DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
THE MISSISSIPPI BOARD OF WATER COMMISSIONERS
AND
THE CITY OF JACKSON, MISSISSIPPI

HYDROLOGIC INVESTIGATIONS
ATLAS HA-127

Photograph by Perry Nations, Jackson Clarion Ledger

AERIAL VIEW OF FLOODED AREA ALONG GALLATIN STREET, JACKSON, MISS., DECEMBER 21, 1961

Photograph by Perry Nations, Jackson Clarion Ledger

FLOODED AREA ALONG SOUTH STATE STREET, JACKSON, MISS., DECEMBER 21, 1961

Uncontrolled photomosaic base by U.S. Geological Survey from aerial photographs taken March 1960 and December 1961

PEARL RIVER FLOODS

Flood heights reached at the Geological Survey gaging station on Pearl River at Jackson, Miss., located at the Woodrow Wilson Bridge. Overflow limits for only the 1961 flood are shown on the map.

Date of flood	Elevation above mean sea level (feet)	Gage height (feet)	Discharge (cubic feet per second)
Apr. 1, 1902	272.1	37.2	80,800
Dec. 21, 1961	272.14	37.24	66,100
Dec. 5, 1886	271.	36.	—
Apr. 18-20, 1900	270.9	36.0	—
Dec. 19, 1932	270.1	35.2	60,000
May 30, 1909	270.2	35.3	58,300
Mar. 12, 1935	270.08	35.18	56, 00

FLOOD ON PEARL RIVER AT JACKSON, MISSISSIPPI

The approximate area inundated by Pearl River at Jackson, Miss., and the adjacent communities of Flowood and Pearl during the flood of Dec. 21, 1961, is shown on a photomosaic base to record the flood hazard graphically. Greater floods are possible, but no attempt has been made to show their probable overflow limits. The 1961 flood on Pearl River is the highest known although it was exceeded in discharge by the flood of 1902. Cultural changes since 1902, such as highways and industrial encroachment on the flood plain, have changed the relation of stage to discharge. Future changes may further influence this relation as well as the inundation pattern of future floods. Flood data were obtained during and immediately after the crest. The discharge was measured at U.S. Highway 80. Many floodmarks were identified in an 18-mile reach of the river near Jackson, and their elevations determined by leveling to benchmarks. Flood limits were identified on aerial photographs taken at or near the crest and were also obtained by field inspection.

Cooperation and acknowledgment — The preparation of this flood map is part of an investigative program financed through cooperative agreements between the U.S. Geological Survey and the Mississippi Board of Water Commissioners, and the city of Jackson. The report was prepared by James D. Shell of the U.S. Geological Survey.

The flood outline was determined principally from aerial photographs furnished by the Mississippi Air National Guard.

Data pertaining to flood-crest elevations along U.S. Highways 80 and 49 were furnished by the Mississippi Highway Department.

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 are in feet above mean sea level, datum of 1929, supplementary adjustment of 1941. The gage-heights or stages at the gaging station at Jackson, located at Woodrow Wilson Bridge at the eastern edge of the city, may be converted to elevations above mean sea level by adding 234.90 feet.

The gage-heights and dates of annual floods (highest peak discharge in each calendar year) exceeding the 32.7-foot stage at the gaging station are shown in figure 1. The 32.7-foot stage was exceeded 14 times in the period 1900-62, an average of more than 2 times per decade. The erratic occurrence of floods is evident (fig. 3). None occurred during the decade 1910-20 and five occurred during the period 1944-51. Although not shown, two floods each year exceeded the 32.7-foot stage in 1949, 1950, and 1962.

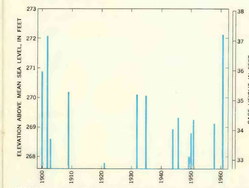

FIGURE 1.—*Annual floods above 32.7-foot gage height, 1900-62, Pearl River at Jackson (Woodrow Wilson Bridge)*

Flood frequency — Frequency of floods at Woodrow Wilson Bridge and Jackson Water Works, 6.9 river miles (approximately 2.8 valley miles) upstream have been derived from the continuous record of annual floods since 1900 at the Woodrow Wilson Bridge gaging station. The relation of flood height to discharge is affected by changes in channel conditions, and the stage-frequency curves shown are based on the current stage-discharge relation. Future channel conditions may define somewhat different stage-frequency curves.

Extrapolation of the frequency curves beyond the limits shown may result in large errors and is not recommended.

Recurrence intervals — As applied to flood events, the recurrence interval is the average interval of time within which a given flood will be equaled or exceeded once. It is inversely related to the chance of a flood of a specific height being equaled or exceeded in any one year. Thus, a 20-year flood would have 1 chance in 20 of being equaled or exceeded in any one year or a 50-year flood would have 1 chance in 50 of being equaled or exceeded in any given year.

The general relation of recurrence interval to flood height and discharge at the gages at Woodrow Wilson Bridge and at Jackson Water Works (fig. 2) is shown in the following table.

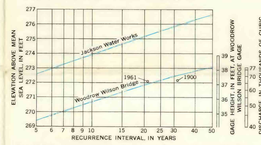

FIGURE 2.—*Frequency of floods on Pearl River at Jackson (Woodrow Wilson Bridge and Jackson Water Works)*

Recurrence interval (years)	Elevation above mean sea level (feet)		Discharge (cubic feet per second)
	Woodrow Wilson Bridge	Jackson Water Works	
50	273.1	276.6	77,000
40	272.8	276.3	74,000
30	272.4	275.8	69,000
20	271.8	275.2	63,000
10	270.7	273.9	52,000
5	269.4	272.6	42,800

It is emphasized that recurrence intervals are average figures—the average number of years that will elapse between occurrences of floods of a certain height in a long period of time. Thus, a flood that reaches an elevation of 271.8 feet at the Woodrow Wilson Bridge gage is said to have a 20-year recurrence interval. However, because of the erratic nature of flood occurrence, the 271.8-foot elevation may not be reached in any specific 20-year period, or it may be reached more than once.

Flood profiles — Profiles of the water surface constructed from marks left by the flood of December 21, 1961, are shown in figure 3. Because of the difference in water-surface elevations, profiles along both banks are shown. The course of the river channel is extremely sinuous and actual river miles are therefore not used as a base for plotting the flood profiles. A straight baseline, conforming to the general direction of the valley floodflow is used. The initial point is arbitrarily set at its intersection with Pearl River at Byram Bridge approximately 7 miles downstream from Jackson, and at mile 261.9 (designated by the Corps of Engineers) upstream from the mouth of Pearl River. The baseline extends 18.6 miles up the valley and intersects the Pearl River Reservoir Dam at mile 296.8. Distances in miles used for the profiles in figure 3 correspond to those marked along the baseline on the flood map. The south edge of the flood map is at mile 6.2.

Abrupt changes in the profile shown at some highways and railroads indicate differences in water-surface elevations at the upstream and downstream sides of the embankments. Water-surface profiles along the Gulf, Mobile, and Ohio Railroad, U.S. Highway 80, and U.S. Highway 49 South are also shown. None of these crossings were overtopped.

Profiles along the Gulf, Mobile, and Ohio Railroad, which crosses the Pearl River near the Jackson Water Works (mile 11.82 along Pearl River base line) in north Jackson, are shown in figure 4. Because the railroad is not perpendicular to the direction of flow but extends diagonally across the valley, water-surface elevations shown on the east side of the valley (fig. 4) are farther upstream and are therefore higher. The Flowood area, downstream from the railroad, was protected by levees and was not flooded. The downstream area between the railroad spur fill and the west Flowood levee was inundated to some extent by a break in the west Flowood levee downstream from the railroad.

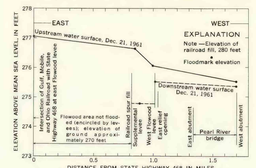

FIGURE 4.—*Flood profiles across valley along Gulf, Mobile, and Ohio Railroad (mile 11.82 on Pearl River baseline)*

Transverse profiles of the water surface across the Pearl River and the flood plain along U.S. Highway 80, which crosses Pearl River near the southern boundary of Jackson, are shown in figure 5. Because the highway is not perpendicular to the direction of flow but curves slightly up the valley to the east, water surface elevations on the east side of the valley are farther upstream and are therefore higher (fig. 5). Abrupt changes in water surface elevation on both upstream and downstream profiles were caused by levees or road embankments extending off the highway fill. The abrupt change in the upstream profile in the vicinity of the relief opening located about 11,000 feet from the east edge of the flood area was caused by water spilling over a levee. Farther to the east, a fall over the fill of Highway 468 South is readily apparent. Shown also in figure 5 are the natural surface of the ground and the locations of all bridges and culverts along U.S. Highway 80.

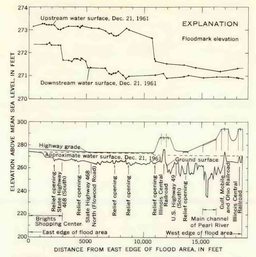

FIGURE 5.—*Cross section of Pearl River and flood plain along U.S. Highway 80 (mile 8.56 on Pearl River baseline)*

U.S. Highway 49 South, which leaves U.S. Highway 80 at mile 8.3 along the Pearl River baseline and extends south along the east flood plain, was not inundated. Flood profiles for a 2-mile distance along both sides of the highway embankment are shown in figure 6. During the crest, water flowed west through the Conway Slough bridge, east through the Richland Creek relief bridge, and west through the Richland Creek bridge. Floodwaters were ponded in a large area along the east side of U.S. Highway 49 south of Richland Creek bridge. The upper 1,000 feet of this pond is apparent in figure 6.

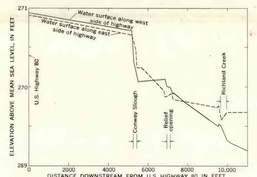

FIGURE 6.—*Profiles of flood of Dec. 21, 1961 along U.S. Highway 49 from U.S. Highway 80 to Richland Creek*

Regulation — Flowood, a levee-encircled industrial and commercial area, is located on the east side of the flood plain north of U.S. Highway 80. To reduce the danger of the floodwaters overtopping the Flowood levees, two gates of the partly completed dam on Pearl River, 5 miles upstream, were closed December 20. It is estimated that the crest at the gaging station at Woodrow Wilson Bridge was reduced approximately 0.2 foot as a result of this action. Reduction in peak discharge of approximately 2,000 cfs, or about 3 percent, is estimated.

Additional data — Other information on floods at Jackson, Miss., may be obtained at the office of the U.S. Geological Survey, Jackson, Miss., and from the following published reports:

Shell, J. D., 1962, Floods of December 1961 in Mississippi and adjoining States: U.S. Geol. Survey Circ. 465, 17 p.

Wilson, K. V., and Trotter, I. L., Jr., 1961, Floods in Mississippi, magnitude and frequency: Mississippi State Highway Dept., 326 p.

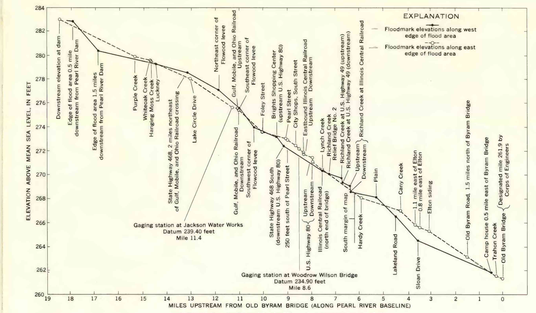

FIGURE 3.—*Profiles of flood of December 21, 1961 on Pearl River*

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FLOOD ON PEARL RIVER AT JACKSON, MISSISSIPPI IN 1961

By
James D. Shell

1964

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For sale by U.S. Geological Survey, price 50 cents