

FLOODS ON SCIOTO RIVER, OLENTANGY RIVER, AND ALUM CREEK AT COLUMBUS, OHIO IN JANUARY 1959

The approximate areas inundated by the Scioto River, Olentangy River and Alum Creek, in the vicinity of Columbus, Ohio, during the flood of January 22, 1959, are shown on a topographic map base in order to record the flood hazard in graphical form. Greater floods are possible, but no attempt has been made to show their probable overflow limits. The flood of January 1959 on the Scioto River, although reduced somewhat by storage in reservoirs upstream, was the highest since the flood of March 25, 1913, which was the greatest since at least 1880. Flood heights on the Scioto River at Columbus in 1913 and 1959 are not comparable because of channel improvements and levees, constructed since 1913. The 1959 flood on Alum Creek was the greatest since 1924. On the Olentangy River, the flood of January 1959 was several feet lower than that of March 1913 at Columbus. Future protective works may reduce the frequency of flooding in the area, but will not necessarily eliminate flooding. New highways and other cultural changes may influence the inundation pattern of future floods.

The reach of Big Walnut Creek which flows near the extreme eastern part of the city of Columbus is outside the limits of this map and the extent of flooding by Big Walnut Creek is not shown.

Flood height.—The height of a flood at a gaging station is usually stated in terms of the gage height or stage, which is the elevation of the water surface above a selected datum plane. Elevations shown are in feet above mean sea level. Gage heights or stages at gaging stations in the Scioto River basin in the vicinity of Columbus can be converted to elevations above mean sea level by adding the gage height to the appropriate datum of gage listed below. Thus the maximum gage height on Alum Creek at the gaging station below Livingston Avenue during the flood of January 22, 1959, was 19.6 feet, and the corresponding elevation above mean sea level was 753.2 feet.

Gaging Station	Datum of gage above mean sea level (feet)
Olentangy River near Worthington (Wilson Road)	743.2
Scioto River at Columbus (at sewage-treatment works downstream from Frank Road)	680.4
Alum Creek at Columbus (downstream from Livingston Avenue)	733.6

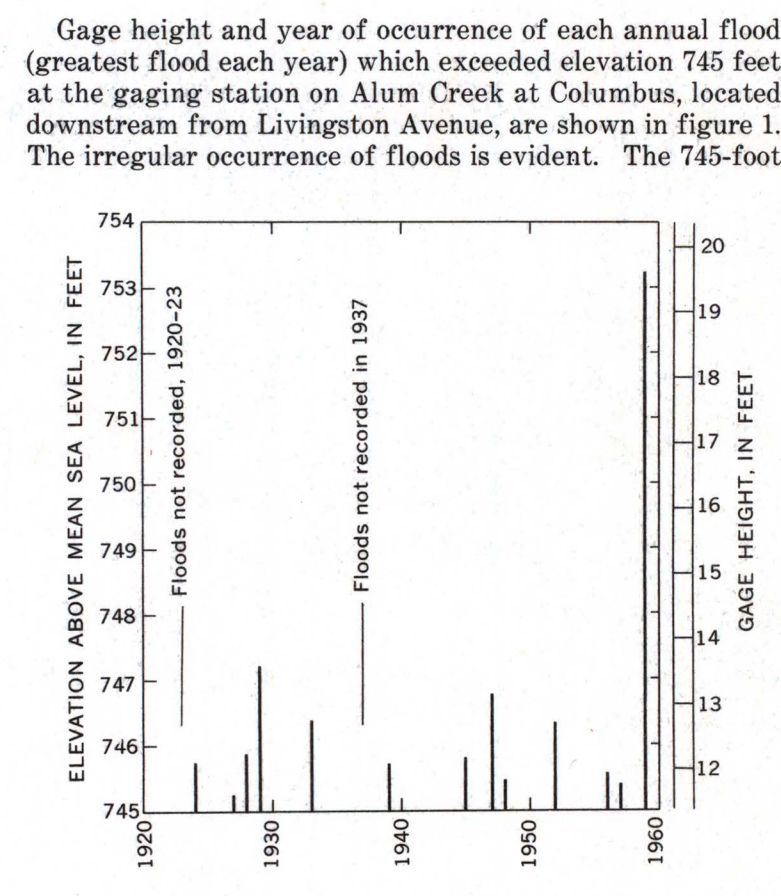


FIGURE 1.—ANNUAL FLOODS ABOVE 745-FOOT ELEVATION, 1924-36, 1938-60, ALUM CREEK AT COLUMBUS, OHIO

elevation was exceeded 14 times in 36 years of record (fig. 1). Although floods above elevation 745 feet occurred on the average of about 3 times per decade, 2 were experienced in some decades, whereas 8 occurred during the past 1924-36.

Flood frequency.—Frequency of flooding without the effects of storage in reservoirs upstream, at the Geological Survey gaging stations on the Scioto River and Alum Creek at Columbus, has been derived from a regional flood-frequency relation for all streams in Ohio except those in the Maumee River basin. Large errors may result if the flood-frequency curves are extrapolated beyond the limits shown.

Frequency of flooding on Olentangy River is not shown because most annual peak discharges at Columbus are effectively regulated by Delaware Reservoir.

Regulation.—Flow of Scioto River at Columbus is subject to regulation by the following reservoirs:

Reservoir	Stream	Beginning of operation
Griggs	Scioto River	1905
O'Shaughnessy	Scioto River	1924
Delaware	Olentangy River	1951

The two water-supply reservoirs, Griggs and O'Shaughnessy, do not include flood storage capacities in their designs and their effect on flood peaks at Columbus is negligible. The effect of the Delaware Reservoir on annual flood peaks at Columbus is usually small but was substantial during the flood of January 1959, storing all the runoff from about three-fourths of the Olentangy River drainage area above Columbus. Floods on Alum Creek at Columbus are not regulated by storage in reservoirs.

Recurrence interval.—As applied to flood events, recurrence interval is the number of years, on the average, within which a given flood height will be equalled or exceeded once. It is inversely related to the chance of a specific flood being equalled or exceeded in any one year. Thus a 20-year flood would have 1 chance in 20 of being equalled or exceeded in any one year, or a 25-year flood would have 1 chance in 25 of being equalled or exceeded in any one year.

The general relationship between recurrence interval and flood height at gaging stations on the Scioto River and on Alum Creek, at Columbus (fig. 2) is tabulated below:

Elevation above mean sea level (feet)			
Recurrence interval (years)	Scioto River at Columbus (at sewage-treatment works downstream from Frank Road)	Alum Creek at Columbus (downstream from Livingston Avenue)	
50	706.8	748.5	
40	706.5	748.3	
30	706.2	748.0	
20	705.8	747.6	
10	705.0	746.9	
5	704.1	746.2	
3	703.2	745.4	

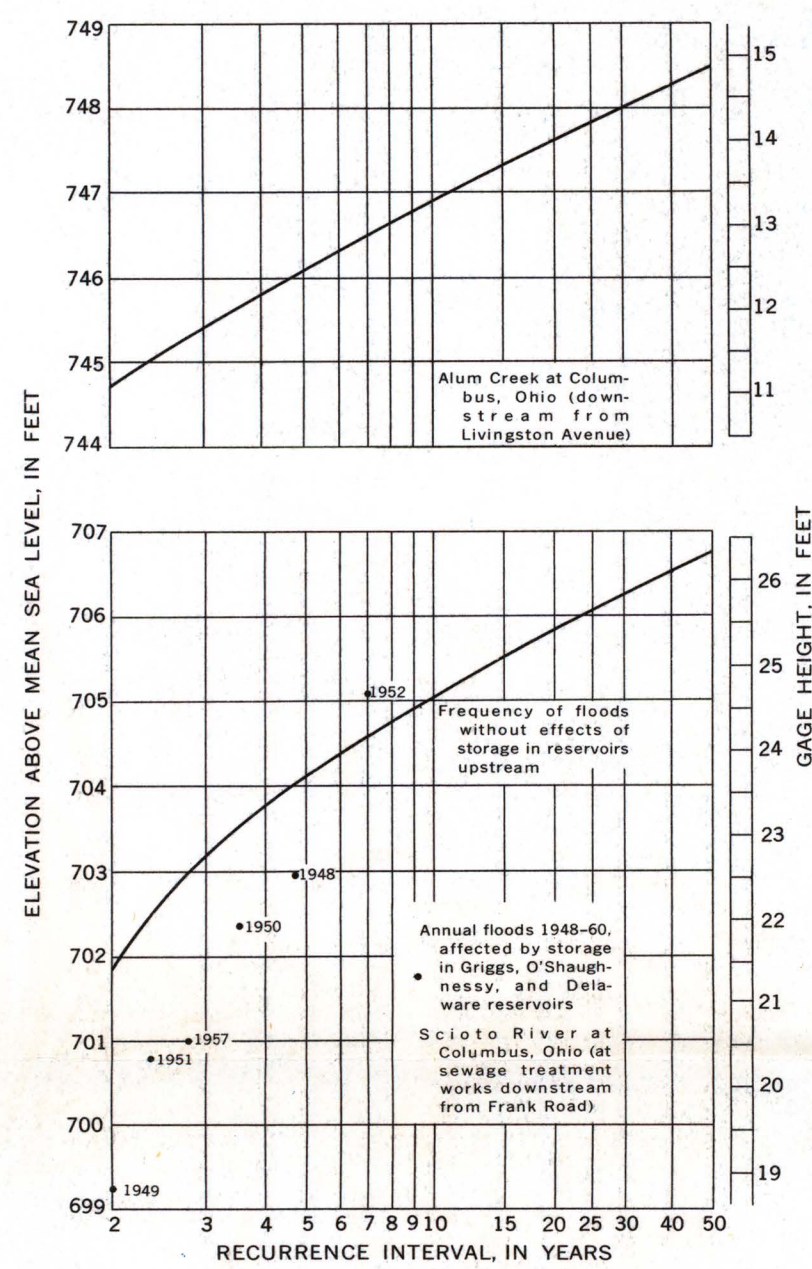


FIGURE 2.—FREQUENCY OF FLOODS ON SCIOTO RIVER AND ALUM CREEK AT COLUMBUS, OHIO

EXPLANATION

- Flood limit 1959
- River miles measured upstream from mouth

The frequency curve shown for Scioto River represents natural conditions of flow uninfluenced by effect of storage in reservoirs upstream. Annual floods exceeding elevation 699 feet on Scioto River during the period 1948-50, affected by storage in Griggs, O'Shaughnessy, and Delaware Reservoirs, are also plotted in figure 2. The floods of February 1956 and January 1959 are not shown because their recurrence intervals are outside the limits of figure 2.

The flood-frequency relation for Alum Creek is not affected by storage in reservoirs. It is emphasized that recurrence intervals are average figures—the average number of years in which floods of specific gage height will be equalled or exceeded. Thus a flood on Alum Creek that is said to have a 20-year recurrence interval may not be reached in any one 20-year period, or it may be reached more than once, because of the erratic nature of flood occurrence.

Flood profiles.—Profiles of the water surface along the Scioto River and Olentangy River constructed from marks left by the floods of March 1913 and January 1959, and along Alum Creek for the flood of January 1959, are shown in figure 3. Profiles of floods corresponding to other flood heights can be plotted on this diagram generally parallel to the 1959 flood profiles. The abrupt changes in the profiles shown at some street locations indicate the difference in water surface elevations at the upstream and downstream sides of bridges.

Base lines for the profiles are located generally along the main channels except in the meandering reaches of Alum Creek between miles 1 and 2 and miles 9 and 10 where a centerline approximately parallel to the valley is used. River miles measured upstream from the mouth of Scioto River are upstream from the mouth of Alum Creek, used for the profiles of figure 3, are also marked along the streams on the map.

Depth of flooding at any point can be estimated by subtracting the ground elevation from the water surface indicated by the profile in figure 3. The approximate ground elevation can be determined from information indicated by contours in the map, although more accurate elevations can be obtained by leveling to nearby bench marks.

Tributaries.—Scioto River, Olentangy River, and Alum Creek, are the principal sources of flooding in the City of Columbus. However, during the flood of January 1959, a large section in the west part of Columbus was inundated by floodwater from the Scioto River, which overtopped a levee along Dry Run, a small tributary that flows into the river near Grandview Avenue.

Several small tributaries flow through Columbus. Few data regarding the extent of their flooding are available and areas inundated by their overflows are not shown.

Additional data.—Other information pertaining to floods at Columbus, Ohio, may be obtained at the office of the U.S. Geological Survey, 1509 Hess Street, Columbus, Ohio, and from the following published reports:

Cross, W. P. and Brooks, H. P., Floods of January-February 1959 in Ohio: U.S. Geol. Survey Circ. 418, 54 p.

Cross, W. P. and Webber, E. E., Floods in Ohio, Magnitude and Frequency: Ohio Dept. Nat. Resources, Div. of Water Bull. 32, 285 p.

Cooperation and acknowledgment.—The preparation of this flood inundation map is part of an investigation program financed through a special cooperative agreement between the Ohio Department of Natural Resources, H. B. Eagon, Director, and the U.S. Geological Survey.

Some 1959 flood profile data were furnished by the Ohio Department of Natural Resources, Division of Water; the Corps of Engineers, and by the City Engineers of Columbus. 1913 flood profiles on Scioto River and Olentangy River were taken from the 1916 report "Flood Relief for the Scioto Valley" by the Franklin County Conservancy District, by permission of Alvord, Bardick, and Howell, Consulting Engineers.

The aerial photograph was furnished by the Ohio Department of Highways.

The flood map was prepared by Frederick H. Ruggies, Jr., and William F. Somers, the flood-frequency relation was developed by William P. Cross, and the explanatory text was written by George W. Eiden, Jr.

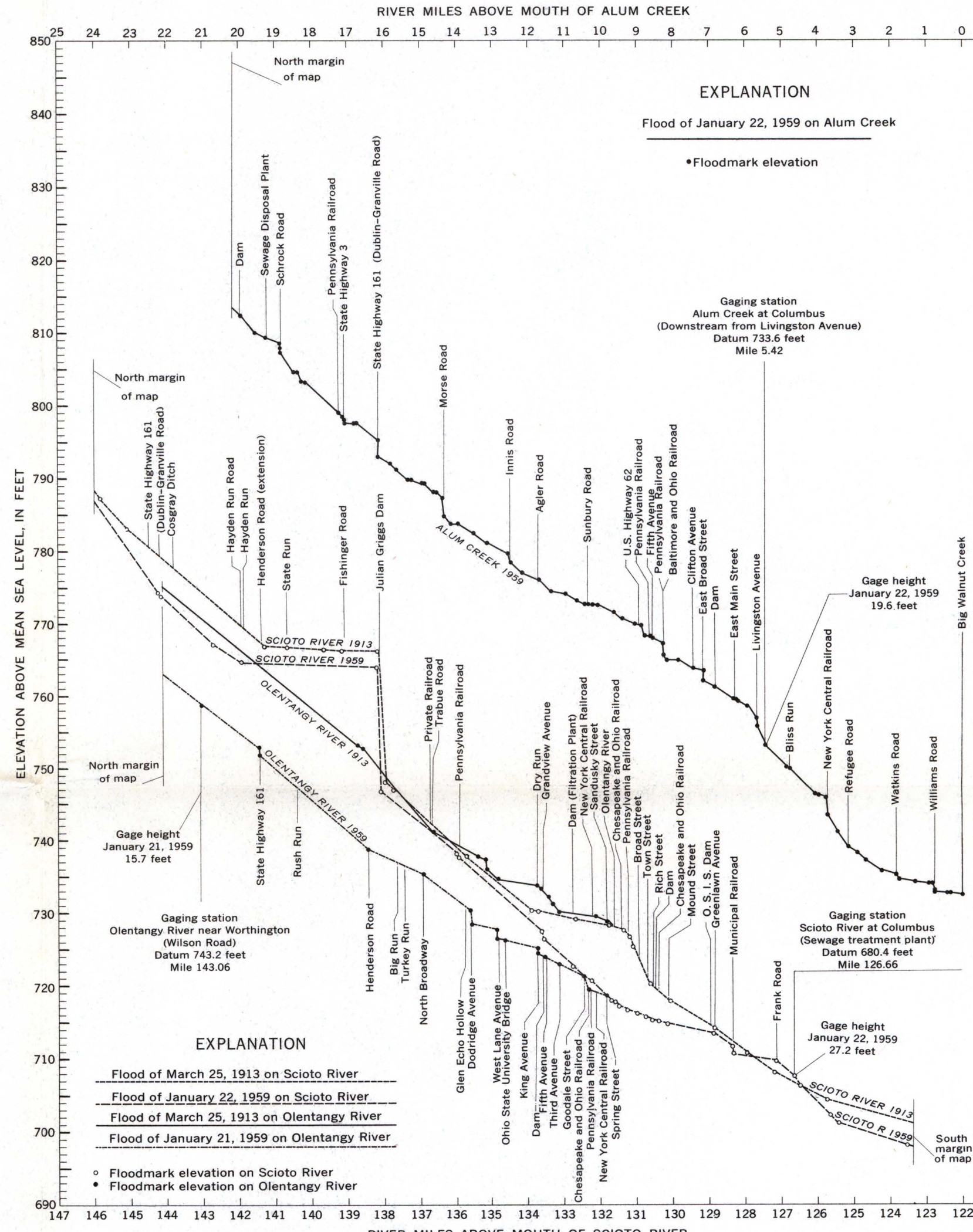


FIGURE 3.—PROFILES OF FLOODS ON SCIOTO RIVER, OLENTANGY RIVER, AND ALUM CREEK



SCIOTO RIVER, OLENTANGY RIVER, AND ALUM CREEK FLOOD HEIGHTS

Flood heights recorded at U.S. Geological Survey gaging stations on Scioto River, Olentangy River, and Alum Creek at Columbus, Ohio. Overflow limits of only the 1959 flood are shown.

Date of flood	Olentangy River at Worthington (Wilson Road)	Scioto River at Columbus (at sewage-treatment works downstream from Frank Road)	Alum Creek at Columbus (downstream from Livingston Avenue)
Stage (feet)	Elevation above mean sea level (feet)	Stage (feet)	Elevation above mean sea level (feet)
March 25, 1913	15.4	706.6	748.5
February 21, 1929		20.8	704.2
January 31, 1959	15.7	758.9	19.6
January 22, 1959		27.2	707.6

a. From flood profile
b. Not comparable with present gage heights because of subsequent channel improvements and levee construction



QUADRANGLE LOCATION