

FLOODS OF JUNE 1972  
IN THE HARRISBURG AREA, PENNSYLVANIA

This hydrologic atlas presents information on the frequency, depth, and extent of flooding along a 28-mile reach of the Susquehanna River extending from Marysville, Pa., to Pottsville, Pa., and including the Harrisburg area. The approximate area inundated by the flood resulting from tropical storm Agnes in June 1972 is shown on a topographic base map. The purpose of this atlas is to provide a technical basis from which sound decisions can be made concerning the use of flood-plain lands.

The areal extent of flooding is mapped for the largest known flood, which occurred on June 24, 1972. The delineation along the channel of the Susquehanna River was based largely on interpretation of aerial photographs obtained by the U.S. Geological Survey shortly after the flood crest. Field surveys made shortly after the flood provided the horizontal control necessary to delineate overland flooding. The inundation pattern of future floods may be affected by new highways and bridges, modifications of stream channels, and other cultural changes.

**Cooperation and acknowledgment.**—This report was prepared by the Pennsylvania district of the U.S. Geological Survey in cooperation with the Pennsylvania Department of Environmental Resources, the Susquehanna River Basin Commission, and the U.S. Army Corps of Engineers. The investigation was conducted under the direction of Norman H. Beamer, district chief.

**Flood height.**—The height of a flood at a gaging station is stated in terms of the gage height or stage, which is the elevation of the water surface above a selected datum plane. Gage heights or stages at the gaging station on the Susquehanna River at Harrisburg (01570500), located at Nagle Street (river mile 68.8), can be converted to elevations above mean sea level by adding 282.6 feet. Thus, the maximum gage height at Nagle Street during the flood of June 24, 1972, was 325.2 and the corresponding elevation above mean sea level was 322.6 feet.

Flood stage is the level at which a river first begins to overflow its banks. Flood stage for the Susquehanna River at Harrisburg as established by the U.S. Weather Bureau is 17 feet, which corresponds to elevation, 307 feet above mean sea level, at the Nagle Street gaging station.

Gage height and a year for each annual flood above elevation, 307 feet at the Nagle Street gaging station are shown in figure 1. The irregular distribution of floods with respect to time is evident. Bankfull stage was exceeded at least once during each of 25 of the 138 years of record (fig. 1).

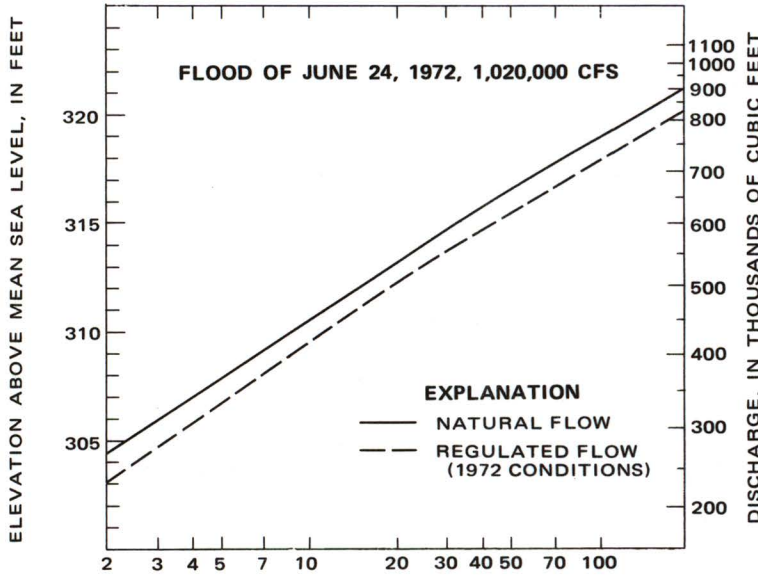


Figure 1.—Annual floods above 307-foot elevation at Nagle Street on Susquehanna River at Harrisburg (01570500), 1848-1972.

**History of floods.**—Good records of flood heights are available for all major floods since about 1840, and some information is available for earlier major floods. The flood of June 24, 1972, is the highest known for the Susquehanna River. The eleven highest floods at Harrisburg are shown below in order of magnitude.

Date of flood	Gage height (feet)	Elevation above mean sea level (feet)
June 24, 1972	32.6	325.2
Mar. 19, 1896	32.2	324.8
June 2, 1889	31.5	324.1
Mar. 22, 1894	31.5	324.1
Mar. 15, 1784	29.8	312.4
Mar. 18, 1865	31.4	314.0
Mar. 3, 1902	31.8	314.4
Mar. 29, 1946	31.5	314.1
Mar. 12, 1964	31.8	314.4
Oct. 5, 1796	31.8	314.4
Mar. 15, 1846	30.8	313.4

\*Approximate

**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. Discharge rates usually are expressed in units of cubic feet per second. Peak discharge, the maximum discharge attained by a flood, generally occurs at the time of the maximum stage of the flood, but if the stream is affected by variable backwater, the peak discharge may not coincide with the maximum stage. For example, backwater from an ice jam may cause a high stage during a period of relatively low discharge.

**Flood frequency.**—Frequency of flooding on the Susquehanna River was determined from the records of annual peak discharge data for the Nagle Street gaging station at Harrisburg. Analyses were made by the log-Pearson Type III method (Water Resources Council, 1967), the annual-series-peak-discharge-array method, and the regional relationships for the Susquehanna River developed by Tice (1967). The results of these three analyses agree, within 4 percent, for return intervals of 2.33 to 100 years. The relationships between discharge and frequency, as determined from the log-Pearson Type III method, are given in figure 2.

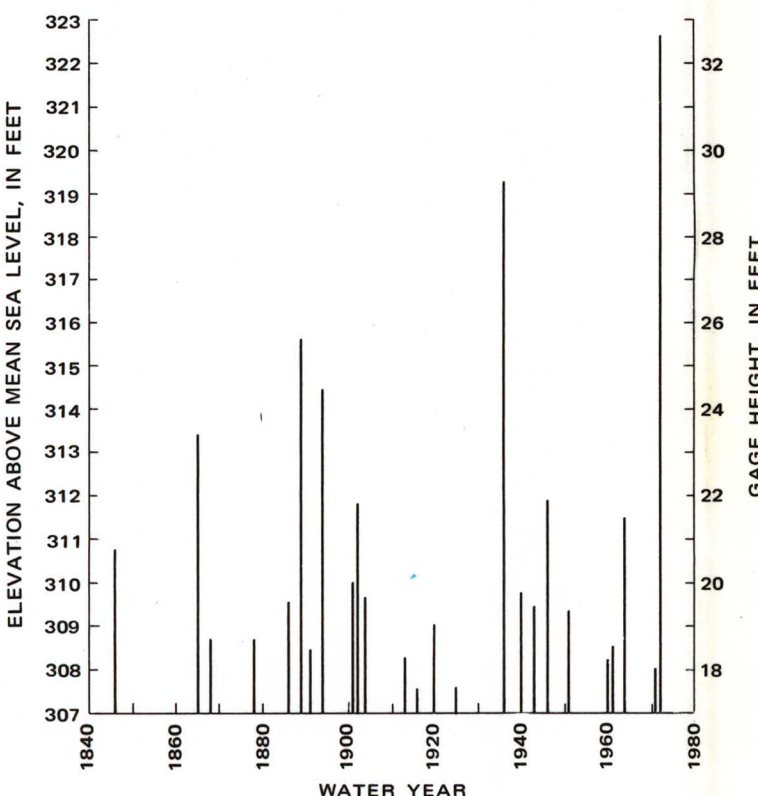


Figure 2.—Frequency of flood discharges on Susquehanna River at Harrisburg (01570500).

The recurrence interval is the average interval of time within which a given peak discharge will be equaled or exceeded once. The recurrence interval is inversely related to the chance of a given flood discharge being equaled or exceeded in any 1 year. Thus, the 20-year flood has a 5 percent (1-in-20) chance of being equaled or exceeded in any 1 year. No regularity of occurrence is implied. Extrapolation of the flood-frequency curve for Harrisburg beyond a recurrence interval of 200 years is not recommended because of the questionable validity of estimated relations. The recurrence interval for the 1972 flood, which was considerably greater than 200 years, cannot be reliably predicted through analysis of the records available.

The general relationship between recurrence interval and regulated flood elevation at the Harrisburg gaging station is shown in the following table and in figure 2.

Recurrence interval (years)	Elevation above mean sea level (feet)
200	320.2
100	317.9
50	315.5
20	312.5
10	309.6
5	308.8
2	308.1

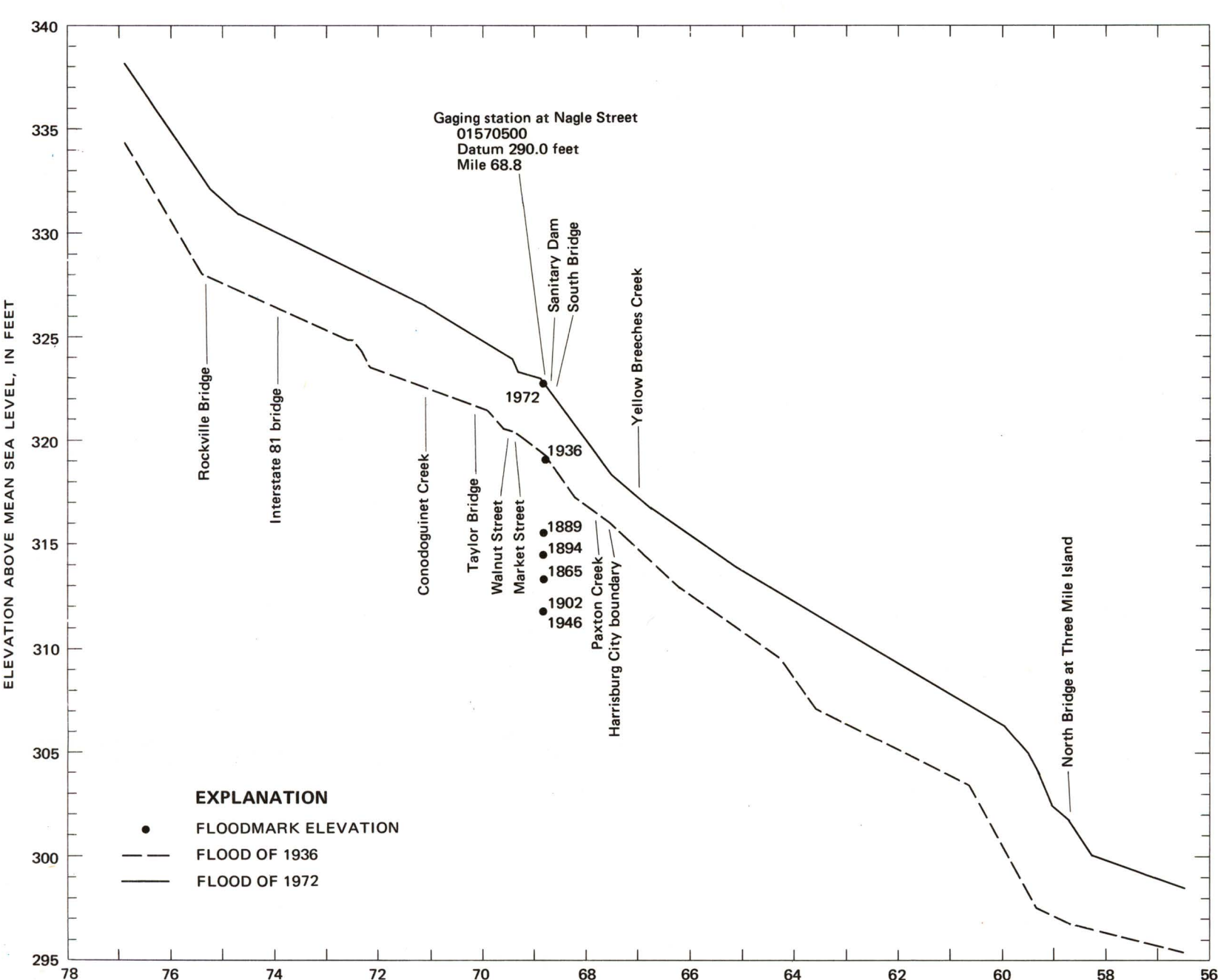
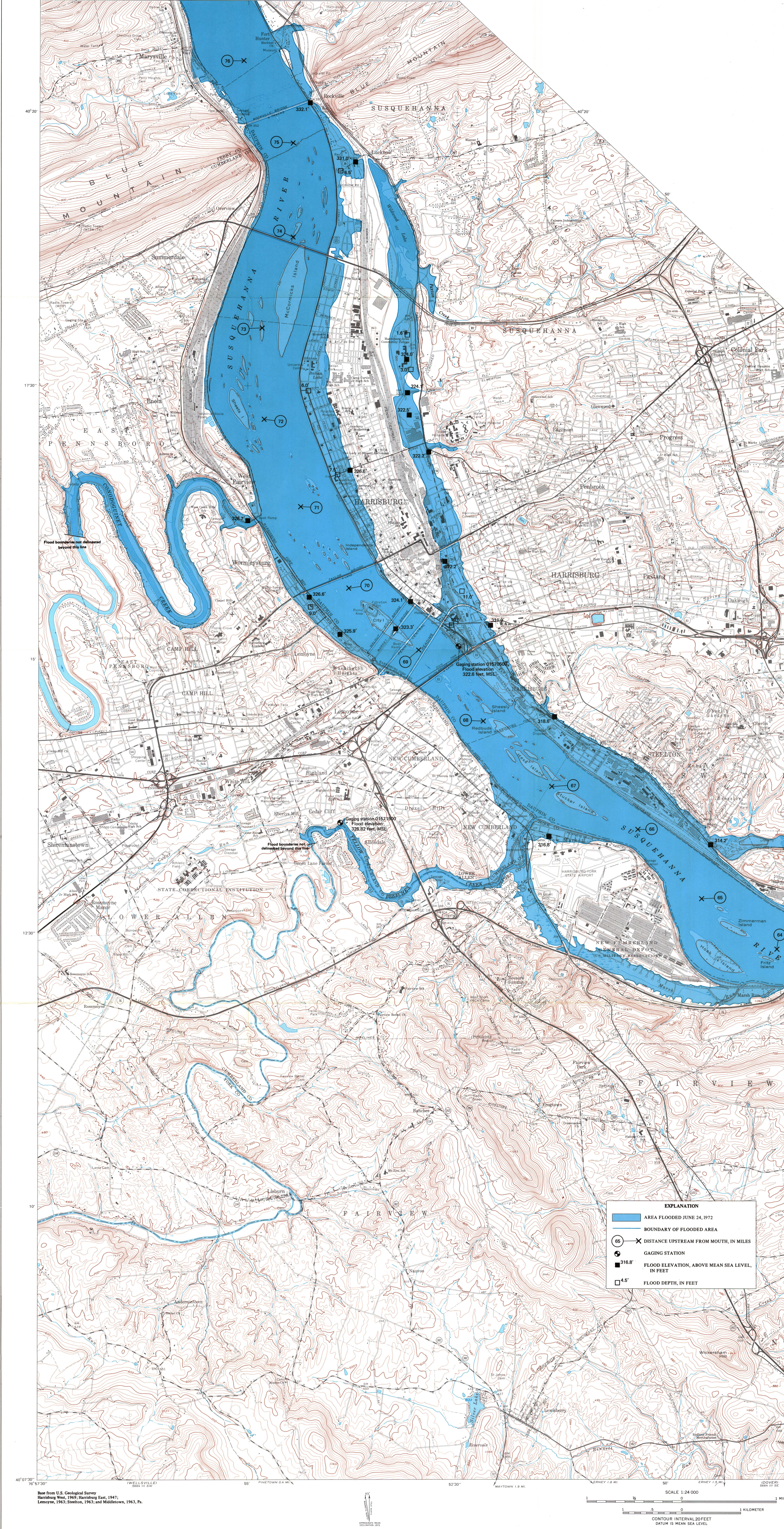


Figure 3.—Profile of floods on Susquehanna River at Harrisburg.



**EXPLANATION**

- AREA FLOODED JUNE 24, 1972
- BOUNDARY OF FLOODED AREA
- X— DISTANCE UPSTREAM FROM MOUTH, IN MILES
- GAGING STATION
- FLOOD ELEVATION, ABOVE MEAN SEA LEVEL, IN FEET
- FLOOD DEPTH, IN FEET

Base from U.S. Geological Survey  
Harrisburg West, 1969; Harrisburg East, 1947;  
Lemoyne, 1963; Steelton, 1967; and Middletown, 1963, Pa.

SCALE 1:24,000  
CONTOUR INTERVAL 20 FEET  
DATUM IS MEAN SEA LEVEL

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By  
L. V. Page and L. C. Shaw  
1973