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Topography by photogrammetric methods from aerial photographs
taken 1976. Field checked 1980. Map edited 1980.
Selected hydrographic data compiled from NOS charts 11376 (1979)
and 11378 (1979). This information is not intended for
navigation purposes.
Projection and 10,000-foot grid ticks: Alabama coordinate
system, west zone (transverse Mercator)
100-meter Universal Transverse Mercator grid, zone 16
1927 North American Datum
To place on the predicted North American Datum 1983
move the projection lines 16 meters south as shown
by dashed corner ticks.
Five red dashed lines indicate selected fence and field lines where
generally visible on aerial photographs. This information is unchecked.
There may be private inholdings within the boundaries of
the National or State reservations shown on this map.

HURRICANE FREDERIC TIDAL FLOODS OF SEPTEMBER 12-13, 1979, ALONG THE GULF COAST, GULF SHORES QUADRANGLE, ALABAMA

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

The Gulf Shores map shows areas flooded along the shores of the
Gulf of Mexico, Oyster Bay, and Bon Secour River. Most
beachfront homes in the Gulf Shores area and most homes fronting on
Little Lagoon in western Gulf Shores, were either destroyed or heavily
damaged. All beachfront motels, including the apartments at Gulf
State Park, were severely damaged. Damage to homes and other
buildings in the Oyster Bay-Bon Secour area was not as great as that
along the beach. Most of the beach highway (Alabama Highway 182)
was either buried under sand or washed out.

HYDROLOGIC INVESTIGATIONS ATLAS NUMBER

MISSISSIPPI		
Kreole-Grand Bay SW	HA-621	
ALABAMA		
Grand Bay	HA-622	
Chickasaw	623	
Mobile	624	
Hollings Island-Theodore	625	
Coden-Baldwin	626	
Heron Bay, Little Dauphin Island, Fort Morgan, and Fort Morgan NW	627	
The Basin, Bay Minette North, and Creola NE	628	
Hurricane	629	
Bridgehead	630	
Daphne-Point Clear	631	
FLORIDA		
Perdido Bay	HA-632	
West Pensacola	639	
Hurricane Fort Benne	640	
Orlando Beach, Garcon Point, Holly, South of Holly, and Navarre	641	

ALABAMA (Cont.)

Magnolia Springs?	HA-632
Bon Secour Bay?	633
Pine Beach, St. Andrews Bay, and Fort Morgan?	634
Gulf Shores?	635
Orange Beach?	636
Lillian	637

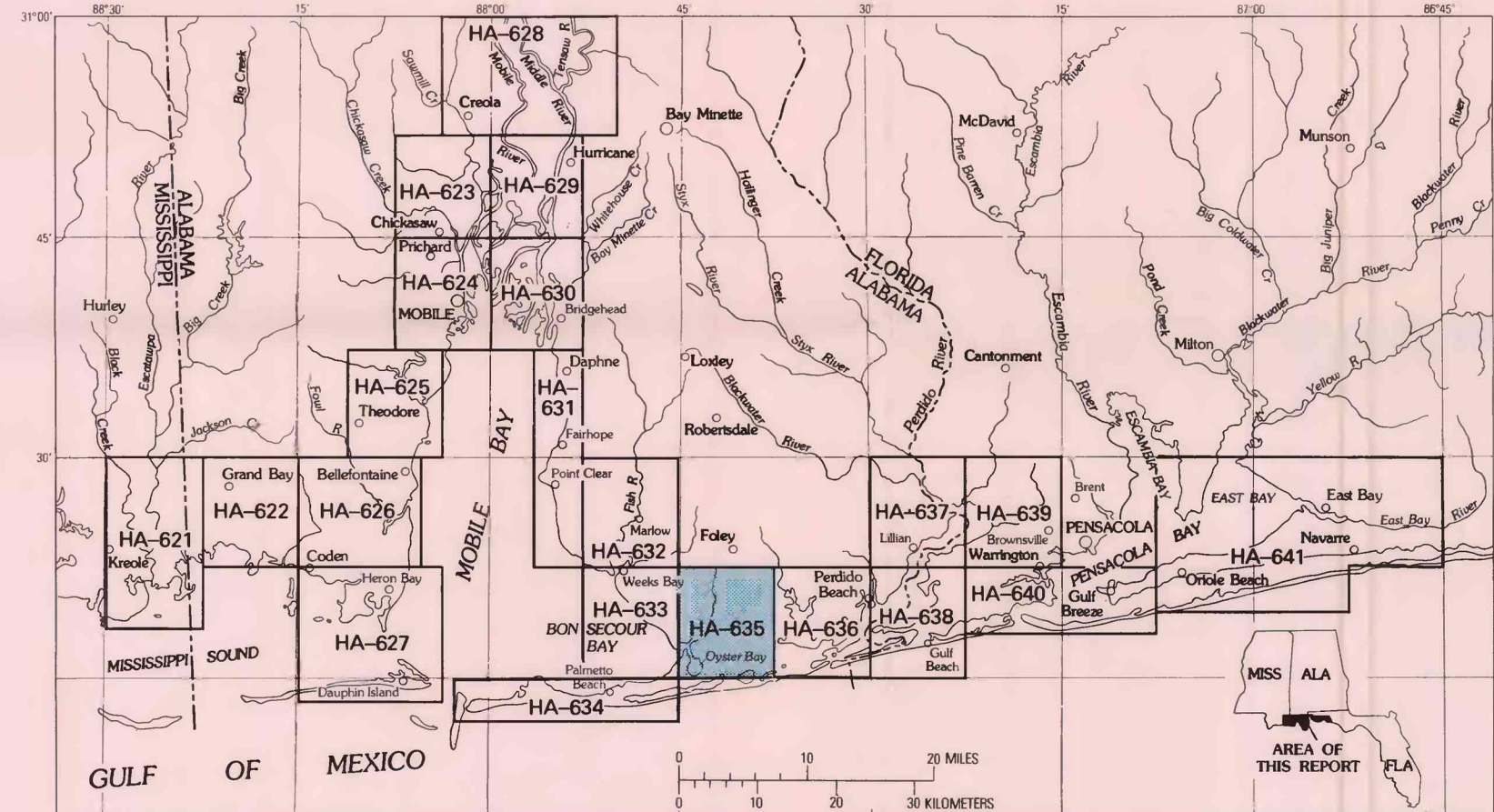


FIGURE 1—Index map of the Mississippi, Alabama, and Florida gulf coast showing location of quadrangles
for which flood boundaries of Hurricane Frederic are delineated

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 light-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.)

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. Esti-
mates 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 Engi-
neers, Mobile District, and the Mississippi District of the U.S. Geo-
logical Survey. Floodmark elevations and other data for Hurricane
Frederic were compiled jointly by the Alabama, Florida, and Missis-
sippi 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 Ad-
ministration; 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.

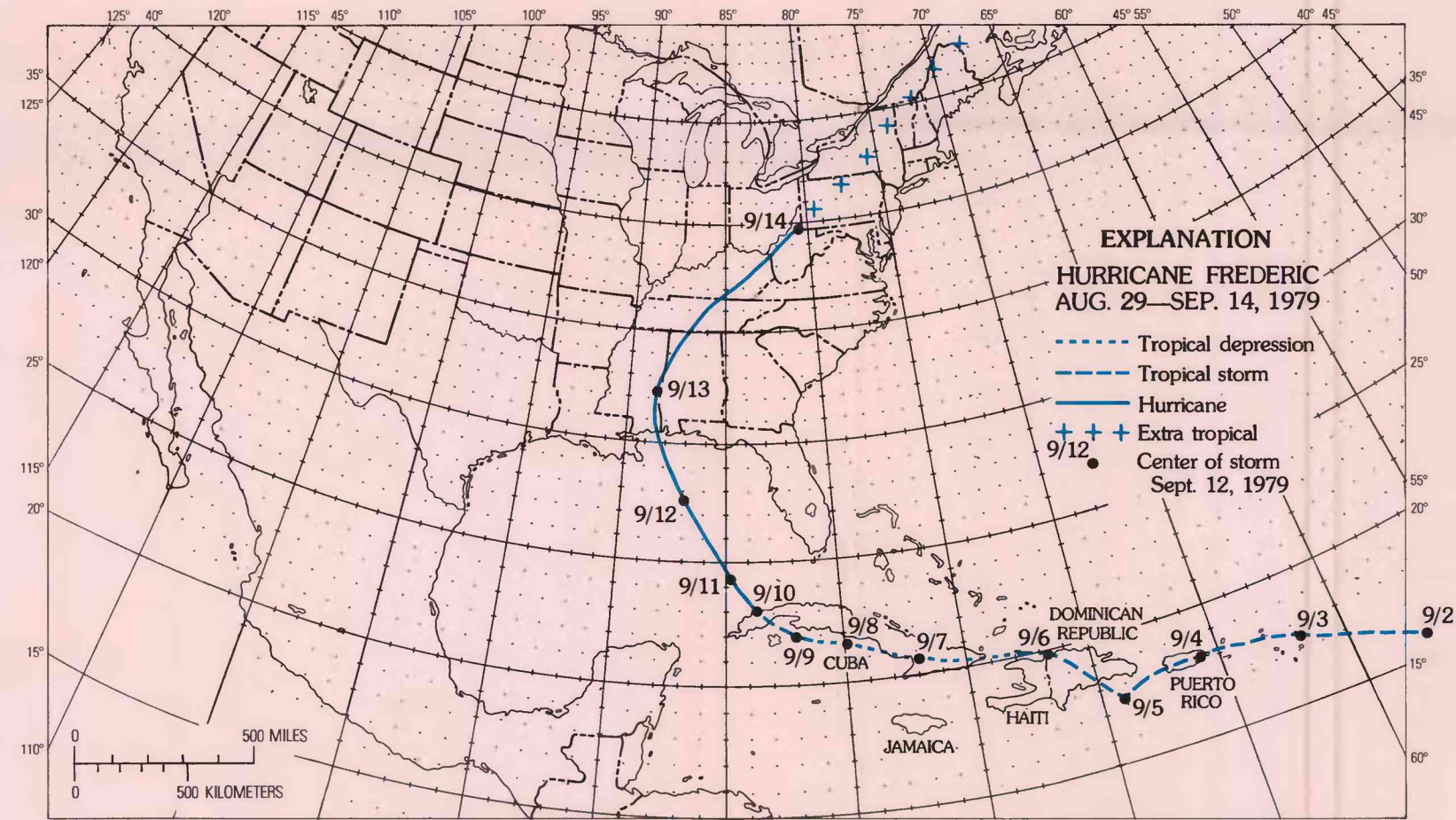


FIGURE 2—The track of Hurricane Frederic, September 2-14, 1979, from track of Hurricane Frederic,
August 29 to September 14, 1979, furnished by National Weather Service

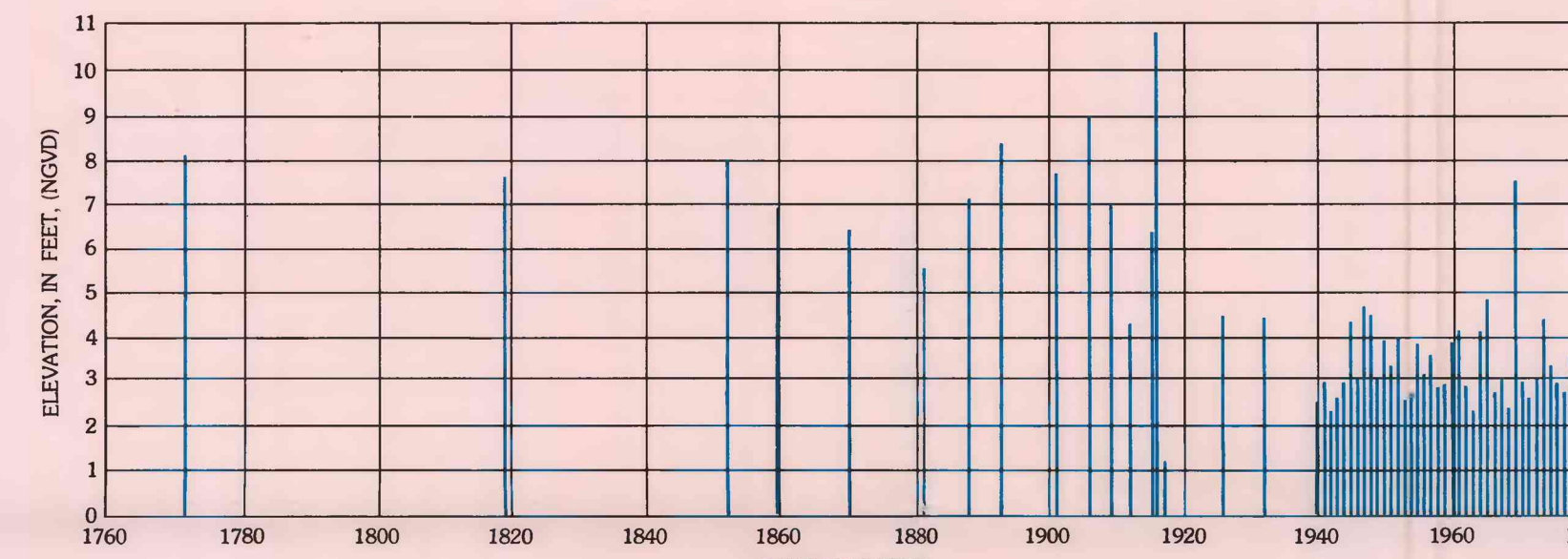


FIGURE 3—Known annual maximum tides at Mobile, Alabama, 1772-1979
(Gage at Alabama State Docks)

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) 0.3048 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 hectopascal (hPa)

Tidal records—Records of storm tides along the Gulf Coast have
been documented since 1772 at Mobile, Ala., by the Corps of En-
gineers 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.	Pensacola Beach, Fla.
September 4, 1772	—	8.2	—
August 23, 1852	—	8.0	—
October 2, 1893	—	8.4	4.9
September 27, 1906	—	10.8	9.1
July 5, 1916	—	10.8	8.0
August 13, 1969	11.2	8.5	5.7
September 13, 1979	5.9	9.9	9.0

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
maximum tide was estimated to have a recurrence interval of about 25
to 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.

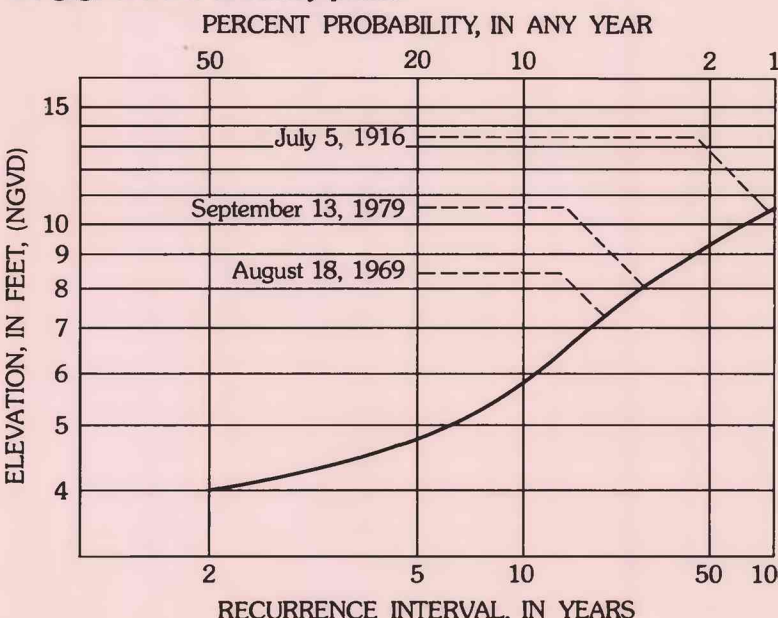


FIGURE 4—Frequency of high tides at Mobile gage
(Mobile River at Alabama State Docks)

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
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.
Drillholes 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., 1967, 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 Hur-
ricane Research Project, report 7.
Wilson, K. V., and Hudson, J. W., 1969, Hurricane Camille tidal flood
of August 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 Kila, HA-404 Biloxi,
HA-398 Waveland-Grand HA-405 Ocean Springs-Deer
Island Pass, HA-406 Pascagoula,
HA-399 Vidalia, (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 Northw 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.