the Civilian Conservation Corps, the Tennessee Valley improvement program, land-utilization plans of the Agricultural Adjustment Administration, and in the forestry, wild-life, and recreational undertakings under the National Recovery Administration.

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WOODLANDS Cut by the "Selection Method" Less Liable to Fire Damage

The greatest concern of many owners with regard to their farm woodlands and timbered areas is that fire may sweep over their land and destroy or seriously injure their forest growing stock. If the fire danger could be reduced, more landowners would be interested in using

FIGURE 112.—Cut-over area with canopy destroyed by fire. The fuels have dried out, and the chances of reproduction are very poor.

for continuous forest production lands that are too poor for agricultural crops. Thus the owner not only would obtain an additional crop, but also provide for himself and others profitable work that could be done at a time of year or during years when other work is at low ebb.

Every timberland owner knows that if he cuts most or all of the trees on an area, this "opening up" lets in the sunlight and the hot, drying winds which were previously excluded by the dense forest canopy. Few owners, however, appreciate the effect of such openings in causing drier fuels and greater inflammability on the area and the danger which threatens not only the forest growth remaining after cutting but also all surrounding timber, adjacent buildings, etc. Tender young seedlings are exposed to the excessively high temperatures of full sunlight; sun scald and cat face are produced on saplings and poles; and the ground is so dried out that new seedlings are unable to obtain sufficient moisture to survive the period of maximum drought (fig. 112). Few even

of those who have noted such conditions have had occasion to measure them and consequently do not appreciate their full effects.

Some recent measurements made on fully timbered, half cut-over, and clear-cut land at the Priest River branch of the Northern Rocky Mountain Forest Experiment Station clearly indicate that these effects are very great. But they also show that it is possible to reconcile the desirable practice of cutting timber with the usually undesirable after effect of extreme drying. This reconciliation can be brought about by the so-called "selection" method of cutting, which removes the merchantable and the undesirable trees in the stand and yet retains enough crown canopy to shade the ground and the mat of leaves and twigs covering it. This shade is the best assurance that the soil moisture will be sufficient for seedlings and that the dead leaves and

FIGURE 113.—Canopy preserved after cutting. The fuels are protected from direct sunlight and the ground conditions are favorable to reproduction.

twigs on the ground will not become extremely dry and inflammable (fig. 113).

Table 10, summarizing these measurements, shows how clear cutting produces greater fire danger and how partial cutting assists in keeping the danger down.

TABLE 10.—*Measurement of factors in fire danger on uncut, half-cut, and clear-cut forest land, northern Idaho, Aug. 11–20, 1931*

Factor measured	Uncut area	Half-cut area	Clear-cut area
Average maximum air temperature ..... °F	83.9	86.9	90.6
Average relative humidity at 5 p.m. ..... percent	23.4	19.0	16.8
Average wind movement ..... miles per day	2.0	24.8	49.6
Evaporation rate ..... grams per period	34.7	93.4	206.7
Average maximum temperature just below surface of duff ..... °F	78.8	93.6	133.3
Highest duff temperature ..... do	85.0	102.0	148.0
Average moisture content of duff ..... percent	10.5	9.9	4.6
Average moisture of 2-inch diameter dead wood ..... do	8.3	7.2	3.8

One of the most striking features in table 10 is the extremely high temperature of 148° F., measured just under the surface of the dead leaves and twigs forming the carpet of duff covering the mineral soil on the clear-cut area. At the surface of the duff, in the full blast of the sun, the temperature must have been even higher than 148°. As surface temperatures above 120° to 125° are dangerous to young seedlings, and temperatures of over 140° are generally fatal, the danger in such exposure to the sun is clear. Under the partial shade of the trees reserved from cutting, however, the temperature rose to only 102°, while under the almost complete shade of the undisturbed forest the maximum temperature in the duff rose to only 85°, or 1.1° above the lowest air temperature recorded.

Tree Crowns Absorb Direct Sunlight

These conditions illustrate the ability of the tree crowns to absorb direct sunlight, thereby preventing high temperatures in the ground and in the fuels on the ground. The remainder of the table shows that this resulted in an improvement of all those factors—air temperature, humidity, and evaporation rate—which make for drier fuels and faster spread of fire.

It is also evident in these measurements that removing half the timber canopy, in order to log the merchantable trees and to remove those that were diseased and otherwise defective and not worth their growing space, did not result in drying out the site to a condition half-way between that of the full-timbered and clear-cut areas. This is shown by the fact that the measurements on the half-cut area resemble more closely those for the fully timbered than those for the clear-cut area. In other words, although half the crown canopy was taken out, the danger was not increased proportionally.

One important fact should be remembered. After logging operations, the debris is usually burned, if it cannot be utilized profitably, and this burning must be done with extreme care in order to save all of the green canopy left. Very often there is plenty of shade available until the debris is burned, but because the burning is done at the wrong time of year, or because the debris is burned broadcast rather than in piles, all this beneficial shade is lost and the area becomes fully exposed and a future fire menace rather than a source of future revenue.

H. T. GISBORNE, *Forest Service.*

WOOL Yield and Fleece Density Can be Measured by a Simplified Method

Since returns from the wool of a flock of sheep depend to a large extent on the weight and quality of the fleeces, information concerning the shrinkage and other characteristics of wool is of practical value to growers. Owing to varying quantities of dirt and other foreign matter in wool, personal judgment, even among experienced sheepmen, is likely to involve serious error. For this reason the Department of Agriculture has developed a reasonably simple method for determining the yield of clean wool and also its density.

Obtaining and Preparing Sample

With clippers, a sample of wool is removed from the side of each sheep, and the cleared area is measured with special care. A clipper