University of Idaho has entered into an agreement with the federal government to carry out this phase of the work. Up to $2,000, the federal government will match University funds to allow the Forestry School to develop its nursery for this purpose.

About two-thirds of the states are dealing more or less with forestry in their agricultural extension work. $50,000 from the current Clarke-McNary appropriation is made available for encouraging this work. Since about one-third of the remaining forest land in the United States is in farm woodlots, the importance of this phase of forestry cannot be taken too seriously.

Taxation

Forest taxation is essentially a state problem, that is, only the states can bring about any suitable reform in the present system. However, the federal government is proposing to assist in a systematic study of the situation to discover weaknesses and develop remedies. State and county officials, forestry schools, forestry organizations, and forest industries will be asked to cooperate in this study. Fred R. Fairchild of Yale University, an authority on taxation, has been chosen to direct the federal activities along this line. New tax measures were passed last year by Michigan, New Hampshire and Ohio. In several other states, notably Oregon and Washington, committees have been appointed to study the situation and to recommend legislation.

The net area of the National Forests was increased practically 300,000 acres during the federal fiscal year 1925, by transfer of forested military reservations.

It appears, therefore, as a national program, the Clarke-McNary Act is beginning to bear fruit.

The Idaho Problem

The greatest forestry problems in this state have to do with the cut-over lands. It is here that taxes and carrying costs are most burdensome, fire protection most difficult, and the future ownership of the land most problematical. When this land is cut off, there is need that the slash menace be removed. There must be protection from fire for a long period of years. Taxes and fire protection costs must be such that the owner can feel optimistic about holding the property, else it will revert for taxes. Possibly the state or the nation must take over part or all of these lands.

If these and similar problems can be worked out in a co-operative way, by private agreement or state law, the Clarke-McNary program will be a success. If they remain unsolved, it will be a failure and something in the nature of the Capper Bill will have to follow.

THE TREND OF FOREST FIRE RESEARCH IN NORTHERN IDAHO

By H .T. GISBORNE,
Associate Silviculturist, Northern Rocky Mountain Forest Exp. Station.

Readers of the Idaho Forester do not need to be told why it is necessary to study forest fires in Northern Idaho. They have seen the fires sweep through virgin stands of merchantable timber and through beautiful young stands of valuable reproduction, greatly reducing the value of the merchantable trees and often completely destroying the young stands which soon would have been merchantable. The readers know that there are different causes of these fires, that some fire seasons are much worse than others, that some fires behave altogether differently from others, and that the cost of suppression, the actual cash value destroyed, and the ultimate loss to the State of Idaho vary as these factors vary. It may be of interest to explain how the United States Forest Service, especially the Branch of Research, is studying these variable conditions, and how the information obtained may be used to reduce the present high expense and loss caused by forest fires.

Coping with the annual crop of forest fires is somewhat like handling the annual sales of a certain seasonal article, rubber galoshes for instance. The manufacturer of rubber overshoes who meets the demands for his product satisfactorily needs to know four things as accurately as possible. He must know the season of the year when the demand begins, reaches a peak, and ends. He must know what sections of the country will make demands and the peculiarities of that section. He must estimate the amount of that demand. And he must know the classes of people who create the demand.

In forest fire protection the problem is very similar. We must know the average beginning, peak, and end of the fire season. We must know these facts for each section of the District. We must know about how many fires to expect in each section. And we must know the individual causes of these fires. The accumulation over a period of years of accurate records of the time of occurance of fires, their location, number, and causes will soon provide statements of the average conditions which must be met.

In Northern Idaho both the Federal and State Forest Services and the private timber protective associations have kept records long enough so that each organization now knows its average conditions very accurately. The fact is becoming all too apparent, however, that it is the departure from the average which is of greatest interest now. We have reached the stage in which we can supply adequate protection during the average year, but we are not yet prepared to guarantee adequate protection during the abnormal season, or to cut down our expenses and save the money that could be saved during years that are less dangerous than average. Most efficient protection means adequate protection at minimum cost The purpose of forest fire research is to discover the fundamental causes and effects which vary in such a way as to cause variable demands on the forest protective organization. When we know accurately all the controlling causes and their effects we should be able to expand the protective organization sufficiently to give adequate protection during the abnormal years, and to reduce expenses as much as possible and still provide adequate protection during the fire seasons that are less dangerous than the average.

In this investigation of cause and effect we usually have the effect clearly before us and then have to discover the cause or causes. Fires burn the forest materials; we know that, and we know what starts these fires. But why do most of these fires occur between June 15 and September 15 each year? Apparently the answer is, because the fuels are driest and most inflammable then. Is that the whole story, or is it also true that there is more lightning then, that there are more campers, hunters, and smokers in the woods, and more logging operations active in the summer than in the winter? How much of the variation in beginning, peak and end of the fire season should be charged to drier fuels and how much to the presence of the causative agencies? Obviously, if there were no agencies present to start forest fires, there would be no fires, even if the forest materials became drier than ever

before. But there are certain agencies always present, whereas there are seasons of the year when they do not produce forest fires. Apparently, then, the dryness or wetness of the fuels is the most important control of the starting of fires at least.

Working on this hypothesis, the fire studies conducted by the Northern Rocky Mountain Forest Experiment Station are attempting to determine how much moisture is in each of the important forest fire fuels from the beginning of the fire season, through the peak of the season, and to its close. Such information is useless for our purposes, however, unless we also know how much moisture in each fuel prevents its ignition, how much moisture permits ignition, and this in each case for each of the common causes of forest fires such as lightning, broadcast slash fires, burning brush piles, campfires, matches, smoking tobacco, etc., down to the tiny sparks from locomotive stacks, ash pans and brake shoes.

Obtaining such information calls for experiments, because we cannot wait for the slow process of obtaining records by finding a blazing match thrown by a careless smoker in each of the fuels at various moisture contents, or catching a camper leaving his fire first in duff, then on rotten wood, then in sound wood, etc., for each moisture condition of each fuel. We can duplicate those conditions experimentally, however, and that is the process being used to determine the amount of moisture in each fuel which prevents or permits its ignition by each of the common causes of forest fires. Lightning is the sole exception to this statement, and because we cannot duplicate lightning, as well as because we have not yet been present when lightning started a fire and left us intact to measure the moisture content in the fuel ignited, we have no measurements at all concerning when the fuels can or cannot be ignited by lightning.

So far most of our experimental tests of ignition have been devoted to the top layer of duff, the carpet of dead and decaying tree leaves, etc., covering the humus and mineral soil in the forest. Several reasons exist for choosing this particular material instead of twigs, slash, windfalls or snags as the object of our first work. The living forest is the most valuable type which we have to protect, and in the green forest, either young or old, there is undoubtedly more surface area covered by the duff than by any other type of fuel. The duff is a nearly continuous fuel; it is not broken up into small patches as often as twigs, dead branch wood, and windfalls. Without running through the duff so that it can ignite separate patches of the other fuels, fire can seldom spread rapidly or attain the momentum necessary for it to burst into a sheet of flame in the crowns of the trees. Hence, if the duff, especially the topmost layer, will not carry fire there is not as great a probability that a fire once started in some other material will spread rapidly. The amount of moisture in the top layer of duff is, therefore, of great significance. Furthermore, our measurements, which now include four consecutive fire seasons, have shown that the amount of moisture in the top layer of duff is usually about the same as the amount in dead branch-wood or slash, and is usually a little less than the amount in the outside half-inch wood of windfalls. A knowledge of the moisture content of the top layer of duff consequently indicates the amount of moisture in the other important fuels and, if used in conjunction with a knowledge of the relation of duff moisture content to duff inflammability, tells us whether or not fire will run through the duff, and how easily.

Eventually we must study the effect of moisture content on the inflammability of each of the other fuels. We already know, for instance, that rotten wood will hold and carry fire even when it has as much as 63% moisture content, or 63 pounds of water for every 100 pounds of dry rotten wood, whereas no case has yet been found in which the duff was burning when it had more than 25% moisture content. Such differences indicate the necessity of studying each fuel separately. We have commenced by concentrating on the duff alone and have found some facts which seem to have real practical value.

How will we use such information when we get it for all the fuels? Perhaps somewhat as follows: On the wall of his office the forest ranger will have a chart with the dates shown along the base and the fuel moisture contents up the left side. Perhaps twice each day the ranger or his assistant will read the instruments properly located to reveal the moisture content of each important fuel on nearby areas which are typical of his district. He will then plot those readings on his chart and observe:

"Well, the effects of that last rain are cer-

tainly disappearing faster than I thought they would. Twigs have dried out till they are extremely inflammable, the top duff is highly inflammable, dead branch wood and slash are in the zone of medium inflammability, snags are in the low inflammability zone, windfalls very low inflammability, and the lower layer of duff still has enough water so that it is non-inflammable. Only yesterday morning all those materials except twigs were too wet to burn. After the rain I put all my guards and smoke-chasers to work building new trails and repairing old ones but I guess I'd better put them back on patrol or keep them close to the phone to-day."

Or, in the opposite condition, the ranger will find that the fuels are still wet enough to permit him to keep his men working on improvements instead of fire protection. Early in the season the measurements should show him when the fuels are becoming dangerously dry, and, therefore, whether or not he will need his emergency men sooner or later than usual. In the fall the measurements should show when the temporary fire protection men can be released or diverted to other work. Measurements, instead of estimates, will point out the departures from the average condition and tell when to spend more money for adequate protection, and when to save money and still maintain satisfactory protection.

At present when rangers or forest supervisors want more men and more money to obtain better forest protection, the common questions from the guardian of the purse strings are:

"How are your fires behaving?" and "how dry is it on your Forest?"

If there are fires burning so fiercely that they cannot be suppressed with the available men, that is demand enough for more men and money. But sufficient men and money should have been on the job before those fires began to burn so fiercely.

If the ranger or supervisor is anticipating great danger before the fires appear, how will he answer the question "How dry is it on your Forest?" Will one supervisor say "too dry to suit me" another "Really quite dry," and another "Extremely dry"? And if they use these terms how will Purse Strings decide where it is driest, and which Forests should receive assistance?

It may help if Supervisor No. 1 says "My average fuel in the timber dropped below 20% moisture yesterday, and the average fuel in the old burn type is down to 11%." Supervisor No. 2 was not watching his forest conditions so closely, however, and he reports an average of 15% in the timber and 7% in the old burns. He probably gets men and money immediately and a warning not to wait so long next time. Supervisor Number 3, is unduly scared when his timber type reaches 25% and his open areas 15%. Money is withheld from him and safely saved.

Using measurements instead of estimates of dryness and using the same classes of fuels in each case so that one estimate is not based on duff dryness, another on dead weeds, and another on slash, such a reporting method should be more dependable than that available at present. One goal of fire research in

Photo by H. T. Gisborne, U. S. Forest Service
The highest degrees of fire danger prevail when sparks and embers, blown ahead of a large fire, start spot fires as in this case.

Northern Idaho is to supply such a method of measuring existing fire danger.

Measurements of prevailing moisture content are not enough, however, for the most efficient forest protection. We need forecasts for the future, as well as accurate statements of the present. As soon as we attempt to forecast fuel moisture content and inflammability, however, a new relationship of cause and effect springs up to demand further research. We may have found that moisture content controls inflammability, but if we are going to forecast either of those conditions we must know of an existing condition is not an accurate forecast of that same con-

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A REPORT OF A COTTONWOOD STUDY IN SOUTH IDAHO

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Instructor in Forestry

One of the finest stands of cottonwood in Idaho is located along the banks of Wood River, in Blaine County. This unusual body of timber, averaging one half mile in width, shows its best development between Ketchum and Bellvue, a distance of approximately twenty miles by river.

The stand is divided into three distinct types, as follows: a pure cottonwood type, which prevails as the dominant type along the river banks; second, a cottonwood-aspen type lying behind the cottonwood and along the edges of of the first old benches, which represent the previous water levels; third, pure aspen, occupying these first low benches and extending back to the higher sagebrush mesas.

At present, comparatively little direct use is being made of this timber, outside of its ground cover value. Stock growers in Wood River Valley have utilized the timber as shade and protection to cattle and sheep and farmers have used some timber for posts, temporary corrals and stack enclosures. A small sawmlil located near Hailey, is utilizing the best grade of cottonwood logs for egg crates, for which a limited market has been developed.

In order to determine the amount and quality of this timber, its location as to ownership, its rate of growth and its greater possible utilization by the land owners of Wood River valley, the School of Forestry sent the writer and two student assistants to map and cruise the area during July, 1925.

General Procedure

The problem of primary control was settled, after some experimenting, by assigning to one man the job of mapping the main river by plane table, pacing for distance and leaving numbered stakes at each turning point of the traverse courses. This man worked on either side of the river, depending upon the amount of brush encountered. The opposite river bank automatically served as inside primary control for the timber units on that side. The greatest difficulties encountered in primary control were brush, death of fords and lack of identified section corners for map ties. In mapping thru three townships, but five positive corners were found, including the one from which the map was started. The average error in horizontal control was five per cent.

The other two men, one on each side of the river, secured secondary control by running a compass traverse around each timber unit, starting from turning points left by the man on primary control, pacing for distance and tying in to the latter's stakes below. Each evening these unit traverse notes were plotted on the base map. Very little difficulty was encountered in tying in secondary control.

As soon as each of these outside unit controls was completed, the cruiser ran strip cruises, one half chain wide and of varying length, depending on the size of the timber block. All trees were estimated, down to 3" D. B. H., with frequent caliper checks against ocular judgment. The length of each strip was paced, recorded by tally register and, after a sufficient number of parallel strips were run to complete a unit, the strip area was figured in the field and recorded on the cruise sheet for that unit. Timber types were mapped and cruised separately. By this method of mapping and cruising, an average speed of one mile per day was maintained.

In order to construct a local volume table and a rough yield table, 188 cottonwood trees were selected thruout the stand, measured for D. B. H. and merchantable height to the first fork, and borings were taken at D. B. H. to secure age at that point. The following table heading illustrates the method of recording these field data:

Tree No.	Species	D. B. H.	Merchantable height to first main crotch in 16' logs	Top Diameter	Age at D. B. H.

Office Work

Two rainy days were utilized in securing the ownership from the county assessor's office in Hailey of all timbered forties along the river. The next step was the construction of a local board foot volume table with which to figure the cruise volume. A curve of merchantable height in 16 foot logs, based on D. B. H., was first constructed and harmonized. From this curve were read the values found in columns 1 and 2 of Table I.

Table I

Column 1	Column 2	Column 3	Column 4
D. B. H. Inches	No. of 16' Logs	Top Dia. inside bark	Vol. in Bd. Ft.
7	0.75	6.0	10
8	1.50	6.0	30
9	1.75	6.1	40
10	2.25	6.2	60
11	2.50	6.4	90
12	2.75	6.6	110
13	2.75	6.9	130
14	2.75	7.3	160
15	2.75	7.9	180
16	2.50	8.6	190
17	2.50	9.5	200
18	2.25	10.5	210
19	2.00	11.7	220
20	2.00	13.0	260
21	2.00	14.4	330
22	2.00	15.9	400
23	2.00	17.5	490
24	2.00	18.2	570

It will be noted that the number of logs increases up to a 15" diameter and then drops. This is due to the fact that the larger trees were more open-grown with lower main forks. Merchantable height was taken only to the first main fork, assuming that breakage in falling would ruin the few logs above that point.

A second curve of top diameter inside bark based on D. B. H. was then constructed from the field data, and from it was secured the top diameter shown in column 3, Table I. From the data secured from the first two curves, namely top diameter and merchantable heights, a set of graphs was constructed by scale to represent the actual dimensions of each size class. These graphs were divided into log lengths and the top diameter of each log was read from the scaled cross-section. By applying the board foot values of the Decimal C log rule to the log dimensions shown on the graphs, the volumes were secured for each size class. A third curve of volume on D. B. H. was then plotted and harmonized and from it was read the volumes shown in Column 4, of Table I.

Using this volume table, the strip cruise of each timber unit was then figured, but before it could be applied to the entire unit it was necessary to determine the percent of cruise. To do this, the base map was corrected, and the corrected area of each unit was then secured by the use of a planimeter. The per cent of cruise for each unit was then determined, applied to the strip cruise and the total volume per unit secured. The per cent of cruise on the seventy mapped units ranged from 4.6 to 52.5, with an average of 16.85 per cent for the stand.

A tabular statement of results was drawn up with the following headings:

Unit No.	Area in Acres	Bd. Ft. Vol.		Location				Ownership		Approx. Area
		Cotw'd	Aspen	T	R	Sec.	40 No	Name	Address	Total or ½, etc.
1	7.7	13,470	40,300	4N	17E	12	10-15	John Doe	Hailey	

The right-hand column refers to the portion of any unit which belongs to any one of two or more owners as indicated by the forty-lines on the type map. The total mapped area was 1460 acres cruising 8,935,000 board feet of cottonwood and 323,000 board feet of aspen.

In order to get a rough estimate of future yield, a curve of age based on D. B. H. was constructed and harmonized and from it the following table was made.:

D. B. H.	Age
7	34.5
8	35.5
9	36.5
10	37.0
11	38.0
12	38.5
13	39.5
14	40.5
15	41.0
16	42.0
17	43.0
18	43.5
19	44.5
20	45.0
21	46.0
22	47.0
23	47.5
24	48.0

In order to use this table in estimating yields, data were taken from the unit stand tables to show how many trees of each diameter class remained on the land after cutting down to an arbitrary diameter limit of 12" D. B. H. The above table shows that in five years a 7" tree will have reached a diameter

fo 13". Multiplying the number of trees per acre of each diameter class by their respective volumes now and five years hence gives the volume increase per acre in that length of time. The following table illustrates the method:

Yield Table for Pure Cottonwood Stand

1925				1930			1935		
DBH	Vol. Bd. Ft.	Trees per Acre	Volume per Acre	DBH	Vol. Bd. Ft.	Vol. per Acre	DBH	Vol. Bd. Ft.	Vol. per Acre
7	10	12.3	120	13	130	1600	19	220	2710
8	30	11.7	350	14	160	1870	20	260	3040
9	40	8.6	340	15	180	1550	21	330	2840
10	60	10.0	600	16	190	1900	22	400	4000
11	90	8.2	740	17	200	1640	24	570	4670
		Total	2,150		Total	8,560		Total	17,260

It will be noted from the above table that if the cottonwood had been cut, in 1925, down to a 12" diameter limit, there would have remained a residual stand of 2150 board feet per acre which would have increased to 8560 board feet per acre in five years and to 17 260 board feet per acre in ten years. These figures are based on the asumption that loss from windfall in the next ten years would be negligible and would be counterbalanced by the growth of those trees which were less than 7" in diameter at the time of logging.

No yield table was made for the aspen as the trees in the pure aspen type were generally crooked, and of little commercial value except as treated fencepost material. A second yield table was made, however, for the cottonwood in the cottonwood-aspen type and is given as follows:

Yield Table for Cottonwood in Cottonwood-Aspen Type

1925				1930			1935		
DBH	Vol. Bd Ft.	Trees per acre	Volume per acre	DBH	Vol. Bd Ft.	Volume per acre	DBH	Vol. Bd Ft.	Volume per acre
7	10	4.6	50	13	130	600	19	220	1010
8	30	6.0	180	14	160	960	20	260	1560
9	40	4.1	160	15	180	740	21	330	1350
10	60	5.1	310	16	190	970	22	400	2040
11	90	3.9	350	17	200	780	24	570	2220
		Total	1,050		Total	4,050		Total	8180

This table shows a residual stand of but 1050 board feet of cottonwood as compared to 2150 board feet in the pure cottonwood type, a stand of 4,050 board feet in 1930 as against 8560 board feet and 8,180 board feet in 1935 as compared to 17,260 board feet of pure cottonwood; in other words the increased volume growth of cottonwood in the mixed type is approximately fifty per cent of that in the pure stands.

RECOMMENDATIONS

Cottonwood has been ranked as second only to the red gum for crate material. If a market for thicker crate material than is now used for egg crates could be developed, the loss thru sawkerf and excessive warping of thinly sawed material could be considerably reduced. Cottonwood decays rapidly when exposed to moisture, unless treated, but is very serviceable for indoor framework in barns, machine sheds and other outbuildings.

In order to secure greater utilization of smaller material by the owners of the local mill, it is suggested that investigation be made of a possible market for excelsior, which is used extensively for packing furniture, glassware, toys, druggist's and confectioner's goods. It is also used extensively in the manufacture of mattresses. Cottonwood ranks first among American woods in excelsior production and the initial investment for machinery in its manufacture is relatively low. Single upright excelsior machines cost from $150 to $200 installed and more could be installed as the market warranted increased output. By using one or more excelsion machines in connection with the egg-crate industry, the smaller logs could be utilized.

It was noted, during the field investigation, that a considerable number of cottonwood posts were being used by the farmers, espec-

ially for the temporary fencing of hay stacks. Four to five years were given as the maximum life of these posts, untreated.

Dr. E. E. Hubert, Professor of Forest Products, has outlined the following statement on the preservative treatment of cottonwood and aspen posts:.

"Cottonwood fence posts, untreated may last no longer than two or three years under conditions favoring decay. On the other hand, the same post, when seasoned and well-treated with a good preservative, may last twenty-seven years under similar conditions. Tests on cottonwood, made by the Iowa State College at Ames and by the Chicago, Boston and Quincy Railroad Company, indicated that the normal life of untreated cottonwood in service is not more than three years while properly creosoted cottonwood ties in service for sixteen years showed a removal percentage of only 1.1 due to decay while for untreated cottonwood the removal percentage was 96.5.

Due to leaching it is not believed that such preservatives as zinc chloride or sodium fluoride would give as good service as creosote.

The cost of treating 5 inch cottonwood posts with a good grade of cresote as given by the Iowa report is about 13 cents per post. Usually the cost varies from 7c to 12c per post according to the condition of seasoning of the post, the method of treatment and the preservative used.

I would suggest the use of a good grade of creosote and the following method of treating your cottonwood posts:

1. Peel and season the posts. (Do not season too rapidly.)
2. Treat the lower three feet for two hours in hot creosote using a temperture of 220°F.
3. Allow posts to remain in cooling creosote for 8 to 10 hours or in a separate barrel or tank containing cold creosote.
4. Dip the tops in hot creosote (220°F) for 15 minutes. (This is to prevent top rot.)

Barrels, metal drums or metal tanks may be used to heat the creosote. Where wooden barrels are used a handy method is to connect two barrels near the bases by means of a large metal pipe. Heat can be applied around the pipe and in this manner the creosote can be heated in the two barrels.

There is no question regarding the value of treating posts. The Iowa report gives a total cost of 19c per 6 inch cottonwood post, untreated. This post lasted three years. A treated cottonwood post, 4½ inches in diameter cost 69c, but lasted twenty-seven years. In the first case the cost per post per year was about five cents, while in the second case it was only three cents. The saving due to reduction of replacement costs is not included, although this would give an additional figure in favor of the treated post."

Treated cottonwood has also been recommended as mine prop material, for which there is a possible local demand in connection with nearby mining property.

Several factors enter into the cutting of this stand of timber which preclude a definite recommendation as to cutting methods. In the first place, cottonwood is very intolerant of shade and requires plenty of overhead light for its development. This fact would suggest that clear cutting would be the logical method of harvesting the timber.

In that case, at least one good seed tree should be left per acre and every fourth tree left should be a male tree for pollenization purposes. These trees should be marked ahead of cutting operations and during seed bearing time, when the male and female trees can be readily distinguished. The flowers of the female tree are inconspicious as compared to the bright red and yellow staminate flowers, and are the ones which produce the cotton or seed balls.

The seed remains fertile for a short time, only, and requires bare mineral soil for ready germination. Due to the heavy under cover of brush and grass on most of the Wood River cottonwood areas, it would not be safe to recommend natural seeding as a certain method of reproduction. A better plan would be to cut the timber to a very low stump height, preferably six inches or less and not over twelve. Such low stumps from those trees which are not over twenty-five years of age would produce sprouts from the ground collar, thus combining the sprouting and natural seeding method of reproduction. The best sprouts

(Continued on page 38)

A PRELIMINARY STUDY OF SHRINKAGE IN IDAHO CONIFERS

by COLLIS H. HUNTINGTON, '26 [1]

Purpose of the Study

It was the object of this study to make a preliminary investigation of the shrinkage during air seasoning of the wood of seven different conifers. Briefly the subject matter of this article is concerned with the shrinkage of wood.

The resultant defects of shrinkage have led to a more or less unwritten classification unfavorable to many woods on the market today. Before any attempt has been made to encourage the use of some of the more undesirable species of wood, little attention was given to the favorable qualifications possessed by such woods for any use. However, now that a timber shortage is anticipated within a short period of years, it behooves the conservationist to furnish the public with reliable data relative to the properties of wood, in order that new economic uses and a demand may be created for those classes of trees now commonly looked upon as "weeds". A more or less ideal condition would be one which permitted harvesting all available mature timber in mixed stands at a profit.

Such defects in shrinkage as a relatively large decrease in size, loose knots, warping or any variation from a true or plane surface,[2] checks or lengthwise separations of the wood, and collapse or the caving in of the surface of a piece of wood, are often limiting factors in the selection of wood to be used in precise work. When the requirements are not as exacting, defects of the nature just mentioned may result in either cull or degrade. Shrinkage defects would not affect or be limiting factors in the use of wood in many instances such as the use of wood for fuel. However, it is essential to use seasoned material whenever boards or dimension stock must remain well joined. The degree of seasoning in joints varies considerably with the use to which the material is to be put, for seasoning involves shrinkage and an absorption of moisture involves a swelling of wood.

SCOPE AND METHOD OF THE EXPERIMENT

Apparatus

The apparatus used for the collection of data in this test consisted of steel calipers, a balance, and a Fries electric drying oven. The steel calipers were graduated to read accurately by means of a vernier, to one one hundredth of a centimeter. The balance used could be read accurately to the nearest tenth of a gram. The drying oven was of the type commonly used for experimental purposes.

Origin of the Data

In making tests of the nature of this study, it is essential that a detailed study be made of many specimens, in order to obtain a normal average. The present report is termed preliminary because only a few tests were made of the various species studied. With one exception readings were made from twelve test blocks as indicated in table No. 1.

Table No. 1

Common Name	Scientific Name	Grain	Serial
Western larch	*Larix occidentalis*	Slash	1-12 incl.
Western larch	*Larix occidentalis*	Edge	13-26 incl.
Western white pine	*Pinus monticola*	Slash	27-38 incl.
Douglas fir	*Pseudotsuga taxifolia*	Slash	39-50 incl.
White fir	*Abies grandis*	Slash	51-62 incl.
Western red cedar	*Thuya plicata*	Slash	63-74 incl.
Engelman spruce	*Picea engelmanni*	Slash	75-86 incl.
West. yellow pine	*Pinus ponderosa*	Slash	87-96 incl.

Data on Species Used in the Test.

Specimens of the species listed were obtained in the form of mill run material from the Potlatch Lumber Company's mill at Potlatch, Idaho. The slash grain material was in the form of 1x8 rough stock, and the individual pieces measured approximately 12" in length The edge grain material consisted of rough stock 1"x3"x14". The size of the final test blocks varied with the individual blocks. Essentially, however, the dimensions were as follows:

Slash grain material (all species) length along grain ..... 6"
width ..... 8"
thickness ..... 1"

Edge grain material (larch only) length along grain ..... 7"
width ..... 8"
thickness ..... 1"

1 Appreciation is expressed to the Potlatch Lumber Company for collecting and forwarding to the School of Forestry the material used in this experiment, and to Dr. E. E. Hubert of the School of Forestry who was influential in obtaining the material for these tests, and who gave freely of his time and ability.

2 Dept. Circular 296, p59, U. S. Department of Agriculture.

The final test blocks were obtained by sawing the original blocks across the grain. Figure 1 illustrates the method of marking the blocks so that the dimensions could be taken at the same place at each weighing.

Lines AC and BD are lines joining the mid points of the sides of the block. To measure the thickness of the specimen the calipers were placed over the edge of the block at the points A, B, C, and D; and along the sides of the lines AC and BD on which the letters are placed. The average of the four readings gave the mean thickness of the piece. The length of the piece was taken along the line AC on the side of the line marked by the number 2. The width was measured along BD on the side marked by the figure 2.

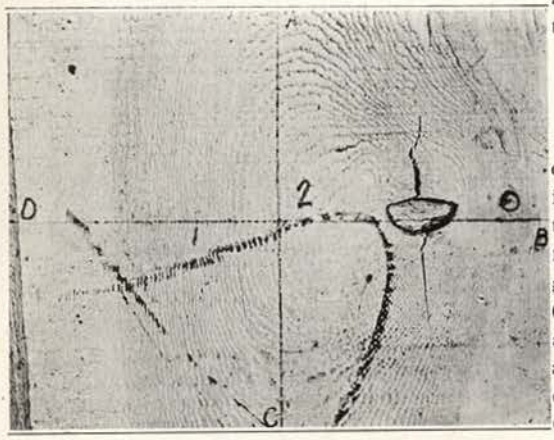


Figure 1, showing a loose knot resulting from shrinkage in Western larch.
Note markings used in measuring.

Readings were taken during air seasoning until consecutive readings and weights indicated that shrinkage had ceased. The blocks were then put in the oven and readings were recorded as in air drying.

DATA

Before taking any of the data, a table was made up (table 2). Each species was tabulated as shown in the table, tabulations being made simultaneously for all test blocks of the same species.

Having a complete set of data for all species and taken at regular intervals of time, it was possible to work out a curve (average of all curves of one species) showing the rate of shrinkage below the fiber saturation point. The percentage of volume shrinkage was used as the ordinate, and the percentage of moisture content for the abscissa. The relation as just outlined was worked out for a moisture content below 40 %.

MOISTURE CONTENT

Air-dry Material

It was found that the wood of all species contained about 12% of their oven dry weight in moisture when reduced to air-dry conditions. The figure of 12% is based upon the final oven-dry condition at 100 degrees Centigrade, assumed for this calculation to contain 0% moisture. However, wood contains a small amount of moisture even when kiln dried for a long time at 100 degrees centigrade. Record estimates that kiln dried wood at 100 degrees Centigrade still retains two or three percent of moisture[3].

Mill Run Material

Coniferous trees vary a great deal in the amount of moisture contained in the mill run material. The tests just conducted showed a variable range in the relative moisture content of mill run material.

3 Record, S. J., Economic Woods of the United States, 2nd Ed., 1919.

Table No. 2—Preliminary table (headings)

Species— Western Larch Set No. 1

Number of test block	Weight in grams	% Moisture Content	Dimensions							
			Length in cms	Width in cms	Thickness (A)	(B)	(C)	(D)	Average
1	526.5	65.5	15.40	20.46					2.425

Species —Western larch Set No. 1 (Continued)

Volume (product of three dimensions)	% Volume shrinkage (calculated from air-dry volume(	Time of measuring, weighing, etc.	Remarks
769		5pm 2-22	block is sound

Table 3

Relative Moisture Content of Mill Run Material (unseasoned)

Species	% Moisture content (oven dry basis)
Western larch	44 - 75
Western white pine	34 - 163
Douglas fir	29 - 79
White fir (grandis)	68 - 226
Western red cedar	21 - 172
Engleman spruce	34 - 149
Western yellow pine	30 - 188

Fiber Saturation Point.

The fiber saturation point in wood is that state at which the free water in the lumina of the cells of the wood has been removed, but at which the moisture is still retained in the cell walls. If wood were to shrink uniformly, free water within the cells would be totally removed before any of the moisture in the cell walls was given up. It is the opinion of the writer that under ideal conditions of kiln drying wood, this condition might be approached very closely, for the wood is heated more or less uniformly throughout and the free water in the innermost cells of the wood tends to volatilize. In as much as shrinkage does not take place until the moisture within the cell walls begins to be given up, the wood should retain its shape except for the collapse of a few of the outermost cells until the fiber saturation point is reached. The gradient curve based on shrinkage percent as the ordinate, and moisture content as the abscissa would then show a very sharp break at the point of fibre saturation. After passing the fiber saturation point the curve would flatten out.

In air seasoning the cells in the outermost part of the wood give up the free water first and then are drawn upon for a part of the water and other materials in solution within the cell walls. At the same time that the outer cells are giving up a portion of the moisture within the cell walls, moisture is "working out" from the innermost cells by osmotic pressure. The osmotic pressure is applicable because the pressure is reduced in the outer cells as the moisture in that portion of the wood volatilizes, and the free water in the innermost cells then diffuses outward thru the semi-permeable cell wall membranes. The free water from within therefore passes from a region of relatively high pressure to a region of low pressure. When the free water has been partially removed from the innermost cells, wood often reaches a more or less stable condition under ordinary atmospheric conditions. Air dry wood is therefore never uniformly seasoned in dimension stock.

Koehler has advanced a very reasonable theory for the shrinkage of wood.[4] He states in part that, "vegetable cells are composed of fine particles that have an affinity for water. The water is held between the particles and separates them somewhat. As the water within the cell walls dries out, the film between the particles becomes narrower, and the particles are drawn together by a mutual attraction causing shrinkage of the cell walls. The combined shrinkage in all of the cell walls produces a decrease in the size of the whole piece".

The curves, (Fig. 2) illustrating the rate of volume shrinkage in the woods studied, are for the most part very regular. In plotting the curves a point is reached in each curve, below which the curve seems to be more or less of a straight line, and above which the curve tends to flatten out gradually approaching a horizontal position. The point at which this change takes effect in the curve may be considered to be indicative of an approach to a state of fiber saturation.

Tieman found that the point of fiber saturation in green wood was between 20 and 30% moisture content. The average of his studies gave a value of 27%. The following figures indicate the position of the fiber saturation point in the plotted curves obtained from the data in this study.

Table 4

Apparent Point of Fiber Saturation.

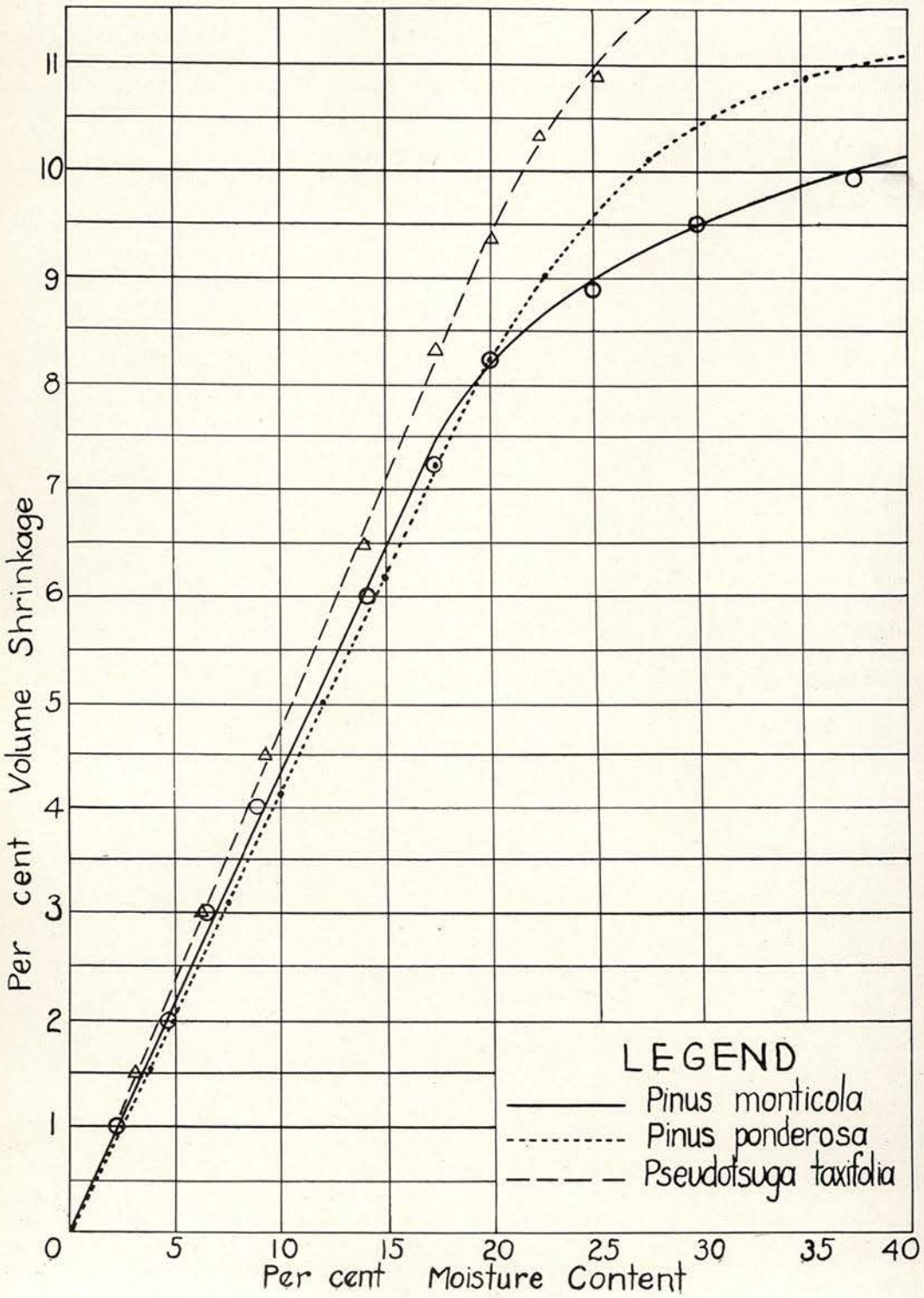
Species	% Moisture Content at apparent point of Fiber Saturation
Western larch (edge grain)	17.5
Western larch (slash grain)	17.5
Douglas fir (slash grain)	20.0a
White fir (slash grain)	20.0
White pine (slash grain)	22.5
Western red cedar (slash grain)	17.5
Engelman spruce (slash grain)	22.5

a. Fiber Saturation Point for Douglas fir is apparently high.

In Table No. 5 is given the percentage of volume shrinkage for the three arbitrary moisture content groups—0-10%, 10-20%, and 20-30%. The tangential, radial and longitudinal shrinkage is given separately for each species between the moisture limits of 0 and 30%. The high values for Douglas fir may be accounted

4 The Shrinkage and Swelling of Wood p3, Forest Products Laboratory, Mimeograph Bulletin.

Figure 2


Per cent Volume Shrinkage
0
1
2
3
4
5
6
7
8
9
10
11
0
5
10
15
20
25
30
35
40
Per cent Moisture Content
LEGEND
Pinus monticola
Pinus ponderosa
Pseudotsuga taxifolia

for in part by the fact that some of the test boards contained early decay, which was difficult to detect. However, the fact must not be overlooked, that the test material was mill run and not selected samples.

the test. Larch lumber cut from the center of the log should show the same results. The larch blocks used in this test were for the most part from the center portions of the log, so that the phenomenon of cupping was not outstanding in this species. The fact that the

Table 5

Showing Shrinkage in Air-Seasoning Below 30% Moisture Content (based on oven-dry conditions)

Species	Slash Grained	Edge Grained	% Volume Shrinkage			% Tangential Shrinkage	% Radial Shrinkage	% Longitudinal Shrinkage
			0-10% Moisture Content	10-20% Moisture Content	20-30% Moisture Content	0-30% Moisture Content	0-30% Moisture Content	0-30% Moisture Content
Larix occidentalis		X	0-3.9	3.9-8.2	8.2- 9.1	0-7.1	0-2.6	0-.14
Larix occidentalis	X		0-5.1	5.1-8.4	8.4- 9.8	0-6.8	0-3.6	0-.19
Pinus monticola	X		0-4.3	4.3-8.2	8.2- 9.5	0-5.9	0-3.6	0-.13
Pinus ponderosa	X		0-4.1	4.1-8.2	8.2-10.5	0-6.2	0-4.3	0-.16
Pseudotsuga taxifolia	X		0-4.7	4.7-9.3	9.3-11.9	0-5.7	0-3.1	0-.19
Picea engelmanni	X		0-4.6	4.6-9.0	9.0-10.8	0-5.7	0-3.2	0-.20
Abies grandis	X		0-4.2	4.2-8.5	8.5- 9.8	0-7.9	0-3.4	0-.19
Thuya plicata	X		0-3.4	3.4-5.6	5.6- 6.6	0-4.4	0-2.5	0-.16

Extent of the Shrinkage in Wood

The extent of the shrinkage in wood varies with such factors as the direction of the grain of the tree, the density, and to a less degree with the species. Tangential shrinkage is about twice as great as the shrinkage radially, while the shrinkage longitudinally is almost negligible. Table 6 gives the species listed in the order of greatest shrinkage.

larch edge grain shows a higher proportional shrinkage tangentially than the slash grain specimens of the same species, would indicate that there is considerable resistance offered to tangential shrinkage in slash grain. Another factor that would bear out this theory is the fact that when an attempt is made to flatten the cupped specimens they will usually break readily with the line of cleavage radiating from the angle of cupping. When a cupped

Table 6

Species Listed According to Maximum Shrinkage Rate

Maximum Volume Shrinkage			Tangential Shrinkage	Radial Shrinkage
Below 10%	Below 20%	Below 30%	Below 30%	Below 30%
W. larch (EG)	D. fir	D. fir	Wh. fir	Yel. pine
D. fir	Eng. spruce	Eng. spruce	W. Larch (SG)	W. larch (EG)
Eng. spruce	Wh. fir	Yel. pine	W. larch (EG)	Wh. pine
Wh. pine	W. larch (EG)	Wh. fir	Yel. pine	Wh. fir
Wh. fir	W. Larch (SG)	W. larch (EG)	Wh. pine	Eng. spruce
Yel. pine	Wh. pine	Wh. pine	D. fir	D. fir
W. larch (SG)	Yel. pine	W. Larch (SG)	Eng. spruce	W. Larch (SG)
W. red cedar	W. red cedar	W. R. Cedar	W. R. Cedar	W. R. Cedar

EG—Edge Grain. SG—Slash Grain

NOTE—In the above tables the values for Douglas fir in the volume shrinkage were the result of the mean average from all of the test blocks of that species and in as much as many of the test blocks were defective the values are undoubtedly high. The values obtained for the data on tangential and radial shrinkage were taken from the most uniform blocks.

Cupping or the tendency of wood to turn away from the center in drying is due to the greater shrinkage along the growth rings or tangentially than radially. It is because of this phenomenon that wood quarter sawed will not cup so easily. In these tests it was found that the white fir, Douglas fir, and spruce cupped very readily. The shrinkage tangentially in these species is proportionally greater than in the other species included in

board is run into the planer rolls, the board will split with a break similar to that just described.

Cupping is most predominant in those specimens containing a large proportion of summer wood. Rapid grown specimens of Douglas fir and spruce illustrate this point. Most rapid grown wood is characterized by a large proportion of summer wood.

In general the heavier a wood is the more

it will shrink when reduced to an oven dry condition. It has been found that heavier pieces from the same log shrink more than lighter specimens. It is because of this factor that light woods are usually preferred in instances where the wood is subject to much change in moisture content.

The density rule of thumb will hold in general for the shrinkage of wood, but there are certain species that deviate from the standard. Basswood is a light wood but shrinks more than one would expect.[5]

Koehler found that there was a little difference in the shrinkage of heartwood and sapwood.[6] Occasionally defects show up in the form of checks and the like, that would indicate that sapwood shrunk more than the heartwood, but the shrinkage is due principally to the fact that sapwood acts quicker than heartwood to changes in atmospheric conditions. Wherever the edger has left strips of bark on the mill run material, it is possible to note the fact that the bark shrinks much more than the adjacent wood.

Conclusions

Conclusions drawn from the data obtained in this experiment, may be summarized as follows:

1. It is essential to use boards and dimension stock seasoned to a moisture content corresponding to that of the place where used, in order to secure tight joints. The moisture content should be about 5% for inside flooring, and 12% when the material is exposed to such climatic conditions as those prevalent in and around Moscow, Idaho.

2. Quarter sawn material shrinks more tangentially than flat grain material of the same size and species. But the quarter sawn material is subject to much less defect such as cup, warp, and check, in seasoning. For this reason quarter sawn larch should give satisfactory results in inside flooring when properly kiln dried to about 5%. The size of the piece changes only as the moisture content changes.

3. Western red cedar, being a light wood and subject to a low degree of shrinkage should be a favored wood when the use is limited by excessive shrinkage. White fir shrinks more tangentially than any of the other species studied. White fir should not be used whenever the material is subject to much change in temperature and humidity, and shrinkage would be a limiting factor in its use.

4. Present improved methods of kiln drying are to be preferred over air seasoning, whenever the extra cost is justified by the improved quality of the kiln dried product. More uniform conditions are obtained by oven treatment.

5 Record, S. J. Loc. cit.
6 Koehler, A. The Properties and Uses of Wood. 1924.

FORESTERS HEAR NOTABLE SPEAKERS

By CLARENCE C. OLSEN, '26

The School of Forestry was exceptionally fortunate the past year in the number and the prominence of visitors who spoke to the School as a whole, to individual classes and at meetings of the Associated Foresters. The roster of speakers includes nationally and internationally-known figures and many others, with smaller fields perhaps, but who are authorities in their own lines.

The first address of the series was given on the opening day of the year by Mr. Huntington Taylor, general manager of the Rutledge Timber Company. Mr. Taylor spoke in particular of the qualities which enable young men to succeed in the industries. He also emphasized the importance of forestry, and the opportunities it affords to young men for a useful career. In view of the success of this meeting, the plan of having an address by a prominent lumberman on the opening day of each succeeding new year will be made a tradition.

Geo. M. Cornwall, editor of "The Timberman", spoke to the Associated Foresters on October 3, on the outlook in forestry and cited the growth of forestry in the south. One particular thought he left was that in that region banks more readily loan money on timber lands if these lands are being kept in a condition of continuous forest production

Within the same month, D. A. Shoemaker, Inspector of Grazing of the Washington, D. C. office, paid us a short visit, during which he discussed several forestry matters, with particular reference to grazing problems. At a Xi Sigma Pi luncheon, Mr. Shoemaker spoke

of grazing legislation and answered many questions raised by those attending.

Early in November, Dr. Raphael Zon, famous forest economist and director of the Lake States Forest Experiment Station at St. Paul, Minn., was with us for a series of lectures. His first talk, "What is a Forest?", which was illustrated, was given to the entire School. He discussed utilization in the Great Lakes region with the class in management and at a Xi Sigma Pi meeting, gave many personal references to forestry problems which are confronting the country at large. Through the courtesy of Sigma Xi, which he addressed upon the subject of "Forestry as a Science", the foresters were enabled to hear him another time. It was with extreme regret to the foresters that Dr. Zon could not remain longer.

Movies started the day of November 16 for the Forestry School, when R. L. Jensen, representative of the John A. Roebling Sons Co., gave a lecture upon the manufacture of wire rope, in which he used a film giving all of the steps through which their product went before emerging in final form.

Director R. H. Weidman and associate silviculturist H. T. Gisbourne of the Rocky Mountain Forest Experiment Station, visited us on the following day. They spoke to the School in the morning relative to experiment station work and again in a reminiscent vein of forestry matters at a luncheon during the noon hour. In the afternoon they spent some time in the School Arboretum, and pronounced it a splendid success. It was at the time of their visit that arrangements were made for the senior class in management to spend two weeks in the field, at the Priest River Branch of the Rocky Mountain Station.

On November 23, Albert Hermann of the Western Pine Manufacturers' Association addressed the Associated Foresters on methods of kiln-drying of lumber. Being absolutely familiar with his subject, Mr. Hermann was able to give an interesting account of studies in this field, as well as of other studies in which his organization is engaged.

Two former Idaho students were with us on the 16th of December. E. H. Myrick, ex-'17, Supervisor of Lewis and Clark Forest at Choteau, Montana, talked to the Forest Club on opportunities in the Forest Service, and he and J. P. Drissen, '21, now in the Indian Forest Service in New Mexico, recounted experiences in forestry work since leaving Idaho at a Xi Sigma Pi luncheon.

At a meeting of the Associated Foresters, on January 27, Dean F. G. Miller reported the meeting of the Western Forestry and Conservation Association held at Victoria in December; Dr. E. E. Hubert discussed the conference at Missoula in January to consider matters pertaining to forest investigations; and Professor H. I. Nettleton told of the Pacific Coast Logging Congress held at Seattle. Dr. Charles S. Crandall, horticulturist at the University of Illinois, who was a guest on the campus at the time, narrated several experiences in forest studies which he conducted in Colorado, before forestry was receiving the attention that it is at the present time.

Dr. C. A. Schenck, once director of the Biltmore Forest School and now of Darmstadt, Germany gained the overwhelming admiration of the students on his first appearance here. He was with us for several days, during which time he covered a multitude of subjects with characteristic forcefulness. At a meeting of the entire School, he compared Europe and American forestry; in the classrooms he discussed many phases of forest economics; at a Xi Sigma Pi meeting, he spoke of the outlook in the forestry profession, and at the Forestry Banquet, on the 16th of February, he ranged far and wide in a running review of forestry developments, interspersing his remarks with many humorous allusions to personal experiences. The morning of February 17, he delighted the student body and faculty in a masterful address at the University Assembly. It is needless to say that Dr. Schenck's visit inspired a greater interest in forestry on the part of everyone who was so fortunate as to hear him.

Fred Morrell, District Forester of District 1, at Missoula, Montana made his initial appearance at the annual banquet, speaking on the topic of "Forest Playgrounds". He spoke on various economic phases of forestry to the assemblies held by the Forest School during the ensuing two days, paying attention to the management of national forests and to employment. As in the case of Dr. Schenck, we gained new inspiration from the talks of Mr. Morrell. Xi Sigma Pi had the pleasure of entertaining Mr. Morrell at luncheon, where he talked entertainingly of personal experiences in forestry.

Supervisor C. K. McHarg of the Coeur

d'Alene National Forest was with us from February 23 to 27 and gave a series of instructive lectures on the management plan for his forest. Mr. McHarg gave an especially clear-cut talk to the members of Xi Sigma Pi on the opportunities in the forestry profession and of the qualities necessary to success on the part of those newly entering the Forest Service.

On March 15, Wolford Renshaw, '25, deputy state forester, narrated experiences in enforcing the Idaho fire laws and of forest conditions throughout the state as they pertained to his office.

Among other visitors of note during the year, but whom the Associated Foresters were not so fortunate as to hear were A. W. Laird, general manager of the Potlatch Lumber Co.; A. D. Decker, land agent, Potlatch Lumber Co.; A. W. Cooper, secretary-manager of the Western Pine Manufacturers' Association, Portland, Oregon; Supervisor Paul A. Wohlen of the Clearwater National Forest, Orofino, Idaho; Hon. Lloyd A. Fenn, Kooskia, Idaho, and Herman Bauman, '24, forester to the California Fruit Growers' Supply Co., Susanville, California.

THE SECOND AMERICAN FOREST WEEK ESSAY CONTEST

By H. I. NETTLETON

As a special feature of the 1925 American Forest Week Program, the Associated Foresters of the School of Forestry, University of Idaho, sponsored a statewide high school essay contest. Cash prizes, totalling $30.00 were offered for the best three essays on "Why Idaho Should Perpetuate Her Forests". Honorable mention was given to the winners of the fourth, fifth and sixth best essays.

The response to this first contest was so satisfactory that the North Idaho Forestry Association agreed to sponsor a second contest during the 1926 American Forest Week program. The subject chosen was "The Relation of the Forest to the Farm". All regularly enrolled high school students, not exceeding eighteen years of age, were eligible to enter this contest. Essays were not to exceed 2500 words in length.

Approximately one hundred students entered the contest, representing high schools from every section of the state. The task of the awarding committee was, by no means an easy one. The essays were graded on the basis of number and application of forestry facts presented, on a knowledge of interrelated farm economics as indicated, and on the general appearance, readability and use of English.

Miss Margery Stock, of Fielding High School, Paris, Idaho, won first honors and a cash prize of $15.00. Miss Stock has just finished her second year of high school work, and according to her instructors, has made a splendid record, being very scholarly in her work, and a young lady of high ideals and splendid character.

Miss Stark's essay is given elsewhere in this edition.

To Miss Vella Egleston, representing Kamiah High School, went second honors and a check for $10.00. Miss Egleston is strictly a Kamiah product, having attended the Kamiah schools from the lower grades. She plays the piano, sings soprano and plays basket ball in addition to her scholastic achievements. Miss Egleston was graduated on May 18th.

Miss Ruby Thenon, wearing the colors of Kooskia High school, won third honors and a check for $5.00. The winning margin between Miss Egleston and Miss Thenon was exceedingly close and necessitated an extra session of the awarding committee. Miss Thenon has two more years at Kooskia.

From Moore, Idaho, came an essay by Miss La Von Crawford which won first honorable mention. Miss Crawford was also graduated this spring with honors, being valedictorian of her class. In common with her sister contestants, Miss Crawford has been highly recommended for her scholarship and readiness to accept responsibilities while in school.

Second honorable mention went to Miss Florence Auxier, a junior in the Meridian High School. Miss Auxier ranked among the first six contestants in the 1925 contest and has another year before graduation.

Miss Georgia Zumwalt, a junior in the Moscow High Schools won third honorable mention. Her contribution won a place by its originality.

These contests are awakening a wider interest in forestry and its relation to the State of Idaho, and it is sincerely hoped that an even larger enrollment will feature a possible repetition of this contest next year.

THE RELATION OF THE FOREST TO THE FARM

By MARGERY STOCK
Fielding High School Paris, Idaho
First Prize Winner in American Forest Week Essay Contest.

Dear Friends:

I am a tree—an Idaho tree—growing in a national forest. Foresters have often built their camp fires under my protecting arms, and talked far into the night of things that interest me strangely. Last summer a group of farmers, with two professors of agriculture, spent two weeks hunting in the forest and pitched their tents in the shade of my fragrant boughs. From them I learned surprising things. This information together with things that I have seen have inspired me to talk to you citizens on a subject that concerns you vitally, i. e., the relation of the forest to the farm.

As I have said before, I live in a national forest. It is situated in eastern Idaho in the Rocky Mountains. They, with the Bitterroot Mountains, form the eastern boundary of Idaho and are commonly called the continental divide and water-shed. I suppose you are wondering what a water-shed is. The peak which is my home has an elevation of over seven thousand feet, thus the moisture laden clouds from the Pacific Ocean cannot easily pass over without losing their moisture. These forest-covered mountains, with the aid of the humus and interlacing roots, hold the water and are called a water-shed. The rain is welcomed by us as it aids our growth and we hold it among our roots and let it seep gradually to supply the surrounding grass-lands and streams.

The Snake River has its beginning in this vicinity. By means of reservoirs and dams the water is saved for irrigation. Idaho has a greater irrigated area than any other state in the Union. It is estimated that it has two and one-half million acres. In 1919 the capital invested in the whole enterprise was ninety one and one-half millions, and the products raised were valued at seventy seven millions of dollars. Since Idaho is situated entirely on the western slope of the Rocky Mountains, we supply it with water held in storage by our roots. More than one-third of Idaho is forested and 80% of this area is included in the national forests. I am a part of these national forests and it furnishes me, as well as the other trees, a great deal of protection, as we are not allowed to be cut until we are mature. The land, then, should not be cleared entirely as the clearing endangers the cities below by letting the rainfall wash down the mountain side without anything to stop it.

The Snake River is the great river that we help supply with moisture. It drains seven-eighths of the state of Idaho and is the largest tributary of the Columbia River. Many dams and reservoirs are constructed in and near it to save the water. The Arrowrock Dam is one of the largest in the world. From the consideration of these things we see that farming is very extensive. The wheat counties are Latah, Nez Perce, Lewis and Idaho. There are approximately twenty-five millions of dollars worth produced annually. Oats are raised mostly in Fremont and Twin Falls counties, with an annual production worth nearly seven millions of dollars. Barley is raised extensively in Nez Perce, Lewis and Idaho counties. The value is estimated at five million dollars annually. The worth of the hay crop grown mostly in Canyon, Twin Falls and Iincoln counties is estimated at thirty-five millions of dollars. In fact this is one of the most important crops. The value of the annual potato crop is five million dollars. This crop is principally grown in Twin Falls, Bonneville and Bingham counties. Boise and Payette counties produce much fruit. There are approximately one million five hundred thousand bushels of apples produced annually, one hundred and fifty thousand bushels of peaches and seventy-five thousand bushels of pears. Forty thousand tons of beet sugar are refined annually. This, then, is the value of the forest to the farmer as a moisture supplier in Idaho, and what is true of this state is equally true of many others in these grand United States of ours.

We, the forests, serve as a summer pasture for live stock and especially sheep. Both of these are of vital importance and closely related to the farmer. The milch cows furnish the farmer milk, butter and cheese. In 1912 thirty-six butter and cheese factories were reported in operation. The farmers, although not the possessors of these large herds of

sheep, are benefited directly or indirectly by them. They use the meat on their tables and use the wool for their clothing. The value of the sheep shipped for mutton and of the wool shipments amounts to over ten millions of dollars annually. Many draft horses, also, graze here. These, the farmer uses in working his farm. Thus the forest aids the farmer in his work and in supplying his food.

There is much need for lumber and trees in all of the farmer's enterprises. He uses lumber to build his home, his fences, his barns, machine sheds, and store houses. The national forests are operated in such a way that lumber is cut wisely and without harm to the forests. Furthermore the forests, both state and national, benefit the community in which the farmer lives. Two funds, the "Forest Development Fund" and the "Forest Highway Fund", are appropriated for the building of roads and trails within and to the national forests, the trails within being a means to protect the forests against fires. Besides these funds, there is an annual payment to each county having national forests of twenty-five per cent of the gross receipts for the support of the common schools. The state also supplies funds for these purposes .

The farmer receives many useful and necessary things from the forest. The rubber trees supply him with boots, rubbers and tires for his "Tin Lizzie." Turpentine, another forest product is used for cuts and sores and forms an important ingredient in the paint which preserve his sheds, machinery, furniture and home, and makes them attractive. The paper on which he writes and the newspaper which he reads is made from wood pulp. It is estimated that six acres of spruce timber are required to furnish sufficient paper to publish the Sunday issue of a metropolitan newspaper. From this he gets his information about crops, markets, social and weather conditions and many things pertaining to the farm. The books from which his children secure an education are partially forest products. The different trees can be used for fire wood. Thus we, the forests, furnish many useful products for the farmer.

The visitors who come to the forest for recreation and sport are many because we shelter the wild animals and serve as a protection to them. There are also many streams protected by us which are the homes of fish, and the people often come to catch them. Though some men are our enemies, I still feel safe in living in this national forest and have found many friends.

Only today I had a forester say that seven percent of the forest land and nearly thirty per cent of the timber is owned by private citizens and that at the present rate of cutting this will last only about thirty-five years. We cannot hope to supply Idaho with timber even with the aid of the state forests. I appeal to the people to study not only us, but all of the trees, and cut their timber wisely so that the supply of timber will increase instead of decrease.

Our greatest enemy is fire. Left burning by careless visitors, it consumes us ravenously. Can't you give us more protection?

I love to live in the forest and meet many people who inspire me to tower still higher and be as useful as possible to the farmer and to everyone. I like the music that the wind plays on my needles and I like the shifting rays of the sun. We try to awaken in men ideals, thus inspiring them to do better. Many poets and great men have been inspired by us and by our ancestors. Homer, the Greek poet, loved nature; Abraham Lincoln enjoyed her beauty; Roosevelt found his recreation amid her charms. As the three main things in order to live are food, shelter and clothing, the forest aids either directly or indirectly not only the farmer, but every human being.

A PLAN FOR EXTENSIVE SURVEYS IN REMOTE REGIONS OF IDAHO

By CHARLES E. FOX, '27

This article is written for conditions such as are found in the more remote districts of Idaho. Some of the ideas herein set forth might be applicable in any part of the country where the forest region is rough and inaccessible. These two qualifications, rough topography and inaccessibility, are fundamental to the understanding of this report and the limits thus necessarily imposed must be continually in the mind of the reader.

METHODS

Control

In determining the system to be used in running the control, so many factors enter into consideration that they will not be discussed in detail here. The method to be used should be such that results are within the limits of error commensurate with the degree of accuracy observed in all other parts of the survey. If a very accurate survey is to be made, good maps are needed, and if they are not available the control must be run with a transit. If less accurate work is allowable, a compass and chain would suffice. In order to save all the time and money spent in actual running control, available maps should be carefully checked, and if they are acurate enough for the work, they should be used.

Purpose

Very little is known concerning many of these remote regions. The districts are large, the topography forbidding, and consequently few of the forest employees leave the main trails. Inaccessibility prevents recreationists from wandering very far from the beaten path. Consequently, when some sort of report is necessary, very little is actually know about that which is on the ground. Frequently the timber survey serves as the basis for management plans, when the forest is placed on a sustained yield basis. This use of the survey is ever increasing and is becoming the chief objective in many cases.

Class of Survey

Ordinarily the region will be so situated that many years will have passed before it becomes of great importance commercially. Thus an extensive survey is in order. It must cover an enormous area in a comparatively short time, it must give a great deal of information and it must be cheap. The problem now narrows down to the obtaining of data in great masses, on a large scale. Obviously, the percent of estimate must be small—five percent or below. In fact, we may almost say that five percent estimate is certainly too high because the cost is too great and since the other elements of the survey are on a less accurate basis, such an estimate is not justifiable.

Field of Survey

What factors other than the timber estimate shall be included? This brings us up to the problem as to which is the more important, a timber survey with stress on the timbered areas, or a fire survey emphasizing burned areas for purposes of computation of future yields and values. There are enormous burned areas on the national forests in Idaho and there is no doubt of their importance. Therefore, if the area to be surveyed is one where logging is the chief consideration, the timber survey should receive greater weight and if the area is largely burned, where plans must be formulated for many years in the future, the fire survey should occupy the important part of the reconnaissance.

At any rate, there should be information on drainage, topography, soil, timber, burns, grazing, fire hazard, reproduction, transportation facilities,logging chances, and recreational possibilities. The best way to organize this collection of data seems to be through a combination of field map and write-up.

Those features which can be better mapped than described in words should go on the field map, as this makes for simplicity and clearness. Care should be taken that too much information is not crowded into the field map or a meaningless jumble is bound to result. Under this system at convenient times during the season, say every three weeks, the field maps are transferred to office maps which are the basis for all final maps, graphs, tables and compilations.

Size of Crews

If speed is imperative, two similar parties will make the survey, but if funds are tight, one party will be used and the work distributed over a longer period of years. Seldom should there be more than 5 men in the party including a chief, a packer, cook, and three estimators. In ordinary extensive work it will be found that with five men, camp will be moved every two days, and in the more extreme cases every other day, or every three days.

Per Cent of Cruise

When one comes to decide upon the percent of cruise to be made there are a great many factors which should be taken into consideration—so many, in fact, that they cannot be discussed here. It will suffice to say then that the following arrangement might be practical and satisfactory for this kind of a cruise. There should always be two lines through a section. In order to facilitate the use of one-man crews the circular plot method should be employed. These plots should be ¼ acre in size (59 foot radius) and should be

estimated along these two lines through each section, being spaced according to the commercial value of the area. When there is enough merchantable green timber in a section to justify a more careful estimate there should be a 2½ percent cruise, otherwise it should be 1¼ percent.

Guides to the Survey

Points to be remembered in connection with the estimate are:

1. Ocular method of estimating is to be used on both diameters and heights.
2. Estimate trees 12" and over D B. H.
3. Estimate heights to nearest ½ log length (8') to an 8" top.
4. Check log length by pacing windfalls.
5. Run strips at right angles to the drainage when possible.

The chief should keep in touch with the nearest ranger, so that the available fire-fighting force is increased. This he usually does by using an emergency phone which can be connected to any woods line encountered and calling in thru the employment of a "howler" at the ranger station. The party of course, is always supplied with fire-fighting tools and emergency rations.

CAMPS

It is altogether proper that some space be here devoted to the subject of camps, inasmuch as the average survey crew will make and break camp some 25 or 30 times during the course of a summer season.

Locating the Camp Site

It should be the duty of the chief of the party to pick the location of the camps since it is his responsibility to see that all sections are surveyed, and reached as easily as possible and that camps are satisfactorily located with regard to the lines which are to be run. The chief should know approximately where his camps must be for several weeks ahead and plan his work and the packers' trips for supplies accordingly.

The chief should plan the work so that few, if any, side camps are necessary. Except in rare instances these one-and-two-day back-trips can be avoided with a little careful manipulation of camping places.

The Camp Site

A camp should be located in such a way that in returning from running a line, an uphill climb to camp is avoided. This necessitates the location of camps in lower country, from whence lines are run uphill with a consequent downhill trip into camp after the day's work. However, as most camps are near the tops of ridges, where travel with stock is easier, this more or less ideal condition is seldom realized. A level place, near water and wood, is also necessary, but the presence of stock feed near at hand should be among the first considerations.

Without sufficient grass the stock cannot be held. A delay is liable to result while the packer makes a trip after them and thus the packer and everyone loses time and temper. Stock that are easily satisfied and seldom run away are a blessing indeed. This point in regard to stock should also be borne in mind—they will invariably return over familiar trails, and so they should be kept "above camp" where possible, and when they try to go back over the trail traversed recently, they can be shunted back into the new country from which they are unlikely to venture, unless feed is especially poor.

A camp should be so located that one has to walk no more than five miles to a line. This should be the absolute maximum. The chief must remember to make his plans so that adjoining sections out of reach from one camp will be within range of some future camp.

MAPS

Number and Kind of Maps

Ordinarily, it will be found that all of the necessary data can be shown clearly enough by the use of three maps—the drainage map, the silvical map, and the hazard map. If more importance is to be placed on other features, such as grazing, lookout control, logging, or management, these may be shown on separate maps or in combination as is desired.

1. The Drainage Map

Lightly drawn lines, with arrows, should represent the trips through the section. Using the control map as a basis, the details of the drainage for the whole section should be filled in by sketching in all creeks estimated to be carrying water the year round at the time they are crossed or observed. The complete drainage should be sketched to edge of section, and one should be sure to put the names on all larger streams with arrows to represent direction of flow. Trails should be sketched to edge of section, good trails with dashes thus ------and poorer trails with dots....., also cabins, lakes, ponds, ranger stations, lookouts,

smokechaser camps, etc. Show with hachures all important peaks, ridges, saddles and passes.

2. The Silvical Map

This map shows the boundaries of green timber, burns, meadows, and barren areas with solid lines. On this and on the hazard map no areas under 160 acres are mapped.

a. Green Timber

The green type should be labeled "Gr" and should show the species and age-class as per the legend. For example: $\frac{\text{SP-V}}{\text{AF-M}}$ denoting a spruce-alpine fir type dominated by spruce (since it is the first named), the spruce being over 180 years old (Veterans) and the alpine fir 120-180 years old (Mature).

If it is a pure stand only one species would be noted and if a mixed stand more than one species as in the example, but never more than three species are to be considered, and they are always named in order of predominance of volume in the stand. This also applies to reproduction in burns.

b. Burned Areas

The burned type should be labeled "Burn" with the year of the burn as approximated by observation. In this connection, I might say that it is well to be fully acquainted with the big fire years of the past to facilitate the use of a good background for these approximations.

c. Reproduction Plots in Burned Areas

The burns are roughly classed as either reproducing or non-reproducing. This classification is based on tallies of reproduction plots every ten chains on the line through a burn. These plots are best taken by counting the number of seedlings and saplings by species on a plot approximately 21 feet square. Multiplying the count for each species by 100 gives the average number per acre for that species.

If there is a total of more than 200 seedlings and saplings per acre on a certain burned area it is classed as reproducing, and if fewer than this number are found it is non-reproducing. If reproducing, the species are noted on the maps as in the case of timber, in order of predominance, with the number per acre and the age class which always will be in or immature (0-60 years old). If not reproducing, the burn is simply labled NR.

Meadows over five acres in size should be mapped for the convenience of travelers and labeled Md.

d. Barren Areas

The barren type is of such a nature that trees find it impossible, or at least extremely difficult to grow there and is not to be confused with non-reproducing areas where the soil is such that seedlings should flourish. The type is usually found at the higher, rugged situations. On the map it is labeled Br.

3. The Field Hazard Map

This map roughly shows the fire hazard on various parts of the section. The fire hazard is either low, medium or high, depending upon the inflammability or fire risk. Green and barren types are always low hazard. The inflammability of burns must be left entirely to the judgment of the estimator. No satisfactory basis has yet been determined, although from observation, I would say that burns over 15 years old are a low hazard, burns 6 to 15 years old a medium hazard, and burns which have occurred during the last 6 years, a high hazard.

AVERAGE COSTS

Three months season. Figures based on survey on Lochsa district, Selway National Forest, 1925.

Salaries

Packer @ $100 per month	$ 300
One Estimator @ $75	225
One Estimator @ $80	240
One Estimator @ $85	255
Chief of Party @ $110	330
Total Salaries	$1350

Food

5 men, $1 per day each, total	$ 450
Total cost for season	$1800
Total cost per day	$ 20

Summary of Time

Cruising, 32 days	$ 640
Moving, 23 days	460
Fire, 6 days	120
Moving (fire), 8 days	160
Delays, 4 days	80
Maps, 5 days	100
Sundays and Holidays, 12 days	240
Total cost, 90 days	$1800

Summary of Costs:

Total miles ran (lines)	154
Cost per mile	$11.68
Total number sections covered	285

Cost per section ..... $ 6.31
Total miles moved 225
Cost per mile ..... $ 2.04
Total number acres cruised 182,400
Cost per acre ..... $ 0.0098
(Practically one cent per acre)

IDAHO'S TIMBER TAX PROBLEM

(Continued from page 4)

of handling lands that are acquired through tax delinquencies by the counties puts an end to the possibility of county management of timber lands—the counties are only too glad to divest themselves of title so that some revenue may be directed to the treasury by having the lands placed on the tax rolls. In the case of cut-over lands thus secured it means that the county would have to sell them, time and again at tax sales as they revert, without any appreciable financial receipts until such time as the investor could see a reasonable chance to profit by the purchase, and this condition would not arrive until the reforested area showed itself to be covered with an age class of timber well toward maturity.

Timber, like ore. has no tangible economic value until severed from the freehold. It is only at the instant of severance that the owner has any chance to secure a market for his product, the condition which makes the timberman's property of tangible or taxable value. Here then is created a property which is subject to valuation and properly liable to taxation for its intrinsic worth. Without reaching a state of personal property the timber can not be segregated from the realty which has a value only for the purpose to which it is adapted or used.

When considering the similarity of the mining and timber industries as tax paying propositions it should be borne in mind that the ore in place suffers no deterioration while the timber, if allowed to remain unharvested soon dies of old age and becomes lost as a revenue producer. Also, once the ore is withdrawn from its depths it is forever lost as a revenue producer, but the timber under proper management reproduces and continues its revenue producing value indefinitely. Hence it would seem that a severance tax on timber has even more justification than one on ore for the reason that timber is capable of production while a mine is not, and would thus afford a cycle of taxing values for all time.

Equitable taxation is in a large measure a matter of education. In the state where there is no established policy of disposing of public lands and especially where the mine tax system as used here is not in vogue it would be a rather difficult thing to secure legislative action in line with the thought expressed in this article, but in Idaho where these things are well known to the citizens and in a very large degree appreciated the situation is not so terrifying. It is but a step from the mine tax system to the severance and surface tax idea for the forest.

Compelled as the writer is, to devote his thought to the question from a layman's viewpoint, there is no entrance here of the technical features involving formulae. Such consideration must be left to those qualified in their profession, but once the idea prevails that Idaho can well afford to adjust its system to meet the commutation, land value, and severance tax theory our problem may well be scrutinized by those versed in the multitude of issues arising in forestry itself.

The admirable forest law passed at the last session of the legislature is going to have a far reaching effect upon the adjustment of our present method of handling timber tax The law will bring forth the need for greater care of the forests to the public mind and thereby influence the tide in favor of a more general consideration of the problem. True it is that the present forest law will need revision and so would it be with the initial forest tax law as here advocated but time and experience will cure the defects in any legislation inaugurated.

Another very pertinent factor in the hastening of the time to a revision of our present method of assessment is the ever increasing inroads upon our virgin stands by the lumberman, in that it results in a loss in revenue to the taxing unit because of low assessments on cut-over areas. Alarming conditions are arising in various parts of the state and legislation is going to be demanded by the general tax payer in self defense.

ENGINEERING ASPECTS OF FORESTRY

(Continued from page 7)

for breeding and winter protection for many of our wild animals.

Engineers, and agricultural engineers in

particular, have therefore a distinct field, an obligation to discharge, in the preservation and better utilization of the forest.

The remarks by Dean Cooley, of the Department of Engineering at the University of Michigan, express this thought much better than I could possibly do. In a letter to President Hartness of the American Engineering Council, he says:

"It has been one of my ambitions to do something worth while in reforestation. I consider it the most vital factor in the future welfare of the country. Looking into the future no further than 75 or 100 years I can see conditions arising, if our cut-over lands remain barren, which will make it very difficult if not impossible to live in this north temperate zone of ours—certainly not in the way we are now living. The price of coal will have advanced beyond what the ordinary man can pay; and the streams which can produce 50 million horse-power will have become filled with earth and silt washed from the watershed to such an extent as to partially or wholly destroy them for power purposes. ..... And he (the engineer) could do so much if he would. And he will, I am sure, when finally aroused to a sense of his responsibility. I have faith in the engineer—absolute faith—that when aroused he will see the way, dark as it is, to bring to bear a protective hand as great as his creative hand is now. If the engineer and all the name implies, fail the world, what must the writing of the future be for ours, the greatest of all civilizations we know aught of?"

SOME PRINCIPLES TO GUIDE THE MARKING AXE IN WESTERN YELLOW PINE IN THE NORTHWEST

(Continued from page 11)

medium height and pyramidal crown, with a good root anchorage and with the center of gravity, so to speak,, nearer the ground than the top.

Regarding Poor and Rocky Sites

Over a large part of the region, the yellow pine type often contains extremely rocky areas, sometimes 15 or 20 acres in extent. Usually these are in the form of broad ridge tops covered with open stands of timber. Although the timber is shorter it is often straight and of large diameter, with one or two good saw logs per tree. It has been the custom on many timber sales to mark such areas when they are encountered. Frequently the markers discuss the silvicultural advantages to the site of leaving these trees, regardless of merchantability, but unconsciously they are guided by the desire to get a cut. Thus, the trees on these sites, if they are merchantable, are practically always cut. Such rocky sites in their present condition of open forest cover are properly protection sites. What few trees are on them, no matter what their age, should be left there to build up forest conditions. The stumpage from such areas is extremely low, whereas the value of the trees to the site is immeasurable. They keep on seeding, they hold moisture in the soil, and they build up the site.

In some parts of the region, there are occassionally very steep ridges composed of loose morainal soil. The yellow pine cover here becomes open and the trees short, possibly containing 2 to 3 logs. There is very little or no ground cover on these steep slopes. Here also trees that could possibly be considered merchantable were marked. And here, more than any where else, the site demands leaving everything, particularly on the south slopes.

Instruction and Inspection

The local timber marker is usually the first man to admit a need for instruction and to express a desire for it. Printed marking rules, no matter how good they may be, do not alone serve in the way of instruction. Nor do the brief inspections from the District office, necessary as they are, serve as instruction. Least of all does an inspection memorandum serve the purpose. The best way of carrying on instruction is for a competent District officer to make the rounds of the timber sales each year and to mark—axe in hand—side by side with the markers on each sale. By spending a week in this way with the timber sale officers of the national forest, the greatest good can be accomplished in interpreting instructions and explaining the principles underlying them. It may be pointed out, also, that the instruction is not entirely one-sided. There are always different problems coming up on the sales which will be new to the District officer. Also, there will always be the viewpoint of the field man who lives the year round with his problems. Whenever it can be arranged the trip of the District officer to the larger timber sale forests, at least, should be

made in conjunction with the forest entomologist and forest pathologist.

Aside from learning from others, there is much that the marker can learn for himself, much that he can learn directly from the forest. Indeed, if he is connected for several years with the same sale or sales, he has an excellent opportunity for doing a little individual research. He can, for example, note down observations on the diameter at which trees begin to seed effectively. This will be indicated by the number of old cones under the trees. He can also watch the future of trees which he finds becoming infested with bark beetles. He can further observe whether trees of doubtful crowns recover or deteriorate. Such observations as these will not only improve his own marking, but will add materially to the sum of marking knowledge.

April 14, 1926.

THE TREND OF FOREST FIRE RESEARCH IN NORTHERN IDAHO

(Continued from page 18)

dition to-morrow, or next week, or next year. Manufacturers, wholesalers, and retailers of silk shirts found that out with financial emphasis when an unprecedented demand for their product suddenly collapsed to an almost negligible quantity following the World War. Many men engaged in forest protection have learned the same lesson to their sorrow, when a nice quiet spell with no fires suddenly changed to an epidemic of raging infernos. In this case the possibility of the sudden change might have been anticipated either by knowing correctly the degree of existing dryness or by forecasting fuel moisture content and causes of fires a few days ahead.

In forecasting forest fire danger two separate predictions are necessary. First, the fuel moisture content, hence inflammability, and second, the activity of the causes of forest fires. Will the fuels burn, and, will something start them burning?.

The weather, of course, controls changes of fuel moisture content. Hence forecasts of rain, humidity, temperature, wind, sunshine, etc., must be available and we must know how each of these elements affects fuel moisture content before we can predict it. Weather forecasting is the field of the Weather Bureau; our first research has concerned itself mainly with the effect of the weather on the fuel moisture contents. With the 36-hour weather forecasts available at present we have been able to predict the degree of inflammability of fuel, the top duff, 36 hours ahead with very satisfactory accuracy. Gradually this work must be extended to include forecasts of the degree of inflammability of the other fuels as well as the duff.

In predicting the activity of the fire-starting agencies we are making progress principally in the study of lightning storms. Approximately 175 fire lookouts, stationed on the higher mountain tops in this region, fill out report forms on every lightning storm within their range of vision during the fire season. Records have now been obtained covering four successful seasons and it is hoped ultimately to obtain from them much valuable information pertaining to the time and place of occurrence, the direction of movement, and the characteristics of the dangerous and non-dangerous storms, such as amount of rain and lightning, which will be of value in forecasting lightning-caused forest fires. Practically no work has yet been done in attempting to predict the activity of the other common causes of fire.

With measurements of the degree of inflammability prevailing at any time, and forecasts of this condition several days ahead, and with added knowledge of when to expect the fire-starting agencies to become active, it should be possible to construct a more flexible forest protective organization which will be better able to supply adequate protection at minimum cost. The present trend of forest fire research in Northern Idaho is the discovery of facts and methods which will contribute to this end.

A REPORT OF A COTTONWOOD STUDY IN SOUTH IDAHO

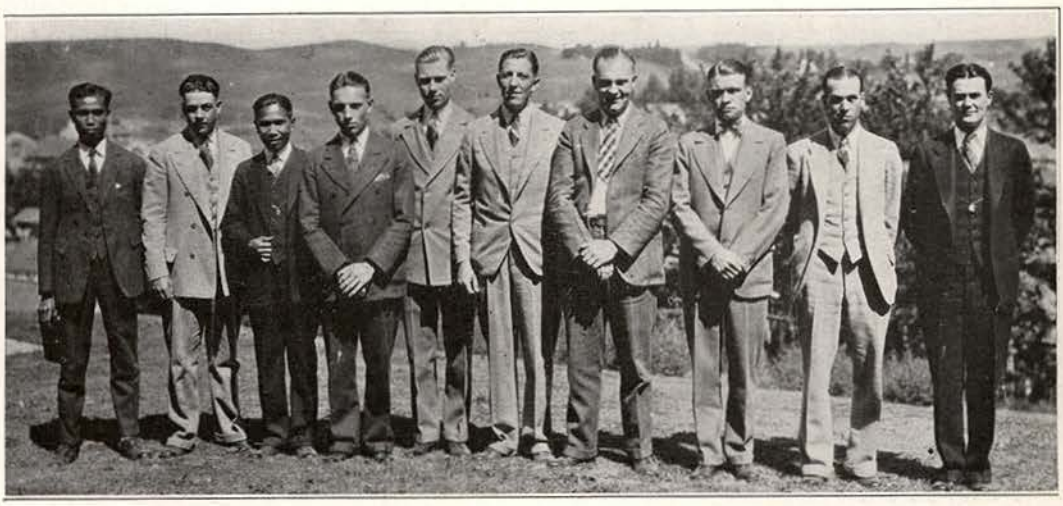
(Continued from page 22)

are secured from trees cut in the winter and early spring. As soon as they are well developed the best from each stump should be selected and the remaining sprouts should be cut back. Stock should be kept out of reseeded or sprouting areas for the first three or four years, to prevent browsing of the young seedlings. In order to give the greatest possible amount of light which is so necessary

for the development of a second crop, all undesirable species should be removed at the time of logging to make room for the residual trees and the new growth.

One possible solution to the transportation problem, so far as the present local mill is concerned, would be the spring rafting of winter cut logs from the up-river areas, with water storage at the mill until the logs are needed. Such procedure should be entirely feasible, especially since the best stands of pure cottonwood are next to the river and often inaccessible to trucks.

No rotation period of cutting has been worked out for the project, due to the fact that so many different land owners are interested in this timber that concerted action would be practically impossible. Figures given in this report should indicate, however, that the cottonwood stand of the Wood River Valley is a real asset, rather than a liability, and it is sincerely hoped that this report may at least awaken a keener appreciation of a tree which is at present considered by many to be a liability and nuisance rather than a potential source of income.



Senior Class, 1926, School of Forestry, University of Idaho, Moscow, Idaho

Left to right—Valentine Sajor, Cabugao, Ilosos Sur, P. I.; Collis H. Huntington, Attica, N. Y.; Eugenio de la Cruz, Lingayen, Pangasinan, P. I.; Harold Z. White, Moscow, Idaho; Lawrence R. Pugh, Springston, Idaho; Walter D. Field, Huston, Idaho; Clarence C. Olsen, Seattle, Wash.; Warren H. Bolles, Little Valley, N. Y.; Ivan S. Doyle, Moscow, Idaho; Fairly Walrath, Orofino, Idaho; Norman F. Gillham (Photo not shown) Edwardsville, Illinois, is also a member of this class.

Bolles, Olsen and White took the junior forester examination, U. S. Forest Service, and all passed. Sajor passed the examination for range examiner These four are the only members of the class taking the civil service examination, but all of them passed with credit to themselves

Bolles has accepted an appointment with the U. S. Forest Service and will have charge of a reconnaissance crew on the Idaho National Forest. Olsen will take an appointment in the Forest Service, and will be located in Oregon. Huntington has taken an appointment at the Priest River Forest Experiment Station. Doyle, Field, Walrath and White have entered the employ of the Clearwater Timber Company, Lewiston, Idaho. Gillham will be employed in a sawmill at Phoenix, Arizona. Cruz and Sajor will enroll for the master's degree at the Yale Forest School next fall. Pugh will engage in the lumber business as salesman with the firm of Russell and Pugh at Springston, Idaho.

SENIOR FIELD TRIP

CLARENCE C. OLSEN, '26

Early in the spring of 1926, it was arranged, through the courtesy of Director Weidman of the Northern Rocky Mountain Experiment Station, that the seniors of the School of Forestry spend a period of two weeks at the Priest River Branch, situated in the Kaniksu National Forest. Accordingly, a party comsisting of Dean Miller, Harold White, Fairly Walrath, Collis Huntington, Lawrence Pugh, Warren Bolles, Ivan Doyle, Norman Gillham, Eugenio de la Cruz, Valentin Sajor and Clarence Olsen left Moscow on May 16, arriving at the station that night, where they were joined a day or so later by Walter Field.

The first day was spent, after meeting the personnel of the station, in getting a proper perspective of the work of the forest experiment stations, through a talk by Mr. Weidman, inspection of sample plots for yield and thinning studies, planting and nursery experiments and a discussion of weather forecasting and duff inflammability by Associate Silviculturist Gisbourne.

On the following day, two crews were formed, one under Mr. Kempff, in charge of the local station and Dean Miller and the others under Mr. Gisbourne and Mr. Haig, also attached to the station staff. The former crew laid out a yield plot in a white pine type and the latter, one in the Douglas fir type. Boundaries were surveyed and marked, trees tagged by consecutive numbers and data on trees in the plot by diameter, species, crown class and height were obtained. On the third day, crews were interchanged between the two types and additional plots were laid out and data secured.

The program for the fourth day consisted of a study of reproduction after fire, on an extensive burn near the station. Along a compass line, trees were tallied as sound, injured, dead and down for every alternate half chain and at each half chain, transects of 1-1000 acre were laid out, upon which seedlings, by species and age class were tallied. Additional notes on site factors and vegetation were taken in the field, and upon return to the station, computations for reproduction percentages and volume of timber by basal area were made. Two crews of three men and an instructor were employed in this study, while the remainder of the group was engaged in laying out a thinning plot.

With crews changed the next day, an additional thinning plot was laid out, all stems were classified by crown class and diameter, trees to be cut were marked and those to be left were banded. Throughout this and all the other studies, instructions were most capably given by the members of the staff and all points not clear were explained. On the succeeding day, tallies of removed trees and trees left were recorded, the actual thinnings made and as much brush disposed of as warranted under existing weather conditions.

The next day, Mr. Gisbourne talked to us

Class of 1926 in the Field

about fire studies and conducted various experiments with smoking materials as causes of fires. Later Mr. Kempff explained the numerous instruments for recording weather conditions, after which an attempt was made by all the party to forecast weather conditions for the following day. In the afternoon, data on the yield plots were "worked up". Space prohibits a detailed account of the computations made. On this evening, the members of the party took a trip to Priest Lake, some ten miles or so from the station.

All the next morning we were engaged in inspection of numerous plots established at various periods and in gaining information showing the relation of fire to humidity. In the afternoon, through the courtesy of the Diamond Match Co., an operation on state land was inspected. We were given an excellent opportunity to witness marking and brush disposal methods (the latter being handled by the Forest Service) and log transportation by live chutes. An excellent meal was provided that evening for the hungry party.

Studies for reduction after cutting were made the next day, on a sale area cut over in 1916, which was situated at some distance from the station. This was similar to the studies made after fire. A very decided difference in reproduction was witnessed on sites where brush was disposed of by piling and burning and on sites where broadcast burning was employed.

A decidedly profitable day was next spent on a sale of the Dalkena Lumber Co. Supervisor Whitham, of the Kaniksu, explained the contract pertaining to the operation, after which he showed us examples of brush disposal and girdling of hemlock. In the afternoon further inspection of the area was made, including sample plots of reproduction studies. Mr. Whitham, Mr. Breen, Mr. McGillivary and Mr. Tracy, forest officials, as well as members of the station staff were very courteous in their explanation of the operation.

We returned, on our last day, to the same operation, where we were given an explanation of the marking rules employed, and of various sale clauses of the contract. Opportunity was offered in the afternoon to mark timber on the sale area under the instruction and supervision of the forest officers. Like all of the other days, this was very interesting and instructive.

Sample Thinning Plot, Priest River Branch Station

Throughout the trip, every opportunity was given us to learn as much as possible. The station staff and the forest officials were courtesy itself. Too much cannot be said for the thoughtfulness of our instructors; for what little work we may have accomplished, we were repaid many fold. Quarters furnished us were comfortably arranged and we were exceptionally fortunate in the choice of the cook who's services were secured for us. On the following day, then, we culminated a trip which was inexpensive in cost and invaluable in experience and returned home in the school truck which had served us well on our trip.

PERSONALS

MARK ANDERSON was recently elected president of the Provo Kiwanis Club, and is also president of the Provo Fish and Game Association. Though no longer a forester by profession, Mr. Anderson has evidently not forgotten his early training for he is working for the cause of conservation at every opportunity.

JESS BEDWELL, who is Assistant Pathologist for the Blister Rust Control work in the Northwest, paid the School of Forestry a visit recently. He was pleased at the rapidity with which the School has expanded, and expressed a desire for closer connection with his Alma Mater in the future.

PAUL BIELER, (R. C.) '21-'22 writes, "I am now Scout Master of a troop of forty boys in Ogden, so I have a big chance to talk forestry. We are helping to arouse interest in a municipal forest for the Boy Scouts."

LEWIS CUMMINGS, B. S. For. '25 recently received a promotion from ranger to junior forester. Since leaving school Cummings has worked on a tie sale, been in the District Office on short detail, and in April was sent to Glenwood Springs where he has charge of a cruising party.

ALBERT DANIELS, B. S. For. '23 writes that he has left the National Lumber and Creosoting Company to accept a position with the Southern Pacific Railroad Company at Houston Texas. He is connected with the engineering department, being chemist in the wood preserving plant.

FRANK DRISSEN, Ex-'27 is employed as a lumber checker for the Tuscor Lumber Company at Tuscor, Montana. He says he is learning considerable about the lumber game and will re-enter the School of Forestry in September.

HERMAN BAUMANN, '21 is forester for the Fruit Growers' Supply Company, Susanville, California. He recently visited the campus for a few days, and praised the new quarters for the School of Forestry very highly. Mr. Baumann was very enthusiastic over the possibilities of forestry in California, and justly so, for the Fruit Growers' Supply Company is practicing forestry on an extensive scale.

JAMES W. FARRELL has been promoted from junior forester to assistant forest supervisor, and transferred from the Idaho to the Wyoming National Forest. Farrell has distinguished himself for his work in connection with timber sales and management plans.

CLIFFORD HUNTER, '27, is employed on the Coeur d'Alene National Forest on timber sale work. He will re-enter the School of Forestry in September.

LES EDDY, Ex-'24, has resigned his position with the Forest Service to take charge of the protection work for the Clearwater Timber Protective Association. He assumed his new duties April 1, and if present weather conditions are any criterion will have plenty to keep him busy this summer.

ART SOWDER, who was a campus visitor recently, would have us believe that he came to visit the school, but—we noticed that his engagement was announced shortly afterward, so are discounting his alleged reasons about 500 per cent. Miss Rose Preuss is the fortunate lady. The Club extends congratulations to these splendid young people.

HARRY MALMSTEN, Ex-'17, is Assistant Professor of Forestry at the University of California. He received his M. F. degree from California in 1922 and has been teaching there since. We notice that Harry is still single; perhaps he believes that man cannot serve two masters.

RALPH ROSS, Ex-'26, says that after school last year he went to sea, but is now "home and much wiser." Evidently the ocean does not agree with "Blease." After this experience he is a confirmed forester, and will re-enter the School of Forestry next September.

"BUNG" SNOW, '25 passed the Junior Forester exam last spring with a very creditable grade, and is now Junior Forester attached to a timber sale on the Medicine Bow National Forest. "Bung" became a benedict shortly after commencement, and like all the others says it's the only life.

WILLIAM BUCKINGHAM, Ex-'26, had planned to be with us this year, but his duties as ranger on the Clearwater National Forest interferred. It is rumored that "Buck" has been promoted ranger in charge of grazing and attached to the supervisor's office. He will probably return next February to complete the requirements for graduation.

TOM LOMMASON, '17 has been promoted to the position of inspector of grazing, and is attached to the District Office at Missoula, Montana. He comes to Moscow quite occassionally and never fails to visit the School of

Forestry. We thought Tom was a confirmed bachelor, but last September his status in this respect underwent a change.

E. H. MYRICK, Ex-'17, paid the School of Forestry a visit last December. He is supervisor of the Lewis and Clark National Forest, Chateau, Montana. Mr. Myrick gave a very interesting talk on the administrative problems encountered by a forest supervisor.

GEO. MADLINGER, Ex-'24, received his M. F. at Yale last year. He is now assistant professor of forestry and engineering, University of the South, Sewanee, Tennessee. His duties consist of teaching three classes in forestry, one in surveying, and the care of 10,000 acres of Southern Appalachian hardwoods belonging to the university.

WM. CALLENDER, '26, has been working in the mines and lumber camps of Idaho. He visited the School of Forestry recently and paid many compliments to the enlarged new quarters . "Bill" expects to re-enter the University in September,

EDDIE NERO, Ex-'23, has resigned his position as Ranger on the Clearwater National Forest, and is now employed in the dry goods department of the Orofino Mercantile Company at Orofino, Idaho.

CHARLES FOX, our esteemed Editor, recently announced his engagement to Miss Dorothy Gorrie. It is rumored that they will be married at the close of the school year.

FLOYD COSSITT, Ex-'24, is Junior Forester on the Selway National Forest with headquarters at Kooskia, Idaho. It is rumored that Cossitt was married last Christmas, but to date no confirmation has been received.

XI SIGMA PI

HAROLD Z. WHITE, '26

Xi Sigma Pi, National Honor Forestry Fraternity, was founded as a local society at the University of Washington in 1908. In 1915 it developed into a National, and began adding new chapters.At present Xi Sigma Pi has nine chapters, located at the prominent and active forest schools throughout the United States.

Epsilon Chapter of Xi Sigma Pi was established at the University of Idaho in 1920, with a membership of seven, two members of the faculty and five students. Since then the number has grown to eighteen, four faculty and fourteen students; and the fraternity can now boast of as large a membership as any other National honor organization of the Idaho Campus.

The objects of the fraternity are to secure and maintain a high standard of scholarship in forest education, to work for the upbuilding of the profession of forestry, and to promote fraternal relations among earnest workers engaged in forest activities. The ideals of scholarship and leadership in forest activities have always been uppermost in mind in the selection of new members.

In order to stimulate scholarship in the School of Forestry, Xi Sigma Pi purchased an attractively designed bronze tablet, upon which are engraved each year the names of the students who have attained the highest average in each class for the school year. The tablet holds its place with the other gifts to the University on the walls of the main floor of the Administration Building.

The names of the students now engraved on the plaque, and the years in which they attained the highest average of the class are as follows:

1922—James W. Farrell, senior; Russell M. Parsons, junior; Arthur M. Sowder, sophomore; Paul M. Harlan, freshman.

1923—Albert S. Daniels, senior; Ralph S. Space, junior; Paul M. Harlan, sophomore; Floyd W. Godden, freshman.

1924—Rogers G. Wheaton, senior; Robert P. McLaughlin, junior; Floyd W. Godden, sophomore; Henry C. Hoffman, freshman.

1925—Ralph S. Space, senior; Warren H. Bolles, junior; Galen W. Pike, sophomore; William W. Mitchell, freshman.

To be eligible for membership in Xi Sigma Pi, a student must have completed two and one-half years of standard college work in an approved school of forestry. Three-fourths of his grades shall have been above 80 per cent, and he shall not have received any failures in forestry subjects. He shall also have shown a creditable interest and activity in practical forestry work. In the election to the fraternity, a man's practical ability is just as thoroughly considered as are his scholarship attainments, and it is hoped by this means to

stimulate the interests of the underclassmen, thus fulfilling the objects of the fraternity.

The officers of Epsilon Chapter for the year just closing are:

Harold Z White, Forester; Warren H. Bolles, Associate Forester; Mark M. Lehrbas, Secretary Fiscal-Agent; and Clarence C. Olsen, Ranger.

The faculty members are F. G. Miller, E. E. Hubert, Clarence W. Watson and Harry I. Nettleton.

The new members initiated this year are: Dr. E. E. Hubert, Galen W. Pike, '27; Charles E. Fox, '27; Henry C. Hoffman, '27; Wilfred F. Beals, '27; Wallace M. Saling, '27; Jackson W. Space, '27; and Carl A. Gustafson, '27.

A TRAGEDY OF THE HIGH RANGE

By ARTHUR W. STEVENS, '15

In the rugged country of southern Utah, Mount Dutton pokes its rocky summit above the eleven thousand foot level. Across this summit we came with a pack train, following a line of blazes that will some day become a Forest Service trail. Down near the ten thousand foot line on the other side we established a camp from which to carry on our surveying work.

The range cattle feed to the very summit of the mountain. It was then late in the season and they had sought the lower levels; but not all of them had gone. Our way was dotted with bleaching bones and carcasses, old and new, of cattle that had died from eating the deadly larkspur.

The next morning I went to look for the horses, and found them half a mile up the canyon. I found something else, too, something I had not expected. It was a young calf, all big eyes, big ears, and big, clumsy-looking legs. He stood and looked at me for one startled moment, and then,with a hump in his tail and the end dangling, he rushed away to the shelter of the nearest patch of timber. Possibly the day when he had received the earmarks and dew-lap had put the fear of all human beings into him; and then, too, he was facing the world all alone, and it did not pay to take chances. That same day we found his mother, a fresh carcass lying across a log in the timber.

We saw him frequently after that, sometimes near the horses for company, and sometimes by himself, but he always regarded us with suspicion and fled as we approached.

One morning, when I was in camp alone, I awoke to a white world. There was half a foot of snow on the ground and more in the air. The fall soon became lighter, however, and then ceased, and I went to look for the horses. Near where they had been the first morning I found the tracks of split hoofs. "Deer," I thought. The tracks turned and wound and wobbled and crossed and recrossed each other in a most amazing manner. "That deer certainly didn't know where he was going," I thought; and then I began to notice more closely. They did not look exactly like deer tracks, and they were too close together. Then, suddenly, I remembered the orphan calf.

It was entirely new to him, this white something that was cold, and that changed the appearance of the whole landscape; and he was wandering—just wandering—because there was nothing else to do. A few minutes later I found him, and this time he did not run away. He was so frightened at this new condition and he wanted the company of some living creature; but still he was suspicious, and kept a tree between us as I approached.

The first snow soon went off, and we continued our work. The marks on the calf had told us his owner, and we sent word to the ranch, but what was one little dogie, away off in the head of a canyon, when there were a thousand cattle on the lower hills to be rounded up?

The nights grew colder. Ice formed on the creek, and stayed there all day. The calf acquired a shaggy coat and a tail almost as bushy as a coyote's. And every day he grew a little thinner.

Our work completed in that vicinity, we moved five miles down the canyon. And then came the big storm. It snowed for two days; and our horses, after the manner of horses in a storm, went up, floundering through the drifts and over logs, in spite of hobbles, to the very top of Mount Dutton. And when we went to find them, there in the head of the canyon was the orphan calf. He was gaunt of body and hollow-eyed, but there was still strength

enough in his wobbly legs to carry him away from supposed danger. And there we left him, alone in a white wilderness, facing death from starvation, from the cold, and from wild animals, but still pluckily keeping alive, because the instinct for self-preservation was strong within him, and because he did not know that his was a hopeless fight.

ROSTER OF STUDENTS

The following is a list of students in actual attendance at the School of Forestry during the year of 1925-'26, with their home addresses.

Graduate Students

Nettleton, Harry I., B. S. (For.) (1921, Oregon Agricultural College,) Moscow, Idaho.

Sowder, Arthur W., B. S. (For.) 1925, (University of Idaho,) Coeur d'Alene, Idaho.

Huntington, Collis H., 11 Windsor Street, Attica, New York.

Olsen, Clarence C., Moscow, Idaho.

Pugh, Lawrence R., Springston, Idaho.

Sajor, Valentin, Cabugao, Ilosos Sur, Philippine Islands.

Walrath, Fairly, Orofino, Idaho.

White, Harold Z., Moscow, Idaho.

Class in Dendrology

Seniors

Bolles, Warren H., Little Valley, New York.

Cruz, Eugenio de la, Lingayen, Pangasian, Philippine Islands.

Doyle, Ivan S., Moscow, Idaho.

Field, Walter D., Huston, Idaho.

Gillham, Norman F., 910 Troy Road, Edwardsville, Illinois.

Juniors

Baird, John C., 2432 N. Rockwell Street, Chicago, Illinois.

Beals, Wilfred F., Okanogan, Washington.

Burroughs, Isaac C., Poughkeepsie, New York.

Cranston, Wm. V., Mt. Vernon, Washington.

Davis, Robert, Moscow, Idaho.

Ellis, Gordon, 486 D. St., Idaho Falls, Idaho.

Fox, Charles E., 1204 Noyes St., Utica, New York.

Gregory, Charles A., 5812 N. Virginia Avenue, Chicago, Illinois.

Godden, Floyd W., River Falls, Wisconsin.

Green, Edwin G., Moscow, Idaho.

Guernsey, William G., Spokane, Washington

Gustafson, Carl A., Vancouver, Washington.

Hatch, Alden B., 1302 Locust St., Philadelphia, Pa.

Heggie, Tracy L., Montpelier, Idaho.

Hoffman, Henry C., 43 W. North St., Galesburg, Illinois.

Icarangal, Primo, Pangil, Laguna, Philippine Islands.

Sophomores

Allen, Fred R., Lester, Washington.

Balch, Prentice C., 703 Wabash Ave., Spokane, Washington.

Biker, John B., Nelson, British Columbia.

Cochran, Allen R., Sundbury, Ohio.

Connaughton, Charles, Placerville, Idaho.

Dean, Kenneth F., Dresden, New York.

Flack, Gordon I., 2017 W. Jackson Ave., Spokane, Washington.

Flock, Kester D., Moscow, Idaho.

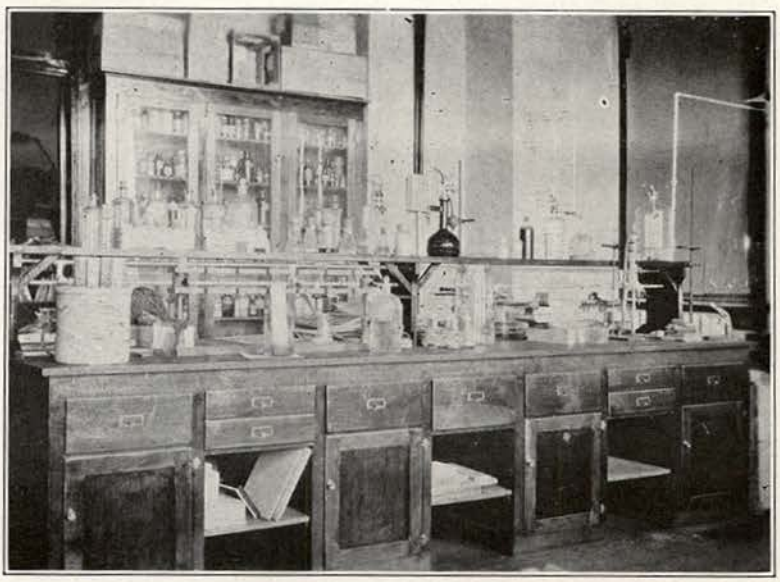
Gamble, Boyd E., Boise, Idaho.

Frost, Levi M., 619 Sante Fe Ave., Salina, Kansas.

Garmo, George A., Bellingham, Washington.

Hedrick, Niel, Willapa, Washington.

Kidd, W. R., Moscow, Idaho.



A Corner in The Forest Products Laboratory

Johnston, Royal H., 11 Stuart St., Everett, Massachusetts.

Lansdon, William H., 1502 N. 6th St., Boise Idaho.

Lehrbas, Mark M., 744 N. Harrison, Pocatello, Idaho.

Phelps, Eugene V., Carlinville, Illinois.

Pike, Galen W., Woodstock, Connecticut.

Rowe, Percy B., Moscow, Idaho.

Saling, Wallace M., Weippe, Idaho.

Space, Jackson W., Orofino, Idaho.

Spence, Liter E., Park Ridge, Illinois.

Toole, Arlie W., Moscow, Idaho.

Ward, Ray, Republic, Washington.

Williams, Guy V., Boise, Idaho.

McKim, Floyd, 926 E. Mt. Hope Ave., Lansing, Michigan.

Mitchell, William W., 1105 Madison St., Wilmington, Deleware.

Page, Milford M., Union Springs, New York.

Seeley, Theodore A., Moscow, Idaho.

Stroud, Charles C., 303 Jeffferson St., Natchintalo, Louisana.

Sumsion, Alma B., Chester, Utah.

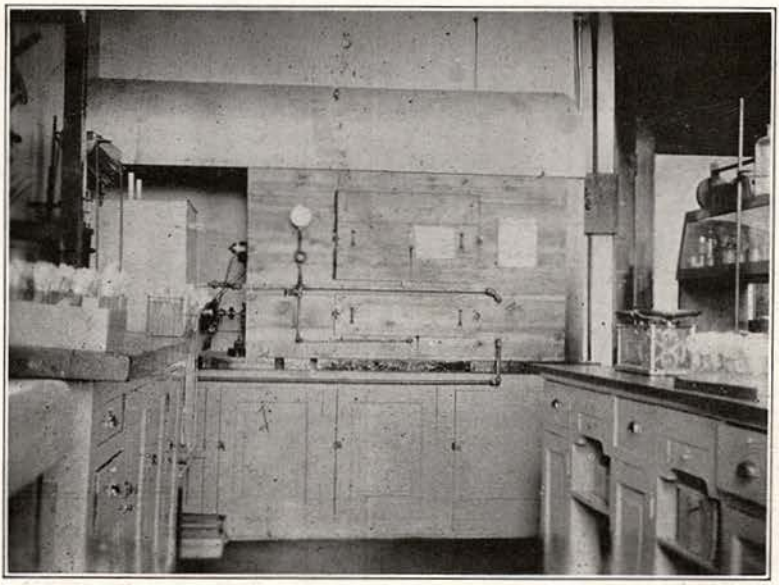
Williams, Griffith S:. Everoon, Washington.

Ward, Robert D., Bryan, Ohio.

Freshmen

Anderson, Ralfe, Turner Bay, Coeur d'Alene, Idaho.

Axtell, Donald H., 2604 W. Dalton Ave., Spokane, Washington.
Barclay, Kenneth M., Jerome, Idaho.
Belknap, Meldon C., Farmington, Washington.
Bollinger, Roy E., 210 Broadway, Boise, Idaho.
Boyd, Burford E., Moscow, Idaho.
Brooks, Dwight S., Hazelton, Idaho.
Buckingham, Art., Gifford, Idaho.
Coleman, William W., Cascade, Idaho.
Ficke, Herman., Payette, Idaho.
Fritchman, Holt., Payette, Idaho.
Fullerton, Claud R., Duncan, Arizona.
Fruit, Melville, Tonasket, Washington.
Kayler, Dean C., Winchester, Idaho.
Kennedy, Fred H., Dubois, Idaho.
King, Richard F., 1607 Grace Ave., Lakewood, Ohio.
Lindsay, Clive J., Hazelton, Idaho.
Luedke, John A., Chicago, Illinois.
McMahon, Daniel P., 7304 Harvard Ave., Chicago, Illinois.
Newcomb, Laurence, Coeur d'Alene, Idaho.
Oliver, George K., Orofino, Idaho.
Olsen, Walter, Buhl, Idaho.
Parnell, Kieth H., 507 Euclid Ave., Lynchburg, Virginia.



Wood Preservation Laboratory, Showing Miniature Dry Kiln

Garst, Virgil L., 504 S. 9th St., Pocatello, Idaho.
Grant, Rex P., Spokane, Washington.
Griffith, Russell D., Ritzville, Washington.
Gries, George C., 3142 Diversey Ave., Chicago, Illinois.
Gustafson, Evon H., Kellogg, Idaho.
Hanley, William A., Mountain Home, Idaho.
Hardin, Kenneth A., Buhl, Idaho.
Harman, Chris C., Richland, Washington.
Higgs, Robert L., Council, Idaho.
Hjort, George V., Kooskia, Idaho.
Hume, John F., Nelson, British Columbia.
Hockaday, James., Rupert, Idaho.
Illichevsky, George., Moscow, Idaho.
Jonson, Carl E., Kelsey, Minnesota.
Jensen, Alfred E., 1920 Hazel St., Caldwell, Idaho.
Porter, Horace M., 7532 Stewart Ave., Chicago, Illinois.
Ralph, Albert A., 1536 Kedzie Ave., Chicago, Illinois.
Reynolds, Robert B., Rupert, Idaho.
Roovaart, William C., 6637 Stewart Ave., Chicago, Illinois.
Rosell, Martin B., Elk River, Idaho.
Stanley, Wilfred B., 12 E. 27th Ave., Coeur d'Alene, Idaho.
Stowasser, Clarence E., 525 Summit Ave., Coeur d'Alene, Idaho.
Thorn, Thomas H., 70 Perry Place, Bronxville, New York.
Taylor, Milo T., Tonasket, Washington.
Teater, Arthur S., Weiser, Idaho.

Tonning, Kenneth. 1005 E. 35th St., Tacoma, Washington.
Weinmann, Attlee, Orofino, Idaho.
Welo, Vernon A., Sandpoint, Idaho.
Williams, Griffiths S., Everoon, Washington.
Wilson, Albert H., Clarks Fork, Idaho.
Young, Burris L., Moscow, Idaho.

Rangers

Brown, Philip, 1746 E. Second Ave., Long Beach, California.
Drake, Asa M. B., Victor, Idaho.
Russell, Dewitt., Moscow, Idaho.
Hunter, George S., Okanogan, Washington.
Rogers, Harold B., San Diego, California.
Clark, J. Herman., Viborg, South Dakota.
Johnson, Charles L., Mountague, Idaho.
Klemme, Maurim., Bessie, Oklahoma.
Farnham, Everett R., Star, Idaho.
Fraser, Thomas R., Colquitz, P. O. V. I. British, Columbia.
Nieland, Edwin., Priest River, Idaho.

ALUMNI AND FORMER STUDENTS

Allgood, Elmo; ex-'27; Salt Lake City, Utah.
Anderson, Mark; ex-'15; Provo, Utah; Hotel Manager.
Autrey, Lawrence; (Voc.) '22-'23; Hausan Ferry, Washington; Rancher.
Bai, Lester; ex-'27; 923 Princeton Ave., Salt Lake City, Utah.
Baldwin, Wesley; (R. C.) '24; Thorrington, Conn.
Bartlett, Stanley Foss; (R. C.) '21-'22; Locke's Mills, Maine.
Baumann, Herman; B. S. For. '24; Suzanville, Cal.; Forester; California Fruit Growers' Supply Company.
Beauregard, Clayton; R. C. '25; Fillmore, Utah.
Bedwell, Jesse L.; B. S. For. '20; Assistant Pathologist Office of White Pine Blister Rust Control, 618 Realty Building, Spokane, Wash.
Bennett, Carey; ex-'27; 579-24th St., Ogden Utah; Engineering Department, Southern Pacific Railroad Company.
Bentz, Charles E.; ex-'28; White Bird, Idaho.
Berry, Waldo Lee; (R. C.) '15-'16; Post Falls, Idaho.
Bergman, Harold E.; (R. C.) '25; Bark River, Michigan.
Bieler, Paul S.; (R. C.) '21-'22; 332 Patterson Ave., Ogden, Utah; Draftsman and Assistant Photographer, Engineering Department, Southern Pacific Railroad Company.
Brown, Frank A., B. S. For. '22, 3218 S. Hoover Street, Los Angeles, California.
Buckingham, Wm. ex-'26; Orofino, Idaho, Ranger, Charge of Grazing, Clearwater National Forest.
Callendar, Wm.; Ex-'26; Boise, Idaho.
Case, Geo. W.; (R. C.) '25; Kooskia, Idaho.
Chamberlain, Edwin Wm.;ex-'26; U. S. Military Academy, West Point, N. Y.
Chambers, Howard J.; (R. C.) '25; Baker Oregon.
Chamberlain, Fred; ex-'23; Lynn, Mass.; Sales Manager, Lumber Department Brockway-Smith Corporation.
Chamberlain, Gail B.; ex-'22; Bend Oregon; Brooks-Scanlon Lumber Company.
Clark, George W.; (Voc.) '22-'23; Route 2, Box 25, Touchet, Washington.
Clegg, Martello; ex-'27; Heber, Utah.
Cochrell, Albert N.; (R. C.) '22; Assistant Forest Supervisor, Clearwater National Forest, Orofino, Idaho.
Collins, Arthur E.; (R. C.) '25; Vancouver, B. C.
Connors, John D.; ex-'26; Prichard, Idaho.
Cossitt, Floyd M.; ex-'24; Junior Forester, Selway National Forest; Kooskia, Idaho.
Cowan, Talmadge D.; (R. C.) '15-'16; Ranger U. S. Forest Service, Targhee National Forest, St. Anthony, Idaho.
Crawford, Virgil; ex-'27; Opportunity, Washington.
Cummings, Lewis A.; B. S. For. '25; c|o Forest Service, Glenwood Springs, Colorado; Junior Forester, District 2.
Cunningham, Russel N.; B. S. For. '17; U. S. Forest Service, Missoula, Montana. Inspector Clarke-McNary Act cooperation.
Daniels, Albert S.; B. S. For. '23; Southern Pacific Building, Houston, Texas. Chemist for Southern Pacific Railroad Company.
Dart, Glen C.; (R. C.) '24; Dartford, Washington.
Daugherty, Charles Ira; ex-'22; Ranger, U. S. Forest Service, Challis National Forest, Challis, Idaho.
Davis, Roscoe E.; ex-'21; Ranger, U. S. Forest Service, Boise National Forest, Boise, Idaho.

Dawson, Robert B.; (R. C.) '25; Cranbrook, B. C.

Decker, Arlie Delos; B. S. For. '13; M. F. (Yale University) '17; Land Agent, Potlatch Lumber Company, Potlatch, Idaho.

Denning, Stewart K.; ex-'13; Sales Manager, Panhandle Lumber Company, Spirit Lake, Idaho.

Dipple, Ralph; ex-'14; Dentist, Springfield, Oregon.

Dodge, Keith A., R. C.) '15-16; Challis, Idaho.

Downer, Ernest R.; ex-'28; Sioux City, Idaho.

Drissen, J. Phillip; B. S. For. '21; Deputy Supervisor of Forests, Indian Service, Dulce, New Mexico.

Drissen, Frank J.; ex-"27; Harrison, Idaho.

Eby, Lester W.; (Voc.) '22-'23; Walla Walla, Washington.

Eddy, Lester E.; ex-'24; Warden, Clearwater Timber Protective Association, Orofino.

Evans, Phillip S.; ex-'20; Preston, Idaho.

Farrell, James W.; B. S. For. '22; Assistant Forest Supervisor, Wyoming National Forest, Kemmerer, Wyoming.

Favre, Clarence E.; B. S. For. '14; M. F. '15; Supervisor, Wyoming National Forest, U. S. Forest Service, Kemmerer, Wyoming.

Fenn, Lloyd Alfred; B. S. For. '11; LLD. (Montana University) '18; Kooskia, Idaho; Attorney-at law; Manager "Kooskia Mountaineer."

Ferguson, Ray S.; (Voc.) '22-'23; Ranger, U. S. Forest Service, Selway National Forest, Kooskia, Idaho.

Flygg, Carl J.; (R. C.) '20-'21; Blackfoot, Idaho; Surveyor, Indian Service.

Folsom, Frank B.; (Voc.) '20-'21; Ranger, U. S. Forest Service; Colville National Forest, Republic, Washington.

Fuller, Harry E.; ex-'25; Emmett, Idaho.

Garner, Lawrence H.; (R. C.) '22-'23; Midvale, Idaho; Ranger, U. S. Forest Service; Wasatch National Forest, Evanston, Wyoming.

Gatley, Howard A.; ex-'26; Boy Scout Executive; Terre Haute Council Boy Scouts of America, Terre Haute, Indiana.

Gerrard, Paul H.; B. S. For. '23; Assistant Supervisor, Clearwater National Forest, Orofino, Idaho.

Gilman, John E.; ex-'19; Obsidian, Idaho, via Stanley.

Guernsey, Wm.; ex-'27; Office White Pine Blister Rust Control; 618 Realty Building, Spokane, Washington.

Hallcraft, Vernon R.; (Voc.) '20-'21; Scaler, ? , California

Hamel, Joseph Henry; (Voc.) '22-'23; U. S. Veteran's Hospital, Walla Walla, Washington.

Hamilton, Wm. Howard; ex-'27; Santa Paulo, California.

Hammond, Geo. M.; ex-'20; Vice-President and Assistant General Manager, Bowerman Lumber Company, Glendale, California.

Hand, Ralph L.; (R. C.) '20-'21; Ranger, U. S. Forest Service Selway National Forest, Kooskia, Idaho.

Hansen, Louis W.; ex-'27; Park Ridge, Illinois.

Hanzen, Maurice H.; ex-'20; Box 904, Kellogg, Idaho.

Harlan, Paul M.; B. S. For. '25; 540 Powell St., San Francisco, Cal., Secretary-Treasurer Gas Appliance Society of San Francisco.

Hauger, Fred E.; ex-'28; Grangeville, Idaho; Rural School Teacher.

Headrick, Ralph A.; (R. C.) '16-'17, Emmett, Idaho.

Heard, Herman C.; ex-'13; County Agent, Phoenix, Arizona.

Herman, Charles H.; B. S. For. '13; (Address unknown).

Higgins, Howard H.; (Voc.) '22-'23; Ranger, U. S. Forest Service, Nez Perce National Forest, Grangeville, Idaho.

Horton, Gerald S.; ex-'27; Clyde, N. Y.

Humphrey, Clyde P.; ex-'17; State Highway Department, Coeur d'Alene, Idaho.

Hunter, Clifford H.; ex-'27; 818 Foster Avenue, Coeur d'Alene, Idaho. Field Assistant, Coeur d'Alene National Forest.

Hupe, Andrew M.; (R. C.) '25; Spokane, Washington.

Hutchins, John E.; ex-'27; Spokane, Washington.

Jackson, Tom; B. S. For. '19; Woods Superintendent, Fruit Growers' Supply Company, Suzanville, California.

Jensen, Irving R.; (R. C.) '16-'17; U. S. Forest Service, Essex, Montana.

Johanson, Robert; (R. C.) '20-'21; Ranger, U. S. Forest Service, Clearwater National Forest, Orofino, Idaho.

Johnston, Herbert Wm.; ex-'17; U. S. Biological Survey, Unalakleet Alaska, Range Investigations.

Kauffman, Alton T.; ex-'28; Orofino, Idaho.

Kelly, Robert C.; (R. C.) '20-'21; Bradford, Pennsylvania.

Kelso, Jean E.; (R. C.) '24; San Francisco, California.

Kemp, Richard L.; ex-'27; Spirit Lake, Idaho; Lumber Checker, Panhandle Lumber Company.

Kent, Howard A.; ex-'25; Bonners Ferry, Idaho.

Keyes, Geo. W.; ex-'22; Challis, Idaho.

King, Leonard A.; (R. C.) '20-'21; Orofino, Idaho.

Kiser, Wm. L.; (R. C.) '22-'23; Weiser, Idaho.

Krim, Benjamin; ev-'24; Nework, New Jersen.

Lefler, Lowell T.; (R. C.) '24; Kamiah, Idaho.

Lewis, Leroy W.; (R. C.) '22-'23; Weippe, Idaho.

Lommason, Thomas; ex-'18; Inspector of Grazing, U. S. Forest Service, Missoula, Montana.

Luby, Lawrence L.; (Voc.) '22-'23; Idaho Falls, Idaho.

Lindstrum, F. J.; B. S. For. '11; 633 Shatto Place, Los Angeles, California.

McKinney, Clark P.; (R. C.) '22-'23; Salmon Idaho; Foreman, Shenon Land and Cattle Company.

McLaughlin, Robert; B. S. For. '25; M.S. For. (Yale University) '26; 411 East Prospect Avenue, Sedalia, Missouri.

McMillan, Carleton W.; (R. C.) '24; St. Maries, Idaho.

Madlinger, Geo. J.; ex-'24; Sewanee, Tennessee; Assistant Professor of Forestry and Engineering, University of the South Sewanee, Tennessee.

Malhotra, Des Raj; B. S. For. '25; Jammu, Kashmire State, India; Assistant Conservator of Forests, Kashmire State, India.

Malmsten, Harry E.; B. S. For. '17; 1715 Francisco Street, Berkeley, California; Assistant Professor of Forestry; University of California, Berkeley, California.

Man, Dasaundha Singh; ex-'25.

Martin, Ernest M.; (R. C.) '19-'20; Weiser, Idaho; Scaler and Commissary Clerk, Baker White Pine Lumber Company, Baker Oregon.

Martin, Paul J.; ex-19; Old National Bank Building, Spokane, Washington; Liverpool and London Globe Insurance Company, Ltd.

Maxwell, Benjamin C.; (R. C.) '22; Ranger, U. S. Forest Service, Wenatchee National Forest, Wenatchee, Washington.

Melchisedeck, L. H.; (Voc.) '22-'23; Sisters, Oregon.

Melick, Harvey Ivan; B. S. For. '23; Nampa, Idaho.

Miller, Robert A.; ev-'22; Manager, Gem State Lumber Company, Weiser, Idaho.

Miller, Wm. Byron; B. S. For. '22; M. S. For. (University of California) '25; Assistant Range examiner, U. S. Biological Survey, Reindeer Investigations, Fairbanks, Alaska.

Moody, Virgil C.; B. S. For. '17; Ranger, U. S. Forest Service, Coeur d'Alene, Idaho.

Morris, Leo Francis; ex-'16; Real Estete, 301 Savings and Loan Building, Spokane, Washington.

Munson, Oscar C.;B. S. For. '21; 740 South Olive Street, Los Angeles, California; Engineer, Southern California Telephone Co.

Myrick, Eldon H.; ex-'17; Forest Supervisor, Lewis and Clark National Forest, Choteau, Montana.

Nero, Edward T.; B. S. For. '23; Orofino, Idaho.

Newkirk, Edwin Ely; (R. C.) '16-'17; Railway Clerk, St. Louis, Missouri.

Noni, Amerigo Louis; (R. C.) '16-'17; Mackay, Idaho.

Parsons, Ralph H.; ex-'14; Assistant Land Agent, Clearwater Timber Company, Lewiston, Idaho.

Parsons, Russel M.; B. S. For. '24,; Clearwater Timber Company, Lewiston, Idaho.

Patrie, Carthon R.; B. S. For, '22.

Potter, Arthur; (R. C.) '24; Assistant Supervisor, Boise National Forest, Boise, Idaho.

Poynor, Neal E.; (R. C.) '21-'22; Ranger, U. S. Forest Service, Salmon National Forest, Salmon, Idaho.

Rector, Charles M.; ex-'28; Bryan, Ohio.

Renshaw, Elmer W.; B. S. For. '25; Deputy State Forester, Idaho; Moscow, Idaho.

Rettig, Edwin C.; B. S. For. '19;Land Agent Clearwater Timber Company, Lewiston, Idaho.

Reuterskiold, France: (Voc.) '22-'23; Atkinson, Wisconsin.

Rigney, Darrel P.; ex-'28; Jerome, Idaho.

Rigney, Jesse W.; ex-'28; Jerome, Idaho.

Robinson, Ernest G.; (R. C.) '24; Forest Service, Clearwater National Forest, Orofino, Idaho.

Roat, Celeste A.; '25; Red Lodge, Montana.

Roeder, Charles; (R. C.) '20-'21; Streator, Illinois; Bookkeeper.

Rodner, Jack W.; ex-'25; Office of Whie Pine Blister Rust Control, 618 Realty Building. Spokane, Washington.

Ross, Ralph B.; ex-'26; 720 W. Sixty Ave., Gary, Indiana; Engineering Department, Chicago and South Bend Railroad Company.

Ross, Oral O.; ex-'27; Long Beach, California.

Ruckweek, Fred J.; B. S. For. '17; Gettysburg Public Schools, Gettysburg, S. D.

Rudesill, Ralph M.; (R. C.) '20-'21, Bradford, Pa.

Runberg, Victor; (Voc.) '22-'23; Hedlund Box and Lumber Company, Spokane, Washington.

Ryan, Cecil C.; B. S. For. '24; Moscow, Idaho.

Salvin, Otia Wm.; ex-'19; Carmen, Idaho.

Schofield, Wm. B.; B. S. For. '16; Topographic Engineer, Hammond Lumber Company, Samoa, California.

Seeley, Theodore A.; '28; Moscow, Idaho.

Shaner, Fred; (Voc.) '23; Ranger, U. S. Forest Selway National Forest, Kooskia, Idaho.

Sharma, Parmeshwri Das; M. S. For. '22; Forest Expert, Department of Forestry, Gwalior State, Central India.

Smith, Henry L.; ex-'14; Administrative Assistant and Clerk, Challis National Forest, Challis, Idaho.

Smith, William H.; (R. C.) '25; Tygh Valley, Oregon.

Snow, E. A.; B. S. For. '25; Junior Forester, U. S. Forest Service, Foxpark, Wyoming.

Sowder, Arthur M.; B. S. For. '25; Logging Department, Rutledge Timber Company, Clarkia, Idaho.

Space, Ralph S.; B. S. For. '25; Ranger, U. S. Forest Service, Blackfoot National Forest, Kalispell, Montana.

Staples, Howard W.;B. S. For. '20; Resident Manager, Yukon Gold Company, Murray, Idaho.

Stevens, Arthur W.; B. S. For. '15; Editor and Manager "The Kearney Democrat", Kearney, Nebraska.

Stillinger, Charles Roy; Special '19; 618 Realty Building, Spokane, Washington; Associate Pathologist, Bureau of Plant Industry; Office of White Pine Blister Rust Control, Spokane, Washington.

St. Mar, Albert W.; (R. C.) '25; Spokane, Washington.

Stone, Capt. Lawrence F.; ex-'15; Commanding Officer, Arcadia Balloon School, Arcadia, California.

Stoneman, Warren J.; ex-'24; Route 9, Hillyard, Washington.

Storms, Willard S.; ex-'23; Farmer, Rupert, Idaho.

Stroud, Charles C.; ex-'28; Natchitockes, La.

Sumsion, Byrd,; ex-'28; Chester, Utah.

Teed, Ryle; ex-'23; Forest Examiner, U. S. Forest Service, Portland, Oregon.

Tucker, Gerald J.; (R. C.) '25; Elgin, Oregon.

Vick, Ernest R.; (R. C.) '19-'20; U. S. Forest Service, Luther, Montana.

Vickery, Dwight R.; ex-'28; Firth, Idaho.

Wadsworth, Herbert A.; B. S. For. '11; Major, U. S. Infantry, Fort Howard, Maryland.

Ward, Raymond; ex-'28; Bryan, Ohio.

Wheaton, Rogers G.; B. S. For. '24; M. (F. Yale University) '25; U. S. Forest Service, Gardner, Montana.

Wells, Harold E.; (R. C.) '25; Manitoba, Canada.

Whitaker, Clarence; (R. C.) '25; Elba, Idaho.

Whitaker, Frank S.; (R. C.) '25; Elba, Idaho.

Whiting, Geo. M.; R. C. '25; Spokane, Wash.

Williamson, Charles L.; ex-'14; 218 Alaska Building, Seattle, Washington; Northwest Manager, Power Regulation Company, Chicago, Illinois.

Yates, Donald; B. S. For. '17; Assistant Manager, Exter Investment Company, 714 Holland Building, Seattle, Washington.

Youngblood, Frank; (R. C.) '22-'23; Ranger U. S. Forest Service, Minidoka National Forest, Burley, Idaho.

Zuver, John H. Jr.; ex-'25; 710 Rex Street, South Bend, Indiana; Vice-President, Mirror Press Company.

Cooperative Research With Western Pine Manufacturers' Association

Research work conducted at the School of Forestry on the properties, defects and uses of wood has received a decided impetus through the cooperative agreement recently entered into between the School of Forestry and the Western Pine Manufacturers' Association. This agreement calls for the carrying out of a definite program of research which includes specified projects covering problems of immediate and vital interest to the western pine industry. The problems, so far outlined, deal mainly with improvements in the use of the wood products and include for study such factors as natural durability, moisture content in relation to decay and stain, and new commercial uses for certain species.

Arrangements have been completed for obtaining the additional equipment and personnel necessary to carry out these cooperative projects. Beginning with the opening of the fall semester attention will be concentrated on the development of a research organization actively engaged in attempting to solve some of the numerous problems confronting the lumber industry in Idaho.

LETTER FROM MR. D. R. MALHOTRA, '25

Friends of D. R. Malhotra, a young man from India, who graduated from the School of Forestry in 1925, will be interested in extracts from a letter recently received from him by Dean Miller. Mr. Malhotra now holds the important post of Assistant Conservator of Forests to the State of Kashmire, India. His letter in part is as follows:

"I left Seattle, U. S. A., with feelings of mingled pleasure and sorrow—pleasure because I was returning home after five years sojourn in America, and sorrow on account of missing the happy company of my associates. Having landed in Japan, I had the privilege to enjoy the friendship of many Japanese, who left no stone unturned to unravel the mysteries of Japan before me. I visited Imperial University of Tokyo, museum and other edifices and sights of interest. Next I visited the cities of Yokohama, Kobe, and several others in the Japanese Empire.

"Leaving Japan I landed at Shanghai, an international port, where I found a heterogeneous mass of all races. Next I came to Hongkong, a British Crown Colony, where I enjoyed a great deal for full one week. Leaving Hongkong I visited Singapore and Penang, two big cities in Malay State, where I learned a great deal of their primitive civilizaton. Next visited Rangoon, Burma, on my way to Calcutta the largest city in India. Boarding the express train at Calcutta, I reached my destination safe and sound.

"There was a large throng of friends and relatives on the railway platform to pay me a hearty ovation. As soon as I stepped down from the train, I was profusely garlanded by relatives, and taken home in automobile (which is a prerogative of the rich people alone) amid cheers and applause. You are fully aware of the fact that I have a daughter born while I was in America, but did not have the least difficulty in recognizing her. All members of my family, and especially my wife and mother were transported with joy on my safe return home after a long separation and I noted tears of joy in the eyes of my wife, mother and father. I thank Almighty for that day, when I had the luck to see my family members and old class mates wishing me success in my future life.

"You will be glad to learn that I have been appointed as Assistant Conservator of Forests, (a rank equivalent to District Forester in the U. S.), and will be posted in Kashmire Circle. Now my future prospects are insured for all time to come."

Yours sincerely,

D. R. MALHOTRA,
Kashmire Forest Service,
Jammu, India.

A Creditable Record

An enviable record was hung up recently by three seniors of the University of Idaho school of forestry when all three passed federal junior forester examinations in competition with 167 applicants over the country. Of the 167 to take the examination only 36 passed with grades above 70, three of those being this year's graduates of the Idaho school.

The three and the only candidates from Idaho to take the junior forester examination, all passing, were Harold Z. White of Moscow, Clarence C. Olsen of Seattle and Warren H. Bolles of Little Valley, N. Y.

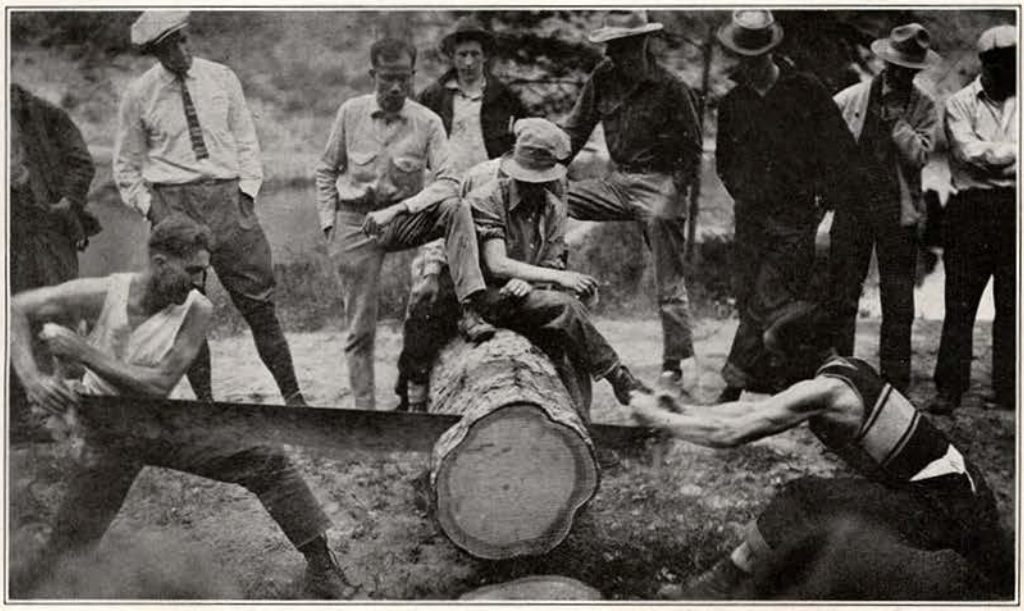
THE ANNUAL BANQUET

The tenth annual banquet held at the Blue Bucket Inn the night of February 16 was one of the most successful events the Associated Foresters have ever staged.

The program was replete with music, good will and excellent speaking. Clarence C. Olsen presided as toastmaster. Those appearing on the program were: President A. H. Upham, who spoke most entertainingly of his impressions of European forestry; J. H. Heckathorn, representing the Moscow business men; W. R. Renshaw, deputy state forester; Dean H. C. Dale of the School of Business Administration; Rev. E. S. Muckley of Moscow; Warren H. Bolles, representing the Associated Foresters; C. R. Stillinger, speaking for the alumni and former students; Fred Morrell, prominnent in U. S. forestry circles, representing the Forest Service; and the guest of honor, Dr. C. A. Schenck of Darmstadt, Germany, widely known in both Europe and America for his achievements in forestry. Dr. Schenck, speaking in a delightfully humorous vein gave his impressions of America and her institutions, based upon personal observations covering thirty-two years. "America," he said, "stands for good will toward all mankind."

THE THIRD ANNUAL BARBECUE

The third annual barbecue of the Associated Foresters was held on Saturday, May 14. at Felton's Mill, twelve miles northeast of Moscow.



Log Sawing Contest, Barbecue, 1926

Leaving Moscow shortly after noon, the entire school, including faculty, students and guests, proceeded to the scene of activities by auto caravan. The afternoon events consisted of boxing and wrestling matches, foot races, log rolling, sawing and chopping contests, swimming races, and a tug of war between the upper and lower classmen. The

interclass competition was exceptionally keen. The Juniors won the field meet with a large margin of points to spare.

A business meeting, including the annual election of club officers, followed the field meet. The club leaders for the coming year are as follows: Floyd Godden, President; Arlie Toole, Vice-President, and W. M. Saling, Secretary-Treasurer.

The speeches of the newly elected officers were interrupted at six o'clock by "Chef" Allen's welcome request to "Come and get it or we'll throw it to the fishes." An hour later eighty-five foresters and their guests were safely on the outside of a choice collection of roast meat, baked beans, buns, doughnuts, ice cream, cookies, coffee and cigars—the grand finale of a perfect day and a highly enjoyable event.

The Kitchen Squad, Barbecue, 1926

Priest River Forest Experiment Station an Asset to the School of Forestry

The generous offer of the Director of the Rocky Mountain Forest Experiment Station to the School of Forestry to use the Priest River Branch Station as one of its primary field laboratories was taken liberal advantage of this year. The sophomore class in seeding and planting under the direction of Prof. C. W. Watson spent a week at the Station in April, engaged in actual planting operations, and as noted in another column the senior class enjoyed a most profitable fortnight there in May.

The Station is within eight hours' run by motor truck from Moscow, and is ideally situated and equipped for instruction. Its four thousand acres of experimental forest together with the Kaniksu National Forest of wihch the station forms a part, and the adjacent state forest, also under management, makes it one of the richest fields in the west for forest research and study. It is certain that classes in forestry will continue to make frequent pilgrimages to the Priest River Branch Station.

Opportunity for Employment

That every member of the senior class had a good job before he graduated and that every available undergraduate was placed for the summer well before the close of the year attests the facilities of the Idaho School to find remunerative employment for its students.

A statement of appointments received by the class of 1926 appears in another column. A canvass of assignments received by the undergraduates shows them to be scattered throughout the several states of the northwest though the most of them are in Idaho. The bulk of the boys will be with the U. S. Forest Service in various capacities. The next greatest number will be employed by the office of Blister Rust Control. A number will work for private concerns. Three will be in the employ of the university and two will be on state work. As usual the demand for men exceeded the supply.

Value of Wood River Trees

(An Editorial)

"H. I. Nettleton, instructor in the School of Forestry, University of Idaho, and two student assistants last July made the first scientific survey of the timber resources on Wood river between Ketchum and Bellevue. The Times-News-Miner has been favored with a copy of the report of this survey just completed. It is worthy of careful study and the recommendations accompanying it are of special value. It has been customary to hold the cottonwood timber in contempt, but with the vaulting prices of all kinds of lumber and the corresponding necessity of utilizing every stick of lumber within reach, this information relative to the cottonwood and the aspen of this immediate vicinity is worth much especially to those who own the land upon which these trees can be so readily grown. The uses to which these trees may be put and the future possibilities of this limited timber belt are matters worthy of the careful consideration of every citizen of this community. This report of Mr. Nettleton's furnishes another proof that there is often wealth lying right at our doors; wealth that we overlook and ignore in our hungry search for other forms of wealth."

—Times-News-Miner, Hailey, Idaho.

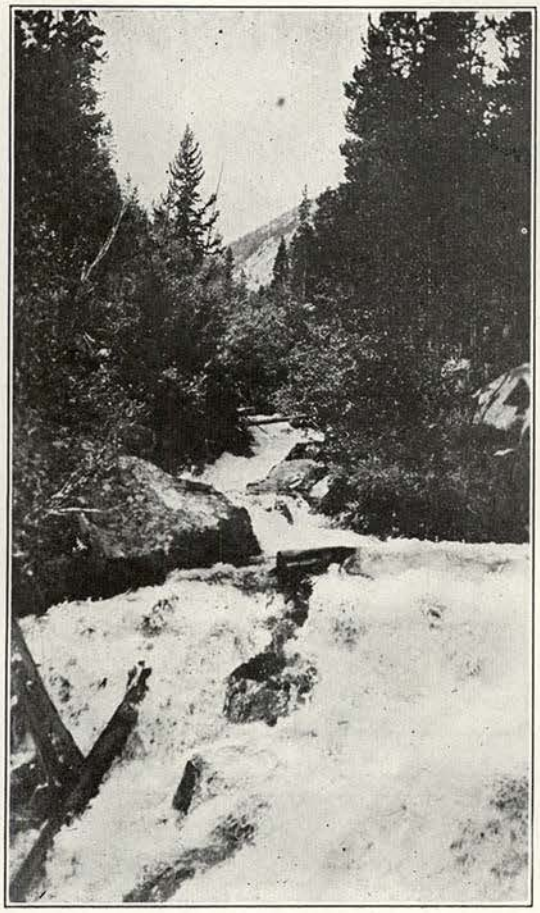
Federal Aid in Tree Distribution

By an agreement entered into the past year with the U. S. Forest Service under the provisions of the Clarke-McNary Act the School of Forestry now receives federal aid in its tree distribution project and is now expanding its forest nursery to meet the growing demand for forest planting material.

For a number of years the School has been distributing forest trees at cost in order to encourage tree planting within the state. This policy will be continued as regards to ornamental stock, but under this cooperative agreement, the School will now supply forest planting stock to establish windbreaks, shelterbelts and woodlots at about one-half the cost of growing and packing it.

The plan of growing and distributing trees at cost was conceived by Dr. C. H. Shattuck, first dean of the School, and was put into operation in the spring of 1910. Time has proved the wisdom of the undertaking. The site chosen for the nursery is a northerly slope just back of the campus and athletic field. The soil and moisture conditions are admirably adapted to forest nursery purposes. From the beginning Mr. C. L. Price has been in charge as forest nurseryman and has contributed his years, industry, and skill to the success of the enterprise.

Plans underway to give the state more adequate service include the expansion of the nursery to several times its present capacity. It is especially desired to encourage windbreak, shelterbelt and woodlot planting in order that forestry may take its rightful place in the program of diversified agriculture. The growing of shade trees will also be put on a much larger scale in order to give the public better service in ornamental planting.



(Photo courtesy H. Hubert Jr.)

THE RIVER'S VINDICATION

It's true I've gone on the war path,
I've smitten your cities and homes,
I've cracked the walls of your stately halls,
I've threatened your spires and domes.

I've spoiled your gardens and orchards,
I've carried your bridges away,
The loss is told in millions of gold;
The indemnity you must pay.

But had I not cause for anger?
Was it not time to rebel?
Go, ask of the springs that feed me;
Their rock ribbed heights can tell.

Go to my mountain cradle,
Go to my home and see,
Look on my ruined forests
And note what ye did to me.

These were my silven bowers,
My beds of bracken and fern,
The spots where I lie and rest me
E'er to your valley I turn.

These you have plundered and wasted,
You've chopped and burned and scarred,
Till my home is left of verdure bereft,
Bare and lifeless and charred.

So I have gone on the war path;
I've harried your lands with glee.
Restore with care my woodlands fair
And I'll peacefully flow to the sea.

—*F. W. Nash.*

Forestry in the Public Schools

Through the good offices of C. J. Brosnan, associate professor of American history, University of Idaho, an excellent statement of forestry in Idaho is now available to the school children of the State through his textbook on the History of Idaho, adopted as the official text for use in the public schools.

E. H. Holmes, professor of geography at the Lewiston Normal School has also written a splendid chapter on the forests of Idaho for the geographies in use in the State. Thus it is that through these two authoritative sources the school children of Idaho have access to reliable information regarding one of the state's most important resources.

Where Our Graduates Are Employed

Since it is through the work of its alumni that the School of Forestry renders its greatest service, it is of interest to know in what lines of work these men are engaged. A canvass of the list, including the class of 1926, shows that practically all of them were engaged in some phase of forestry work for a time, and that 72 per cent are actually so employed at the present time. Of the eight men graduating in 1925 all but one are in the profession of forestry, and as noted elsewhere in this volume 100 per cent of the class of 1926 will either engage in the forestry work, or will pursue graduate work in forestry.

Of the 72 per cent of the alumni now in forestry practice, 47 per cent is in some form of public service, and 27 per cent is employed in private forestry. In point of the number employed, the federal government lays first claim to the graduates. The lumber business is a close second, the demand coming largely from the timber companies.

In this connection it should be stated that a large number of former students whose courses were unavoidably interrupted are likewise well established in some phase of forestry work, and are rendering commendable service.

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