PREPARED IN COOPERATION WITH THE
COMMONWEALTH OF MASSACHUSETTS
WATER RESOURCES COMMISSION

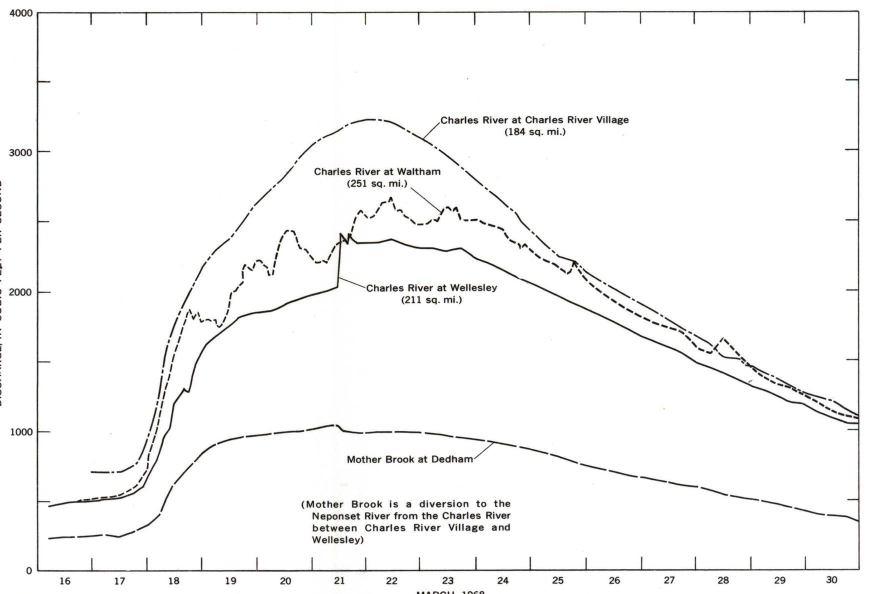
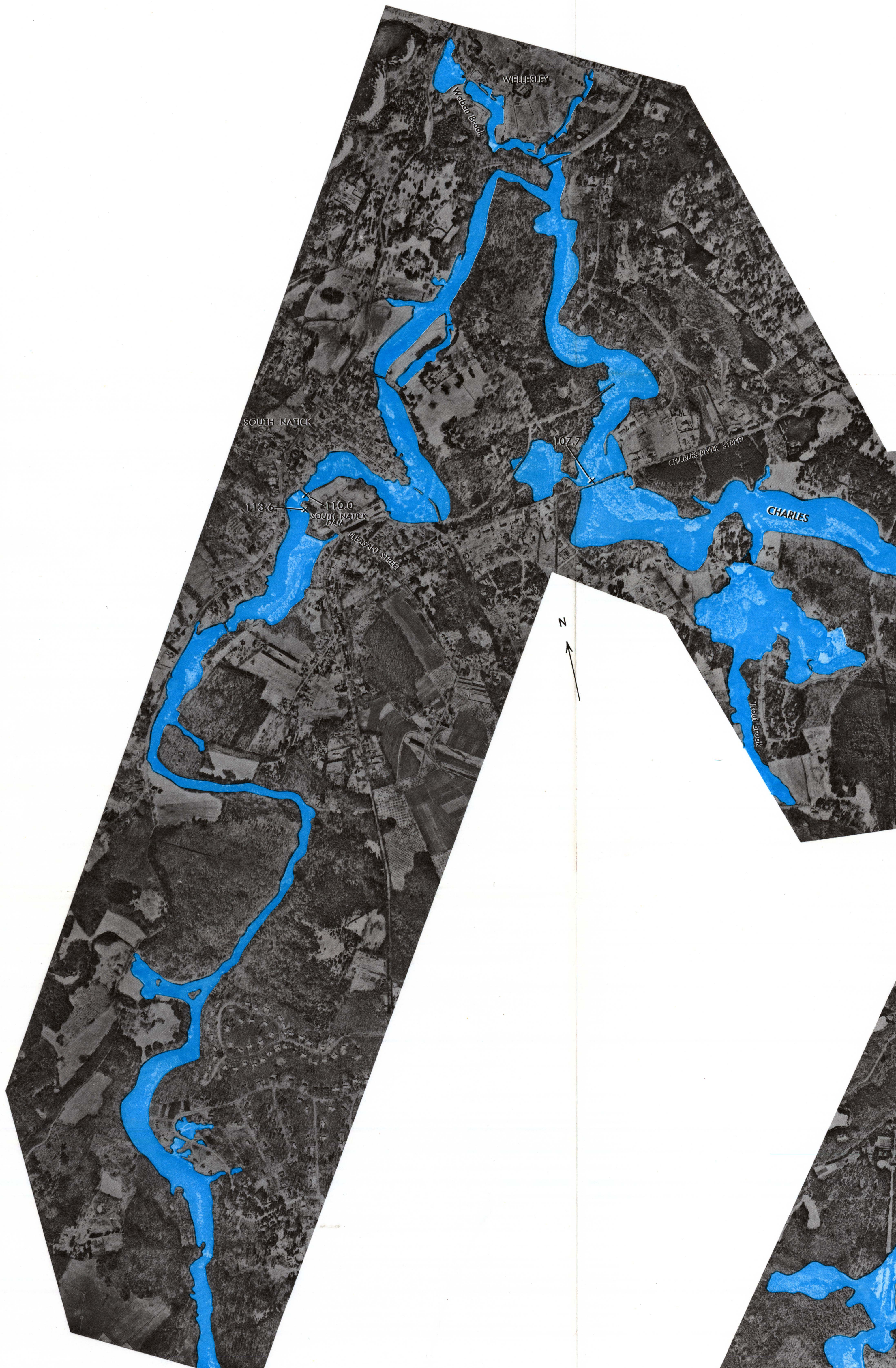
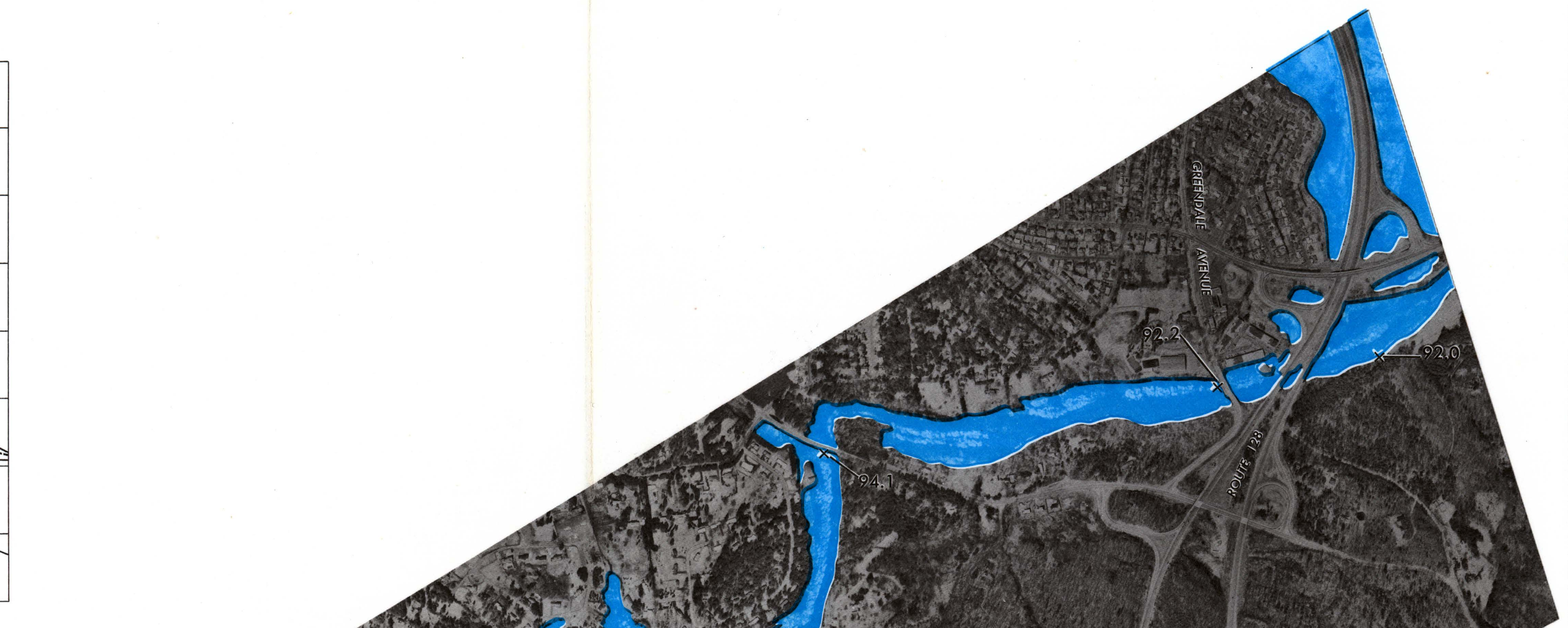
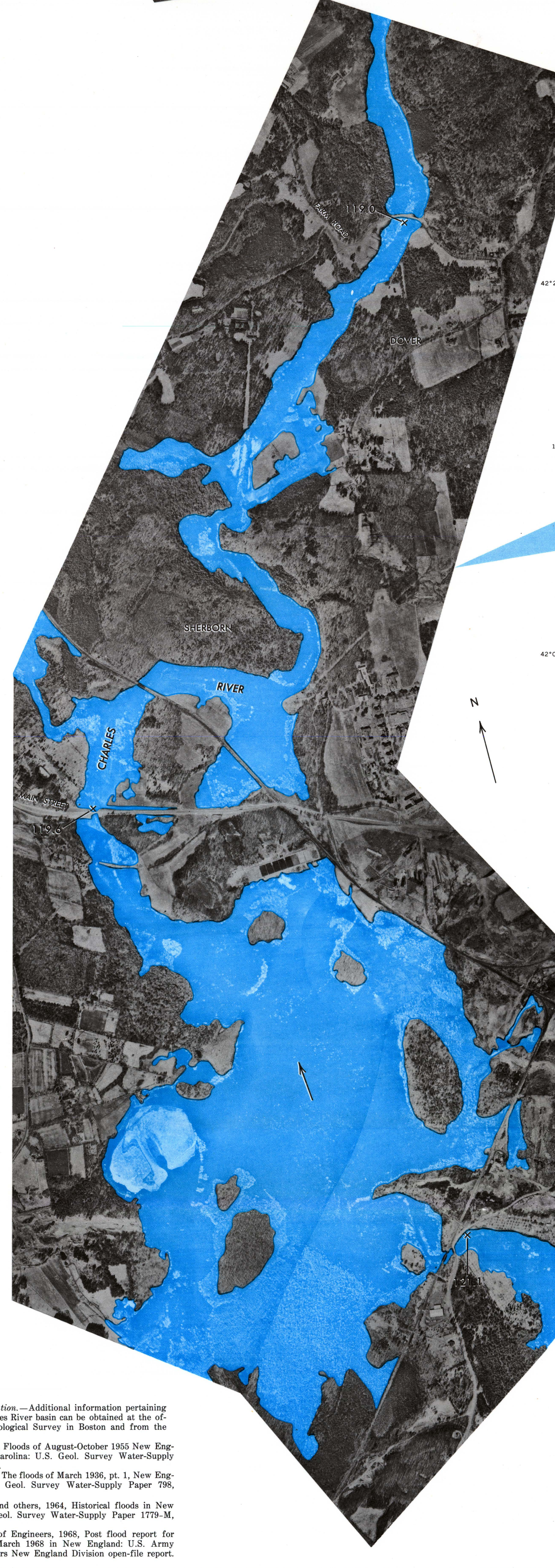
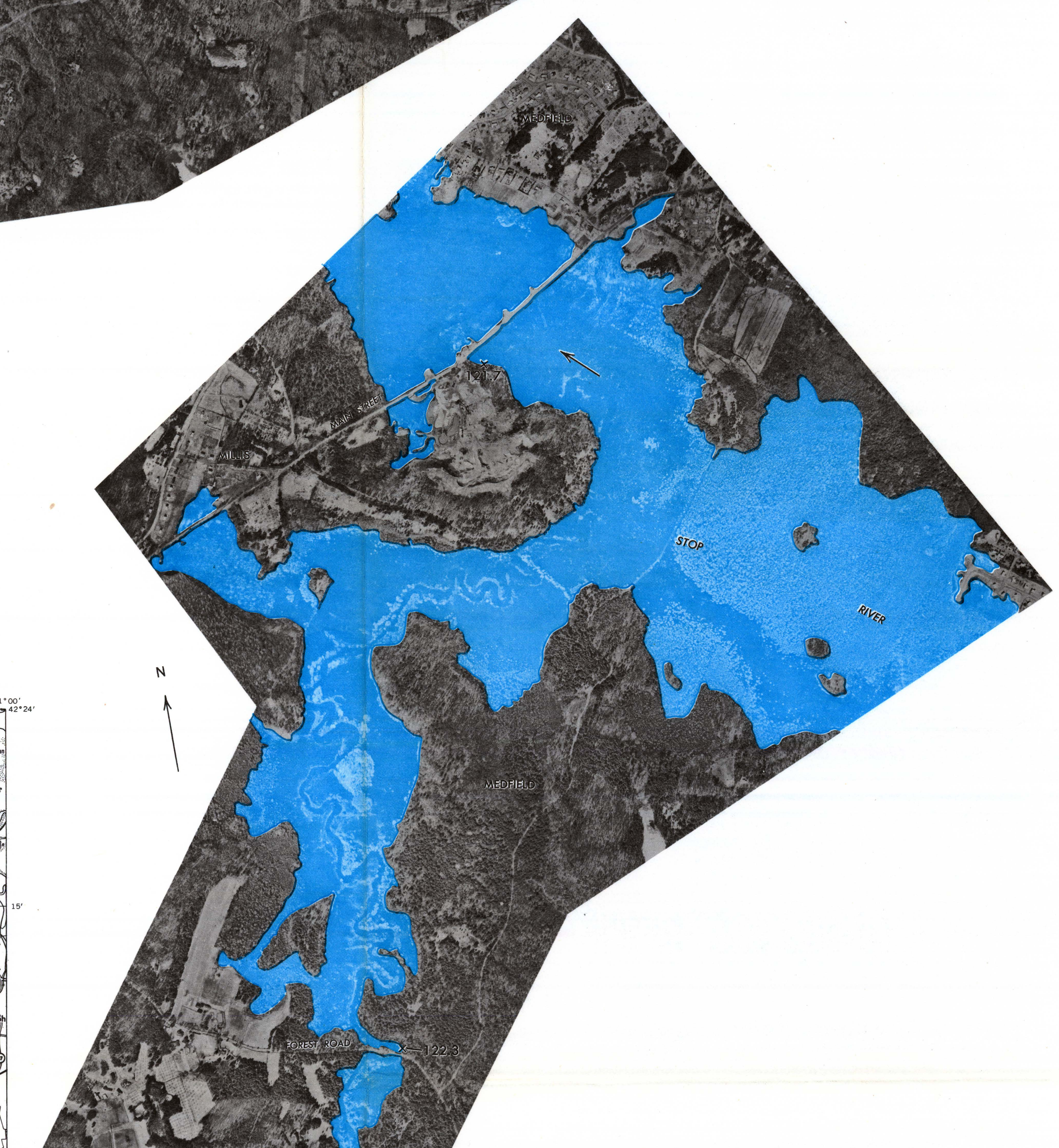


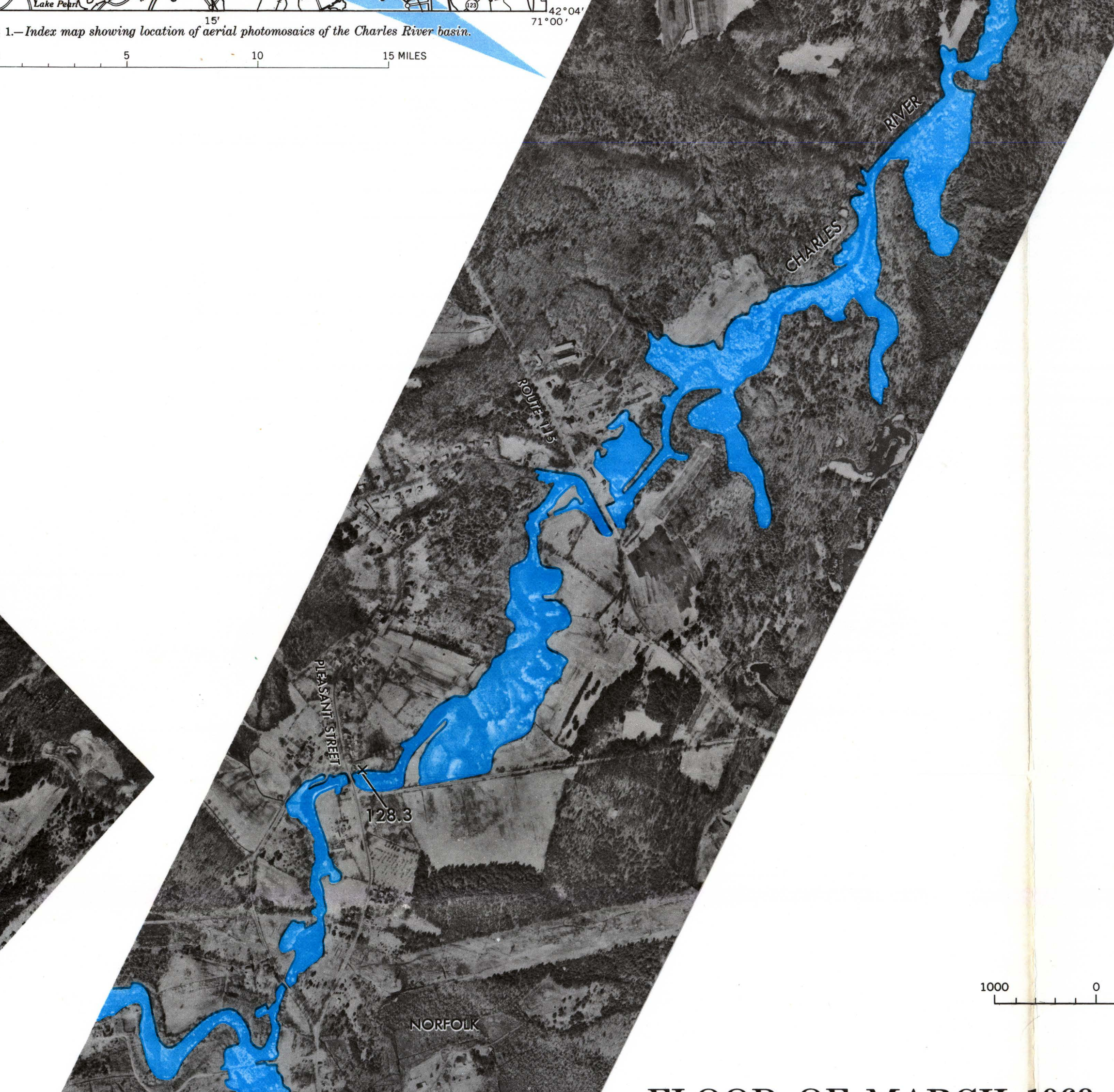
FIGURE 2.—*Discharge hydrographs for gaging stations in the Charles River basin.*

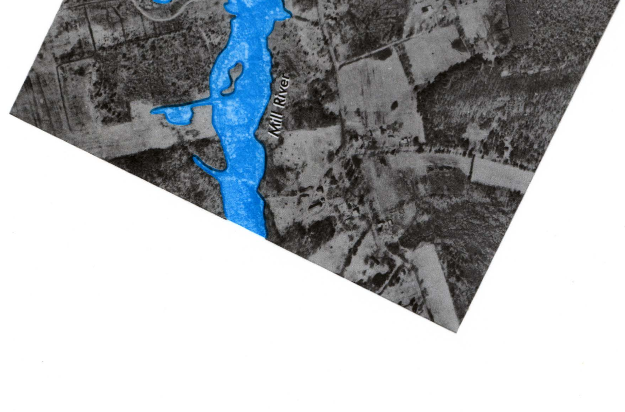












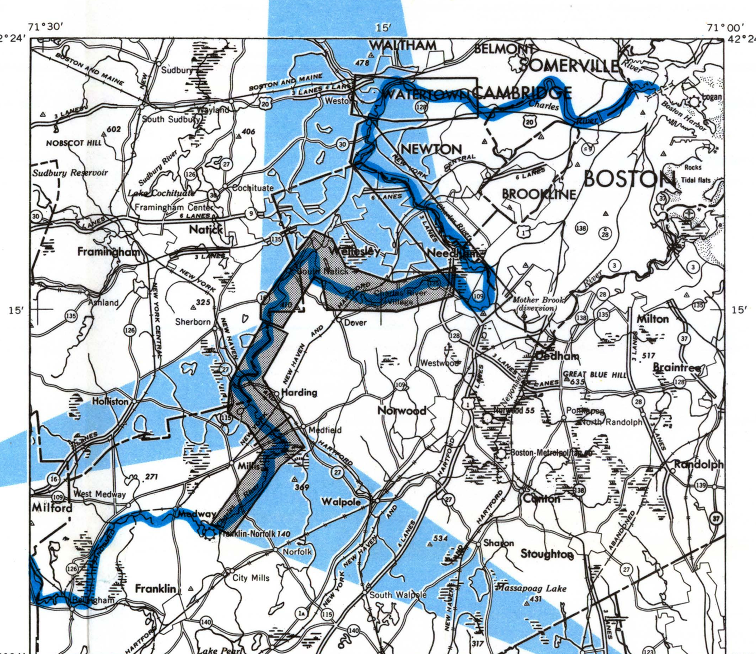


FIGURE 1.—*Index map showing location of aerial photomosaics of the Charles River basin.*

0 5 10 15 MILES

EXPLANATION

Area flooded March 20–21, 1968

Boundary of 1968 flood
Dashed where approximate

Flood crest elevation, in feet above mean sea level

Gaging station

1000 0 1000 2000 3000 4000 5000 FEET

FLOOD OF MARCH 1968 ON THE CHARLES RIVER, MASSACHUSETTS

By
L. A. Swallow, R. G. Petersen, and G. H. Searles
1971

FLOOD OF MARCH 1968 ON THE CHARLES RIVER, MASSACHUSETTS

This report presents six photomosaics which show areas inundated along the Charles River during the flood of March 1968. It also presents flood data for the gaging stations in the Charles River basin. The report illustrates the magnitude of the 1968 flood and should assist State and local planners in making decisions pertaining to flood-plain zoning and flood containment and prevention, on a technical basis. It is one of a series covering the March 1968 floods on the major rivers in eastern Massachusetts.

The flood of March 1968 on the Charles River was caused by an intense 3-day storm, which began on March 17. The rain, totaling from 5 to 6 inches in 36 hours, fell on ground already saturated by snowmelt and 1½ to 2 inches of precipitation on March 12-13. It caused a flood that equaled or exceeded the maximum for the period of record at the three gaging stations on the Charles River. Maximum flow at the gaging station at Waltham is the greatest known since at least 1887.

The Charles River is a meandering stream, bordered by marshland along much of its length; the average slope of its 79-mile course is less than 5 feet per mile. The river rises slowly—normally reaching its peak 2 to 4 days later than other streams in the area. Flood damage along the river is generally caused by inundation rather than high velocity. During the March 1968 flood, streets and lowlands along the river were flooded. The flooding of Storrow Drive, an expressway along the Charles River in Boston, caused severe traffic jams. No lives were lost, but many residents were evacuated from their homes. Much of the property damage was confined to basement flooding—including the flooding of family rooms in newer homes. Flood losses of all types—residential, industrial, commercial, and public—were estimated by the Corps of Engineers to be more than $600,000.

Flooded areas.—The areas covered by the photomosaics are outlined in figure 1. The upper reaches of the Charles River and the lower reaches—where the river widens into what is called the Charles River Basin—are not included, although some flooding occurred along these reaches.

The photomosaics show the areas flooded by the main river only—not its tributaries.

The photomosaics are "uncontrolled"—that is, they have not been corrected for possible distortions caused by camera tilt or minor changes of altitude during flight. Although such distortions might cause slight error in the linear scale on the photomosaics, they have no effect on the boundaries of the flooding. Flooded areas masked by dense vegetation are outlined by a dashed line to indicate that the limit of flooding is approximate. The photographs from which the photomosaics were compiled were taken after the river had reached its peak. Although the extent of flooding was—for the most part—clearly visible, it is possible that flooding may have extended beyond the outlined areas in some reaches.

Flood-crest elevations for the 1968 flood, in feet above mean sea level, are shown on the photomosaics. The location of high-water marks is given in table 1, which compares flood-crest elevations at sites along the Charles River—from Cedar St. Bridge, Milford, to Charles River Dam, Boston—for the March 1936, July 1938, August 1955, and March 1968 floods. Below Charles River Dam, the river is affected by tide.

Flood data.—The earliest known flood on the Charles River occurred in February 1807. It carried away many dams and bridges, one of which was built in 1788. Other major floods occurred in 1818, 1886, 1936, 1938, and 1955 (Thomson and others, 1964, p. 14, 16, 53). The flood of February 1886 was the highest since at least 1840 and possibly since the area was settled in 1630.

The discharge of a stream is the volume of flow that passes a given site in a given period of time. Discharge in this report is expressed in units of cubic feet per second. Peak discharge is the maximum discharge during a flood.

Peak-discharge data for major floods at the three gaging stations on the Charles River for the periods indicated are tabulated below.

Date	Elevation (feet above mean sea level)	Discharge (cubic feet per second)
Charles River at Charles River Village (1937-1968)		
March 1936	—	3,170
July 27, 1938	98.76	3,110
Aug. 22, 1955	99.90	3,220
Mar. 22, 1968	99.45	—
Mar. 21-22, 1968	—	3,220
Charles River at Wellesley (1956-68)		
Mar. 21, 1968	74.12	2,450
Charles River at Waltham (1887-1968)		
Mar. 19, 1936	24.81	2,540
July 26, 29, 1938	24.58	2,190
Aug. 19, 1955	25.37	2,490
Mar. 22, 1968	25.41	2,670

Discharge hydrographs for the 1968 flood for the gaging stations on the Charles River and Mother Brook are shown in figure 2. Mother Brook diverts flow to the Neponset River from the Charles River in the reach between the Charles River Village and Wellesley gaging stations. Because this diversion at high flows is about one third of the flow of the Charles River, the discharge at Charles River Village during the 1968 flood was greater than the discharge downstream at Wellesley and Waltham.

Flood frequency.—The flood-frequency graph for the Charles River at Charles River Village (fig. 3) has been derived from the streamflow records, which began in 1937, and from historical flood data.

The frequency of a flood may be expressed in terms of recurrence interval or of probability. The recurrence interval is the average interval of time within which a flood of given magnitude will be equaled or exceeded once. At Charles River Village, a flood equal to the March 1968 flood would be expected, on the average, only once in about 40 years. Floods, however, do not occur at regular intervals. A flood equal to the March 1968 flood had occurred at Charles River Village in August 1955—only 13 years earlier.

Probability is virtually the reciprocal of the recurrence interval for floods greater than the 10-year flood. For example, the chance of a flood equal to or greater than the March 1968 flood occurring at Charles River Village is 1 in 40, in any given year.

The relation between water-surface elevation and discharge can vary from time to time at any point along a stream because of changes in the channel or in the flood plain. A relatively minor flood can cause much damage if the channel has been constricted or if the flood plain has been encroached upon by works of man. Likewise, flood damage can be minimized by proper land use along the river and by channel improvements. After the 1955 flood, the Metropolitan District Commission made channel improvements between Kendrick Street and the Silk Mill Dam upstream from Route 9. Since then, flood crests have been consistently lower for several miles upstream from Route 9.

Cooperation and acknowledgments.—This report was prepared by the U.S. Geological Survey under the direction of C. E. Knox, chief, Central New England District, Water Resources Division, in cooperation with the Commonwealth of Massachusetts, Water Resources Commission.

The Corps of Engineers furnished the flood-crest elevations shown on the photomosaics and in table 1. The aerial photographs for the photomosaics were taken by Lockwood, Kessler, and Bartlett, Inc., Syosset, New York. Extent of flooding was delineated by W. J. Schneider and Antonio Jurado of the U.S. Geological Survey.

Additional information.—Additional information pertaining to floods in the Charles River basin can be obtained at the offices of the U.S. Geological Survey in Boston and from the following reports:

Bogart, D. B., 1960, Floods of August-October 1955 New England to North Carolina: U.S. Geol. Survey Water-Supply Paper 1420, 854 p.
Grover, N. C., 1937, The floods of March 1936, pt. 1, New England rivers: U.S. Geol. Survey Water-Supply Paper 798, 466 p.
Thomson, M. T., and others, 1964, Historical floods in New England: U.S. Geol. Survey Water-Supply Paper 1779-M, 105 p.
U.S. Army Corps of Engineers, 1968, Post flood report for flood of 18-25 March 1968 in New England: U.S. Army Corps of Engineers New England Division open-file report.

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