

GENERAL INSTRUCTIONS FOR MARKING TIMBER ON THE
_____ NATIONAL FOREST¹

The following general rules, to be varied at the discretion of the Forest officers in charge, should serve as a guide in marking timber on the _____ National Forest. These rules are supplementary to the General Instructions in "The Use Book."

Pure White Pine Stands

The marking in stands of white pine should aim first of all to remove undesirable individuals. Trees that are diseased, unsound, attacked by insects or fungi, dead, overmature, badly forked, spike-topped, or otherwise in such a condition as forbids favorable development or constitutes a menace to the forest, should be marked if such trees contain at least one merchantable log.

If possible leave from 50 to 75 young, thrifty, well-formed trees per acre. Trees with well-developed crowns are to be preferred since they are generally more wind-firm. Trees standing alone in small openings in the forest are frequently the most wind-firm and can safely be left. The distribution of trees left should be uniform.

If clean cutting in any form seems advisable in any case, special rules will be prepared.

Pure Yellow Pine Stands

Since on much of the land included in this type, the ground is now but partly and insufficiently stocked with young timber, whereas the areas of forest are constantly becoming more accessible to market and there is every indication of a strong future demand at greatly increased prices, all marking under present sales should be done with reference to the following:

Leave all young trees unless plainly undesirable from serious unsoundness or overcrowding, or so misshapen that they will not develop into valuable timber trees, and in general all thrifty trees which will plainly be much more valuable at the time a second cut may reasonably be expected in from thirty to fifty years.

Never make an opening of more than one quarter of an acre in the forest, or enlarge a natural opening of a greater size, even if the only trees available for seed are mature and partially unsound, unless good reproduction is already well established.

Before marking any tree for removal be sure that it is not needed for seed. Young, thrifty yellow pines with full crowns make the best seed trees, and enough trees of this kind to seed up the area should be left. This usually means from two to five to the acre, the number varying with the seed-

¹ This document was transcribed from a photocopy of the original, which is located in the Supervisor's Office Silviculture Library Archives. To the greatest extent possible, this version is an exact duplicate of the original text.

bearing capacity of the trees. If young trees that are just beginning to bear cones are left, at least five are needed to the acre. From two to four seed trees are enough if they are old and have large, spreading crowns and are wind-firm. The trees left should, wherever possible, be distributed in small groups. This makes them more secure against windfall, and conforms to the grouping tendency of the western yellow pine. Leave enough seed trees even where the seedling growth is good, in order to ensure reseeding in case of fire.

When a sale area included enough thrifty timber to make it possible to leave from 1,500 to 2,000 board feet of merchantable timber per acre without too far reducing the present cut, this amount should be left standing to furnish the basis for an early second crop. Sales should not be made from areas on which the stand is very thin, and it is evident that reproduction will not follow. Furthermore, sales in which it will be necessary to cut too large a percentage of the stand in order to make a logging operation profitable should not be considered. In general, not less than one-third of the original stand should be left on the cutting area.

If these rules are carefully observed the result will be that not seed trees and reproduction only, but an existing forest, will be left standing and the chances for reproduction greatly increased, since forest conditions are much less disturbed. This is important in an arid region where the forest maintains itself as against chaparral with difficulty, and where reproduction depends largely upon the protection against evaporation furnished by the older trees.

On all of the drier portions of this type slash should be lopped and scattered over the openings on the cutover area. This material will aid reproduction by protecting the soil from evaporation and gradually forming humus. Where there is danger from fire, the brush should be piled and burned on a strip approximately 200 feet wide, around the area where the brush is scattered. Where the danger from fire is extreme it may be necessary to pile and burn all the brush.

Pure Lodgepole Pine Stands

Selection Cutting

In selection cuttings, the aim should be either to thin the stand very lightly and only to such a degree as will make the remaining trees become more wind-firm eventually and allow of a second cutting at an early date, or to remove nearly all the mature and undesirable individuals, which would leave, ordinarily, only enough trees to form the basis for a future cut. Between these two extremes there are many gradations, and the exact extent of cutting to be adopted in a particular sale depends on the judgment of the Forest officer in charge.

As the name implies, the selection cutting depends for its success on the careful and judicious choice of the trees to be removed. It is applicable in uneven-aged stands of lodgepole pine, except where the danger from windfall is excessive, in even-aged stands where most of the trees are too small to admit of a strip system, in even-aged stand where the cutting is to be very light in order to secure a second cut within a short time, in all stands where the cutting is merely designed to remove diseased or other affected individuals.

In the case of uneven-aged stands, the trees to be left should be young and thrifty and carefully selected for their wind-firmness. The seed-bearing quality of the trees is only a secondary consideration in lodgepole stands, since the necessity of guarding against windfall results in leaving too many trees for the purpose of securing the best regeneration by natural reseeding. In marking stand of this character, therefore, bear in mind the danger from windfall, the basis for a future cut, and the removal of all undesirable individuals.

Where there is a choice between trees to be left, favor straight, clean individuals having the best crown development. Trees left should be spaced as evenly as possible. Where the cutting is heavier, the grouping of trees may be advantageous, since the individual tree is thus better able to resist windfall.

Mark heaviest on northern slope and moist situations, and very lightly on dry, exposed situations. Mark heavier near the bottom of slopes and mark lightly toward the top.

Where the situation is exposed or the present stand naturally open, marking should be most careful if, indeed, it be found that any trees can be spared. Small patches of isolated timber and solitary trees should not be marked for removal.

In even-aged stands which are too immature to admit of a strip system, and in even-aged stands where the cutting is to be very light in order to secure a second cut within a short time, a modification of the selection system is indicated, in the nature of thinnings. This method of cutting is especially desirable where the danger from windfall is marked, since it removes only overmature, suppressed, defective, and diseased trees in order to make room for more thrifty and hence more wind-firm trees. A thinning should never be heavy enough to break the crown cover permanently; in general no openings should be made in the crown cover which will not be fairly well filled long before a second cutting will be made. In stands of equal density the thinning may be more heavy on deep, moist, and fertile soils than on shallow, dry, and poor soils, since on the former the more rapid growth will close up the crown space in a shorter time.

If any part of the stand is much exposed to severe winds, great care should be taken not to open it so much as to cause danger from windfall.

The main object in thinning a stand is to improve its character by the removal of all suppressed, defective, or diseased trees, and of such large individuals left from a previous stand which limit the upper crown space and retard the growth of the more promising young trees. Mark all trees infested by insect enemies and all trees infected by fungous diseases, provided the trees so marked are merchantable for any purpose. In sales of saw-timber only, any such tree should be marked if it will make one sawlog. Logging and brush disposal should be so conducted as to entirely remove any danger of the evil's spreading.

The diseases and defects which may be looked for are dry-topped trees, trees attacked by fungus or insects, or injured by lightning, and trees barked by animals or by rubbing, and trees with cat-faces or frost cracks.

Clean Cutting in Strips

In even-aged stands of lodgepole where, as is usually the case, there is danger of windfall, and where the markets are such as to permit this kind of cutting, it is usually desirable to cut clean strips, leaving the alternate strips uncut or merely thinned of defective and overmature trees. This method of cutting is most successful when a complete utilization of timber can be secured. Where there is a market for only sawlogs, clean cutting is applicable only in very even-sized stands.

Everything merchantable should be removed from the clean-cut strips. In any case only defective and overmature trees should be removed from the timbered strips. If there is great danger of windfall, it will be best to leave the timbered strips intact.

The strips may run with the slope where there is no danger of snowslides or of erosion. Otherwise they should run along the slope or diagonally to it. Careful attention must be paid to the danger from windfall, and where heavy winds blow from a certain quarter, the strips should run across the wind direction or diagonally to it. The strips should rarely exceed 100 feet in width. All brush should be piled and all trees thrown within the strips which are cut clean. Ordinarily the strips left should be of the same width as the strips cut.

Engelmann Spruce

In the more moist situations where the Engelmann spruce grows best it should be favored. That is, other species should be cut to a lower diameter limit and in cases of doubt the spruce should always be left. In addition to the serious danger from windfall in the spruce type, there is great danger from the drying out of the soil by the sun and wind, from too heavy cutting. The result is the killing of the spruce left and the prevention of spruce reproduction.

Pure Stands

In the dense pure stands of spruce on cold, moist situations at high elevations, the essential point in marking is to leave the remaining timber safe from uprooting. Cutting in this type should be restricted to a thinning, removing the most overripe, suppressed, and defective trees and leaving from one-half to two-thirds of the present merchantable stand. The thinning should be still lighter, if necessary, in order to leave the remaining timber absolutely safe from wind-throw. It is essential that the first cuttings in this type be very light until it is fully determined to what degree the stand may be opened up with safety.

Especially on slopes where spruce grows as a result of heavier precipitation, the danger from wind is extreme since the Engelmann spruce is very shallow rooted, and this danger must control the marking of the mature and still thrifty trees. No rule but experience and observation can be given to prevent windfall due to overcutting, but if no openings more than a rod or two wide are made in the dominant trees, windfall should not ordinarily result. Large mature trees are not necessarily windfirm and it is therefore better to leave the smaller-sized trees.

Trees on the borders of parks or otherwise in the open will suffer loss from windfall than trees in dense stands. Great care should be taken to mark lightly in stands bordering on parks; the trees next to the opening are more wind resistant and should be marked only if dying or badly diseased, since they will form windbreaks for the weakly rooted trees farther back from the opening.

Mixed Stands

Where equally valuable species occur in mixture with Engelmann spruce, favor the one which is most suited to the situation and will grow best there. For example, lodgepole pine and spruce commonly occur in mixture. In deciding which of those two to favor, moisture is the determining factor. Where there is enough moisture to enable spruce to grow well, favor the spruce. Where the situation is rather dry and indications point to a better growth of lodgepole than of spruce, favor the lodgepole.

Where alpine fir occurs in mixture with Engelmann spruce, discriminate against it since spruce will ordinarily grow wherever the fir thrives. On areas where fir predominates to such an extent that it is impossible to replace it naturally by spruce, nothing is gained by a severe cutting of fir. Rather the fir should be thinned out as indicated above for spruce.

As far as practical, alpine fir should be used for skids and other logging material, and the trees for this purpose cut, wherever; from dense groups where they are crowding spruce. In no case, however, should fir be cut where its removal endangers the remaining timber.

Blue Spruce

Blue spruce is commonly an inferior species, but where there are no trees of greater value in the stand, heavy cutting of blue spruce will merely injure the forest without converting it into one of more valuable species. However, it usually occurs in mixture with more valuable trees, and all blue spruce which is not needed for the protection of the watershed, and which will yield one merchantable log should be marked.

A fourteen to eighteen-inch diameter limit is suggested as a rough guide in distinguishing mature trees of this species. Blue spruce is commonly hollow butted, but if there is merchantable material above the hollow, the trees should be marked.

Mixed Stands of Various Species

In mixed stands of different species, market values and future demands upon the forest must be considered in selecting the species to be favored; usually, however, that species should be favored which seems to grow best under the existing conditions. Thus in moist soils Engelmann spruce should be favored as against other species, but, as pointed out above, on drier sites favor lodgepole pine over spruce.

Skids and other small material needed in logging should be cut from suppressed or defective trees or thinned from dense bunches of young timber. Thrifty young trees growing in the open should never be cut for this purpose. Where young white fir or balsam occurs it should be utilized for chute poles and skids, and wherever practicable cut out of bunches where it is crowding more valuable species.

Minor differences in the methods to be followed are discussed under each species:

Douglas fir

Since Douglas fir is perhaps the most wind-firm of the species occurring in this region, it should be especially favored on exposed situations. On areas naturally well adapted to it, Douglas fir should be given the preference in marking, over other species.

Tamarack

If tamarack occurs, it should be favored equally with Douglas fir on ridges, steep slopes, and other exposed situations. In old windfalls or where the ground is so covered with inflammable material that the fire danger is very great, all tamarack should be left for seed because of its fire-resistant qualities. In true tamarack types aim to perpetuate it by favoring it over other species. If smaller trees are lacking, leave, per acre, 20 to 30 trees of 12 or more inches D. B. H.

Cedar

In cedar types on well-drained areas, favor cedar over all other species excepting white pine. Leave 50 to 75 young thrifty trees per acre, spaced as evenly as possible. In addition to danger of windfall in this type, there is danger of drying out of the soil by sun and wind if the cutting is too severe. Accordingly the marking should, under ordinary conditions, be light. On cedar flats or bottomland where the soil is cold and poorly drained, favor cedar and Engelmann spruce.

Hemlock

In mixture with better species mark all dispensable hemlocks that contain at least one merchantable log.

Pure stands of hemlock usually occur as protection forests on high slopes. Marking in this type should be very conservative.

Balsam and White Fir

Balsam and white fir should not, ordinarily, be left in mixture with better species. In cold deep gulches where either grows to good size and spruce is wanting, they may be left. Leave the firs only where needed to protect the watershed, or for seed in default of better species. All trees which will cut one merchantable log should be marked for removal, and the destruction of balsam and white fir reproduction should be permitted in logging operations, but only where reproduction of more valuable kinds may reasonably be expected to take its place.

General Rules

As a general rule, at least one-third of the present merchantable stand should be left on every sale area to form the basis for a second cut. Exceptions occur only in cases where all the timber is overmature, insect infested, or otherwise deteriorating and it is not practicable to get a second cut from trees already on the ground. In clean cutting in strips in lodgepole pine, the uncut strips should contain at least one-third of the total stand, and preferably more.

Where the present stand is naturally open or the situation is exposed, marking should be most careful, if indeed it be found that any trees at all can be spared. Around openings it is well to leave a belt of wind-firm trees. If they are needed for seed or protection, small patches of isolated timber and solitary trees, even though merchantable or defective, should not be marked for removal. If not needed small patches of trees which are merchantable now and which would be isolated and un-merchantable after the cutting in any sale is completed, should be marked unless it is clearly unreasonable to ask the purchaser to remove them.

Trees on top of ridges, knolls, upper slopes, and other prominent places will seed up larger areas than if located in the bottom of draws and gulches and other places where the seed is restricted in its distribution, but the fact that their location makes them more liable to windfall must be considered.

All trees infested by insect enemies and all trees infected by fungous diseases should be marked, provided such trees are merchantable for any purpose.

There are frequently large, limby trees with widespreading crowns which occupy more than their share of space in the stand. Their shape makes them of little future value except for seed and they should be removed if not needed for that purpose.

In marking small material in dense stands, consider how much space and light the thrifty trees need, and mark the trees which now crowd them. Aim to leave the remaining stand sufficiently dense to produce good saw-timber trees in the future.

Along lake or river fronts, important public highways, or the brink of canyons, or wherever the forest has a distinct scenic value, or is used as a public resort, the marking should be very light. In such places, aim to improve the appearance of the forest by removing only dead, dying, defective, and unsightly trees. Along public highways no thrifty trees should be marked in a strip at least a hundred feet on each side of the road.

Extensive areas of timber not yet fully mature should be excluded from sale. On patches or small areas of immature timber which it is not practicable to exclude from the sale, marking should be very light, limited to one-third or less of the largest trees, or omitted altogether.

In areas already cut over, marking should be very light and only those trees taken which it is obvious are not needed for seed or protection, and which will not be more valuable at the time when a third cut may reasonably be expected.

A diameter limit should never be rigidly adhered to, since it is invariably productive of poor results. It should be varied at the discretion of the Forest officer, who should always bear in mind that the improvement of the forest and the protection of the watershed area are of the first importance. Thin-crowned, unsound, or diseased trees should not as a rule should be left, since they will not live until the next cutting, nor should thrifty, rapidly-growing trees, which, although merchantable now, can be cut more profitably later, be marked. If there is any doubt mark conservatively, rather than too heavily, and with a view to a second cut.

Owing to the great importance of marking, it should be done slowly and thoroughly. Too large an area should not be marked at first. A Forest officer should study the silvical condition of the stand, and bear in mind the demands both present and future, to be made upon the forest. Decide first what trees should be left, and then mark those to be removed. In marking, the direction in which the trees can be felled and removed should be carefully considered. Trees which are certain to be injured in the felling and logging operations should be marked for cutting and trees whose removal would injure a considerable amount of thrifty growing timber should be left even if overmature. The practical routes for logging roads or skidding trails should be determined and the timber marked with reference to them so that the remaining groups or strips will not be injured in the logging of marked trees. Study results after cutting has begun, and, where possible, correct errors.

When in doubt whether a defective tree contains merchantable material, mark it.

When in doubt whether a tree is needed for seed or protection, or is a proper tree to leave for the future crop, leave it.