

Introduction.—The approximate areas flooded by Hurricane Camille tides of August 18, 1969, along the Mississippi gulf coast are shown in a series of hydrologic atlases. The area covered by the entire series of atlases extends from Bayou La Batre, Ala., westward along the gulf coast through Mississippi to the mouth of West Pearl River, a distance of 90 miles.

The Pascagoula quadrangle covers the lower 10 miles of the Pascagoula estuary and shoreline of the Mississippi Sound from Bayou Casotte to Belle Fontaine Point.

Camille was the most intense hurricane on record to enter the United States mainland. According to the U.S. Weather Bureau maximum winds were estimated to be at least 190 mph (miles per hour) and central pressure observed was 26.61 inches of mercury, lowest ever recorded on the gulf coast. The eye of the storm, 5 miles in diameter, traveling almost due north, passed over the Waveland-Bay St. Louis area and hurricane force winds of more than 75 mph extended approximately 50 miles on either side. The maximum precipitation near the coast during the passage of the hurricane was 10 inches recorded at the Mississippi Test Facility, approximately 18 miles northwest of Bay St. Louis.

Flooding was the most severe in the Pass Christian-Long Beach area where tides reached elevations about 25 feet above mean sea level. In the St. Louis Bay, maximum elevations were about 18 feet and in the Back Bay of Biloxi, about 15 feet.

American Red Cross casualty figures listed 139 known dead and 76 missing in Mississippi. Known dead in Louisiana totaled five. Total number of persons injured was estimated to be 8,931. The total damage caused by Hurricane Camille, as reported by the Office of Emergency Planning, was \$1.3 billion; damage by Hurricane Betsy (1965) was \$400 million.

Past tide records and some Camille tide elevations were obtained by the U.S. Army Corps of Engineers, Mobile district. Most of the Camille flood data were obtained by the U.S. Geological Survey from August 19 to September 17, 1969.

Tidal Records.—Reasonably accurate records of storm tides for the Mississippi coast since 1882 have been recorded at Biloxi by the Corps of Engineers and others. A tide gage is located near the center of the Louisville and Nashville Railroad bridge across the Back Bay of Biloxi. Elevations of the annual maximum tides at this gage are shown on figure 1.

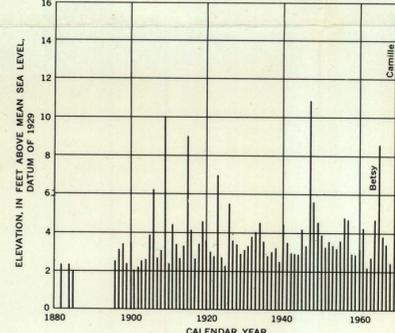


FIGURE 1.—Annual maximum tide at Biloxi, Mississippi, 1882, 1884-85, 1896-1969

Tide gages with much shorter records are operated by the Corps of Engineers at Mobile, Dauphin Island, Pascagoula, and Pearlinton. Significant tide elevations at various points along the Mississippi coast for more than 20 hurricanes since 1893 have been recorded by the Corps of Engineers, the U.S. Geological Survey, and others. Data pertaining to some of the highest tides of record are shown in table 1. Additional data for the September 1965 hurricane tide (Betsy) are shown on the map.

TABLE 1.—Hurricane tide elevations at selected locations along the Mississippi gulf coast, 1893-1969, in feet above mean sea level, datum of 1929.

| Date | Bay St. Louis | Pass Christian | Long Beach | Gulfport | Biloxi | Pascagoula |
|----------------|---|----------------|------------|----------|--------|-----------------------|
| Oct. 2, 1893 | 10.8 | — | 10.8 | — | — | — |
| Sept. 27, 1906 | — | — | — | — | — | 6.2 |
| Sept. 20, 1909 | 8 to 12 feet above normal tide along Mississippi gulf coast | | | | | |
| Sept. 29, 1915 | 11.8 | — | 12.8 | — | 9.0 | 9.0 |
| July 5, 1916 | 13.7 | — | — | — | — | 4.3 |
| Sept. 19, 1947 | 15.2 | 13.4 | — | 14.0 | 14.0 | 11.1 ^a 7.7 |
| Sept. 10, 1965 | 12.7 | 12.5 | 10.8 | — | 12.3 | 10.2 8.6 6.4 |
| Aug. 18, 1969 | 21.7 | 16.5 | 24.2 | 21.0 | 20.1 | 15.5 8.5 |

Note: Elevations shown are from Corps of Engineers unless otherwise noted.
^a At old Vicksburg community near Kiln, determined by U.S. Geological Survey.
^b Elevation 14.5 feet at Kiln landing, determined by U.S. Geological Survey.
^c At main building of U.S. Coast Guard base; maximum elevation 10.8 feet recorded at automatic gage one mile northeast.
^d Elevation 9.0 feet from U.S. Weather Bureau.
^e Elevation 10.8 feet at seaward end of State dock.
^f Determined by U.S. Geological Survey.
^g Elevation 15.5 feet at seaward end of State dock.

Storm-tide frequency.—Frequency of high storm tides along the Mississippi gulf coast can be derived from a statistical evaluation of the tidal records from the Biloxi gage. The frequency, expressed as the relation of recurrence interval to elevation of high tide at the Biloxi gage, is shown in figure 2. Recurrence interval is inversely related to percent probability of an event being equaled or exceeded in any 1 year. The percent probability of high tide elevations at the Biloxi gage is also indicated. At the Biloxi gage, Hurricane Camille tides are estimated to have a recurrence interval of about 170 years; that is, it may be equaled or exceeded on the average of about 6 times in a thousand years. Hurricane Betsy (1965) tides are estimated to have a recurrence interval of 30 years.

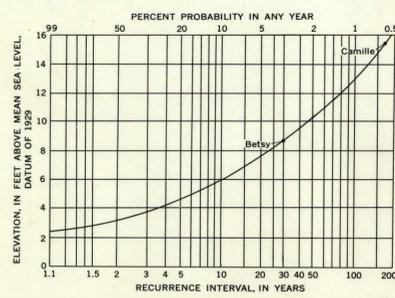


FIGURE 2.—Frequency of high tides at Biloxi gage (near center of L. & N. R.R. bridge across Back Bay)

Because of the dissipation of the elevations of tidal waves as they move into the bays and estuaries, the frequency data for the Biloxi gage is applicable only for the gage site. It can be assumed that the frequency of a particular high tide at nearby points along the Mississippi Sound beach areas is approximately the same as the frequency for that tide determined at the Biloxi gage.

Variations in maximum tide elevations.—Water-surface elevations for the maximum tides of Camille (and Betsy) varied from point to point, especially along the beach front. Maximum water-surface elevations shown are generally averages of several floodmarks. Maximum water-surface elevations offshore were determined to be between 15 and 16 feet from floodmarks on Ship and Cat Islands and at the end of the Gulfport pier. The higher flood levels onshore were the result of runoff.

Extent of flooding.—U.S. Geological Survey topographic maps were used on which to delineate the approximate flood boundaries for Camille. Surveys of the water's edge along the streets and roads were used to refine the boundaries.

Flood boundaries for Betsy were delineated using topographic maps and the Mobile Corps of Engineers' report "Hurricane Betsy" as a guide.

Depth of flooding.—At any point, the depth of flooding can be estimated by subtracting the ground-surface elevation from the water-surface elevation determined by interpolating between maximum tide elevations shown on the map. Approximate ground elevations can be estimated from contours on the map, although more accurate elevations can be obtained by leveling to bench marks.

Additional information.—Some of the major wells from which emergency water supplies may be available are located on these maps.

Additional information pertaining to floods along the Mississippi gulf coast may be obtained at the district office of the U.S. Geological Survey, Jackson, Miss. Descriptions of tidal characteristics, tidal records, and tidal datums may be obtained from the following published reports: Harris, D. L., and Lindsay, C. V., 1957, An index of tide gages and tide gage records for the Atlantic and Gulf Coasts of the United States; U.S. Dept. Commerce, Weather Bur. Natl. Hurricane Research Proj., rept. 7, U.S. Department of the Army, Corps of Engineers, Mobile District, 1965, Report on hurricane survey of Mississippi Coast; 49 p. U.S. Department of the Army, Corps of Engineers, Mobile District, 1967, Hurricane Betsy, 8-11 September 1965; 65 p.

HURRICANE CAMILLE TIDAL FLOODS OF AUGUST 1969 ALONG THE GULF COAST, PASCAGOULA QUADRANGLE, MISSISSIPPI

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