

February 1, 1926.

MARKING POLICY STATEMENT

GENERAL BASIS OF MANAGEMENT

National Forest timber is a crop. The fundamental purpose of management is to harvest this crop at the point where it yields the largest or most profitable return.

Generally speaking, trees should be marked for cutting as nearly as possible at the time when the mean annual growth begins to fall off. This does not coincide with diameter growth, for even where the growth rings get narrower the tree may still be putting on more increment than when the tree was smaller and the rings wider. Also in general a larger proportion of desirable and valuable products are secured from the larger trees. Therefore, when increment ceases to increase satisfactorily, the tree has reached commercial maturity and ordinarily should be harvested. "Maturity" throughout this statement is used with this meaning.

This shows the importance of studying carefully the individual tree before deciding that it is no longer profitable to keep. The amount of growth necessary to add steadily to the board foot volume is of course, most important in estimating the value of the tree, and is shown to be only 1/10 as much for a 32-inch tree as for a 10-inch tree. The other scale shows that in cubic feet (e.g. for pulpwood) trees are putting on relatively less in the larger sizes, or in other words, their actual volume does not increase so rapidly with size as their board foot volume.

The foregoing discussion applies primarily to sawlog production, as the maximum amount of lumber is, of course, secured from the largest trees which can practicably be grown.

Large portions of the Washakie Forest, however, are necessarily managed for the production of hewed ties. On these areas, therefore, commercial maturity occurs at the point when the tree produces the most hewed ties. Commercial maturity should not be confused with physical maturity in the usual sense. Trees may often produce the maximum number of ties before they are actually or physically mature.

The Washakie Forest is logically divided into two distinct management areas. This division is brought about by location, topography, character of tree growth, and markets of the areas concerned.

The most important of these areas is in the Upper Wind River country where the timber is of a good grade and size, and in this region the tie industry calls for a management form primarily for hewed ties. This market necessitates that this area be handled with this aim in view. But due to the mature and overmature stands of virgin timber which contain trees of sizes too large for hewed ties, the utilization of the larger trees for sawlogs and sawed ties is at present necessary

The other area is within the Lander district. In the past, the more accessible stand of timber in this region has been heavily burned over, and at present, except for a few small isolated tracts, the timber is below a merchantable size, and no large amount of cutting will be possible within the next 20 years. The territory surrounding this latter region is largely a farming and stockraising community, with Lander as the center, and since the demand for forest products will be principally for lumber, the system of management should be planned with this in mind.

The same general principles governing marking hold good, however, for both hewed tie and sawlog stands. Each tree must be examined closely and the markers conclusions based on external appearance, checked sufficiently by use of the increment borer to insure proper selection. Marking involves more than the mere selection of trees for cutting. It is the first essential step towards regulating the cut and making management plans effective. From the ultimate standpoint of forest management, a partial cutting system is desirable in all types where the condition of the stand makes this feasible. Partial cutting with as short cutting cycles as economic and stand conditions justify, is therefore the basic policy which should be kept in mind in deciding upon the treatment to be given each area, and in actually conducting the marking.

In stands cut under the selection system and managed for the production of hewed ties, the aim will be to make a second cut as soon as the largest trees in the stand attain a maximum diameter of $15\frac{1}{8}$ inches. This will ordinarily occur from 30 to 50 years after cutting. Sawlog areas will ordinarily be managed on a longer rotation than areas managed for the production of hewed ties, so that the products of large size may be secured. In overmature stands where clear cutting has been necessary, the period of second cutting is uncertain, and will not ordinarily occur within 100 years.

Conditions on the ground after cutting and brush disposal are completed are what count. This principle should be kept in mind in determining the marking policy for a given sale, and sacrifice if necessary made in stumpage rather than in desirable silvicultural work

MARKING PRACTICE

Marking in all types will follow the selection system. Only in clearly defined cases where different treatment is justified because of fire or wind damage, insect injury, injury from other causes, disease or decadence, or stagnation beyond point of recovery will this practice be departed from. The object in all marking is to harvest the commercially mature and overmature timber and also to remove defective, diseased or overcrowded trees in the younger age classes.

Designating areas for cutting.

Even where a heavy cut is warranted on account of maturity or seriously defective condition of the stand, an absolutely clear cutting is seldom warranted. Trees of unmerchantable size are usually found on the area as well as immature merchantable trees which should be reser-

ved from cutting. This means that we should go slow in designating areas for cutting without marking. There are also many disadvantages from the standpoint of sale administration in allowing cutting to take place without marking. Accordingly, authorizing cutting without marking should be done with great caution and the practice held to areas where as satisfactory results will be secured from this plan, with the necessary increased supervision as would be secured through marking. There is no intention in this statement to discourage the designation of area for clear cutting in those places where it is manifestly the most economical and practical procedure. The idea is that the Forest Officer should be absolutely sure of his ground before adopting this practice.

Areas where clear cutting is to take place will be clearly and specifically defined. Order of cutting in all such operations, excepting possibly very small sales, will be controlled by dividing the area into small units, and designating the sequence of cutting.

Diameter Guides.

Diameter guides are intended merely to give Forest Officers inexperienced in marking in a given type of timber, a general idea of the average sizes at which the different species reach commercial maturity. These guides are not intended as diameter limits to be applied automatically and care will be necessary to see that marking officers understand their application. The size at which maturity is reached will vary widely with conditions of site and growth and marking must be based upon a close examination of each tree. However, in stands being managed on a hewed tie basis any tree should be removed which would be too large for hewing at the time of the next cutting.

Vary Marking.

One of the chief faults in marking practice is failure to change the marking when the character of the stand changes. In passing from a thrifty mature stand to a pole or overmature stand the marking must change abruptly. On ridges and otherwise poor sites, trees virtually stop growing at smaller diameters than on good sites, and the marking must vary accordingly.

Defects of various characters often furnish sufficient reason for taking out trees which are approaching maturity or certain trees located in stands where there is an opportunity to practice selection. However, the same defects occurring on younger trees may not be of sufficient importance to warrant removal of the tree before the next cut. The marker will also be less exacting regarding defects in considering trees along the edges of openings or parks or in any other location where a tree is badly needed for seed or for otherwise assisting in extending the forest.

Forked and Leaning Trees.

Trees will not be marked for cutting merely because of a fork or slight lean. However, they should ordinarily be marked, even though immature, if they have forks so located that an appreciably greater

quantity of the more valuable products will never be produced. Forks of certain types split off or allow the entrance of disease. Knowledge of local timber will indicate the need for marking trees with forks of a character subject to such damage.

Unless a tree leans to the extent that it will possibly fall before a second cut, or lose in value through distortion, or unless likely to rub or distort another tree, it will not be marked merely because of the lean.

Basal Fire Scars.

Basal fire scars are most important in lodgepole pine. The damage done on individual tree depends upon the size and character of the scar. Only rarely in lodgepole pine do the scars become pitched over; but when such is the case the scar has little or no effect on the need for marking the tree.

Trees showing scars will be marked only when the scar is really a serious defect that is retarding growth or threatening the life of the tree. However, basal fire scars on lodgepole pine and Englemann spruce are ordinarily of sufficient importance to warrant marking the trees affected.

Basal fire scars on all species should be examined critically, because if any rot exists the tree should invariably be marked.

Canker.

Canker infections are important in lodgepole pine for breakage takes place and fungous diseases gain entrance at the point of infection. Trees with the larger, more serious infections, should be marked but trees with small cankers, unimportant from the above standpoints, should be marked only when they can be removed as a thinning measure.

Mistletoe Infected Trees.

Mistletoe is found chiefly on lodgepole pine. Heavily infected trees are characterized by a general appearance of unthriftiness, poor thin crowns, sickly, pale colored, and often short needles, distorted branches, frequently dead or dying, and the presence of witches broom.

As far as possible all infected trees should be marked for cutting. Some stands are so heavily infected that it is impossible to get rid of all mistletoe without clear cutting. In most lodgepole stands this treatment is proper.

Insect Infestations.

The subject of insect infestations is too large to attempt to cover in detail. Infestations of any consequence should be promptly reported with a view to undertaking special control measures without delay in all cases where conditions warrant.

On the other hand, there is an opportunity to reduce insect damage of a minor nature and eliminate the infestation before it becomes serious through intelligently directing the regular marking practice. Bark beetles cause the most serious damage and it is important that trees containing them be marked for cutting and utilized before the broods emerge.

Dead Shoots.

Frequently in lodgepole pine and occasionally in other species, a dead stub of a limb extends from the bole at an upward acute angle. Water works into the bole at the junction of such limbs with the trunk and almost invariably causes rot to enter, which fully justifies the marking of trees where this condition is present. Dead lower limbs which are the result of natural shading out and which protrude from the trunk at a right or downward obtuse angle are not serious defects and do not constitute a justification for marking the tree.

LODGEPOLE PINE TYPE.

Railroad ties, mine timbers, mine props, fence posts and telephone poles are the products which will be secured from this type. Sawtimber will occur nearly always as a by-product from the few larger trees scattered through the stands. However, some stands show a very pronounced slowing down in growth at comparatively small sizes, reaching their point of commercial maturity at mine prop size.

Excepting on the Lander District area, where sawlog production will be the rule, this type will be managed primarily for the production of hewed railroad ties, with lumber, mine props, and similar materials produced as byproducts. There will be but little difference in marking practice whether stands are managed for sawlogs or hewed railroad ties, except that on areas being managed for hewed ties, it is important that all trees which will be too large for hewing at the time of the next cutting be removed at the first operation.

Thrifty lodgepole pine forests with an average representation of age classes should, in theory, be cut over at regular intervals, taking out the trees which have attained physical maturity.

However, railroad ties are the most important marketable product which can be secured from such stands, and they are obtained from the larger trees. In general, therefore, in thrifty as well as in older stands of sawlog or tie size, trees are cut when they produce the maximum or nearly the maximum number of ties. Obviously there is nothing gained by holding trees beyond the point where most ties are produced and where the additional increment is in the form of slabs or lumber which are generally unsalable on this forest. Consequently all trees are considered mature which have reached the point where they will produce the maximum number of ties, and this policy makes it practicable to mark more or less mechanically on the basis of diameter guides.

Some trees even in better than average stands cease rapid growth before attaining tie size. Cutting them at this point would certainly be harvesting the largest amount of wood for the time involved in growing it. If the market will absorb the product this treatment is proper,

but small size trees produce only mine props and fence posts and the market in this region can use only limited amounts of such material. Consequently, the only alternative usually is to let such trees stand, even though growing very slowly, until they finally reach sawlog or railroad tie size.

Overmature Stands.

In these stands the majority of the trees have passed the point of maturity and are overripe, evidenced by sparse, short crowns or spike tops, smooth gray and thin bark, and a general appearance of being in poor growing condition.

All mature, overmature and defective trees of a merchantable size will be removed. This means practically a clear cut of trees of merchantable size, leaving the thrifty, immature trees which are windfirm. On account of the increased growth that may be expected as well as to insure reproduction in case the advanced reproduction should be subsequently destroyed by fire, it is well to leave such trees if they may reasonably be expected to withstand the wind.

Thrifty Mature Tie or Sawtimber Stands.

In this class of stand the majority of the trees have not passed beyond the mature stage, most of the trees being in fairly thrifty condition and having full crowns and reddish rough bark.

The object in marking will be to remove trees which have reached or passed maturity, and defective and crowded trees below this size. In marking for thinning purposes where immature trees are involved, the principles outlined under "Thinnings" will apply.

Most of these stands are managed for hewed ties. Trees capable of yielding the maximum number of ties are considered mature and should be marked, even though the tree might still be gaining in board foot volume. A minimum diameter of 13" d.b.h. will work out satisfactorily on most sites, but should be varied where conditions warrant. A lower guide may be justified toward the upper limits of the type in those stands which reach actual maturity at smaller diameters.

Care should be taken not to leave trees which will be too large for hewing at the next cut.

Trees below the minimum diameter limit of 13" will not be marked unless they are stagnated or contain spike tops, fire scars, dying or very thin crowns, lightning or frost cracks, insect infestation, canker porcupine injury or other defects serious enough to make the trees less valuable before the next cut. Minor defects, however, should not be overemphasized in marking. Judgement must be used.

Lodgepole pine is often subject to windthrow when the stand is removed in two or more cuts. This should be considered in marking, and sufficient trees must be left to insure leaving a windfirm stand. This may require the leaving of some trees which are commercially mature, but in sufficiently thrifty condition to last over until the next cut. Care should be taken however, not to leave tall trees which will pro-

ject much above the general crown level of the rest of the stand.

Pole Stands.

The object of management here is to remove occasional mature trees and as far as markets will permit to make such thinnings as are desirable from a silvicultural standpoint. See paragraph under "Thinnings". Stagnated stands of poles too small to produce railroad ties should in theory be cut clean. About all that can be done at present is to hold these stands until the market for pulpwood, mine props, posts or other small sized products develops sufficiently to make cutting possible.

ENGLEMANN SPRUCE TYPE.

On the upper Wind River portion of the Forest the Englemann spruce type will be managed for the production of hewed railroad ties. The basis for this is that there is an established market for only this class of product and the type occurs largely in mixture with the predominant lodgepole pine type which is being managed for the production of hewed railroad ties.

On areas managed for hewed ties, Englemann spruce will be marked in the same manner as lodgepole pine. That is, trees large enough to produce a maximum of hewed ties will be marked and no trees will be left unless needed for seed or wind protection, which are apt to be too big for hewing at the next cut.

On the Lander district, where saw log production is the rule, spruce will be marked on the basis of maturity, removing trees only where the board foot increment has ceased to increase at a satisfactory rate. Immature trees will be marked only because of defect or where thinning is desirable.

In either tie or saw log stands a sufficiently dense stand of young and middle-aged trees will usually remain after cutting to protect itself against windthrow. If trees much taller than the new canopy are left they will afford little or no additional protection to the remaining stand and are the ones most likely to blow down. Accordingly care should be taken not to leave tall trees, the crowns of which will extend much above the general crown level of the stand after cutting.

Approximately 60% of the merchantable volume of the stand will be removed by following this policy.

LIMBER PINE, DOUGLAS FIR, AND SUBALPINE TYPES.

The basis of management outlined for Englemann spruce will be applied to these types.

ASPEN TYPE.

Markets for aspen are limited and this species generally contains a great deal of defect. Excelsior, fuelwood and other minor products will be produced. Except when marking may be desirable because of some special local conditions - such as along highways or in the vicinity of recreational areas - trees will be designated for cutting without marking.

MIXED TYPES.

Mixed types will be marked in the manner prescribed for the major species involved. The same principles apply where small patches of a different species occur upon areas where railroad ties are being produced but where sawmills are not planned on at the time of the next cut. This is illustrated by Englemann spruce occurring in patches on north slopes or in strips along streams within a lodgepole pine stand that is adapted to the production of hewed ties.

INFERIOR SPECIES.

The cutting of alpine fir will be uniformly required where products of this species are marketable. Since alpine fir railroad ties are not accepted by the railroad the utilization of this species can be required only where it can be marketed for lumber.

Where marketable, the species will ordinarily be marked heavily, taking out all trees which are 10" d.b.h. and larger.

GENERAL MARKING CONSIDERATIONS

Thinnings:

Stands of immature timber which are too dense to permit of proper development occur in nearly all types. These stands may occur as pole stands covering considerable areas or as small patches or clumps within areas of older timber. In either case it is good silviculture to thin these stands by removing sufficient trees to provide room for the remainder of the young stand to develop. The extent to which thinnings can be practiced depends almost entirely upon the class of products which the markets can absorb. At present we are unable to conduct operations in many stands of small sized timber where thinnings are silviculturally desirable. As time goes on this condition will likely right itself but for the time being thinnings will have to be largely confined to pole size stands large enough to produce mine props, poles, posts, or other small products.

All thinning operations must be handled with care. In general the thinnings will be made from below. That is, the poorer and usually crowded or partially suppressed trees will be taken to make room for the better individuals. Where, through natural survival of the fittest, a few trees in the group have obtained dominance and the others are more or less badly crowded so their response to release is questionable, it is obviously poor practice to mark the larger trees to make room for the poorer ones. These larger trees are reaching the point where they are making the most valuable and rapid growth and to cut these to free doubtful trees will detract from the final yield obtainable.

In making thinnings, the aim should be to obtain ample and approximately equal spacing in the stand left on the ground. This is of particular importance in lodgepole pine where immature pole stands are often fairly even aged and where there is less choice between the trees to be taken and those to be left.

Reproduction Openings.

In the Englemann spruce and lodgepole pine types, mature trees frequently occur in groups. Where these groups are cut, a small opening is left surrounded by middle-aged and young trees. Such openings afford reproduction an excellent opportunity, and marking officers should not be reluctant about making them when they result from carrying out the marking policy outlined heretofore.

Timber Cutting on Scenic Areas.

Around the more important areas used, or likely to be used, extensively for recreation the policy will be to make an improvement cutting removing dead, insect infested and diseased trees, and only such other trees in need of removal as can be spared without marring the beauty of the setting.

Along highways the standard marking policy should not be varied if sufficient timber will remain to insure a forested appearance on the area. It is very desirable for the public to see forestry in practice. However, in case the character of the stand is such that under the regular marking policy only scattered seed trees will be left for any great distance along a road, tree of a character ordinarily marked for cutting will be reserved to the extent necessary to avoid leaving areas which have a denuded appearance.

On camp and summer home sites shade is an important feature and unless marking according to the standard practice will result in adequate shade on such areas, sufficient trees will be left for this purpose. Such additional trees as far as possible should be those which will last over until the next cutting.

ADMINISTRATION.

Marking Percentage in Contracts.

Forest Officers preparing timber sale contracts should not be influenced by the natural desire of operators to secure the greatest volume possible. The percentage stated in each contract should be based on conditions on the ground, and application of the marking practice to the particular area.

Diseased Trees.

Removal of "diseased" trees of all species, as defined in timber sale contracts, will be uniformly required as called for by the instructions on page 11 of the Forest Management Handbook.

Sample Marking.

Instructions relative to sample marking are contained on page 31 of the Forest Management Handbook.

Leaving Sawlog Trees.

Stands will not be cut over for hewed railroad ties, or other products, leaving sawlog trees except with the specific approval of the District Forester.

Checking Up Marking.

Regular inspection of the marking just in advance of the cutting presents an excellent opportunity to catch up trees overlooked in marking and every advantage should be taken of this.

Both intensive and extensive records of cutover areas indicate that we have not give sufficient attention to the preservation of the young trees below marking size, which will form the growing stock for the next crop. In the conversion of old forests where young trees are scarce, these few are our most important asset, and administration which will prevent their needless destruction in felling and skidding operations will be required.

General.

It is the duty of those in charge to see that the various officers understand the principles and interpret and apply the instructions uniformly. One standard should hold for the entire Forest. Men newly assigned to marking should not be allowed to mark independently until sufficient timber has been marked by them to insure their getting a thorough knowledge of the work before they are turned loose.

The above plan will govern all marking. Additions or modifications will be approved by the District Forester before being made effective.

Forest Supervisor

Approved Feb. 1 1926