DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
COMMONWEALTH OF MASSACHUSETTS
WATER RESOURCES COMMISSION

HYDROLOGIC INVESTIGATIONS
ATLAS HA-371 (SHEET 1 OF 2)

FLOOD OF MARCH 1968 ON THE SUDBURY, ASSABET, AND CONCORD RIVERS, MASSACHUSETTS

During a 3-day period from March 17 to 19, 1968, a total of 3 to 7 inches of rain fell on parts of eastern Massachusetts. This heavy rainfall, combined with the generally wet antecedent conditions of the spring season and some runoff from snowmelt, caused considerable flooding of the rivers in the area. Property damage in Massachusetts from the flood was reported by the New England Division, Corps of Engineers (1968) to be $28 million. Most of the damage occurred where construction, both industrial and domestic, had encroached upon the flood plains of the rivers.

The Sudbury and Assabet Rivers join at Concord, Mass., to form the Concord River (see fig. 1). This three-river system, which is known locally as the "Su-As-Co" basin, drains an area of about 405 square miles.

The purpose of this report, which is one of a series covering the major flooded rivers in eastern Massachusetts, is to show flood stages and areas inundated by the March 1968 flood, to compare the severity of this flood with past floods, and to show the frequency of floods of given magnitudes which may be expected in the future at gaging stations in the basins. These basic flood data, as compiled, will serve as a broad, sound basis to assist state and local planners in such measures as flood-plain zoning and flood containment and prevention.

Flood history.—Floods are a part of a stream's life, and the flood plain is part of a stream's path. Floods have occurred in the Sudbury, Assabet, and Concord Rivers many times in the past and will recur many times in the future.

M. I. Thomson (1964) discusses floods in the "Su-As-Co" basin in 1927, 1936, 1938, and 1955. He also records statements of longtime residents of the basin (p. 91–92) who claim that the 1955 flood was the most severe. Another report (Sudbury Valley Commission, 1950) lists two additional floods on the Sudbury River in 1886 and 1896 which were about equal in magnitude to the 1936 flood. Table 1 shows that the peak discharge of the March 1968 flood was slightly less than that of the 1955 flood at the Assabet River gage but slightly greater than that of the 1955 flood at the Concord River gage. This is probably due to the distribution of rainfall during the 1955 flood, at which time rainfall in the "Su-As-Co" basin was greater in the Assabet and the Sudbury River basins than in the Concord River basin.

Flooded areas.—Areas along the Sudbury, Assabet, and Concord Rivers which were covered by the March 1968 floodwaters are shown on the aerial photomosaic map in blue. The photomosaic map is classified as uncontrolled; that is, it has not been corrected for distortions that may have been caused by camera tilt or minor changes of elevation during flight. Although these minor distortions may cause errors in the true linear scale of the photographs, the areas shown as inundated are not affected. Some field checking was done to determine the accuracy of the flood outline on the map. However, the entire area was not covered in the field; therefore some minor discrepancies may be found.

Flood height.—The flood-crest elevations shown on the photomosaic map are in feet above mean sea level. The flood-crest points were determined from actual field evidence. Descriptions of the locations of these and other points not shown on the map are given in table 2.

Table 1 lists the elevation and discharge of the flood peak at the gaging stations on the Assabet and Concord Rivers. Figure 2 shows hydrographs of discharge as recorded at the gaging stations.

Flood frequency.—The flood-frequency graph (fig. 3) for Assabet River at Maynard has been derived from records since 1941, modified by historical data. The graph for the Concord River below River Meadow Brook, at Lowell, is based upon records since 1936. The flood-recurrence interval is the average interval of time within which a flood of a given magnitude will be equaled or exceeded once. For example, figure 3 shows that, at the Concord River station, a flood equaling or exceeding the March 1968 flood (4,800 cfs) would be expected to occur, on the average, once in about 50 years. Probability of occurrence is virtually the reciprocal of the recurrence interval for floods greater than the 10-year flood. When stated as a probability, a flood equaling or exceeding the magnitude of the March 1968 flood would have 1 chance in 50 or a 2-percent chance of occurring in any given year. However, the stage-discharge relation may change from time to time as a result of channel or flood-plain alterations such as the artificial restriction of the channel or the filling of a flood-plain swamp.

Cooperation and acknowledgments.—This report was prepared by the U.S. Geological Survey under the administrative direction of C. E. Knox, district chief, in cooperation with the Commonwealth of Massachusetts, Water Resources Commission. We are grateful to the U.S. Department of Agriculture, Soil Conservation Service, Amherst, Mass., for supplying the flood-crest elevations which are shown on the aerial photomosaic map and in table 2. Aerial photographs for the map were obtained from Lockwood, Kessler, and Bartlett, Inc., Syosset, New York. The extent of flooding was delineated by William J. Schneider and Antonio Jurado of the U.S. Geological Survey.

REFERENCES

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.

Paulsen, C. G., and others, 1940, Hurricane floods of September 1938: U.S. Geol. Survey Water-Supply Paper 867, 562 p.

Sudbury Valley Commission, 1950, Report of the Sudbury Valley Commission, March 1950.

Thomson, M. T., and others, 1964, Historical floods in New England: U.S. Geol. Survey Water-Supply Paper 1779-M, 105 p.

U.S. Corps of Engineers, 1968, Post flood report for flood of 18–25 March 1968 in New England: U.S. Corps of Engineers New England Division open-file report, 22 p.

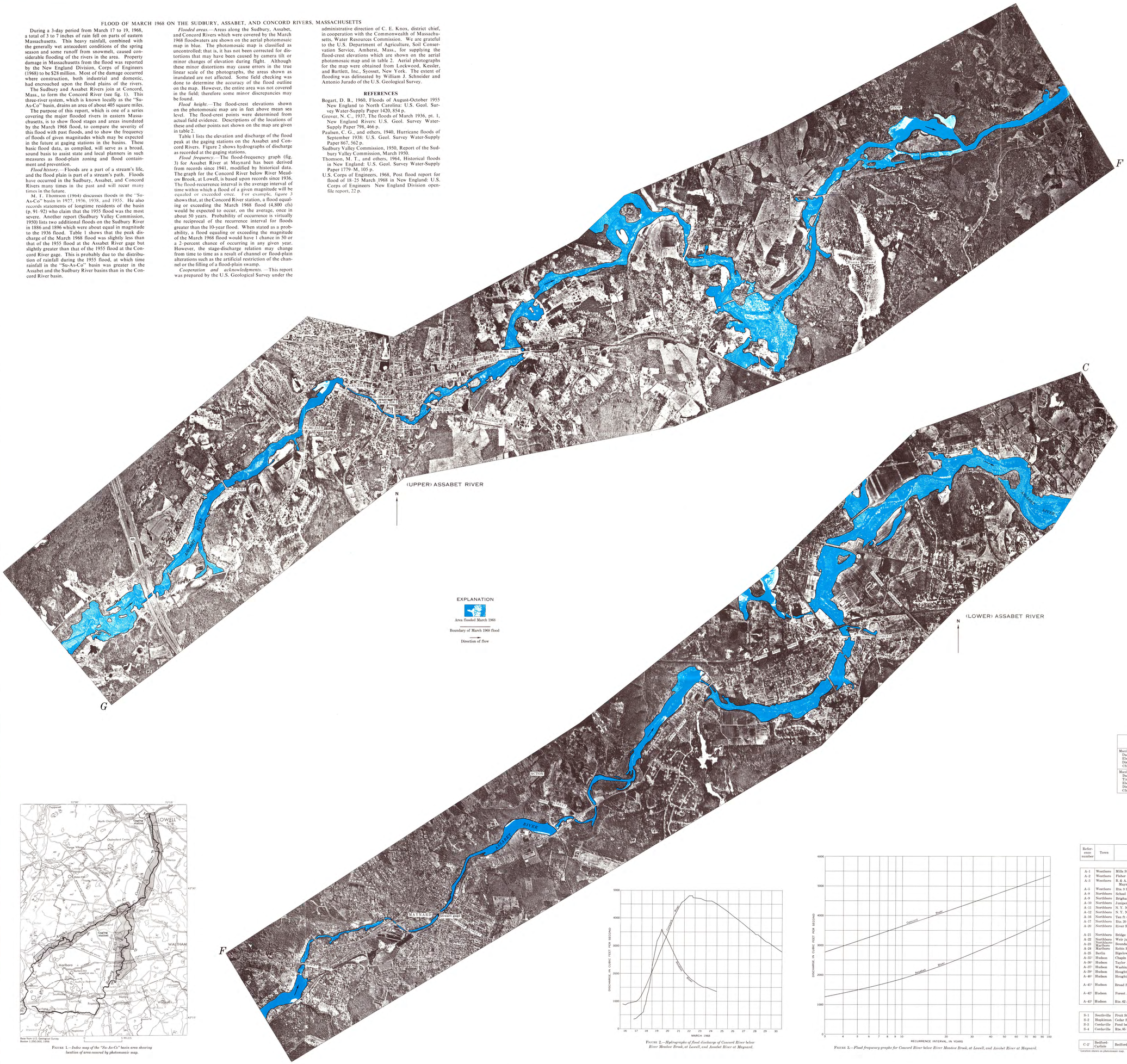

FIGURE 1.—*Index map of the "Su-As-Co" basin area showing location of area covered by photomosaic map.*

FIGURE 2.—*Hydrographs of flood discharge of Concord River below River Meadow Brook, at Lowell, and Assabet River at Maynard.*

FIGURE 3.—*Flood frequency graphs for Concord River below River Meadow Brook, at Lowell, and Assbet River at Maynard.*

TABLE 1.—*Comparison of floods, Assabet and Concord Rivers.*

	Assabet River at Maynard	Concord River below River Meadow Brook, at Lowell
Maximum flood previously known		
Date	Aug. 20, 1955	Aug. 23, 1955
Elevation above mean sea level (ft)	151.06	76.38
Discharge (cfs)	4,250	4,540
Cfsm	36.6	—
Maximum during present flood		
Date	Mar. 19, 1968	Mar. 22, 1968
Time	2200	1200 to 1630
Elevation above mean sea level (ft)	150.27	76.57
Discharge (cfs)	3,620	4,800
Cfsm	31.2	—

TABLE 2.—*Flood-crest data, March 1968.*

Reference number	Town	Location	Floodmark	Elevation (feet above mean sea level)
		ASSABET RIVER		
A-1	Westboro	Mills St. Bridge	On stone abutment at upstream side of bridge	297.8
A-2	Westboro	Fisher St. Bridge	On upstream face of bridge	287.2
A-3	Westboro	B. & A. RR. bridge between Maynard and Fisher Sts.	On upstream west wingwall	284.7
A-5	Westboro	Rte. 9 bridge	On road embankment at upstream side of bridge	273.6
A-8	Northboro	School St. Ext. Bridge	Stake in field approx. 50 ft east of bridge	272.1
A-9	Northboro	Brigham St. Bridge	Stake between 2 culverts	270.9
A-10	Northboro	Juniper Hill Golf Course	Debris line on 10th fairway	270.4
A-11	Northboro	N. Y. N. H. & H. RR. bridge upstream	Debris on embankment	268.3
A-12	Northboro	N. Y. N. H. & H. RR. bridge downstream	Debris on embankment	267.6
A-16	Northboro	Ten ft. upstream from Rte. 20 bridge	Mark on concrete blocks on west bank of river	265.2
A-17	Northboro	Rte. 20 bridge	On upstream face of abutment	257.6
A-20	Northboro	River St. Bridge	Stake on west bank of river approx. 20 ft upstream from bridge	253.0
A-21	Northboro	Bridge upstream of Gothic Crafts	On upstream face of bridge	249.5
A-22	Northboro	Weir just above Gothic Crafts	On retaining wall on west side of weir of dam	249.1
A-23	Northboro-Southboro	Boundary St. Bridge	On upstream face of east end of bridge	220.6
A-24	Marlboro	Robin Hill Rd. Bridge	On upstream face of south end of bridge	219.8
A-25	Berlin	Bigelow St. Bridge	On upstream west wingwall of bridge	215.9
A-35[1]	Hudson	Chapin Rd. Bridge	On upstream embankment of bridge	213.2
A-36[1]	Hudson	Taylor Bridge (footbridge)	On upstream face of east side of bridge	212.0
A-37[1]	Hudson	Washington St. Bridge	In parking lot approx. 300 ft upstream from bridge	210.5
A-39[1]	Hudson	Houghton St. Bridge	Approx. 200 ft upstream and 150 ft north of river	205.0
A-40[1]	Hudson	Houghton St. Bridge	On sidewalk parallel with river on downstream side of bridge	204.3
A-41[1]	Hudson	Broad St. Bridge	On sidewalk on south side of 59 Broad St., upstream from bridge	203.9
A-42[1]	Hudson	Forest Ave. Bridge	Stake at intersection of Wheeler Rd. and Forest Ave. upstream from bridge	202.6
A-43[1]	Hudson	Rte. 62 and RR. bridges	On bank just upstream from RR. bridge	199.6
		SUDBURY RIVER		
S-1	Southville	Fruit St. Bridge	Debris line on upstream bank	275.0
S-2	Hopkinton	Cedar St. Bridge	On upstream face of bridge	254.1
S-3	Cordaville	Pond behind old mill	Debris line on bank of pond	253.2
S-4	Cordaville	Rte. 85 bridge	Nail in tree about 20 ft upstream from bridge	253.0
		CONCORD RIVER		
C-2[1]	Bedford-Carlisle	Bedford Rd. Bridge	Actual high-water levels	119.0

[1] Location shown on photomosaic map.

Uncontrolled photomosaic base by U.S. Geological Survey. Aerial photographs from Lockwood, Kessler, and Bartlett, Inc., Syosset, New York, 1968

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1000 0 1000 2000 3000 4000 FEET
APPROXIMATE SCALE

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1970

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