

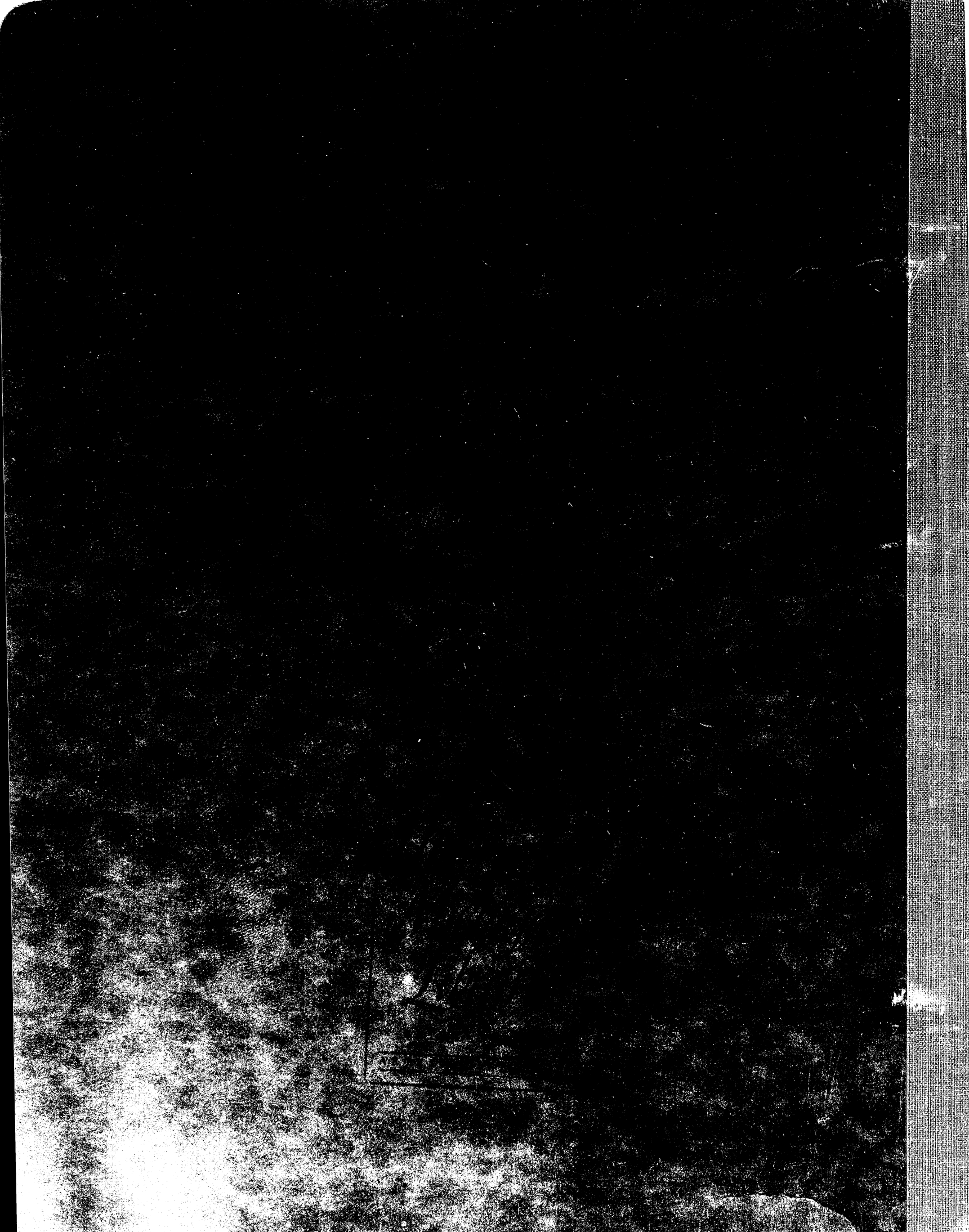
FIRE PREVENTION AND CONTROL  
ON THE  
MESABA RANGER DISTRICT,

SUPERIOR NATIONAL FOREST

MT

(5. 11. 11)

Samuelson





## FOREWORD

This report attempts to present a method of analysis of fire prevention and control activities on any Ranger District.

In writing this paper information was drawn from many sources. Verbal suggestions were obtained from persons in the United States Forest Service; especially C. A. Gregory, Ranger on Mesaba Ranger District, Superior National Forest. A number of ideas were taken from Region 4, Region 7, and Region 9 Fire Manuals, as well as the Western Fire Fighter's Manual. For information and help received the author wishes to express sincere appreciation.



C. A. Samuelson

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FIRE PREVENTION AND CONTROL ON THE MESABA RANGER DISTRICT,  
SUPERIOR NATIONAL FOREST

by

C. A. Samuelson

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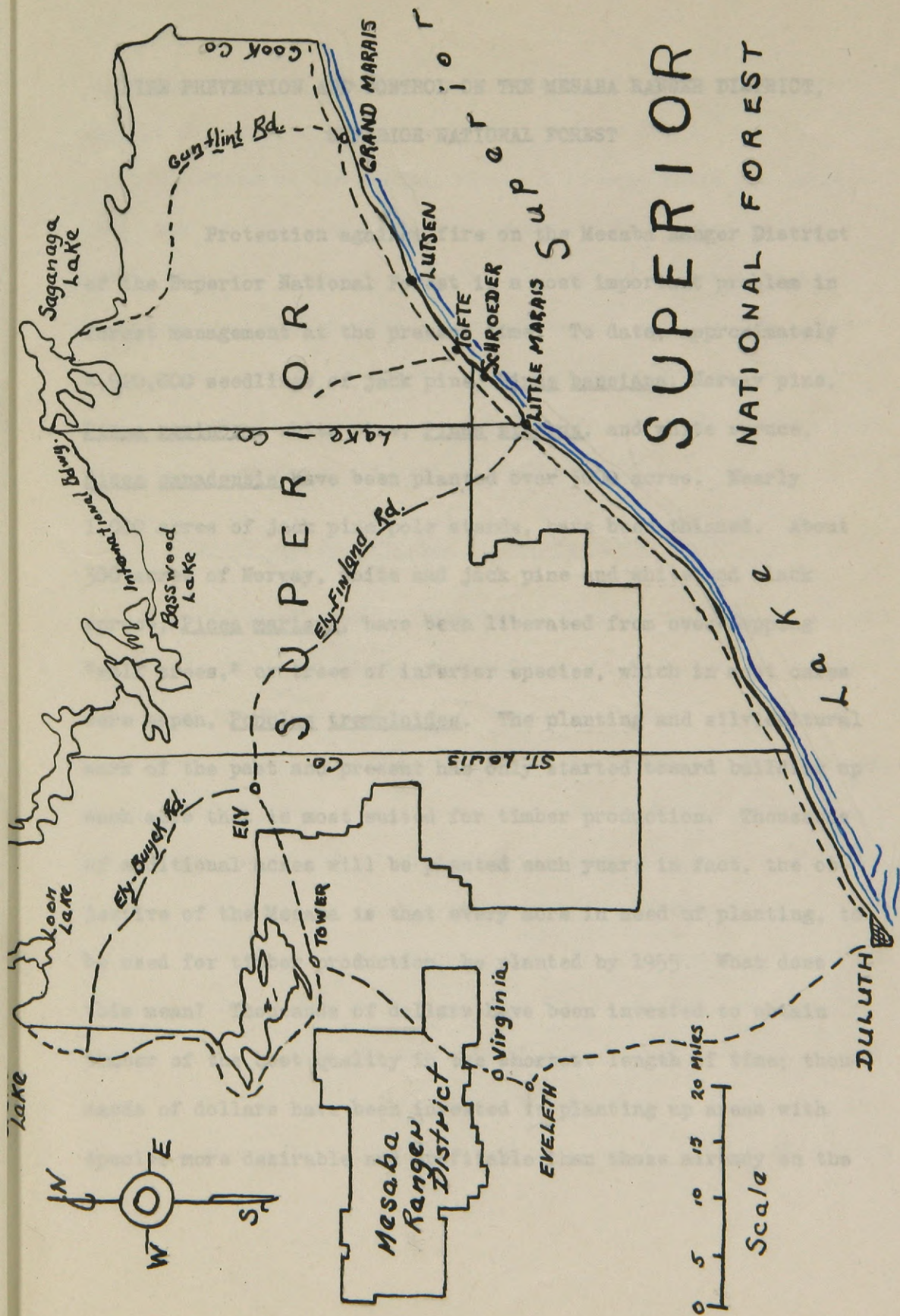


Figure 1.



FIRE PREVENTION AND CONTROL ON THE MESABA RANGER DISTRICT,  
SUPERIOR NATIONAL FOREST

Protection against fire on the Mesaba Ranger District of the Superior National Forest is a most important problem in forest management at the present time. To date, approximately 4,520,000 seedlings of jack pine, Pinus banksiana, Norway pine, Pinus resinosa, white pine, Pinus strobus, and white spruce, Picea canadensis have been planted over 5000 acres. Nearly 1,000 acres of jack pine pole stands, have been thinned. About 300 acres of Norway, white and jack pine and white and black spruce, Picea mariana, have been liberated from over-topping "wolf trees," or trees of inferior species, which in most cases were aspen, Populus tremuloides. The planting and silvicultural work of the past and present has only started toward building up each acre that is most suited for timber production. Thousands of additional acres will be planted each year; in fact, the objective of the Mesaba is that every acre in need of planting, to be used for timber production, be planted by 1955. What does this mean? Thousands of dollars have been invested to obtain timber of the best quality in the shortest length of time; thousands of dollars have been invested in planting up areas with species more desirable and profitable than those already on the

land; and thousands of additional dollars will be spent in reaching the objective of the Mesaba.

Fires on the Mesaba, although in most cases not large, have been numerous and a constant menace to the forest officer. Losses have been enormous and will continue so unless more adequate measures of fire prevention and control are adopted. This paper attempts to point out the fire prevention and control possibilities on the Mesaba, show what has been done along these possibilities, and recommend what is yet to be done.

#### History and Description of Mesaba Ranger District

The Mesaba Ranger District is located in the northeastern part of the State of Minnesota. Although it is under the jurisdiction of the Superior National Forest, it is not a contiguous part of it. Figure 1. The boundary of the Mesaba encloses approximately 252,160 acres of rock out-crop lands in St. Louis County. The acreage is made up of the following descriptions; all of T.61N., R.17W., sections 10-15 inclusive, and 22-36 inclusive T.61N., R.18W., sections 25-36 inclusive T.61N., R.19W., sections 19-22 inclusive, and sections 25-36 inclusive T.61N., R.20W., section 23, NW 1/4, S 1/2 section 24, sections 25, 26, 35 and 36 T.61N., R.21W., all of T.60N., R.17, 18, 19, and 20 W., sections 1, 2, 11, 12, 13, 14, 23, sections 24-28 inclusive and sections 33-36 inclusive T.60N.,

R.21W., all of T.59N., R.16W., sections 1-26 inclusive, N 1/2 section 27, N 1/2 section 28, sections 29, 30, 35 and 36 T. 59N., R.17W., sections 1-24 inclusive, N 1/2 section 25, N 1/2 section 26, N 1/2 section 27, section 28, 29, 30, W. 1/2, N. 1/2 NE 1/4 section 31, N 1/2 N 1/2 section 32, and N 1/2 N 1/2 section 33 T.59N., R.18W., all of T.59N., R.19W., sections 1-9 inclusive, N 1/2 section 10, sections 11-14 inclusive, section 23-26 inclusive, and section 36, T.59N., R.20W., sections 1-4 inclusive E 1/2 section 9, sections 10, 11, and 12 T. 59N., R. 21W., N 1/2 section 2, N 1/2 section 3, N 1/2, SE 1/4 section 4, section 5 and 6 T.58N., R.19W. The topography is rough, lakes are thirty-five in number and rivers and streams are numerous. Sand, Fourteen Mile, and Leander Lakes are very picturesque and are prominent vacational spots in Minnesota. The soil on highland is either gravel, sandy gravel, sand, clay sand or loam type. The jack pine is found on the sandy soils while aspen and birch is more common on the heavier soils.

Thirty-five years ago the Mesaba was still a part of the so-called North Woods, or pine and spruce forest, of Minnesota. The North Woods extended north from the mouth of the Crow Wing River to Canada and west to the prairies. The southern half was a pine forest, and it was in this pinery that the Mesaba began its

history. Maple, Acer rubrum, white birch, Betula alba papyrifera and a few other northern hardwoods were scattered through the pine and in a few cases formed more or less pure stands over comparatively small areas. Balsam, Abies balsamea, tamarack, Larix laricina, white cedar, Thuja occidentalis, and black spruce also was present, found for the most part in the swamps, mixed in some cases and also occurring in pure stands. The pines, however, made up the great bulk of the forest. The merchantable timber was composed of a mixture of white and Norway pine with jack pine mixing in on the poorer soils and forming pure stands on the very light sands.

Today, where once the white and Norway pine grew abundantly, aspen, birch, and jack pine make up the forest cover. Such is the result of fire. A few areas, however, escaped fire and at the present time support excellent pole and sapling stands of Norway and white pine. It is evident that if fire had been kept out of the Mesaba, the entire forest today would be similar to these areas. Repeated burnings have baked the soil to such an extent that in many cases brush and weed species are the only forms of vegetation present. The swamps too have been harassed by fire. Many swamps that only a few decades ago supported dense stands of spruce, today are densely covered with alder brush, Alnus incana

and in many cases, purely muskeg. Specifically, the Mesaba supports commercial pulpwood types on only one fiftieth of its area. Eighty per cent is timber-producing land now stocked with commercial species, five per cent is cultivated land, and fifteen per cent of the area is non-productive swamp or highland and swamp brush land. (Figure 2)

Acreeage of Size Classes - All Types (See Appendix)

	<u>Acres</u>
Commerical pulpwood - poles -----	5,200
Pole stands other than pulp species -----	2,800
Saplings -----	192,910
Non-productive swamp (muskeg & grassland ----	6,280
Swamp brush land -----	21,330
Highland brush -----	9,640
Cultivated -----	14,000
	<hr/>
Total	252,160

Following the lumbermen, settlers began to drift into this area, that was destined to be a part of the Superior National Forest. A few settlers went into this country before the timber was cut that they might sell the stumpage to the lumbermen, but most of them drifted into the cut-over lands in the wake of the logging operations. Today there are 350 settlers on the Mesaba, most of whom are located in one of three distinct settlements within the area. (Figure 3) In these settlements the farmers are more prosperous than those scattered more or less singly throughout the

T61N

T60N

T59N

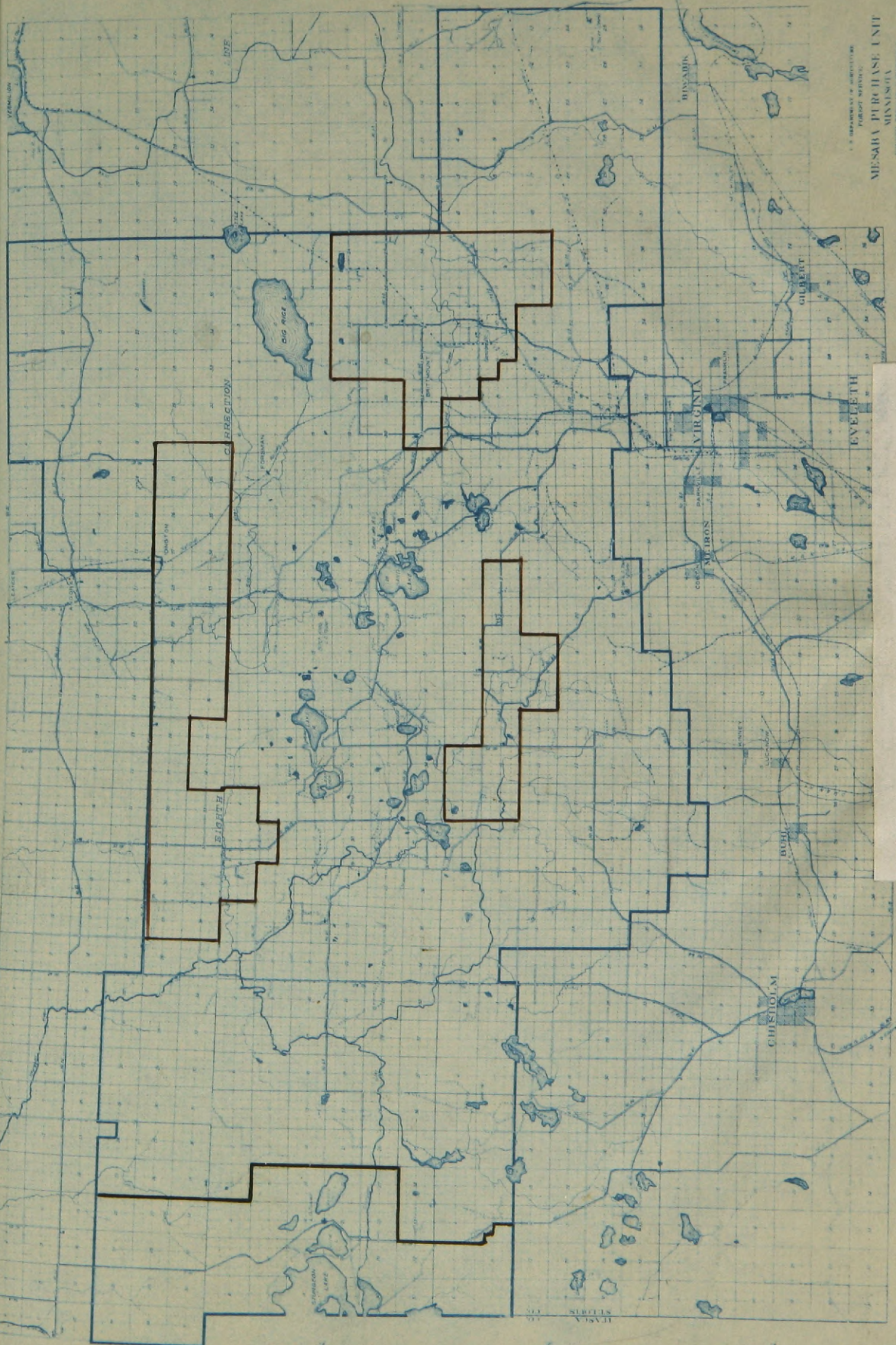
T58N

T61N

T60N

T59N

T58N



U.S. DEPARTMENT OF AGRICULTURE  
 FOREST SERVICE  
**MESABI PURCHASE UNIT**  
 MINNESOTA  
 FOURTH PRINCIPAL MERIDIAN  
 1954

LEGEND

[Symbol]	Settlement Areas
[Symbol]	Water
[Symbol]	Contours
[Symbol]	Highways
[Symbol]	Railroads
[Symbol]	Streams
[Symbol]	Other

**Figure 3. District Settlement Area**  
 [Brown Outline] settlement areas

ranger district. This is evident because of cooperative man power among the settlers.

In 1914 a constitutional amendment was passed, authorizing the establishment of State Forests by the setting aside of non-agricultural lands already belonging to the State. Lands within the present Mesaba Ranger District were included in the State Forests, under the administration of the State Forestry Board.

The Board was made up of nine members, including the Dean and Director of the Department of Agriculture of the University of Minnesota, and the Chief of the Division of Forestry, ex-officio. The seven other appointments were made by the Governor on the recommendations of different organizations such as the Board of Regents, the State Horticultural and Agricultural Societies, the Game and Fish Commission and the State Forestry Association.

The duties of the State Forestry Board were the appointment of the State Forester, the administration of the State Forests and the promotion of forestry on both private and public lands.

Opposition to this organization was strong, and in certain quarters and interests its work waned. The people of Minnesota had not yet fully realized the importance and significance of the Forestry Board's work. The great fire of 1918 supplied the necessary incentive. This fire, the worst in forest history, wiped out Cloquet, Moose Lake and several small towns, burning into the city limits of

Duluth, taking the lives of 438 people, and destroying millions of dollars worth of property. Minnesota and Ontario records show a total burning of 250,000 acres.

Basing their claims on the reasoning that the fire was started at Mile Post 62 by a spark from a locomotive, 15,003 persons affected by the disaster brought action against the United States, holding that the government was liable because it operates the railroads. The combined damages totaled \$73,000,000, and involved four railroads, namely, the Great Northern, North Pacific, Soo Line, and the Duluth, Mesabe and Northern.

The legal battle that ensued was a bitter one. The government claimed the fire was an act of God and, therefore, could not be responsible for the fact that the wind blew 70 miles per hour. But the courts decided in favor of the people, and the government had to pay.

Angus McLaughlin, general solicitor of the United States Railroad Commission, then set out to guard against fraud. With his men, called "cruisers," he dug up evidence concerning property damages, and decided in each case how justifiable the claim was. After thorough investigation, the claims were grouped by geographical areas, attorneys were called into conference, and it was decided that a cash settlement of not more than 50% of the estimated damage would be made.



As a result, 7,858 claims, totaling \$42,937,459.15, were settled for \$11,740,122.37.

But the issue was not yet closed. In the summer of 1935 Congress enacted a law which entitled those who suffered loss from the fire to full payment of their loss. In cases where the losses were partly covered by fire insurance, the government paid to those claimants the difference between the total damage and the amount paid by the insurance company.

Since the great fire of 1918 interest in the protection and development of Minnesota forests has been intense and sustained. There is, however, much room for improvement in fire prevention and control work.

In 1923 an act of the State Legislature discontinued the State Forestry Board and created the Department of Conservation. The chiefs of the Forestry Department, Game and Fish Department, and State Auditor were in charge of this new organization. Under this re-organization, the State Forester became the Commissioner of Forestry and Fire Prevention.

In 1931 the Mesaba Purchase Unit was created by the approval of the National Forest Reservation Commission.

Fire prevention and control, however, was still administered by the Minnesota State Forest Service. Not until July 1, 1933, did

the United States Forest Service take over the entire administration of the Mesaba Purchase Unit. Since the area has been under the jurisdiction of the Federal Government, detailed records have been made of all fires occurring on the now Mesaba Ranger District. The Mesaba is now a ranger district, as over fifty percent of the land within its boundaries has been purchased and paid for by the United States Government.

#### Forest Fires on the Mesaba Ranger District

All fires occurring on the Mesaba that are on record in the Minnesota State Forest Service files at Hibbing, Minnesota, and those in the United States Forest Service files at Sand Lake Ranger Station, address Virginia, Minnesota, were examined and studied. The Minnesota State Forest Service fire reports dated from May 18, 1930, to June 21, 1933. Fire reports previous to this date were not obtainable. The United States Forest Service reports dated from July 6, 1933 to October 21, 1935. Information and data of significant value in each fire report was recorded. (Table I) This data was summarized for each year and total time concerned (May 18, 1930 to October 21, 1935) in order to present the total number and percentage of fires by cause, character, classification, source of people responsible, and physical condition of ground cover at point of origin; and also to make possible a study of report time, discovery

time, get-away time, number of men on fire when first reached, visibility, and law enforcement concerning fires recorded in Table I. (Table II)

A fire record map was prepared to show the starting point of each fire with appropriate symbol\* to indicate the class, cause and year. (Figure 4)

In correlation with the study of fires on the Mesaba it is of importance to know the number of towers that were on the area from May 18, 1930 to October 21, 1935 and to realize the significance of C.C.C. aid which became available in July, 1933. In 1930 two towers were used for detection work, the Sturgeon Lake and Wynne Lake Look-Out Towers. (Figure 2) The Mountain Iron Look-Out Tower was added to the detection system in the fall of 1932. In 1934 the Birch Knob Look-Out Tower also was available.

#### Data Analysis of Fires on Mesaba

Information and data in this analysis concerns the period of time from May 18, 1930 to October 21, 1935.

1. All fires on the Mesaba have been due to human carelessness. Forty-seven percent have been caused by smokers, 26 percent by debris burning, 21 percent by camp fires, 4 percent by miscellaneous causes, and 2 percent by incendiaries. No fires have been caused by railroads, lumbering operations, or lightning.

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\* See Appendix - Fire Record Map Symbols.

2. Sixty-seven percent of fires have been of surface character, while 33 percent have been ground fires.
3. Fifty percent of fires have been of "C" classification; 46 percent, "B"; and only 4 percent, "A".
4. Total area burned equals 1,854.6 acres; 952 acres having been burned in 1930, 304 in 1931, 260 in 1932, 203.4 in 1933, 89.1 in 1934, and 46.1 in 1935. The summer of 1930, 1931, and 1933 were very dry, while those of 1932 and 1934 were moist, and that of 1935 was wet.

A steady decrease in number of fires and area burned has been evident, decidedly so with introduction of C.C.C. help.

5. Fifty-one percent of fires have been caused by outsiders and 49 percent by local people. It is important to sell fire prevention to local people as well as outsiders.
6. Forty-three percent of fires have been caused by settlers, 16 percent by fishermen, 15 percent by travelers, 15 percent by blueberry pickers, 4 percent by resorters, 3 percent by grocers, 2 percent by hunters, 1 percent by shackers, and 1 percent by Indians.

The settler must be taught fire prevention and its justification.

7. Seventy percent of fires have been started in dry grass, 16 percent in brush, 11 percent in litter, 2 percent in duff, and 1 percent in reproduction.
8. Report time has steadily decreased due primarily to construction of telephone lines. All fires in 1935 were reported within five minutes.
9. Discovery time has fluctuated; that is at times fires have been discovered promptly but most fires have been discovered a half hour or more after the smoke has risen over the timber. This fact may be accounted for because of frequent hazy weather, blind spots or need of more towers.
10. Get-away time has been improved steadily.

11. Travel time has been less than one hour except for a few cases.
12. Number of men on fire when first reached has been 6 to 10 in most cases previous to C.C.C. era. There are 15 to 20 men on fires when first reached under the present suppression plan of action. This number appears to be approximately the right number to send to fire as records indicate little increase in size of fire after arrival of suppression crew since C.C.C. aid was used.
13. All fires reported since 1932 indicated visibility to be direct.
14. Law enforcement on fires has been in effect only since 1933. Fifty percent of fires occurring in 1933 received law enforcement action, 14 percent in 1934, and 33 percent in 1935.
15. Record Map (Figure 4) indicates that all smoker fires occurred along roads, trails, streams, rivers, or lakes. Campfires occurred near streams, rivers, lakes or in blueberry areas. Debris fires in all cases were caused by settlers who burned brush or stumps in order to clean up their property.

TABLE I. Forest Fires on the Mesaba (May 18, 1930-October 21, 1935)

Name of Fire	Date	Description	Cause of Fire	Character (on arrival)	Classification	Source of people responsible	Class of people responsible	Physical Conditions (at point of origin)		Report Time	Discovery Time	Get-away Time	Travel Time	Size of fire when reached	Total acreage of fire	No. of men on fire when first reached	Visibility (Direct, Indirect, or Blind Area)	Law enforcement record. Criminal or Civil cases.
								Ground Cover	Wind rate & Direction									
Tower Rd.	5/18/30	SE1/4 Sec.8, T.61N.,R.17W	Smoker	Surface	C	outsider	traveler	grass	Moderate N.E.	5 min.	1 hour	30 min.	1 hour	30 acres	142 acres	6	Direct	None
Salmi	5/21/30	SENE, E1/2 NE1/4, T.58N., R.19W.	Debris	Surface	C	local	settler	grass	Moderate N.E.	35 min.	30 min.	45 min.	32 min.	12 acres	20 acres	10	Direct	None
The 64	5/21/30	NENW, NE1/4, Sec. 33, T. 59N., R.16W.	Smokers	Surface	C	outsider	traveler	grass	Moderate N.E.	5 min.	10 min.	1 hour	45 min.	26 acres	152 acres	8	Direct	None
Johnson	5/23/30	NENE Sec. 14, T.59N.,R.18W.	Miscellaneous (Burning barn)	Surface	C	local	settler	reproduction	Moderate S.W.	45 min.	2 hours	23 min.	33 min.	18 acres	23 acres	12	Indirect	None
Hokken	5/23/30	SESE, Sec.3 T.59N.,R.19W.	Debris	Surface	C	local	settler	grass	Moderate S.W.	50 min.	1 1/2 hrs.	37 min.	35 min.	23 acres	37 acres	10	Indirect	None
Nurmi	5/23/30	E1/2SE1/4, Sec.33 T.61N.,R.19W.	Debris	Surface	C	local	settler	brush	Moderate S.W.	4 min.	25 min.	10 min.	40 min.	8 acres	14 acres	5	Direct	None
The 63	5/23/30	S1/2NE1/4, NE SE, Sec.4, T.59 N.,R.20W.	Smoker	Surface	C	outsider	traveler	grass	Moderate S.W.	7 min.	20 min.	1 hour	30 min.	20 acres	33 acres	9	Direct	None
Koski	5/25/30	SENE Sec. 22, T.60N.,R.17W.	Debris	Surface	C	local	settler	brush	Fresh N.W.	10 min.	40 min.	35 min.	40 min.	15 acres	23 acres	7	Direct	None
Resort	6/15/30	Lot 2 Sec.27, T.60N.,R.18W.	Debris	Ground	B	outsider	resorter	duff	Moderate N.E.	25 min.	30 min.	50 min.	35 min.	7 acres	8 acres	20	Indirect	None
Lake 14	6/21/30	Lots 1 & 2, N1/2SE1/4,S1/2 NE1/4 Sec.11 T.60N.,R.19W.	Campfire	Surface	C	outsider	fisherman	grass	Fresh N.E.	30 min.	45 min.	1 hour	50 min.	38 acres	125 acres	7	Direct	None
Rubbish	6/24/30	SWNE, Lot 2, Sec.30,T.59N., R.17W.	Debris	Surface	C	outsider	grocer	grass	Moderate N.W.	20 min.	3 hours	25 min.	35 min.	22 acres	50 acres	15	Indirect	None
Rice Lake	6/24/30	NE1/4Sec.3, T.60N.,R.18W.	Campfire	Surface	C	outsider	fisherman	grass	Moderate N.W.	10 min.	4 hours	30 min.	50 min.	50 acres	70 acres	10	Indirect	None
Little Sand	6/27/30	NWSE Sec. 17, T.60N.,R.18W.	Smoker	Surface	C	outsider	fisherman	grass	Moderate S.W.	15 min.	6 hours	35 min.	50 min.	25 acres	38 acres	18	Blind	None
Incendiary	6/30/30	S1/2SW1/4 Sec. 22,T.59N.,R. 19W.	Incendiary (4 sets)	Surface	C	local	settler	brush	Moderate N.E.	20 min.	1 hour	25 min.	35 min.	30 acres	45 acres	10	Indirect	None
Hay	7/8/30	NENE Sec.13, T.59N.,R.16W.	Smoker	Surface	B	local	settler	grass	Gentle N.E.	10 min.	30 min.	30 min.	25 min.	5 acres	8 acres	12	Direct	None

TABLE I. (Continued)

Name of Fire	Date	Description	Cause of Fire	Character (on arrival)	Classification	Source of people responsible	Class of people responsible	Physical Conditions (at point of origin)		Report Time	Discovery Time	Get-away Time	Travel Time	Size of fire when reached	Total acreage of fire	No. of men on fire when first reached	Visibility (Direct, Indirect, or Blind Area)	Law enforcement record. Criminal or Civil cases.
								Ground Cover	Wind rate & Direction									
Sturgeon	7/10/30	N1/2SW1/4, Sec.17, T.60 N., R.20W.	Smoker	Surface	C	outsider	fisherman	grass	Gentle N.W.	20 min.	30 min.	10 min.	35 min.	8 acres	11 acres	4	Direct	None
Koski	7/10/30	N1/2NW1/4 Sec.13, T.61N., R.17W.	Debris	Ground	B	local	settler	brush	Gentle N.W.	15 min.	30 min.	15 min.	25 min.	3 acres	4 acres	5	Direct	None
Bickford	7/12/30	NWNE Sec.23, T.60N., R.19W.	Smoker	Surface	B	outsider	traveler	grass	Gentle N.E.	10 min.	25 min.	15 min.	30 min.	5 acres	6 acres	10	Direct	None
Gravel pit	8/3/30	SWSE, Sec.23, T.59N., R.17W.	Campfire	Ground	B	outsider	blueberry picker	litter	Gentle S.W.	10 min.	35 min.	20 min.	40 min.	3 acres	4 acres	3	Direct	None
Angora Rd.	8/10/30	NE1/4 Sec.24, T.60N., R.18W.	Smoker	Surface	C	outsider	blueberry picker	grass	Moderate N.W.	15 min.	45 min.	15 min.	45 min.	50 acres	70 acres	15	Direct	None
The 24	8/10/30	SENE Sec.16, T.60N., R.20W.	Smoker	Ground	B	outsider	blueberry picker	grass	Moderate N.W.	10 min.	30 min.	10 min.	30 min.	5 acres	9 acres	9	Direct	None
Big Rice Lake	10/3/30	SE1/4, Sec.3, T.60N., R.17W.	Campfire	Ground	C	outsider	hunter	grass	Moderate N.E.	20 min.	4 hours	30 min.	2 hours	45 acres	60 acres	10	Direct	None
Rd. No. 64	5/18/31	SWNW Sec.27, T.59N., R.16W.	Smoker	Surface	B	outsider	traveler	grass	Gentle N.E.	10 min.	30 min.	45 min.	30 min.	5 acres	7 acres	5	Direct	None
Rd. No. 5	5/19/31	SWNW Sec.4, T.59N., R.21W.	Smoker	Surface	C	outsider	traveler	grass	Moderate N.E.	15 min.	20 min.	30 min.	20 min.	9 acres	12 acres	9	Direct	None
Pelto	5/23/31	Lot 3 Sec.16, T.60N., R.17W.	Debris	Ground	B	local	settler	brush	Moderate N.E.	10 min.	25 min.	20 min.	40 min.	5 acres	9 acres	8	Direct	None
Saari	5/23/31	SENE Sec.25, T.61N., R.19W.	Debris	Ground	C	local	settler	brush	Moderate N.E.	5 min.	35 min.	45 min.	35 min.	8 acres	11 acres	6	Direct	None
South East	5/29/31	SESE Sec.11, T.59N., R.18W.	Smoker	Ground	C	outsider	traveler	grass	Moderate N.E.	15 min.	2 hours	15 min.	40 min.	25 acres	30 acres	15	Indirect	None
Sandy River	6/15/31	Lot 1 Sec.6, T.59N., R.17W.	Smoker	Surface	B	outsider	fisherman	grass	Gentle N.E.	10 min.	3 hours	30 min.	45 min.	5 acres	6 acres	10	Indirect	None
Clear Lake	6/29/31	Lot 1 Sec.34, T.60N., R.19W.	Campfire	Ground	B	outsider	fisherman	grass	Gentle N.E.	10 min.	45 min.	25 min.	40 min.	6 acres	8 acres	8	Indirect	None
Maki	6/30/31	SENE, Sec.25, T.59N., R.20W.	Debris	Ground	B	local	settler	brush	Moderate N.W.	10 min.	1 hour	15 min.	30 min.	6 acres	7 acres	10	Direct	None
Barn	7/2/31	E1/2SE1/4, Sec.24, T.61N., R.21W.	Miscellaneous (burning barn)	Surface	C	local	settler	grass	Moderate N.E.	5 min.	20 min.	20 min.	25 min.	10 acres	15 acres	5	Direct	None
Clearwater	7/5/31	SENE Sec.23, T.61N., R.17W.	Campfire	Ground	C	outsider	fisherman	litter	Moderate N.W.	10 min.	1 hour	25 min.	50 min.	15 acres	22 acres	8	Direct	None
Section 17	7/28/31	S1/2NE1/4, N1/2 SE1/4, Sec.17, T.59N., R.18W.	Smoker	Surface	C	local	settler	grass	Fresh N.E.	10 min.	2 hours	30 min.	45 min.	50 acres	72 acres	20	Indirect	None
Elm	7/28/31	NESE, Sec.4, T.60N., R.20W.	Campfire	Ground	B	outsider	fisherman	litter	Fresh N.E.	15 min.	3 hours	15 min.	40 min.	5 acres	6 acres	5	Blind	None
Grass	7/28/31	Lot 1 Sec.28, T.60N., R.18W.	Smoker	Surface	C	local	settler	grass	Fresh N.E.	20 min.	45 min.	20 min.	50 min.	15 acres	25 acres	15	Indirect	None

TABLE I. (Continued)

Name of Fire	Date	Description	Cause of Fire	Character (on arrival)	Classification	Source of people responsible	Class of people responsible	Physical Conditions (at point of origin)		Report Time	Discovery Time	Get-away Time	Travel Time	Size of fire when reached	Total acreage of fire	No. of men on fire when first reached	Visibility (Direct, Indirect, or Blind Area)	Law Enforcement record. Criminal or Civil cases.
								Ground Cover	Wind rate & Direction									
Angora Rd.	8/12/31	SWSW Sec.14, T.60N.,R.18W.	Smoker	Surface	C	local	Blueberry picker	grass	Moderate N.E.	15 min.	2 hours	30 min.	1 hour	10 acres	18 acres	9	Indirect	None
The 109	8/14/31	NENW,Sec.24, T.59N.,R.17W.	Campfire	Surface	C	outsider	blueberry picker	litter	Moderate N.W.	10 min.	30 min.	15 min.	45 min.	8 acres	11 acres	12	Direct	None
Pike River	8/14/31	S1/2NW1/4,Sec. 1, T.59N.,R.17W.	Smoker	Surface	C	local	settler	grass	Moderate N.W.	5 min.	35 min.	15 min.	35 min.	12 acres	18 acres	10	Direct	None
The 65	8/20/31	SESE, Sec.15, T.60N.,R.20W.	Smoker	Surface	C	outsider	blueberry picker	grass	Fresh N.W.	5 min.	30 min.	20 min.	40 min.	7 acres	11 acres	8	Direct	None
Tote Rd.	8/20/31	NESE,Sec.12, T.61N.,R.17W.	Smoker	Surface	B	local	blueberry picker	grass	Gentle S.W.	10 min.	45 min.	10 min.	30 min.	5 acres	7 acres	7	Direct	None
Duck	10/3/31	SWSE,Sec.27, T.60N.,R.18W.	Campfire	Surface	B	outsider	hunter	grass	Fresh N.E.	5 min.	30 min.	15 min.	40 min.	7 acres	9 acres	10	Direct	None
Nurmi	5/24/32	NENW,Sec.13, T.60N.,R.17W.	Debris	Surface	B	local	settler	brush	Fresh N.E.	10 min.	40 min.	10 min.	50 min.	8 acres	9 acres	14	Direct	None
Niemi	5/25/32	NWSE,Sec.5, T.60N.,R.19W.	Debris	Ground	B	local	settler	brush	Moderate N.E.	5 min.	15 min.	10 min.	30 min.	5 acres	8 acres	6	Direct	None
Twin Lake Road	5/30/32	SESE,Sec.11, T.59N.,R.19W.	Smoker	Surface	B	outsider	traveler	grass	Moderate N.E.	10 min.	20 min.	5 min.	25 min.	5 acres	9 acres	10	Direct	None
Salo	6/10/32	SWNW,Sec.33, T.60N.,R.21W.	Debris	Ground	B	local	settler	brush	Fresh N.W.	5 min.	15 min.	10 min.	20 min.	3 acres	5 acres	7	Direct	None
Rd. No. 25	6/15/32	E1/2NW,Sec.33, T.59N.,R.19W.	Smoker	Surface	C	outsider	traveler	grass	Fresh N.E.	15 min.	30 min.	25 min.	40 min.	15 acres	21 acres	20	Direct	None
Ylinen	6/18/32	NESE,Sec.13, T.59N.,R.18W.	Debris	Ground	B	local	settler	brush	Moderate S.E.	10 min.	45 min.	10 min.	35 min.	5 acres	8 acres	10	Direct	None
Resort	6/19/32	Lot 7, Sec14, T.60N.,R.19W.	Debris	Ground	B	outsider	resorter	brush	Moderate S.E.	10 min.	50 min.	15 min.	50 min.	6 acres	9 acres	15	Direct	None
Sturgeon River	7/4/32	NWSE,Sec. 17, T.60N.,R.20W.	Smoker	Surface	C	outsider	fisherman	grass	Fresh N.E.	10 min.	45 min.	10 min.	40 min.	15 acres	23 acres	20	Direct	None
Lost Lake	7/4/32	NESE, Sec.28, T.60N.,R.19W.	Campfire	Surface	C	outsider	fisherman	grass	Fresh N.E.	5 min.	40 min.	10 min.	50 min.	12 acres	20 acres	20	Direct	None
Dark River	7/6/32	E1/2NW1/4, Sec.13, T.60 N.,R.20W.	Smoker	Surface	C	outsider	fisherman	grass	Moderate N.W.	10 min.	30 min.	5 min.	40 min.	25 acres	38 acres	25	Direct	None
Makinen	7/28/32	NESE,Sec 13, T.59N.,R.17W.	Debris	Ground	B	local	settler	brush	Gentle N.E.	10 min.	45 min.	10 min.	35 min.	5 acres	8 acres	15	Direct	None
Road 64	7/29/32	SWNW,Sec.27, T.59N.,R.16W.	Smoker	Surface	B	outsider	traveler	grass	Gentle N.E.	5 min.	20 min.	5 min.	25 min.	3 acres	5 acres	5	Direct	None
Clearwater	7/30/32	SWNW,Sec.13, T.61N.,R.17W.	Smoker	Surface	C	local	settler	grass	Fresh N.E.	5 min.	35 min.	10 min.	35 min.	10 acres	15 acres	10	Direct	None



TABLE I. (Continued)

Name of Fire	Date	Description	Cause of Fire	Character (on arrival)	Classification	Source of people responsible	Class of people responsible	Physical Conditions (at point of origin)		Report Time	Discovery Time	Get-away Time	Travel Time	Size of fire when reached	Total acreage of fire	No. of men on fire when first reached	Visibility (Direct, Indirect, or Blind Area)	Law enforcement record. Criminal or Civil cases.
								Ground Cover	Wind rate & Direction									
Road 65	8/10/32	W1/2SE, Sec. 15, T.60N., R.20W.	Smoker	Surface	B	local	blueberry picker	grass	Fresh N.E.	5 min.	45 min.	10 min.	35 min.	5 acres	9 acres	10	Direct	None
Road 24	8/12/32	NENE, Sec. 28, T.60N., R.20W.	Smoker	Surface	B	outsider	blueberry picker	grass	Moderate N.W.	5 min.	30 min.	15 min.	30 min.	4 acres	7 acres	12	Direct	None
Dark Lake	8/14/32	Lot 3, Sec. 5, T.59N., R.19W.	Campfire	Ground	B	outsider	fisherman	grass	Gentle S.W.	10 min.	50 min.	15 min.	30 min.	5 acres	8 acres	9	Direct	None
Blueberry	8/18/32	NESW, Sec. 19, T.60N., R.18W.	Smoker	Surface	C	local	settler	grass	Fresh N.W.	10 min.	40 min.	10 min.	40 min.	12 acres	20 acres	12	Direct	None
Road 63	8/19/32	NENW, Sec. 10, T.59N., R.20W.	Smoker	Surface	C	local	settler	grass	Moderate N.E.	15 min.	35 min.	15 min.	30 min.	11 acres	16 acres	11	Direct	None
Rice River	9/7/32	NESW, Sec. 32, T.61N., R.18W.	Smoker	Surface	C	local	settler	grass	Moderate S.W.	5 min.	40 min.	10 min.	55 min.	12 acres	22 acres	8	Direct	None
Four Corners	7/7/33	SESE, Sec. 21, T.59N., R.19W.	Smoker	Surface	C	local	settler	grass	Moderate N.E.	20 min.	50 min.	5 min.	50 min.	12 acres	15 acres	15	Direct	Civil - Won
Resort	7/11/33	Lot 6, Sec. 28, T.60N., R.18W.	Debris	Ground	A	outsider	resorter	brush	Moderate N.E.	5 min.	15 min.	5 min.	10 min.	.1 acre	.2 acre	5	Direct	Civil - Won
Angora	7/16/33	NWNE, Sec. 10, T.60N., R.18W.	Smoker	Surface	C	outsider	fisherman	grass	Moderate S.W.	25 min.	45 min.	10 min.	25 min.	25 acres	39 acres	30	Direct	None
Admiral	7/20/33	SENW, Sec. 31, T.59N., R.18W.	Smoker	Surface	C	local	settler	grass	Gentle N.E.	20 min.	20 min.	5 min.	35 min.	11 acres	13 acres	30	Direct	None
Garbage	7/21/33	Lot 3, Sec. 30, T.59N., R.17W.	Debris	Surface	B	outsider	grocer	grass	Fresh N.E.	25 min.	20 min.	6 min.	20 min.	5 acres	6 acres	20	Direct	Civil - Won
109	7/21/33	SENE, Sec. 24, T.59N., R.17W.	Smoker	Surface	B	local	settler	grass	Fresh N.E.	20 min.	30 min.	4 min.	35 min.	4 acres	7 acres	15	Direct	None
McGiven	7/22/33	SENW, Sec. 25, T.59N., R.20W.	Debris	Surface	B	local	settler	grass	Moderate N.W.	25 min.	15 min.	8 min.	40 min.	5 acres	6 acres	20	Direct	Civil - Won
Meadow	7/30/33	NENE, Sec. 21, T.59N., R.18W.	Smoker	Surface	C	local	settler	grass	Fresh N.E.	20 min.	20 min.	6 min.	50 min.	10 acres	12 acres	20	Direct	Civil - Won
Lock-Out	8/3/33	SENW, Sec. 33, T.59N., R.18W.	Campfire	Ground	A	local	settler	litter	Gentle S.E.	20 min.	5 min.	5 min.	30 min.	.1 acre	.2 acre	5	Direct	Civil - Won
Koski	8/5/33	Lot 2, Sec. 20, T.60N., R.18W.	Smoker	Ground	B	outsider	resorter	litter	Gentle N.E.	30 min.	15 min.	8 min.	15 min.	3 acres	3 acres	10	Direct	Civil - Won
Road 63	8/10/33	NENW, Sec. 8, T.59N., R.18W.	Smoker	Surface	B	outsider	blueberry picker	grass	Moderate N.E.	20 min.	30 min.	6 min.	30 min.	4 acres	4 acres	15	Direct	None
Section 15	8/12/33	SWNE, Sec. 15, T.60N., R.18W.	Campfire	Surface	C	outsider	blueberry picker	grass	Moderate N.E.	20 min.	40 min.	5 min.	25 min.	9 acres	11 acres	20	Direct	None
Idington	9/7/33	Lots 1 & 2, N1/2SE1/4, Sec. 1, T.60N., R.18W.	Smoker	Surface	C	local	settler	grass	Fresh S.W.	20 min.	30 min.	6 min.	35 min.	50 acres	75 acres	50	Direct	None
Indian	9/25/33	Lot 1, sec. 9, T.60N., R.17W.	Campfire	Surface	C	outsider	Indian picking Wild Rice	ground	Gentle N.W.	25 min.	50 min.	5 min.	50 min.	12 acres	13 acres	15	Direct	None

TABLE I. (Continued)

Name of Fire	Date	Description	Cause of Fire	Character (on arrival)	Classification	Source of people responsible	Class of people responsible	Physical Conditions (at point of origin)		Report Time	Discovery Time	Get-away Time	Travel Time	Size of fire when reached	Total acreage of fire	No. of men on fire when first reached	Visibility (Direct, Indirect, or Blind Area)	Law enforcement record. Criminal or Civil cases.
								Ground Cover	Wind rate & Direction									
Road 71	5/3/34	SWNW, Sec. 10 T. 61N., R. 17W.	Smoker	Surface	C	outsider	traveler	grass	Fresh N.E.	20 min.	50 min.	5 min.	40 min.	10 acres	12 acres	20	Direct	None
Heikkala	5/10/34	NENW, Sec. 15 T. 61N., R. 17W.	Debris	Surface	C	local	settler	grass	Fresh N.W.	15 min.	40 min.	6 min.	30 min.	9 acres	11 acres	20	Direct	Civil - Won
Road 25	5/21/34	NWSE, Sec. 16 T. 59N., R. 19W.	Smoker	Surface	B	outsider	traveler	grass	Moderate N.E.	20 min.	25 min.	5 min.	50 min.	4 acres	4 acres	20	Direct	None
Leander	5/30/34	SWNE, Sec. 15 T. 60N., R. 19W.	Smoker	Surface	B	outsider	traveler	grass	Moderate N.W.	20 min.	30 min.	5 min.	45 min.	3 acres	3 acres	20	Direct	None
Dark Lake	5/31/34	Lot 1, Sec. 32, T. 60N., R. 19W.	Campfire	Ground	B	outsider	fisherman	grass	Moderate N.W.	20 min.	35 min.	5 min.	40 min.	1 acre	1 acre	15	Direct	None
Sand River	6/5/34	Lot 4, Sec. 4, T. 59N., R. 17W.	Smoker	Surface	B	outsider	fisherman	grass	Gentle N.E.	5 min.	15 min.	4 min.	20 min.	1 acre	2 acres	15	Direct	None
Hill	6/20/34	SWSE, Sec. 23 T. 59N., R. 19W.	Debris	Ground	B	local	settler	grass	Gentle N.E.	5 min.	40 min.	5 min.	45 min.	2 acres	2 acres	15	Direct	None
Auto Lake	7/3/34	Lot 4, Sec. 16, T. 60N., R. 18W.	Campfire	Ground	A	outsider	traveler	litter	Gentle N.E.	5 min.	30 min.	5 min.	25 min.	1 acre	1 acre	10	Direct	None
cottage fire	7/4/34	Lot 4, Sec. 28, T. 60N., R. 18W.	Burning Cottage	Ground	B	outsider	resorter	litter	Gentle N.W.	5 min.	10 min.	5 min.	15 min.	1 acre	3 acres	30	Direct	None
Biwabik	7/20/34	S1/2NE, Sec. 33 T. 59N., R. 16W.	Smoker	Surface	C	local	settler	grass	Strong N.W.	3 min.	10 min.	5 min.	35 min.	15 acres	25 acres	30	Direct	None
Nett Lake	7/22/34	NWNW, Sec. 29, T. 59N., R. 16W.	Misc. (Burn- ing shack)	Ground	C	local	shacker	duff	Fresh N.W.	3 min.	15 min.	5 min.	55 min.	10 acres	16 acres	30	Direct	None
Hay	7/25/34	SWSW, Sec. 9, T. 59N., R. 19W.	Smoker	Surface	B	local	settler	grass	Moderate N.W.	4 min.	25 min.	4 min.	40 min.	7 acres	8 acres	20	Direct	None
Tower	8/14/34	SESW, Sec. 24, T. 59N., R. 17W.	Incendiary	Surface	B	Local	blueberry picker	grass	Moderate N.E.	5 min.	30 min.	5 min.	50 min.	1 acre	1 acre	20	Direct	None
Korpi	8/17/34	NWSE, Sec. 19, T. 60N., R. 17W.	Smoker	Surface	B	local	blueberry picker	grass	Moderate N.W.	5 min.	40 min.	5 min.	15 min.	1 acre	1 acre	25	Direct	Civil - Won
Pentilla	6/10/35	NESW, Sec. 32, T. 61N., R. 19W.	Debris	Ground	B	local	settler	grass	Gentle N.E.	5 min.	50 min.	7 min.	50 min.	4 acres	4 acres	30	Direct	Civil - Won
Johnson	6/11/35	NENE, Sec. 7 T. 60N., R. 18W.	Debris	Ground	B	local	settler	brush	Gentle N.E.	5 min.	40 min.	5 min.	25 min.	2 acres	2 acres	25	Direct	Civil - Won
Pocket Hole Lake	7/15/35	SENW, Sec. 24, T. 60N., R. 19W.	Campfire	Ground	B	local	settler	litter	Gentle N.E.	5 min.	50 min.	5 min.	45 min.	2 acres	2 acres	20	Direct	None
Cowfire	7/30/35	SENE, Sec. 33 T. 59N., R. 18W.	Campfire	Ground	A	local	settler	litter	Gentle N.E.	5 min.	40 min.	5 min.	40 min.	1 acre	1 acre	15	Direct	None
Angora	8/16/35	NESE, Sec. 9 T. 60N., R. 18W.	Campfire	Ground	B	outsider	blueberry picker	grass	Moderate N.W.	5 min.	30 min.	5 min.	35 min.	3 acres	3 acres	20	Direct	None
Cranberry	8/30/35	NWNE, Sec. 26 T. 59N., R. 20W.	Smoker	Surface	C	local	settler	grass	Fresh N.E.	5 min.	45 min.	5 min.	40 min.	30 acres	35 acres	40	Direct	None

TABLE II.

Summary of the fire situation for the period of May 18, 1930 to October 21, 1935, recording the total number and percentage of fires per year and for the total time concerned. The following factors are considered: (1) Cause; (2) Character; (3) Classification; (4) Source of People; (5) Class of People; (6) Physical Condition at Point of Origin; (7) Report Time; (8) Discovery Time; (9) Get-away Time; (10) Number of Men on Fire when first reached; (11) Visibility; (12) Law Enforcement.

Cause of Fire	1930		1931		1932		1933		1934		1935		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Campfire	4	18	5	26	3	16	3	21	2	14	3	50	20	21
Smoker	9	40	10	53	10	52	8	57	6	43	1	17	44	47
Debris	7	32	3	16	6	32	3	22	3	21	2	33	24	26
Incendiary	1	5							1	8			2	2
Misc.	1	5	1	5					2	14			4	4
Total	22	100	19	100	19	100	14	100	14	100	6	100	94	100
<u>Character</u>														
Surface	17	77	12	63	13	68	11	79	9	64	1	17	63	67
Ground	5	23	7	37	6	32	3	21	5	36	5	83	31	33
Total	22	100	19	100	19	100	14	100	14	100	6	100	94	100
<u>Classification</u>														
A	6	27	8	42	11	58	5	36	9	64	4	67	43	46
B	16	73	11	58	8	42	7	50	4	28	1	16	47	50
Total	22	100	19	100	19	100	14	100	14	100	6	100	94	100
<u>Source of People Responsible</u>														
Outsiders	14	64	10	53	9	47	7	50	7	50	1	17	48	51
Local	8	36	9	47	10	53	7	50	7	50	5	83	46	49
Total	22	100	19	100	19	100	14	100	14	100	6	100	94	100

TABLE II. (Continued)

<u>Discovery Time</u>	1930		1931		1932		1933		1934		1935		Total No.	Total %
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
0-5 min.	1	5					1	7	1	7	1	7	1	1
6-10 min.														
11-15 "	1	5			2	10	3	21	3	21	2	8	2	2
16-20 "	2	9	2	10	2	10	3	21	3	21	8	8	8	9
21-25 "	5	23	4	21	3	16	3	22	2	14	5	5	5	8
26-30 "	2	9	2	11	2	11	1	8	1	7	19	20	7	7
31-35 "	1	5	3	16	4	21	1	7	3	21	2	33	11	12
36-40 "	2	9	3	16	4	21	1	7	3	21	1	17	11	12
41-45 "					2	11	2	14	1	8	2	33	7	8
46-50 "	8	35	7	37									15	16
Over 1 hr.														
Total	22	100	19	100	19	100	14	100	14	100	6	100	94	100
<u>Get-away Time</u>														
0-5 min.														
6-10 min.														
11-15 "	3	13	1	5	3	16	7	50	13	93	5	83	28	30
16-20 "	3	13	6	32	11	58	7	50	1	7	1	17	24	26
21-25 "	1	5	4	21	4	21							13	14
26-30 "	3	13	2	11	1	5							5	5
31-35 "	4	18	4	21									6	6
36-40 "	2	9											8	9
41-45 "	1	5	2	11									2	2
46-50 "	1	5											1	1
51-55 "	1	5	2	10									3	3
56-60 "	1	5											1	1
Total	3	14	19	100	19	100	14	100	14	100	6	100	94	100

Class of People Responsible	1930		1931		1932		1933		1934		1935		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Traveler	4	18	3	16	3	16	4	29	4	29	5	83	14	15
Settler	8	36	7	37	9	47	4	28	4	28			40	43
Fisherman	4	18	4	21	4	21	2	14	2	14			15	16
Resorter	1	5		5	1	5	2	14					4	4
Grocer	1	5					1	7	1	7			3	3
Blueberry picker	3	13	4	21	2	11	2	14	2	14	1	17	14	15
Hunter	1	5	1	5									2	2
Misc.							1	8	1	8			2	2
Total	22	100	19	100	19	100	14	100	14	100	6	100	94	100

Physical Condition At Point of Origin

Grass	15	68	13	68	13	68	11	79	11	79	3	50	66	70
Reproduction	1	5											1	1
Brush	4	17	3	16	6	32	1	7	1	7	1	17	15	16
Duff	1	5							1	7			2	2
Litter	1	5	3	16			2	14	2	14	2	33	10	11
Total	22	100	19	100	19	100	14	100	14	100	6	100	94	100

Report Time

0-5 min.	3	13	5	26	8	42	1	7	9	64	6	100	32	34
6-10 min.	7	32	9	48	9	47							25	27
11-15 "	3	13	4	21	2	11			1	8			10	11
16-20 "	4	17	1	5			8	57	4	28			17	18
21-25 "	1	5					4	28					5	5
26-30 "	1	5					1	8					2	2
31-35 "	1	5											1	1
36-40 "														
41-45 "	1	5											1	1
46-50 "	1	5											1	1
Total	22	100	19	100	19	100	14	100	14	100	6	100	94	100

TABLE II. (Continued)

Number of Men on Fire when first Reached	1930		1931		1932		1933		1934		1935		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0-5	4	18	3	16	1	5	2	14	1	7	1	17	10	11
6-10	12	55	12	63	8	42	1	7	1	7	1	17	34	36
11-15	4	18	3	16	6	32	4	28	3	21	2	33	21	22
16-20	2	9	1	5	3	16	4	29	6	43	2	17	18	19
21-25					1	5	2	14	1	8	1	17	3	3
26-30									3	21	1	17	6	7
31-35											1	16	1	1
36-40														
41-45														
46-50							1	8					1	1
Total	22	100	19	100	19	100	14	100	14	100	14	100	6	100
Visibility														
Direct	15	68	12	63	19	100	14	100	14	100	14	100	6	100
Indirect	6	27	6	32									12	13
Blind	1	5	1	5									2	2
Total	22	100	19	100	19	100	14	100	14	100	14	100	6	100
Law Enforcement														
None	22	100	19	100	19	100	7	50	12	86	4	67	83	88
Civil Case Won														
							7	50	2	14	2	33	11	12
Total	22	100	19	100	19	100	14	100	14	100	6	100	94	100

A METHOD OF REALIZATION OF FIRE PREVENTION  
AND CONTROL ON THE MESABA

Fire Prevention

The Means of Preventing Fires from Standard Causes

"There is no honor due a forest officer for suppressing a fire that he should have prevented." It is well that forest officers keep this thought in mind at all times.

Fire prevention is the attempt to reduce the number of fires through law enforcement, education, and danger reduction. Forest fires are dependent upon risk; the factor of ignition, and hazard; the factor of inflammability. The efforts of fire prevention must therefore be directed toward the abatement of risk and hazard in each of the standard causes of fire by the use of the fire reduction factors, namely, law enforcement, education, and danger reduction.

The means of preventing fires from standard causes by use of the fire reduction factors are considered as follows:

1. Lightning Fires

(1) Law enforcement

It is impossible for laws to be enacted to prevent lightning fires. Lightning fires are an act of God.

(2) Education

1. Research studies are made of lightning fires.

Where have lightning fires occurred? What forest fuels were ignited first? (See Form 1100 in Appendix for information requested in lightning storm report.)

(3) Danger Reduction

1. Reduce inflammability of area by falling of snags.

2. Railroad Fires

(1) Law Enforcement---between the dates March 1, and November 30.

1. Locomotives must be equipped with spark arrester device, proper hopper bottoms, dampers, screened draught openings in pans, screened grate connections, proper ash pans, and a ash pan sprinkling device. (Refer to Forest Laws of Minnesota for details)
2. Record must be kept of all inspections required by every person operating a railroad for any purpose, showing:
  - (a) The place and number of each engine inspected.
  - (b) The date and hour of day of such inspection.
  - (c) A detailed statement signed by the employe making the inspection, giving location and size of openings greater than permitted by this act and of any and all defects found in ash pan or spark arrester device, and of the condition thereof. The word "person" in this subsection shall not be construed to mean the engine crew.
  - (d) A detailed statement signed by employe making repairs will be submitted. This book shall always be open for inspection by the Minnesota State Forester or other authorized



officer appointed by him.

3. Railroad companies must keep right-of-way clean of grass, brush, combustible materials, logs, poles, lumber and wood, except ties and material for shipment and other material necessary for the maintenance and operation of road.
4. Railroad companies must construct fire breaks along the route of its railway as can be constructed and maintained at not excessive expense.
5. No person operating a railroad for any purpose shall leave a deposit of fire, live coals, or ashes in the immediate vicinity of forest lands liable to be overrun by fire. Every engineer, conductor, or trainman discovering a fire adjacent to the track shall report the same promptly to the agent at the first telegraph or telephone station reached. The agent shall take necessary steps to put out such fire.
6. Railroad companies must issue particular instructions to employees for the prevention and extinguishment of fires.
7. Combustible material adjacent to right-of-way of a railroad must be removed.
8. Railroad companies must provide railroad patrolmen, when in the judgment of the forester there is danger of the setting and spreading of fires from locomotive engines, to follow each train throughout such fire patrol district as he deems necessary to prevent fires. Patrolmen must also cause extinguishment of fires he locates along railroad right-of-way.
9. Penalties for Violation
  - (a) Railroad companies operating a locomotive

without a properly equipped, practical, and efficient ash pan and spark arrester device, constructed and operated in conformity with all the specifications and requirements set forth in the Act in relation to the organization of the State Government of Minnesota, Chapter 426, shall be liable to a penalty of five hundred dollars (\$500.00) per day for each and every day on which such defective locomotive is run within this state.

- (b) A violation of any of the above provisions for which no specific penalty is herein prescribed shall be guilty of a misdemeanor and shall be punished accordingly; also shall be liable in full damages to any and every person suffering loss or injury, including liability to the State of Minnesota and Federal Government.

## (2) Education

1. Place fire posters in trains, and railroad stations.
2. Distribute fire prevention codes, maps, bulletins, etc., in trains and railroad stations.
3. Keep press well informed about fires.

## (3) Danger Reduction

1. Remove from railroad right-of-way any grass, brush,, combustible material, logs, poles, lumber and wood except ties and material used for shipment and other material necessary for the maintenance and operation of road.

## 3. Lumbering

### (1) Law Enforcement

1. When a railroad locomotive is used the principals SP

listed under railroad fires are applicable.

2. Portable engines used must be equipped with spark arresters except when ground is covered with snow. Any person violating this provision is guilty of a misdemeanor and shall be liable in full damages to any and every person suffering loss or injury, including liability to the State of Minnesota and Federal Government.

## (2) Education

1. Train employees, particularly smokers, to not let fires escape.
2. Post fire laws and instructions in places on job where they most likely will be read.
3. Instruct crew foreman to teach fire prevention to men.

## (3) Danger Reduction

1. Install spark arresters in chimneys of cook shacks, bunk houses, and other buildings in camp.
2. Burn slash properly at right time under best of supervision.
3. Clear sights for donkey engines before installation of same.

## 4. Campfire

### (1) Law Enforcement

1. Every person who, when ground is not covered with snow, starts a fire in the vicinity of forest or prairie land, shall exercise every reasonable precaution to prevent such fire from spreading, and shall, before lighting the same clear the ground of all branches, brushwood, dry leaves, and other combustible material within a radius of five feet

from the fire and shall carefully extinguish the fire before leaving the place. Any person who violates this provision is guilty of a misdemeanor.

2. Forest Supervisor has authority, with the approval of Regional Forester, to designate camp grounds or improved places of habitation where campfires can be built if emergency is great enough to warrant it.
3. Every person who shall kindle a fire on or near forest and leave it unquenched, or be a party thereof shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not less than twenty-five dollars (\$25.00) and not exceeding one hundred dollars (\$100.00) and cost of prosecution, or by imprisonment in the county jail not less than ten days and not exceeding ninety days.
4. Penalties for violation other than that listed above.
  - a. See "b" under "9" of railroad fires.

## (2) Education

1. Register visitors at forest boundaries and camp grounds for a psychological effect in promotion of fire-mindedness.
2. Contact public personally, also by use of press, exhibits, lectures, radio, signs and posters, and through schools.
3. Distribute printed fire prevention codes and laws on small inexpensive cards to visitors at forest boundary.

## (3) Danger Reduction

1. Construct permanent camp ground at proper locations

on ranger district.

2. Fire-proof camp-grounds by constructing camp grates or stones. Build fire lines around camp-grounds. Keep campground free from litter and inflammable material.
3. Have supply of wood on hand at camp ground at all time.

## 5. Smoker Fires

### (1) Law Enforcement

1. Every person who shall throw or drop into combustible material any burning match, ashes of pipe, lighted cigar or cigarette, or any other burning substance, and who fails to extinguish the same immediately shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not less than twenty-five dollars (\$25.00) and not exceeding one hundred dollars (100.00) and costs of prosecution or by imprisonment in the county jail not less than ten days and not exceeding ninety days.
2. Forest Supervisor has authority, with the approval of Regional Forester, to close certain portions of forest to smoking, except at designated campgrounds or improved places of habitation, if emergency is great enough to warrant it.

### (2) Education

1. Register visitors at forest boundaries and camp-grounds for a psychological effect in promotion of fire-mindedness.
2. Distribute printed fire laws on cards to visitors at forest boundaries.
3. Contact public personally at campgrounds, while hunting and fishing.

4. Install fire prevention exhibits at Look-Out Towers and ranger stations.
5. Inform press when forest is closed to smoking.
6. Distribute cards to visitors at boundary informing them that forest is closed to smoking at present and state penalties for violation.
7. Post signs and posters at places where they most likely will be read.

### (3) Danger Reduction

1. Reduce inflammability of area along roads and trails by burning all slash on each side of same for a distance of 200 feet, and fall all snags on either side of each for a distance of 500 feet.
2. Do all cars driven into forest have ash tray devices? Is it possible to encourage the purchase of these for automobiles that may be driven into forest?

## 6. Debris Burning

### (1) Law Enforcement

1. Every person who shall negligently or carelessly set on fire any brush, stumps, dry grass, field, stubble, or other material on his land and fail to extinguish it before it has endangered the property of another shall be deemed guilty of misdemeanor and on conviction thereof shall be punished by a fine of not less than twenty-five dollars (\$25.00) and not exceeding one hundred dollars (\$100.00) and cost of prosecution or by imprisonment in the county jail not less than ten days and not exceeding ninety days.
2. Permission to set fire to any grass, stubble, brush, slashing or wood for the purpose of clearing land and improving land may be granted by a forest officer in the form of a written permit with the

understanding, however, that the forest officer has the right to refuse, revoke or postpone use of permits to burn when such act is clearly necessary for the safety of life and property. Any person violating the provisions of the permit will be guilty of misdemeanor and shall be liable in full damages to any and every person suffering loss, including liability to State or Federal Government.

## (2) Education

1. Contact settlers on district either personally or in groups at school houses or town halls and by use of illustrated lectures teach them the value of fire prevention.
2. Have press print fire laws and codes in their papers. Find out what papers most of settlers get so all papers will contain fire laws, etc.
3. Teach settlers the value of burning brush at proper times.
4. Send form letters to settlers keeping them informed of laws and their rights on this forest, doing this in a very tactful manner.

## (3) Danger Reduction

1. Find out what settlers have brush piled or stumps to burn. See that this settler burns brush piles safely at the right time under permit, and that some forest officer shows the settler how to handle the brush burning safely.

## 7. Incendiary Fires

### (1) Law Enforcement

1. Every person who shall negligently or carelessly set on fire, or cause to be set on fire, any woods, prairie, or other combustible material, whether

his own land or not by means where of the property of another, the State or Federal Government shall be endangered, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not less than twenty-five dollars (\$25.00) and not exceeding one hundred dollars (\$100.00) and costs of prosecution, or by imprisonment in the county jail not less ten days and not exceeding ninety days.

## (2) Education

1. Enforcement of law.
2. Post fire laws at places they most likely will be read.
3. Distribute forest service literature that points out value of forest. "Who loses when forests burn?", etc.

## (3) Danger Reduction

1. Reduce inflammability of ranger district by falling all snags, and burning all slash. A very expensive task.

## 8. Miscellaneous Fires

### (1) Law Enforcement

1. Every person who shall use other than incombustible wads for firearms, or carry a naked torch, firebrand, or exposed light in or near forest land; every person who drives upon or over forest lands in a motor vehicle with an open cut-out or without a muffler on the exhaust pipe; shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not less than twenty-five dollars (\$25.00) and not exceeding one hundred dollars (\$100.00) or by imprisonment in the county jail not less



than ten days and not exceeding ninety days.

2. There may be other laws of enforcement that may be referred to, but their application will depend upon how the miscellaneous fire was started and its results.

## (2) Education

1. Publish cards with fire prevention reminders on them. These reminders will concern use of matches, how to operate kerosene or gasoline stove, etc. Distribute these cards to settlers and resorters.

## (3) Danger Reduction

1. Have floor protected with heavy tin where stove is set; also have walls near stove protected with heavy tin if condition warrants it. .
2. Use safety matches.
3. Keep gasoline and kerosene in colored cans----red for gasoline, blue for kerosene.

## Classification of Means of Fire Prevention

### Law Enforcement

Adequate law enforcement is a valuable aid in fire prevention. Society has outlawed carelessness with fire, and the moral effect of that action gives fire prevention added weight and prestige. To derive the utmost benefit from the fire laws people must know them, and it is the business of the Forest Service to see that they do. Mere existence of fire laws would not command respect for them, however, without prompt and impartial enforcement of them.

Before any law can be enforced successfully, public backing is essential. Therefore, wide publicity should be given the Forest Service policy in law enforcement and the reasons for this policy.

### Danger Reduction

1. Risk Survey - In every forest there are distinct fire risks which can be discovered and removed, before they cause forest fires. Some risks can be removed by law, others can be removed through the self-interest of the person who create them, if such persons can be made to understand the danger. The necessity is to find the risk before it causes fires, and having found it, to take corrective measures.

2. Restriction in Use of the Forest During Hazardous Periods - The Forest Service should make sure that there is a real necessity for closing measures before putting them into effect.

Forest Officers must give the order as much publicity as possible, through the medium of news releases, by information to be furnished by Chambers of Commerce, garagemen, and others, by placing of easily read signs on roads at Forest boundary and at places where people congregate and by personal contact with campers and other users.

3. Reducing Physical Risks - Areas where risks are especially great because of snags, slash, windfalls, sawmills, railroads, etc., should be given the extra protection needed.

4. Removal of Slash - All slash, windfalls, snags, etc., should be cleaned up along trails and roads for a distance of 200 feet in so far as possible.

5. Fire-proofing Campgrounds - Camp grates or stones will assist in preventing campers fires from spreading. Some campgrounds may need fire lines around them, and the campground itself should be kept free from litter and inflammable material.

### Education

1. Personal Contacts - Risk surveys bring the forest officer in touch with persons whose activities create special risks. There remains the great majority of residents in the users of forests, who individually may rate as low risks. Collectively, they cause a large portion of the fires. Hence, personal contacts with as many of them as possible are highly important.

It is hopeless to expect to reach all the tourists and other transients who occasionally visit the forest. It is distinctly possible to contact many or most of the people who use the forest often, and that must be done.

Every forest officer makes many casual contacts in the course of his work. Such contacts give him an opportunity and a duty to talk fire control, interest the other man, and show him how he can help. A great deal can be done in this way, without

special travel or the use of much time. The casual contacts are not sufficient. Much more can be accomplished by studying the field, deciding what contacts are most necessary, and then going about making them in a systematic way.

2. Distribution of Printed Matter - Fire prevention codes, as well as camp sanitation codes, might well be distributed with special use permits, or with membership cards in sports clubs and other organizations.

These codes, as well as map folders, bulletins, specially prepared letter, cards of introduction, fire prevention bulletins, etc., should be distributed to different classes of forest visitors or to specially prepared mailing lists. On some forests good use can be made of registration lists secured as visitors enter the forest or some particular campground. Such material can also be distributed by use of display racks in forest headquarters, libraries, service stations, etc., or given out by auto associations and by forest officers during their contact work on the forest or when giving talks elsewhere.

3. Schools - Every school within the ranger's district should be furnished annually with fire prevention instructions, preferably by having this made a part of their regular course of study. This can be accomplished by furnishing the teachers with

information by specially prepared texts and bulletins.

4. Exhibits - Each ranger district should prepare a list of store windows, conventions, and other suitable means, including look-out towers visited by the public, where fire prevention exhibits should be installed.

5. Press- Forest officers should keep press supplied with information of fire warnings and fire news.

6. Lecturers, With or Without Slides or Pictures - Talks should be given to Civic organizations, 4-H Clubs, Scouts, teacher's conventions, etc., as occasion offers, and there should be a determined effort to develop opportunities for this sort of educational work.

7. Signs and Posters - There should be a definite plan for placing signs and posters. Postmasters are authorized to permit the posting of fire signs in lobbies of the post offices. Fire posters can also be placed to advantage in busses, trains, and other public places.

No fire warnings should be kept up on any area when no hazard exists. Fire warnings may be so frequent and kept up so constantly as to lose any value they might otherwise have.

Fire signs should not be placed too close together.

There should be one at each campground where there is a material fire hazard. Signs along roads should be large enough to be readable by motorists.

8. Registration of Visitors - Visitors may be asked to register at campgrounds or at forest boundary for the psychological effect in promoting fire-mindedness. People who register may be furnished with some sort of fire prevention information, as well as other information.

## Fire Presuppression

After all precautions have been taken to prevent forest fires, the next step is to be ready for quick suppression of any fires which may occur. Plans should be made in advance; old fire plans should be revised and brought up to date; fire equipment should be inspected; and guards and other temporary employees must be carefully selected and given adequate training for their work. Fire wardens and other cooperators must be ready; lines of communication and transportation must be in first class shape.

To be adequately prepared, forest officers should "suppose" a fire in a certain locality and determine just what action would be necessary to get men, equipment and supplies quickly on the job, and what strategy should be used in fighting the fire. Such questions as the following should be asked in regard to the "supposed" fire:

"Where is the fire?" "What type of timber is it in?" "Where is it heading?" "How could he hear of it?" "How long would it take to reach the fire?" "How many men can he get and where would he get them?"

## The Fire Plan

Fire planning is necessary for preparedness. A complete fire plan is composed of the accumulation and recording, chiefly in map form of all information which would be used in directing a

suppression campaign from the Ranger's office.

The first requisite in preparing an intelligent fire plan is an intimate knowledge of the forest. The forest ranger must be familiar with all parts of the ranger district, knowing the areas where the danger of fire starting is the greatest, and knowing those areas where forest fires would do the most damage.

### 1. Organization Chart

This chart, Form 468, (see Appendix) will contain lists of man power, equipment and supplies for fire suppression. A copy should be available for each C.C.C. camp superintendent. This chart should be revised currently, before the beginning of each fire season.

### 2. Zone Plan

Mesaba Ranger District should be divided into zones and number. These divisions will be based on accessibility, hazard, source of labor, work area, number of C.C.C. camps, or combinations of these factors.

### 3. Action Map

In support of the organization chart and zone plan, there will be a forest base map (preferably 1" scale) emphasizing the items and features affecting action and fire control. Roads, trails, telephone lines, look-out towers, guard stations, etc., will be emphasized



on map by being colored with crayons or ink. Such items that are missing or incomplete on the base map should be added. Other items that should be on the action map include the following: cooperators, key-men, number of fire fighters available at a given time and place, location of telephone instruments, etc.

#### 4. Radial Map

The radial map is a base map of the forest showing azimuth circles around each lookout tower. Have copy of lookout radial map on the wall of Ranger's Headquarters.

#### 5. Hazard and Risk Map

This map should show the potential hazard and character of fire to be expected on the Mesaba. Use a tracing (linen cloth) with hazard classes indicated by colored hatching which can be used over the forest type map.

#### 6. Individual Fire Handbook

Ranger should prepare six to ten copies of an individual fire handbook. Copies are needed for dispatcher's desk, each guard, and one for the fire truck.

### Fire Detection

The first step toward extinguishing a forest fire is quick detection and location. All Forest Service Officers should be on

look out for forest fires at all times. During the fire season, however, the main reliance for rapid discovery of fires is dependent upon the lookout tower system.

#### 1. Lookouts

Lookouts or tower men are the "eyes" of the fire suppression system. They are responsible for the location and reporting of fires.

- (1) Ranger should issue written instructions to towermen outlining in detail their duties and responsibilities.
- (2) Report time - report time should not exceed two minutes; in other words, the lookout should report the fire by legal subdivision and azimuth reading to the dispatcher within two minutes from the time the fire was first discovered.

### Transportation

The objective of transportation is to get men on fire and at work as quickly as possible. The principle medium of transportation on the Mesaba consists of automobiles or trucks.

#### 1. Automobile Equipment

At least one truck will be equipped as a fire truck at the Ranger Station during the fire season. This truck should be serviced

at all times so that it may be used immediately for fire emergency. It should be equipped with an adequate supply of fire fighting tools. (See Appendix for Cache for  $1\frac{1}{2}$  ton truck)

#### E. C. W. Camps

During the duration of the E.C.W. camps, camp superintendents should be given instructions by the ranger as to their duties in the case of fire emergencies.

Camp superintendents or specified foremen at each camp should function as forest guards. They will be held strictly responsible for all suppression and presuppression activities within their respective camp work areas.

#### Telephone Lines

The most important part of the protective equipment is the telephone system. It must be maintained in perfect order at all times. Ranger should be held strictly accountable for any failures in the functioning of the telephone lines.

Suitable and sufficient tools and equipment for keeping telephone lines in repair should be maintained at the ranger's headquarters and at each C.C.C. camp or lookout tower cabin.

### Get-away Time

Most failures in fire control in the past can be traced to a slow attack and loss of time in getting equipment and men to the fire.

Get-away time should not exceed five minutes. This period includes the time when forest officer receives report of fire to the time he leaves with equipment and men for fire.

### Equipment

The objective for the Mesaba should be to supply fire fighting equipment sufficient for one hundred men for each one hundred thousand acres. All equipment organized for use in five-man, ten-man, and larger units will be held at the ranger headquarters and C.C.C. camps. (See Appendix for 5-men and 10-men caches) An extra equipment cache for fifty men will be held at the ranger station for rapid transfer to any other district when the need arises.

#### 1. Fire Tool Caches

Fire tool caches should be placed where they are conspicuous and easily seen from routes of travel and should be limited largely to road intersections, depending upon the source of labor supply.

#### 2. Marking Fire Tools and Equipment

All fire tools and equipment should be marked with red paint and tools and equipment so marked should be used for no other purpose other than fire.

## Fire Suppression

Each fire suppression job is an individual problem varying in some respects from all others, but there are certain basic principles that are sound and should be recognized by every forest officer. Fire fighting is not a highly specialized job that only an expert can handle successfully. It is a strenuous job, undesirable and unpleasant, but with the proper spirit men with little training can handle it satisfactorily, provided they thoroughly understand a few basic principles. These principles are discussed as follows:

### 1. Preparation

Be prepared. This means having tools and supplies ready, and arrangements should be made for securing foremen, crews, and transportation.

### 2. Initial Action

- (1) Suppression crews should be sent to every fire without delay, day or night.
- (2) Fires should be hit hard at the very start, that is, size of suppression crew should be large enough for initial action.

### 3. Organization

- (1) Ranger should assume full charge upon arrival at fire and continue in charge, regardless of the presence of superior officers, unless he is specifically informed by a superior that the latter has assumed charge.

- (2) Small camps should be established when suppression crews are fighting large fires.
- (3) Large crews should be divided into small units under straw bosses, and assigned a definite task.
- (4) Foreman should assign definite strip of work to each man in his crew.
- (5) To get the maximum amount of efficiency, shifts of ten to twelve hours should be recommended.
- (6) Well-cooked food should be provided the men, ample lunches should be given men on line at proper intervals.
- (7) Emergency telephone wires should be strung for large fires, as direct communication is important.
- (8) First aid kit including necessary articles for treating burns and minor injuries, and a few bandages for use in binding wounds or broken bones should be on hand at all times.
- (9) A camp timekeeper should be appointed and made responsible for keeping the time of all men on fire.
- (10) In using labor other than C.C.C., men should be informed as to the terms of hire, including all transportation and time allowance agreements.

#### 4. Plan of Attack

- (1) Immediately upon arriving at scene of fire, the forest officer in charge, should go around fire in order to size up the situation before putting men to work. He should keep posted as to the progress and conditions of fire on all sides.

- (2) Forest officer in charge upon arrival at fire should try to determine its cause. He should detail a special man to locate any clew that might give reason as to who might have started the fire. These clews should be preserved and protected.
- (3) Determination of critical points of fire, at present, and those that might arise during the day or night should be noted.
- (4) Forest officer in charge should have a definite reason for every act he wishes carried out.

#### 5. Time of Attack

- (1) Attack should be made just as soon as possible after arrival upon fire.
- (2) Time of attack on small fires is unimportant; they should be extinguished and put under control as soon as possible.
- (3) Work on large fires, after the first day, should be started at 4 A.M.
- (4) Advantage should be taken of all lulls in fire due to changes in wind, moisture conditions, etc.

#### 6. Point of Attack

- (1) The aim should be to cut off fires as soon as soon as possible; in small or weak fires attack head of fire, in large fires start on flanks and work toward head.
- (2) Immediate action should be given to any spot fire outside of fire line.

#### 7. Method of Attack

- (1) Methods of attack to be used on the Mesaba

should be direct, two-foot, or parallel method. (See Appendix for definitions)

- (2) Direct method should be used when fire is smoldering.
- (3) Parallel method should be used when fire is hot and backfiring easy.
- (4) Fires should be kept off areas of material which will create a large volume of heat.
- (5) Backfire lines should be built in advance of fire front.
- (6) Snags that threaten to throw fire across fire lines should be fallen.
- (7) Crown fires should be combated for the most part at night and early morning.
- (8) Sources of water that can be used in fire suppression work should by all means be used when ever practical, however, its extensive use on any fire will always depend upon its accessibility and the kind of equipment available.

#### 8. Patrol

- (1) Fire lines should be held no matter even if it takes entire crew.
- (2) Intensity of patrol should be based upon the condition of the main fire and the probable rate and direction of spread of any fire which might become established across the fire line.
- (3) A watch for spot fires up to a half mile or more beyond fire lines should be maintained on any large fires where there has been intense volume of heat.



- (4) Fires should never be abandoned until all ground fires within sixty feet and snags within a hundred and fifty to three hundred feet of line are extinct.
- (5) One man, at least, should be kept on patrol for 4 or 5 days after last spark of fire is discovered.

PRESENT STATUS OF FIRE PREVENTION AND CONTROL  
ON THE MESABA

Fire Prevention

Very little effort has been <sup>Exerted</sup> ~~exerted~~ toward fire prevention on the Mesaba to date. That which has been done can best be presented by considering each of the standard causes of fire, keeping in mind the means of preventing these causes. These considerations are as follows:

1. Lightning Fires

- (1) Lightning Storm Reports, Form 1100, are filled out by lookouts. (See Appendix for Form 1100.)
- (2) No record of lightning forest fires on Mesaba between May 18, 1930 and October 30, 1935.
- (3) All snags on both sides of roads and trails for distance of 500 feet were fallen.

2. Railroad Fires

- (1) The Canadian National Railroad right-of-way extends through eastern part of Mesaba. (Figure 2) Forest Ranger on Mesaba has done nothing to prevent railroad forest fires.
- (2) There is no record of railroad fires on Mesaba within the period of time in question.

3. Lumbering Fires

- (1) Ranger has done nothing to prevent lumbering fires. To his knowledge there have been no lumbering operations on district since July 1933.

- (2) There is no record of lumbering fires on the Mesaba between May 18, 1930 and October 30, 1935.

#### 4. Campfire Fires

- (1) On August 3, 1933, a settler was convicted in civil court for leaving campfire unquenched.
- (2) Campgrounds have been planned for Clear Lake and Dark Lake.
- (3) Fire prevention signs have been erected along main highways.
- (4) Fire prevention literature is given to public on visits to C.C.C. Camps and Ranger Station.

#### 5. Smoker Fires

- (1) Four specific offenders were tried and convicted in Civil Court.
- (2) Fire prevention signs have been erected along main highways.
- (3) All slash on both sides of roads and trails for a distance of 200 feet is burned, and all snags on both sides of each for a distance of 500 feet were fallen.

#### 6. Debris Burning

- (1) Six specific offenders were tried and convicted in Civil Court.

#### 7. Incendiary Fires

- (1) All slash on both sides of roads and trails for a distance of 200 feet is burned, and all snags on both sides of each for a distance of 500 feet were fallen.

#### 8. Miscellaneous Fires

- (1) Nothing has been done by the Ranger to prevent miscellaneous fires.

## Fire Presuppression

It is evident that fire presuppression and suppression have been given preference over fire prevention on the Mesaba Ranger District. Presuppression has been planned so effectively that at the present there is not a great deal left to be remedied in this particular phase of forest protection. That which has been done is briefly summarized as follows:

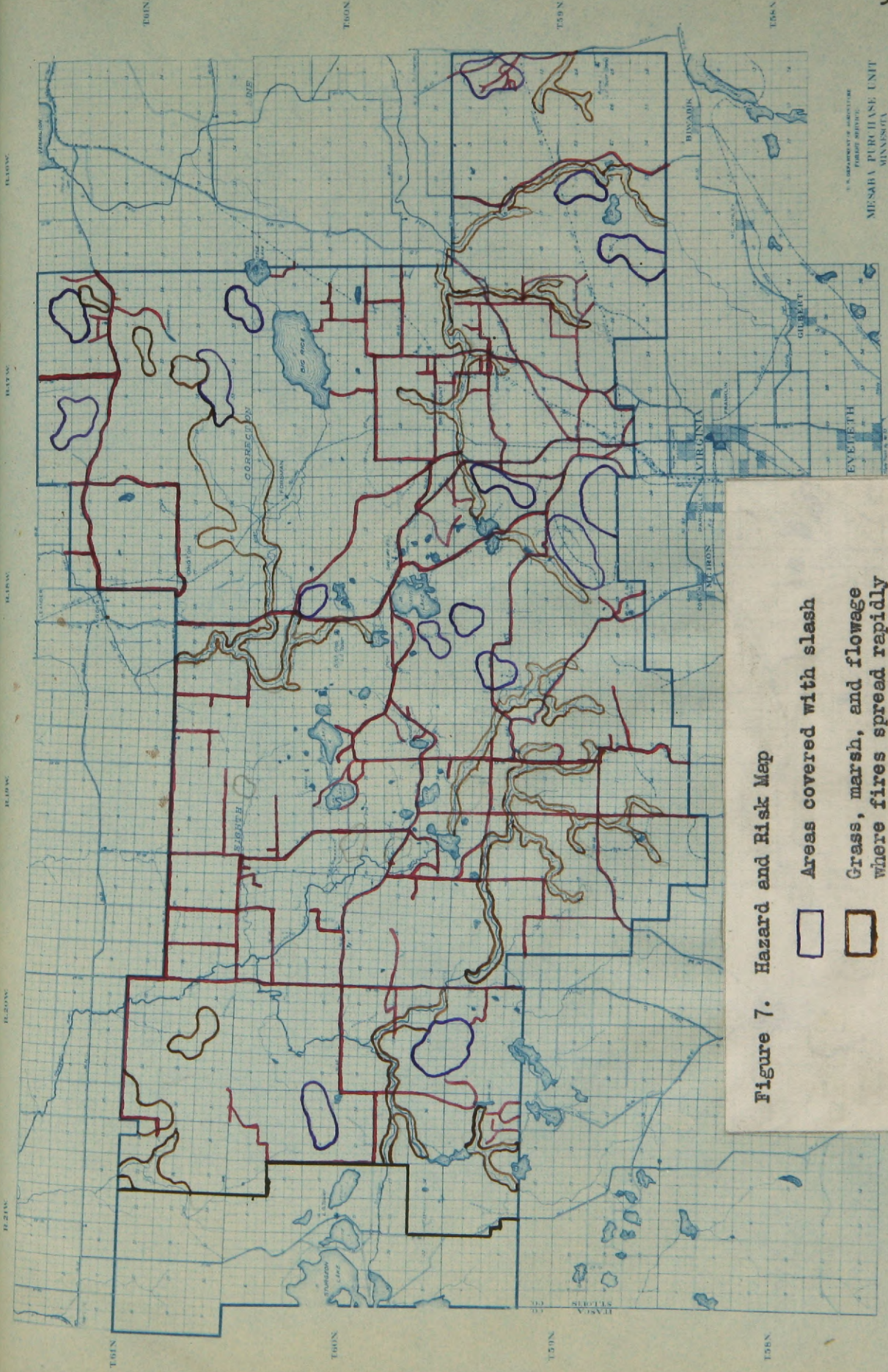
### 1. Fire Plan

Organization chart, zone chart, action map, radial map, hazard and risk map, and individual fire handbook have been prepared by the Ranger's Office. (Figures 2, 4, and 7)

### 2. Fire Detection




The United States Forest Service has constructed one lookout tower on the Mesaba, namely, the Birch Knob Lookout Tower. (See Figure 2 for location) The Sturgeon Lake, Wynne Lake and Mountain Iron lookouts were erected by the Minnesota State Forest Service; however, the federal government has access to these towers as well.

Ranger has issued written instructions to towermen outlining in detail their duties and responsibilities. (See Appendix)



U.S. DEPARTMENT OF AGRICULTURE  
 FOREST SERVICE  
**MESABA PURCHASE UNIT**  
 MINNESOTA  
 FOURTH PRINCIPAL MERIDIAN  
 1924

Figure 7. Hazard and Risk Map

-  Areas covered with slash
-  Grass, marsh, and flowage where fires spread rapidly once area is dried out
-  High hazard and risk along roads and trails (small amount of grass present along most roads and trails)

Individual fire handbook outlining fire pre-suppression plan and instructions for dispatcher is available at Ranger's Headquarters. Dispatcher is requested to carefully study this manual and become very familiar with his fire tools, namely, the organization chart, zone chart, action map, radial map, hazard and risk map.

### 3. Transportation

Two  $1\frac{1}{2}$  stake body trucks located at the Ranger Station are available for transportation in fire suppression work. Five similar trucks are available for same use at each of the C.C.C. camps on Ranger District. Other automobile equipment can be had from cooperators. (See Form 468, Appendix).

### 4. E.C.W. Camps

Instructions to camp superintendents concerning their part in the fire pre-suppression work on the Mesaba has been outlined by the Ranger.

Each camp has a specific foreman (trained forester) who is held strictly responsible for all pre-suppression activities within his respective camp area. He has 20 select men in his camp which he can use as "straw bosses" in fire suppression work. A fire truck containing a "twenty man cache" is ready for fire suppression work at any time. There is additional fire equipment in camp that can outfit at least

a "200 man" fire suppression crew. The foreman in charge of fire in his particular camp trains C.C.C. enrollees fire suppression tactics from time to time. This foreman assigns a capable C.C.C. man to keep fire equipment in A-1 condition at all time.

#### 5. Telephone Lines

The dispatcher checks telephone line with camps and lookouts hourly during the day. If any failures occur in the functioning of the telephone lines, the dispatcher has the authority to order telephone maintenance crew to locate and repair defect.

The location of telephone lines can be traced on the "action map." (Figure 4)

#### 6. Get-away Time

Get-away time has been greatly improved on the Mesaba. In 1934, there were fourteen fires. The get-away time for thirteen of these was 5 minutes or less; the remaining fire required 7 minutes. In 1933 there were only six fires. The get-away time for five was 5 minutes; the remaining fire required 7 minutes.

#### 7. Equipment

The Mesaba has equipment enough to supply 500 men for fire suppression work. This equipment is arranged

in "5-men", "10-men", and "20-men" caches. There is also one 50-men cache held in the Ranger Station for emergency work, that is, it can be transferred rapidly to any other ranger district or forest. Each C.C.C. camp has enough fire fighting equipment to supply at least 200 men.

A few fire tool caches have been placed at conspicuous and important locations on the Mesaba and can be used for suppression work at any time condition warrants it. Location of these caches are shown on the "action map". (Figure 4)

All fire tools and equipment have been marked with red paint which means "use only for fire fighting."

### Fire Suppression

Fire suppression has priority over all other forest service activities during the fire season. It has always received strict adherence of forest officers as serious mistakes in suppression work usually mean dismissal from the Forest Service. It is evident, therefore, why suppression activities function properly in most cases, and why more stress is put upon suppression than prevention. The author, however, wishes to point out again the importance of fire prevention as no fires mean no suppression. To state just what the present status of fire



suppression is on the Mesaba Ranger District would require an inspection of suppression activities on each fire that has occurred during the past year. The writer has not had this experience and must present suppression as it has been conferred to him. Suppression principles, as they are outlined on the Mesaba are summarized as follows:

### 1. Preparation

One fire truck containing suppression equipment for 20 men is ready at each of two C.C.C. camps and at the Ranger Station. Form 468 and "action map" present details in location of tools, supplies, crews, transportation, etc.

### 2. Initial Attack

Twenty men crews are sent to fires when first reported, unless towerman suggests sending larger crews.

### 3. Organization

Ranger assumes full responsibility of supervision of suppression crew when he arrives on fire. If he does not take action on some particular fire, forest officer assigned to suppression crew will have full charge, however, Ranger is still held responsible to Supervisor for all fires on his district.

In no case during era of C.C.C. has it been necessary for camps to be established near fire lines. The number of

enrollees available and the establishment of C.C.C. camps has made conditions such that men on fire could be relieved after eight to ten hours work. Food could be packed in fireless cookers and taken to fire suppression crew, and men just relieved of fire fighting duty could be taken back to camp to rest.

Certain C.C.C. men have been selected as "straw bosses" in suppression activities. These "bosses" have ten men under their supervision and have authority to assign them work on the fire line.

First aid equipment is on hand for the treatment of minor injuries. In the case of serious injury, the man is taken back to main camp where the army doctor can treat patient properly.

Record is kept of time put in by each enrollee on fire so that no C.C.C. man will put in more work than is required of him per day. If record indicates that a man has put in overtime, he is given time off immediately.

#### 4. Plan of Attack

It is the request of Ranger that first forest officer on scene of fire go around fire before deciding upon place of attack.

A specific man is detailed to look for clues as to cause of fire and if any are found they are preserved and protected.

#### 5. Time of Attack

Fires are attack as soon as they are reported and a crew remains on fire until it is out, after which time a few men are assigned to patrol duty.

#### 6. Point of Attack

Small fires are hit hard and put out as soon as possible. Fires that are large and contain a large volume of heat are attacked at flanks with the purpose of surrounding it and then working in on it, putting out every spark.

When small spot fires occur, specific men are assigned to put these out immediately.

#### 7. Method of Attack

Back firing has not been used since the Mesaba Ranger District has been under the administration of the United States Forest Service. The direct, two-foot method, and parallel method, without back firing have been used in all cases.

The method of attack in most cases has been a combination of three methods; the parallel method of attack may first be used but as conditions of the fire change the direct and two-

foot methods are used.

Snags within fire line, not yet ignited, are fallen.

Water is always used to quench fire if its accessibility warrants its use.

#### 8. Patrol

Patrol crew should always be large enough in number to suppress any new source of fire within or outside fire lines

A large supply of water is kept on hand in back pumps to be used in suppressing any new source of fire.

## RECOMMENDATIONS - FIRE PREVENTION AND CONTROL

Fire Prevention

## 1. Lightning Fires

- (1) Make a risk survey for areas supporting large snags. Fall snags to eliminate hazard.

## 2. Railroad Fires

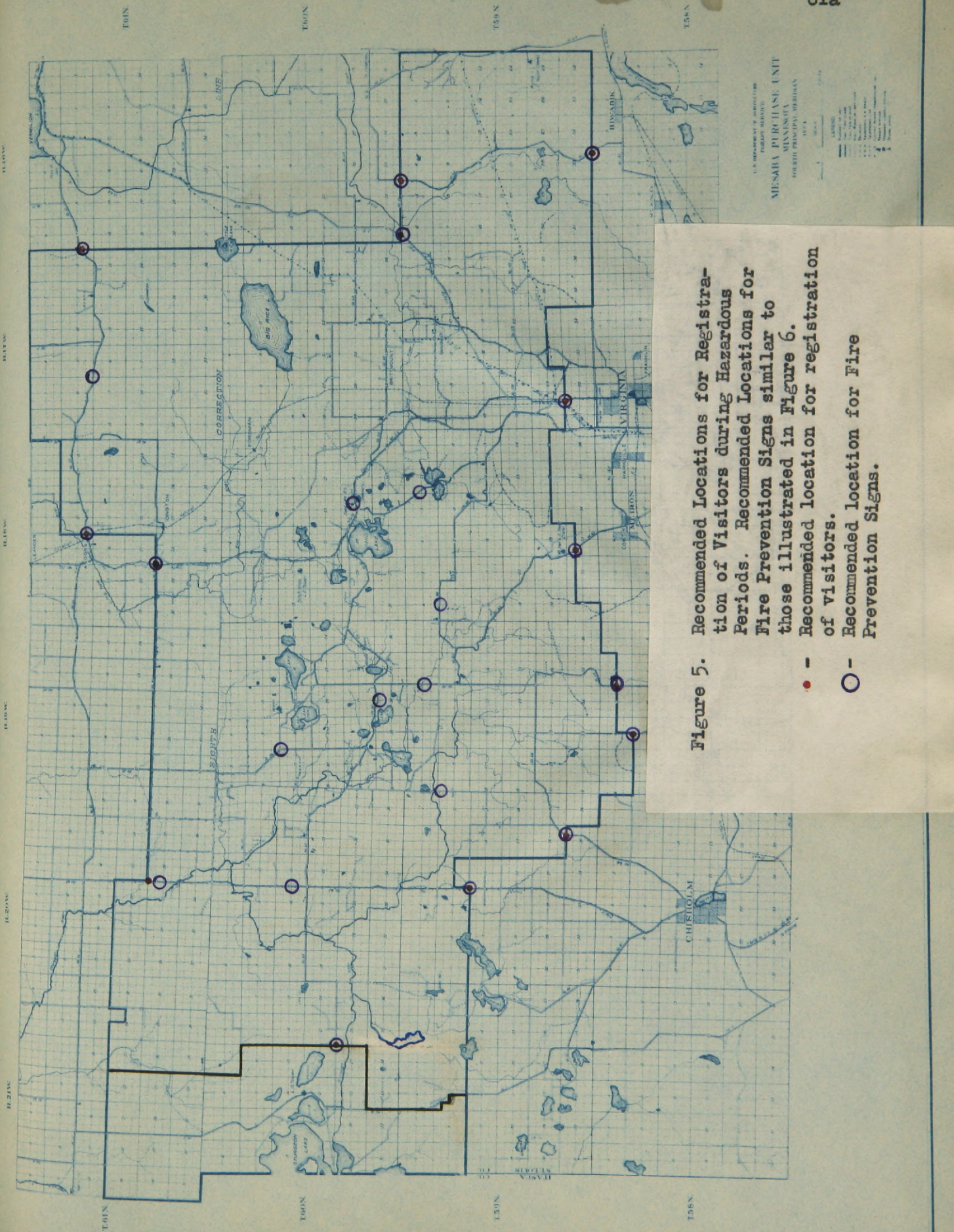
- (1) Make risk surveys along Canadian National Railroad noting if right-of-way is clean of grass, brush, combustible materials, logs, poles, lumber and wood, except ties and material for shipment and other material necessary for the maintenance and operation of road. If hazard is present request railroad to remove such or arrest company for violations of state law.
- (2) Obtain permission from State Forester to inspect book containing inspection of locomotives on Canadian National Railroad to see if spark arresters and ash pans are up to standards requested in State Law.
- (3) Request railroad to construct fire-breaks along right-of-way if you feel conditions warrant it.
- (4) Inform railroad company to provide railroad patrolmen to follow train throughout fire patrol district when fire hazard is high.
- (5) Send fire prevention posters to Canadian National Railroad requesting them placed in trains enroute through Mesaba Ranger District. Distribute fire prevention codes, maps, bulletins, and etc., in railroad stations along right-of-way enroute through Mesaba.

### 3. Lumbering Fires

- (1) Make risk survey of Mesaba noting locations of any lumbering operations. Are all portable engines properly equipped with spark arresters? Are chimneys of cook shacks, bunk houses, and other buildings in camp properly equipped with spark arresters? Is there an abundance of slash near saw mill? Insist upon the prompt installation of these fire prevention precautions.
- (2) Post fire laws and instructions in places on job where they most likely will be read by crew.
- (3) Train employees, particularly smokers, to sit down while smoking and to be sure cigarette or tobacco ashes are put out when dropped.

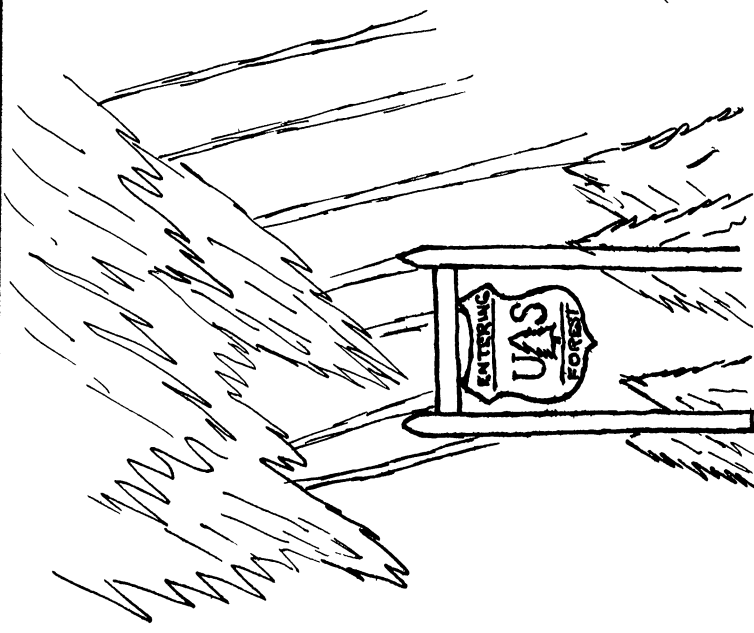
### 4. Campfire

- (1) Register visitor at forest boundaries on roads marked on map (Figure 5). Select C.C.C. men of good personnel qualities to register visitors, explaining and distributing printed fire prevention codes and laws on small inexpensive cards.
- (2) Place fire prevention signs, such as those shown in Figure 6 on locations indicated on map (Figure 5).
- (3) Post fire prevention signs along roads that cross streams and rivers. Post similar signs near lakes and resorts.
- (4) Detail a forest officer to make lecture tour to school in vicinity of Ranger District, stressing fire prevention a few weeks before fire season begins.
- (5) Detail forest service employe to contact visitors at camp grounds and resorts explaining fire prevention.

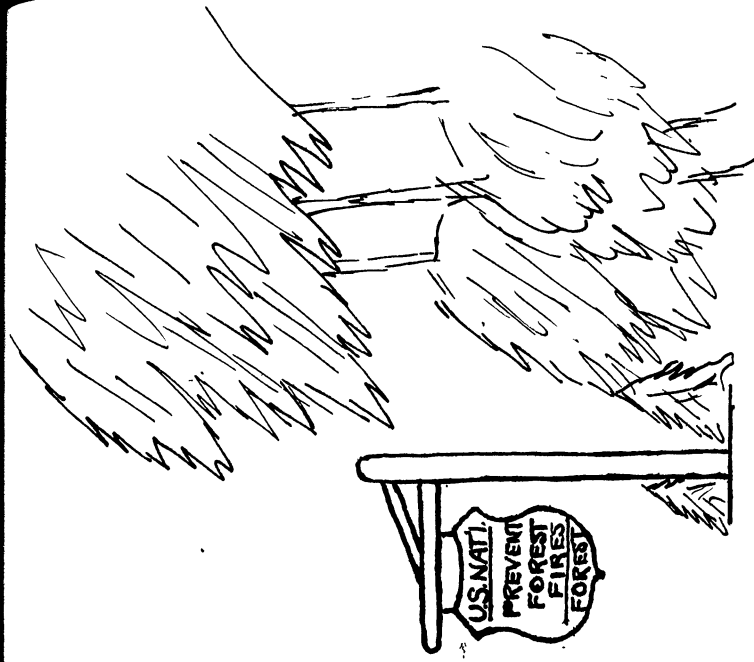


**Figure 5. Recommended Locations for Registration of Visitors during Hazardous Periods. Recommended Locations for Fire Prevention Signs similar to those illustrated in Figure 6.**

- - Recommended location for registration of visitors.
- - Recommended location for Fire Prevention Signs.



ROAD SIDE SIGN  
TWO POSTS



ROAD SIDE SIGN  
ONE POST

FIG. 6 ROAD SIDE SIGNS



- (6) Install fire prevention exhibits at C.C.C. camps, Look-out Towers, Ranger Stations, Gasoline Service Stations and stores on Ranger District.
- (7) Lay out campgrounds on proper locations. Build fire lines around campground and keep free from litter and inflammable material. Have supply of wood on camp ground at all time.
- (8) Designate areas that could be used as secondary camp grounds during hazardous periods.

#### 5. Smoker Fires

- (1) Register visitor at forest boundaries on roads marked on map (Figure 5). Select C.C.C. men of good personnel qualities to register visitors, explaining and distributing printed fire prevention codes and laws on small inexpensive cards.
- (2) Place fire prevention signs, such as those shown in Figure 6 on locations indicated on map (Figure 5).
- (3) Post fire prevention signs along roads that cross streams and rivers. Post similar signs near lakes and resorts.
- (4) Inform press when forest is closed to smoking.
- (5) Distribute cards to visitors at forest boundary informing them that forest is closed to smoking at present, and state penalties for violation.
- (6) Install fire prevention exhibits at C.C.C. camps. Look-out Towers, Ranger Stations. Gasoline Service Stations and stores on Ranger District.
- (7) Detail forest service employe to contact visitors at camp grounds and resorts explaining fire prevention.

## 6. Debris Burning

- (1) Send form letter to settlers in Ranger District informing them of the forest fire laws, tactfully explaining penalties for violation.
- (2) Make risk surveys of area with the purpose in mind of locating stump and brush piles to be burned by settlers. Explain to such settlers the proper method of burning and request that they burn safely at the right time under permit.
- (3) Have fire laws printed in newspapers that are most widely read by settlers.
- (4) Develop opportunities to speak at town hall meetings or social gatherings in rural communities. At these occasions use slides, moving pictures, and exhibits in presenting fire prevention.

## 7. Incendiary Fire

- (1) Enforce law to fullest extent if offender is caught.
- (2) Post fire laws at places they most likely will be read.
- (3) Distribute forest service literature that points out value of forest.

## 8. Miscellaneous Fires

- (1) Publish cards with fire prevention reminders on them, may also have a small calendar attached. Distribute these to settlers and resorters. Information on cards will concern use of matches, operation of gasoline and kerosene stoves, etc.

## Pre-suppression

### 1. Fire Plan

- (1) Hazard Map should be prepared on linen cloth so it can be hung over type map of forest, At present separate map is used for hazard map.
- (2) Indicate on action map, streams and lakes that can be used as a water supply for Pacific Marine Pumps and those that only can be used as a source of water for back pumps.
- (3) Classify district as to small, average, or large amount of rock outcrop; that is, work out definite set of instructions that may be used to classify land as to small, average, or large amount of rock outcrops. Map of this nature should be of importance in determining type of equipment, and number of men to send to fire.

### 2. Fire Detection

- (1) Discovery time has in most cases been above standard discovery time of 15 minutes. Have visibility maps drawn from towers now on area at hour intervals each day. Another tower may be needed in the Messaba fire detection system.
- (2) Train lookouts to report fires in two minutes. Report time for fires in 1935 was 5 minutes in all cases.

## Suppression

Suggest that training school periods be enacted in C.C.C.

camps a few weeks before fire season. During this time enrollees will be taught methods of attack in fire suppression work.

No specific recommendations are made as fire records (Table I and II) for 1934 and 1935 indicate efficient fire fighting.

## APPENDIX

Acres of Cover Types

		Acres
Aspen saplings	Ab .....	134,830
Aspen poles	Ac .....	1,960
Balsam saplings	Bb .....	2,520
Balsam reproduction	Bc .....	640
Mixed hardwood saplings	Mb .....	2,320
Mixed hardwood poles	Mc .....	1,400
Brush (highland)	1-h .....	9,640
Brush (lowland)	1-l .....	21,330
Muskeg	2 .....	4,680
Grassland	0 .....	1,600
Cultivated	C .....	14,000
Birch saplings	3b .....	16,640
Birch poles	3c .....	160
Cedar saplings	4b .....	1,600
Cedar poles	4c .....	960
Jack pine saplings	5b .....	11,000
Jack pine poles	5c .....	2,240
Black spruce saplings	7b .....	22,800
Black spruce poles	7c .....	360
Norway saplings	8b .....	1,200
Norway poles	8c .....	280
		<hr/>
	Total	252,160

Type size - volume criteria

Reproduction - An area supporting seedlings (trees up to 6' in height) averaging 200 or more per acre. A lower stocking than this was classed as a non-timber type.

Saplings - An area supporting saplings (trees between 6' high and less than 4.6" DBH) averaging 150 or more per acre or an average spacing of 17 x 17 feet. A lower stocking of saplings than this was classed as a reproduction or non-timber type.

Poles - An area supporting poles (trees between 4.6" and 9.5" DBH averaging not less than 100 stems 6" to 7.6" for J. P. & Asp.) DBH per acre or ten poles per chain. The exceptions in this class are jack pine, spruce, and balsam types where a minimum of five cords per acre was the criterion, if less than 100 trees would produce this volume. A lower stocking than this was classed as saplings, reproduction, or a non-timber type.

Saw logs - An area supporting trees over 9.5" DBH (7.5" DBH for J. P. & Asp.) averaging not less than 3,000 board feet per acre (five 10" trees 60' high or their equivalent per chain).

Fire Record Map Symbols

Each fire is indicated on map by a small circle of colored ink---brown for Class A; violet for Class B; red for Class C. A figure is placed within the circle to indicate year of fire, last two figures of the numeral representing the year are used, thus, 30 for 1930, 31 for 1931, and so on. The cause of fire is indicated by a letter within the circle. Legend used is as follows:

R - Railroad	D - Debris (burning)
S - Smokers	L - Lumbering
I - Incendiary	M - Miscellaneous
C - Campfire	X - Lightning

## Methods of Attack - Suppression

### 1. Direct Method

The Direct Method is a spade method and consists of scraping in, shoveling in, or digging out and throwing in the burning edge of the fire. In other words, the fire line in this case is the same as the natural edge of fire. It is composed of stretches of front which either have gone out naturally, been extinguished, or from which all smouldering material has been dug out and thrown on burned-over ground.

### 2. Two-Foot Method

The Two-Foot Method is a substitute for the Direct Method where hazel hoes or mattocks are used in constructing a line not over two feet from the burning edge so as to leave a little material as possible for smouldering. If fire persists without burning to line, it becomes a part of the method either to shovel all intervening litter or duff onto the burned area or to dig out smouldering spots as in Direct Method. This possible additional work must always be taken into account in selecting and applying this system.

### 3. Parallel Method

The Parallel Method consists of constructing a continuous trail from 6 to 50 feet in advance of the fire and immediately burning out the intervening strip. Where it is only a matter of five or ten minutes, the main fire may sometimes be allowed to burn to the edge of the line. Even in these cases it is usually better to backfire.

### 4. Indirect Method

The Indirect Method consists of completing a

continuous line at a considerable distance in advance of the fire, usually taking advantage of favorable topography, and then backfiring. Backfiring, however, cannot follow close on heels of construction crew and usually must be delayed until line across entire side of fire is completed.



INSTRUCTIONS TO LOOKOUTS  
FOR  
MESABA DISTRICT

The lookout observer is the eye of the entire fire suppression organization. His duty is to keep that organization informed with respect to the occurrence and subsequent progress of fires that occur within his radius of visibility. The suppression forces are practically helpless every minute he is off the job. Therefore if the occasion demands it, he should expect to be on the watch from daylight till dark.

LEARN YOUR TERRITORY

It is essential that you familiarize yourself with the names of streams, lakes, farms, prominent points etc. and identify them on the map. If they are not shown plot them, and add other landmarks, such as patches of second growth Jack Pine, prominent knobs or hills and any other distinguishable features which may be of assistance in determining the location of fires which may be near them. For your own sake mark as "Fake" any smokes which result from industrial activities. Such smoke occurs south of the Mesaba Range, the crest of which marks the South Boundary of the District in a general way. Saw mills are also "Fake" smokes.

GENERAL INSTRUCTIONS

There is no one time of the day when fires are most apt to occur or be detected. THE LOOKOUT MUST BE ON THE JOB MORNING, NOON AND NIGHT.

His duty is to detect fires while they are small. Small fires and those cut off by intervening topography can frequently be detected only by a puff of smoke occurring only occasionally.

Due to the heavy use and travel within the boundaries of the Mesaba District, there is a proportionally a severe hazard from man-caused fires. KEEP YOUR EYES PEELED AT ALL TIMES.

While lightning is not frequent, an electrical storm must be carefully watched and the points where lightning strikes must be noted. A "strike" may smoulder for weeks before smoke can be detected.

REPORTS

The main aims of the Lookout's report are to:

1. Show and furnish data for determining a precise platted location of fire.

2. Give all additional information which will aid in judging the number of men and type of equipment needed.
3. Furnish all information which will help the fire fighters to find the fire. As it is important that this report be accurate and concise, and contain all essential facts, the report form should be used. Always fill out the form as completely as possible and READ IT OFF over the phone. This results in boiling down all essential data without forgetting any of it.

Those whom it will be necessary to notify are the dispatcher and Ranger. If you cannot get either one, try to communicate with the nearest camp. A shorted line does not always mean a completely "dead" line. In such cases Sturgeon Tower should call Luna Lake Camp, Birch Knob Tower will call Headquarters and Pike Mountain Tower should call the Rice Lake Camp.

The whole aim is to get results. This means an adequate number of men to be landed on the fire with the least possible loss of time. Intelligent use of the information called for on the "Lookout Fire Report" form will in the majority of cases result not only in more competent action being initiated but also in the actual saving of minutes, hours, or even days. In short, the suppression of fires depends on SPEED and ACCURACY OF REPORTS from an efficient lookout man.

#### POST OF DUTY

The lookout observers job is to locate fire and to report the progress of going fires as long as there is need for his service. He will be expected to report at the specified time usually at 8 A.M. and remain at his post of duty throughout the usual hours. At no time will he leave that post of duty unless permission is secured from the dispatcher.

#### PROPERTY

The lookout will be charged with the equipment necessary for the performance of his duties. He is responsible for its care and if broken, the property will be immediately be replaced. However, the unserviceable must be returned to the Ranger before relief can be secured. A lock will be provided for safe keeping of equipment left in the tower over night.

#### DIARY

Each lookout is required to keep a diary which is simply a chronological record of occurrences, official conversations and observations which gives the reader a picture of the lookouts duties. A sample is attached in the appendix.

EXTRA JOBS

On rainy days you will perform the jobs given to you in the order of listed priority.

The public frequently visits our towers. See to it that:

1. The premises are kept neat and orderly at all times.
2. The cab windows will be washed every two weeks and oftener if necessary.
3. The cab floor will be swept once a day and scrubbed every two weeks.
4. Allow no marking or writing on any part of the tower structure by your friends or visitors. Any such markings will be removed.
5. Dress neatly and be shaved. Personal appearances are valuable from a public relations standpoint.
6. Be courteous and instructive to all visitors.

SPECIFIED INSTRUCTIONS1. How to Orient your Board

- (a) Place your alidade on the pivot and the sighting edge of the alidade on zero of the radial circle.
- (b) Now move the map until the sight through the alidade bisects the mark on the cab, which is north.
- (c) Check the readings to other reference points and your map is oriented.

2. How to locate a Fire and Make Report

- (a) If your board is oriented, (it should be oriented at all times when on duty), simply revolve the alidade on the pivot until the sighting slot, the tight horse hair and the center of the smoke nearest to the base are in line. Guess the miles to the smoke and read the degree on which the edge of the alidade falls. Try to locate the fire by Township, Range, Section and forty. Record on Fire Report Form the location, whether base is or is not sighted, character of the smoke and its drift. Then call the dispatcher at Headquarters and READ the report thus, "Radial 240; distance  $5\frac{1}{4}$  miles, guessed location, Township 59-N, R-19-W, Section 5, Southwest Quarter of the Northwest Quarter. Base of smoke not sighted; heavy black smoke drifting east."

The dispatcher upon receiving your report, just illustrated, probably interpret is thus: "Since the base was not sighted the fire is to the west of the smoke seen and probably the fire is crowning in a spruce swamp (Black Smoke). "I had better send 50 men." If the lookout's report had been a thin white smoke, the dispatcher would probably have interpreted it as a ground fire in brush, aspen or birch timber and would have sent only 20 men instead of 50. Such is the value of a lookout's report. Writing first the essential data and reading it over the phone to the dispatcher insures that nothing immediately important is forgotten.

LOOKOUT FIRE REPORT

SUPERIOR National Forest \_\_\_\_\_ Lookout

1. Report Number: \_\_\_\_\_ Date \_\_\_\_\_ 193 \_\_\_\_\_

2. Smoke discovered: \_\_\_\_\_ AM:PM - Reported \_\_\_\_\_ AM:PM

3. Reported to \_\_\_\_\_ at \_\_\_\_\_  
(name) (place)

and \_\_\_\_\_ at \_\_\_\_\_

4. Approximate location of fire:  
(a) bearing \_\_\_\_\_ (alidate or compass)

(b) \_\_\_\_\_ Sec. \_\_\_\_\_, T. \_\_\_\_\_ R. \_\_\_\_\_ M

(c) By topographic features: \_\_\_\_\_

5. Size and progress of fire at time of discovery: \_\_\_\_\_

6. Remarks: \_\_\_\_\_  
(include here additional information on progress  
of fire after first seen and reported.)

\_\_\_\_\_  
(Lookout Observer)

---TO BE FILLED IN BY SUPERVISOR, OR BY LOOKOUT FROM INFORMATION  
SECURED FROM RANGERS OR SUPERVISOR---

7. Name of fire: \_\_\_\_\_ Forest Number \_\_\_\_\_

8. Correct location of fire: (a) bearing \_\_\_\_\_ Alidate or compass)

(b) \_\_\_\_\_ Section. \_\_\_\_\_, T. \_\_\_\_\_  
; R. \_\_\_\_\_ M

9. Was this a false alarm? If not, what class of fire developed, that is,  
A, B, C, etc.? \_\_\_\_\_

\_\_\_\_\_  
(Name)

EXPLANATION OF THE LOOKOUT FIRE REPORTFORM F-5CAPTIONS NUMBER:

## 3. Approximate Location of Fire

- (a) Give radial reading and strike out compass if the shot was taken with the alidade. Be accurate and sight on the center of the base of the smoke.
- (b) Example: "Halfway up the south slope of the Mesaba Range or "near west shore of Dark Lake." Always include whether base of smoke was or was not sighted. Remember that locating a fire from a lookout tower is much easier than finding it on the ground.

## 4. Size and Progress of Fire at Time of Discovery

- (a) Show volume of smoke as "small, medium or large."
- (b) Character as "thin, heavy, billowy, drift smoke or blanket smoke."
- (c) Color: As white, yellow, black.

This indicates not only the size and intensity of the fire, but also the material in which it is burning. It is basic data in determining the number of men and the type of equipment needed.

(d) Size: Estimate the size in acres. In most cases an estimate can be obtained by the tangents of the fire.

EXAMPLE: Assume that the fire is 10 miles away and that the radial reading on the right extremity is 180 and on the left 179 degrees 30' (each degree is divided into 60 minutes). The tangent for 1 minute per mile is  $1\frac{1}{2}$  feet. The tangent for 1 minute per 10 miles,  $10 \times 1\frac{1}{2}$  or 15 feet. The tangent for 30 minutes is  $30 \times 10 \times 1\frac{1}{2}$  or 450 feet.

In other words, the actual width of the fire from your view is 450 feet. Similar sights taken from two lookouts furnish a fair map of the fire. When not the base, but only the column of smoke is visible, this computation will give a fair estimate. In order to become proficient in sizing up fires, it would be well if the lookout in the absence of other information inquire about the progress of the fire at different stages.

6. REMARKS

Include here such observations:

"Fire began spreading at 2 P.M. Crowned at 3:10 P.M. Quieted down at 6:30 P.M. It spread about 1,300 feet this P.M. Wind from South West.

### LIGHTNING STORM REPORT

Record the data called for each lightning storm. Print any written information. At the end of the season this report will be turned in to the dispatcher.

Form 1100  
Rev. Mar., 1929

## LIGHTNING STORM REPORT

UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE

(Year)	(Months)			(National Forest)			(Lookout station name)	(Location—Sec., Twp., Range)				(Observer)			
Date	State hour, direction, and distance from you			Storm passed by to the N, S, E, W, or overhead? If not overhead state direction and distance from you to the nearest edge of storm cloud when it was nearest to you	Total number of flashes (both cloud-to-cloud and cloud-to-ground)	Of all the flashes, what per cent was confined to the clouds and did not reach the ground?	For some specific topographic point over which the storm passes when nearest to you, record—				Did the part of the storm which you saw start any fires? Answer "yes" or "no" for each storm. If answer is "yes," state also, for each of the first four fires, the date and hour when each fire was seen from your lookout, and the section, township, and range location of each.				
	When storm was first seen		When storm was last seen				Hour and minute when rain began to fall on that point	Hour and minute when lightning began to flash over that point	Hour and minute when lightning stopped flashing over that point	Hour and minute when rain ended on that point		"Dry," "damp," or "wet," (see explanation below)			
	Hour	Direction	Distance										Hour	Direction	Distance
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

### EXPLANATION

Column No.:

- Record the month and day when the storm was first seen.
- Record the cardinal direction according to the eight principal points of the compass.
- Record the total number of flashes ONLY when a dependable count has been obtained. In many cases a dependable count will be impossible.
- Report your best estimate even if a dependable count was not made. If you do not feel at all sure of your estimate record "Unknown."

# LIGHTNING STORM REPORT-CONTINUED

Date	State hour, direction, and distance from you						Storm passed by to the N, S, E, W, or overhead? If not overhead state direction and distance from you to the nearest edge of storm cloud when it was nearest to you	Total number of flashes (both cloud-to-cloud and cloud-to-ground)	Of all the flashes, what per cent was confined to the clouds and did not reach the ground?	For some specific topographic point over which the storm passes when nearest to you, record—					Did the part of the storm which you saw start any fires? Answer "yes" or "no" for each storm. If answer is "yes," state also, for each of the first four fires, the date and hour when each fire was seen from your lookout, and the section, township, and range location of each.
	When storm was first seen			When storm was last seen						Hour and minute when rain began to fall on that point	Hour and minute when lightning began to flash over that point	Hour and minute when lightning stopped flashing over that point	Hour and minute when rain ended on that point	"Dry," "damp," or "wet," (see explanation below)	
	Hour	Direction	Distance	Hour	Direction	Distance									
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

## EXPLANATION-CONTINUED

- Column No.:
15. Report "Dry" if no rain reached the ground UNDER THIS STORM CLOUD; report "Damp" if only a sprinkle reached the ground; and "Wet" if the rain was sufficient to hinder the spread of fire for several hours. If storm passes overhead and you have a rain gauge, record the actual amount of precipitation from this storm.
16. Be sure and state whether the part of the storm which you saw did, or did not, start forest fires.
- GENERAL CAUTIONS.—Report only those storms in which one or more flashes of lightning were actually seen or heard. If you saw no lightning, but did hear thunder, record "Thunder Only" in columns 9 and 10, and record "Unknown" in columns 12 and 13.
- U. S. GOVERNMENT PRINTING OFFICE: 1929 8-5234



HOW TO WRITE YOUR DIARY

(Example) Use form 874-2B

Date: Sunday-----7/1 1935  
 Mileage Etc.-----Do not Use  
 Expense-----Do Not Use

ACTIVITY CHARGES BY PROJECTS:

The lookouts time while engaged in fire detection is charged against Activity #39 Presuppression. When engaged in other activities such as maintenance, construction or other work on off days, the activity benefitting will be charged.

BODY OF THE DIARY: PRINT, DON'T WRITE LONGHAND

Hour

8:00 A.M. : On tower, called dispatcher. Line O.K.  
 : Checked orientation of map board.  
 : Weather cloudy and cool with a breeze  
 : blowing from the southwest.  
 ;  
 9:40 A.M. : "State Fire" south of boundary beginning  
 : to smoke up a little.  
 ;  
 9:55 A.M. : Spotted a smoke on radial 115 about 9 miles.  
 : Reported it to dispatcher at Ranger Head-  
 : quarters.  
 ;  
 9:57 A.M. : He informed me that a permit was in effect  
 : but to watch it.  
 ;  
 10:25 A.M. : Two tourists visited tower. Showed them how  
 : we spotted fires and explained out lookout  
 : system.  
 ;  
 11:30 A.M. : Clouds are breaking. Beginning to get hazy.  
 : Wind picking up. Check looked, no smoke.  
 ;  
 12:00 Noon : Got permission to leave tower.  
 ;  
 12:10 :P.M. : Returned to tower and reported.  
 ;  
 2:30 P.M. : Smoke seen this A.M. showed up, called  
 : dispatcher. He said the permit was not in  
 : effect now.  
 ;  
 2:35 P.M. : Dispatcher called and gave me the number and  
 : name of this fire. Reported on Form F-5.  
 ;  
 4:00 P.M. : Made regular contact call to dispatcher.  
 : Visibility 10 miles.

6:00 P.M. : Made final report and quit work.

Since all the time was spent on fire detection the charge is #39-----10 hours.

This record of the days events should be written throughout the day, and should be in any event up to date each night.





Fire Truck, 1½-Ton, loaded with (15-man outfit)

- 100-300 gallons water (optional as regards method of carrying)
- 1 - thresher pump and suction hose
- 4 - 8 backpack pumps
- 5 - gallons gasoline, in can
- 2 - 4 pack-sacks (optional)
- 3 - 6 axes, DB
- 2 - Stones, carborundum
- 2 - Saws, cross-cut, 2-man
- 1 - axe, SB (optional)
- 2 - 8 mattocks or Pulaski tools
- 6 - 12 shovels, LHRP or SHRP
- 1 - Grinder, tool
- 6 - Buckets, water
- 2 - 4 cans milk, 10-gallon
- 2 - torches, back-firing
- 1 - gallon kerosene, in can
- 2 - lanterns, electric
- 3 - bags, water, 5-gal. man-pack
- 1 - spanner wrench
- 5 - headlights, flashlights
- blankets (optional)
- tarpeaulins, 14x16 (optional)
- 6-man mess outfit (optional)
- non-perishable food for 10 men for 2 meals (optional)
- 1 - portable telephone
- 1 - chain, log, 16'
- 1 - Panama pump and suction hose
- 600' - discharge hose, 1" rubber lined
- 2 - quarts of oil
- well point outfit, complete (optional)
- 1 - siren
- 1 - rear spot-light
- 2 - nozzles, one ¼" and one 1/8"
- 1 - tractor plow outfit, mounted on truck, minimum 20 H.P. for sand plains country, and minimum 25 H.P. for other types.
- 2 - water units in the form of small tanks or oil drums filled with water will be maintained on racks for convenient loading on to a truck, as needed.

# FIRE PLAN ORGANIZATION CHART

SUPERIOR

National Forest

MESABA

Ranger District

Year 1935

CHARLES A. GREGORY, RANGER

in Charge

REGULAR PROTECTIVE ORGANIZATION Classified as Rangers, Guards, and Lookouts			
NAME	Classification	Location	Phone No. or other means of Communication
C. A. GREGORY	RANGER	T-60-N, R-L8-W SECTION 27	L60-F-2
C. V. RAUPACH	ASS'T RANGER	" " "	" "
BIRCH KNOB LOOKOUT TOWER	LOOKOUT	T-60-N, R-L8-W SECTION 17	L60-F3L
PIKE MOUNTAIN LOOKOUT TOWER	LOOKOUT	T-59-N, R-L7-W SECTION 25	L60-F18
STURGEON LAKE LOOKOUT TOWER	LOOKOUT	T-60-N, R-20-W SECTION 16	L60-F22
WYNNIE LAKE LOOKOUT TOWER	LOOKOUT	T-59-N, R-L8-W SECTION 25	LONG DISTANCE M.S.F.S. TOWER
ART MORREL	CAMP SUP'T		
U. M. MARTTILA	CAMP SUP'T		
C. H. JOHNSON	D SPATCHER		

SPECIAL MEN Cooks, Packers, Timekeepers				
Classification	Occupation (farmer, etc.)	NAME	Rate per Hour	Location, Phone No., or Address
PUMPMAN	CCC	DICKINSON	CCC	L60-F-3
TRACTOR AND PLOWMAN	VCC	7 AVAILABLE	VCC	L60-F-4

EQUIPMENT—GOVERNMENT			
Location	Fire-Fighting Tools Number of Men Supplied	Mess Equip. (No. Men)	Beds (Number)
(ORGANIZED CACHES IN LO MAN UNITS)			
CAMP F-25	M 50 MEN		
CAMP F-30	MM 50 MEN		
SAND LAKE RANGER STATION	MM 10 MAN	NONE	
T-60N, R-20W S-20	2 TRACTORS 25 H.P		
PHONE L60-F4	2 PLOWS		
T-60N, R-L8 S 27	MOTOR PUMP 600' HOSE		
(ADDITIONAL WORK EQUIPMENT)			
CAMP F-25	100 MAN		
CAMP F-30	125 MAN		
M-2 CACHES ON FIRE TRUCK, MM 2 CACHES			
READY FOR LOADING			

KEY MEN Responsible, personally-instructed cooperators who can be depended upon to take initial action on fires, mobilizing, and outfitting crews, if necessary				
NAME	Occupation (farmer, etc.)	Rate per Hour	Map Symbol and Location	Phone No. or other means of Communication
William Biss	grocer	.30	Lot 1, sec. 28, T. 60N., R. 18W.	
Arthur Johnson	farmer	.30	NWNW Sec. 21, T. 60N., R. 18W.	
Charles Koski	grocer	.30	SWSW Sec. 9, T. 61N., R. 18W.	
Wilho Korpi	farmer	.30	SWSE Sec. 17, T. 60N., R. 20W.	
Toivo Saari	farmer	.30	NWNW Sec. 11, T. 59N., R. 19W.	

LABORERS				
Numbers	Location, Town, Ranch, Mill, Mine, etc.	Rate per Hour	Location, Phone No., or Address	
2LO	CAMP F-30 (CCC) T-60-N, R-L7-W-S-30	CCC	L60-F-3	
180	CAMP F-25 T-60-N, R-20-W-S-20	VCC	L60-F-4	
20	SAND LAKE RANGER STA. DUTY 12 NOON TO 6:PM		L60-F-2	

FOOD SUPPLY		
Name of Firm With Whom Ration List is Posted	Address and Phone No.	Number of Man-Day Rations
FOOD FURNISHED BY ARMY FOR CCC AND VCC ONLY		
NOTIFY ARMY MESS OFFICER OF EACH CAMP		
THE AMOUNT OF LUNCHES REQUIRED AS SOON AS POSSIBLE. ORGANIZE FIRE FIGHTING		
SHIFTS SO THAT MEALS CAN BE TAKEN AT CAMP WHERE POSSIBLE.		

COOPERATORS List those who cooperate in detecting fires and who can be depended upon for individual action in limited zones				
NAME	Occupation	Rate per Hour	Map Symbol and Location	Phone No. or other means of Communication
<del>TO BE CONTACTED BY PHONE</del>				
John Keranen	farmer	.20	NENE Sec. 22, T. 61N., R. 20W.	
Jacob Mattson	farmer	.20	NENE Sec. 19, T. 61N., R. 20W.	
Melvin Ketola	farmer	.20	NENE Sec. 3, T. 60N., R. 19W.	
Peter Petroskey	farmer	.20	NWNW Sec. 8, T. 60N., R. 19W.	
John Lake	farmer	.20	NENE Sec. 5, T. 59N., R. 16W.	

TRANSPORTATION—GOVERNMENT Automobiles (M), Motor Trucks (MT), Teams and Wagons (T & W), Motor Boats (MB), Pack Animals (PA), Saddle Horses (SH), Canoes (C)			
Kind	Number	Location and Phone No.	
M T	10	T-60-N, R-L7-W, SEC 30	L60F-3
PICKUPS	2	" " " " " "	" "
M T	10	T-60-N, R-20-W, SEC 20	L60F-4
PICKUPS	2	" " " " " "	" "
PICKUPS	2	SAND LAKE RANGER STA.	L60-F2

LAW ENFORCEMENT		
Justice of Peace	Address	Phone Nos.
O. C. CROSBY	BUHL, MINNESOTA	L55
JUDGE HOLMES	HIBBING, MINNESOTA	393
County Attorney	DULUTH, MINNESOTA	
U. S. Commissioner	DULUTH, MINNESOTA	
District Attorney		
C. JOHNSON	HIBBING, MINNESOTA	
Ass't District Attorney		

CREW FOREMEN Names of qualified men. Repeat names in preceding caption if any are suitable				
NAME	Occupation	Rate per Hour	Location	Phone No. or other means of Communication
L. A. J. MORREL	U. S. F. S.		LUNA LAKE CAMP	L60F-4
2. C. E. TOOR	U. S. F. S.		" "	" "
L. U. M. MARTTILA	U. S. F. S.		CAMP F-30	L60F-3
P. C. ERICKSON	U. S. F. S.		CAMP F-30	" "

TRANSPORTATION—PRIVATE				
Owner's Name	Kind	Number	Location, Phone No., or Address	Agreed Price per Day or per Mile
M. A. Murphy	truck	2 ton	Virginia, Minn.	
P. A. Boyle	truck	1 1/2 ton	Virginia, Minn	
J. Kovaniemi	ruck	1 ton	Mt. Iron, Minn	
J. A. Olson	truck	1 1/2 ton	Chisholm, Minn	

PRINCIPAL POINTS—DISTANCES BETWEEN			
From—	To—	Miles	Road or Trail
HEADQUARTERS	CAMP F-30	5 -68-	53
"	CAMP F-25	L6-	#65
"	BIRCH KNOB LOOKOUT	3-	#53
"	CAMP F-24	L--	#53
"	CAMP F-29	7-	#53

<sup>1</sup> Rancher, miner, farmer, etc.  
<sup>2</sup> Insert here symbol used on coop. map, indicating number of individual cooperator; give location by Sec., Twp., and Range, or otherwise.

R.21W.

R.20W.

R.19W.

R.18W.

R.17W.

R.16W.

T.61N.

T.61N.

T.60N.

T.60N.

T.59N.

T.59N.

T.58N.

T.58N.

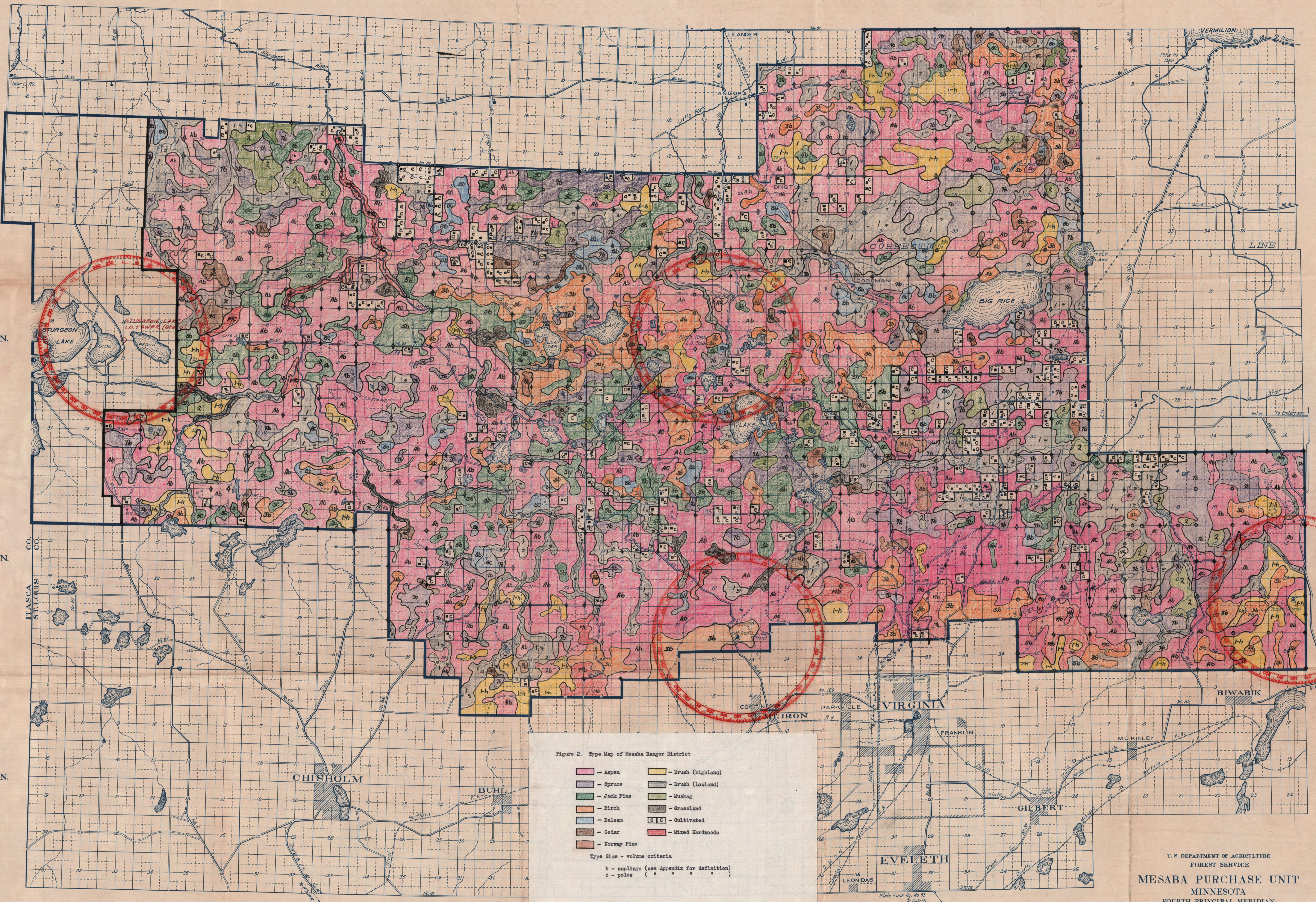


Figure 2. Type Map of Mesaba Ranger District

- Aspen
- Spruce
- Jack Pine
- Birch
- Balsam
- Cedar
- Norway Pine
- Brush (highland)
- Brush (lowland)
- Muskog
- Grassland
- Cultivated
- Mixed Hardwoods

Type Size - volume criteria  
 b - saplings (see Appendix for definition)  
 c - poles ( " " " " )

U. S. DEPARTMENT OF AGRICULTURE  
 FOREST SERVICE  
**MESABA PURCHASE UNIT**  
 MINNESOTA  
 FOURTH PRINCIPAL MERIDIAN  
 1934

SCALE  
 1 1/2 2 MILES

- LEGEND
- BOUNDARY OF UNIT
  - ROAD, FIRST CLASS
  - ROAD, FAIR OR GOOD
  - ROAD, MINOR OR VERY POOR
  - RAILROAD
  - ABANDONED R. R. GRADE
  - TELEPHONE LINE
  - ELECTRIC POWER TRANSMISSION LINE
  - RANGER STATION
  - PERMANENT LOOKOUT STATION
  - SCHOOL HOUSE

R.21W.

R.20W.

R.19W.

R.18W.

R.17W.

R.16W.

T.61N.

T.60N.

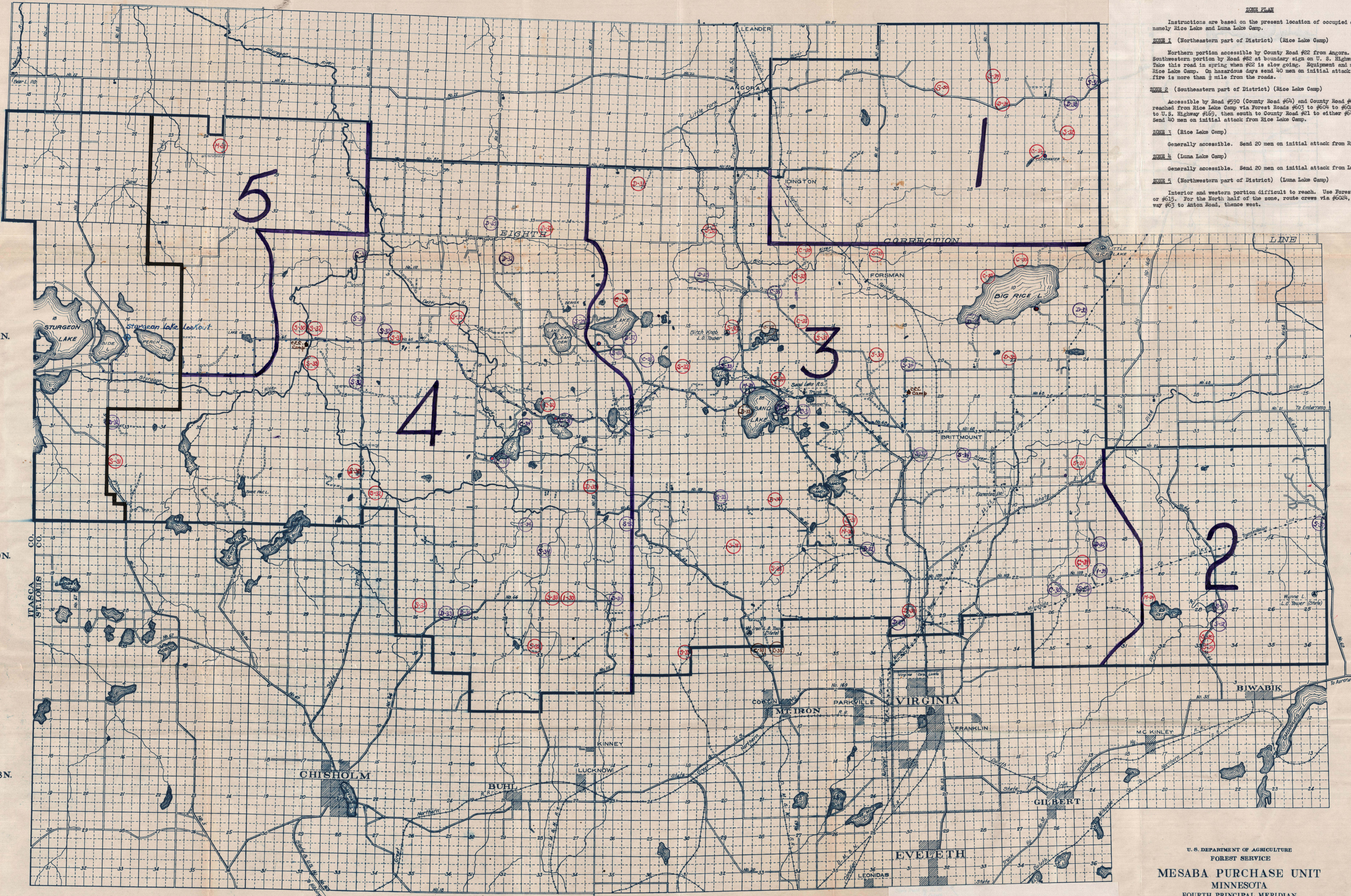
T.59N.

T.58N.

T.60N.

T.59N.

T.58N.



**ZONE PLAN**

Instructions are based on the present location of occupied camps, namely Rice Lake and Luna Lake Camp.

**ZONE 1** (Northeastern part of District) (Rice Lake Camp)  
Northern portion accessible by County Road #22 from Angora. The Southern portion accessible by County Road #22 from Angora. The Southern portion by Road #22 at boundary sign on U. S. Highway #53. Take this road in spring when #22 is slow going. Equipment and men from Rice Lake Camp. On hazardous days send 40 men on initial attack if the fire is more than 1/2 mile from the roads.

**ZONE 2** (Southeastern part of District) (Rice Lake Camp)  
Accessible by Road #590 (County Road #64) and County Road #69 both reached from Rice Lake Camp via Forest Roads #603 to #604 to #602 to #601 to U. S. Highway #169, then south to County Road #21 to either #64 or #69. Send 40 men on initial attack from Rice Lake Camp.

**ZONE 3** (Rice Lake Camp)  
Generally accessible. Send 20 men on initial attack from Rice Lake Camp.

**ZONE 4** (Luna Lake Camp)  
Generally accessible. Send 20 men on initial attack from Luna Lake Camp.

**ZONE 5** (Northwestern part of District) (Luna Lake Camp)  
Interior and western portion difficult to reach. Use Forest Roads #616 or #615. For the North half of the zone, route crews via #602, State Highway #65 to Anton Road, thence west.

Figure 4. Fire Record, Action, and Zone Map.  
Fire Record Map - See Appendix for symbols.  
Action Map - Symbols in right-hand corner of map.  
Zone Plan - See upper right-hand corner.

U. S. DEPARTMENT OF AGRICULTURE  
FOREST SERVICE  
**MESABA PURCHASE UNIT**  
MINNESOTA  
FOURTH PRINCIPAL MERIDIAN  
1934

SCALE 1" = 2 MILES

- LEGEND**
- BOUNDARY OF UNIT
  - ROAD, FIRST CLASS
  - ROAD, FAIR OR GOOD
  - ROAD, MODERATE OR VERY POOR
  - RAILROAD
  - ABANDONED R. R. GRADE
  - TELEPHONE LINE
  - ELECTRIC POWER TRANSMISSION LINE
  - RANGER STATION
  - FOREMAN'S LAYOUT STATION
  - SCHOOL HOUSE
  - FIRE CACHE
  - C.C.C. CAMP



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