

FLOOD OF JUNE 22-23, 1972, AT LOCK HAVEN, PENNSYLVANIA

Severe flooding occurred June 22-23, 1972, in the Lock Haven area, Clinton County, Pennsylvania, as a result of heavy rains produced by Tropical Storm Agnes. Resultant property damages were substantial in the City of Lock Haven, in the Borough of Mill Hall, and in adjacent low-lying areas of Allison, Bald Eagle, and Castanea Townships. The area of flooding is delineated on the map. Accompanying graphs show the results of analyses of available data on the frequency and depth of flooding. These data provide a basis for making future decisions concerning management of the flood-prone area.

Acknowledgments.—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 administrative direction of Norman H. Beumer, district chief.

Flood occurrences.—Lock Haven, which lies mostly on the flood plain at the junction of the West Branch Susquehanna River and Bald Eagle Creek, is subject to occasional flooding. Records of gage heights, or stage, for major floods have been collected at a nonrecording gage at the Jay Street Bridge on the West Branch Susquehanna River at Lock Haven (1-5458) since 1894. Fifteen annual floods exceeded bankfull stage in the period 1894-1972, as shown in fig. 1.

Flood discharge, which is expressed in cubic feet per second, is the maximum rate of flow during the flood. Some large floods on the West Branch Susquehanna River are affected by ice jams (fig. 1); consequently, peak stages often represent backwater conditions and are not always simultaneous with peak discharges. Peak data for the flood of June 1972 at gaging sites on the three principal streams in the Lock Haven area are summarized in the following table.

Gaging station	Drainage area (sq mi)	Date and hour	Elevation (feet above mean sea level)	Discharge (cubic feet per second)
West Branch Susquehanna River at Lock Haven (1-5458)	3,345	23 13 30	566.5	210,000
Bald Eagle Creek at Beech Creek Station (1-5480)	559	23 08 00	584.03	19,400
Fishing Creek at stream mile 1.65 at Mill Hall	180	22	587.4	25,000

Metric equivalents for drainage area, elevation, and discharge can be calculated by multiplying English Units by the appropriate conversion factor, as given below:

English Unit	Conversion factor	Metric Unit (International System of Units)
square miles	2.590	square kilometers
feet	0.3048	meters
cubic feet per second	0.02832	cubic meters per second

Reservoirs on the West Branch Susquehanna River served to reduce the peak at Lock Haven by about 2 feet. In addition, regulation on Bald Eagle Creek reduced the flood discharge at Beech Creek Station from its potential of approximately 40,000 cubic feet per second to 19,400 cubic feet per second; the resultant reduction in the peak stage at Lock Haven was approximately 1 foot. Thus, the peak at Lock Haven was reduced approximately 3 feet by floodwater retention in reservoirs.

Flood frequency.—The recurrence interval is the average interval of time within which a given peak discharge will be exceeded once. Frequency of floods may also be stated in terms of their probabilities of occurrence (virtually reciprocals of their recurrence intervals for floods with recurrence intervals greater than 10 years). For example, a flood with a 25-year recurrence interval would have a 1 chance in 25 or 4-percent chance of being exceeded in any given year.

Frequency of flooding for natural conditions of flow on the West Branch Susquehanna River was determined from the records of annual floods at the Renovo and Williamsport gages. At Renovo, 27.6 miles upstream from Lock Haven, the flow from 2,975 square miles has been gaged since 1908. The Williamsport gage, 30.7 miles downstream from Lock Haven where the drainage area is 5,682 square miles, has been in operation since 1895. The results of log-Pearson Type III analyses of the unregulated annual flood discharges at these gages were used in a unit-runoff analysis to calculate the flood-frequency relation for the Lock Haven gaging site. A

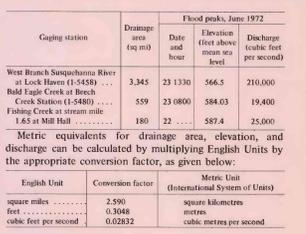


FIGURE 2.—Annual floods above 9.0-foot gage height, Bald Eagle Creek at Beech Creek station (1-5480), 1911-72.

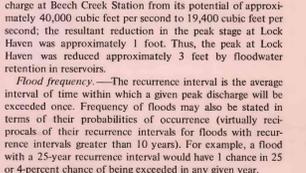


FIGURE 3.—Annual floods above 21.0-foot gage height, West Branch Susquehanna River at Lock Haven (1-5458), 1894-1972.

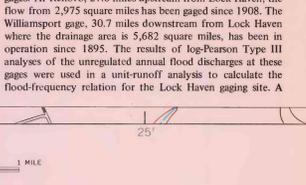


FIGURE 4.—Flood-frequency relation for natural and regulated flow of West Branch Susquehanna River at Lock Haven (1-5458).

similar relation was prepared, on the basis of data furnished by the U.S. Army Corps of Engineers, Baltimore, Maryland District, for conditions of regulated floodflow in effect on the West Branch since 1966. The flood-frequency relations for natural and regulated flow at the Lock Haven gage are given in figure 3. The relationship between elevation and discharge shown in this figure applies to flow that is unaffected by irregular backwater, such as that produced by ice jams.

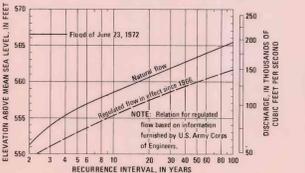


FIGURE 5.—Profiles of 1936 and 1972 floods on West Branch Susquehanna River.

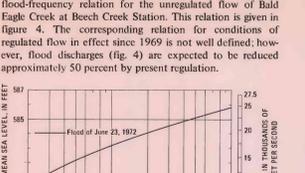


FIGURE 6.—Profiles of 1936 and 1972 floods on Bald Eagle Creek.

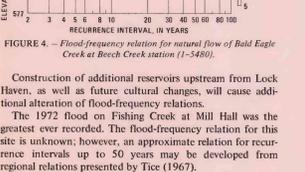
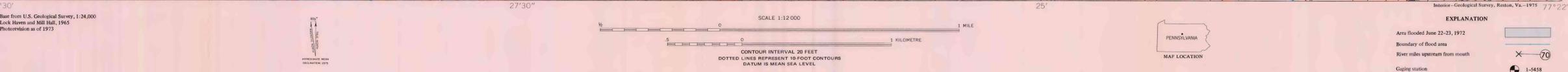


FIGURE 7.—Profile of 1972 flood on Fishing Creek.

Additional information.—Other information pertaining to floods on the West Branch Susquehanna River and its tributaries may be obtained from the U.S. Geological Survey, P.O. Box 1107, Harrisburg, Pennsylvania, 17108, and from the following published reports:

- Grover, N. C. 1937. The floods of March 1936. U.S. Geological Survey Water-Supply Paper 799, 667 p.
- Mangan, J. W., 1936. The floods of March 1936 in Pennsylvania. Commonwealth of Pennsylvania, Department of Forests and Waters, 129 p.
- Tice, R. H., 1967. Magnitude and frequency of floods in the United States, part 1-B: U.S. Geol. Survey Water-Supply Paper 1672, 585 p.
- U.S. Army Engineer District, Baltimore, 1971. Flood plain information, Clinton County, Pennsylvania: 37 p., 13 pl.
- U.S. Army Engineer District, Lycoming County, Pennsylvania: 37 p., 12 pl.



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By
Herbert N. Flippo, Jr.
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