PUBLIC DOCUMENTS

OF THE

STATE OF MAINE

BEING THE

REPORTS

OF THE VARIOUS

PUBLIC OFFICERS
DEPARTMENTS AND
INSTITUTIONS

FOR THE TWO YEARS

JULY 1, 1930 - JUNE 30, 1932

STATE OF MAINE

NINETEENTH

BIENNIAL REPORT

OF THE

FOREST COMMISSIONER

1931 - 1932

STATE OF MAINE

December 27, 1932.

To His Excellency, Wm. Tudor Gardiner, Governor of Maine:

I have the honor to submit herewith my biennial report for the years 1931-1932.

NEIL L. VIOLETTE,

Forest Commissioner

CONTENTS

PERSONNEL

NEIL L. VIOLETTE, *Forest Commissioner*
Augusta, Maine

HENRY B. PEIRSON, *State Entomologist*
Augusta, Maine

ROBLEY W. NASH, *Assistant Entomologist*
Augusta, Maine

Field Entomologists
AUBURN E. BROWER, Bar Harbor
ARTHUR M. GILLESPIE, Bar Harbor

WALTER O. FROST, *Blister Rust Agent*
Augusta, Maine

District Blister Rust Agents
HARRINGTON G. BRADBURY, Belfast
DANIEL S. CURTIS, North Bridgton
GUY H. KIMBALL, Auburn
JOHN McG. WHITE, Waterville

District Supervisors
GEORGE A. FAULKNER, Winter Harbor
GEORGE H. GRUHN, Seboomook
ROBERT G. STUBBS, Hallowell
HARRY G. TINGLEY, Island Falls

Town Supervisor
AUSTIN H. WILKINS, Augusta

Bookkeeper
LILLIAN J. COLEMAN, Augusta

Stenographers
BLANCHE L. VIOLETTE, Augusta
NELLIE CHAISSON, Augusta

APPROPRIATIONS AND ACTIVITIES AS AUTHORIZED BY THE 1931 LEGISLATURE

Administration of Public Lands **$500.00**

The appropriation of $500.00 annually for the Administration of Public Lands is used to run, retrace and maintain the lines of school lots in 55 plantations, which lands are held in trust by the State through this Department for these plantations until they are organized as towns. There are about 50,000 acres of such lands.

Control of White Pine Blister Rust **$6,250.00**

White pine blister rust contol work is conducted on a cooperative agreement between the State and the United State Department of Agriculture, cooperating with towns and white pine owners.

The State appropriation of $6,250.00 is expended for the travelling expenses of the Federal paid agent in charge, the salaries of several summer employed men who perform educational, scouting and supervisory work among the cooperating towns and pine owners, for the cooperation on a fifty percent basis with towns raising funds for control work, and for general office and field equipment necessary for the work.

Previous to 1930, town appropriations were used for the hire of one man per town to assist the pine owner's labor in the removal of the ribes plants, the State furnishing men for the advance scouting and the supervision. This policy was successful in that over eleven thousand pine owners, plus their hired laborers, received a rough working knowledge of blister rust control. However, many pine owners were dissatisfied, many objecting to this method since they were not always in a position to give their personal service or to hire labor during the control season, which is from early May to the middle of September. Other reasons why they wanted a change were that

more thorough work would be done by a full sized crew hired for the season, and that all pine lands would be worked irrespective of ownership, which was not always the case when the owner had to furnish the labor. The pine owners realized the necessity of protecting the future white pine crop from blister rust, they wanted it done, and were willing that the towns raise funds for it, but to use a full sized eradication crew for the work, a crew whose personnel would not change with each pine lot worked. Hence, a change in the working policy was made, effective in 1931.

As blister rust control work is now conducted the State adds fifty percent to the town appropriations, the combined funds being spent for eradication crews consisting of four to six men. As fewer temporary State agents are required under this method, State funds for matching town appropriations on a fifty percent basis became available by reducing the number of agents employed in the field and applying this reduction cost to the matching of town funds. This policy has been followed the past two years, and has been very successful.

During 1932 blister rust control work helped solve the unemployment situation in nine cities and towns, sixty-six men being employed approximately fourteen thousand hours, at a cost of $4,045.24, with beneficial results to all parties concerned. The scale of wages averaged around thirty cents per hour, some towns making cash payments while others paid only a portion in cash and held out the balance for future payments in the form of groceries, clothing, fuel, etc. The towns financed the work, and upon its conclusion, the State reimbursed the towns in the amount agreed upon. Undoubtedly more of this "welfare" work will be done in the future now that it has been tried out and found effective by town officials and taxpayers.

In 1931 blister rust control work was conducted in seventy towns and cities in eleven counties. Fifty towns and cities appropriated $8,449.00, and thirty-one individual pine owners and two village improvement societies expended $2,248.63.

Early in 1932 twenty-four towns and cities appropriated $4,200.00. Later in the season ten additional towns and

cities raised $3,696.41 (chiefly "welfare" funds to be expended on the unemployed). Eleven individual pine owners added $984.93 to town appropriations, and forty-two pine owners paid all the costs of control work amounting to $2,863.29. The work was conducted in fifty-six towns in thirteen counties.

The Federal Government allots to Maine for this work $21,250.00 yearly. This sum is handled through the Washington office for the salary of the State agent in charge, the salaries and expenses of four permanent district agents, whose activities are conducted in the white pine areas of the southern half of the State, and for about eight summer employed men who perform educational, scouting, and supervisory work among cooperating towns and pine owners.

During the past two years an average of 100,000 acres of white pine bearing lands were given control measures by the removal of approximately 1,000,000 wild and cultivated ribes plants (currant and gooseberry plants) by all cooperating parties.

Hence, for the $6,250.00 of State funds, there is expended over $32,000.00 of Federal, town, and pine owners funds.

State Forest Nursery **$1,000.00**

For the past nineteen years, the State has made an appropriation of $1,000.00 annually towards the maintenance of a forest nursery at the University of Maine. This nursery, covering $1\frac{1}{2}$ acres, serves as a laboratory and demonstration area for the students in the School of Forestry. The trees raised in this nursery are distributed to farmers at cost price. The money from this appropriation is used to hire a caretaker in the summer and for the purchase of seed and plants. This nursery is partially self-sustaining, for the reason that the proceeds from the sale of plants is returned to the State.

Purchase of Land and General Forestry Purposes **$10,000.00**

This appropriation plus revenues is being used for two purposes, viz:

1. Entomology. The duties of the State Entomologist are "to answer calls for information on insect control and

identification, to supervise necessary control work not already provided for by law, and to assist other departments in work along this line". This work is carried on by using about $7,000.00 a year from the appropriation for the salary and expenses of the State Entomologist and his assistant. During the past season approximately 3,000 calls were answered.

By utilizing the Maine Forest Service fire protective force, the State is gradually building up a very efficient insect protective organization at no additional cost to the State. The wardens, patrolmen, and lookout men are instructed as to the nature of the more important insects, and are furnished with blanks to report outbreaks in their territory, and mailing tubes in which specimens can be sent in to the office for identification. The object of this work is to get data on insect outbreaks before they become widespread. The landowners are then advised as to control measures which should be instigated. In this way outbreaks which otherwise might sweep over wide areas are being stopped.

Through cooperation with forest owners, the State has many control experiments under way. Methods of control are continually being worked out for those insects of which previously we have known little.

The letters of inquiry and calls for assistance are by no means confined to forest and shade tree insects. Insects affecting man, animals, grain, food, fruit, flowers, garden crops, clothing, furniture, lumber, water supplies, and health of communities continually require control measures. Efforts are being made to cooperate in every way possible with those asking for assistance.

2. Fire Protection in Organized Towns Outside of the Maine Forestry District. About $4,000.00 of this appropriation is used to maintain 14 lookout stations in organized towns, to investigate slash law violations, and for the printing and distribution of fire signs and bulletins, which this Department is required by law to furnish these towns free of charge.

Study and Control of the Birch Saw Fly, Birch Case Bearer, and other Forest Insects. **$7,000.00**

An appropriation of $7,000.00 a year is used for the raising of parasites and the working out of other means of control for the two new insects attacking birch and other dangerous forest insects pests which may appear. Laboratory quarters have been furnished at no cost by the Acadia National Park and winter quarters by the town of Bar Harbor. Parasites of the Birch Leaf Miner have been liberated throughout the white birch region and these are beginning to take a definite part in the control of the leaf miner. Parasites on other forest insects are also being liberated.

In 1931-1932 the sum of $4,866.62 was spent for the services of two permanent men and one summer assistant. One man and assistant confined their work largely to a study of the Birch Leaf Miner and methods of control. The other permanent man worked on the life history and control of the Birch Case Bearer. The appearance of several other new foreign forest insects has made it necessary to give some time to them. This work is described in this report. The expenses of the men in the field amounted to $717.53. Equipment cost $314.26. A balance of $1,101.59 during the year was due to the fact that the permanent man in charge of the work resigned and returned to college. This left the work temporarily very much weakened until a new man was found. All three men carrying on this work are trained entomologists.

Maine Forestry District **$181,339.45**

An annual tax of $2\frac{1}{4}$ mills on the dollar is assessed upon all the property in said Forestry District, which amounted to $181,339.45 in 1931 and 1932. This special tax is used for forest fire protection in the District, comprising 452 towns, or a total area of 10,000,000 acres. During the fire season the District employs about 190 regular men and it owns equipment valued at $375,000.00 in the form of lookout towers, telephone lines, camps, boats, trucks, pumps, and sufficient fire tools to equip 10,000 men. The State now receives from

the Federal Government about $52,000.00 annually. From this sum $30,000.00 is used in the District and the balance in the organized towns.

In 1932, notwithstanding a rebate of 30%, amounting to $54,401.84 upon the 1932 tax assessment and the unusually large expense of fighting fires, amounting to $48,399.68, our books show a balance of $106,129.73.

Under the organization of the Forestry District the property owners in the District pay for the fire protection on their land without any tax burden being imposed upon property owners outside of the District in the organized towns.

FOREST FIRE PROTECTION

MAINE FORESTRY DISTRICT

Season 1931 and 1932

The fire season of 1931 was about two weeks longer than the average season, beginning on April 19th and lasting until November 1st, which was about two weeks longer than the previous season.

Although there was a shortage of water in the woods during the winter, rains in the spring were sufficient and so distributed that hazardous conditions did not develop. Except for about a week during the last of June, there was no time when the woods were critically dry. The largest fire of record covered 150 acres and occurred early in the season, thereby causing very little damage.

The fire season of 1932 began on April 22nd and closed early in September due to heavy rains. Although this season was short, the forests during the months of May and June were in an extremely hazardous condition, due to the light rainfall in the month of April followed by a similar occurrence the next two months. During this period 80% of the total number of fires for the season occurred.

During the drought in the middle of May, a very serious condition existed along our northwestern boundary. This is the season that many Canadian farmers burn their brush before clearing lands. Strong and continued northwestern winds brought fourteen of these fires across the border, and two were very disastrous. The larger of these two fires burned 14,720 acres on Township No. 11, Range 17, Aroostook County, and the other burned 9,200 acres on Township No. 20, Range 11 and 12.

Due to the long continued drought and the occurrence of a large number of fires throughout the entire State, the Governor issued a proclamation on May 19th prohibiting smoking and building of fires out-of-doors and at the same time suspending the fishing season, except from boats or canoes.

On May 27th, the ban was lifted due to a general distribution of rain throughout the State that decreased the hazard of forest fires, and conditions seemed favorable for continued wet weather.

However, the heavy rain usually occurring the first part of June did not arrive until the first of July and this relieved the seriousness of the situation for the remainder of the season. The season closed with the last fire on September 20th.

Comparison of Burned Area 1929 to 1932

1929	1930	1931	1932
1,323 acres	11,677 acres	561 acres	36,342 acres

District Supervisors

Carrying out the plans undertaken in 1925, the district is divided in four sections, with the following men in charge:

I. Eastern Section, in charge of Supervisor George A. Faulkner, with headquarters at Winter Harbor.
II. Northern Section, in charge of Supervisor Harry G. Tingley, with headquarters at Island Falls.
III. Western Section, in charge of Supervisor George H. Gruhn, with headquarters at Seboomook.
IV. Southern Section, in charge of Supervisor Robert G. Stubbs, with headquarters at Hallowell.

Chief Wardens

J. J. Kneeland of Topsfield, who was chief warden of the Musquash District for the past fifteen years passed away in July, 1931.

Fred C. Knowlen of Stockholm, who was chief warden of the Madawaska District from 1905 to 1914 and 1923 to 1931 passed away in February, 1932. The Department regrets the loss of these two men who had carried on the work in this Department so faithfully.

Silas F. Peaslee of Upton, who has been a chief warden on the Androscoggin Waters since the Forestry District was organized in 1909, was appointed Honorary Forest Fire

Warden for the season of 1932. He has, for many years, been connected with the timber interests in western Maine and was first appointed a Forest Fire Warden for the unorganized towns in 1904, which makes him the first chief warden in this part of the State.

Charles C. Murphy of Rangeley, who has also been a chief warden in the District since it was first organized, was likewise appointed an Honorary Forest Fire Warden for the season of 1932.

Albert Thibodeau of Waterville has been appointed chief warden of the Chamberlain District to fill the vacancy caused by the resignation of Chief Warden Wm. A. Dubay. Mr. Dubay was chief warden of the Chamberlain District from 1929 to 1931. Mr Thibodeau has been connected with this Department for eight years, serving both as patrolman and lineman.

Stanley E. Drake was appointed chief warden of the Madawaska District in 1931. Mr. Drake has been connected with this Department for ten years.

Beginning of the 1932 season the Musquash and St. Croix Districts were combined which resulted in a saving for the Department.

Deputy Wardens

Deputy warden is the official title applied to the watchmen, patrolmen and other assistants to the chief warden. As in the past, very few changes were made during the past two years which shows that the men picked for this type of work appear contented and are also satisfactory to this Department.

Lookout Stations

Three new steel towers were erected in the spring of 1931, viz:

Trout Mountain—Township 2, Range 9—60 feet.

Peaked Mountain—Township 30, M. D.—36 feet.

Lawler Hill—Township 2, Range 6—60 feet.

The steel work for a new tower has been hauled to the top of No. 5 Mountain, Township 5, Range 7, B. K. P., preparatory for erection next spring.

Patrol

Patrolmen are employed during particularly hazardous periods to patrol the most dangerous areas, especially along roads, streams, lakes, and trails frequented by people. During wet periods they are employed on construction work, such as brushing out telephone lines, trails, and roads.

Telephone Lines

Continuing our plans of extending and improving our telephone system, 229 miles of new telephone lines have been constructed and 146 miles of old telephone lines have been rebuilt, of which the following are the most important:

Gulf line to White Brook camp—5 miles.
Completed line from Aurora to Sullivan—30 miles.
Cooper to Wesley—8 miles.
Narraguagus River to Washington Bald Mt.—20 miles.
Franklin to Schoodic Mt.—5 miles.
Peaked Mt. to Main River camp, Twp. 30—9 miles.
Tomah stream to Lambert Lake—12 miles.
Millinocket to Millinocket Lake—pole line—8½ miles.
Macwahoc to Reed farm—pole line—8½ miles.
Madawaska stream to New Sweden—7¼ miles.
Davidson to Lawler Hill—6¾ miles.
Davidson to Grindstone—10 miles.
Mattawamkeag Dam to Caribou Lake—5¼ miles.
Lunkasoos Lodge to Daicey Mt.—5¼ miles.
Howe Brook to No. 9 tower—11 miles.
Millinocket Lake to Touge Pond—7 miles.
Churchill Dam to Priestly Mt.—7 miles.
Daaquam to Chief Warden camp—3 miles.
Boundary Bald to Green Mt.—16 miles.
Williams Mt. to Parlin Pond—7 miles.
Moxie Station to East Outlet—20 miles.
Saddleback Mt. to Rangeley—5 miles.
Upton to Grafton Notch—9 miles.
North Reddington to West Branch Nash Stream—3 miles.

Pumps

275 five gallon hand pumps and 3 four cylinder Northern fire fighting pumps were added to the District during 1931 and 1932. At the present time, some of the chief wardens have more than one of the four cylinder pumps stationed within their district and all chief wardens have a good supply of the five gallon hand pumps. These small hand pumps have proved to be effective on most all fires and it is planned to add many more in the future.

Roads and Trails

The policy of the Department for the past few years has been to keep the roads and trails cleared to the most dangerous places for fires. During the past two years, those previously cleared for transportation purposes have been kept cleaned as well as an additional 317 miles being cleared. This phase of the work is usually done by our regular force during weather unfavorable for forest fires and has been a great help in case of a fire.

General Improvements

The year 1931 was very favorable for the Department to undertake a large construction program in the form of building telephone lines, camps, storehouses, and clearing of roads, and trails, and all projects contemplated in the spring were completed before the end of the fire season with our regular force.

The year 1932 was very unfavorable for the Department to continue an expansion program due to the large expense incurred in the fighting of forest fires during May and June. However, during the latter part of the season, a few of the projects proposed were finished.

Airplanes

Airplanes have been used for detection and observation of forest fires each year since 1927 by the Maine Forest Service. In 1929 this Department hired a plane to fly 100 hours on fire

work during the forest fire season. Since that time we have depended on private owners, and have hired a plane only at the time when needed. These private owners give this Department a very fair flat rate for the service and give preference to all forest fire work.

There are private planes available now for all parts of the State, and suitable and sufficient landing places have been located for both land and water equipped planes. A pontoon equipped plane is located near Millinocket and can well serve the northern part of this State. Planes located at Bangor, Trenton and Augusta can well serve the needs of the eastern and western parts of this State.

Camp Sites

There are now 114 camp sites available for the use of the public. These camp sites are being used more and more each year, and the Department intends to build more camp sites as the demand increases. The Department feels that these camp sites are a great factor in helping to reduce the number of road side fires, which are usually caused by inexperienced campers building fires in unsafe places. The following list shows the general location of our camp sites:

Aroostook County

Twp. 1, R. 5, W.E.L.S.
Twp. 3, R. 2, W.E.L.S.
Twp. 7, R. 5, W.E.L.S. (2)
Twp. 8, R. 5, W.E.L.S. (2)
Twp. 9, R. 5, W.E.L.S.
Twp. 9, R. 7, W.E.L.S.
Twp. 9, R. 8, W.E.L.S.
Twp. 11, R. 13, W.E.L.S.
Twp. 14, R. 6, W.E.L.S.
Twp. 14, R. 7, W.E.L.S.
Twp. 14, R. 8, W.E.L.S.
Twp. 14, R. 12, W.E.L.S.
Twp. 15, R. 6, W.E.L.S. (2)
Twp. 15, R. 11, W.E.L.S.
Twp. 16, R. 4, W.E.L.S. (2)
Twp. 16, R. 10, W.E.L.S.
Twp. 17, R. 4, W.E.L.S.
Castle Hill
Hammond Pl. (2)
Hersey
Island Falls
Macwahoc
Nashville Pl.
New Limerick
Oxbow (2)

Franklin County

Dallas Pl.
Jerusalem (4)

Hancock County

Twp. 10, S.D.
Aurora
Castine
Mariaville

Oxford County

Twp. A, No. 2 (Grafton) (3)
Twp. 4, R. 1, W.B.K.P. (Richardsontown)
Twp. 4, R. 2, W.B.K.P. (Adamstown)
Twp. 5, R. 4, W.B.K.P. (Lynchtown)
Denmark

Penobscot County

Twp. 1, R. 7, W.E.L.S.
Twp. 2, R. 6, W.E.L.S.
Twp. 2, R. 7, W.E.L.S.
Twp. 3, R. 1, W.E.L.S.
Twp. 5, R. 6, W.E.L.S. (2)
Twp. 6, R. 7, W.E.L.S. (2)
Burlington
Grand Falls
Lincoln
Lowell
Mount Chase (2)

Piscataquis County

Twp. 2, R. 12, W.E.L.S.
Twp. 3, R. 9, W.E.L.S.
Twp. 3, R. 11, W.E.L.S. (8)
Twp. 7, R. 15, W.E.L.S.
Elliottsville Pl.
Greenville
Monson (2)

Somerset County

Twp. 1, R. 4, N.B.K.P. (2)
Twp. 2, R. 4, N.B.K.P. (2)
Twp. 5, R. 16, W.E.L.S.
Twp. 8, R. 17, W.E.L.S.
Bigelow Pl.
Boyd
Dead River Pl. (2)
Harmony
Jackman Pl.
Moose River Pl.
Parlin Pond
Pittston
The Forks Pl.
West Forks Pl.

Washington County

Twp. 10, R. 3, N.B.P.P.
Twp. 19, E.D.
Twp. 18, M.D.
Twp. 27, E.D. (2)
Twp. 30, M.D.
Baileyville
Calais
Codyville Pl.
Cooper
Crawford
Edmunds
Grand Lake Stream Pl. (3)
Lambert Lake
Indian Township
Perry
Topsfield (2)

York County

York

Fire Weather Stations

In cooperation with the United States Weather Bureau and the United States Forest Service seven weather stations have been maintained. The stations are located so as to cover the forest area of the State. They are located at

Ossippee Mountain, Gardiner, Jackman, Princeton, Oquossoc, Macwahoc and Township 11, Range 17. Each of these stations is equipped by the Department with instruments for measuring wind velocity, humidity, precipitation and range of temperature. The persons in charge of each of these stations are under the supervision of the United States Weather Bureau of Boston, to which they make daily reports. In return the Weather Bureau furnishes these stations with daily weather forecasts for two days in advance. The forecasts from Boston to the cooperative station are telephoned to other chief wardens and are of great assistance to the entire Forestry Department.

The work at the McManus Farm Experiment Station was completed in 1932, and a report is appended.

Each chief warden and nearly every tower man has a rain guage so that he can make comparison of the conditions in his district with those of the fire weather station, and report each week to the Augusta office the amount of rain in his district. For purposes of comparison tables showing precipitation in the different districts for the two years 1931-1932, follow:

RAIN PRECIPITATION—1931-1932

NORTHERN SECTION

	Katahdin District	Davidson District	Mattawamkeag District	East Branch District	No. 9 District	Aroostook Waters District	Fish River District	Madawaska District	Allagash District
	1931-1932	1931-1932	1931-1932	1931-1932	1931-1932	1931-1932	1931-1932	1931-1932	1931-1932
May	4.12– 3.37	2.01	2.47– 2.52	4.26– 1.91	2.60– 1.58	2.71– 1.84	2.08– 1.63	1.98– 2.34	1.94– 1.58
June	6.10– 1.00	1.05	4.75– 1.98	5.79– 2.30	3.75– 4.38	3.86– 2.84	4.06– 1.86	3.09– 3.64	4.68– 3.01
July	6.85– 2.77	2.18– 2.92	4.34– 5.29	4.87– 4.51	4.50– 2.23	5.87– 2.80	5.58– 4.10	4.06– 3.60	5.62– 7.89
August	3.47– 4.22	2.40– 4.83	2.73– 5.26	2.01– 4.05	1.50– 1.43	1.33– 2.45	1.88– 4.51	2.09– 4.50	1.68– 4.62
September	3.59– 9.99	4.77– 8.82	3.40– 6.27	4.20– 6.38	3.00– 2.13	6.29– 5.04	5.93– 3.63	3.87– 5.19	5.13– 2.79
October	5.61– 1.41	3.35– 1.62	6.90	1.26	5.20	3.59– 3.07	.12	2.56– 1.43	.72
Total	29.74–22.76	12.70–21.25	24.59–21.32	21.13–20.41	20.55–11.75	23.65–18.04	19.65–15.73	17.65–20.70	19.77–19.89

EASTERN SECTION

	Pleasant River District	Passadumkeag District	Musquash-St. Croix Districts	East Machias District	Machias District	Union River District
	1931-1932	1931-1932	1931-1932	1931-1932	1931-1932	1931-1932
May	1.62– 1.66	3.59– 3.65	2.07– 1.23	2.43– 1.38	1.25– 1.34	1.94– .74
June	7.33– 2.08	6.27– 1.97	4.50– 1.76	3.40– 1.30	2.83– .80	3.54– 1.46
July	6.80– 4.03	5.59– 4.72	3.69– 3.20	4.48– 4.38	3.01– 3.77	3.99– 5.64
August	4.59– 7.11	4.03– 4.57	3.89– 4.12	3.15– 5.02	2.97– 6.45	4.08– 3.68
September	3.72– 8.80	4.61– 4.08	4.28– 4.36	4.97– 4.76	4.66– 3.46	3.88– 4.40
October	.....	.....	.37	.47	.50	.33
Total	24.06–23.68	24.09–18.99	18.80–14.67	18.91–16.84	15.22–15.82	17.76–15.92

RAIN PRECIPITATION—1931-1932

WESTERN SECTION

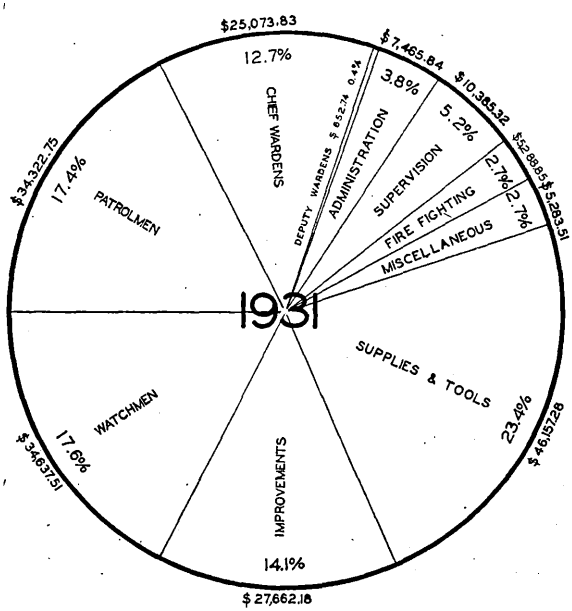
	Upper St. John District	Musquacook District	Seven Islands District	Chamberlain District	Seboomook District	Moosehead District	Chesuncook District
	1931-1932	1931-1932	1931-1932	1931-1932	1931-1932	1931-1932	1931-1932
May	2.47– 1.50	2.37– 1.60	2.23– 1.10	2.33– 1.56	3.14– 1.14	3.57– 1.21	2.28– 1.09
June	5.45– 2.08	5.37– 1.93	5.09– 2.78	6.02– 2.97	5.21– 1.46	5.95– 1.76	5.63– 1.92
July	4.22– 5.53	5.49– 8.45	5.83– 6.68	5.57– 5.63	4.10– 4.35	5.18– 2.07	5.21– 1.87
August	2.22– 4.21	2.38– 4.99	2.55– 4.64	2.53– 2.24	3.10– 3.26	2.99– 3.65	2.84– 3.71
September	5.02– 3.64	5.14– 6.95	5.09– 3.85	4.93– 6.33	3.63– 5.22	4.88– 4.21	4.76– 4.18
October	4.34– *.63	*.26	.....	2.82–	.....	.....	.....
Total	23.72–16.96	20.75–24.18	20.79–19.05	24.20–18.73	19.18–15.70	22.57–12.90	20.72–12.77

*Incomplete

SOUTHERN SECTION

	Dead River District	Parlin Pond District	Moose River District	Carrabassett District	Rangeley Dist. Upton	Rangeley Dist. Cupsuptic
	1931-1932	1931-1932	1931-1932	1931-1932	1931-1932	1931-1932
May	3.65– 2.45	3.96– 2.06	4.03– 1.98	4.05– 2.80	4.24– 2.32	4.24– 3.09
June	4.02– 2.23	3.45– 1.87	3.13– 1.79	3.90– 3.70	4.54– 1.56	4.04– 1.66
July	5.57– 4.50	5.45– 5.41	6.83– 4.02	5.05– 5.35	3.81– 8.36	4.49– 9.90
August	4.83– 4.69	4.03– 4.12	3.26– 3.96	5.40– 6.50	2.10– 3.53	3.63– 3.65
September	4.81– 7.39	3.89– 7.28	5.77– 3.64	5.40– 8.95	4.73– 6.33	7.62– 4.11
October	2.69	3.39	3.49	4.40	3.61	3.74– 3.18
Total	25.57–21.26	24.17–20.74	26.51–15.39	28.20–27.30	23.03–22.10	27.76–25.59

MAINE FORESTRY DISTRICT



TOTAL DISBURSEMENTS $ 196,929.81

Maine Forestry District

FINANCIAL STATEMENT

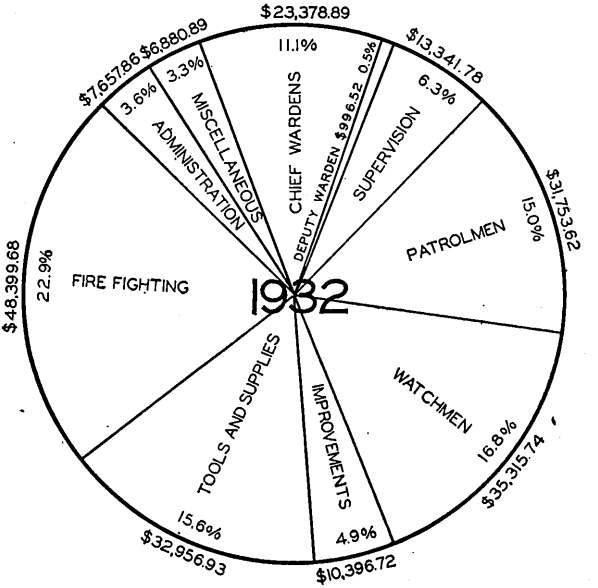
1931

Receipts		
Balance on hand January 1, 1931	$133,960.17	
1931 Assessment	181,339.45	
Interest on Deposits	127.07	
Federal Cooperation	29,156.56	
Miscellaneous	4,338.70	
Total Receipts		$348,921.95
Disbursements		
Chief Wardens	$25,073.83	
Deputy Wardens	652.74	
Supervision	10,385.32	
Patrolmen	34,322.75	
Watchmen	34,637.51	
Improvements	27,662.18	
Tools and Supplies	46,157.28	
Fire Fighting	5,288.85	
Administration	7,465.84	
Miscellaneous	5,283.51	
		196,929.81
Balance on hand January 1, 1932		$151,992.14

EXPENDITURES BY WATERSHEDS 1931

	St. John	Penobscot	Kennebec	Androscoggin	Machias	Totals
Chief Wardens	$8,346.96	$9,069.77	$4,447.93	$1,079.56	$2,129.61	$25,073.83
Deputy Wardens	99.60	173.38	.....	18.68	361.08	652.74
Supervision	1,838.26	2,976.57	1,278.83	1,221.89	3,069.77	10,385.32
Patrolmen	12,020.47	10,340.55	3,908.80	3,888.83	4,164.10	34,322.75
Watchmen	8,660.39	10,010.40	8,567.94	2,200.53	5,198.25	34,637.51
Improvements	5,516.21	9,361.69	4,023.55	4,864.03	3,896.70	27,662.18
Tools and Supplies	10,130.54	16,121.86	7,147.54	5,407.13	7,350.21	46,157.28
Fire Fighting	952.56	2,375.11	232.43	422.50	1,306.25	5,288.85
Administration	1,574.97	1,655.70	1,408.28	1,398.42	1,428.47	7,465.84
Miscellaneous	2,077.09	1,361.18	866.05	324.22	654.97	5,283.51
Totals	$51,217.05	$63,446.21	$31,881.35	$20,825.79	$29,559.41	$196,929.81

MAINE FORESTRY DISTRICT



TOTAL DISBURSEMENTS $211,078.63

Maine Forestry District

FINANCIAL STATEMENT

1932

Receipts		
Balance on hand January 1, 1932	$151,992.14	
1932 Assessment	181,396.98	
Interest on Deposits	148.84	
Federal Cooperation	34,879.55	
Miscellaneous	3,192.69	
Total Receipts	$371,610.20	
Refund to Land Owners	54,401.84	
		$317,208.36
Disbursements		
Chief Wardens	$23,378.89	
Deputy Wardens	996.52	
Supervision	13,341.78	
Patrolmen	31,753.62	
Watchmen	35,315.74	
Improvements	10,396.72	
Tools and Supplies	32,956.93	
Fire Fighting	48,399.68	
Administration	7,657.86	
Miscellaneous	6,880.89	$211,078.63
Balance on hand January 1, 1933		$106,129.73

A saving of $705.30 was made due to the reduction of salaries.

EXPENDITURES BY WATERSHEDS 1932

	St. John	Penobscot	Kennebec	Andros-coggin	Machias	Totals
Chief Wardens	$8,017.37	$8,151.21	$4,473.23	$1,026.44	$1,710.64	$23,378.89
Deputy Wardens	54.37	456.28	207.30	40.95	237.62	996.52
Supervision	3,278.31	3,622.37	1,617.34	1,519.93	3,303.83	13,341.78
Patrolmen	10,581.78	9,952.79	3,993.29	3,245.00	3,980.76	31,753.62
Watchmen	9,294.97	10,790.71	8,067.28	2,391.78	4,771.00	35,315.74
Improvements	2,287.49	3,088.49	2,219.43	1,163.89	1,637.42	10,396.72
Tools and Supplies	8,031.80	7,967.25	6,853.41	3,994.38	6,110.09	32,956.93
Fire Fighting	9,098.39	11,089.15	23,025.97	993.02	4,193.15	48,399.68
Administration	1,691.82	1,566.54	1,571.05	1,404.33	1,424.12	7,657.86
Miscellaneous	1,858.04	1,803.05	1,579.70	607.28	1,032.82	6,880.89
Totals	$54,194.34	$58,487.84	$53,608.00	$16,387.00	$28,401.45	$211,078.63

LOOKOUT STATIONS

Stations	Opened		Closed		No. Fires	
	1931	1932	1931	1932	1931	1932
Allagash Mt.	June 21	May 19	Sept. 26	Sept. 25	.....	1
Aziscoos Mt.	May 6	May 15	Sept. 22	Sept. 18	6	5
Beetle Mt.	May 6	May 21	Sept. 30	Sept. 23	5	6
Bigelow Mt.	May 2	May 11	Oct. 20	Oct. 4	15	7
Boarstone Mt.	April 26	May 8	Oct. 17	Oct. 4	4	5
Boundary Bald Mt.	May 3	May 5	Sept. 19	Oct. 2	5	3
Burnt Mt.	May 6	May 11	Sept. 30	Sept. 21	1	3
Carr Pond Mt.	May 3	May 8	Sept. 10	Sept. 27	3	8
Clear Lake Mt.	June 3	May 21	Sept. 18	Sept. 21	10	13
Cooper Mt.	April 22	May 6	Sept. 30	Oct. 1	15	29
Deboulie Mt.	May 3	May 8	Oct. 7	Aug. 27	27	.....
*Deer Mt.	June 11	May 11	Sept. 5	Sept. 15	9	3
Depot Mt.	May 1	May 8	Sept. 26	Sept. 24	2	10
Daicey Mt.	May 21	May 12	Sept. 26	Aug. 31	49	31
Dill Ridge	May 1	May 6	Sept. 22	Sept. 19	2	.....
†Doubletop Mt.	.....	.....	.....	.....	.....	.....
†Flagstaff Mt.	.....	.....	.....	.....	.....	.....
Green Mt.	June 22	May 18	Aug. 29	Sept. 10	.....	1
Hardwood Mt.	April 23	May 12	Sept. 24	Sept. 26	21	3
Hedgehog Mt.	May 7	May 12	Oct. 17	Sept. 17	60	34
†Horse Mt.	.....	.....	.....	.....	.....	.....
Howe Brook Mt.	May 6	May 9	Sept. 12	Sept. 17	4	.....
Kibbie Mt.	May 4	May 15	Sept. 23	Sept. 17	3	3
Kineo Mt.	May 6	May 11	Sept. 26	Sept. 29	2	7
Lawler Hill	May 10	May 11	Sept. 15	Sept. 15	5	17
Lead Mt.	April 21	May 1	Oct. 10	Sept. 16	17	15
Little Russell Mt.	June 1	May 15	Sept. 27	Sept. 17	.....	.....
Mattamiscontis Mt.	May 1	May 12	Sept. 22	Sept. 22	1	1
Mt. Abram	June 1	May 15	Oct. 18	Sept. 30	5	17
Mt. Chase	May 5	May 8	Sept. 26	Sept. 20	6	21
Mt. Coburn	June 2	May 12	Oct. 24	Oct. 1	.....	33
Mitchell Mt.	May 1	May 10	Oct. 16	Sept. 20	.....	3
Moxie Bald Mt.	April 30	May 5	Oct. 21	Sept. 26	4	24
Musquacook Mt.	May 3	May 15	Sept. 13	Sept. 16	6	6
Musquash Mt.	April 26	May 8	Sept. 21	Sept. 19	13	23
No. 4 Mt.	April 25	May 12	Sept. 12	Sept. 3	2	2
No. 9 Mt.	May 3	May 8	Sept. 26	Sept. 17	.....	.....
Norway Bluff	May 10	May 13	Sept. 12	Sept. 17	4	16
†Nulhedus Mt.	.....	.....	.....	.....	.....	.....
Oak Hill	May 9	May 13	Sept. 18	Sept. 19	3	8
Old Spec Mt.	July 5	May 12	Aug. 31	Sept. 10	.....	10

Stations	Opened		Closed		No. Fires	
	1931	1932	1931	1932	1931	1932
Otter Lake Mt.	.....	.....	.....	.....	.....	.....
Passadumkeag Mt.	April 26	May 5	Sept. 27	Sept. 24	4	3
Peaked Mt.	May 10	May 8	Oct. 20	Sept. 30	12	21
Pirate Hill	May 6	May 7	Sept. 30	Sept. 19	.....	4
†Pleasant Pond Mt.	.....	.....	.....	.....	.....	.....
Pocomoonshine Mt.	May 7	May 7	Oct. 15	Sept. 30	9	18
Priestly Mt.	April 23	May 12	Sept. 10	Sept. 19	39	7
Ragged Mt.	April 24	May 10	Sept. 26	Sept. 22	8	25
Rocky Mt.	April 26	May 14	Sept. 28	Sept. 24	27	11
Round Mt.	May 12	May 13	Sept. 30	Sept. 21	4	106
Saddleback Mt.	May 7	May 16	Sept. 3	Sept. 9	4	1
Sally Mt.	May 21	May 13	Sept. 4	Sept. 14	11	6
Schoodic Mt.	April 23	May 7	Oct. 14	Sept. 27	28	37
Snow Mt.	May 8	May 16	Sept. 26	Sept. 30	8	5
Soper Mt.	.....	May 18	.....	Sept. 12	.....	1
Soubunge Mt.	June 7	May 18	Sept. 4	Sept. 14	2	8
Spencer Mt.	April 21	May 12	Oct. 6	Sept. 24	10	15
Spoon Mt.	May 6	May 17	Sept. 20	Sept. 22	.....	1
Squa Pan Mt.	May 3	May 10	Sept. 19	Sept. 20	6	23
Squaw Mt.	April 24	May 10	Sept. 19	Sept. 24	3	6
*Stockholm Mt.	July 4	May 11	Oct. 17	May 25	.....	.....
Three Brooks Mt.	May 3	May 12	Oct. 3	Sept. 17	11	102
Trout Mt.	May 20	April 29	Sept. 27	Sept. 17	2	35
Tumbledown Mt.	May 28	May 16	Oct. 16	Sept. 17	11	.....
*Wadleigh Mt.	May 26	June 7	Sept. 1	July 16	.....	3
Washington Bald Mt.	May 14	May 8	Sept. 26	Sept. 10	10	23
*Wesley Mt.	July 1	May 10	Aug. 13	July 23	5	8
Whitney Hill	May 12	May 11	Oct. 15	Sept. 8	11	13
West Kennebago Mt.	May 17	May 15	Sept. 21	Sept. 22	29	15
White Cap Mt.	June 14	May 17	Sept. 19	Sept. 20	2	13
Williams Mt.	April 23	May 11	Sept. 22	Sept. 21	11	24
					576	902
Fires discovered by patrolmen					30	61
					606	963

*Emergency stations opened for a few days. †Emergency stations not opened.

FIRE RECORD 1931

Location	Date	Acreage	Cause	Damage
Aroostook County				
T. 9, R. 4, W.E.L.S.	April 20	½	Railroad	.....
T. 20, Rs. 11 & 12, W.E.L.S.	April 22	30	Canadian fires	$50.00
Reed Pl.	April 25	½	Railroad	.....
T. 11, R. 14, W.E.L.S.	May 2	¼	Lumbermen	.....
T. 12, R. 13, W.E.L.S.	May 2	75	Lumbermen	.....
Reed Pl.	May 19	½	Brush burning	.....
T. 12, R. 17, W.E.L.S.	May 20	2	Brush burning	.....
Garfield Pl.	May 29	4	Incendiary	5.00
T. 15, R. 7, W.E.L.S.	May 30	4	Lumbermen	.....
Garfield Pl.	June 4	60	Incendiary	60.00
Macwahoc Pl.	June 25	½	Farmers	.....
Winterville Pl.	July 1	1	Lumbermen	5.00
T. 7, R. 4, W.E.L.S.	July 1	½	Fishermen	.....
T. 16, R. 8, W.E.L.S.	July 2	3	Lumbermen	200.00
T. 16, R. 8, W.E.L.S.	July 9	½	Lumbermen	.....
Silver Ridge Pl.	Aug. 2	¼	Campers	50.00
T. 17, R. 4, W.E.L.S.	Aug. 13	6 sq. ft.	Fishermen	.....
T. 10, R. 4, W.E.L.S.	Aug. 19	.....	Hunters	.....
T. 8, R. 4, W.E.L.S.	Aug. 20	1/6	Lightning	5.00
T. 17, R. 4, W.E.L.S.	Aug. 21	6 sq. ft.	Fishermen	.....
T. 17, R. 4, W.E.L.S.	Aug. 22	15 x 30 ft.	Fishermen	.....
T. 4, R. 3, W.E.L.S.	Aug. 22	¼	Fishermen	.....
T. 17, R. 4, W.E.L.S.	Aug. 23	150 x 40 ft.	Fishermen	.....
Westmanland Pl.	Aug. 24	2	Farmers	10.00
Westmanland Pl.	Aug. 24	2	Farmers	.....
T. 17, R. 5, W.E.L.S.	Aug. 27	1	Fishermen	2.00
T. 17, R. 5, W.E.L.S.	Aug. 27	1	Fishermen	5.00
Franklin County				
T. 3, R. 4, W.B.K.P.	June 29	5	Unknown	75.00
Lang Pl.	July 14	⅛	Fishermen	.....
T. 3, R. 3, W.B.K.P.	Aug. 18	.....	Lightning	.....
Hancock County				
T. 10, S.D.	May 30	5	Fishermen	.....
T. 3, N.D.	June 5	½	Lightning	5.00
T. 3, N.D.	June 30	1	Campers	25.00
T. 9, S.D.	Aug. 6	½	Lightning	.....
T. 3, N.D.	Aug. 25	4	Fishermen	75.00
Oxford County				
Grafton	Oct. 13	.....	Hunters	.....
C. Surplus	Nov. 14	¼	Hunters	15.00
Penobscot County				
T. Long A	April 22	1	Railroad	.....
Indian No. 3	April 24	¼	Fishermen	5.00
T. A, R. 7, W.E.L.S.	May 5	2½	Railroad	.....
T. 5, R. 7, W.E.L.S.	May 16	½	Fishermen	.....
T. 1, R. 7, W.E.L.S.	June 3	30	Brush burning	250.00
T. 2, R. 7, W.E.L.S.	July 28	200 sq. ft.	Fishermen	.....
Indian No. 3	Aug. 26	5½	Smokers	11.00
Indian No. 3	Oct. 12	½	Hunters	.....
T. 6, R. 8, W.E.L.S.	Oct. 12		Hunters	.....

Location	Date	Acreage	Cause	Damage
Piscataquis County				
Spencer Bay Tract	April 20	150	Lumbermen	100.00
Squaw Mt.	May 6	2	Railroad	50.00
T. A, R. 12, W.E.L.S.	May 27	10 sq. ft.	Lightning	.....
T. 10, R. 13, W.E.L.S.	June 19	1/8	Lightning	.....
T. 6, R. 10, W.E.L.S.	June 20	.....	Lightning	.....
T. 10, R. 13, W.E.L.S.	Aug. 11	2 sq. rods	Lumbermen	.....
T. 10, R. 14, W.E.L.S.	Aug. 14	1/8	Lumbermen	.....
T. A, R. 10, W.E.L.S.	Oct. 10	25	Hunters	.....
Smithtown	Oct. 14	.....	Hunters	.....
Somerset County				
Moscow	April 22	5	Railroad	.....
Taunton & Raynham	May 20	1/4	Unknown	10.00
Brassua	June 21	1 1/4	Fishermen	20.00
T. 5, R. 7, B.K.P., W.K.R.	June 21	4	Fishermen	40.00
T. 4, R. 5, B.K.P., W.K.R.	June 22	1/8	Fishermen	.....
Flagstaff Pl.	June 22	1/4	Fishermen	.....
West Forks Pl.	July 2	20 sq. ft.	Lightning	.....
Parlin Pond	July 2	.....	Lightning	.....
Caratunk Pl.	July 8	10 sq. ft.	Fishermen	.....
Parlin Pond	Aug. 24	.....	Miscellaneous	.....
Moose River Pl.	Aug. 27	1/8	Fishermen	50.00
Bowtown	Sept. 13	20 sq. ft.	Fishermen	.....
Caratunk Pl.	Sept. 14	Dump fire	Tourists	.....
Sapling	Oct. 7	.....	Smokers	.....
Moose River Pl.	Oct. 9	1/4	Tourists	.....
Washington County				
Beddington	April 20	.....	Brush burning	.....
Beddington	April 21	10	Lumbermen	50.00
T. 18, E.D.	April 22	1/2	Hunters	.....
Whiting	April 22	10	Fishermen	50.00
T. 18, E.D.	April 23	30	Hunters	30.00
T. 19, M.D.	April 24	15	Hunters	.....
Marion	April 25	10	Farmers	.....
Codyville Pl.	April 25	1/2	Farmers	5.00
Washington County				
Whiting	April 25	2	Fishermen	25.00
Marion	May 7	15	Brush burning	30.00
T. 18, M.D.	May 7	1	Incendiary	.....
Kossuth	June 24	16	Fishermen	65.00
Cooper	July 1	2	Unknown	.....
Cooper	July 1	1	Fishermen	.....
T. 6, N.D.	July 5	1/4	Fishermen	.....
Whiting	July 5	1	Smokers	7.50
T. 19, E.D.	July 5	1/2	Fishermen	5.00
T. 6, R. 1, N.B.P.P.	July 6	6	Fishermen	50.00
T. 6, N.D.	Aug. 6	3/4	Lightning	10.00
T. 29, M.D.	Aug. 7	1/2	Lightning	5.00
T. 27, E.D.	Aug. 8	4	Lightning	75.00
T. 27, E.D.	Oct. 14	1	Hunters	50.00

FIRE RECORD 1932

Location	Date	Acreage	Cause	Damage
Aroostook County				
Molunkus	April 30	10	Farmers	
T. 2. R. 6, W.E.L.S.	May 8	30	Unknown	$50.00
Garfield Pl.	May 8	280	Farmers	280.00
T. B, R. 2, W.E.L.S.	May 8	5	Farmers	
T. 4, R. 7, W.E.L.S.	May 9	11	Fishermen	
T. E, R. 2, W.E.L.S.	May 11	5	Farmers	
T. 3, R. 4, W.E.L.S.	May 11		Fishermen	
T. 1, R. 5, W.E.L.S.	May 12	10	Incendiary	
T. 10, R. 6, W.E.L.S.	May 12	Camp yard	Fishermen	
T. D, R. 2, W.E.L.S.	May 13	18	Fishermen	
Reed Pl.	May 13	½	Lumbermen	
T. 14, R. 6, W.E.L.S.	May 14	Camp yard	Fishermen	
T. 11, R. 17, W.E.L.S.	May 14	14,720	Canadian fires	6,720.00
T. 17, R. 10, W.E.L.S.	May 14	15	Unknown	15.00
T. C. R. 2, W. E. L. S.	May 15	40	Farmers	50.00
T. 11, R. 4, W.E.L.S.	May 15	60	Incendiary	180.00
Cox Patent	May 16	200	Unknown	500.00
T. 18, R. 10, W.E.L.S.	May 16	800	Unknown	1,200.00
Winterville Pl.	May 16	4	Incendiary	10.00
T. 3, R. 4, W.E.L.S.	May 16	6	Lightning	18.00
T. 17, R. 10, W.E.L.S.	May 16	10	Unknown	
Glenwood Pl.	May 16	6	Fishermen	4.00
T. 17, R. 5, W.E.L.S.	May 17	200	Farmers	500.00
T. E, R. 2, W.E.L.S.	May 17	35	Unknown	25.00
T. D, R. 2, W.E.L.S.	May 17	5	Farmers	5.00
T. 17, R. 5, W.E.L.S.	May 17	200	Farmers	200.00
T. 17, R. 5, W.E.L.S.	May 17	200	Farmers	275.00
T. 20, Rs. 11 & 12, W.E.L.S.	May 17	4,000	Canadian fire	1,000.00
Nashville Pl.	May 18	Camp yard	Railroad	
T. 1, R. 5, W.E.L.S.	May 18	175	Incendiary	175.00
T. 1, R. 4, W.E.L.S.	May 19	50	Fishermen	100.00
Winterville Pl.	May 28		Farmers	
T. 17, R. 5, W.E.L.S.	June 4		Incendiary	
T. 10, R. 3, W.E.L.S.	June 4	20	Fishermen	10.00
T. 1, R. 5, W.E.L.S.	June 14	Camp yard	Fishermen	
Garfield Pl.	June 17	½	Fishermen	
T. D, R. 2, W.E.L.S.	June 18	¾	Incendiary	
T. 14, R. 8, W.E.L.S.	June 19		Fishermen	
T. 10, R. 6, W.E.L.S.	June 19	1,480	Fishermen	500.00
T. 19, R. 11 & T. 20, Rs. 11 & 12, W.E.L.S.	June 20	5,200	Lumbermen	7,000.00
Indian No. 3	June 21	3	Smokers	
T. 11, R. 10, W.E.L.S.	June 26		Unknown	
T. 11, R. 14, W.E.L.S.	June 28	½	Unknown	
Silver Ridge	June 29	100	Farmers	
T. 6, R. 8, W.E.L.S.	June 29	2	Fishermen	100.00
T. 4, R. 3, W.E.L.S.	June 30	¼	Fishermen	
T. 1, R. 5, W.E.L.S.	June 30	90 sq. ft.	Lightning	
T. 11, R. 7, W.E.L.S.	July 2		Fishermen	
T. D, R. 2, W.E.L.S.	July 7	⅛	Incendiary	
T. 14, R. 5, W.E.L.S.	Sept. 3	10	Unknown	50.00
T. 15, R. 5, W.E.L.S.	Sept. 10	Camps	Hunters	

Location	Date	Acreage	Cause	Damage
Aroostook County				
T. 14, R. 6, W.E.L.S.	Sept. 10	¼	Fishermen	.....
T. 2, R. 8, W.E.L.S.	Oct. 1	⅛	Hunters	.....
Franklin County				
Dallas Pl.	April 22	Barn	Unknown	.....
Jim Pond	May 12	2	Fishermen	.....
T. 2, R. 4, W.B.K.P.	May 17	500	Lumberman	1,500.00
T. D.	May 20	¼	Unknown	.....
Jim Pond	May 25	2	Unknown	.....
T. D,	June 2	15	Lightning	50.00
T. D.	Oct. 1	Camps	Campers	.....
Hancock County				
T. 10, S.D.	April 23	.....	Hunters	.....
T. 10, S.D.	May 7	8	Fishermen	40.00
No. 21 Pl.	May 7	10	Unknown	60.00
No. 8 Pl.	May 8	15	Fishermen	.....
T. 10, S.D.	May 10	250	Hunters	750.00
T. 7, S.D.	May 11	300	Railroad	300.00
T. 9, S.D.	May 12	4	Fishermen	20.00
T. 10, S.D.	May 13	10	Fishermen	25.00
T. 7, S.D.	May 17	40	Railroad	40.00
T. 10, S.D.	May 19	3	Fishermen	10.00
No. 8 Pl.	May 19	14	Unknown	42.00
T. 22, M.D.	June 12	100	Fishermen	222.00
T. 7, S.D.	June 20	2	Unknown	.....
T. 39, M.D.	July 10	⅛	Campers	.....
T. 3, M.D.	Aug. 23	½	Berry pickers	.....
T. 7, S.D.	Aug. 30	1	Hunters	5.00
T. 22, M.D.	Sept. 11	30	Berry pickers	10.00
No. 8 Pl.	Sept. 13	10	Smokers	25.00
Oxford County				
Letter C	Sept. 10	½ cord	Lumbermen	.....
Penobscot County				
T. 1, R. 7, W.E.L.S.	April 22	15	Railroad	45.00
T. A, R. 7, W.E.L.S.	April 29	20	Farmers	20.00
Indian No. 3	May 6	5	Lumbermen	5.00
Indian No. 3	May 7	5	Unknown	5.00
Indian No. 3	May 10	6	Unknown	.....
Summit Pl.	May 10	⅛	Campers	.....
T. 1, R. 7, W.E.L.S.	May 15	1½	Railroad	7.50
Mattamiscontis	May 19	5	Lumbermen	15.00
T. A, R. 7, W.E.L.S.	May 19	2	Fishermen	.....
Stacyville	May 19	3½	Fishermen	75.00
Stacyville	May 24	.....	Unknown	.....
Indian No. 3	June 4	½	Lumbermen	.....
Drew Pl.	June 9	12	Incendiary	.....
Indian No. 3	June 12	¼	Unknown	.....
Indian No. 3	June 13	280	Lumbermen	420.00
Stacyville	June 21	.....	Fishermen	.....
Stacyville	June 26	⅓	Fishermen	10.00
T. 2, R. 6, W.E.L.S.	June 29	16	Fishermen	50.00

Location	Date	Acreage	Cause	Damage
Penobscot County				
Indian No. 3	July 15	1	Railroad	.....
Indian No. 3	July 16	⅛	Lumbermen	.....
T. 2, R. 7, W.E.L.S.	Aug. 1	½	Fishermen	.....
Grand Falls	Aug. 17	1½	Unknown	2.00
Indian No. 3	Aug. 18	¼	Unknown	.....
Piscataquis County				
3 R. 5, E.K.R.	May 7	2	Fishermen	10.00
T. 6, R. 10, W.E.L.S.	May 15	1½	Unknown	.....
T. 5, R. 12, W.E.L.S.	May 22	4	Unknown	.....
T. B, R. 11, W.E.L.S.	June 19	2	Lumbermen	10.00
T. B, R. 11, W.E.L.S.	June 19	4	Lumbermen	15.00
T. 7, R. 10, W.E.L.S.	June 30	.....	Lightning	.....
T. 1, R. 9, W.E.L.S.	July 11	¼	Brush burning	.....
T. 1, R. 9, W.E.L.S.	July 14	¼	Fishermen	.....
Somerset County				
Lexington	April 29	4	Farmers	.....
Moose River Pl.	May 11	2	Fishermen	.....
Long Pond Pl.	May 12	75 sq. ft.	Unknown	.....
Holeb	May 15	500	Fishermen	2,500.00
East Moxie and Bald Mt.	May 16	5,157	Lumbermen	19,471.00
Long Pond Pl.	May 20	Old stump fire	Fishermen	.....
T. 5, R. 20, W.E.L.S.	May 25	15	Canadian fire	30.00
Misery	June 11	⅛	Fishermen	10.00
Flagstaff	Aug. 25	¼	Berry pickers	.....
Tomhegan and Brassua	Sept. 5	6	Fishermen	30.00
Taunton and Raynham	Sept. 11	16	Incendiary	.....
Washington County				
Whiting	April 25	15	Brush burning	15.00
T. 27, E.D.	May 6	15	Fishermen	15.00
Cooper	May 7	½	Fishermen	.....
Cooper	May 7	10	Hunters	10.00
Cooper	May 8	10	Hunters	25.00
Whiting	May 10	10	Hunters	20.00
Whiting	May 10	75	Hunters	150.00
Deblois	May 12	15	Farmers	45.00
Cooper	May 12	5	Hunters	.....
T. 7, R. 2, N.B.P.P.	May 13	⅛	Smokers	.....
Northfield	May 14	3	Farmers	15.00
Whiting	May 15	2	Fishermen	10.00
T. 18, E.D.	May 15	50	Fishermen	25.00
Cooper	May 16	50	Fishermen	100.00
Whiting	May 16	1½	Hunters	20.00
T. 10, R. 3, N.B.P.P.	May 16	80	Lightning	400.00
T. 30, M.D.	May 17	600	Lightning	5,000.00
T. 21, E.D.	May 18	8	Hunters	.....
Indiantown	May 19	¼	Incendiary	5.00
T. 10, R. 3, N.B.P.P.	May 19	¼	Smokers	5.00
Codyville	May 19	1	Tourists	5.00
T. 19, M.D.	May 20	50	Incendiary	100.00
Lambert	May 22	¼	Incendiary	5.00
Edmunds	June 2	1	Incendiary	.....

Location	Date	Acreage	Cause	Damage
Washington County				
Indiantown	June 11	1/16	Incendiary	
Whiting	June 13	1	Incendiary	
T. 30, M.D.	June 15	2	Lightning	
T. 30, M.D.	June 15	4	Lightning	25.00
No. 21 Pl., E.D.	June 15	1/2	Campers	5.00
T. 30, M.D.	June 15	1	Lightning	
Hinckley	June 15	1/16	Campers	
T. 35, M.D.	June 17		Lightning	
T. 18, M.D.	June 21	1/2	Fishermen	2.50
Topsfield	June 23	Old camp	Campers	
T. 18, M.D.	June 28	10	Fishermen	25.00
No. 21, E.D.	June 29		Brush burning	
T. 42, M.D.	July 1	1/8	Lightning	
T. 37, M.D.	July 7	1/8	Lightning	
Topsfield	Aug. 18	1/4	Lumbermen	
Grand Lake Stream Pl.	Sept. 3	1/4	Lightning	5.00
T. 18, E.D.	Sept. 9	1/4	Campers	2.00
Whiting	Sept. 14		Campers	
Hinckley	Sept. 20	1/16	Brush burning	

Summary of Forest Fires for 1931-1932 by Months, Counties and Causes

	No. of Fires		Acreage		Damage	
	1931	1932	1931	1932	1931	1932
By Months:						
April	16	7	265¼	64	$315.00	$ 80.00
May	14	85	112	28,940¼	95.00	42,167.50
June	13	42	118¾	7,259½	540.00	8,404.50
July	15	9	15⅞	2⅛	267.50	.....
August	23	7	22 1/6	4	298.00	7.00
September	2	13	.....	72 15/16	.....	72.00
October	8	1	27½	.....	50.00	.....
November	1	.....	¼	.....	15.00	.....
	92	164	561 19/24	36;342-31/48	1,580.50	$50,731.00
By Counties:						
Aroostook	27	53	188 11/12	27,913	162.00	18,917.00
Franklin	3	7	5⅛	519¼	75.00	1,500.00
Hancock	5	18	11	797⅝	105.00	1,549.00
Oxford	2	1	¼	.....	15.00	.....
Penobscot	9	23	41	375⅓	266.00	654.50
Piscataquis	9	8	177¼	14	150.00	35.00
Somerset	15	11	11¼	5,700⅜	120.00	22,041.00
Washington	22	43	27	1,023 1/16	457.50	6,034.50
	92	164	561 19/24	36,342-31/48	$1,580.50	$50,731.00
By Causes:						
Berry pickers	.....	3	.....	30¾	.....	10.00
Brush burning	5	4	47½	15 5/16	280.00	15.00
Campers	2	8	1¼	1 1/16	75.00	7.00
Farmers	5	15	15	1,087	15.00	1,490.00
Fishermen	28	43	54⅛	2,390 17/24	392.00	3,793.50
Hunters	11	12	73	370⅝	95.00	980.00
Incendiary	3	15	65	330 7/16	65.00	475.00
Lightning	12	13	6 13/24	708½	100.00	5,448.00
Lumbermen	10	13	243⅞	11,154⅜	355.00	28,436.00
Miscellaneous	2	3	30	18,735	50.00	7,750.00
Railroad	6	6	11½	357½	50.00	392.50
Smokers	3	4	6½	13⅜	18.50	30.00
Tourists	2	1	¼	1	.....	5.00
Unknown	3	24	7¼	1,147	85.00	1,899.00
	92	164	561 19/24	36,342-31/48	$1,580.50	$50,731.00

ORGANIZED TOWNS

In retrospect of the forest fire seasons of 1931-32 in the Organized Towns many gratifying accomplishments have been made. These came as the result of acts of cooperation between the State and the Organized Towns in an intensive drive for greater efficiency in forest fire prevention and protection work.

County Fire Wardens

The experiment of 1930 in forming a Fire District composed of sixteen towns overlooked by Dedham-Bald Lookout in Hancock County together with a District Fire Warden in charge, proved highly successful. Thus in the spring of 1931 it was decided to extend this plan to other counties. There were appointed by the State, subject to the unanimous approval of the Organized Town Selectmen, eleven county wardens each in charge of a district which represented either a part of or a whole county. These eleven districts comprise approximately three hundred towns.

The selection of these county fire wardens was based on their knowledge of their county, ability to organize men to fight fires, and competence to attack and handle the various forest fire problems. It was made clear in the beginning that this new plan would in no way take away any authority from the local Town Selectmen, excepting that which they wished to grant to the county wardens.

One great benefit of this plan was the fact that the Organized Towns were to receive the services of these county fire wardens at no expense to the towns. In addition, these men were equipped with a State-owned one-half ton truck and fire fighting tools sufficient to equip and form a fighting unit of twenty-one men. The salaries of these wardens together with expenses on the State trucks and tools were to be borne by the State. Aside from these expenses, all other costs of fighting fires were to be taken care of by the towns. Needless to say this newly proposed plan was very favorably accepted by the Town Selectmen.

In the early spring each county warden met the local boards of each town in his district. Much benefit was derived from these meetings because a definite plan of action was decided upon in the event of forest fires occurring in that particular town. It was also decided just what authority the Town Selectmen wished to invest upon the county wardens. Many of the towns wrote out commissions which gave these wardens full power to handle all forest fires and fire problems in their towns. Under this plan the towns still appointed their own local fire wardens, for there were many instances where the county warden could not be present to take charge of a fire due to others which he was fighting elsewhere. The local wardens took charge till the county warden arrived.

Fires which occurred in these towns and handled under this new plan brought out some interesting facts. One most noticeable was that very few fires ever reached big proportions. Most of them were kept down to a small acreage. This was largely due to the promptness in reaching the fires, quick organization of the men, and staying till the fires were completely extinguished. Each town had the assurance that the county warden was on the job and stayed till the fire was completely out.

In 1931 several of the county wardens had to rely on road patrol work to spot fires or await calls from the Town Selectmen as there were no lookouts to report fires to them. Some of them followed a schedule of observing at regular periods from the tops of high hills.

In addition to handling fires the county wardens duties included the posting of metal forest fire signs on every wooded road in each respective district, investigating bad slash areas, checking up on portable sawmill licenses, assisting in the burning of brush, blueberry land, grass, and slash, visitation to boy's and girl's summer camps, and other general forest fire work.

Lookout Stations

In the Fall of 1931 it was decided to do away with the handicap of certain districts not having a lookout tower. After a careful survey, five new forty-seven foot steel

lookout stations and one dismantled one were erected on peaks in the Organized Towns, which in cooperation with those already up would practically look over all the timberland in the greater part of southern Maine. The new lookouts were erected on Mt. Ararat in Sagadahoc County, Mountain Hill in Lincoln County, Blackstrap Hill in Cumberland County Mt. Blue in Franklin County, Chase Hill in Somerset County, and the dismantled tower on Frye Mountain in Waldo County. These towers now gave each county warden one or two lookouts for each of the eleven districts. Today there are fourteen lookout stations in the Organized Towns which overlook about five million acres of forest land.

From a pre-arranged schedule made in the early spring of each year, the watchman has for his district a complete list of the names of selectmen or town fire wardens together with their telephone numbers. The watchman reports all fires to the town selectmen or fire wardens first, and then immediately calls his county fire warden. Within the short time that these new lookout stations have been in use they have more than once proved their value and usefulness. Selectmen from several towns have made special trips to the lookouts to see how fires are so accurately reported to them.

Fire Districts and Lookout Stations in Organized Towns

County Warden Districts	Town	Lookout Station
(1) York	York	Agamenticus Mt.
	Waterboro	Ossipee Mt.
(2) Cumberland	Falmouth	Blackstrap Mt.
(3) Sagadahoc	Topsham	Mt. Ararat
(4) Knox and Lincoln	Jefferson	Mountain Hill
(5) Waldo	Montville	Frye Mt.
(6) Hancock	Dedham	Dedham Bald Mt.
(7) So. Washington*		
(8) E. Washington*		
(9) Piscataquis	Brighton Pl.	Kelley Mt.†
(10) So. Oxford	Denmark	Pleasant Mt.
(11) No. Oxford	Milton Pl.	Zircon Mt.
	Avon	Mt. Blue
	Canaan	Chase Hill
	Island Falls	May Hill
	Effingham, N. H.	Green Mt.‡

*These districts have lookouts which are located in the Maine Forestry District but are not included in the Organized Town list of stations.
†Privately owned station.
‡Cooperating lookout station between Maine and New Hampshire.

These Organized Town lookout stations serve two valuable purposes (1) detecting and reporting fires, and (2) education of all tower visitors as to forest fire prevention and protection work done in the State. For the first time an accurate record was made of all visitors to eleven towers, and in the fall each registration book was studied and a compilation made. This compilation revealed the astonishing fact that a total of 7,054 persons visited these towers during the season of 1932 coming from 37 states, the District of Columbia, 3 U. S. possessions, and 13 foreign countries. By number of registrations Maine was easily first with Massachusetts, New York, New Jersey, and Pennsylvania following in respective order.

Fire Fighting Equipment

The equipment with which the State furnished each county warden was a particularly valuable asset in fighting fires. About twenty-one pieces of equipment went with each truck and many fires were quickly put out due to the timely arrival of the county warden and the use of hand pumps which are always kept full of water. For Organized Town work the State had ready for immediate use 11 one-half ton-trucks, 75 shovels, 60 hand fire pumps, 50 forestry axes, 35 mattocks, 55 pails, and a large supply of signs. The State also loaned the use of a portable 4 cylinder rotary gasoline fire pump and 1,000 feet of hose to towns which were fighting bad fires.

In 1931 an innovation was tried out which proved most successful. In several counties, articles were written in the town warrants that if any town would appropriate $12.50 for purchasing fire fighting equipment the State would match it making $25.00. Twenty-five towns readily took advantage of this offer with Sagadahoc County going 100 per cent. This amounted to a sum of $1,000 with $500 appropriated by the towns and $500 by the State. With this money 86 hand fire pumps, 102 shovels, 126 pails, 48 mattocks, and 15 forestry axes were purchased. Later on when more funds are available this fifty-fifty plan for purchasing forest fire equipment in the Organized Towns will be extended to other counties.

The little five gallon knapsack hand pump has proved to be one of the most popular and useful of fire fighting pieces of equipment used in the Organized Towns. This is strikingly shown by the fact that in 1931 about 213 of these pumps were purchased by towns and individuals after witnessing demonstrations on fires by the county wardens. For the season 1932 over three hundred more of these pumps were purchased by thirty-nine towns and fifty individuals.

Some of the towns are so much in accord with the work being done in the Organized Towns on fire protection that plans are now underway for groups of towns to jointly purchase the 4 cylinder rotary gasoline fire pump and 1,000 feet of hose.

General Improvements

So many people visit the lookout stations each year in the Organized Towns that work was immediately started in 1931-32 to improve and help beautify the trails and the grounds around the towers. Old and defective trees were cut, others thinned out, and branches pruned off from those remaining to make the tower sites more attractive. Springs were made more sanitary, fixed fire places made, refuse barrels provided, lunch tables and benches put up, several rain shelters built, and in some places even automobile parking spaces were made.

Practically all of the trails leading to the lookout stations are comparatively short. Great care was taken to cleanly brush out these trails, improve the walking conditions, provide culverts and foot bridges where there is much rain wash, and to keep the telephone lines in good working order. Most of this trail and ground improvement was completed in time to take care of the hundreds of people who came up to the mountain lookouts to view the wonderful spectacle of the total eclipse.

Acts of Cooperation

At the close of the 1932 fire year there were many fine acts of cooperation between the State, Organized Towns and private individuals which are worth mentioning here.

For the past two years in the late summer and early fall several requests have come to this Office from Town Fair Associations to provide them with the services of the county fire warden together with his truck and equipment during fair time. Similar requests have also come from Fish and Game Associations for their annual field day celebrations. The presence of the county fire warden with his truck and equipment at these fairs and meetings has left a marked impression upon the people who saw what was being done in the way of cooperation for better forest fire prevention and protection work.

The State Highway Commission has cooperated in a splendid way by writing to all supervisors on road or bridge construction work to exercise care in properly disposing of slash and other inflammable material left by the side of the road, and cautioning all foremen to first get a permit from the local town officers before burning. In some instances burning was purposely delayed until the county fire warden could come to take charge. This is a fine spirit and will help much towards reducing the fire hazards.

In those towns where there is considerable brush and blueberry land burning, the local Town Selectmen have refused to issue burning permits until a time when the county warden could personally supervise the work. When a permit is issued, the watchman on the lookout station is notified and he can observe where the smoke is coming from and watch for a possible "out-of-control" fire. There can be no question but that many possible forest fires were stopped by this regulated burning.

Organized burning has also been carried out to prevent the scorching of trees along the roads and main highways. By small pile burning and pulling the slash and brush far enough away from the standing trees there has been preserved the natural beauty of the roadside trees. Much of the county warden's time has been spent in supervising such burning.

Another fine act of cooperation is the action taken by several of the railroad companies to send their representatives to the lookout stations and talk over the situation with the watchman and county warden. They also carefully supplied

the watchman with the names of the section foreman and their telephone numbers which are covered by that particular lookout. In addition, one watchman was given a free ride over a railroad line in order to more familiarize himself with the lay of the country.

In this brief summary of the work done for the fire seasons of 1931-32 in the Organized Towns it is felt that much has been accomplished and should be recorded as two most successful years.

ORGANIZED TOWNS

Financial Statement

1931

Receipts		
1931-1932 Appropriation	$5,000.00	
Federal Cooperation	27,607.66	
Reimbursement on Fire Tools	413.77	
Miscellaneous	225.70	
(Includes refunds on salaries and telephone rentals, etc.)		$33,247.13
Disbursements		
County Wardens	$11,809.51	
Supervision	2,856.28	
Watchmen	5,394.24	
Equipment	5,767.00	
(Tools—Pumps—Automobiles)		
Improvements	4,991.63	
(Towers—Camp Sites)		
Miscellaneous	88.41	30,907.07
Balance January 1, 1932		$2,340.06

(Expense of Fire Fighting by the Towns, $8,932.71)

ORGANIZED TOWNS

Financial Statement

1932

Receipts		
Balance on hand January 1, 1932	$2,340.06	
1932-1933 Appropriation	5,000.00	
Federal Cooperation	22,016.94	
Miscellaneous	23.00	
(Auxiliary State Forest inspections)		$29,380.00
Disbursements		
County Wardens	$8,994.55	
Supervision	2,548.85	
Watchmen	5,880.69	
Equipment	328.12	
(Tools, etc.)		
Improvements	157.11	
(Camp sites, etc.)		
Miscellaneous	47.03	17,956.35
Balance January 1, 1933		$11,423.65

(Expense of Fire Fighting by the Towns, $11,570.89)

LOOKOUT STATIONS IN THE ORGANIZED TOWNS

Stations	Opened		Closed		No. Fires	
	1931	1932	1931	1932	1931	1932
Agamenticus Mt.	April 16	April 22	Oct. 15	Sept. 30	43	95
*Blackstrap Mt.	.....	April 21	.....	Sept. 17	.....	68
*Chase Hill	.....	May 6	.....	Oct. 6	.....	75
Dedham Bald Mt.	April 14	April 25	Sept. 24	Sept. 30	64	43
*Frye Mt.	.....	May 10	.....	Sept. 30	.....	75
†Green Mt.	April 20	April 25	Oct. 15	Oct. 10	56	57
‡Kelly Mt.	April 21	May 5	Oct. 14	Oct. 6	51	34
May Mt.	May 11	May 2	Sept. 6	Sept. 21	7	12
*Mount Ararat	April 22	April 22	.....	Sept. 17	.....	83
*Mount Blue	.....	May 9	.....	Sept. 30	.....	19
Mountain Hill	May 18	April 25	Oct. 7	Sept. 17	29	40
Ossipee Mt.	April 13	April 21	Oct. 14	Sept. 30	19	54
Pleasant Mt.	April 20	April 25	Sept. 26	Sept. 30	6	25
Zircon Mt.	April 24	May 7	Sept. 26	Oct. 16	15	13
					290	693

*New Lookout Station
†In New Hampshire
‡Privately owned

FIRE RECORD 1931

Location	Date	Acreage	Cause	Damage
Androscoggin County				
Auburn	April 19	10	Grass burning	$50.00
Auburn	April 20	20	Brush burning	100.00
Auburn	April 21	25	Brush burning	100.00
Auburn	June 21	5	Brush burning	75.00
Turner	July 27	380	Berry pickers	2,000.00
Aroostook County				
Eagle Lake	April 22	30	Campers	.....
Moro Pl.	May 19	.....	Lumbermen	.....
Sherman	June 27	2	Campers	90.00
Cumberland County				
Raymond	April 16	10	Campers	4,000.00
Falmouth	April 16	6	Brush burning	.....
North Yarmouth	April 18	½	Smokers	10.00
Portland	April 20	50	Grass burning	50.00
Cumberland	April 20	2½	Grass burning	.....
Cumberland	April 21	5	Grass burning	20.00
Windham	May 18	10	Smokers	270.00
North Yarmouth	June 28	1	Lightning	.....
Otisfield	July 29	4	Berry pickers	35,050.00
Falmouth	Aug. 1	100	Berry pickers	100.00
Otisfield	Aug. 5	20	Brush burning	25.00
Windham	Aug. 6	60	Berry pickers	150.00
Cumberland	Aug. 8	4	Berry pickers	.....
Brunswick	Oct. 12	8	Hunters	80.00
Franklin County				
Carthage	April 15	5	Grass burning	10.00
Carthage	April 21	15	Incendiary	15.00
Carthage	April 22	4	Unknown	10.00
Hancock County				
Bucksport	April 22	60	Brush burning	40.00
Mt. Desert	April 24	60	Brush burning	100.00
Verona	April 24	1	Lumbermen	30.00
Hancock	April 25	Camp and 10	Lumbermen	333.00
Gouldsboro	May 6	1	Unknown	.....
Orland	May 7	13	Incendiary	25.00
Aurora	May 30	50	Fishermen	.....
Sullivan	July 10	⅛	Fishermen	.....
Trenton	July 29	3	Berry pickers	15.00
Mt. Desert	Aug. 2	20	Campers	.....
Bar Harbor	Aug. 2	10	Berry pickers	20.00
Dedham	Oct. 13	40	House burning	150.00
Kennebec County				
Augusta	April 22	20	Brush burning	100.00
Augusta	April 22	150	Brush burning	200.00
Augusta	April 25	5	Grass burning	25.00
Augusta	May 2	20	Miscellaneous	10.00
Litchfield	Sept. 13	4	Fishermen	20.00

Location	Date	Acreage	Cause	Damage
Knox County				
Cushing	April 15	12	Unknown	40.00
Cushing	April 17	85½	Blueberry burning.	100.00
St. George	April 18	2	Brush burning	10.00
Rockport	April 19	185	Blueberry burning.	50.00
Washington	April 19	6	Blueberry burning.	60.00
Warren	April 19	251	Unknown	300.00
Owl's Head	April 20	10	Grass burning	50.00
Washington	April 20	20	Unknown	200.00
Warren	April 20	29	Unknown	40.00
Owl's Head	April 21	6	Brush burning	60.00
Owl's Head	April 24	6	Unknown	25.00
Appleton	May 3	4	Blueberry burning.	87.00
Lincoln County				
Damariscotta	April 16	60	Grass burning	40.00
Jefferson	April 16	10	Rubbish burning	60.00
Boothbay	April 19	31	Grass burning	150.00
Waldoboro	April 20	6	Brush burning	25.00
Wiscasset and Dresden	April 21	165	Unknown	150.00
Waldoboro	April 22	35	Blueberry burning.	125.00
Jefferson	April 23	25	Brush burning	.....
Waldoboro	April 24	30	Blueberry burning.	50.00
Somerville	April 24	15	Smokers	.....
Newcastle	May 6	115	Unknown	850.00
Edgecomb	May 6	500	Road crew	2,000.00
Oxford County				
Paris	June 28	3	Brush burning	30.00
Sumner	Aug. 5	2	Lumbermen	.....
Penobscot County				
Orrington	June 28	20	Incendiary	.....
Piscataquis County				
Medford	April 15	5	Unknown	20.00
Abbott	April 21	25	Grass burning	30.00
Monson	April 21	40	Railroad	140.00
Monson	April 22	4	Railroad	12.00
Blanchard	April 25	2	Rubbish burning	.....
Monson	May 5	2	Brush burning	.....
Williamsburg	May 7	5	Unknown	20.00
Wellington	June 5	1¼	Unknown	10.00
Wellington	June 21	1/40	Unknown	.....
Wellington	Oct. 13	175 cds. & 25	Smokers	1,250.00
Williamsburg	Oct. 14	4	Hunters	10.00
Abbott	Nov. 12	¼	Railroad	3.00
Parkman	Nov. 14	½	Brush burning	.....
Sagadahoc County				
Bath	April 14	20	Miscellaneous	100.00
West Bath	April 16	31	Grass burning	80.00
Richmond	April 16	10	Smokers	100.00
Bowdoinham	April 16	10	Grass burning	150.00
Bowdoinham	April 18	1	Smokers	.....

Location	Date	Acreage	Cause	Damage
Sagadahoc County				
Topsham	April 20	3	Miscellaneous	
Topsham	April 20	75	Grass burning	250.00
West Bath	April 21	8	Blueberry burning	20.00
Bowdoinham	April 21	10	Miscellaneous	
West Bath	April 23	10	Hunters	50.00
Bowdoinham	April 24	5	Railroad	
Bowdoinham	April 25	1	Brush burning	
West Bath	April 25	5	Miscellaneous	
Richmond	May 2	1	Campers	
Phippsburg	May 5	10	Brush burning	25.00
Bowdoinham	June 22	⅛	Brush burning	
Bowdoinham	Aug. 6	¼	Railroad	
Somerset County				
Embden	May 8	5	Unknown	50.00
Waldo County				
Palermo	April 20	5	Brush burning	
Frankfort	April 20	15	Blueberry burning	25.00
Stockton Springs	April 24	30	Brush burning	10.00
Swansville	May 6	5	Brush burning	25.00
Belfast	May 6	60	Blueberry burning	65.00
Stockton Springs	May 6	1	Brush burning	
Stockton Springs	Aug. 1	2	Blueberry pickers	10.00
Searsport	Aug. 2	50	Raspberry pickers	10.00
Washington County				
Harrington	April 16	100	Blueberry burning	500.00
East Machias	April 25	1	Brush burning	3.00
Baring	May 21	30	Miscellaneous	324.00
Columbia Falls	May 30	1	Miscellaneous	
Centerville	June 25	2	Incendiary	3.00
Columbia Falls	July 6	2	Unknown	2.00
Roque Bluffs	Oct. 12	5	Brush burning	25.00
Steuben	Oct. 12	¼	Miscellaneous	
York County				
Shapleigh	April 14	300	Smokers	
Alfred	April 14	2	Railroad	20.00
No. Kennebunkport	April 17	50	Grass burning	
Kittery	April 19	2	Unknown	20.00
Hollis Center	April 25	½	Railroad	
Alfred	April 28	20	Fishermen	100.00
Hollis Center	April 28	1½	Railroad	10.00
York	May 1	2	Unknown	20.00
Waterboro	May 3	5	Fishermen	
Shapleigh	May 4	200	Grass burning	
Shapleigh	May 6	50	Smokers	
Limerick	May 17	1½	Campers	
Hollis Center	May 18	2	Brush burning	20.00
Waterboro	May 20	¼	Railroad	
Kennebunk	May 29	45	Fishermen	100.00
Lyman	May 29	2½	Lumbermen	30.00
Cornish	Aug. 1	50	Smokers	
Shapleigh	Aug. 2	2	Campers	
Limington	Aug. 6	3	Smokers	

FIRE RECORD—1932

Location	Date	Acreage	Cause	Damage
Androscoggin County				
Auburn	May 20	10	Smokers	.....
Lisbon	July 16	20	Berry pickers	.....
Aroostook County				
Castle Hill	May 11	15	Brush burning	45.00
Castle Hill	May 11	20	Brush burning	20.00
Castle Hill	May 13	300	Brush burning	300.00
Wallagrass Pl.	May 16	56	Lumbermen	100.00
St. John Pl.	June 1	600	Brush burning	600.00
Cumberland County				
Gray	April 21	150	Unknown	200.00
Scarboro	April 23	500	Brush burning	425.00
Baldwin	April 30	60	Brush burning	100.00
Otisfield	April 22	100	Brush burning	300.00
Poland	April 22	50	Brush burning	100.00
Cumberland	April 29	2	Brush burning	.....
Windham	May 5	2½	Smokers	.....
Scarboro	May 7	25	Fishermen	25.00
North Yarmouth	May 7	25	Unknown	50.00
Falmouth	May 9	2	Brush burning	.....
North Yarmouth	May 9	1	Incendiary	.....
Westbrook and Falmouth	May 14	5	Brush burning	10.00
Gorham	May 16	10	Incendiary	10.00
Cumberland	May 17	1	Incendiary	10.00
Standish	June 29	4	Incendiary	.....
Otisfield	Nov. 30	100	Brush burning	300.00
Franklin County				
Eustis	April 29	1	Unknown	.....
Eustis	April 29	12	Brush burning	.....
Hancock County				
Bar Harbor	April 21	1	Smokers	3.00
Winter Harbor	April 24	3	Incendiary	15.00
Winter Harbor	April 24	5	Berry pickers	25.00
Dedham	April 29	¾	Steam shovel	150.00
Bluehill	May 8	2	Unknown	.....
Dedham	May 16	55	Steam shovel	125.00
Bucksport	May 18	3	Incendiary	20.00
Orland	May 18	3	Unknown	.....
Gouldsboro	May 19	300	Incendiary	2,000.00
Orland	May 19	2	Unknown	.....
Ellsworth	May 20	1½	Smokers	.....
Dedham	May 26	2	Railroad	.....
Bucksport	June 16	Stable and 1	Fishermen	25.00
Bluehill	June 21	20	Unknown	.....
Kennebec County				
Litchfield	April 21	2	Brush burning	5.00
Benton	April 29	10	Unknown	10.00
Gardiner	May 8	3	Unknown	15.00
Chelsea	May 12	10	Brush burning	50.00
Gardiner	July 25	1	Berry pickers	10.00

FIRE RECORD—1932 (Continued)

Location	Date	Acreage	Cause	Damage
Knox County				
Union	April 29	3	Brush burning	10.00
Washington	April 29	3	Grass burning	15.00
Washington	May 8	4	Fishermen	20.00
Warren	May 14	10	Blueberry burning	100.00
Warren	May 14	4	Railroad	20.00
Warren	May 19	25	Grass burning	25.00
Lincoln County				
Newcastle and Edgecomb	April 21	25	Unknown	25.00
Bristol	April 21	2	Brush burning	5.00
Waldoboro	April 23	5	Railroad	25.00
Westport	May 4	4	Grass burning	20.00
Whitefield	May 5	4	Unknown	20.00
Waldoboro	May 6	6	Unknown	15.00
Boothbay	May 10	10	Smokers	40.00
Waldoboro	May 11	7	Grass burning	15.00
Whitefield	May 15	1	Unknown	.....
Damariscotta	May 16	3	Unknown	15.00
Alna	May 16	2	Blueberry burning	.....
Jefferson	May 18	36	Unknown	20.00
Wiscasset	July	3	Unknown	30.00
Oxford County				
Oxford	May 11	20	Unknown	300.00
Woodstock	May 16	25 cords	Brush burning	85.00
Bethel	May 20	100	Unknown	300.00
Sweden	June 11	10 cds. & 75	Smokers	500.00
Denmark	June 21	2	Unknown	10.00
Penobscot County				
Medway	April 30	24	Farmers	50.00
Medway	April 30	24	Farmers	50.00
Millinocket	May 7	8	Incendiary	15.00
Medway	May 9	.....	Farmers	.....
Millinocket	May 13	2	Unknown	4.00
Medway	May 13	1	Brush burning	.....
Enfield	May 14	10	Unknown	50.00
Millinocket	May 16	½	Unknown	.....
Medway	May 17	6	Unknown	15.00
Medway	May 18	5	Incendiary	15.00
Medway	May 18	5	Unknown	15.00
Medway	May 21	40	Incendiary	500.00
Medway	May 21	3	Incendiary	5.00
Medway	May 21	10	Incendiary	.....
Medway	May 25	15	Fishermen	55.00
Millinocket	June 9	½	Fishermen	.....
Medway	June 19	.....	Farmers	.....
Millinocket	June 21	3	Unknown	.....
East Millinocket	June 26	2	Brush burning	5.00
Piscataquis County				
Blanchard	April 19	1	Brush burning	25.00
Monson	April 27	4	Brush burning	25.00
Abbott	May 11	¼	Railroad	.....
Orneville	May 17	40	Unknown	150.00
Orneville	May 25	¼	Unknown	2.00

FIRE RECORD—1932 (Continued)

Location	Date	Acreage	Cause	Damage
Sagadahoc County				
Bowdoin	April 19	3	Incendiary	10.00
Woolwich	April 22	15	Buildings burning	80.00
Bowdoinham	April 22	35	Brush burning	35.00
Litchfield	April 22	80	Brush burning	130.00
Bowdoinham	April 25	40	Brush burning	80.00
Georgetown	May 4	300	Incendiary	300.00
Brunswick	May 7	7	Brush burning	.....
Brunswick	May 9	10	Brush burning	10.00
West Bath	May 12	2	Brush burning	.....
Brunswick	May 16	125	Incendiary	695.00
Harpswell	May 17	150	Lumbermen	1,000.00
Phippsburg	May 22	10	Campers	50.00
Brunswick	May 26	6	Unknown	20.00
West Bath	June 26	1	Incendiary	.....
Topsham	Aug. 2	½	Berry pickers	.....
Topsham	Aug. 5	¾	Road crew	.....
Waldo County				
Northport	April 21	2	Brush burning	.....
Belfast	April 22	2	Brush burning	20.00
Northport	April 22	95	Brush burning	500.00
Prospect	April 24	⅓	Unknown	.....
Troy	May 13	20	Unknown	50.00
Winterport	May 18	75	House burning	400.00
Knox	May 20	25	Unknown	325.00
Washington County				
Baring	April 22	100	Incendiary	300.00
Baring	April 23	2	Incendiary	.....
Baring	April 23	4	Incendiary	.....
Calais	April 25	10	Incendiary	10.00
Calais	May 7	2¾	Brush burning	2.00
Trescott	May 8	2½	Incendiary	.....
Baring and Calais	May 8	3½	Incendiary	20.00
Cutler	May 9	2¾	Incendiary	12.00
Robbinston	May 12	20	Incendiary	15.00
Baileyville	May 13	65	Incendiary	1,336.00
Calais	May 14	1½	Incendiary	2.00
Crawford	May 16	4	Incendiary	24.00
Crawford	May 16	3	Incendiary	17.25
Alexander	May 18	2¼	Incendiary	12.00
Alexander	May 18	2½	Incendiary	12.00
Baring	June 5	2	Incendiary	23.00
Pembroke	July 14	⅛	Smokers	4.00
Baring	Aug. 16	¼	Incendiary	.....
York County				
Sanford	April 21	40	Unknown	100.00
Sanford	April 21	4	Brush burning	20.00
Shapleigh	April 22	5	Incendiary	10.00
Biddeford	April 22	15	Fishermen	45.00
Sanford	April 22	10	Unknown	30.00
Shapleigh	April 23	25	Incendiary	50.00

FIRE RECORD—1932 (Concluded)

Location	Date	Acreage	Cause	Damage
Limington	April 23	135	Incendiary	300.00
Sanford	April 29	252	Unknown	50.00
No. Kennebunkport	May 3	160	Brush burning	150.00
Limerick	May 4	25	Smokers	25.00
Waterboro	May 8	1½	Smokers	.....
Hollis	May 8	1	Glass mirror	.....
Kennebunk	May 12	25	Brush burning	25.00
Kennebunk	May 12	1	Smokers	.....
Shapleigh	May 14	25	Incendiary	75.00
Biddeford	May 14	1,000	Brush burning	1,000.00
Sanford	May 20	30	Incendiary	1,500.00
Kennebunk	May 27	300	Smokers	300.00
York	June 21	25	Fishermen	50.00
Limington	July 15	8	Smokers	40.00
Shapleigh	July 21	3	Berry pickers	10.00
Limington	Aug. 2	75	Incendiary	300.00
No. Kennebunkport and Biddeford	Sept. 9	30	Brush burning	150.00
Buxton	Sept. 10	½	Smokers	.....

Summary of Forest Fires for 1931-1932 by Months, Counties and Causes

	No. of Fires		Acreage		Damage	
	1931	1932	1931	1932	1931	1932
By Months:						
April	70	44	2,270 1/12	1,862½	$8,369.00	$3,333.00
May	28	87	1,141¼	3,644¼	3,921.00	13,686.00
June	9	13	34 2/5	735½	208.00	1,213.00
July	5	6	389⅜	35⅛	37,067.00	94.00
August	13	4	323¼	76½	315.00	300.00
September	1	2	4	30	20.00	150.00
October	6	.....	82¼	.....	1,515.00	.....
November	2	1	¾	100	3.00	300.00
	134	157	4,245 21/40	6,483 23/24	$51,417.00	$19,076.00
By Counties:						
Androscoggin	5	2	440	30	$2,325.00	.....
Aroostook	3	5	32	991	90.00	1,065.00
Cumberland	14	16	281	1,037½	39,755.00	1,530.00
Franklin	3	2	24	13	35.00	.....
Hancock	12	14	268⅜	399¼	713.00	2,363.00
Kennebec	5	5	199	26	355.00	90.00
Knox	12	6	616½	49	1,022.00	190.00
Lincoln	11	13	992	108	3,450.00	230.00
Oxford	2	5	5	197	30.00	1,195.00
Penobscot	1	19	20	159	.....	779.00
Piscataquis	13	5	114 1/40	45½	1,495.00	202.00
Sagadahoc	17	16	200⅜	785¼	775.00	2,410.00
Somerset	1	.....	5	.....	50.00	.....
Waldo	8	7	168	219⅓	145.00	1,295.00
Washington	8	18	141¼	228⅛	857.00	3,497.00
York	19	24	739¼	2,196	320.00	4,230.00
	134	157	4,245 21/40	6,483 23/24	$51,417.00	$19,076.00
By Causes:						
Berry pickers	9	5	613	29½	37,355.00	45.00
Blueberry burn'g	10	2	528½	12	1,082.00	100.00
Brush burning	26	37	470⅝	3,285¾	973.00	4,532.00
Campers	7	1	66½	10	4,090.00	50.00
Farmers	.....	4	.....	48	.....	100.00
Fishermen	6	7	124⅛	85½	220.00	220.00
Grass burning	15	4	569½	39	905.00	75.00
Hunters	3	.....	22	.....	140.00	.....
Incendiary	4	38	50	1,337¼	43.00	9,321.00
Lightning	1	.....	1	.....	.....	.....
Lumbermen	5	2	15½	206	393.00	1,100.00
Miscellaneous	12	6	641¼	146½	2,644.00	775.00
Railroad	9	4	53¾	11¼	185.00	45.00
Smokers	10	13	464½	436⅛	1,630.00	912.00
Unknown	17	34	625 11/40	836 1/12	1,757.00	1,821.00
	134	157	4,245 21/40	6,483 23/24	$51,417.00	$19,076.00

ENTOMOLOGY

ENTOMOLOGY

Due to the large percentage of forested area in the State the majority of the entomology work is directed towards the detection, control, and suppression of forest and shade tree insects. Approximately three thousand inquiries were received during the year 1932 covering all phases of entomological work, and about 2,500 in 1931. Although the majority of these inquiries were in regards to native insect pests it is surprising to note the increase in foreign invaders. During the two years 1931-1932, covered by this report, a total of thirty-seven species of foreign insects were reported in outbreak form in the State. A number of these were reported in the State this past summer for the first time and although at present restricted to local areas will undoubtedly spread over wide areas unless controlled. Every possible effort is being made to exterminate the outbreaks before they do spread. As the State has insufficient funds for this work it is necessary to depend largely on cooperation from owners of infested property. This cooperation is being splendidly given.

One of the most important phases of the work has been the maintenance of the Field Laboratory at Bar Harbor. Laboratory quarters have been furnished free by the National Park Service and the Jackson Memorial Laboratory. Winter quarters have been furnished by the town of Bar Harbor. At this laboratory large numbers of parasites are reared for distribution in infested areas. Studies are made of large numbers of insects each year to find the best method of control. New sprays are tried out so that the best possible means of controlling insect pests can be furnished to the public. This work is absolutely essential for no other agency is working on these lines and a large number of the insect pests about which inquiries are made have not had any control worked out for them. The work at the laboratory is carried on by Dr. A. E. Brower and Mr. Arthur M. Gillespie who also look after inquiries in the eastern part of the State.

The work of detecting insect outbreaks which is carried on in cooperation with the Maine Forest Service forest fire protective organization has proved very effective. Splendid cooperation has been received from the wardens, patrolmen, and lookout men. During the past two years practically all of the men have been visited and instructed as to what insects to be on the lookout for. The report blanks and mailing tubes furnished the men have proved very helpful. Due to this service, outbreaks have been located while still small and control measures started before the outbreaks have become widespread. This work is particularly helpful in the case of insects such as bark beetles and scale insects which spread rather slowly. It has also proved effective in the case of some defoliating insects when control measures were immediately put in effect.

TREE SURGERY

Each year has seen a rapidly increasing interest in shade trees owned by minicipalities and private individuals. Unfortunately this interest is being preyed upon by literally hordes of unscrupulous "tree surgeons" who scare tree owners into the belief that unless they are hired immediately to look after the trees, the trees will die. Thousands of dollars are thrown away on work which usually leaves trees in worse shape than they were before treatment. Several cases have come to notice where $500 or more have been spent on an individual tree. The favorite sales talk has to do with cavity work. In general it can be stated that it does not pay to fill large cavities. The purpose of cement is not to add strength to a tree but primarily to form a surface over which new growth can spread. Decay in itself is usually very slow acting and the removal of infested wood is nowhere near as important as is usually made out. Spraying has also become a racket in which itinerant crews go from town to town spraying with anything for everything at any time. In many cases trees are ruined by oil sprays or strong arsenic sprays which burn the foliage. One of the most important phases of tree work is feeding. A healthy growing tree will overcome much injury

from fungus and insect attack. A well balanced tree food must however be used. Such a food should contain available nitrogen, potash, and phosphorous.

There are a number of reliable conscientious tree concerns whose work and advice can be depended upon. Their men are usually well trained and are insured against accident. There is considerable demand from these companies for a self sustaining licensing law which will protect not only their own legitimate business, but the public as well, from unscrupulous workers. Such a law exists in several states.

FOREST INSECTS

Only what appear to be the most serious outbreaks will be listed. Some of these spread in from Eastern Canada. Others appear to have come in on nursery stock.

1. Beech Scale. Ever since the severe outbreak of the Felted Beech Scale (*Cryptococcus fagi*), a European insect, was reported in Nova Scotia and New Brunswick, a particularly careful watch has been kept in Maine for its appearance here. The first report was received in the fall of 1931 from the town of Liberty. A careful check up in this area indicated that the outbreak in Liberty was several years old and approximately twenty smaller outbreaks, apparently having spread from this, were found in the surrounding towns of Palermo, Montville, Washington, and Somerville. Another report came from Charlotte in Washington County. An examination here showed the outbreak to be of several years duration and a large amount of beech was already dead. Beech stands in Pembroke, Meddybemps, and Baring were also heavily infested. The owners of all infested areas were visited and asked to cooperate with the State by cutting and hauling out for fire wood all of the infested trees. In all cases cooperation was promised. The insect is followed by a fungus disease (*Nectria sp.*) which shows up as red fruiting bodies on the trunk. There seems to be little question but that the beech in Maine will disappear like the chestnut unless active measures are applied. It will require constant vigilance.

2. Birch Leaf Miner. The white birch of the State has suffered severely during the past few years from attack by three serious defoliators. The fact that two of them appear in the late summer has led many people to believe that they would not prove serious. Such, however, is positively not the case as very thorough studies have shown that fall defoliation not only seriously retards growth but will kill white birch. In the manufacture of novelties, which is the principle market for white birch, it is the sapwood which is used. The slowing up of growth greatly increases the amount of "red heart" or heartwood and thereby cuts down the value of the birch in some cases to such an extent that it cannot be marketed.

The Birch Leaf Miner (*Phyllotoma nemorata*), a European insect, was first reported in Maine in 1926 having previously been in outbreak form in Eastern Canada. The insect spread over the State in the most rapid manner that has ever come to our attention. The adult belongs to the group of four winged flies known as sawflies and is a strong flier. It is also apparently carried long distances by the wind for even birches on the islands off the coast of Maine are infested. Another important factor in its spread is that there are no males so that each individual is capable of laying fertile eggs. This doubles the possibility of increase. The larval stage mines in the leaves causing them to turn brown at a time when the leaves are manufacturing food for the coming years growth. In order to combat this insect large numbers of parasites are being raised and distributed in the most heavily infested areas. This work is proving very satisfactory and we have every reason to believe that the parasites will eventually control the insect. Satisfactory spray schedules for ornamental birches were worked out.

3. Birch Case Bearer. (*Coleophora salmani*). This insect first appeared in Maine about 1926. Its origin is unknown. The outbreak first appeared near Bar Harbor. In the following years it spread rather slowly to the mainland and due to the shipment of infested nursey stock from the Island several outbreaks occurred inland at some distance.

These were completely stamped out. Here again parasites are beginning to show promise of controlling the insect. A bulletin setting forth the results of our work with this insect was published in 1932.

4. Birch Leaf Skeletonizer. (*Bucculatrix canadensisella*). This native insect has appeared in great numbers throughout the northern two-thirds of the State during the past two years. The small pale green larvae skeletonize the under surface of the leaf. As this is a native insect which appears periodically it has not seemed worth while to attempt any control measures.

5. Fir Bark Louse. (*Dreyfusia picea*). This European insect appeared in epidemic form in Maine in 1931. Arrangements were made to start control measures in these areas. Futher surveys showed the insect to be present in many localities along the coast where much of it has already been killed. This insect has been reported as destroying vast amounts of fir in New Brunswick and Nova Scotia. In 1932 several severe outbreaks were found at points inland near Weld and Bingham. The owners were notified and it is hoped that the infested timber will soon be cut. The injury caused by this insect is very unusual. The twigs and branches on infested trees swell and the buds become enclosed in the swollen tissue and die. The tops of the trees become very much stunted and umbrella shaped. The insect appears as white flocculent areas on the bark and buds. A mild outbreak appears to be sufficient to kill the trees. The Maine Forest Service is starting a study of this insect.

6. Larch Case Bearer. Serious outbreaks of the Larch Case Bearer (*Coleophora laricella*) continue throughout most of the State. In some areas twenty-five percent of the stand has already been killed. This insect is of foreign origin and attempts to rear native parasites have so far been futile. An effort will be made to obtain parasites from abroad. A fairly complete series of spraying experiments have been carried on with the result that efficient sprays have been found for all seasons of the year.

7. Larch Sawfly. (*Lygaeonematus erichsonii*). Outbreaks have occurred in several sections of the State. This insect has been responsible in the past for the almost complete annihilation of the larch in the Northeast. The Canadian Government imported parasites from England and liberated them in Manitoba with the result that in 1916 nineteen percent of the larvae were parasitized, in 1919 forty percent, in 1920 sixty-six percent, in 1927 seventy-five percent, and in 1928 as high as eighty-eight percent. This is an excellent check up of what parasites can do to bring an outbreak under control. The Federal Government has started liberating parasites for this insect and are cooperating with the State.

8. White Pine Weevil. By far the most serious insect enemy of the white pine is the White Pine Weevil (*Pissodes strobi*). This insect destroys the terminal shoots of the white pine spoiling the trees for lumber purposes. With the increase of areas coming in to white pine the insect has increased tremendously in numbers and to a large extent is discouraging the planting of this species. As is often the case under epidemic conditions the insect is attacking other species which hitherto have been considered relatively immune. In cooperation with the Bates College Forest in Alfred, Mr. D. W. Leavitt in Parsonsfield, and several pine owners near Augusta, an intensive effort is being made to find a practical way of controlling the weevil. Experience has shown that to be of any real value experimental plots on weevil control must be extensive in size and located in an area where weeviling is prevalent. In the past experiments on some areas have given what appeared to be a high degree of control but further experiment showed the idea to be of little value when applied on a large scale. Six methods of approach were used: (1) protective bands and collars to prevent weevils reaching the leader, (2) repellants, (3) attractant poison baits, (4) attractant and repellant colors, (5) insectivorous birds, and (6) mixed plantations. Under the first head trees were treated with bands of tanglefoot, one series placed about midway on trunk, one at top whorl, and one just below terminal buds. The degree of control proved very slight, although the series with tanglefoot

placed just below terminal buds seems worthy of further trial. Inverted cones placed just below top whorl which absolutely prevented weevils from climbing proved useless. Due to previous apparent success 1,500 trees were treated with tar paper collars which it was believed would act not only as a means of preventing weevils from climbing but also as a repellant. The results were very variable but gave a small degree of control. A series of trees were sprayed with different dilutions of oil of cedar and glycerine. The spraying proved ineffective. Other trees were treated by tying sprays of cedar to the leaders but this gave no control. The results from Bordeaux, arsenate of lead, and lime sulphur sprays were inconclusive due to lack of severe weeviling in sprayed areas.

Poisin baits using pine derivative oils, plus bran, pine sawdust, and arsenate of lead failed to attract weevils although the odor of pine was noticeable for a distance of twenty feet throughout most of the season. The baits were placed in open pans at about the height of the pine and protected from rains by means of a shade.

Some insects are repelled or attracted by colors and a series of plots were set out using colored cloths on the pine leaders. Red, white, and yellow were used. The colors apparently had no effect.

In cooperation with the Waterville Water District, whose plantations have been very severely injured by the weevil, bird houses were erected in one of their new plantations in an effort to attract the birds which are known to feed on the weevil. This control project is one which will take several years before definite results will show up. In cooperation with the Augusta Water District and local owners eight mixed plantations were started.

The results of the weevil work to date indicate (1) Weevils are not attracted or repelled by odors or colors so far as tried, (2) the majority of the weevils fly directly to the tops of the trees, (3) density of planting (6x6) will overcome weevil injury only when it is slight, (4) the infestation of leaders is largely mechanical or in other words due to their dominance in a stand. Continued examination shows that when the pine is out-topped by protecting hardwoods very little weevil-

ing results. (5) Notes on flight proved the weevils to be strong fliers. Although the flying is largely done in mid-day they are strongly attracted to lights at night.

9. White Grubs. For several years a number of forest nurseries throughout New England have been cooperating with the Maine Forest Service in an effort to find a practical control for white grubs which are extremely destructive to nursery stock. Several hundred plots have been treated with crude arsenic in amounts varying from 100 to 1,500 pounds per acre. Eleven species of coniferous seedlings and transplants were experimented with in three types of soil, fine sandy loam, sandy loam, and sandy silt loam. The results indicate that 200 pounds per acre of crude arsenic should be used the first year followed by amounts of 100 to 150 pounds in following years depending upon amount of grub damage. Due to the spotted type of infestation commonly found in nurseries it is difficult to check as accurately as desired. To meet this situation two series of potted trees with known number of grubs and accurately measured amounts of arsenic were started. The object of one series was to determine how much arsenic a tree will stand and of the other series the minimum amount necessary to kill the grubs.

In the first series red pine transplants were used and crude arsenic in amounts varying from 585 to 37,484 pounds per acre were added to the soil. One series treated at a rate of 2,343 pounds per acre were killed and nearly all trees in soil treated with 4,500 pounds or more per acre died. Arsenic injury is very characteristic in that the needles start browning at the base so that in the early stages the needles will appear brown at the base and green at the tips. A quantitative chemical analysis of needles from trees which had died showed relatively high amounts of arsenic present. From this series of experiments it is indicated that no danger will result from use of crude arsenic in amounts recommended. It is possible that some species may be more susceptible than red pine but field experiments have not shown this in the present study.

A second series using potted white pine transplants and known numbers and size of grubs was also carried through.

In this series crude arsenic in rates running from 100 to 300 pounds per acre and lead arsenate at similar rates were used. An average of five grubs were used with each amount of arsenic and notes were taken throughout the season on amount of feeding and condition of grubs. This was done by sifting the soil. The results show that crude arsenic or lead arsenate used at rates of 100 to 150 pounds per acre are not satisfactory. At the rate of 200 pounds per acre fair control was obtained. Lead arsenate used at rates of 200 to 250 pounds per acre gave fair control whereas crude arsenic used at these rates gave very good control. The results of the control projects using potted plants correspond almost identically with those carried on in the field. If the grubs are very numerous in the nursery it will probably be necessary to use as high as 250 pounds of crude arsenic per acre the first year, otherwise the 200 pounds previously recommended should prove satisfactory.

10. Borers in logs. Pine, fir, and spruce logs or dimension lumber left in the open with the bark on during the spring and summer months usually becomes heavily infested with borers that spoil the wood for lumber purposes. For several years the Maine Forest Service has cooperated with the Bates Forest, The Brown Co., and the Diamond Match Co., in an effort to find a practical way of keeping borers out of logs. Dusting with lime sulphur has given the most promising results. In 1931 approximately 1,300,000 feet of pine logs were dusted in Moosehead and Saponac Lakes and the East Branch of the Penobscot. In previous years logs floated in coves where the exposed surfaces dried were infested with borers. The cost of labor, travel, and material amounted to twelve cents per thousand. This cost was high due to inexperience. The results were successful.

In both 1931 and 1932 the Diamond Match Co., furnished pine logs which were stacked in two triangular piles, one of which was dusted and the other left as a check. The logs were from twelve to sixteen feet long and averaged ten inches in diameter. The logs in the treated pile were dusted with lime sulphur using a hand duster operated with a crank. The 1932 logs were dusted May 19 and inspected September 26.

The results were not as satisfactory as expected from previous experiments due apparently to washing off of the lime sulphur as the borers present in the logs were concentrated largely in five of the top logs. The lime sulphur reduced the infestation of round headed borers by 73% and flat headed borers by 59%. It would seem advisable to stack logs off the ground so as to allow for rapid drying and to use a heavier dosage of lime sulphur on the upper surfaces. Covering the logs with balsam brush will also aid in preventing damage.

Pine lumber sawed round edge in stock two inches or more thick and piled in the open during the spring may be completely ruined by borers. One inch stock seems to dry out so as to prevent injury. If dimension stock is to be cut and sawed in the spring and summer it should be square edged i. e. all bark removed.

11. Poplar Leaf Roller. During 1931 nearly 100,000 acres of poplar were defoliated by the Poplar or Dusky Leaf Roller (*Tortrix conflictana*), in the region near Skinner and in areas around Kokadjo. This insect had not previously been reported in epidemic form in Maine, although outbreaks have occurred in Manitoba. Indications are that the insect may have been brought in on the railroad. In 1932 the outbreak appeared to have subsided to a considerable degree. A heavy outbreak of the Forest Tent Caterpillar (*Malacosoma disstria*) on poplar occurred on No. 8 Plantation, Hancock County. The caterpillars were present in millions and swarmed over the main highway. This is a native insect that is heavily parasitized and usually brought under control through natural forces.

12. Spruce Bark Beetle. Several outbreaks of the Eastern Spruce Beetle (*Dendroctonus piceaperda*) have occurred in Northern Maine. The areas have been gone over by the department and recommendations on control made to the landowners. What appears to be the beginning of a severe outbreak was located in a stand of virgin spruce in Northern Franklin County. Arrangements are being made by the owners to cut the infested timber before the outbreak spreads.

If the timber is cut to a small diameter, such as in pulping operations, and taken out of the woods before spring the outbreak can be stopped.

13. Spruce Web Worm (*Epinotia nanana*) **and Spruce Gall Aphid** (*Adelges abietis*). These two insects which have appeared in epidemic form on the spruce along the coast of Maine somewhat subsided during 1932. A large amount of spraying was done by estate owners. A rather uncommon species of spruce gall (*Adelges pinifoliae*) occurred in some localities along the coast. Much of the spruce infested by these insects surround summer estates and hotels and is therefore of considerable value.

14. White Spruce Sawfly. (*Diprion polytomum*) Specimens were collected near Mt. Katahdin, and in Bar Harbor. This insect has recently appeared on the Gaspe Peninsula in Quebec where large areas of spruce have been defoliated. The appearance in Maine this past year is its first record in the United States. No defoliation in Maine has been reported as yet and extreme care will be taken to watch out for it.

15. Continuing Projects. The artificial defoliation experiments which were started in 1927 and which are still underway are bringing out some extremely worth while information which will be published when complete. The object of this work is to determine how much defoliation various species of trees can stand and what the effect is at various seasons of the year. Many of the trees are already dead.

The project on control of the Spruce Bud Worm by girdling infested trees which was started in 1924 is being continued to study the succession of insects and fungi which attack dying and dead trees. This project has already shown the possibility of controlling the bud worm by girdling infested trees and is now showing the length of time trees girdled at different seasons of the year will remain worth salvaging. When completed it is planned to publish the results of this project.

SHADE TREE INSECTS

The past two years have seen many serious outbreaks on shade trees. Calls for assistance are received from all sections of the State. It is very evident that many of the insect pests are brought in on nursery stock. It is very pleasing to note the increased interest that is being shown for the value of the shade trees to the State can hardly be overestimated. The Satin Moth (*Stilpnotia salicis*) was very prevalent in central Maine where in many towns and cities they swarmed over houses. The European Fruit Lecanium (*Lecanium corni*) was quite prevalent on elm trees in northern Aroostook. This scale insect attacks a great variety of trees. Red spiders have been prevalent on many species of hardwoods and softwoods throughout the State causing the foliage to take on a rusty appearance. The Elm Bark Louse was found in several localities in Augusta having come in on nursery stock. The Pine Leaf Scale was found on spruce, hemlock, pine, and balsam fir. Outbreaks of the Elm Leaf Beetle occurred in many cities and towns in the southern third of the State. Severe outbreaks of the Willow Snout Beetle (*Orchestes rufipes*) occurred in Kennebunk, Portland, Falmouth, and a light infestation in Bangor. This European insect mines in the leaves in the larval stage and chews holes in the foliage in the adult stage. The department has been carrying on extensive spray experiments in an effort to find a suitable method of control. The insect is very resistant to sprays and has proved very difficult to control although the results obtained this last summer are very promising.

HOUSEHOLD INSECTS

There is a rapidly growing demand for information on insects commonly found in houses and a small State publication giving the best methods of control is needed for distribution. The losses from such insects as cloths moths, grain beetles, meal worms, larder beetles, carpet beetles, and bean and pea weevils is very great. Many calls are received for information on the control of cockroaches, bed bugs, fleas, ants, crickets, and silver fish. Another type of insect commonly

inquired about are borers attacking woodwork and furniture. Insect affecting human health such as flies, mosquitoes and some of the insects already mentioned cause far more loss through spreading disease than the public is aware of. There is a growing feeling amongst those taking in overnight transients that insects are often spread by tourists.

Several rather unusual insect outbreaks have occurred. Swarms of strawberry root weevils have invaded houses in widely separated parts of the State. Those are large black beetles which enter houses to pass the winter. Three outbreaks of tineid larvae in cases made of lichens have occurred. These queer insects encased in grayish cases about three-eighths inch long invaded houses in two sections of the State. A third unusual outbreak was of Spider Beetles (*Megium americanum*) which feed on fur coats, animal skins, etc. These minute beetles appear like small, rather stout, brick-red spiders.

ORCHARD AND MARKET GARDEN INSECTS

During 1932 two very dangerous foreign insects were reported in the State for the first time, which threaten to do a great deal of damage. The Mexican Bean Beetle (*Epilachna corrupta*) was found throughout most of York County. This beetle spreads very rapidly and is extremely destructive to beans. The Maine crop with a valuation of nearly $500,000 is bound to be seriously effected unless active control measures by the growers are taken. Arsenate of lead alone cannot be used. Magnesium arsenate at the rate of two pounds to a hundred gallons of water is advised. It is necessary to use an angle nozzle so as to spray the under side of the leaves.

The Japanese Beetle (*Popillia japonica*) was found in Kennebunk, Portland, and Augusta. This is its first recorded appearance in Maine. Twelve dead beetles were found on the radiator of an out of State car in Bar Harbor which indicated how they may be spread. This insect has an extremely wide range of food plants ranging from lawns to forest trees.

The ordinary run of orchard and market garden insects were slightly more prevalent than usual. The Raspberry Cane Borer was unusually prevalent.

FLOWER AND GREENHOUSE INSECTS

An unusually large number of calls in regard to greenhouse insects were received. It was evident that many of these were brought in on stock from out of the State. A considerable amount of damage was caused by the Greenhouse Leaf Tyer (*Phylctoenia ferrugalis*). The Lilac Leaf Miner (*Gracillaria syringella*), a European insect, was found in Bar Harbor.

PUBLICATIONS

An effort has been made to keep the public informed as to insect pests through the newspapers, as the department has to depend almost entirely upon the public's cooperation in reporting outbreaks and in putting into effect control measures advised. Talks have been given before clubs in several places.

A "Fieldbook of Destructive Forest Insects" was published in cooperation with the Kennebec Valley Protective Association. This booklet describes and pictures the types of forest insects and gives the latest methods of control under both forest and shade tree conditions. Specific descriptions and control for the more important insects are given and tables of spray dilutions are included.

Maine Forest Service Bulletin No. 7 "The Birch Case Bearer in Maine", summarizing the work done in controlling this new insect, was published this year.

A spray schedule for conifers and a mimeographed "Outline of Forest Entomology" for forest school students were prepared for distribution. Each winter two weeks are spent at the University of Maine forestry camp instructing the students in the elements of forest insect control.

SUMMARY

Each year finds the department in better condition to meet the insect problem. The work is so divided that each man has the opportunity to become well trained in his particular lines—spraying, rearing of parasites and life history studies, detection and control of forest insects, and answering

general correspondence. The laboratory has proved of inestimable value in the rearing of parasites and the working out of control measures. To a considerable extent insecticides are furnished free by insecticide companies for experimental work.

There seems to be a growing need of keeping the wardens better posted as to insect conditions and it is hoped that through mimeographed notes this can be done. There is considerable need for a better State insect collection to be used in comparing specimens and for exhibition purposes. During 1932 the collection was built up to a considerable degree.

WHITE PINE BLISTER RUST

WHITE PINE BLISTER RUST

Importance of White Pine and Control of Blister Rust

There are eight native species of white pine in the United States. One or more of them are present in 38 States, and, in the aggregate, they cover millions of acres of forest land. Three species, the white pine of the eastern United States, the western white pine, and the sugar pine, are of great commercial importance. The value of their timber as it stands in the forests is estimated at over $400,000,000.00. In addition, there are several million acres of young growth. The maintenance of these pines in the forests directly affects the local, regional, and natural public welfare.

Maine, at one time, led the entire country in the production of white pine lumber—it was shipped far and wide. We were blessed with what appeared to be an inexhaustible stand of as fine virgin pine timber as ever grew on this globe. It must have been so, otherwise how could we have gained the slogan of being "The Pine Tree State". For nearly 300 years we have been sawing pine, producing an annual cut ranking well with the cut of the highest producing States. Today, we are still cutting millions of feet annually, but not of that old "pumpkin" kind—that is practically gone.

We are fortunate in that white pine is a great reproducer, in that we have thousands of acres of young growth coming along to perpetuate one of the State's most valuable natural assets. It is by all odds the most important tree in southern Maine—it covers a larger area, is used for more purposes, and brings in a far larger return than any other tree in that part of the State. Its management as a permanent crop, both on farm woodlots and on wild lands, is essential to maintain the prosperity of the region.

If it were not for fire, insects, and fungi, which take their yearly toll, the management of white pine would be an easy matter. However, since these troubles are with us, we must constantly combat them if we are to assure a future crop.

Throughout the entire white pine areas of the country pine owners are greatly concerned over the rapid advance of an imported disease—White Pine Blister Rust—a member of a widely distributed family of fungus diseases known as rusts. This disease has an interesting life history. Part of its life cycle is spent on five needle pines (white pine) and the other stage of its development occurs on wild and cultivated currant and gooseberry plants belonging to the genus Ribes.

White Pine Blister Rust does not spread from pine to pine. Infection on pines comes from spores on the undersides of currant and gooseberry leaves, which in turn are infected by spores from blister rust infected pines. The disease attacks white pine by entering through the needles whence it works through the bark of the branches, eventually reaching and girdling the main trunk. Young white pines usually die from the disease in a few years, but older and larger trees are killed more slowly.

Climatic conditions play an important part in the spread of blister rust, seasons of extreme moisture being most favorable for its development. In regions where currant and gooseberry plants have not been removed nearly one hundred percent infection is found. Once established in a pine lot a high degree of infection occurs in a few years, unless control measures are practiced immediately.

Blister rust is firmly established throughout the United States. It entered the country from Europe on imported white pine planting stock and is now present in New England, New York, New Jersey, Pennsylvania, Washington, Maryland, Virginia, West Virginia, Ohio, Michigan, Wisconsin, Minnesota, Iowa, Montana, Idaho, and Oregon.

Within the past two years control measures on a large scale have been undertaken in Idaho and neighboring states to protect the vast white pine stands in those states. In Maine, blister rust was first found in 1916 at Kittery Point, and for several years after was thought to be confined chiefly to York County. Recent investigations show that other bad infection centres had already become established. In Moxie Gore 160 miles north of Kittery, a white pine plantation planted in 1916 and now showing infection running over 90%

became infected in 1916, undoubtedly coming from native pines infected several years earlier. One other example is that of a plantation of 2,000 trees planted by Mr. Z. Chaffee in 1916 on an island in the town of Sorrento, 160 miles northeast of Kittery. In 1932 these trees were found to be 100% infected—none could be saved—the owner cut and burned the entire plantation. Wild gooseberry plants were responsible for this loss. Other similar "centres" could be cited. In the course of a comparatively few years these "centres" produced a general infection, which have increased the amount of infection to an alarming stage throughout southern Maine.

As white pine blister rust is a two host disease and cannot go directly from one pine to another, but is carried to healthy pines from infected currant and gooseberry bushes, its control is assured by the removal of these bushes from a distance of nine hundred feet from the pines. (R. nigrum are an exception and are dangerous within a mile.)

Blister rust control work in Maine has been practiced since 1917, but not until 1922 was it conducted on an extensive scale. In this year the State and Federal Governments entered into an agreement for the control of the disease, whereby, they would cooperate with towns and white pine owners, the State and Federal Governments furnishing the educational, service, scouting and supervisory work, and the towns and owners, the eradication labor. As pine owners, in general, were not familiar with the disease, and did not recognize the many varieties of wild currant and gooseberry bushes, it was the State's duty to instruct them and supervise the work by furnishing trained men who knew the disease, the alternate host plants, and the best methods to eradicate them.

The above policy was used up to 1930, when a change was made. Previous to 1931, town appropriations were used for the hire of one man per town to assist the pine owner's labor in the renoval of ribes plants (currant and gooseberry bushes), the State furnishing men for advance scouting and supervision. During this period over 11,000 pine owners and their laborers received a rough working knowledge of blister rust control. However, many pine owners were not satisfied, many object-

ing to this method since they were not always in a position to give their personal service or to hire labor during the control season, which is from May to September, a period of the year when farmers are busily engaged with their regular routine work. They also realized that far better control work could be done by using a full sized eradication crew of four to six men hired for the season, and above all else, that all pine lands would receive control measures irrespective of ownership, which was not always the case when the owner had to furnish labor. The pine owners realizing the necessity of protecting the future white pine crop, after being made acquainted with the facts, wanted protection, and were willing that their towns raise funds for it, but they saw that a full sized eradication crew was essential, a crew whose personnel would not change with each pine lot worked. Hence, a change in the control policy was made, effective in 1931.

As blister rust control work is now conducted the State adds fifty percent to town appropriations, the combined moneys being expended for eradication crews consisting of four to six men. As fewer temporary State agents are required under this method, State funds for matching town appropriations on a fifty percent basis became available by reducing the number of State agents in the field and applying this reduction cost to the matching of town funds. This policy has been used the past two years, and proves very satisfactory.

Progress in Control Measures in 1931 and 1932

During 1931 control work was conducted in seventy towns and cities in eleven counties, fifty of which appropriated cooperative funds, as follows: 4 towns in Waldo County, 2 towns in York County, 9 towns in Oxford County, 8 towns in Franklin County, 8 towns in Kennebec County, 2 towns in Androscoggin County, 2 towns in Lincoln County, 5 towns in Cumberland County, 8 towns in Somerset County, and 2 towns in Hancock County. Private owner work was conducted in twenty other towns.

Town funds raised—$8,449.00.
Private funds raised—$2,248.63.

During 1932 control work was conducted in fifty-six towns and cities in thirteen counties, thirty-four of which appropriated cooperative funds, as follows: 2 towns in Androscoggin County, 1 town in Sagadahoc County, 4 towns in Cumberland County, 5 towns in Kennebec County, 1 town in Lincoln County, 3 towns in Hancock County, 2 towns in Knox County, 2 towns in Waldo County, 7 towns in Oxford County, 3 towns in Franklin County, 1 town in York County, and 3 towns in Somerset County. Private owner work was conducted in twenty-two other towns.

Town funds raised—$7,896.41.

Private funds raised—$3,848.22. (11 pine owners added $984.93 to town appropriations, and 42 pine owners assumed all costs of control work.)

Several of the largest private cooperators paying all costs of control work were:

Hon. E. Hamlin	Ellsworth	$97.45
H. B. Thayer	Sorrento	449.90
Z. Chaffee	Sorrento	266.65
M. Garrigue	Rangeley	237.69
L. Goodspeed	Wilton	85.25
R. Brann	Bridgton	86.44
A. Willis	Naples	75.00
Jas. Dean	Winslow	57.50
Freeman Estate	Newcastle	75.00
Wales Estate	Northport	66.60

Among the larger cooperating corporations were:

The American Thread Company	Milo	$181.00
The Diamond Match Company	Denmark	48.00
The Portland Water District	Standish	295.20

Local labor, with the exception of the crew foreman, is used for the eradication crews, thereby helping to solve the unemployment situation. In 1932 nine cities and towns appropri-

ated $3,651.60 for blister rust control work to furnish work for the unemployed, expended as follows:

Town funds spent for unemployment	State funds added to town funds	Amount spent by town and State including foremen
$3,651.60	$1,638.32	$5,459.17
Cost of foremen	**Net amount funds used for unemployed (minus foremen costs**	**Number men and man hours by unemployed**
$1,413.93*	$4,045.24	66 men—13,896 man hrs.

*Foreman by State ($169.25) in one town—no other State funds added.

These men, after a few days training by our agents and supervised by trained foremen, did satisfactory work, with beneficial results to all parties concerned—to the men themselves and to the taxpayers, especially pine owners. The scale of wages averaged about thirty cents per hour, some towns making cash payments while others paid only a part in cash, holding out the balance for future payments in the form of groceries, clothing, fuel, etc. The towns financed the work, and upon its conclusion the State reimbursed the towns in the amount agreed upon. Undoubtedly more blister rust control "welfare" work will be done in the future now that it has been tried out and found effective by town officials and taxpayers.

The removal of currant and gooseberry plants checks the spread of blister rust but it does not prevent trees already infected from dying. Trees having trunk infection cannot be saved unless careful surgery work is performed, that is, the removal of all diseased bark. Trunk infection may be prevented in the majority of cases by cutting off diseased branches before the infection reaches the trunk. More or less of this salvaging work has been done in the past but in 1932 it was conducted on a large scale. After protecting their pines from futher infection by removing currant and gooseberry plants, the owners cut off diseased branches and removed the diseased parts from the trunks of many thousands of trees, the majority being in white pine plantations. This work was conducted in eleven towns in six counties: 80,000 trees were examined, 47,000 trees pruned for blister rust protection, including 479 larger ornamental pines, 14,000 branch cankers removed,

1,310 trunk cankers removed, and nearly 6,000 dead or doomed ornamental and plantation pines removed, at a cost of $977.12. This work is recommended—it is money well spent, otherwise, the majority of many plantation and ornamental trees will be a total loss within a few years. Infection from thirteen to fifty percent already present in the above work bears out this statement.

Blister rust on unprotected areas is increasing rapidly—many formerly skeptically inclined pine owners are now aware of the damage being done and are sorry that they did not heed the Department's warnings in the past. It is not too late to correct part of the damage done, but it must be done at the proper time, which is not waiting until the pine lot is heavily infected. Even though a pine lot appears healthy, there is always the possibility of its being infected, the infection being in a stage so young that its presence is not perceptible to the untrained. To safeguard such pine lots, control measures should be applied. Control work is not costly—in fact, it represents only one-half of one percent of the commercial value of the pine—surely cheap insurance.

Re-eradication, that is, the re-working of certain areas after a lapse of several years since the initial control work was practiced, is playing an important part in the control work in recent years. The best authorities recognize the fact that wild ribes re-establish themselves in time, due to germination of seed stored in the soil, the scattering of seed by birds, soil disturbances, and the growth of seedlings missed at time of first eradication. In many towns where initial work was done five or more years ago this condition now exists and has warranted the following amount of re-eradication:

Year	No. Towns	No. Jobs	Acreage	Number Wild Ribes	Number Cult. Ribes	Cost
1931	14	28	2,165	70,096	134	$1,395.00
1932	22	149	7,755	284,031	1,154	6,626.77

The summary on the following page shows blister rust control work for the eradication seasons of 1931 and 1932:

SUMMARY OF BLISTER RUST CONTROL WORK DURING 1931 AND 1932

Eradication Seasons (May to September)

Year	No. Acres Eradicated	No. Wild Ribes* Destroyed	No. Cult. Ribes* Destroyed	Cost to Individuals	Cost to Towns	Cost to State	Cost to Government	Total Cost	Per Acre Cost
1931	114,889	1,283,439	5,002	$2,248.63**	$8,443.13	$4,977.12†	$1,271.59‡	$16,940.47	.....
1932	79,701	905,810	4,726	2,366.10**	8,245.27	4,669.15†	1,346.04‡	16,626.56	.....
Total	194,590	2,189,249	9,728	$4,614.73	$16,688.40	$9,646.27	$2,617.63	$33,567.03	$0.12

1931 *Currant and gooseberry bushes. **Includes $500.00 by 2 V. I. A.'s.
†For Scouting $735.37 by State. ‡For Scouting by Gov't. $1,271.59.

1932 *Currant and gooseberry bushes. **Includes $50.00 by 1 V. I. A.
†For scouting $357.45 by State. ‡For scouting by Gov't. $1,346.04.

WHITE PINE BLISTER RUST CONTROL

Appropriations and Expenditures Fiscal Years 1922-23 to 1931-32 and Part of 1933

	State		Towns			Owners		Federal	
	Appropriation	Expenditures	No.	Appropriation	Expenditures	No.	Expenditures	Appropriation	Expenditures
1922-23	$5,000.00	$4,966.03	8	$1,300.00	$1,300.00	464	$4,409.32	$20,000.00	$15,562.01
1923-24	5,000.00	4,994.73	39	7,115.00	6,899.99	1,148	8,760.34	17,000.00	16,404.34
1924-25	5,000.00	4,984.38	49	8,154.25	8,115.55	1,701	10,619.58	20,000.00	19,910.59
1925-26	5,000.00	4,965.04	50	8,000.00	7,199.63	1,595	9,337.30	20,000.00	19,250.25
1926-27	5,000.00	4,759.47	45	7,321.28	7,318.89	1,485	9,612.67	20,000.00	19,625.75
1927-28	6,250.00	6,231.95	53	8,277.00	8,319.01	1,372	9,324.06	21,250.00	21,190.79
1928-29	6,250.00	6,249.60	61	10,717.00	10,009.07	1,090	9,567.09	21,250.00	22,263.50
1929-30	6,250.00	6,086.77	55	9,485.27	9,429.83	1,146	8,261.32	21,250.00	22,022.16
1930-31	6,250.00	6,231.20	56	9,100.00	8,971.81	996	7,804.69	21,250.00	21,123.17
1931-32	6,250.00	6,249.64	50	8,449.00	8,443.13	31	2,248.63*	21,250.00	19,844.57
Totals	$56,250.00	$55,718.81	466	$77,918.80	$76,006.91	11,028	$79,945.00	$203,250.00	$197,197.13
1932-33	$6,250.00	†	34	$7,896.41	$7,815.28	53	$3,848.22	$16,800.00	†

*Includes $500.00 by V. I. A.'s of Northeast Harbor and Seal Harbor.

†Fiscal year ends June 30, 1933. Expenditures will be kept within appropriations.

GENERAL FORESTRY

GENERAL FORESTRY

Publicity

Realizing that the cooperation of the public is essential, if the menace of forest fire is to be kept under control, this Department has endeavored in every way possible to make the citizens of Maine "forest conscious. The forest lands of the State cover such a vast area that no amount of fire fighting apparatus can prevail, unless the public is educated into a realization of what the forests mean to the average man and to his job.

It has been the constant aim of the Forestry Department to bring home to the unthinking but well meaning citizen the dreadful results of some act of carelessness on his part, such as, the dropping of a smouldering cigar or cigarette stub, the failure to properly extinguish a camp fire or to grind the lighted match beneath his heel. It is the belief of the Forest Commissioner that deliberate incendiarism is extremely rare. It has been a problem to reach the public and make them appreciate the serious results of their actions. Warnings to the public during spells of dry weather, which have been printed in the news columns of virtually every newspaper throughout the State, undoubtedly have proved very effective. In the more remote districts not so well covered by newspapers, other methods become necessary.

During the early summer of 1932, when conditions in the woods were unusually bad, the Department used a plan which can be developed into a real force for public education and which seems to do that which newspaper publicity alone could not accomplish. This was the publishing of a newspaper by the Department for free distribution throughout the vicinity of Millinocket, in which there are more fires due to carelessness than in any other district. This newspaper, of tabloid size, was christened "The Katahdin Record", and was prepared under the supervision of the Forest Commissioner. A total of 6,000 copies was sent to Millinocket where the force of wardens delivered a copy to every home in the district. The

results were gratifying. There was a noticeable diminution of the series of fires which had previously given the Department so much trouble and the reaction to the newspaper was very favorable.

The idea which was tried out at Millinocket could be used in other districts where similar conditions prevail. Throughout the tabloid, the serious economic loss to community and State occasioned by forest fires was stressed and an effort was made to bring home to the man in the pulp mill or the woods crew that he was likely to lose his job, if the forest fires continued. Fishermen and hunters were likewise warned that unless there was a cessation of forest fires, their hunting and fishing grounds would be destroyed.

Publicity is one of the most powerful arms for the conservation of our forest which can be used and the Forest Commissioner recommends that this branch of activity be stressed in the future. Cooperation by the newapapers throughout the State during the past years has been very pleasing. News columns have always been open to stories from the Department and in many instances favorable editorial comment has followed publication of such stories. Education of the public is an effective way in which to reduce the forest fire hazard. Even the slowest witted individual can be made in time to realize that the forests constitute the greatest natural heritage of the State and that the future welfare of all the people depends upon his cooperation in helping to keep them green.

During 1932 the Department also issued its bulletin entitled "The Forests of Maine, Their Extent, Character, Ownership and Products". This is a comprehensive treatise of 107 pages containing essential facts regarding the forests and the influence they and their products play in the life of the State. Five thousand copies have been printed and are available for free distribution. More than 1,000 metal signs, marking the boundaries between towns, have been set up along the chief highways of the State during the past two years. The signs have the name of the town in large print and the phrase "Prevent Forest Fires". These were set up in cooperation with the Organized Towns and by the Forest Service itself in the unorganized districts. Forty thousand

other fire prevention signs were posted during the past two years on trees, posts, and buildings, wherever there is a growth of timber. This was the greatest number of such signs ever posted in the history of the Department. A total of 20,000 celluloid rulers and 15,000 calendar cards containing forest fire warnings have been distributed and 10,000 book covers given away to pupils in the elementary schools of the State. In addition the Department has furnished lecturers and speakers to various clubs, organizations and schools. Every newspaper in the State printed substantial stories on May 19th, 1932, when the Governor issued a proclamation declaring a suspension of the open season on fishing.

In conclusion, the Forest Commissioner believes that an expenditure of funds for publicity is as essential as similar expenditures for fire fighting apparatus and constitutes the payment of insurance premium upon forest protection.

State Forest Nursery

All receipts from the sale of trees from the State Forest Nursery were turned over to the State Treasury. In 1931 the sales amounted to $320.95 and in 1932 the sales amounted to $350.50. All transplant trees were sold at the stipulated price of $5.00 a thousand with the exception of a few seedlings at $1.00 to $2.50 per thousand.

List of Trees Sold	1931	1932
White Pine	46,200	10,100
Red Pine	5,000	28,700
White Spruce	29,125	38,850
Norway Spruce	550	3,150
Scotch Pine	1,750	4,550
Norway Pine	3,000	.....
Miscellaneous	375	.....
	86,000	85,350

Forest Nurseries in the State

Name	*Location*	*Acreage*	*Approximate Output*
S. D. Warren Company	Bingham	2	300,000
J. L. Dean	Winslow	3	118,000
Bates College	Alfred	3	75,000
Francis H. Friend	Skowhegan	2	250,000
Western Maine Forest Nursery	Fryeburg	22	1,500,000
Brown Company	Oquossoc	15	3,000,000
Oxford Paper Company	Roxbury	25	.....
State Forest Nursery	Orono	2	250,000

The following table shows that there has been a general falling off in the planting program by those interested in reforestation. A large amount of this is due to the curtailment of planting by the lumber and pulp companies.

Trees Planted in the State of Maine	**1931**	**1932**
White Pine	213,900	89,245
Red Pine	223,900	72,175
White Spruce	293,125	86,150
Norway Spruce	129,650	70,350
Austrian Pine	1,000	6,050
Scotch Pine	37,550	17,100
Cedar	.....	1,000
Douglas Fir	.....	1,000
White Birch	.....	1,000
Balsam Fir	.....	500
Norway Pine	10,000	.....
Poplar	30,000	25,000
Miscellaneous	38,375	.....
	977,500	369,570

AUXILIARY STATE FORESTS

The Auxiliary State Forest Law enacted by the 1921 Legislature and known as the Granville Law, was repealed by the 1929 Legislature and the following bill enacted:

(R. S. Chap 11, Sec. 82-89)

AN ACT RELATING TO AUXILIARY STATE FORESTS

Sec. 1. The forest commissioner shall have full charge of all auxiliary state forests, as the same are hereinafter defined.

Sec. 2. Auxiliary state forests shall include all areas owned by corporations, firms, or individuals, now covered by trees or which shall be planted to trees for use as fuel, manufacture or sale, and which are capable of producing fifteen thousand feet, board measure, of soft wood, and eight thousand feet, board measure, of hardwood, or their equivalent, per average acre, exclusive of ledges, swamps, bogs, or ponds, the owner of which shall, in cities and organized townships have filed with the assessors and forest commissioner plans or description of such tracts with a request that the same be included as part of the auxiliary forests of the state; upon receipt of application of owners for inclusion of land as a part of the auxiliary state forests, the primary purpose of which shall be to produce timber for manufacture or sale, the assessors shall notify the owner within thirty days of the acceptance or rejection of said application. If the assessors reject the application or fail to take action within thirty days, the applicant may appeal to the forest commissioner, who shall have an investigation made, and, if in his judgment the land is capable of producing timber as required by this section, shall grant such application.

Sec. 3. State, town and plantation assessors shall, for the purpose of taxing auxiliary state forests, appraise only the land, which shall be appraised at the same valuation as stripped forest land in the same vicinity; provided, however, that such valuation shall not exceed two dollars per acre, independent of any great pond therein.

Sec. 4. No person desiring to clear land for agricultural purposes, for building, or for highways, or to cut trees for use in building camps, dams, or the construction of ways, or for use as fuel in the course of lumbering operations, or from his own land for use upon his farm in the ordinary course of good husbandry, shall pay a tax under this act, unless the wood so cut is to be sold for fuel or sold or used for manufacture.

Sec. 5. All persons, firms or corporations owning auxiliary state forests, and who are engaged in the business of cutting trees therefrom for market or manufacture shall pay to the various cities, towns and plantations, where the land from which said trees so cut is located, a tax of one-half of one per cent, if cut during the first year, two per cent for the second year, three per cent for the third year, four per cent for the fourth year, five per cent for the fifth year, and thereafter upon the stumpage value of all trees so cut and during the year ending the first day of April the value of the stumpage so cut, and shall make a return to the assessors each year stating the amount of each kind of wood or timber cut during the preceding year ending April first, together with the estimated stumpage value or actual stumpage price received therefor.

Sec. 6. Any person, firm or corporation refusing to make the returns required by this act within the time limited herein or any person who shall knowingly or willfully make a false return of the quantity of logs cut or the number of cords of wood cut, during any season, or who shall cut any trees from the auxiliary state forests contrary to the provisions of this act shall be punished by a fine not exceeding one thousand dollars.

Sec. 7. Provided, however, that in any one year not more than ten per cent of the area of a town can be admitted as a part of the auxiliary state forests of the state if the assessors of said town file a protest with the forest commissioner within ten days from the date of appllcation for admission.

Sec. 8. Provided that all or any part of any land included in the auxiliary state forest may be withdrawn by filing with the forest commissioner description of such land and the payment of the tax on the full value of trees thereon.

AUXILIARY STATE FORESTS

	Lands Accepted by Maine Forest Service			Lands Accepted by the Town		
County	No. of Towns	Number of Landowners per County	Acreage	No. of Towns	Number of Landowners per County	Acreage
Androscoggin	5	19	4,158	5	6	1,550
Aroostook	36	66	82,718	5	6	14,797
Cumberland	8	13	4,509	7	29	4,631
Franklin	16	41	34,451	3	5	3,397
Hancock	6	7	4,499	1	1	1,300
Kennebec	7	10	1,392	1	1	605
Knox	1	1	50	.....	.....	.....
Lincoln	1	1	201	.....	.....	.....
Oxford	21	46	12,767	20	114	26,282
Penobscot	29	61	98,053	2	3	1,095
Piscataquis	5	8	11,841	4	7	5,139
Sagadahoc	.....	.....	.....	.....	.....	.....
Somerset	14	39	26,042	3	5	4,656
Waldo	9	15	1,823	1	1	78
Washington	12	14	64,399	.....	.....	.....
York	14	23	11,790	2	2	959
Total	184		358,693	54		64,489

Note—Figures in this table are inclusive from the date of the signing of the bill April 13, 1929, to December 14, 1932. There are approximately seventy-five individual landowners who have filed applications under this Act.

BENJAMIN C. JORDAN FUND

In 1909 the late Benjamin C. Jordan of Alfred gave the State of Maine, to be its property forever, one thousand dollars, on condition that in consideration of said gift, the State shall once in eighteen years offer five prizes to be called the Jordan Forestry Prizes.

By Chapter 157, Public Laws, 1929, the rules and conditions of the original resolve were modified and changed so that the first award under the new resolve should be made in 1932, and once every five years thereafter, and the first prize shall be one hundred and twenty-five dollars, the second prize seventy-five dollars, and the third prize fifty dollars.

Conditions of said Gift

The time of the contest shall be made to read, once in five years and the prizes shall be one hundred and twenty-five dollars, first prize; seventy-five dollars, second prize; fifty dollars, third prize.

Rule 1. Each lot shall consist of one parcel of not less than ten acres in somewhat regular shape and shall be accurately surveyed and plotted.

Rule 2. The majority of said trees shall not be less than five feet nor more than thirty feet high and not less than five nor more than thirty years old when the prize is awarded.

Rule 3. Said forest may consist of any of the following kinds of trees, but other circumstances and conditions being equal, preference shall be given in the following order: White Pine, White Oak, Hickory, Chestnut, Hackmatack, White Ash, Yellow Oak, Red Oak, Bass, Hemlock, Spruce, Norway Pine, Pitch Pine, Cedar, Fir, Poplar, Birch, Maple, Beech, and Elm.

Rule. 4. All competitors for the prizes shall file in the office of the State Forest Commissioner, their intention to compete, together with a correct and definite survey and plan of the lot and when such notice has been filed, said lot shall be eligible although the ownership may have been changed. During the period from January first, nineteen hundred and twenty-seven to December thirty-first, nineteen hundred and thirty-one, all entries shall be made on or before June thirtieth, nineteen hundred and twenty-nine. Entries in contest periods on and after January first, nineteen hundred and thirty-two shall be made during the first year of the period.

Rule 5. Myself and heirs shall have the same right as others to compete for the prizes. The same lot cannot be entered in more than one contest.

Rule 6. In awarding prizes, other circumstances being equal, the following conditions shall be considered in the order named: (a) Right number of trees per acre. (b) Even dis-

tribution over whole lot. (c) Health and thriftiness of trees. (d) Adaptation of the varieties of trees to the soil in which they stand. (e) Uniformity of size of trees. (f) Size of trees. (g) Size of lot.

A committee consisting of Robert G. Stubbs and George H. Gruhn, Supervisors, Maine Forest Service, recommend awarding the prizes to the following applicants:

1st. H. R. Ober, Sebec Station, Maine
2nd. Alfred K. Wilson, Alfred, Maine
3rd. Miss Nellie B. Jordan, Alfred, Maine

A discussion of the lots with brief description follows.

1. Ober Lot, Atkinson. This lot is a 14 acre white pine plantation. The plantation is divided into three parts about the same area. The first planting was done in 1916, the second in 1921, and the third in 1928. The trees are six by six feet apart and are very well distributed over the entire area. In the oldest plantation the owner has pruned the trees carefully to a height of 7-8 feet. The distribution of the trees, condition of the present growth, and the care which the owner has given this plantation, appear to warrant granting first award.

2. The Wilson Lot. This is a tract of eleven acres, covered with a natural growth white pine, with a few scattered hemlock, red oak, and white oak distributed through it. The trees are well distributed over the tract, and appear to be very thrifty and well adapted to the soil. The owner has done some pruning on the older trees.

3. The Jordan Lot. This lot consisting of 14 acres is covered with a natural growth of white pine, with a few scattered mixed hardwoods. The trees are thrifty, well adapted to the soil, quite evenly distributed. The trees on this lot have reached the age and size when pruning would be to their advantage.

The next award under this Fund will be made in 1937.

PUBLIC LANDS

PUBLIC LANDS

School Lots

There are about 50,000 acres of school lands in the State located in fifty-five different plantations which are held in trust for those plantations. The revenues from these lots for 1931 and 1932 are, as follows:

Township	County	1931	1932
Cyr Plantation	Aroostook	$13,808.83	.....
Glenwood Plantation	"	5,216.08	.....
Molunkus Plantation	"	25.00	25.00
Nashville Plantation	"	.....	60.75
Oxbow Plantation	"	5.00	5.00
Reed Plantation	"	2,379.55	.....
St. John Plantation	"	100.00	.....
Winterville Plantation	"	194.00	.....
T. 10, R. 4, W. E. L. S.	"	.....	30.00
T. 14, R. 6, W. E. L. S.	"	965.00	384.20
T. 16, R. 10, W. E. L. S.	"	6.29	.....
T. 17, R. 10, W. E. L. S.	"	99.68	3.67
T. 17, R. 11, W. E. L. S.	"	.....	6.75
Letter E	Franklin	50.00	.....
T. 3. R. 3, W. B. K. P.	"	300.00	300.00
T. 3, R. 4, W. B. K. P.	"	450.00	450.00
No. 33 Plantation	Hancock	.....	24.00
T. No. 8	"	.....	5.00
T. 4, R. 2, W. B. K. P.	Oxford	100.00	135.00
T. 5, R. 4, W. B. K. P.	"	151.00	125.00
Lakeville Plantation	Penobscot	.....	413.00
Stacyville Plantation	"	379.20	715.97
Webster Plantation	"	.....	92.40
T. 5, R. 8, W. E. L. S.	"	10.00	10.00
Elliottsville Plantation	Piscataquis	.....	50.00
T. 2, R. 11, W. E. L. S.	"	25.00	.....
T. 10, R. 9, W. E. L. S.	"	12.50	12.50
Bigelow Plantation	Somerset	2,092.04	.....
Dead River Plantation	"	2,139.38	.....
Flagstaff Plantation	"	2,913.23	21.45
Highland Plantation	"	2,371.66	646.71
West Forks Plantation	"	517.29	.....
No. 14 Plantation	Washington	500.72	.....
No. 21 Plantation	"	4,573.96	.....
Grand Lake Stream Plantation	"	.....	9.13
		$39,385.91	$3,525.53

State Park

In March 1931 the Hon. Percival P. Baxter, former Governor of Maine, presented to the State a large tract of land in the northwest corner of Township No. 3, Range 9, Piscataquis County, which included the greater part of Mount Katahdin, highest point of land in the State. The gift was accepted by the Legislature, then in session, and the State Park, thus created, was placed under the jurisdiction of the Forest Commissioner.

Later Mr. Baxter acquired more land which he added to his original gift and which was accepted for the State by the Governor and the Executive Council. There are now nine square miles, or 5,760 acres, in the park and virtually the entire mountain, rising a mile above sea level, is the property of the State of Maine.

Due to its isolation and the extreme ruggedness of its granite peaks Mount Katahdin does not yield easily to the vacationist pleasure seeker. Until funds are appropriated for the specific purpose it will be impossible to do more than improve and mark trails to the top and to keep a watchful eye on the dense forest growth around the lower slopes.

In his deed of gift Mr. Baxter specified that the mountain was to be left in its natural wild state and that no motor highway was ever to be constructed within the park confines. The Forest Commissioner believes that that provision is extremely wise because it insures the preservation of Maine's highest mountain for all time.

However, some means should be provided for entry into the park other than existing highways. At present only one motor road leads into the country around Katahdin and that road is almost impassable a large part of the year. The highway runs from Millinocket to Windey Pitch and Abol Field, a distance of approximately 25 miles and is largely a private thoroughfare owned and maintained by the Great Northern Paper Company.

If the road could be widened and improved, visitors in vastly greater numbers could make the trip to the mountain's border and then climb to the top afoot. It is possible to approach the mountain from Greenville to the west, using an-

other Great Northern Paper Company road to Ripogenus Dam, and then taking to canoes down the west branch of the Penobscot River but that trip involves considerable expense and some hardship to persons not accustomed to the woods.

At present Mount Katahdin is too isolated to offer much inducement to a large majority of tourists. However, the past season saw many hundreds of persons climbing the peak and marvelling at the magnificent panorama which is unrivaled east of the Rocky Mountains.

If the park is to serve a greater number of people, it must be made easier of egress and some accomodations must be provided for the overnight entertainment of guests. At present visitors may use the camp site at Chimney Pond but must bring their own food, bedding and the like.

The Forest Commissioner recommends that when funds become available some sort of hotel or camp be constructed at Chimney Pond and that a corps of wardens or forest rangers be commissioned to serve as guides and to patrol the trails. Mount Katahdin could be run along the lines laid down by the National Park Service and carried out at Acadia National Park on Mount Desert Island.

There is no spot east of the Mississippi River more ideally located or more scenically beautiful than Mount Katahdin and its wise development would do much to advertise the State of Maine and bring thousands of visitors during the Spring, Summer and Fall months.

A bronze tablet, construction of which was authorized by the Governor and Council, was cast during September of 1932 and carried to the mountain top by the Forest Commissioner and a group of State officials and guests including Mr. Baxter. The tablet commemorates the gift of the mountain to the State by its former Governor and it was placed where it will be read by all who climb the mountain in future years.

It is to be hoped that the generosity of Mr. Baxter will serve as an example for other public spirited citizens and that spots of rare scenic beauty located elsewhere in the State may be acquired in the same manner. Properly developed State Parks should do much to stimulate interest in the out-of-doors among our people and to aid in the protection and conservation of our forests and our wild life.

Town Forests

There heve been no accessions to the list of towns in the State which have town forests.

Eight (8) towns in the State have now established town forests as follows:

Town	*Acreage*	
Bangor	40	
Brunswick	528	
Fryeburg	80	
Kennebunk	2	
Old Town	247	
Skowhegan	332	
Waterford	5	
Cumberland Center	50	
		1,284

National Forests

The Forest Service of the United States Department of Agriculture announces that the area of the National Forests of Maine is 33,482 acres, which are located in Oxford County and in the following towns:

Town	*Acres*	
Albany	3,290	
Batchelder's Grant	14,242	
Gilead	1,116	
Mason	5,976	
Stoneham	8,017	
Stow	841	
		33,482

Twenty-five per cent of the net receipts realized from these Forests, representing a Federal payment in line of taxes, was received by the State Treasury Department and was paid by him to the towns as follows:

	1931	**1932**
Albany	$137.41	$52.81
Gilead	46.61	17.90
Mason	249.61	95.90
Stoneham	334.85	128.65
Stow	35.11	13.50
	$803.59	$308.76

As Batchelder's Grant is not incorporated, its share was apportioned to the other towns within that area. Besides the twenty-five per cent fund, an additional ten per cent of net receipts is set aside each year to be used for forest roads.

These forests are administered on a permanent yield basis and so revenues are expected to increase in the future as the resources develop. The State bears no expense of protecting, administering and developing these forests.

Indian Township

Following Mr. R. E. Rendall's report of a preliminary survey made on Indian Township in the fall of 1930, an advisory committee of four specialists in forest management was appointed by the Forest Commissioner to visit this area and make definite recommendations for preparing a management plan. This committee is made up of Mr. Austin Cary and Mr. C. R. Tillotson, both of the United States Forest Service, Mr. E. F. Jones of the Great Northern Paper Company, Bangor, Maine, and Mr. R. E. Rendall, Manager of the Bates College Forest, Alfred, Maine.

Each year since 1923, the University of Maine Forest School has held a winter camp for its students. No permanent quarters or area has been available and it has been necessary to hold camp in different localities. On December 22nd, 1930, permission was granted by the Governor and Council for the Department of Agriculture at the University of Maine to erect and maintain a camp on Indian Township for the purpose of conducting its winter camp courses for the Forestry School students. The Maine Forest Service laid out one and one-quarter acres in the northeast corner of Lot No. 43 at the junction of the Grand Lake Stream road with the Houlton—Calais road, so-called, on Indian Township, Washington County, as a site for this camp. The logs used in the construction for this camp were furnished free of stumpage by the Maine Forest Service. Through a generous gift of money from Mr. Curtis M. Hutchins, a former post graduate student at the University of Maine, the cost of erecting five sturdy log cabins was made possible. All future costs for this camp are

to be maintained by the University of Maine. These winter quarters on the Indian Township will now make possible for the students to start permanent study plots and to follow the progress of management as it is carried on from year to year.

The advisory committee on September 9th, 1931, submitted their first report to the Forest Commissioner. During the winter of that year the University of Maine Forestry School held its first winter courses in the new camp with the students, under the guidance of the professor in charge, carrying out as nearly as possible the recommendations as made to the Forest Commissioner. Much was accomplished that first camp period and a report of the work done was submitted to the Maine Forest Service Office. On August 16th, 1932, the advisory committee again visited the Indian Township to make an inspection of the work done and submitted to the Forest Commissioner further recommendations for a management plan for this area.

From every view point the carrying through of the yearly recommendations of the advosiry committee in cooperation with the Maine Forest Service should prove of great benefit to the State.

The new revenues from Indian Township derived from stumpage and leases for the past two years are as follows:

1931	**1932**
$5,014.04	$4,220.48

APPENDIX

THE FUTURE OF THE TIMBERLANDS OF MAINE

By Austin Cary, U. S. Forest Service

Maine from the beginning has been a timber State; a great share of its prosperity has been based on that resource throughout its history. At one time Maine produced more lumber than any other State in the Union, and Bangor shipped a greater volume of the commodity than any other port in the world. With expansion of the Nation's population westward supremacy was yielded, but still for a long period lumber production remained a staple and profitable industry here.

Some 40 years ago a marked change came over the scene. Somewhat to our surprise and certainly to our regret, the old staple line of lumber manufacture became less and less profitable and in the course of a number of years a large share of our mill capacity went out of business. This on the larger rivers notably and of lumbering on the familiar large scale, for the shrinkage referred to was in a rough way balanced by expansion in another area and of another description—a portable mill business conducted in the settled parts of the State, based chiefly on second-growth pine. Then, too, the loss in one form of industry was replaced by gain in another, the expansion of paper making. This shift in the form of manufacture was natural and proved to be in every way a desirable thing. It has been profitable in the ordinary sense for we realized more on our spruce by exporting it as paper and shipping in from other regions a large share of the lumber we required; then the resource was utilized with a thoroughness previously undreamed of; finally our paper mill towns have been admirable in their way, far superior to the old sawmill communities. The debt Maine owes to its paper industry is indeed widely known and freely acknowledged and Maine reciprocated by good treatment in turn—notably by creation of the Forestry District some 25 years ago, and stabilization of timber taxation within it, also by support of forest fire protection.

With as many years of stable business and generous prosperity as we had, it was natural that we should come to look on these things as assured, permanent, and the setback that has been experienced during the last decade must have come as a real shock to very many. In fact, it is questionable if the severity of the trouble that was in store was anticipated by any, although men well informed in one field and another understood perfectly that new elements in the situation were shaping up that must inevitably cause disturbance. These elements, of course, are clearer today than they were, and it is possible in some degree to put quantitative values on them and to forecast to an extent how they will bear on us in future. To do this as far as may be done for the benefit of Maine people is the purpose of this article. Wide contacts and the contribution of well informed and interested men are behind it.

We may in the first place deal briefly with one element in the case that has been operative within the last three years. That is a general lowering of values and slackening of the producing pace of industry due to monetary, general economic, or international causes. We have all felt these effects and in a general way recognize their source. Other industries than those dependent on timber have felt them. To do more than refer to them is not within the purpose of this article. These particular difficulties we expect to surmount in the course of no very long time.

Proceeding to topics that are more tangible and more clearly related to the subject in hand, the shrinkage in the pine industry of southwestern Maine may be taken up first.

Only the elders among us remember its genesis and early expansion, but the recollection of many will reach back to the years of its extensive development, before the war. Portable mills were the chief means of production, and of these we had developed a very efficient type. With the main product, pine box boards, bringing from $14 to $17, there was profit in the business for efficient operators, labor was paid reasonably, and a class of timber that was not suitable for other forms of utilization brought a fair stumpage price. A remark made in those years by one of the best informed and wisest men connected with Maine timber sticks in the mind. It was to the

effect that while naturally ups and downs were to be expected, there promised always to be a free market for Maine box boards in generous amount along at the range of prices named.

How different has the event proved! With the advent of the war industries of many kinds were enormously stimulated, box board production among them, and by 1918 prices doubled. This had its effect in all branches—profits, wages and stumpage. The last named more than doubled, and on the reverse movement proved to be the hardest element in cost to get down. But the most telling result of this period of stimulated price was that competition was given opportunity and set in motion. Up to the time of the war the wooden box had nearly a monopoly in its field. Under the conditions named, manufacturers of kraft paper took to adapting their product to this use, and the employment of hardwood veneer for the same purpose was also stimulated. These new materials, properly prepared and employed, have proved thoroughly serviceable and grown in use yearly. As a consequence the New England pine box has been more and more displaced as the years passed, production shrinking to a fraction of its former volume, the price receding heavily as well. How conditions stand today is well known in a general way. We still have an industry of this sort, and expect to hold it on the basis of merit, but it is comparatively small in volume and very closely conducted. Broadly looked at, what seems to have transpired is this—unnatural and temporary prosperity led to a loss that is enduring. For that, it may be said, there is abundant precedent. Business men, labor, and owners of timber are all feeling the effects.

Second may be taken up the recent history of the paper industry of Maine. The train of events here is somewhat similar to the other though there are strong points of difference.

Here are two facts fundamental in this connection—that spruce, poplar also in its field and in less degree, were long recognized as the woods of premier quality for paper production, and that Maine at the time they were wanted was better supplied with resources of this sort than any other state or section. While, therefore, New York with its Adirondack forests and nearness to markets led in the early development of paper making 40 to 50 years ago, Maine soon went ahead

and for some decades past has led the States of the Union in volume of production. This favorable condition again it was natural to take for granted and look on as a permanent thing. Manufacturers evidently shared in this feeling as well as the people at large, for relying apparently on the continuance of prosperity they expanded their plants beyond the capacity of their natural territory to furnish wood, bringing it in from outside our boundaries frequently at heavy cost for transportation.

The check experienced of late years is in a general way well known; it originated in a variety of sources. First in importance among these is probably to be placed the fact of new technical discoveries relating chiefly to the suitability of different woods to paper making. This has in course of time led to some wholesale and rather surprising developments. An instance is that in just recent years the hemlock of the West Coast has been found to have a fibre closely similar to the long and pliant fibre of spruce.

Several of the pines, jack pine of the Lake States and those of the vast Southern forests notably, we know now possess a fibre thoroughly well suited to some kinds of paper. Various broad-leaved trees, too, some of the South among them, prove to be well suited to the form of use formerly filled almost exclusively by poplar. And the sections of country referred to, the Lake States first and for a considerable period, the South beginning significantly with the war, the West Coast within the last few tears only, have been pushing their new found opportunity hard, building commercial plants and backing the program of research that for the time being was working so powerfully to their advantage. Such is one line of development that has of late been putting pressure on our Maine manufacturers. In this connection cost of wood is no less a factor than its quality. On this point the new regions of paper production command advantages hardly to be realized here. Cheap operation and very low stumpage cost are the usual conditions; at the West vast quantities of excellent material are to be had in the shape of off-fall from lumbering operations. These new regions in fact have been operating on a scale of wood cost less than half that to which our New England mills had become habituated.

Nor is this the only difficulty that has been experienced; others in fact are more easily discerned and little doubt have figured larger in the mind of the public. Of them, three may be mentioned here—extensive importation of chemical pulp from the Baltic countries, the recent rate of money exchange between the United States on the one hand and Canada and some European countries on the other, the importation within a few years past of some cargoes of Russian pulpwood. These matters have indeed played their part in depressing our paper industry and making things hard for those dependent upon it, and recently all factors mentioned have borne simultaneously. Each is of enough importance to require careful treatment on its own account, though in the case of some relief does not seem unlikely to be afforded. The factor first mentioned remains, however, and promises long to do so. The Northeast has lost its heavy relative advantages in the field of paper manufacture. The industry has expanded from a regional to a Nation-wide basis and the fact necessitates costly readjustments of whose final outcome there is considerable doubt.

It seems well to cover in some detail, though briefly, the features of the local situation, the severity and wide incidence of the effects chiefly in mind. It is certain for one thing that the manufacturers, woods operators, labor, and the stumpage owner have all felt these effects. That indeed is probably well known, but definite figures, though approximate only as they must be, will bring the point home. Take the situation of the manufacturer in the first place. Within two years past volume of output has shrunk heavily and the price realized for some products towards 50 per cent. Stumpage may next be taken up. From the general level of around $5 a cord that prevailed some years ago, by 1932 it has come down some 50 or 60 per cent. A standard branch of woods work for which $4 or $4.50 was customary, has been done this year as cheaply as $2 a cord. Then the *volume* of labor performed and paid for is of fully as great importance as the rate of pay from the community standpoint. For several years ending in 1929, towards 1,200,000 cords of wood were yearly cut in Maine for the use of our paper mills, a figure which shrunk to around 500,000 cords in 1931; 20,000 men were employed at woods

work at the earlier period, their net daily wages reckoned at $1.60, while 8,000 were so employed at the later date on a wage reckoned in the same way at 90 cents daily. Multiplication of the two sets of figures gives a result that it is true may not be depended on to a nicety, but that makes it clear nevertheless that in three years the aggregate income to labor of this class has fallen to a minor fraction of its former amount, inevitably carrying serious dislocation and hardship. A striking illustration of the effect of industrial depression on community income is available from another section of the country, a set of facts that will be made use of in another connection later. A competent representative of the lumber industry of western Washington and Oregon, early in the present year before a committee of Congress, made the following statements: In 1929, 73 per cent of the capacity of existing lumber mills was operated, 54 per cent in 1930, 37 per cent in the year following, a shrinkage very close to 50 per cent. From early 1929 to early 1932, the average price received for lumber shrunk 48.6 per cent. On the basis of these figures, yearly community income from the lumber industry shrunk to a fourth of its former proportions. No one questions that conditions of this sort are highly regrettable. Everyone should sympathize with the efforts of the leaders in any industry to put its affairs in better order provided the measures proposed are adequate and fair.

Another aspect of the general topic vitally concerns our people—the prospect of recovery and of profitable demand for our forest products broadly speaking. As to the paper industry this seems to be true:—of wood resources we have reasonable abundance and these of quality as good as any, a resource in fact whose superiority in the great field of ground wood and newsprint production has not yet been convincingly disproved. As a whole paper-making is an expanding industry. Our general facilities for manufacture are good, geographic relations to markets fair, and we have the advantages of capital and of experience on the part of both management and labor. The power to adapt is with us therefore, while it is realized that by cutting off the long freight hauls and reverting to our splendid, improved rivers in the old fashioned way the cost of wood can be reduced very

materially. In a general way, then, the men best informed expect that as against competition from other parts of the United States we shall stay in the game, though it may indeed be that shrinkage in volume of production and what will be felt as hardship may be involved in the readjustment.

How stands the matter in regard to lumber? We long ago learned that in Maine utilization of virgin timber was not the end, that our forests replenish themselves and are capable of supplying far more than our own needs. We are concerned then for profitable future outlets, and these we were long told would always exist and call on us with ever increasing volume and force. Of late years, however, we have had reason to question that idea.

Per capita use of lumber in the United States has indeed been shrinking fast. Twenty-five years ago it was at the level of 525 feet per annum, but by 1920 it shrunk to between 300 and 400. By 1930 again it had shrunk to around 200 feet, while as near as can be told in early autumn production for the year 1932 will be only at the rate of about 125 feet per capita, a figure that is close to the level of use in the more prosperous European countries. Even total volume of lumber produced in the United States has shrunk markedly in the very last years. For long it stood at rising 30 billion feet annually; for the present year around 15 billions is the cut expected.

Changes in use among our people are at the bottom of much of this, along with the development and abundant supply of materials competing with wood and lumber. Two homely and familiar examples may be employed to illustrate this last point, the shift made years ago from lumber to barbed wire for fencing and the extensive shift from wood to petroleum as a household fuel that is taking place at the present time. Great numbers of our people live today in conditions entirely different from those of the past, vastly more of them in cities, and notoriously city building dispenses largely with lumber. Composite materials, largely of chemical origin, have replaced wood in a multitude of minor uses. For building purposes, a variety of clay products are widely available for suburban and even country use, while metals are striving for a place in the same field. These developments, entirely natural as looked back upon though foreseen by but few, have radically changed of late years the position of lumber in the markets.

Men should not, however, be influenced too much by conditions that may prove to be transient, or fail to recognize the strong as well as the weak points of a situation in which they are vitally concerned. Wood has its strong points—wide adaptability, ease of working, reasonable durability, cheapness up to date; it seems to suit mankind in their immediate surroundings and for a multitude of uses—no other material has a record of service as consistent or as long. Revival of the lumber industry from its present low ebb, therefore, is confidently expected by the well informed, and continued extensive use of wood as a structural material. In this revival, whatever may be its extent, Maine should have a due and generous share.

Some further grounds for this belief, and a summary of our present situation and of what it seems we may expect to work out of it will conclude this article:

1. Our paper industry is in the midst of a period of stress and readjustment to changed conditions, the final outcome of which no man can accurately foretell. It is working manfully at the problems with which it is confronted, hopefully too because of belief in itself, in the resources at hand, in the community that surrounds it. Consideration and forbearance are due for the time being, and there is no reason to think that they will fail.

2. As respects lumber, the following is the first and a primary and telling fact: the Pacific Northwest cannot long maintain the existing severity of competition in our natural markets. Such competition soon results in ruin as the present originators of it are well aware. Just at this time in fact they are making heroic efforts to get their industry on a living basis.

Coupled with that another point in our favor should be noted, the high quality of our own woods. Spruce for a combination of light weight with elasticity and strength leads the field of timbers. For white pine in certain important uses there is, according to specialists in those fields, no substitute as good. Our common hardwoods, little used as yet chiefly because of geographical relations, have good qualities nevertheless and men expect them sometime to be of substantial value to us. The general thought in this field is as follows:

that while really favorable and generous conditions may take some time to return, their final return is altogether probable.

3. Our pine industry is worthy of special reference. We have here, as was just made clear, a natural resource of a peculiar sort. Uniform in texture, easily worked, free from warping, durable, both in low and high grades the wood has fields of use in which it is preëminent. Then the area in the United States that is occupied by this tree is relatively small, southwestern Maine, southern New Hampshire, and eastern Massachusetts containing the most and the best of it. All considered, relations to population and markets among other things, no forest region in the country looked at broadly and in long range seems to promise better. The production of lumber of good grade to be worked up into a variety of high priced and high quality products is indicated as the main object of management, sufficient low grade to meet demand promising to be produced as a side line.

4. Finally, it seems desirable to refer in a broad way and comparatively to the producing power of Maine forests, ground that has often been covered before but that it seems particularly desirable to cover again in this period of doubt and uncertainty. Their fine natural character is the primary point—the prevalence of valuable species, rapidity of growth, the readiness of natural reproduction as a rule, the comparative ease with which they are protected. The value of these natural factors it is hard to overset. Our forests for the most part have kept on producing even though heedlessly cut, a fact, it is well understood, that does not hold everywhere. Further than that, Maine foresters and timber men are familiar with measures capable at small cost of adding greatly to their productiveness which there is every reason to think our people and business concerns will apply when inducement is in evidence. Of the future of timber in Maine there need be, unless we fail to maintain toward it the same sort of intelligent interest we have in the past, no sort of question. In times to come as in those past, Maine should profit largely through the supply of forest products to communities not as favorably situated.

WEATHER AND FOREST FIRE HAZARD WITH SPECIAL REFERENCE TO THE SPRUCE-FIR REGION OF NORTHERN MAINE

By

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in cooperation with

The Maine Forest Service

INTRODUCTION

In Maine, as in the other New England states, forest fire control is the most important single activity of federal, state, and private forest protective organizations. Past forest fire records of Maine[2] indicate two outstanding facts: (1) that fires are practically all man-caused, and (2) that fires are more likely to occur during certain periods of the year than at other times. Thus, for the state as a whole, lightning causes only slightly more than 8 per cent of the fires each year; these lightning fires are small, being responsible for less than 1 per cent of the total area burned. The remaining 92 per cent of fires and 99 per cent of area burned are entirely the result of human carelessness during the forest fire season. In the spruce-fir region of northern Maine, the greatest danger from forest fires exists from May to August inclusive. Annually, about 81 per cent of the fires occur during these four months. The forest fire hazard is particularly acute during May and June, because almost 56 per cent of the fires each year are reported as occurring during these two months.

Since people are no more careful with fire at one time of the year than another, the question naturally arising is: What are the circumstances producing dangerous forest fire conditions? The seasonal aspect of the forest itself partially answers this question. A more complete answer, however, lies in the moisture conditions of the forest fuels. It is well-known that

[1] Maintained by the U. S. Department of Agriculture at New Haven, Connecticut, in cooperation with Yale University.

[2] Dana, S. T. Forest fires in Maine, 1916-1925. Maine For. Ser., Bul. No. 6. 73 p., 33 figs., 25 tables.

woody materials ignite more readily, and the rate of fire spread increases with decrease in their moisture content. Since weather is the only natural agent which can bring about a change in the moisture content of forest fuels, it logically follows that weather conditions must largely govern the degree of forest fire danger.

Among foresters and others concerned with forest fire control, "forest fire-weather" has come to mean weather conditions favorable to the inception and spread of fire. For four years (1927 to 1930 inclusive) the Maine Forest Service and the Northeastern Forest Experiment Station[1] have investigated the relationship between weather and forest fire hazard in the spruce-fir region at Smyrna Mills, Maine. The results of this investigation have brought to light two points of interest, both of which have an important bearing on forest fire control. These are (a) that from certain simple meteorological measurements it is possible to determine the degree of fire hazard, and (b) that the forest canopy, by its modifying effect upon the controls of fuel moisture content, greatly reduces the intensity of fire hazard. Both of these points will be discussed more fully in later sections.

To the experienced forest fire warden, the evidence of the effect of weather upon inflammability may appear to be proving the obvious. However, the classification of these data into "degrees of hazard" will enable even the expert fire fighter to do something which even with his experience he could not do otherwise; namely, to classify danger into extreme, high, moderate, etc., and to do this consistently and in agreement with other expert fire-fighters. This feature should appeal not only to the fire wardens themselves but also to the administrators of forest protective organizations. Such consistency among wardens cannot but bring about better protection at less cost. .

[1] The writer is particularly grateful to Mr. Neil L. Violette, Forest Commissioner, Maine Forest Service, for his interest in the project. He is likewise indebted to the following men who were observers at the Smyrna Mills stations during the years indicated: Roy A. Chapman and Frederick Ames, 1927; Joseph Truncer, 1928; J. W. Chalfant, 1929; and C. L. Stewart and W. R. Feeley, 1930. Finally, the writer wishes to express his gratitude to Miss Mary C. Weldon, junior statistical clerk, Northeastern Forest Experiment Station, for her assistance in analyzing the data, and to Miss Esther E. Scott, assistant clerk, Northeastern Forest Experiment Station, for her care in typing the manuscript.

WEATHER CONDITIONS AND THE MOISTURE CONTENT OF FOREST FUELS

Two factors govern the character and severity of forest fires. The first of these is the physical characteristics of the forest fuels. The second is the amount of moisture held by the inflammable materials. Weather has little, if any, effect upon the first of these two factors. Upon the moisture content of forest fuels weather does, however, have a very decided influence. This is particularly true with regard to the moisture content of the materials which go to make up the duff layer on the forest floor. This layer is the principal carrier of fire in the spruce-fir region.

The duff layer, being composed of loose, porous materials, in the form of dead needles, twigs, and humus, has a tremendous capacity for water absorption. It likewise loses moisture very rapidly. In this connection, duff can be likened to a sponge which absorbs moisture when the surrounding space is wetter than itself and which gives it off when the reverse condition is true.

The relationship between weather and the moisture content of forest fuels is presented graphically in Figure 1, which also depicts the precipitation-evaporation cycle. Rain, as it falls upon the forest floor, is either absorbed by the duff materials or percolates into the soil beneath. The water held by the duff particles is retained there only as long as the surrounding space is as wet or wetter than the duff layer. The rate at which the water present in the duff layer is returned to the atmosphere in the form of water vapor depends upon many interrelated factors.

Precipitation is the only weather element which can add sufficient moisture to forest fuels to render them non-inflammable. When frequent and abundant enough, rainfall alone may entirely eliminate forest fire danger. During dry periods the other factors—*heat, atmospheric moisture deficit, and wind*—govern the intensity of forest fire hazard.

The heat factors, of which solar radiation or sunshine and air and duff temperatures are of most importance, influence fire hazard in two ways. First, by their heating effects they

raise the temperature of the inflammable materials. Less additional heat is necessary, therefore, to start and maintain combustion than when the fuels are cool. Second, by increasing the temperature of the atmosphere the heat factors increase its moisture-holding capacity, a fact which is of outstanding importance to the correct appreciation of the relationship between weather conditions and the moisture content of forest fuels.

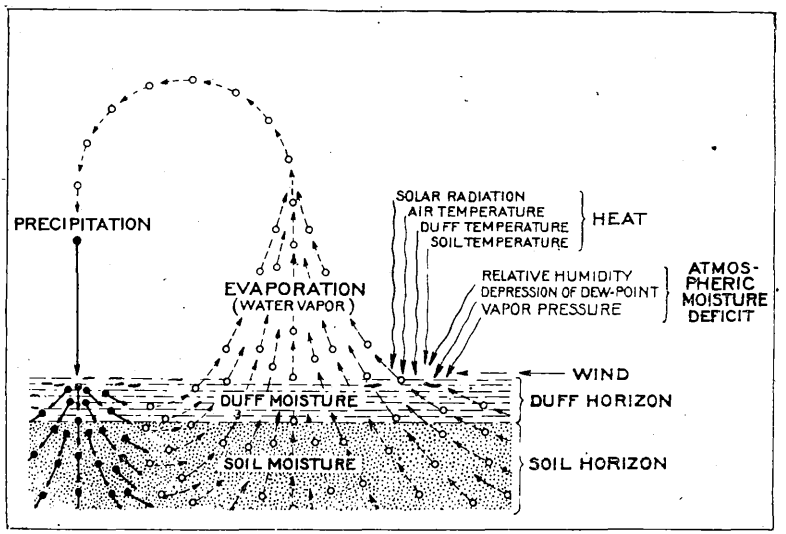

Fig. 1. The Intake and Outgo of Duff Moisture and the Weather Factors which Influence the Precipitation-Evaporation Cycle

Thus, for example, in the early morning when the air is cool it may hold enough moisture to be completely saturated. When such a condition exists, there is no moisture outgo to the atmosphere from the duff layer. However, as the air temperature increases, the capacity of the atmosphere for moisture likewise increases. If the amount of water vapor in space remains constant there is a steady rise in atmospheric moisture deficit, which the atmosphere tries to make up by withdrawing water from the forest litter, thereby making the fuels drier and more inflammable.

As has been indicated in the previous paragraph, the atmospheric moisture deficit factors—particularly relative humidity and depression of the dew-point—control the rate at which moisture is evaporated from the duff layer. It will be shown later that once the effect of precipitation has disappeared, the daily curve of duff moisture content follows directly the daily trend of relative humidity. Because of this intimate relationship, and because the daily low value of relative humidity occurs during the early hours of the afternoon, it is obvious that the peak of daily fire hazard occurs also at that time. From the late afternoon onward there is usually a decline in atmospheric moisture deficit because of lowering air temperatures with increasing humidities. Duff then tends to reabsorb from the atmosphere some of the water vapor it has lost during the earlier part of the day. The amount regained, however, is seldom sufficient to render the inflammable materials safe, once they have dried out below the danger line.

A two-fold part is played by wind in the forest fire problem. By bringing in warm air, wind hastens the water loss from duff by reason of the facts mentioned above. This influence upon evaporation is, however, of less importance than the effect of wind upon the rate of fire spread. Fire fighters are more concerned with the direct action of the wind in leveling flames, thus making more heat available at the head of the fire, and in causing spot-fires by wind-borne, glowing embers.

The extent to which this theoretical discussion actually applies in nature is substantiated by the data collected at the two Smyrna Mills fire-weather stations. (See Figures 2 and 3.) Both stations were located in the spruce-fir forest type. The open station, on the one hand, was situated in an area from which most of the timber had been removed in a heavy pulpwood cutting. The forest station, on the other hand, was located in an adjacent stand of green timber where no cutting had been done.

In Figure 4 data are presented which are typical of the entire four years during which the Smyrna Mills stations were in operation. It will be noticed that duff moisture content is only high on days when rain occurred (See June 23, 24, and

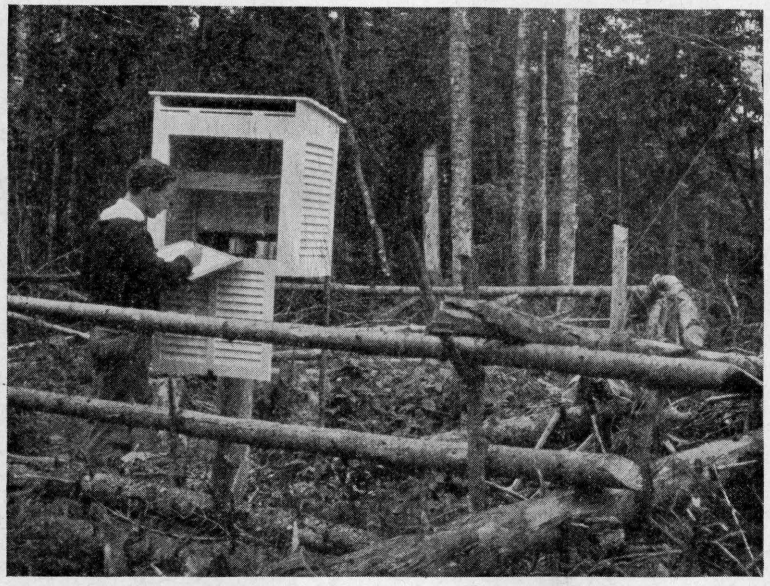

Fig. 2. Fire-Weather Station in Open, Smyrna Mills, Maine

Fig. 3. Fire-Weather Station in Forest, Smyrna Mills, Maine

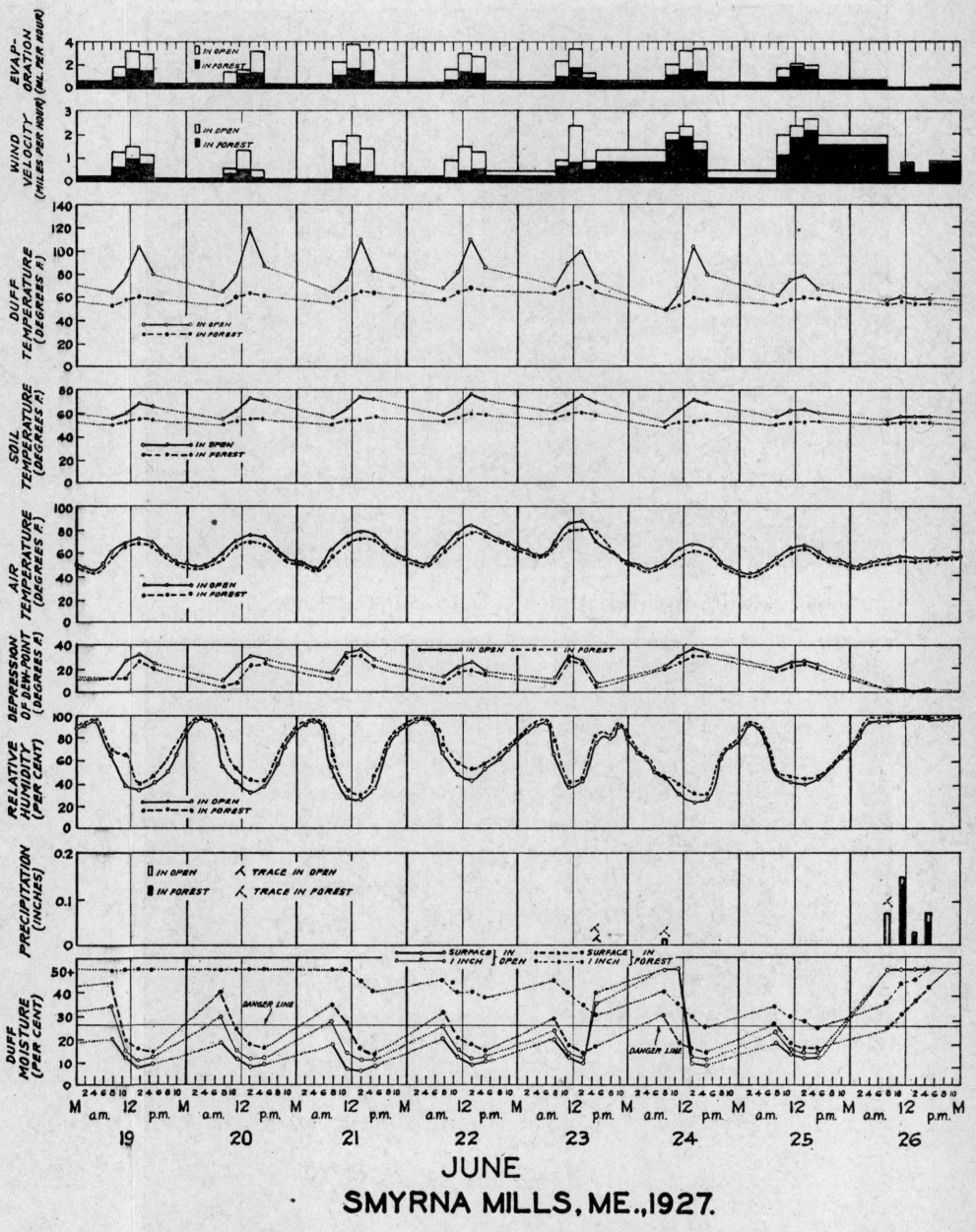

Fig. 4. Weather and Forest Fire Hazard Conditions in the Open and Within the Forest

26). Between periods of rain the other components of fire-weather control fuel moisture content,—hence, forest inflammability. Thus, low duff moisture values are created when relative humidity is low and when depression of dew-point, evaporation rate, wind velocity, and the temperature of air, duff, and soil are high. When, as for example in the early morning, the relative magnitude of these weather elements is reversed, fuel moisture content is higher, consequently fire hazard is reduced. Figure 4 also shows that there is considerable difference in the moisture content of the duff layer in the open as compared to that within the forest. This point will be emphasized later.

One may justly raise the question: How representative are fire-weather data secured from one locality for a forest region having the same timber type? Variations in topography, density, and composition of the forest, etc., all help to produce differences in weather and forest fire hazard conditions, even within short distances. However, even with such minor dissimilarities, the fire hazard in any one region tends to approach a common value where one type of duff is outstanding. This statement is confirmed by the figure in Table I, in which relative humidity data collected at Smyrna Mills are compared with forest fire records of the northern Maine counties, which embrace a land area of about 15,000,000 acres, most of which is covered with forests of the spruce-fir type.

It is immediately apparent from Table I that the majority of fires listed occurred on days when the 2 p. m. relative humidity at Smyrna Mills was low. For example, over 80 per cent of the total fires fall within relative humidity classes of 60 per cent or less. The percentage figures for area burned and damage caused within these lower relative humidity limits are even more impressive; for area burned this is 99.1 per cent and for damage caused it is 95.9 per cent.

TABLE I

RELATION BETWEEN FOREST FIRES OCCURRING IN NORTHERN MAINE* AND FIRE-WEATHER DATA OBTAINED AT THE SMYRNA MILLS FIRE-WEATHER STATION, JUNE TO OCTOBER 1927-1930, INCLUSIVE

Relative Humidity in open at 2 p.m. per Cent	Degrees of Hazard	Aver. Surface Duff Moisture Content in open 2 p.m.	Number of Fires			Area Burned			Damage Caused		
			No.	Percentage for Class	Cumulative Percentage for Class	Acres	Percentage for Class	Cumulative Percentage for Class	Dollars	Percentage for Class	Cumulative Percentage for Class
31– 40	High	18	8	20.0	.....	2962	79.2	.....	266	6.7	.....
41– 50	Moderate	26	12	30.0	50.0	371	9.9	89.1	1085	27.5	34.2
51– 60	Moderate	32	13	32.5	82.5	372	10.0	99.1	2438	61.7	95.9
61– 70	Low	36	1	2.5	85.0	1	.....	99.1	.....	.....	95.9
71– 80	None	41	3	7.5	92.5	16	0.4	99.5	45	1.1	97.0
81– 90	None	44	2	5.0	97.5	11	0.3	99.8	20	0.5	97.5
91–100	None	50	1	2.5	100.0	6	0.2	100.0	100	2.5	100.0
Total...			40	100.0		3739	100.0		3954	100.0	

*Includes the following counties—Aroostook, Franklin, Hancock, Oxford, Penobscot, Piscataquis, Somerset, and Washington.

DUFF MOISTURE CONTENT AND DEGREE OF INFLAMMABILITY

Duff moisture measurements in themselves can only express the relative increase or decrease in forest litter inflammability. Such data cannot denote positive hazard or non-hazard unless the duff moisture percentages are directly related to ease of burning, which after all is the primary point of interest to fire wardens.

At Smyrna Mills, some 400 inflammability tests were made with the common causes of forest fires: matches, cigarette butts, pipe heels, small coal sparks such as are thrown off by steam locomotives, and small camp fires. By conducting such tests over a wide range of duff moisture percentages it has been possible to determine how different percentages of moisture influence the ease of ignition of spruce-fir duff particles.

Using the results of these inflammability tests, a rating scale of degree of hazard has been prepared and is presented in Table II. It must be realized that these zones of inflammability are by no means as sharply differentiated as shown. There is considerable overlapping, still, it is believed that the classification of degrees of hazard is a definite improvement over the rule-of-thumb and experienced-opinion base which at present largely governs the practices of fire control.

TABLE II
ZONES OF INFLAMMABILITY IN RELATION TO DUFF MOISTURE CONTENT AND COMMON CAUSES OF FOREST FIRES

Degree of Hazard	Surface Duff Moisture Content	Effective Firebrands
Extreme	Below 6 per cent	Locomotive sparks, cigarette butts pipe heels, matches, and camp fires.
High	6 to 8 per cent	Cigaretts butts, pipe heels, matches, and camp fires.
Moderate	9 to 13 per cent	Pipe heels, matches, and camp fires.
Low	14 to 17 per cent	Matches and camp fires.
Very low	18 to 26 per cent	Camp fires—duff at edges smolders but fire does not spread.
None	27 per cent or more	None; generally safe from all.

THE MODIFYING EFFECT OF FOREST CANOPY UPON FOREST INFLAMMABILITY

The simultaneous observations of weather factors and duff moisture content made at the open and forest stations at Smyrna Mills have been instrumental in confirming the belief held by many experienced fire fighters that the forest itself is one of the best natural means of "fire-proofing" forest land. In other words, these fire-weather data show that the extent of forest inflammability is as much the result of the degree of exposure of fuels to weather as of the type of weather itself.

A study of Figure 4 will illustrate this point. It will be noticed that duff moisture content and its control—the weather elements,—are modified to a considerable extent by the forest canopy. For instance, the duff layer within the forest is appreciably wetter than the same layer in the open. Furthermore, the rate of drying is much slower beneath the crowns. This is particularly true in the case of the 1 inch duff layer in the forest. These facts indicate that within the green timber a hazard develops much more slowly, and a very dry state is not attained so rapidly as in the open.

The effect of the tree crowns upon the controls of forest inflammability, the weather elements, is equally illuminating. This is particularly striking in the case of the duff temperatures of these two exposures, for at mid-day the differential between surface duff temperature in the open and within the forest can amount to almost 60° F. (See 2 p. m. on June 20, Fig. 4). Although for air and soil temperatures the variance is of a much smaller magnitude than for duff temperature, these factors are, nevertheless, consistently lower beneath the trees. Thus, with air temperature the difference ranges between 5° and 10°; with soil temperature it averages around 20°. Both relative humidity and depression of dew-point show that the atmosphere under the green canopy has uniformly a higher moisture content than that of the unshaded area. Likewise, wind velocity, especially during the day, is lower under the trees, being only between two-thirds to one-half of that in the open. All these circumstances operating together produce a lower rate of evaporation within the forest. As the evapora-

tion data of Figure 4 show, usually twice as much evaporation for the same period of time takes place in fully exposed areas as under the trees. This means that there is less drain upon the moisture held by the forest litter. Consequently, higher duff moisture values and lower degrees of inflammability are maintained within the forest.

So marked is the modifying effect of the forest canopy upon the various weather elements which together constitute forest fire-weather, that it has been possible to construct a table showing the relationship between the more important fire-weather elements and the beginning of forest fire hazard in the open and within the spruce-fir forest at Smyrna Mills. These data are contained in Table III.

TABLE III

RELATION BETWEEN THE MORE IMPORTANT WEATHER ELEMENTS AND THE BEGINNING OF FOREST FIRE HAZARD IN THE OPEN AND WITHIN THE FOREST

Weather Element	Hazard commences at surface in the		Differences resulting from the influence of forest canopy
	Open at	Forest at	
Air temperature—°F.	74	85	11
Surface duff temperature—°F.	83	not sufficiently high	
Relative humidity—%.	47	25	22
Depression of dewpoint—°F.	19	36	17
Hours since last measurable precipitation (0.01 inches or more).	50	190	140
Evaporation—milliliters per hour.	1.30	1.80	0.50

ESTIMATING AND FORECASTING FOREST FIRE HAZARD

The analysis of the Smyrna Mills fire-weather data shows that the moisture content and degree of inflammability of spruce-fir duff can be estimated by any of the weather elements listed in Table III. However, since weather is the cumulative effect of many interrelated factors, estimates of hazard based on only one weather element are inadequate. The accuracy of such estimates is low because no single weather factor is a true measure of the weather as a whole.

Estimates and forecasts of fire hazard based upon meteorological data can be made more accurate if a combination of several weather factors is used. For the spruce-fir region of northern Maine, the most practical measure to use is a combination of relative humidity, air temperature, and the number of hours since last measureable precipitation. The influence of all the important weather elements is represented in such a combination. For instance, the effect of the heat factors is represented by air temperature. The atmospheric moisture deficit factors are represented by relative humidity, which to a considerable degree also evaluates the drying influence of wind. Lastly, rain is represented by the number of hours since last measurable precipitation.

The complex relationship between the three weather elements listed above and fuel moisture content and degree of inflammability can best be presented in the form of alinement charts (See Figures 5, 6, and 7). An alinement chart is simply a mathematically constructed diagram from which the values of an unknown factor can be obtained from the known values of two or more factors closely associated with the unknown. In the present case duff moisture content represents the unknown, while the measured weather elements are the known factors.

The three alinement charts are for weather observations made in the open at 11 a. m. and 2 and 5 p. m. No charts have been prepared for readings earlier than 11 a. m. because of the low correlation between weather and duff moisture content earlier in the day. If only one determination can be made daily it should be done regularly at 2 p. m. Estimates made at that hour are more accurate because of the comparative equilibrium between the moisture content of the atmosphere and of fuels during the early hours of the afternoon. Furthermore, the daily minimum duff moisture value usually occurs at 2 p. m. This fact is important when weather forecasts are about to be applied to single daily estimates of existing hazard in order to formulate forecasts of probable future hazard.

The use of the alinement charts is illustrated by the example shown on the 11 a. m. chart (Figure 5). The different

SMYRNA MILLS, ME.

ALINEMENT CHART FOR 11 A.M. OBSERVATIONS

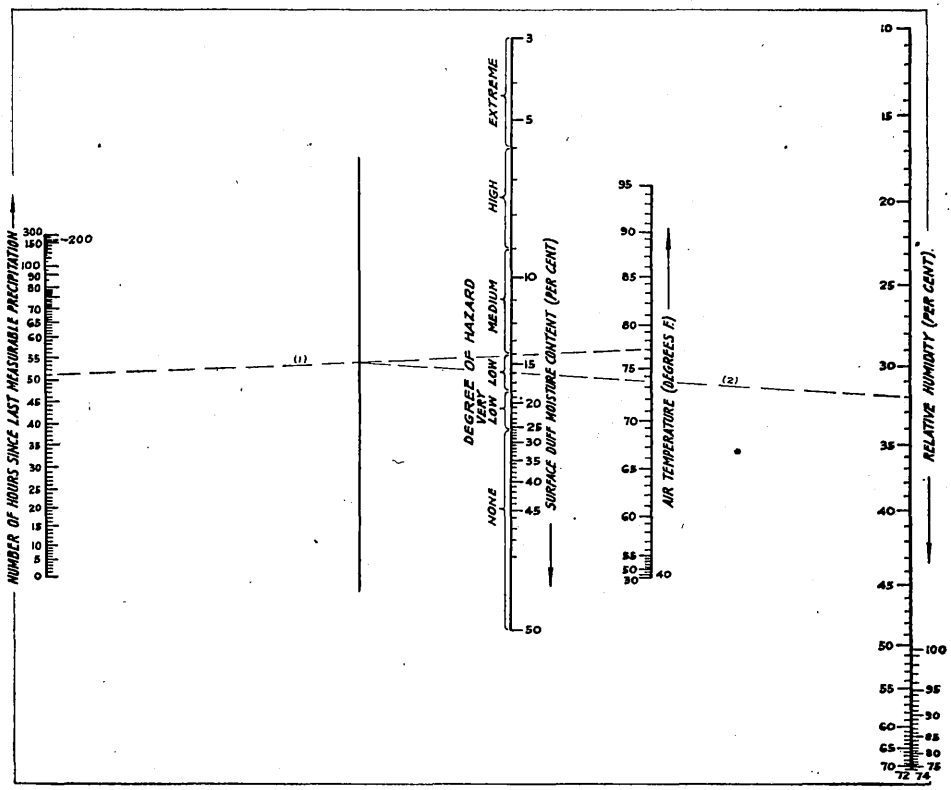

TABLE SHOWING THE RELATIONSHIP BETWEEN SURFACE DUFF MOISTURE CONTENT IN THE OPEN AND WITHIN THE FOREST AT 11 A.M.

Open %	Forest %	Open %	Forest %	Open %	Forest %	Open %	Forest %	Open %	Forest %
1	14	11	27	21	37	31	44	41	49
2	16	12	28	22	38	32	45	42	49
3	17	13	29	23	38	33	46	43	50 or more
4	18	14	30	24	39	34	46	44	" " "
5	20	15	31	25	40	35	47	45	" " "
6	21	16	32	26	41	36	47	46	" " "
7	22	17	33	27	41	37	48	47	" " "
8	23	18	34	28	42	38	48	48	" " "
9	25	19	35	29	43	39	49	49	" " "
10	26	20	36	30	44	40	49	50	" " "

Fig. 5. Alinement Chart and Table for Determining Surface Duff Moisture Content and Degree of Hazard in the Open and Within the Forest at 11 a. m.

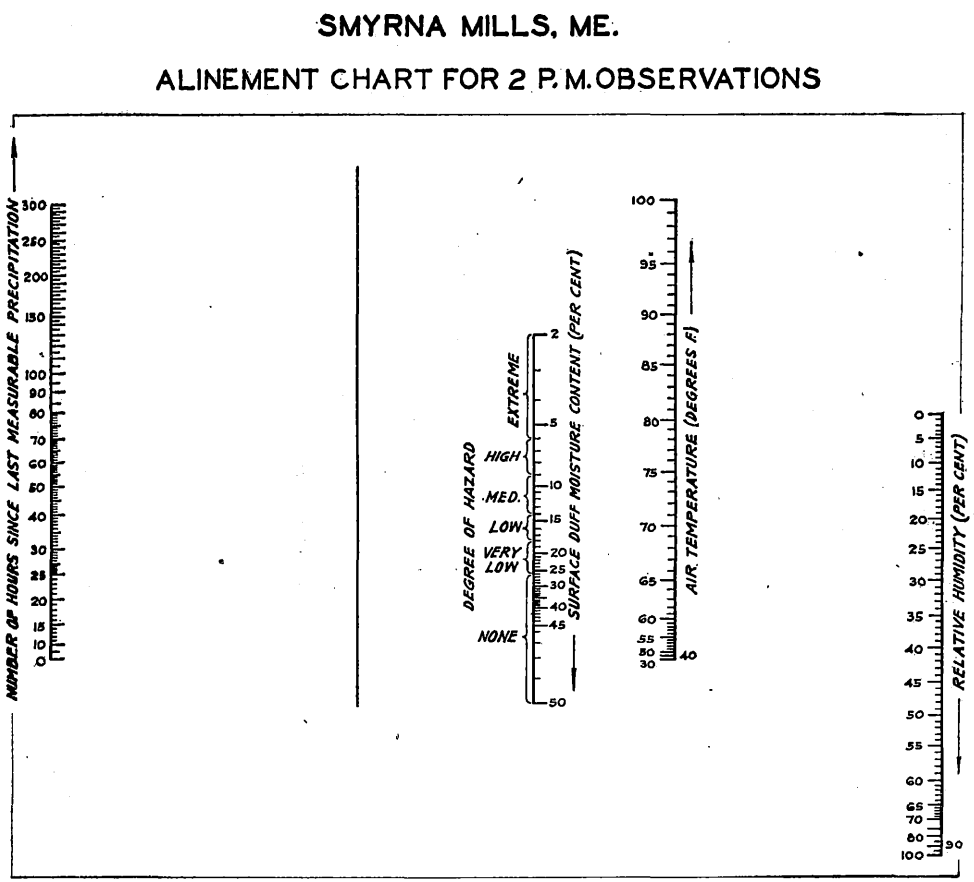

TABLE SHOWING THE RELATIONSHIP BETWEEN SURFACE DUFF MOISTURE CONTENT IN THE OPEN AND WITHIN THE FOREST AT 2 P.M.

Open %	Forest %	Open %	Forest %	Open %	Forest %	Open %	Forest %	Open %	Forest %
1	12	11	26	21	36	31	44	41	49
2	14	12	27	22	37	32	44	42	49
3	15	13	28	23	38	33	45	43	49
4	16	14	29	24	38	34	45	44	50 or more
5	18	15	30	25	39	35	46	45	" " "
6	19	16	31	26	40	36	47	46	" " "
7	20	17	32	27	41	37	47	47	" " "
8	22	18	33	28	42	38	48	48	" " "
9	23	19	34	29	42	39	48	49	" " "
10	25	20	35	30	43	40	48	50	" " "

Fig. 6. Alinement Chart and Table for Determining Surface Duff Moisture Content and Degree of Hazard in the Open and Within the Forest at 2 p. m.

SMYRNA MILLS, ME.

ALINEMENT CHART FOR 5 P.M. OBSERVATIONS

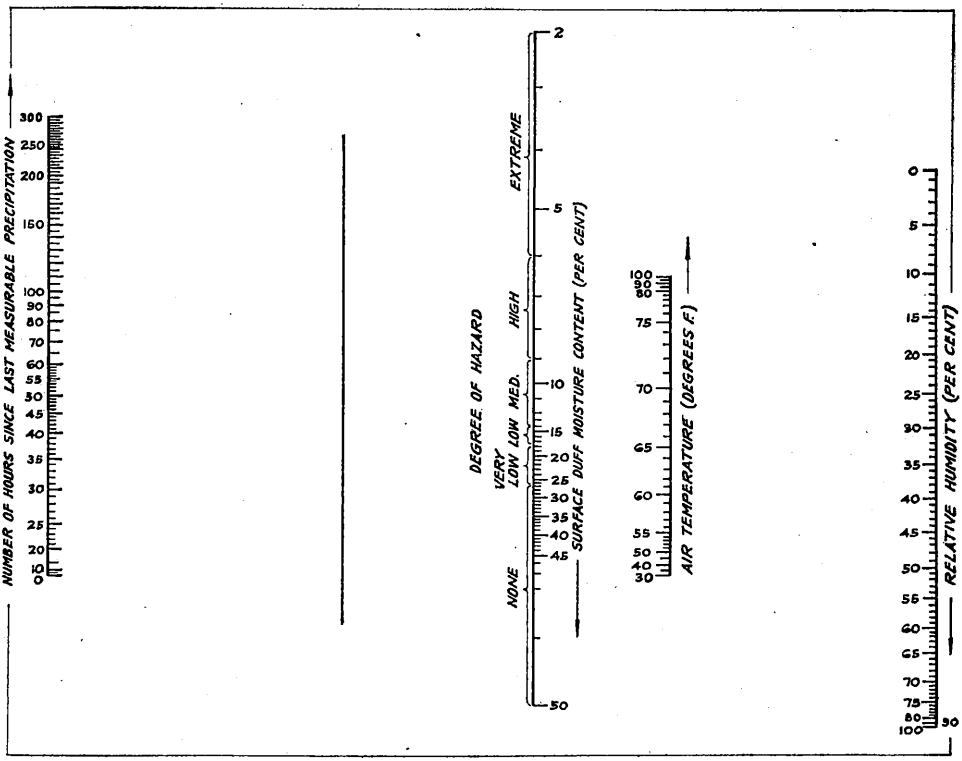

TABLE SHOWING THE RELATIONSHIP BETWEEN SURFACE DUFF MOISTURE CONTENT IN THE OPEN AND WITHIN THE FOREST AT 5 P.M.

Open %	Forest %	Open %	Forest %	Open %	Forest %	Open %	Forest %	Open %	Forest %
1	10	11	24	21	35	31	43	41	49
2	11	12	25	22	36	32	44	42	49
3	13	13	26	23	37	33	45	43	49
4	14	14	27	24	38	34	45	44	49
5	16	15	29	25	38	35	46	45	50 or more
6	17	16	30	26	39	36	46	46	" " "
7	18	17	31	27	40	37	47	47	" " "
8	20	18	32	28	41	38	47	48	" " "
9	21	19	33	29	42	39	48	49	" " "
10	23	20	34	30	43	40	48	50	" " "

Fig. 7. Alinement Chart and Table for Determining Surface Duff Moisture Content and Degree of Hazard in the Open and Within the Forest at 5 p. m.

weather factors are as follows: time elapsed since last measurable precipitation 51 hours; air temperature 77 degrees, and relative humidity 32 per cent.

One end of a straight edge is placed on 51 of the precipitation-hour scale and the other end is moved upward until it strikes 77 on the air temperature scale. Holding the straight edge on the point where it intersects the unmarked vertical line to the right of the precipitation-hour scale, the other end of the straight edge is moved downward along the relative humidity scale until 32 is reached. Duff moisture content and degree of hazard can now be read at the point where the straight edge intersects the duff moisture scale. For the example cited, the chart gives an estimate of 16 per cent duff moisture content which is indicative of a low degree of hazard.

For information on fuel moisture and fuel inflammability conditions within pure spruce-fir stands, the figures obtained from the alinement charts are applied to the tables appearing below the scales. When, for example, the surface duff layer in the open has 16 per cent moisture, within the green timber the surface duff moisture content is 32 per cent with no inflammability.

For general forest conditions in the spruce-fir region of northern Maine, however, the hazard in the spring and fall is best indicated by estimates which apply to open conditions. Much of the spruce-fir forests of northern Maine are of a mixed nature containing considerable amounts of hardwood species. In such stands the hardwood species are leafless in the spring and fall, at which times they represent nearly as hazardous conditions as cut-over areas.

APPLICATION OF FIRE-WEATHER DATA IN FOREST FIRE CONTROL

In view of the fact that the greater number of fires in northern Maine are man-caused, fire prevention must necessarily play a major part in fire control in that region. What is needed, therefore, in this campaign against human carelessness is some method of determining accurately the beginning of hazardous conditions so that preventive measures may be taken, and so that sufficient men and equipment may be at

hand to suppress promptly any fires which may occur. Fire-weather data, when used in connection with the daily weather forecasts issued by the U. S. Weather Bureau, meet this long-felt need.

Although permits to burn brush are required in Maine, brush burning is still one of the three major causes of fires in northern Maine. In handling burning permits the fire warden is faced with the perplexing problem of determining when it is safe to issue such permits and when permits already issued should be cancelled.

Two steps can be taken to remedy this situation. In the first place, no permit should be given for burning between the hours of 9 a. m. and 5 p. m. Generally during these hours weather conditions, particularly wind, are all favorable to the fire getting beyond control.

In the second place, by determining the existing state of hazard for himself the warden can quickly decide whether it is safe to issue permits or not. If at 2 or 5 p. m. a low to medium hazard exists and the weather forecast reads: "Fair tonight and tomorrow; rising temperature with moderate to fresh winds," a greater hazard will exist on the following day and brush burning will not be safe. The warden can then justly refuse to issue any permit and likewise cancel all existing permits until wet weather sets in. However, if the alinement chart shows no hazard or a very low one and the forecast indicates: "Cloudy weather tonight and tomorrow; falling temperatures with light winds," the warden has some assurance that there will be no increase in hazard, and brush burning can be done safely the next day.

Fire-weather data are also of value for indicating when patrols should be used. When no hazard exists patrolmen can be used to greater advantage on other work. As the degree of hazard increases, so likewise does the need for closer inspection of roads and trails by patrolmen, not only to insure the suppression of many fires in their incipient stages, but also because of the moral effect of special patrol on the public.

When dispatching men to fight fires the warden can obtain considerable assistance from fire-weather data. With his knowledge of the existing degree of hazard and of the type of

cover in which the fire is reported, the warden is in a better position to determine the number of men and type of equipment which may be required to suppress the fire. Fire-weather data, likewise, give some inkling as to the strategy which can be applied on the fire line. Under high and extreme inflammable conditions fires advance so rapidly and "spot" ahead so far that direct suppression is out of the question. With a low or very low hazard the forest fuels will contain sufficient moisture to prevent the fire from "running" and it will merely creep along the surface. Under this burning condition, direct attack can be employed successfully.

Finally, fire-weather data have a distinct place in the molding of public sentiment toward conscious care with fire during hazardous periods. The information obtained from the alinement charts when broadcast in every manner—thru the press, over the radio, and from mouth to mouth—is effective in helping to prevent fires by making people realize when periods of danger occur.

APPENDIX

Instrumental Measurements

To use the alinement charts contained in this report three values must be known. Of these, two must be measured—relative humidity and air temperature. The third factor—number of hours since last measureable precipitation—can be obtained from a rough rainfall record in which the approximate time of the beginning and ending of each rain is recorded. By "measurable precipitation" is meant one which amounts to at least 0.01 inches or more. Traces of rain should be disregarded.

Relative humidity and air temperature measurements can be obtained readily from a sling psychrometer. Except that air temperature readings must be made in the shade, no other special instructions are necessary. Such data can quickly be obtained from the dry-bulb (the uncovered thermometer) of a sling psychrometer.

Two types of sling psychrometers are particularly recommended: the standard Weather Bureau and the Bureau of

Mines patterns. For ferestry work, the latter has the advantage over the former, for it is better protected. It is, therefore, less likely to be broken when accidentally knocked against a solid object.

When using a sling psychrometer the following precautions must be observed:

1. The muslin covering of the wet-bulb thermometer must be kept clean and free of oil and grease. The muslin *must be thoroly saturated* before the instrument is whirled.

2. *Only distilled or rain water* caught in a clean container should be used to wet the muslin.

3. The instrument, held at arm's length, should be whirled in the shade of a building, tree, or the shadow of the observer's body. If possible, the observer should face into the direction of the wind.

4. A uniform speed should be used in whirling the thermometers. The procedure in making a relative humidity determination is about as follows: After the wet-bulb (muslin-covered thermometer) is thoroly saturated with water, the instrument is whirled for about half a minute. The temperature of the wet-bulb is then quickly read. This process is repeated several times until a constant reading of the wet-bulb is obtained. The dry-bulb (uncovered thermometer) is now read, which constitutes the air temperature. The difference between the wet- and dry-bulbs is calculated next. This is termed "the depression of the wet-bulb." The relative humidity is then obtained by applying the air temperature and depression of wet-bulb values to the data found in Table IV.

TABLE IV—RELATIVE HUMIDITY—PER CENT

Fahrenheit Temperatures

Pressure=29.0 inches

Air Temp.	Depression of wet bulb (Dry-bulb temperature minus wet-bulb temperature)																								
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
20	100	85	70	56	42	28	14																			
22	100	86	72	59	45	32	19	7																		
24	100	87	74	61	49	36	24	12	0																	
26	100	88	75	64	52	40	29	18	7																	
28	100	88	77	66	55	44	33	23	12	2																
30	100	89	78	68	57	47	37	27	17	8																
32	100	90	79	69	60	50	41	31	22	13	4															
34	100	90	81	72	62	53	44	35	27	18	9	1														
36	100	91	82	73	65	56	48	39	31	23	14	6														
38	100	91	83	75	67	59	51	43	35	27	19	12	4													
40	100	92	84	76	68	61	53	46	38	31	23	16	9	2												
42	100	92	85	77	70	62	55	48	41	34	28	21	14	7	0											
44	100	93	85	78	71	64	57	51	44	37	31	24	18	12	5											
46	100	93	86	79	72	65	59	53	46	40	34	28	22	16	10	4										
48	100	93	87	80	73	67	60	54	48	42	36	31	25	19	14	8	3									
50	100	93	87	81	74	68	62	56	50	44	39	33	28	22	17	12	7	2								
52	100	94	88	81	75	69	63	58	52	46	41	36	30	25	20	15	10	6	0							
54	100	94	88	82	76	70	65	59	54	48	43	38	33	28	23	18	14	9	5	0						
56	100	94	88	82	77	71	66	61	55	50	45	40	35	31	26	21	17	12	8	4						
58	100	94	89	83	77	72	67	62	57	52	47	42	38	33	28	24	20	15	11	7	3					

TABLE IV—(Continued)

Air Temp.	Depression of wet-bulb (Dry-bulb temperature minus wet-bulb temperature)																								
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
60	100	94	89	84	78	73	68	63	58	53	49	44	40	35	31	27	22	18	14	10	6	2				
62	100	94	89	84	79	74	69	64	60	55	50	46	41	37	33	29	25	21	17	13	9	6	2			
64	100	95	90	85	79	75	70	66	61	56	52	48	43	39	35	31	27	23	20	16	12	9	5	2		
66	100	95	90	85	80	76	71	66	62	58	53	49	45	41	37	33	29	26	22	18	15	11	8	5	1	
68	100	95	90	85	81	76	72	67	63	59	55	51	47	43	39	35	31	28	24	21	17	14	11	8	4	1
70	100	95	90	86	81	77	72	68	64	60	56	52	48	44	40	37	33	30	26	23	20	17	13	10	7	4
72	100	95	91	86	82	78	73	69	65	61	57	53	49	46	42	39	35	32	28	25	22	19	16	13	10	7
74	100	95	91	86	82	78	74	70	66	62	58	54	51	47	44	40	37	34	30	27	24	21	18	15	12	9
76	100	96	91	87	83	78	74	70	67	63	59	55	52	48	45	42	38	35	32	29	26	23	20	17	14	12
78	100	96	91	87	83	79	75	71	67	64	60	57	53	50	46	43	40	37	34	31	28	25	22	19	16	14
80	100	96	91	87	83	79	76	72	68	64	61	57	54	51	47	44	41	38	35	32	29	27	24	21	18	16
82	100	96	92	88	84	80	76	72	69	65	62	58	55	52	49	46	43	40	37	34	31	28	25	23	20	18
84	100	96	92	88	84	80	77	73	70	66	63	59	56	53	50	47	44	41	38	35	32	30	27	25	22	20
86	100	96	92	88	85	81	77	74	70	67	63	60	57	54	51	48	45	42	39	37	34	31	29	26	24	21
88	100	96	92	88	85	81	78	74	71	67	64	61	58	55	52	49	46	43	41	38	35	33	30	28	25	23
90	100	96	92	89	85	81	78	75	71	68	65	62	59	56	53	50	47	44	42	39	37	34	32	29	27	24
92	100	96	92	89	85	82	78	75	72	69	65	62	59	57	54	51	48	45	43	40	38	35	33	30	28	26
94	100	96	93	89	86	82	79	75	72	69	66	63	60	57	54	52	49	46	44	41	39	36	34	32	29	27
96	100	96	93	89	86	82	79	76	73	70	67	64	61	58	55	53	50	47	45	42	40	37	35	33	31	29
98	100	96	93	89	86	83	79	76	73	70	67	64	61	59	56	53	51	48	46	43	41	39	36	34	32	30