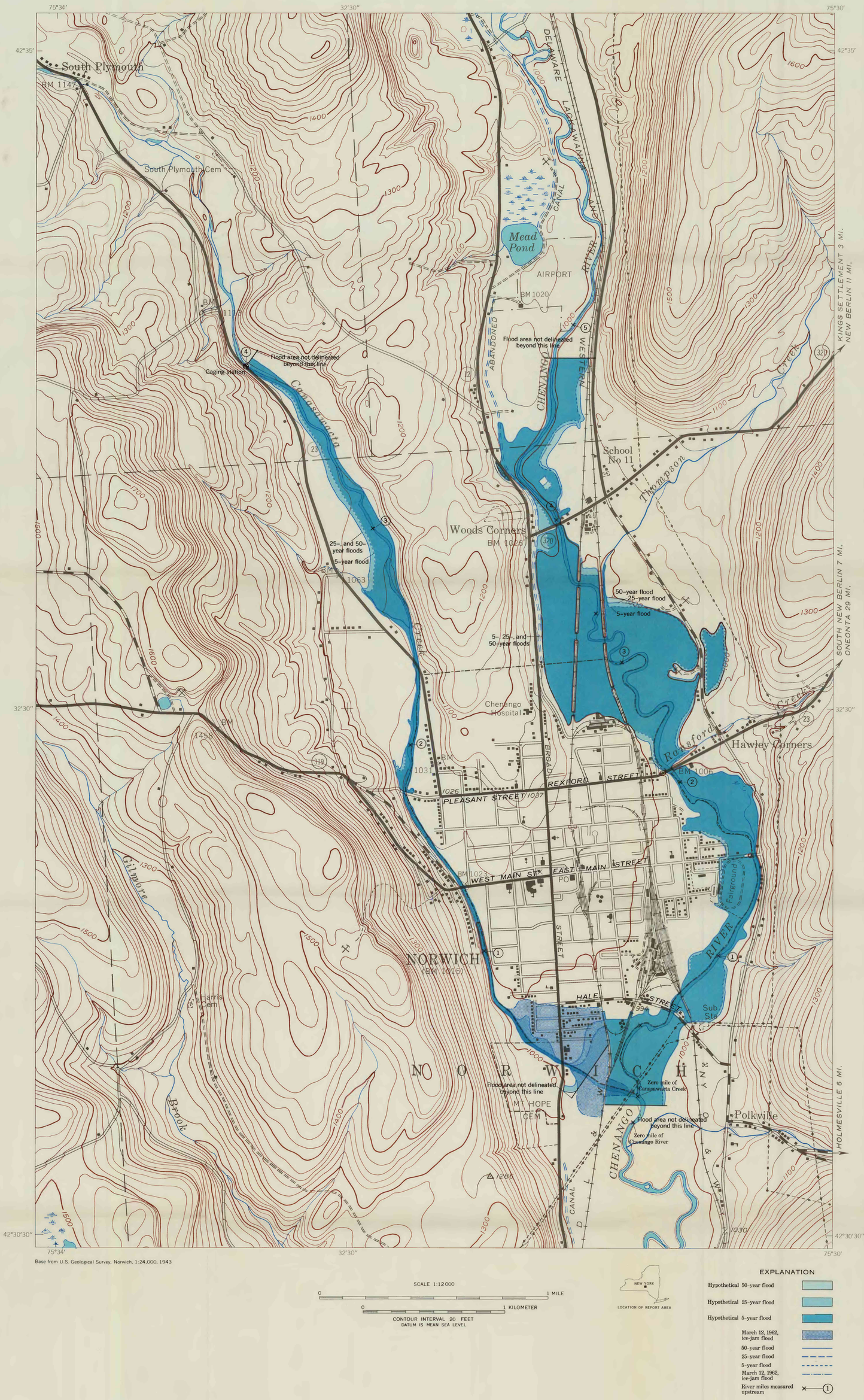

Base from U.S. Geological Survey, Norwich, 1:24,000, 1943

SCALE 1:12 000
0 1 MILE
0 1 KILOMETER
CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

LOCATION OF REPORT AREA

EXPLANATION

- Hypothetical 50-year flood
- Hypothetical 25-year flood
- Hypothetical 5-year flood
- March 12, 1962, ice-jam flood
- 50-year flood
- 25-year flood
- 5-year flood
- March 12, 1962, ice-jam flood
- River miles measured upstream

FLOODS ON CHENANGO RIVER AND CANASAWACTA CREEK AT NORWICH, NEW YORK

This report was prepared by the U.S. Geological Survey to further the objectives of the Appalachian Regional Commission. Hydrologic data pertaining to the extent, depth, and frequency of flooding that may be expected along Chenango River and Canasawacta Creek in the vicinity of Norwich, Chenango County, are presented in this atlas. The areas inundated by floods having recurrence intervals of 5, 25, and 50 years are shown on the map. The area inundated by an ice-jam flood on Canasawacta Creek also is shown. Greater floods have occurred and may occur in the future. Flooding will not be entirely eliminated by protective features although the frequency and depth of flooding may be lessened. The extent of flood inundation in the future may be altered by new highways, bridges, improved drainage systems, increased urbanization, and other cultural changes. The technical information provided will aid in reaching decisions for sound economic development of flood-plain lands for varying degrees of inundation.

The general procedure used to delineate the extent of overflow boundaries was to determine the flood stage for each of the three frequencies at selected sites investigated during field reconnaissance and surveys along the lower 4 miles of Canasawacta Creek and about 5 miles of Chenango River above the confluence of Canasawacta Creek. The profiles between the sections were defined and the flood boundaries derived by interpolating between the contours or by field investigations.

The computed profiles represent the water-surface elevation that would result from unimpeded open-water flow. Because flood crests from the two streams will not normally reach their confluence simultaneously, there may be backwater effect from each, which will at times alter the flood profile of the other stream near the confluence.

Ice jams tend to form near the confluence, particularly on Canasawacta Creek. The ice jams may result in flooding of the lower sections of Norwich. As an example of such flooding, the area inundated during the ice-jam flood of March 12, 1962, on Canasawacta Creek is shown on the map. The water level resulting from this ice-jam flood was higher than that which would have resulted from an open-water flood of a 50-year recurrence interval.

Bench marks.—Elevations shown are in feet above mean sea level (msl) and are referenced to seven bench marks of known elevation which are shown on the map. Bench mark (BM) 1020 was plotted on the atlas map although it is not shown on the published topographic map. Descriptions of all of the reference points can be obtained from the mean sea level elevation data compiled by the U.S. Coast and Geodetic Survey. A correction of the description for BM 1020 was made as the result of physical changes at the airport. It is revised as follows:

Warren Eaton "A". —About 2.7 miles north along State Highway 12 from the courthouse at Norwich, Chenango County, at the Warren Eaton Airport, 74 feet northeast of the northwest corner of the hangar, 36 feet north of the north side of the hangar, and in the southwest corner of a concrete base. A standard disk, stamped "X 298 1942". Elevation, 1,019.621 feet, msl.

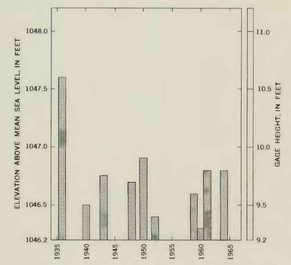

FIGURE 1.— *Annual floods above 1046.2-foot elevation, Chenango River at Sherburne, New York, 1936, 1938–66.*

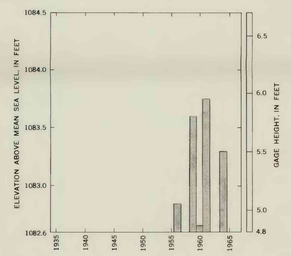

FIGURE 2.— *Annual floods above 1082.6-foot elevation, Canasawacta Creek near South Plymouth, New York, 1955–66. Flood stages prior to 1953 are not comparable to those shown.*

Additional mean sea level elevations can be obtained from the Norwich City Engineer, who maintains a standardized system of reference marks.

Flood height.—The height of a flood at a gaging station is usually expressed in terms of the gage height, or stage, which is the elevation of the water surface above a selected datum plane. Gage heights for the gaging stations on Chenango River at Sherburne and Canasawacta Creek near South Plymouth can be converted to elevations above mean sea level by adding 1,037.0 feet and 1,077.8 feet, respectively.

Gage height and year of each annual flood (highest peak discharge in a calendar year) above a selected stage for each gaging site are shown in figures 1 and 2, respectively. Owing to changes in channel conditions since 1953, Canasawacta Creek annual flood peaks for the 1945–53 period were not plotted. The 1936 annual flood peak for Chenango River, which was obtained from records of the U.S. Weather Bureau, was included although continuous records did not start until 1938. The irregular occurrence of floods is evident.

Flood discharge.—The rate of discharge of a stream is the volume of flow that passes a particular location in a given period of time. Normally the discharge rates are expressed in units of cubic feet per second (cfs). Peak discharge is the maximum discharge occurring during a flood. Occasionally the peak discharge does not occur at the time of maximum elevation because of variable backwater conditions.

Flood frequency.—Frequency of flooding on Canasawacta Creek was derived from the regional flood-frequency relation for streams in south-central New York. For Chenango River the frequency of flooding was determined from long-term continuous records of annual floods for the gaging stations at Sherburne and at Greene supplemented by historical records from the U.S. Weather Bureau. The general relation between discharge and frequency, converted to the partial-duration series, is shown in figure 3. Confidence in the flood-frequency curves is lessened considerably if they are extrapolated beyond the limits shown.

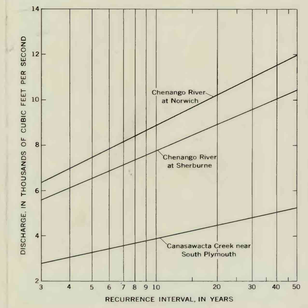

FIGURE 3.— *Frequency of flood discharges on Chenango River and Canasawacta Creek.*

Recurrence intervals.—As applied to flood events, recurrence interval is the average interval of time within which a flood of a given magnitude will be equaled or exceeded once. For floods greater than the 10-year flood, it is virtually inversely related to the chance of a specific flood being equaled or exceeded once in any one year. Thus a 25-year flood would have one chance in 25, or a 4-percent chance, of being equaled or exceeded in any one year.

The general relation between recurrence interval and flood height for floods at the South Plymouth and Sherburne gaging stations is shown in the following tabulation:

Recurrence interval (years)	Elevation above mean sea level (feet)	
	Chenango River at Sherburne	Canasawacta Creek near South Plymouth
50	1047.0	1084.0
30	1046.9	1083.8
20	1046.8	1083.6
10	1046.6	1083.3
5	1046.4	1083.0
3	1046.2	1082.7

The stage-frequency relations listed were based on the current stage-discharge relation for each gage and a step-backwater method computation of water-surface profiles for Canasawacta Creek. Changes in channel conditions would result in somewhat different stage-frequency relations.

Flood profiles.—A profile of the water surface of Canasawacta Creek and Chenango River is shown in figure 4 for hypothetical floods of 5-, 25-, and 50-year recurrence intervals. The profiles shown were derived from discharge-frequency relations at the Canasawacta Creek gage and at intervening points on both streams. The water-surface elevation of any flood at any desired site can be determined by plotting on the appropriate figure the stage for the selected frequency listed in the stage-frequency tabulation, and drawing the profile through this point, approximately parallel to the profiles shown. For most of the area studied, there is little difference between the boundaries of the 25- and 50-year recurrence-interval floods.

Generally, abrupt changes in the profile are due to differences in water-surface elevation between the upstream and downstream sides of bridges and are caused by constriction of the channel at the bridge structure. The base line for the profiles is located along the centerline of the streams. River mileage for Chenango River was based upon use of the 980-foot contour line as the zero point. For Canasawacta Creek the mouth of the Creek was used as its zero station.

Flood depth.—Depth of flooding at any point can be estimated by subtracting the ground elevation from the water-surface elevation indicated by the profiles shown in figure 4. The approximate ground elevation can be determined by estimating between the contours on the map, although more precise elevations can be obtained by leveling from nearby bench marks.

Acknowledgments.— The selection of the site for this project was made in collaboration with the Appalachian Regional Commission and the State of New York. Coordination of planning with the district office of the Corps of Engineers was accomplished through the office of Appalachian Studies, Corps of Engineers. This report was prepared by the U.S. Geological Survey under the administrative direction of Garald G. Parker, district chief.

Flood information and bench-mark elevations were furnished by Thomas Natoli, Norwich City Engineer. Additional data were obtained from other government agencies, newspapers, and various individuals.

Additional data.—Other information pertaining to floods at Norwich, New York, can be obtained from the U.S. Geological Survey, P. O. Box 948, Albany, New York, 12201, and from the following published reports:

Johnson, H., 1936, The New York State flood of July 1935: U.S. Geol. Survey Water-Supply Paper 773-E, p. 233-268.

Robison, F. L., 1961, Floods in New York, magnitude and frequency: U.S. Geol. Survey Circular 454, 10 p.

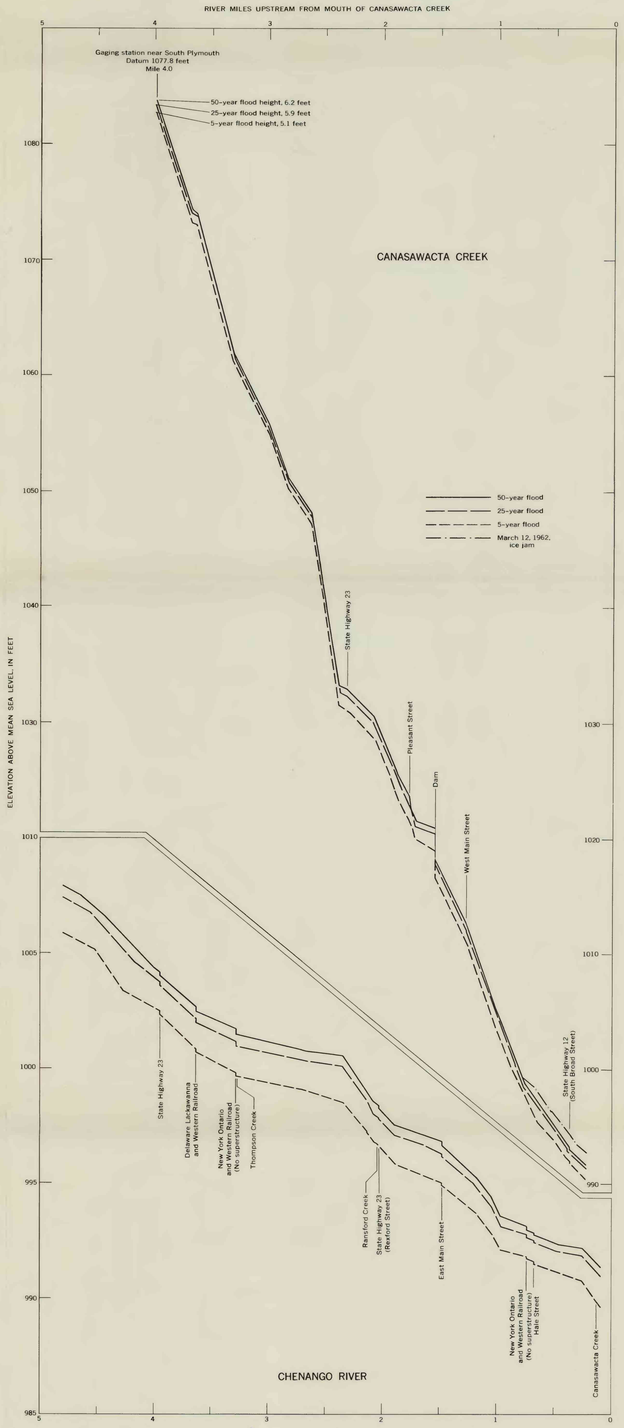

FIGURE 4.— *Profiles of floods on Chenango River and Canasawacta Creek.*

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.—1968—WSB163

FLOODS ON CHENANGO RIVER AND CANASAWACTA CREEK AT NORWICH, NEW YORK

By
Stephen Hladio

1968

For sale by U.S. Geological Survey, price 75 cents