GLAZE STORM OF MARCH 17–19, 1936, IN PENNSYLVANIA AND NEW YORK

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[Allegheny Forest Experiment Station [1], Philadelphia, February 1937]

On March 17–19, 1936, a severe glaze storm occurred which damaged timber, orchards, and other property on approximately 4 million acres in New York State and 2 million acres in Pennsylvania. The area lies largely within the Northern Allegheny Plateau; much of it is above 1,500 feet in altitude, particularly in Pennsylvania where considerable portions rise above 2,000 feet; in New York the elevation dips below 1,000 feet around the Finger Lakes and toward Lake Ontario. The Weather Bureau [2] reported that glaze damage losses sustained by public utility companies in New York State alone amounted to $800,000. In northwestern Pennsylvania one-third of the total cubic wood volume of second-growth stands on the Kane Experimental Forest, lying at and above an elevation of 1,900 feet above sea-level, was classed as damaged material due to ice breakage. This loss is about 9 cords per acre.

Slight glaze storms which do not do much damage are known from experience to be fairly common; and Lutz [3], for example, has noted the evidence of their effects in the form of small scars on twigs and branches. On occasion, however, glaze storms can and do become catastrophic.[4]

The accompanying map is based on climatological data published by the Weather Bureau. The isotherms show average maxima and minima for the 3 days March 17–19, the period of the storm. Deposition of ice was heaviest on the night of March 17, with an additional lighter layer on the night of March 18. The total precipitation is also for the 3-day period, and is based on Weather Bureau climatological data supplemented by additional information gathered by the Pennsylvania Department of Forests and Waters. This map shows the influence of these three weather factors. The writer has also found that altitude and aspect, among other topographic factors, are very important locally. The cross-hatched area indicates the region in which glaze damage to trees, and to telephone, telegraph, and power lines was reported; this information was obtained by correspondence with county agents and other public agencies.

(1) *Minimum temperature.*—No damage occurred where the minimum isotherm did not reach 32° F. or lower; nor was damage reported where the minimum isotherm was below 29° F., because there snowfalls occurred. Thus, New York and Pennsylvania can be separated into three regions: The eastern, where the average minimum temperature was above the freezing point and rain and mist were reported; extreme western New York and northwestern Pennsylvania, where the average minimum temperature was below 29° F. and snow was reported; the middle region with average minima from 29° to 32° F., where rain, sleet, and snow were reported with glaze damage in places. Some observers declared that woodlots near Lake Ontario and within a mile of Seneca and Cayuga Lakes in New York were injured much less than those farther away, and attributed the difference to the ameliorative effects of large bodies of waters.

(2) *Maximum temperature.*—As the maximum temperature increased, damage decreased; but nowhere was the maximum a limiting factor when the minimum dropped below freezing at night. Rather the maximum was important in determining how soon the minimum would drop to the freezing point at night. In New York damage occurred where the maximum rose above 40° F., but this was not true in Pennsylvania.

(3) *Precipitation.*—Amount of precipitation was an important factor in the severity of the glaze damage. It is obvious that the amount of ice accumulated on trees and other objects depends on the amount of precipitation falling while conditions favorable to freezing prevail. The most severe damage occurred between the 3- and 4-inch isohyets with favorable temperatures. Under similar temperature conditions the damage decreased as the rainfall decreased, until in the counties near Lake Ontario with rainfall under 2 inches the damage was slight. In general damage was most severe where the temperature range was 29° to 39° F. and the rainfall 3 inches or more, decreasing as the range between minimum and maximum increased and as the rainfall decreased.

Ice storms sometimes occur when rain, following a sudden rise in temperature, freezes to everything it touches because the temperature of objects is still below the freezing point. The glaze storm of 1936, however, did not follow a period of continued cold, but rather a slightly warmer period than that which characterized the storm. The conditions prevailing during the storm of March 17–19, 1936, were characterized by a temperature inversion aloft: A LOW appeared on the morning of March 15 over central Colorado, and by the morning of March 17 it was centered over northern South Carolina with rain setting in over the States north of Georgia. Moving slowly, the storm was centered over southern Virginia on the morning of March 18 with rain continuing. By the morning of March 19 it was centered over New York City. A warm current of TA air aloft was flowing over a lower current of cooler NPP air, the precipitation from which fell as rain where the surface air temperatures were above the freezing point. At night as the temperature in the lower stratum of air dropped to or just below the freezing point the rain from the upper warmer layer was supercooled as it fell and froze instantly on obstacles such as telegraph and telephone wires, twigs, and branches which follow air temperatures closely.

[1] Maintained by the U. S. Department of Agriculture in cooperation with the University of Pennsylvania.

[2] Climatological data, New York Section. Vol. 48, no. 3, p. 24, March 1936.

[3] Lutz, H. J. Scars resulting from glaze on woody stems. Jour. For., vol. 34, pp. 1039–1041, 1936.

[4] See, for example, Monthly Weather Review, December 1900, vol. 28, p. 548; January 1920, vol. 48, p. 50; February 1922, vol. 50, pp. 77–82. Abell, Chas. A. Influence of glaze storms upon hardwood forests in the southern Appalachians. Jour. For., vol. 32, pp. 35–37.

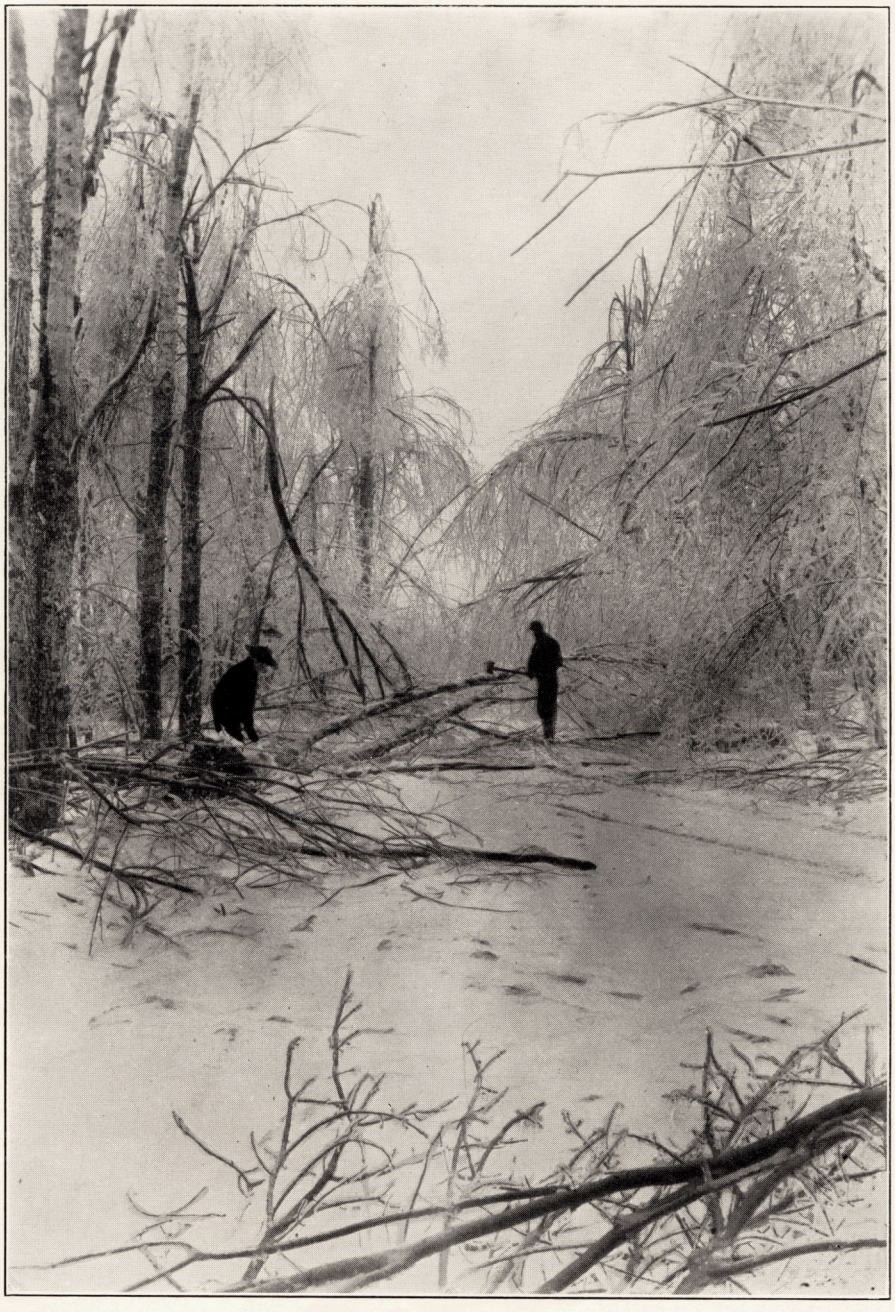

FIGURE 1.—Breakage, uprooting, and bending of trees caused by weight of ice during severe glaze storm of March 17–19, 1936, on the Kane Experimental Forest, Elk County, Pa.

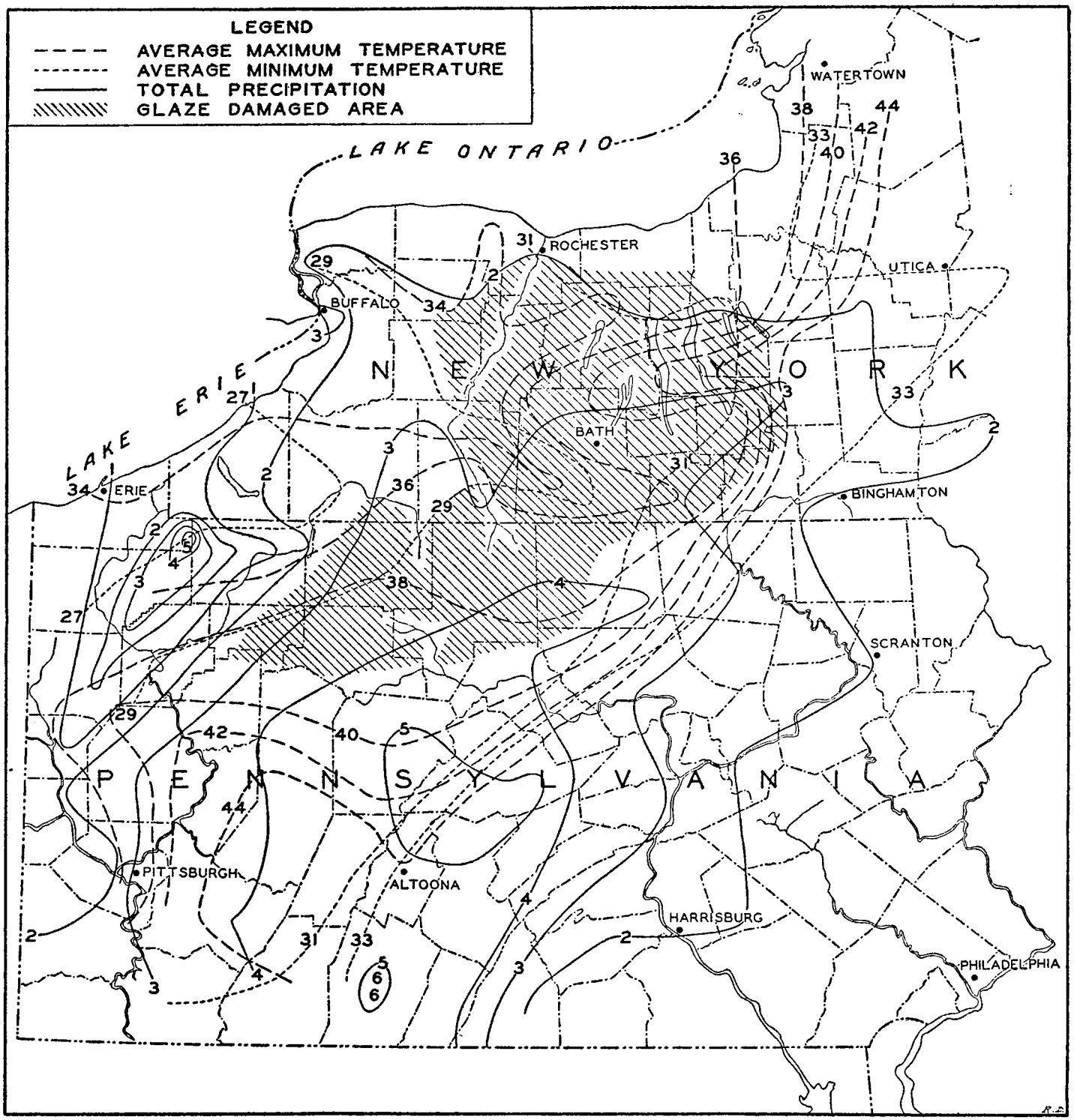
LEGEND
AVERAGE MAXIMUM TEMPERATURE
AVERAGE MINIMUM TEMPERATURE
TOTAL PRECIPITATION
GLAZE DAMAGED AREA
LAKE ONTARIO
LAKE ERIE
NEW YORK
PENNSYLVANIA
WATERTOWN
ROCHESTER
UTICA
BUFFALO
BATH
BINGHAMTON
ERIE
SCRANTON
PITTSBURGH
ALTOONA
HARRISBURG
PHILADELPHIA

FIGURE 2.