MAINE FOLDER

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REPORT ON THE SURVEY OF TIMBER DAMAGE BY FOREST FIRES IN SOUTHWESTERN MAINE, OCTOBER 1947

Forest Survey
Division of Forest Economics

Northeastern Forest Experiment Station
Bankers Securities Building
Philadelphia 7, Pa.

V. L. HARPER, Director

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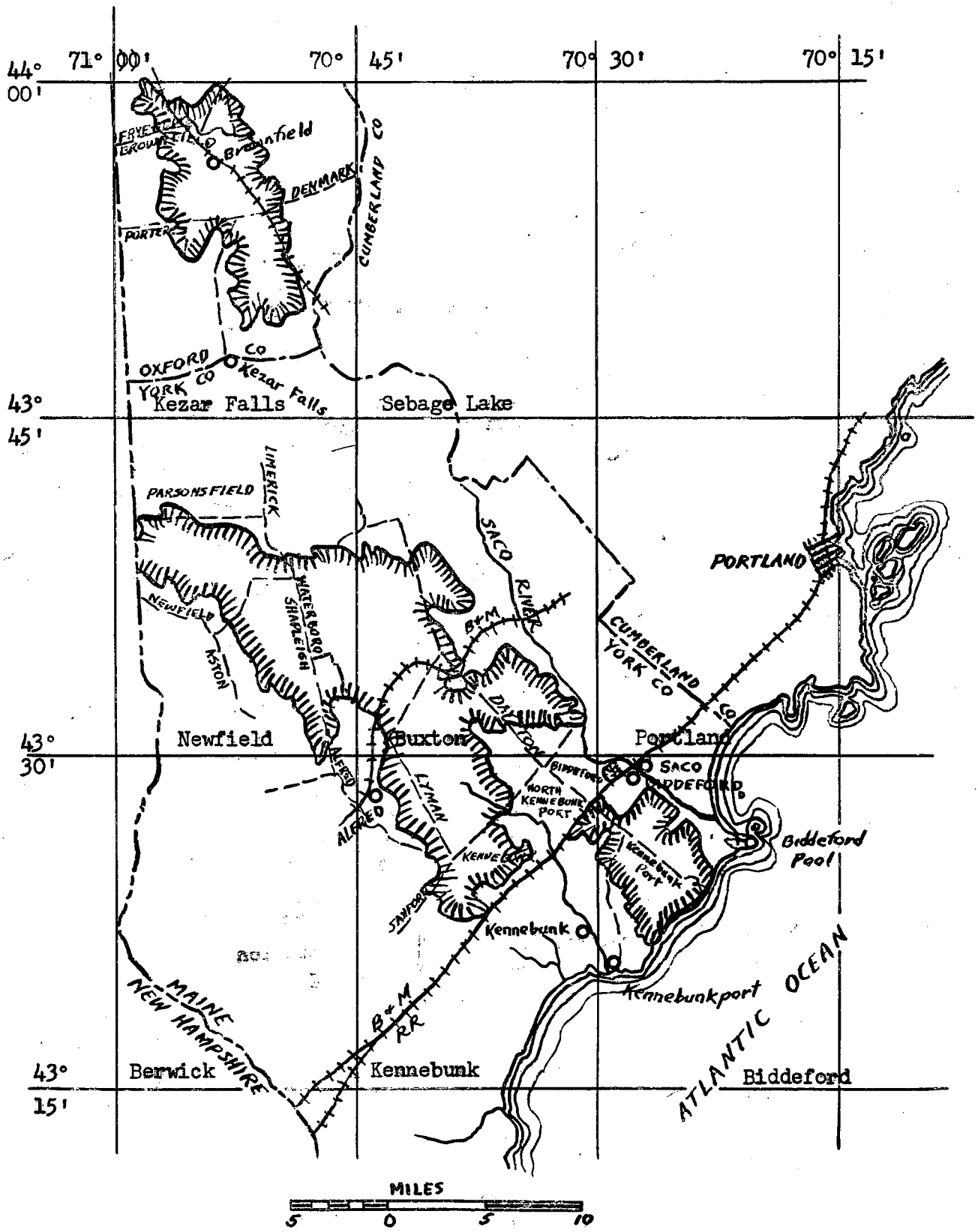
OUTLINE MAP

Fryeburg-Brownfield, Newfield-Waterboro, Waterboro, Kennebunkport Fire Areas



REPORT ON THE SURVEY OF TIMBER DAMAGE BY FOREST FIRES IN SOUTHWESTERN MAINE, OCTOBER 1947

This report supplements the maps[1/] showing the location and classification of pole-timber and saw-timber tracts and accompanying tabulations of tract acreages for the fire areas in southwestern Maine. It summarizes the findings of the survey relative to area, volume, species, timber size, and conditions of salvable material in each of the fire-damaged areas.

Area estimates

Altogether the survey covered 151,140 acres in southwestern Maine. (See table 1.) Slightly over 86 percent of this is forest area. Nearly 19 percent of the forest area or about 24,000 acres supports saw-timber stands and a similar area is in pole-timber stands.

The gross area and forest area were determined from the detailed maps prepared from aerial photographs. The acreage of pole-timber and saw-timber stands was estimated from ocular classifications made along cruise lines a half mile apart throughout the burned-over areas. The field crews classified conditions along 507 miles of lines in southwestern Maine.

Stands were classified as pole timber if they contained a volume ranging from about 5 cords per acre up to the minimum for saw-timber stands. Stands were classified as saw timber if they contained about $1\frac{1}{2}$ M board feet or more per acre of softwood or of hardwood, or about $2\frac{1}{2}$ M board feet per acre or more of hardwood and softwood in combination.

The stands were further classified into broad forest type groups. Softwood types are dominated by white pine, spruce-fir, pitch pine, and hemlock. Softwood-hardwood types include the white pine-hardwood, and spruce-fir-hardwood types. Hardwood-softwood types include the hardwood-white pine and hardwood-spruce-fir types. Hardwood types are dominated by northern hardwood and other hardwood species.

The total acreage in pole-timber and saw-timber stands in these broad forest types by fire areas is as follows:

Broad forest type	Fire area			
	Newfield-Waterboro	Kennebunkport	Fryeburg-Brownfield	All southwestern Maine
	Acres	Acres	Acres	Acres
Softwood	24,160	1,330	3,100	28,590
Sfwd-hdwd	6,840	550	900	8,290
Hdwd-sfwd	520	90	320	930
Hardwood	7,640	60	2,440	10,140
All types	39,160	2,030	6,760	47,950

1/ Detailed maps of the Newfield-Waterboro, Waterboro, Kennebunkport, and Fryeburg-Brownfield fire areas furnished to the State Forest Commissioner, Augusta, Maine.

Net volume

The total volume in sawlog material in the fire areas in southwestern Maine is estimated at 211,580 M board feet. (See table 2.) In addition, there are 490,900 cords of material in the upper stems and limbs of saw-timber trees and in pole-timber trees. About 80 percent of the sawlog material is in saw-timber stands and 83 percent is in the Newfield-Waterboro fire area. It is estimated that there are 145 million board feet in white pine in the southwestern Maine fire areas. (See table 3.) In addition, there are about 38 million board feet in other softwood and 28 million in hardwood.

Estimates of volume in the pole-timber and saw-timber stands were based on the measurement of timber on 1/5-acre plots located along the cruise lines. A total of 84 plots were examined in pole-timber stands and 173 in saw-timber stands.

Pole-timber trees include softwoods from 5.0 to 8.9 inches d.b.h. and hardwoods from 5.0 to 10.9 inches d.b.h. Volume in pole-timber trees was estimated to a 4" minimum top unless utilization was limited by large branches, forks, or deformities. Volume in pole-timber trees is shown in terms of standard cords, 4' by 4' by 8'.

Saw-timber trees include softwoods from 9.0 inches d.b.h. and up and hardwoods from 11.0 inches d.b.h. and up. Volumes are based on the International 1/4" log rule. Merchantable heights for sawlogs were estimated to the point at which utilization was limited by large branches, forks, or deformities, or a diameter inside bark of not less than 6 inches for softwoods and 8 inches in hardwoods.

The pole-timber stands average 15.0 cords per acre. More than half of this volume is in hardwoods. The saw-timber stands average 6,910 board feet per acre, 73 percent of which is in white pine. The average volume per acre in the pole-timber and saw-timber stands by species is shown below:

	All saw-timber stands	All pole-timber stands
	Board feet	Cords
White pine	5,070	4.5
Pitch pine	260	0.4
Hemlock	710	1.4
Other softwood	140	0.8
Oak	380	2.5
Other hardwood	350	5.4
All species	6,910	15.0

Fire intensity

Nearly 4,000 acres of the pole-timber and saw-timber stands were burned over by crown fires. Practically all trees in the crown-fire areas were fire-killed. (See table 4.) The proportion of trees fire-killed was based on observation of the stands in areas where plots were taken. The fires were less intense under surface fire conditions but due to damage to roots and cambium, many trees were fire-killed.

The area of each stand-size affected by fires of different intensity is shown below:

	Crown fire Acres	Surface fire Acres	Total Acres
Pole-timber stands	2,000	21,610	23,610
Saw-timber stands	1,980	22,360	24,340
Total	3,980	43,970	47,950

Because the amount of bark-charring influences utilization for pulping purposes, observations were made on the proportion of stem-length (total height) bark-charred. (See table 5.) More than 50 percent of the pole-timber trees and more than 40 percent of the saw-timber trees were observed with bark char. About 1/4 of the stem-length (total height) of the softwoods was bark-charred and a similar proportion of the hardwoods. Very little wood char was observed.

Because of the importance of white pine, their condition after the fires was noted especially. (See table 6.) Estimates were made for each sample tree as to whether it would continue to live, was living but would probably die within a year, or had been killed outright by the fire. The proportion of the crown that was browned at the time of the survey and the proportion of the root system damaged were the principal guides to the condition of individual trees. There is little or no technical basis for definitely determining mortality immediately after fire. The indications are, however, that about 83 percent of the cord-wood volume in pole-timber stands is in trees that are dead or will die during the next year. Similarly, about 59 percent of the sawlog volume in saw-timber stands is in trees already dead or expected to die within one year.

Salvage operations

Extensive salvage operations are already underway in the southwestern Maine fire areas. Various reports indicate that the local mills are overloaded with timber and the problem of salvaging the small blocks of remaining timber before destruction by insects will be a difficult one.

The net volume shown in the previous section represents the total volume found by the survey in pole-timber and saw-timber stands. If the observations of tree condition following the fires are substantiated in the Spring, the indications are that about 60 percent of the white pine saw timber is in need of immediate salvage. This will amount to about 87 million board feet. This would be augmented by about 23 million board feet of other softwoods or a total salvage job of about 110 million board feet of softwoods. Salvaging of hardwoods is apparently not as pressing a problem as for softwoods. There may be about 10 million board feet of hardwoods in need of salvage within the next year.

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Table 1.--Area burned over by principal forest fires in Southwestern Maine (October 1947) by fire area, area class, and U.S.G.S. quadrangle

U.S.G.S. quadrangle	Gross area	Nonforest area	Forest area	Unburned islands of pole timber & saw timber	Burned-over pole-timber stands	Burned-over saw-timber stands	All other forest
	Acres	Acres	Acres	Acres	Acres	Acres	Acres
NEWFIELD-WATERBORO FIRE AREA							
Newfield	43,880	4,740	39,140	350	8,300	6,720	23,770
Buxton	43,080	6,440	36,640	380	6,720	10,380	19,160
Kennebunk	22,150	3,340	18,810	130	3,290	3,750	11,640
Total	109,110	14,520	94,590	860	18,310	20,850	54,570
KENNEBUNKPORT FIRE AREA							
Biddeford	21,910	3,490	18,420	0	950	1,080	16,390
FRYEBURG-BROWNFIELD FIRE AREA							
Kezar Falls	20,120	2,940	17,180	100	4,350	2,410	10,320
ALL SOUTHWESTERN MAINE FIRE AREAS							
All fire areas	151,140	20,950	130,190	960	23,610	24,340	81,280
Percent gross	100.0	13.9	86.1	---	---	---	---
Percent forest	---	---	100.0	0.7	18.2	18.7	62.4

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Table 2.--Net volume of timber in saw-timber and pole-timber stands burned over by forest fires in southwestern Maine, October 1947, by class of material, U.S.G.S. quadrangles, and principal fire areas.

U.S.G.S. quadrangle	All saw-timber stands					All pole-timber stands					All saw-timber and pole-timber stands				
	Saw-timber trees			Pole-timber trees	Total	Saw-timber trees			Pole-timber trees	Total	Saw-timber trees			Pole-timber trees	Total
	Sawlogs		Upper stems & limbs[1]			Sawlogs		Upper stems & limbs[1]			Sawlogs		Upper stems & limbs[1]		
	M Bd.ft.	Cords	Cords	Cords	Cords	M Bd.ft.	Cords	Cords	Cords	Cords	M Bd.ft.	Cords	Cords	Cords	Cords
NEWFIELD-WATERBORO FIRE AREA															
Newfield	44,680	88,700	17,900	47,800	154,400	14,650	31,200	9,900	80,400	121,500	59,330	119,900	27,800	128,200	275,900
Buxton	74,240	146,500	26,400	70,100	243,000	12,310	25,900	8,000	63,900	97,800	86,550	172,400	34,400	134,000	340,800
Kennebunk	23,980	47,000	9,100	25,900	82,000	6,060	12,800	4,000	31,000	47,800	30,040	59,800	13,100	56,900	129,800
Total	142,900	282,200	53,400	143,800	479,400	33,020	69.900	21,900	175,300	267,100	175,920	352,100	75,300	319,100	746,500
KENNEBUNKPORT FIRE AREA															
Biddeford[2]	7,740	15,100	2,500	6,800	24,400	1,930	4,200	1,200	8,700	14,100	9,670	19,300	3,700	15,500	38,500
FRYEBURG-BROWNFIELD FIRE AREA															
Kezar Falls	17,570	35,700	7,000	15,100	57,800	8,420	17,800	5,200	50,000	73,000	25,990	53,500	12,200	65,100	130,800
ALL SOUTHWESTERN MAINE FIRE AREAS															
All fire areas	168,210	333,000	62,900	165,700	561,600	43,370	91,900	28,300	234,000	354,200	211,580	424,900	91,200	399,700	915,800

1/ Upper stems only for softwoods.
2/ Including a small portion of the Kennebunkport fire area that occurred in the Kennebunk quadrangle.

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Table 3.--Net volume of timber in saw-timber and pole-timber stands burned over by principal forest fires in southwestern Maine, October 1947, by class of material and species.

Species	All saw-timber stands					All pole-timber stands					All saw-timber and pole-timber stands				
	Saw-timber trees			Pole-timber trees	Total	Saw-timber trees			Pole-timber trees	Total	Saw-timber trees			Pole-timber trees	Total
	Sawlogs		Upper stems & limbs 1/			Sawlogs		Upper stems & limbs 1/			Sawlogs		Upper stems & limbs 1/		
	M Bd.ft.	Cords	Cords	Cords	Cords	M Bd.ft.	Cords	Cords	Cords	Cords	M Bd.ft.	Cords	Cords	Cords	Cords
White pine	123,430	237,600	33,400	56,900	327,900	21,500	42,600	10,400	53,100	106,100	144,930	280,200	43,800	110,000	434,000
Pitch pine	6,350	12,500	2,600	6,200	21,300	2,350	5,200	1,100	3,600	9,900	8,700	17,700	3,700	9,800	31,200
Hemlock	17,400	37,100	7,500	16,100	60,700	6,270	14,200	3,100	15,800	33,100	23,670	51,300	10,600	31,900	93,800
Other sfwd.	3,370	6,600	600	5,400	12,600	2,430	5,200	900	13,300	19,400	5,800	11,800	1,500	18,700	32,000
Oak	9,240	20,300	9,800	25,700	55,800	3,610	8,700	4,900	46,200	59,800	12,850	29,000	14,700	71,900	115,600
Other hdwd.	8,420	18,900	9,000	55,400	83,300	7,210	16,000	7,900	102,000	125,900	15,630	34,900	16,900	157,400	209,200
All species	168,210	333,000	62,900	165,700	561,600	43,370	91,900	28,300	234,000	354,200	211,580	424,900	91,200	399,700	915,800

1/ Upper stems only for softwoods.

Table 4.--Proportion of stems fire-killed by tree size, fire intensity, and broad forest types in southwestern Maine

Broad forest type	Large saw timber 1/	Small saw timber 2/	Pole timber	Seedlings & saplings
	Percent	Percent	Percent	Percent
		CROWN FIRE		
Softwood	93	100	99	100
Sfwd-hdwd	100	90	90	100
Hdwd-sfwd	0	100	100	100
Hardwood	--	--	--	--
All types	88	99	~~89~~ 97	100
		SURFACE FIRE		
Softwood	47	53	58	79
Sfwd-hdwd	48	58	52	78
Hdwd-sfwd	31	36	53	76
Hardwood	39	50	56	66
All types	45	~~32~~ 52	57	76

1/ D.B.H. 15.0 inches and larger
2/ D.B.H. less than 15.0 inches

Table 5.--Proportion of stems (total height) bark-charred by tree size and principal species group in southwestern Maine

	Saw-timber trees		Pole-timber trees	
	Softwood1/	Hardwood2/	Softwood3/	Hardwood4/
	Percent	Percent	Percent	Percent
Prop. of trees with bark char	45	42	59	54
Prop. of stems (total hgt.) bark-charred of trees with bark char	24	17	29	3 5

1/ Based upon 169 sample trees
2/ Based upon 25 sample trees
3/ Based upon 68 sample trees
4/ Based upon 47 sample trees

Table 6.--Condition of white pine trees in the burned-over areas of southwestern Maine

Tree condition[1]	Pole-timber stands: Proportion total cordwood volume	Saw-timber stands: Proportion total sawlog volume
	Percent	Percent
Living	17	41
Living but expected to die[2]	8	15
Dead	75	44
	100	100

1/ Based on proportion of crown-browned and of root system damaged.
2/ Will probably die within one year.