



EDITOR'S

FILE COPY

FOREST RESEARCH NOTES

Issued by the

EDITOR'S

FILE COPY

PACIFIC NORTHWEST FOREST EXPERIMENT STATION

No. 18

Portland, Oregon.

March 25, 1936

TABLE OF CONTENTS

	<u>Page</u>
The Tillamook Burn--Its Area and Timber Volume, William G. Morris - - - - -	2
Reproduction on the Tillamook Burn, L. A. Isaac and G. S. Meagher - - - - -	5
Ponderosa Pine Log Grades, J. E. Lodewick - - - - -	6
Wide Spread Found in Ponderosa Pine Tree Values, Axel J. F. Brandstrom - - - - -	8
Haze Meters Used by 100 Lookouts, Donald N. Matthews - - - - -	9
Rate of Fire Line Construction Studies on a Large Fire, Donald N. Matthews - - - - -	10
News Items - - - - -	11

THE TILLAMOOK BURN--ITS AREA AND TIMBER VOLUME

Whenever the Tillamook burn and its problems are considered, there is need for accurate information on the location of the area, acreage burned, and the volume of timber killed. The data used by one agency are liable to be inconsistent with those used by another if a convenient source of accurate data is not available to all. In order to meet this need the best existing information has been compiled and is being circulated through this publication to interested agencies with the suggestion that these data be used in the future wherever applicable.

Before the fire the federal Forest Survey had complete timber volume estimates and type maps of the counties in which the fire burned. Immediately after the fire the Forest Survey, cooperating with private owners, put men into the field and made a map of the entire fire in order to correct the type maps and timber estimates. The statistics herein presented use the most complete and most accurate sources of information, largely the Forest Survey, about the location of the area, acreage burned, and volume of timber killed by the Tillamook fire. Subdivision of data in Tables 1 and 2 by counties and in Table 2 by diameter size classes may be obtained from the Experiment Station upon request.

Certain highlights of the Tillamook fire record are:

Started 12:30 p.m., August 14, 1933, in Sec. 17, T. 2 N., R. 5 W., W.M.
Greatest run August 25 and 26 during which 180,000 acres burned.
Total area burned - - - - - 244,706 acres.
Total volume of timber killed - - - - 10,257,517,000 board feet.

Details may be found in the following publications and manuscripts:

Cronemiller, L. F. Oregon's Forest Fire Tragedy. American Forests 39:
487-490, 523. 1933.

Dague, C. I., and Morris, W. G. Weather During the Tillamook Fire.
The Timberman 35 (2): 32-36, illus., December, 1933.

McArdle, R. E. The Tillamook Fire. U.S.F.S. Service Bulletin 17 (21):
1-2. October 9, 1933.

Morris, W. G. The Details of the Tillamook Fire From Its Origin to the
Salvage of the Killed Timber; manuscript in Pacific Northwest For-
est Experiment Station files; March 19, 1935.

Wilson, S. A. The Tillamook Fire. Four L Lumber News, September 15,
1933.

Newspaper Accounts of Tillamook Fire. A scrapbook compiled by and
filed at the Pacific Northwest Forest Experiment Station.

William G. Morris

TABLE 1.--ACREAGE BURNED IN TILLAMOOK FIRE, BY FOREST COVER AND OWNERSHIP CLASSES

OWNERSHIP	CLASS OF FOREST COVER BURNED (IN ACRES)						
	MERCHANT-	NONMERCHANT-	NON-		CULTI-		
	ABLE SIZE	ABLE SIZE	PREVIOUS	RESTOCKED	RECENT	VATED OR	TOTAL
	CLASSES ^{1/}	CLASSES ^{2/}	BURNS ^{3/}	CUTOVER ^{4/}	CUTOVER ^{5/}	PASTURE ^{6/}	
PRIVATE	165,838	30,169	1,790	176	12,932	420	211,325
COUNTY	4,436	21,429	565		2,940		29,370
REVESTED LAND GRANT	845	1,085			210	5	2,145
PUBLIC DOMAIN	365	1,471			30		1,866
TOTAL	171,484	54,154	2,355	176	16,112	425	244,706

^{1/}STANDS IN WHICH 60 PERCENT OR MORE OF THE VOLUME IS IN TREES 16 INCHES OR MORE D.B.H.

^{2/}STANDS IN WHICH 60 PERCENT OR MORE OF THE VOLUME IS IN TREES LESS THAN 16 INCHES D.B.H.

^{3/}LANDS DEFORESTED BY FIRE AND LESS THAN 10 PERCENT RESTOCKED.

^{4/}CLEAR-CUT PRIOR TO 1920, AND NOT RESTOCKING, OR PUT TO OTHER USE.

^{5/}CLEAR-CUT SINCE 1920, REGARDLESS OF AMOUNT OF RESTOCKING.

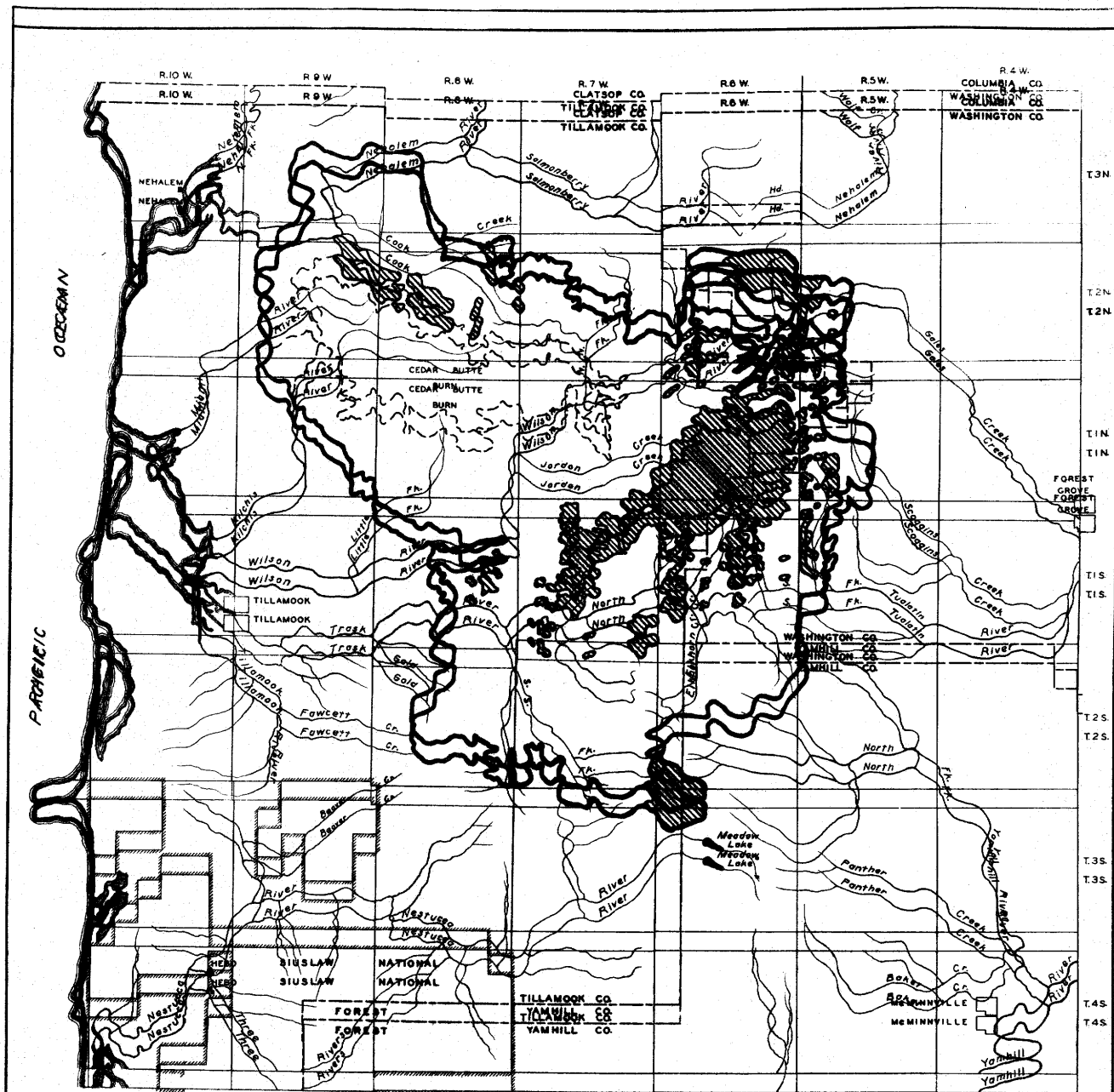
^{6/}CULTIVATED AND LOGGED-OFF, OR BURNED-OFF LAND, DEVOTED CHIEFLY TO GRAZING IN OPERATING FARM UNITS.

TABLE 2.--VOLUME OF TIMBER KILLED IN TILLAMOOK FIRE, BY SPECIES AND OWNERSHIP CLASSES

OWNERSHIP	VOLUME ^{1/} OF TIMBER KILLED, BY SPECIES (IN THOUSANDS OF BOARD FEET)						
	DOUGLAS FIR		SECOND		SITKA		OTHER
	OLD GROWTH	GROWTH ^{2/}	HEMLOCK	CEDAR	SPRUCE	SPECIES	ALL SPECIES
PRIVATE	7,765,448	152,372	1,717,556	186,247	124,205	80,661	10,026,489
COUNTY	122,105	1,980	36,559	5,159	6,767	542	173,112
REVESTED LAND GRANT	29,974	1,334	4,578	2,165	235	258	38,544
PUBLIC DOMAIN	11,968	1,730	3,325	45	110	2,194	19,372
TOTAL	7,929,495	157,416	1,762,018	193,616	131,317	83,655	10,257,517

^{1/}INCLUDES ALL TIMBER 16 INCHES OR MORE D.B.H.

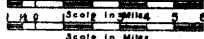
^{2/}YOUNG GROWTH COARSE GRAINED TIMBER THAT WILL CUT ONLY A SMALL PERCENTAGE OF THE UPPER GRADES OF LUMBER.



TILLAMOOK BURN OF 1933

LEGEND

- Exterior Boundary of Tillamook Burn
- ▨ Patches Bounded by Tillamook Burn
- ▤ Patches Burned in 1918
- Cedar Butte Burn of 1918



REPRODUCTION ON THE TILLAMOOK BURN

What is the status of reproduction on the Tillamook Burn 2 years after the fire? What does the future hold for this highly productive forest area? What principles of natural reforestation does this great burn teach? These were the questions that prompted a field study of this area during the summer of 1935.

The attached map shows the general outline of the fire and patches of green timber within the boundary. Data collected by random sampling on 90 miles of line in representative parts of the area showed that the restocking varied in general with the severity of the burn. In the northeast quarter where the fire burned with moderate intensity and left numerous single live trees and patches of green timber and also left a great many unburned cones clinging to the fire-killed trees, the ground was well stocked with 1- and 2-year-old seedlings. Where the fire burned very intensely in the southern and western portions of the burn (Trask, Wilson, and Nehalem River areas), and green trees and unburned cones were less numerous, most of the ground was found to be poorly stocked or nonstocked.

The Kilchis River-Cedar Butte area in the west central part of the tract had first burned in 1918; in 1933 it returned, killing the remnants of the original forest and such new growth as had developed. This area is now a barren waste with eroding hillsides. Inasmuch as the source of seed has been wiped out and the soil covering burned away, it has little chance of naturally restocking for generations.

The natural reproduction now present on the Tillamook Burn consists of 52 percent hemlock, 30 percent Douglas fir, 18 percent cedar, and 6 percent spruce. Three quarters of this had become established the first year following the fire. Wherever seedlings were encountered, the source of seed could almost always be traced to unburned cones or to living trees. Thus it is reasonably certain that each seedling crop originated from the seed of the previous year's cone crop.

Except for the double-burned areas, and other limited areas where the fire was extremely hot, single living trees and patches of green timber were found to be well distributed throughout most of the burn. Reproduction counts showed that within the 2-year period the surviving seed trees have seeded up the ground reasonably well for a radius of 10 chains and sparsely for a somewhat greater distance.

Slope and exposure were found to have a decided effect on seedling establishment and survival. On the average, only 40 percent as many seedlings were found on the most severe sites, steep southern slopes, as were found on the most favorable sites, gentle northern slopes.

Fire offers a most serious threat to the new forest that is getting started on this great burned area. The barren waste on the Cedar Butte double burn furnishes a striking picture of the conditions that might be expected in the future if subsequent fires sweep over the area. The detailed report of this reproduction survey of the Tillamook Burn is available in mimeograph form for anyone who wishes it.

L. A. Isaac and G. S. Meagher

PONDEROSA PINE LOG GRADES

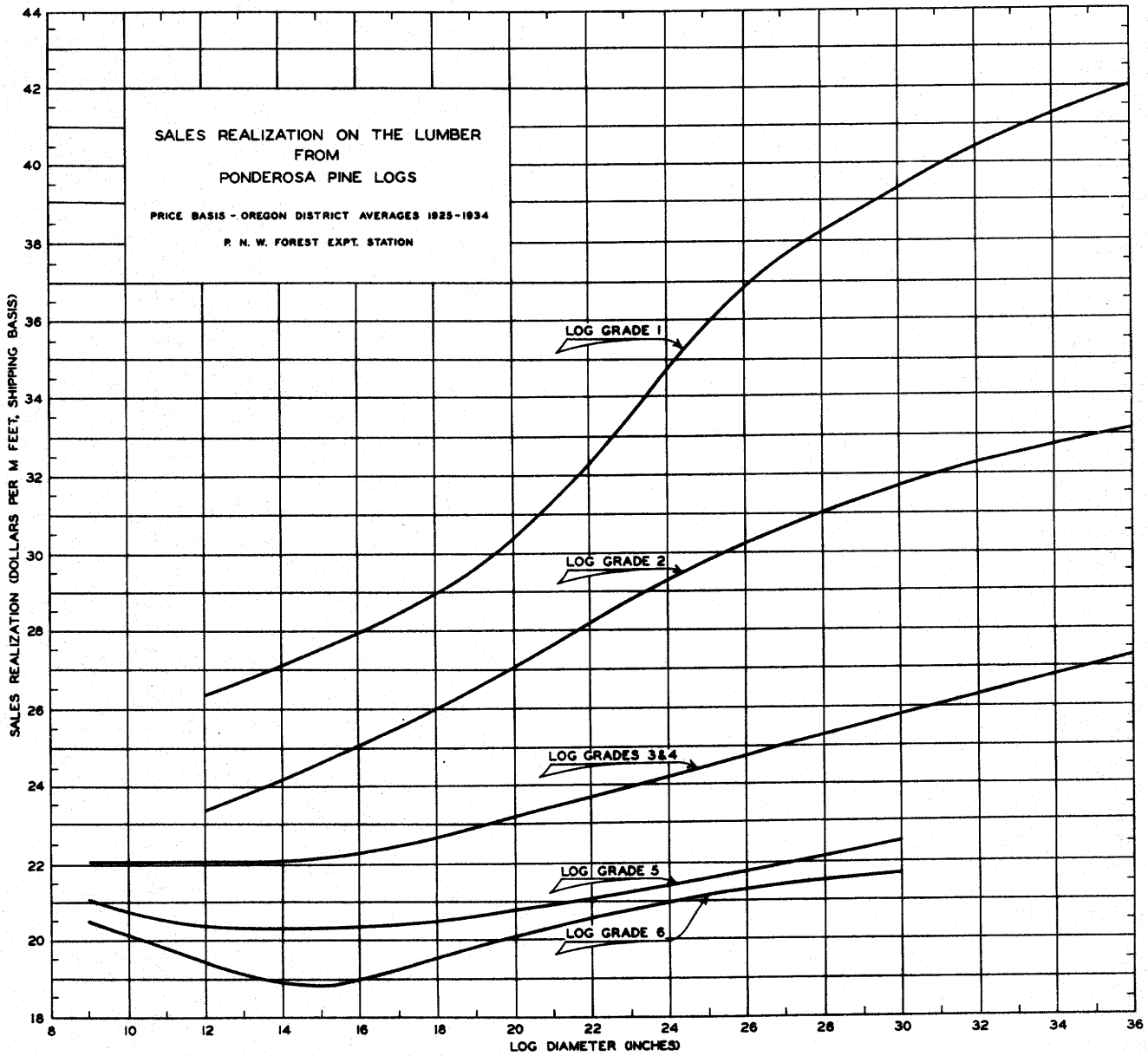
A system of six descriptive log grades, applicable equally well in the woods or on the log deck, was used in the pine logging and milling studies conducted during the summer of 1935. It is believed that the log grades may be used throughout the ponderosa pine region, though it would be necessary to develop new sales realization data if the operator were emphasizing the production of Box or Common instead of Shop Lumber.

The grade descriptions used are as follows:

- Grade 1 Logs - Shall be smooth and practically surface clear without indications of knots near the surface. Small fire scars not over four feet in length and on a single face, or other comparable surface defects for which deductions are made in scaling, are permissible.
- Grade 2 Logs - Shall be smooth and practically surface clear on three faces but with knots or other defects permissible on the fourth. In addition fire scars up to six feet in length or other comparable surface defects for which deductions are made in scaling, are permissible on one of the three clear faces.
- Grade 3 Logs - Shall display knots which may be large and unsound but which are so widely spaced as to permit the production of No. 1 and 2 shop lumber. Generally this will require a spacing of from three feet when the knots are staggered and up to six feet when they are in solid whorls.
- Grade 4 Logs - Shall display numerous small and medium sized red knots or shall be surface clear but with plain indications of knots close to the surface. The permissible size of the knots shall be proportionate to the size of the log.
- Grade 5 Logs - Shall display numerous small or medium sized knots of which (in contrast to grade 4) a large proportion or all may be black knots.
- Grade 6 Logs - Shall be rough, coarse knotted logs unsuited for any of the previous grades.

The sales realizations from these grades of logs are presented in the accompanying illustration. The curves are based upon the lumber yielded by 998 sound 16-foot logs, discounted for degrade and footage losses incurred during seasoning and surfacing, and priced as though sold at the average weighted lumber selling prices during the 10-year period 1925-1934. The curves indicate for each log grade and diameter the amount available to defray log cost, milling cost, overhead, profit, etc.

J. E. Lodewick



WIDE SPREAD FOUND IN PONDEROSA PINE TREE VALUES

In one of the logging economics studies made last summer in the ponderosa pine region of Oregon and Washington a detailed analysis was made of the spread in value among not only diameter classes but also within individual diameter classes. Records for more than 2,000 sample trees, showing among other things volume and grade of each log and net stumpage return, were placed on individual cards. The cards were sorted first by diameter class and then by value. Finally, each diameter class was divided into 10 value classes, of equal volume, the highest value class being designated 1 and the lowest 10. The average value for each value class was then determined. In the table below the results are shown for the highest, lowest, and two intermediate value classes.

Strikingly wide variations in values are shown. On the basis of diameter classification alone tree values rise from minus \$4.65 per M (for 12-inch trees) to plus \$6.30 (for 56-inch trees). A strikingly wide variation occurs also within each diameter class, particularly in the higher diameter range; for example, in the 56-inch class the stumpage value per M of class 1 trees is \$9.00 higher than that of class 10 trees.

From the standpoint of selective logging this wide spread within diameter classes is obviously of great importance.

Values of ponderosa pine trees before falling by diameter
and value class

Breast-height :	Value per M for value class--				Average value
diameter :					per M
(inches) :	1 :	4 :	7 :	10 :	
12 :	-\$3.80	-\$4.30	-\$4.65	-\$5.80 :	-\$4.65
16 :	-1.40	-2.55	-2.90	-3.70 :	-2.75
20 :	0.40	-1.00	-1.55	-2.10 :	-1.15
24 :	2.25	0.35	-0.40	-0.95 :	0.25
28 :	3.25	1.70	0.60	0.00 :	1.40
32 :	5.40	2.90	1.55	0.80 :	2.45
36 :	6.80	4.10	2.40	1.05 :	3.45
40 :	7.95	5.05	3.15	1.45 :	4.30
44 :	8.90	5.70	3.70	1.70 :	5.05
48 :	9.75	6.30	4.15	1.95 :	5.60
52 :	10.55	6.85	4.55	2.10 :	6.00
56 :	11.30	7.35	4.90	2.25 :	6.30

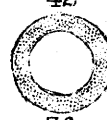
Axel J. F. Brandstrom

HAZE METERS USED BY 100 LOOKOUTS

Measurements of visibility distance were made 3 or 4 times daily by 100 lookouts in Region 6 last year using the simple and inexpensive haze meters developed at the Pacific Northwest Forest Experiment Station. The haze meter enables a lookout to determine the distance in miles that he can expect to see the smoke from a small fire under existing atmospheric conditions. The measurements are valuable in day-to-day planning for adequate fire detection because they give fire control executives correct information (instead of guesses) on which to take action to meet changing conditions; for example, additional lookouts must be put up promptly if the visibility distance drops from 15 miles to 8 miles.

Analysis of the daily records obtained reveals many possibilities for comparing visibility conditions as between lookout points or for comparing conditions by months or seasons. A sample of the daily visibility distance record and one analysis of the variations in visibility conditions at a lookout point during one month are given below:

		Visibility Distance Record																		Marble L. O.	
August, 1935		(Measurements with Byram Haze Meter)																		Colville N. F.	
Direction	Hour	Days of the Month																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
North	8 a.m.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.	Mi.
		4	6	8	4	10	10	12	5	5	8	15	16	12	9	12	12	8	0	4	8
	Noon	4	8	8	0	10	10	12	4	4	7	10	15	8	10	12	9	6	0	4	9
	5 p.m.	6	8	6	8	8	8	5	4	4	7	8	10	5	8	10	7	0	0	6	6

		Summary of Visibility Observations				
		Averages for all Directions				
		August, 1935				
Visibility Distance in miles		0	1-5	6-10	11-15	16+
Percent of days		3	3	42	39	13
8:00 a.m.						
Percent of area		0	10	36	76	100
Percent of days		10	10	55	25	0
5:00 p.m.						
Percent of area		0	12	40	62	100

This chart shows how variations in visibility conditions during one month affected the "seen area" coverage of one lookout. Outer circles represent the area described by a 15-mile radius about the lookout point. The white areas indicate seen area when visibility distance is 1-5 miles, 6-10 miles, etc. ("visibility distance in miles" at top of chart), and darkened portions of circles indicate unseen area under the same visibility conditions. Numbers immediately above circles indicate percentage of days on which given visibility conditions occurred. Numbers under circles indicate visible area in each visibility distance class in percentage of area of a circle of 15-mile radius.

RATE OF FIRE LINE CONSTRUCTION STUDIED ON A LARGE FIRE

It is the firm policy of the Forest Service to make plans to control every fire on the national forests within the first work period or, failing in that effort, plans will be made for control by 10 o'clock of the next morning. In order to meet this objective it is necessary for fire control executives to be able to estimate the length of held line a man can construct per hour under different conditions of cover, topography, soil, and weather. One of the best aids in estimating what men should do is to have records of what men have actually done.

In order to get just such man power production figures on various sectors of a going fire the research personnel of the regional scouting unit made a complete field study of the rate of fire line construction and fire suppression on the various sectors of the seventeen hundred acre fire on the Willamette National Forest in early September of 1935. On the 1,276 chains of fire perimeter the snags, logs, and green trees cut were counted and an estimate was made as to the relative difficulty of control on each chain of fire line. Records were obtained of the number of men and the number of hours that they worked on each sector.

The fire was fought mostly on steep, broken, south slopes. About 53 percent of the line was constructed on slopes of over 56 percent. The timber cover type was principally second-growth Douglas fir with some old growth and burns. The ground cover classes were as follows (by percents of total fire perimeter): duff and litter 54 percent; dense brush 19 percent; medium brush 17 percent, thin brush 1 percent; and dense salal 9 percent.

On the fire as a whole there were 24.5 sound logs (89 percent of the logs were under 30 inches in diameter), 34 rotten logs, and 18 snags cut per mile. The sectors ranking highest in these items had 45.4 sound logs, 100 rotten logs, and 58.7 snags to cut per mile respectively.

The production on the various sectors of the fire ranges from 0.21 to 0.09 chains per man-hour in building held line. The production rates for corralling the fire range from 0.13 chains per man-hour down to 0.02 chains per man-hour with an average on the entire fire perimeter (1,276 chains) of .05 chains per man-hour. In arriving at these figures only the approximately 1,050 men actually engaged in fire fighting were counted; travel time was excluded, and the 250 or more men engaged in transporting and feeding the crews were not counted.

On one spot fire with 11 chains of perimeter 0.06 chains were worked per man-hour, and on another spot fire with 116 chains of perimeter 0.04 chains of fire line were corralled per man-hour.

Although these figures are all in terms of chains of perimeter worked, nevertheless, in the Douglas fir region, trenching the edge of the fire is only a small part of the total job. There are snags to fall, logs and brush to cut, burning roots to dig out, rolling embers to catch in special trenches in addition to the digging of fire trench. The above figures indicate the speed that the men made in doing the total fire fighting job on the sectors of this particular fire. It will be necessary to study many fires in order to obtain good average man power production rates.

NEWS ITEMS

Lithographed Colored Type Map Available. One of the products of the Forest Survey of Oregon and Washington will be a $\frac{1}{4}$ -inch-to-the-mile map showing in colors the 26 most important forest cover types. Each quarter of each State will be printed on a separate sheet. Copies are being distributed to the public for the nominal charge of \$1.00 per sheet (\$1.10 if by mail). The first of these sheets, namely, for the northwest quarter of Oregon, is now available and may be had by sending postal money order or certified check, made out to the Treasurer of the United States, to the Pacific Northwest Forest Experiment Station, 424 U. S. Court House, Portland, Oreg.

Forest Statistics By Counties. Field work on the Forest Survey having been completed in eastern Washington and in eastern Oregon, except the Blue Mountains, office compilation of the volume of timber by species and of the areas of the several types is progressing rapidly. A set of tables giving in detail the forest inventory of Klamath County, Oreg., has already been distributed in mimeograph form, and within the next two months it is expected that similar sets of statistics will be available for Wasco, Jefferson, Deschutes, and Lake Counties, Oreg., and for Okanogan, Chelan, Kittitas, Yakima, and Klickitat Counties, Wash.

Statistics for all counties west of the Cascades were prepared and distributed some months ago.

County Forest Type Maps Available. Copies of 1-inch-to-the-mile forest type maps showing in detail all the type data as mapped in the field have been prepared for all the above-mentioned counties and also for all counties west of the Cascades in both States. Hundreds of these maps are now in use by lumber companies, pulp companies, and various public agencies. Uncolored blue-line print copies may be obtained from the Station for the cost of blueprinting.

The Forest Research Council of the Pacific Northwest held its annual meeting in Portland March 4, to discuss the policy and the program for the Experiment Station and other forest research agencies of the region. Mr. D. T. Mason and Mr. T. S. Goodyear were elected chairman and vice chairman, respectively, to succeed Mr. A. R. Watzek and Dean Hugo Winkenwerder. The Secretary of Agriculture has invited Mr. E. C. Manning, Chief Forester of British Columbia, to succeed on the Council the late Mr. P. Z. Caverhill. Mr. J. W. Ferguson, as State Forester of Oregon, succeeds Mr. Lynn F. Crone-miller.

The Report of the Pacific Northwest Forest Experiment Station for the calendar year 1935 was issued January 23 in mimeograph form, and a copy may be had by application to the Experiment Station.