

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 Daphne-Point Clear map shows the areas flooded along the

eastern shore of Mobile Bay generally from Daphne, Ala., southward through Fairhope and Point Clear to Bryant Landing, Ala. Buildings and seawalls were damaged by flooding and tidal waves in the vicinity of Fairhope, Ala. Most fishing piers along the shore were either destroyed or severely damaged. From Fairhope southward, many homes and other buildings, including the Grand Hotel complex at Great Point Clear, Ala., were severely damaged.

Elevations shown are referred to National Geodetic Vertical Datum of 1929 (NGVD).

HYDROLOGIC INVESTIGATIONS ATLAS NUMBER

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

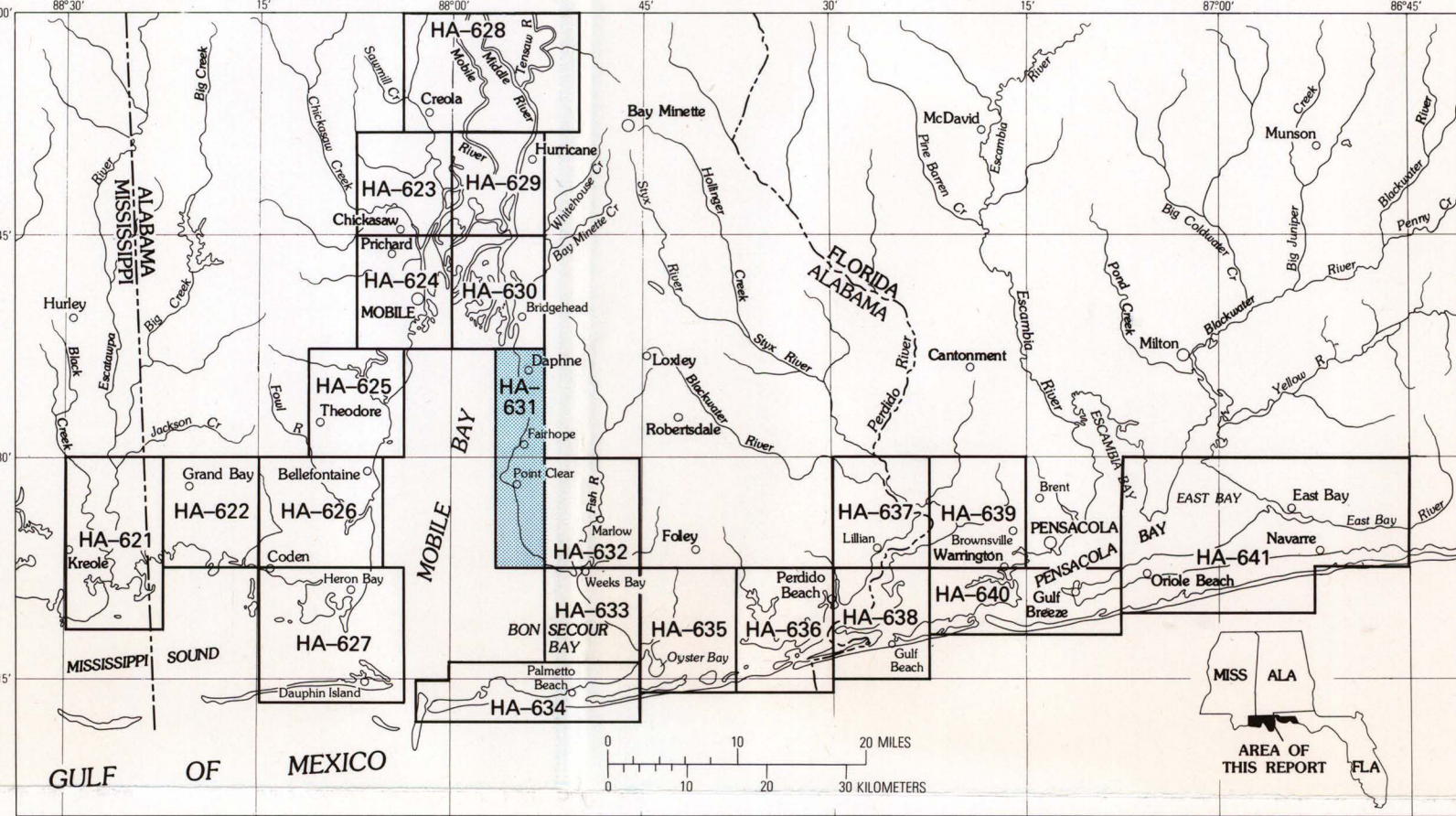


FIGURE 1—Index map of the Mississippi, Alabama, and Florida gulf coast showing location of quadrangles for which flood boundaries of Hurricane Frederic are delineated

Hurricane Frederic was one of the most intense hurricanes of record 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 gage maintained by the NWS near Dauphin Island, Ala., recorded a maximum wind speed of about 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 about 8.5 inches at Dauphin Island, Ala. A map of the storm track furnished by NWS is shown below. (See fig. 2.)

Flooding and water-related damages were most severe at Dauphin Island and Gulf Shores, Ala. However, significant flooding and damage occurred as far east as Pensacola Beach, Fla., and as far west as Moss Point, Miss. Maximum prevailing flood elevations were about 9.7 ft at Dauphin Island, Ala., about 10.3 ft at the U.S. Highway 98 Causeway across Mobile Bay, Ala., and about 14.3 ft at Gulf Shores, Ala.

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.

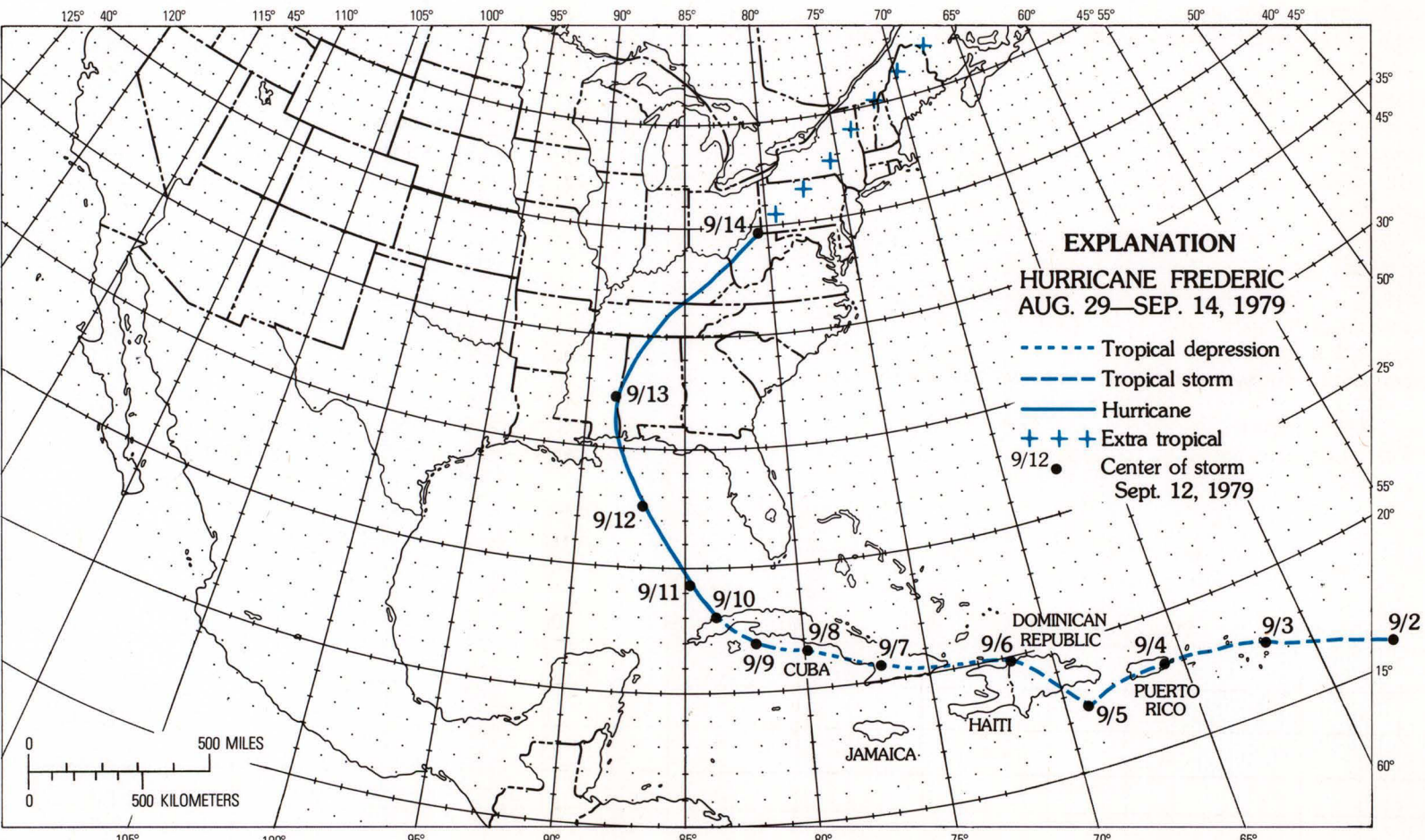


FIGURE 2—The track of Hurricane Frederic, September 2-14, 1979 (from track of Hurricane Frederic, August 29 to September 14, 1979, furnished by National Weather Service)

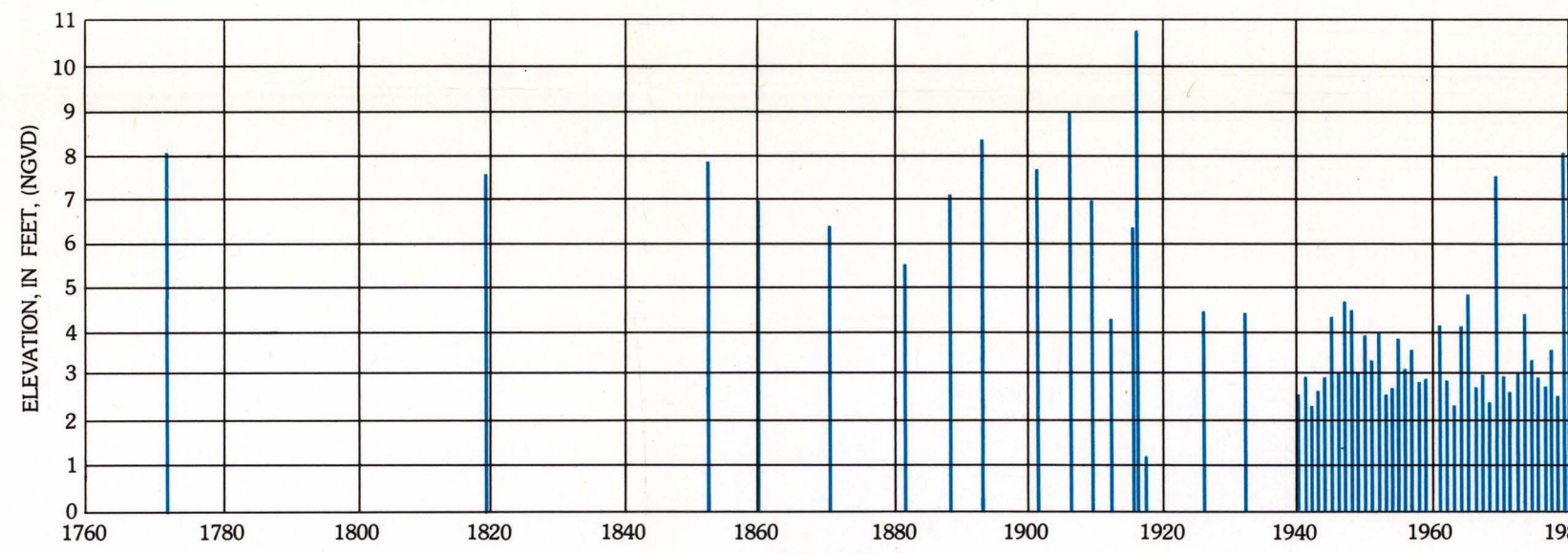


FIGURE 3—Known annual maximum tides at Mobile, Alabama, 1772-1979 (Gage at Alabama State Docks)

International system of units (S.I.).—Most units of measurement used in this atlas are inch-pound units. The following factors may be used to convert inch-pound units to Standard International (S.I.) units:

Multiply inch-pound units	By	To obtain S.I. units
inch (in)	2.54	centimeter (cm)
foot (ft)	30.48	meter (m)
mile (mi)	1.609	kilometer (km)
knot (kt)	1.609	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.

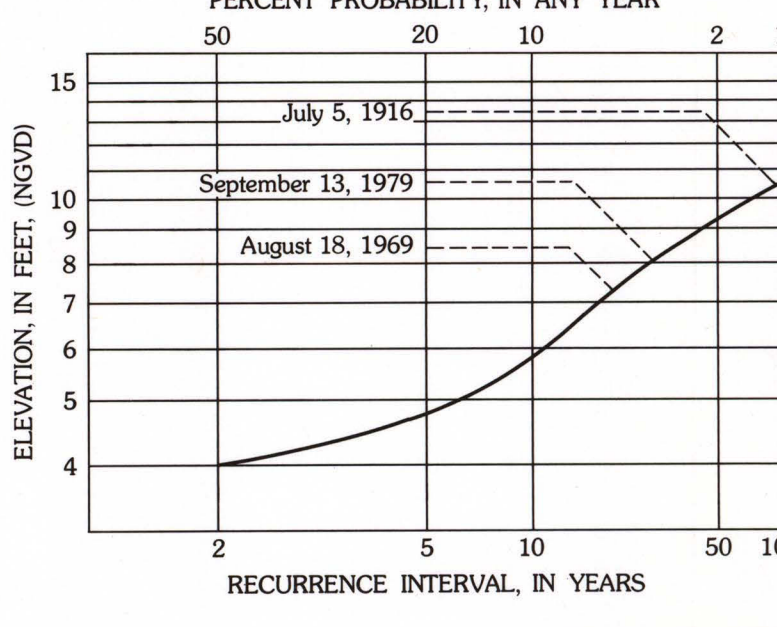
TABLE 1—Hurricane tide elevations at selected locations along the Gulf of Mexico coast, 1772-1979, in feet above National Geodetic Vertical Datum of 1929

Date	Bayou La Batre, Ala.	Dauphin Island, Ala.	Point Clear, Ala.	Weeks Bay, 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	11.3
August 18, 1969	11.2	8.5	8.3	7.3
September 13, 1979	5.9	9.9	9.0	7.4

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 equaled 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 maximum tide was estimated to have a recurrence interval of about 25 to 30 years; that is, it may be equaled 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.



ROAD CLASSIFICATION	Light duty	Unimproved dirt	Interstate Route	U.S. Route	State Route
Heavy-duty	—	—	—	—	—
Medium-duty	—	—	—	—	—

HURRICANE FREDERIC TIDAL FLOODS OF SEPTEMBER 12-13, 1979, ALONG THE GULF COAST, DAPHNE-POINT CLEAR QUADRANGLES, ALABAMA

By
John C. Scott and Larry R. Bohman
1980