

By
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1980

<i>Multiply inch-pound units</i>	<i>By</i>	<i>To obtain S.I. units</i>
inch (in)	2.54	centimeter (cm)
	25.4	millimeter (mm)
foot (ft)	.3048	meter (m)
	.0003048	kilometer (km)
mile (mi)	1.609	kilometer (km)
knot (kt)	.5148	meter per second (m/s)
mile per hour (mi/h)	1.609	kilometer per hour (km/h)
millibar (mb)	.1	kilopascal (kPa)

Tidal records.—Records of storm tides along the Gulf Coast have been documented since 1772 at Mobile, Ala., by the Corps of Engineers and others, and continuous tide records have been compiled by the Corps of Engineers since 1940. A tide gage is located at the Alabama State Docks, Mobile, Ala. Elevations of the annual maximum tides at this gage are shown in figure 3. Significant tide elevations at various points along the Gulf Coast for more than 20 hurricanes since 1893 have been recorded by the Corps of Engineers, the Geological Survey, and others. Data pertaining to some of the highest tides of record are shown in table 1. Additional data for Hurricane Camille (1969) tides are shown on some of the maps.

TABLE 1—Hurricane tide elevations at selected locations along the Gulf of Mexico coast, 1772–1979; in feet above National Geodetic Vertical Datum of 1929

Date	Pensacola Beach, Fla.				
	Bayou La Batre, Ala.	Dauphin Island, Ala.	Mobile, Ala.	Gulf Shores, Ala.	
September 4, 1772				8.2	
August 23, 1852				8.0	
October 2, 1893				8.4	4.9
September 27, 1906		10.8		9.1	11.8
July 5, 1916			10.8	8.0	10.8
August 18, 1969	11.2	8.5	8.3	5.7	7.3
September 13, 1979	5.9	9.9	9.0	7.4	8.0

Note: Records furnished by U.S. Army Corps of Engineers, Mobile District.

Storm-tide frequency.—Frequency of high storm tides in Mobile Bay was derived from a statistical evaluation of the tidal records of the gage at Mobile, Ala. The frequency, expressed as the relation of recurrence interval to elevation of high tide at the Mobile gage, is shown in figure 4. The recurrence interval is inversely related to the percent probability of an event being equalled or exceeded in any one year. The percent probability of high-tide elevations at the Mobile gage is also indicated. At the Mobile gage, Hurricane Frederic's storm-tide elevation of about 10 feet above mean low water occurred about 30 years; that is, it may be equalled or exceeded on the average of about 40 times in a thousand-year period. The maximum tide at Biloxi, Miss., during Hurricane Camille (1969) was estimated to have a recurrence interval of about 170 years.

Because tidal waves dissipate as they move into the bays and estuaries, the frequency data at the Mobile gage are applicable only at the gage site and at nearby points.

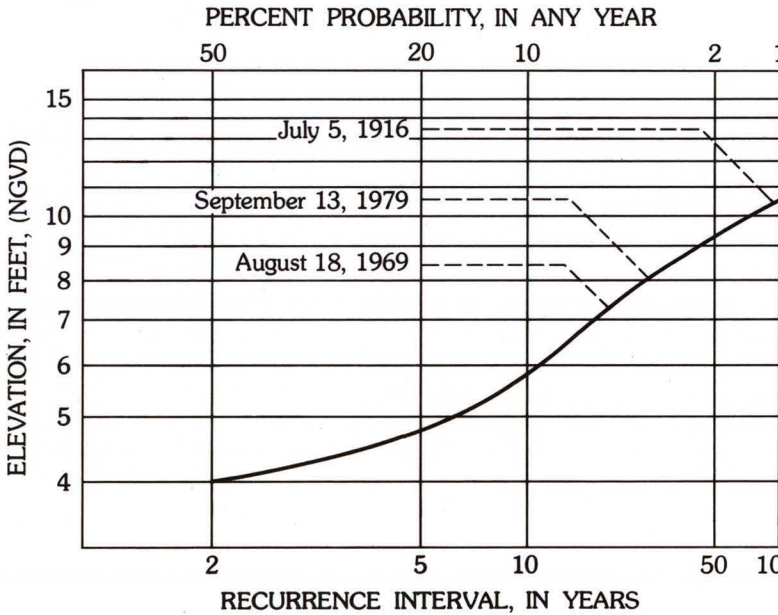


FIGURE 4—Frequency of high tides at Mobile gage
(Mobile River at Alabama State Docks)

Variations in maximum tide elevations.—Water-surface elevations of maximum tides of Hurricane Frederic varied from place to place, especially along beach fronts. High-water marks for Hurricane Frederic are identified on atlases as "inside" or "outside." Marks found within a building or structure are labeled "inside," those located outside of any enclosure are identified as "outside." Where two or more outside marks are shown at one location, the lower marks are considered to be the prevailing high tide; the higher marks are the maximum wave height or runup. The maximum documented wave height above the prevailing tide for Hurricane Frederic is about 7 feet. Where the elevation of several high-water marks at a location varied slightly, the average elevation of the marks is shown.

Extent of flooding.—Approximate flood boundaries of Hurricane Frederic are delineated on U.S. Geological Survey topographic maps. Driftlines along streets, roads, dunes, and other landmarks were used to define the boundaries.

Depth of flooding.—The depth of flooding at any point 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. The elevations of contour lines on some maps are in meters. Elevations of high-water marks shown on these maps are given both in meters and in feet.

Emergency water supplies.—Some water wells identified by the Alabama Health Department, Division of Public Water Supplies, as either approved or potential emergency water supplies, are shown on the map.

Additional information.—Other information pertaining to floods along the Gulf Coast may be obtained at the district offices of the U.S. Geological Survey, Tuscaloosa, Alabama, Tallahassee, Florida, and Jackson, Mississippi. Descriptions of tidal characteristics, tidal records and tidal data 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. Department of Commerce, Weather Bureau National Hurricane Research Project, report 7.

Wilson, K. V., and Hudson, J. W.	1969, Hurricane Camille tidal flood
August 6, 1969, along the Gulf Coast.	U.S. Geological Survey
Hydrologic Investigations Atlas (name of quadrangle), Mississippi	
HA-395 Logtown.	HA-402 Pass Christian.
HA-396 English Lookout.	HA-403 Gulfport North-South.
LA-Miss.	
HA-397 Kln.	HA-404 Biloxi.
HA-398 Waveland-Grand	HA-405 Ocean Springs-Deer
Island Pass.	Island
HA-399 Vidalia.	HA-406 Pascagoula.
	(Scale 1:62,500.)
HA-400 Bay St. Louis.	HA-407 Kreole-Grand Bay
	SW, Miss.-Ala.

HA-401 Gulfport NW.
U.S. Department of the Army, Corps of Engineers, Mobile District
1965, Report on Hurricane survey of Mississippi Coast. 49 p.
1965, Report on Hurricane survey of Northwest Florida, 49 p.
1966, Report on Hurricane survey of the Alabama Gulf
Coast, 40 p.
1967, Hurricane Betsy, 8-11 September 1965: 65 p.
1970, Hurricane Camille, 14-22 August 1969, 80 p.
1976, Hurricane Eloise, 16-23 September 1975, 89 p.

For sale by Branch of Distribution, U.S. Geological Survey,
1200 South Eads Street, Arlington, VA 22202

Introduction.—The approximate areas flooded by Hurricane Frederic tides of September 12–13, 1979, along coastal areas of Alabama, Florida, and Mississippi are shown in a series of hydrologic atlases. The atlases (fig. 1) are listed below. The area covered by the atlases extends from about 8 miles west of Fort Walton Beach, Fla., westward along the Gulf Coast through Alabama to Moss Point, Miss., a distance of about 115 miles.

The West Pensacola quadrangle shows the elevations of flood marks along the eastern shore of Perdido Bay. Still water elevations ranged from about 5 feet above National Geodetic Vertical Datum in sheltered areas to about 7.5 feet in areas subject to wind setup. Elevations shown are referred to National Geodetic Vertical Datum of 1929 (NGVD).

HYDROLOGIC INVESTIGATIONS ATLAS NUMBER

MISSISSIPPI		ALABAMA (Cont.)	
Kreele-Grand Bay SW	HA-621	Weeks Bay NE	HA-632
ALABAMA		Weeks Bay SE	633
Grand Bay	HA-622	St. Andrews Bay NE, St. Andrews Bay NW,	
Chickasaw	623	and Fort Morgan	634
Mobile	624	Foley SW	635
Hollingers Island-Theodore	625	Foley SE	636
Coden-Bellefontaine	626	Lillian	637
Heron Bay, Little Dauphin Island, Fort Morgan,		FLORIDA	
and Fort Morgan NW	627	Perdido Bay	HA-638
Bay Minette NW, Bay Minette NE, and Creola NE	628	West Pensacola	639
Hutchins	629	Gulf Breeze-Fort Barrancas	640
Bridghead	630	Orlando Beach, Garcon Point, Holley, South of	
Daphne-Point Clear	631	Holley, and Navarre	641

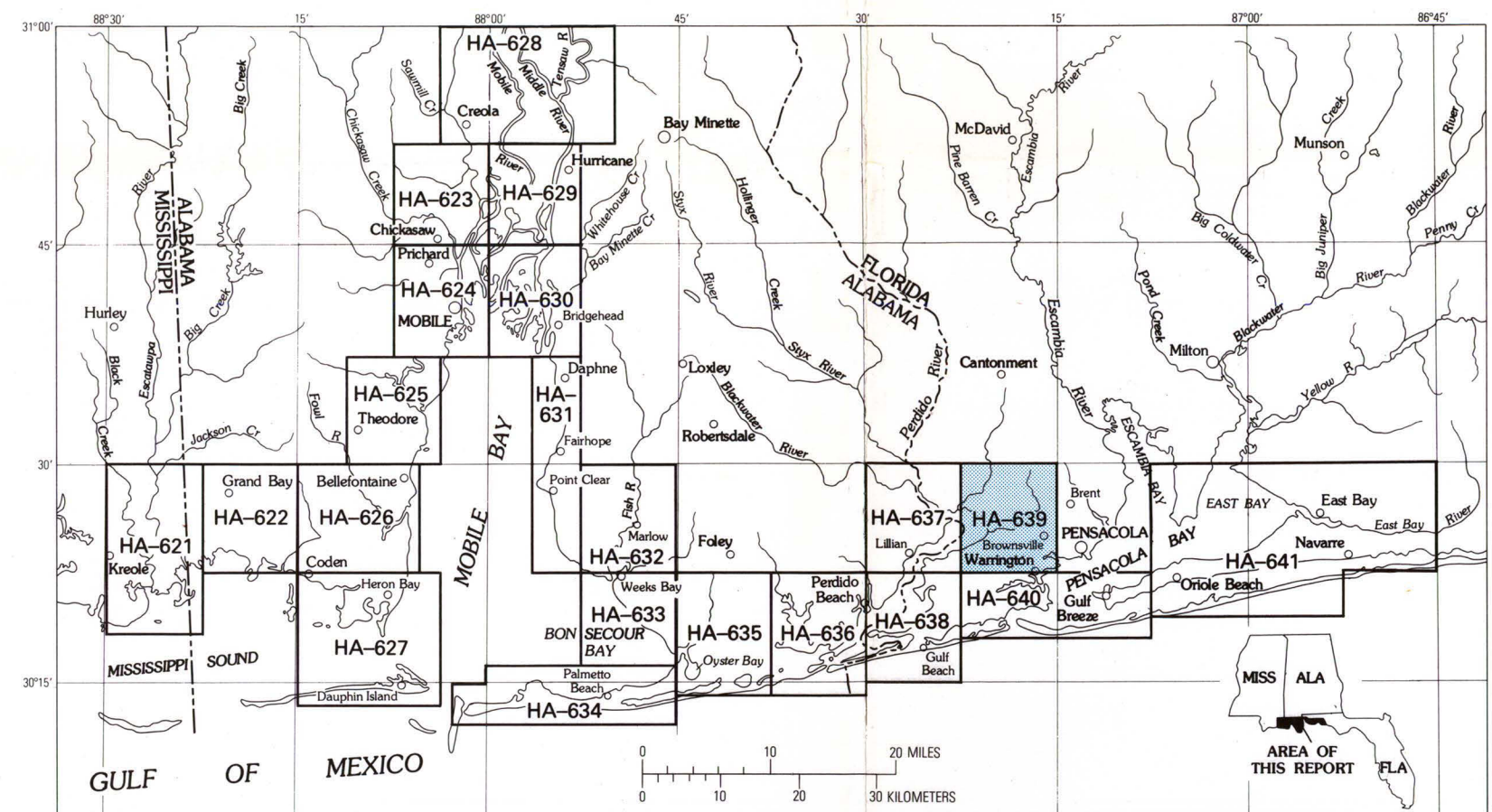


FIGURE 1—Index map of the Mississippi, Alabama, and Florida gulf coast showing location of quadrangles for which flood boundaries of Hurricane Frederic are delineated

Hurricane Fredric was one of the most intense hurricanes recorded to enter the United States mainland. A National Weather Service (NWS), National Oceanic and Atmospheric Administration (NOAA) research aircraft reported a flight-level wind of 138 knots (about 160 miles per hour) a short time prior to landfall. A wind velocity gauge on the aircraft reported a maximum wind speed of 126 knots (154 miles per hour) and a maximum wind speed time to time of 126 knots (145 miles per hour). Lowest central pressure recorded, 943 millibars (about 27.8 inches of mercury), was that reported aboard an Air Force Reconnaissance aircraft; unofficial central pressure reported at Grand Bay, Ala., was 931 millibars (about 27.5 inches of mercury). The maximum recorded precipitation along the coast during the passage of the hurricane was 1.5 inches (38 mm) at Grand Bay, Ala. The storm track and other data furnished by NWS is shown below. (See Fig. 2.)

American Red Cross casualty figures list 10 known deaths in Alabama, 1 in Florida, and 2 in Mississippi. The total number of storm-related injuries and illnesses for the three States is 4,711. Estimates indicate that the total damage caused the Hurricane Frederic probably will exceed \$2 billion. In comparison, the total damage for Hurricane Camille (1969) was \$1.3 billion.

Past tide records were furnished by the U.S. Army Corps of Engineers, Mobile District, and the Mississippi District of the U.S. Geological Survey. Floodmark elevations and other data for Hurricane Frederic were compiled jointly by the Alabama, Florida, and Mississippi Districts of the Geological Survey and the Corps of Engineers.

Acknowledgments.—We greatly appreciate the cooperation of the National Weather Service, National Oceanic and Atmospheric Administration; the U.S. Army Corps of Engineers; the U.S. Air Force; the U.S. Coast Guard; the Alabama Health Department, Division of Public Water Supplies; The American Red Cross; and others who furnished information.

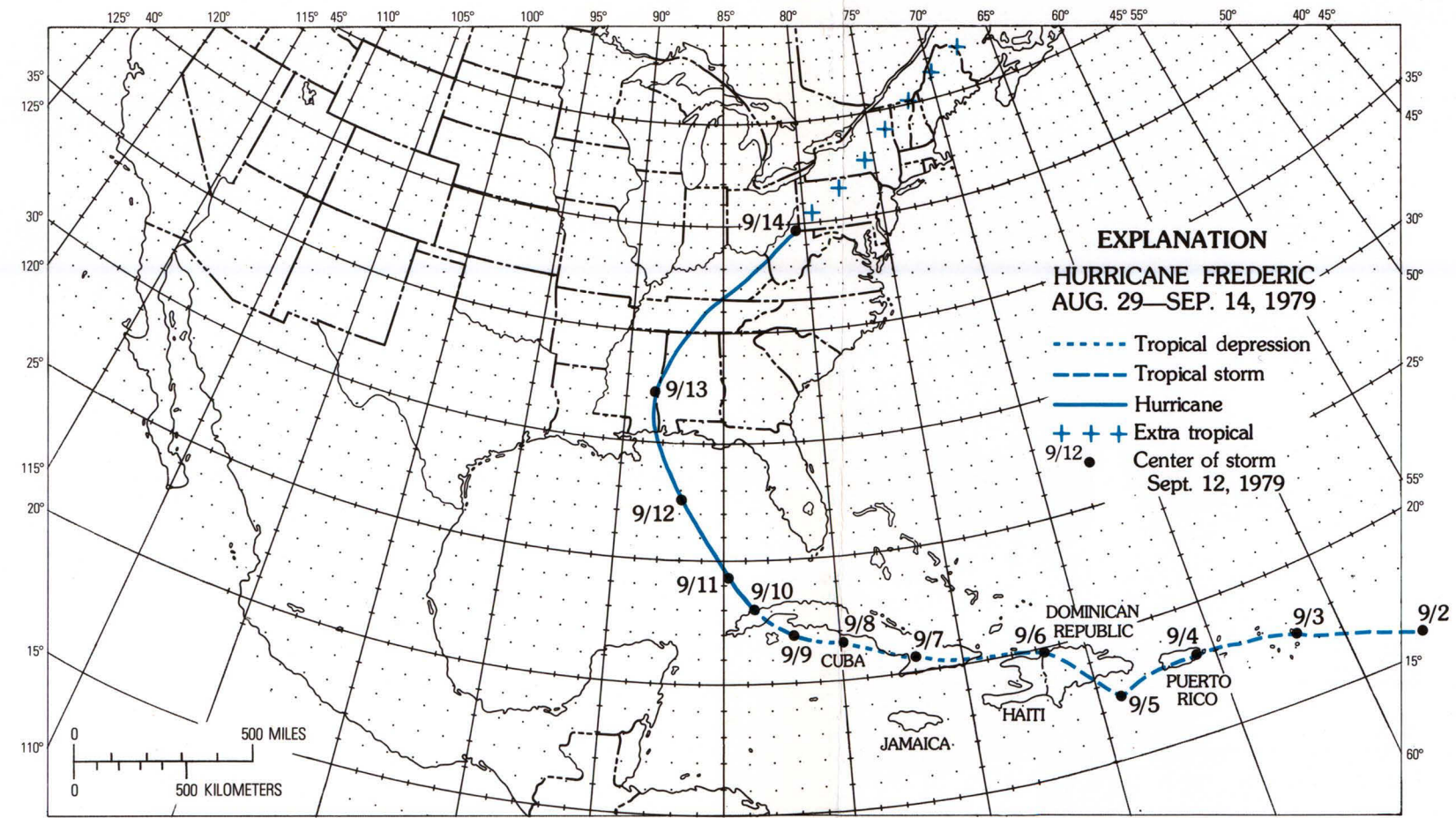


FIGURE 2—The track of Hurricane Frederic, September 2–14, 1979 (from track of Hurricane Frederic, August 29 to September 14, 1979, furnished by National Weather Service)

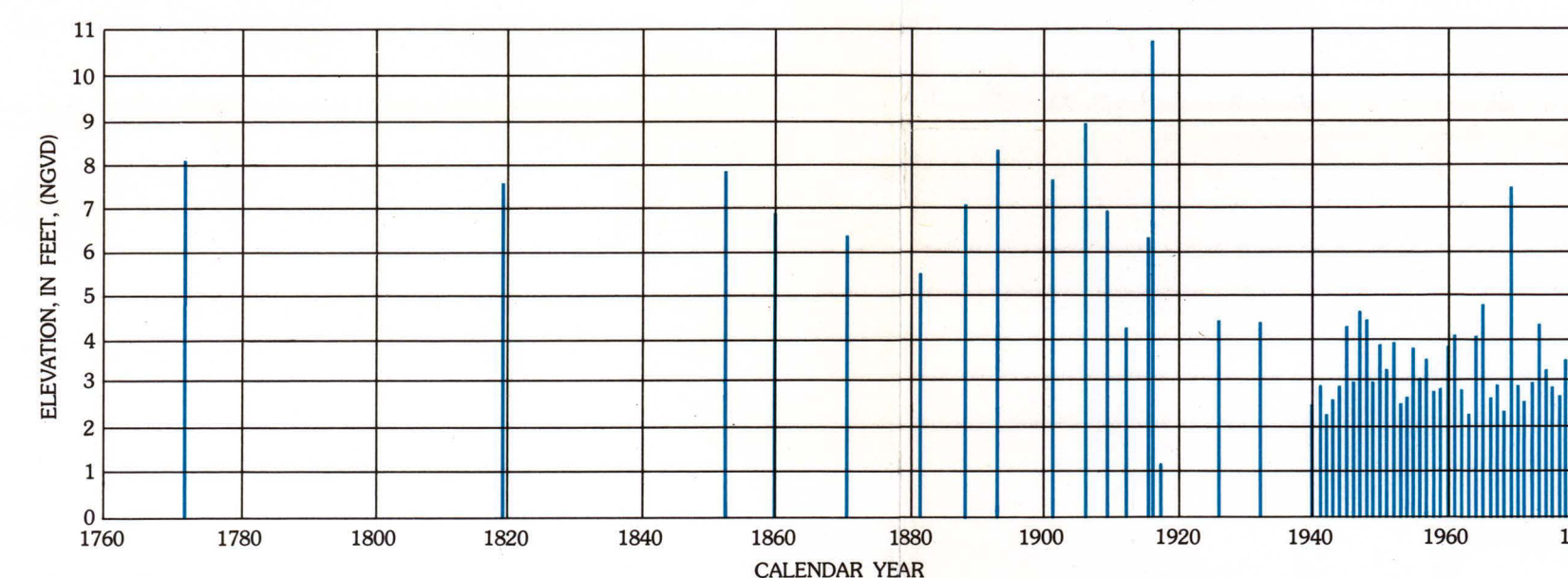


FIGURE 3—Known annual maximum tides at Mobile, Alabama, 1772–1979
(Gage at Alabama State Docks)