PREPARED IN COOPERATION WITH

THE STATE OF OHIO

DEPARTMENT OF NATURAL RESOURCES

FRED E. MORR, DIRECTOR

×663 Base from U.S. Geological Survey Flood heights recorded at the U.S. Weather Bureau gaging topographic quadrangles, 1961 station at the U.S. Highway 22 bridge. Overflow limits for only the 1959 flood are shown on the map Elevation above Discharge mean sea level (cubic feet **EXPLANATION** (feet) per second) 1 ½ 0 March 26, 1913 28.2 671.2 260,000 *669.2 144,000 January 22, 1959 | *26.2 1 .5 0 665.5 January 28, 1952 | 22.5 Boundary of January 22, 1959 flood CONTOUR INTERVAL 5 and 10 FEET APPROXIMATE MEAN *From floodmark DATUM IS MEAN SEA LEVEL AREA OF THIS REPORT — Flood-profile centerline River mile measured upstream

FLOODS ON SCIOTO RIVER AND DARBY CREEK AT CIRCLEVILLE, OHIO, IN 1959

Hydrologic data pertaining to the depth and frequency of flooding along the Scioto River and Darby Creek in the vicinity of Circleville, Ohio, are presented in this atlas. The map and flood data provide a technical basis for making land-use decisions commensurate with the degree and probability of flooding. No recommendations or suggestions for land-use regulations are made and no solutions of existing flood problems are proposed.

The approximate area inundated during the flood of January 22, 1959, is shown on a topographic map to record the flood hazard in graphic form. Greater floods are possible but no attempt has been made to define their probable overflow limits. The flood of January 1959, although reduced somewhat by storage in reservoirs upstream, was the highest on the Scioto River since the flood of March 26, 1913. The 1913 flood was the greatest since at least 1800. Future protective works may reduce the frequency of flooding in the area but will not necessarily eliminate flooding. The inundation pattern of future floods may be affected by new highways, bridges, and other cultural changes.

Cooperation and acknowledgment. — The preparation of this flood map is a part of an investigative program financed through a cooperative agreement between the Ohio Department of Natural Resources, Fred E. Morr, director, and the U.S. Geological Survey, Thomas B. Nolan, director.

Data for the 1959 flood profile were furnished by the Corps of Engineers.

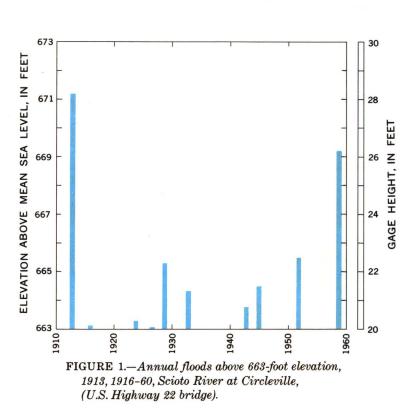
The 1913 flood profile of Scioto River was obtained from the 1916 report "Flood Relief for Scioto Valley" to the Franklin County Conservancy District, by permission of Alvord, Burdick, and Howson, Consulting Engineers, Chicago,

Gage height record for Scioto River at U.S. Highway 22 bridge was furnished by the U.S. Weather Bureau.

The explanatory text was written by George W. Edelen, Jr., the flood boundaries were defined by Frederick H. Ruggles, Jr., and the flood-frequency relation was derived by William P. Cross, Geological Survey.

Flood height.— The height of a flood at a gaging station usually is stated in terms of the gage height or stage, which is the elevation of the water surface above a selected datum plane. Elevations shown on the map are in feet above mean sea level. Gage heights or stages at the U.S. Weather Bureau gaging station on Scioto River at Circleville, located at the U.S. Highway 22 bridge, can be converted to elevations above mean sea level by adding 643.03 feet.

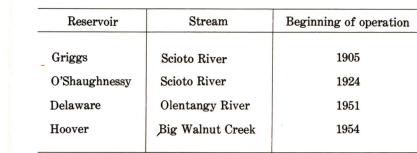
Gage height and year of each annual flood (highest momentary peak discharge in each calendar year) that exceeded elevation 663 feet at the U.S. Highway 22 bridge on Scioto River at Circleville during the period 1913, 1916-60, are shown in figure 1. The irregular occurrence



of floods is evident. Floods above 663-foot elevation occurred 10 times in the 46-year period, an average of about one flood each 4 1/2 years. Although no flood of this magnitude occurred in 30 of the years, there were 4 floods this great during the 10-year period 1924-33.

Flood discharge. — The rate of discharge of a stream is the volume of flow that passes a specific location in a given period of time. Peak discharge is the maximum value of the discharge reached during a flood. Discharge rates usually are expressed in units of cubic feet per second (cfs).

Regulation.—The flow of Scioto River is subject to regulation by the following reservoirs:



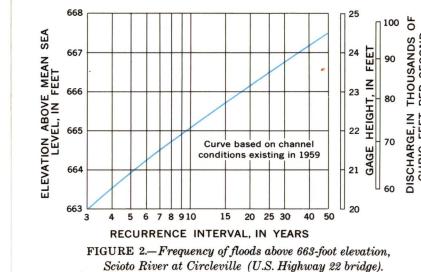
The three water-supply reservoirs, Griggs, O'Shaughnessy, and Hoover, do not include flood storage capacities in their designs and their effects on flood peaks at Circleville are negligible. The effect of the Delaware Reservoir on annual flood peaks at Circleville is usually small, but was substantial during the January 1959 flood.

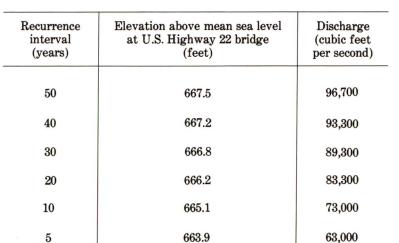
Flood frequency. — Frequency of flooding at

the U.S. Highway 22 bridge on Scioto River at Circleville has been derived for conditions of natural flow without the effect of storage in reservoirs upstream. The frequency derivation is based on records from the U.S. Geological Survey gaging station on Scioto River near Circleville, located at a bridge on Circleville-Commercial Point Road (river mile 101.64), combined with a regional flood frequency relation for all streams in Ohio except those in the Maumee River basin. The relation between stage and frequency is dependent on the relation of stage to discharge which is affected by changes in physical conditions of channels and constrictions. The frequency curve shown in figure 2 is based on channel conditions existing in 1959. Large errors may result if the floodfrequency curve is extrapolated beyond the limits shown. Frequency of flooding on Darby Creek has not been determined.

Recurrence intervals. — As applied to flood events, recurrence interval is the number of years, on the average, within which a given flood height will be equaled or exceeded once. It is inversely related to the probability of a specific flood being equaled or exceeded in any one year. Thus a 20-year flood would have 1 chance in 20, or a 5-percent chance, of being equaled or exceeded in any one year.

The general relationship between recurrence interval and both flood height and flood discharge at the U.S. Highway 22 bridge gaging station on Scioto River at Circleville (fig. 2) is tabulated below. The curve represents natural conditions of flow, uninfluenced by the effect of storage in reservoirs upstream.





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It is emphasized that recurrence intervals are average figures—the average number of years that will elapse between occurrences of floods that equal or exceed a certain flood height. For example, about 5 floods of at least the magnitude of a 20-year flood may be expected to occur in a 100-year period. A flood that reaches a 666.2-foot elevation at the U.S. Highway 22 bridge is said to have a 20-year recurrence interval. However, because of the erratic nature of flood occurrence, the fact that a 20-year flood is experienced in one year does not reduce the probability of that flood being equaled or exceeded in the next year or in the next week.

Flood profiles. — Profiles of the water surface along Scioto River and Darby Creek, constructed from marks left by the flood of January 22, 1959, and along the Scioto River for the flood of March 26, 1913, are shown in figure 3. Profiles of floods corresponding to other flood heights can be plotted on this diagram generally parallel to those shown.

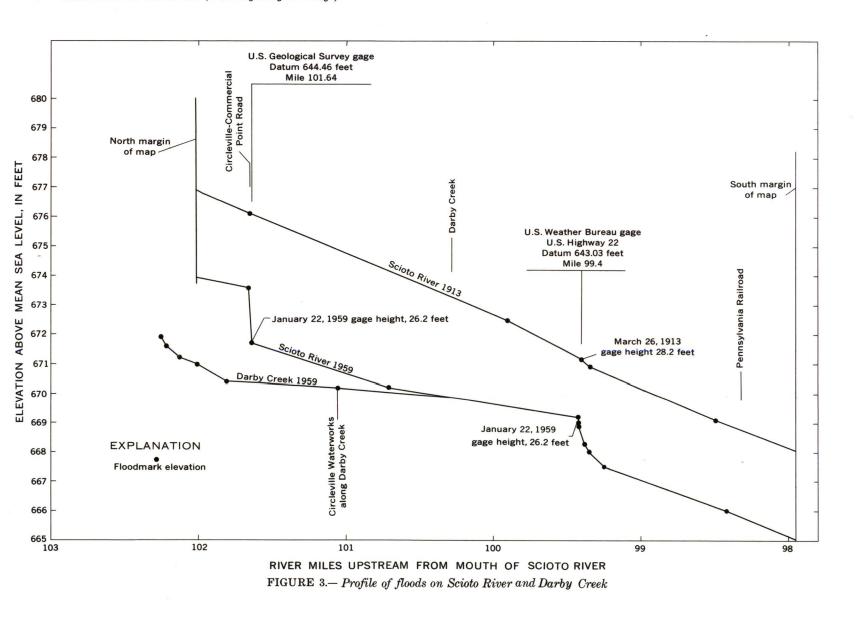
The abrupt changes in the profiles, shown at some road locations, indicate the difference in water surface elevations at the upstream and downstream sides of bridges. Base lines for the profiles are located generally along the main channels except in the meandering reach of Scioto River between mile 98 and mile 100 where a centerline approximately parallel to the valley is used. River miles upstream from the mouth of Scioto River, used for the profiles of figure 3, are also marked along the streams on the map.

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

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

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

Nat. Resources, Div. of Water, Bull. 32, 325 p.



from mouth of Scioto River

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