

EXTREME FLOODING 1990



From March 16 to 17, 1990, heavy rainfall in northwestern Florida sent surging flood waters throughout the region for days (Figure 1). An estimated 2,500 residents were evacuated, with many losing their homes and businesses. The Federal Emergency Management Agency (FEMA) declared Florida a major disaster zone on April 3, 1990, with an estimated \$3 million in total damage. Submerged roads, highways, and bridges were shut down for weeks, with many routes in need of repair or completely destroyed. Although there were no reported flooding deaths in Florida, thirteen people died in Alabama.

PANHANDLE RESIDENTS ORDERED OUT AS FLOODWATERS RISE

The Miami Herald,
March 19, 1990

The flooding was described in some places as the worst in a century.

“We’ve got about 100 houses under water,”

Tom Roche, Civil Defense director for Santa Rosa County, said Sunday.

“This is the worst I’ve seen since the early ‘70s,” Roche said.



Figure 1. Caryville, FL, March 1990, State Archives of Florida, Donn Dughi, *Florida Memory*.

This touchstone event summary highlights an exceptional weather event, extreme flooding in 1990, and related health outcomes in Florida. Utilizing the Florida Climate Extremes Index, technical reports, and newspapers, a touchstone event was identified for this priority hazard. It is important to note that these reports were not validated with vital statistics or notifiable disease surveillance data. Experiences and memories from historical events can highlight the importance of public health preparedness and adaptation planning.

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METEOROLOGICAL SET-UP

PRECURSOR: FEBRUARY 1990 FLOODING

A severe line of storms from February 16 to 17, 1990, brought heavy rain to Alabama and Georgia. This event caused widespread flooding and damage only three weeks before the March event, with many of the same areas impacted twice. The saturated ground and filled waterways amplified the effects of the March event (Figure 2).

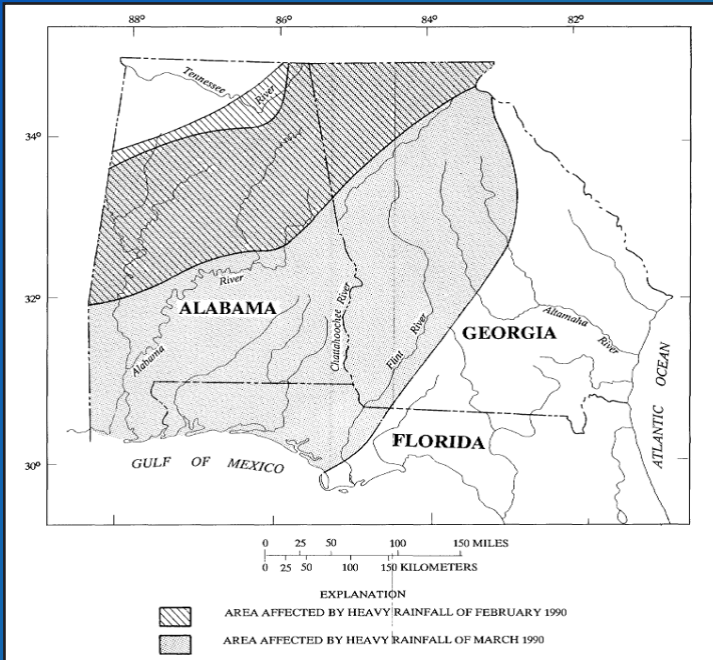


Figure 2. Rainfall map, February and March 1990, United States Geological Survey.

MARCH 1990

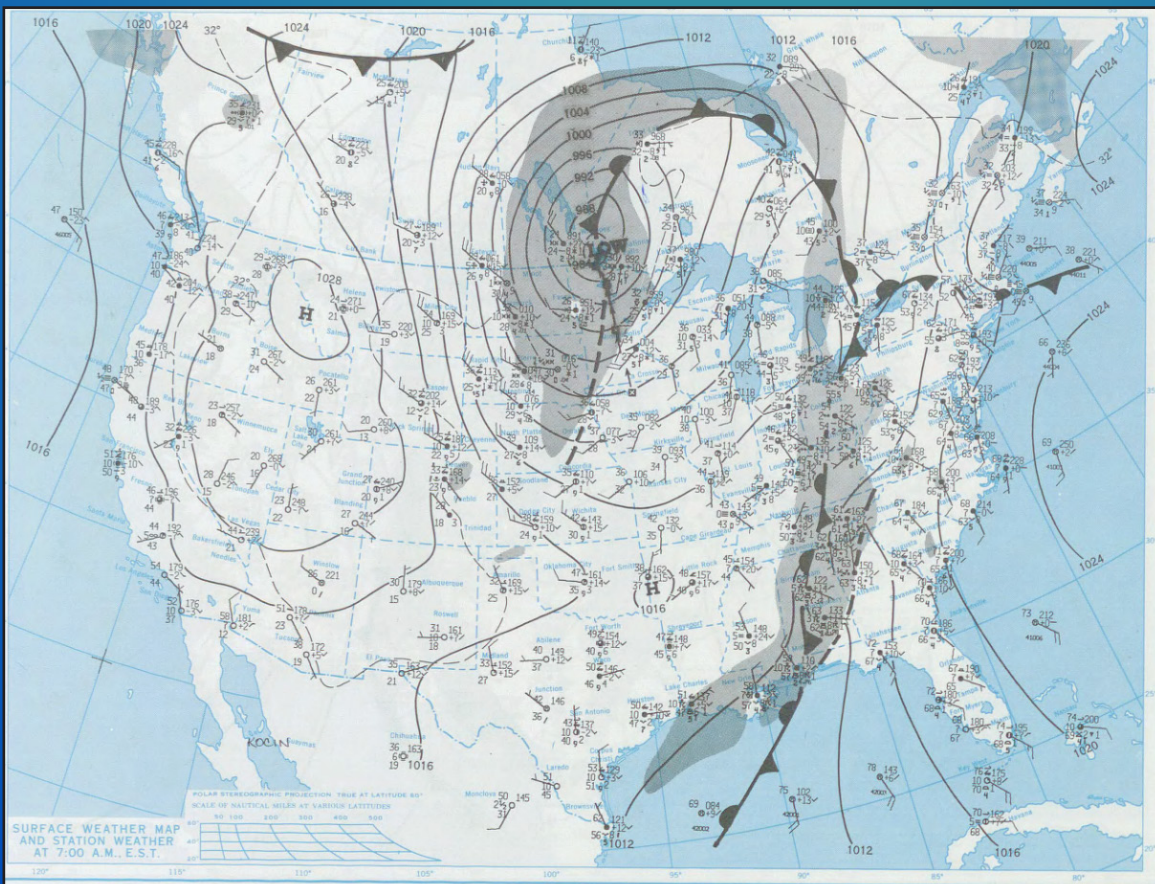


Figure 3. Surface analysis, 7:00 a.m. EST, March 16, 1990. National Oceanic and Atmospheric Administration (NOAA).

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On March 16, an approaching cold front collided with a stationary front over the region. This convergence of events, along with a massive amount of warm, humid air coming up from the Gulf of Mexico, provided for what would be two days of non-stop downpours over Alabama, Georgia, and northwestern Florida (Figures 2 and 3).

Rainfall totals in Florida ranged from 4 to 14 inches (Figure 4), breaking numerous daily precipitation and long-term hydrological records. Flash flood, severe weather, and tornado warnings were all issued by the National Weather Service leading up to and during this event. Although this event was not classified as a widespread flash flood, some of the characteristics of a flash flood were experienced.

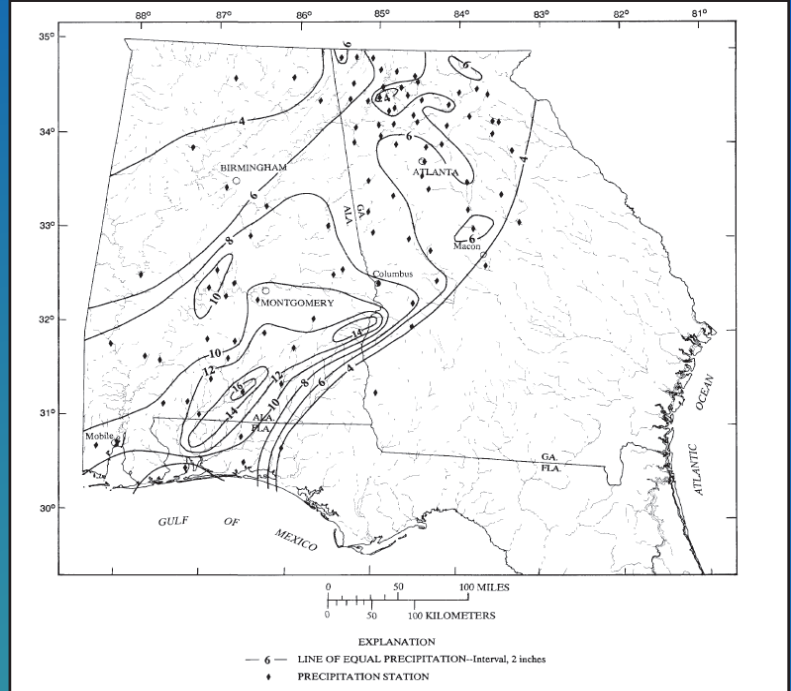


Figure 4. Rainfall totals, inches, February and March 1990, *United States Geological Survey.*

UPSTREAM EFFECTS AND LENGTHY IMPACT

Although heavy rain only occurred over two days, floodwaters continued to surge and flow for as many as ten days after. Northwestern Florida is comprised of many rivers and waterways that are continuations downstream from Alabama and Georgia (Figure 5). Florida felt continual, delayed impacts from overflowing rivers and damaged infrastructure upstream, taking nearly two weeks for water levels to return to normal. Areas surrounding the following rivers were heavily affected, with Caryville, FL perhaps hit the hardest: Escambia, Blackwater, Yellow, Choctawhatchee, and Apalachicola.

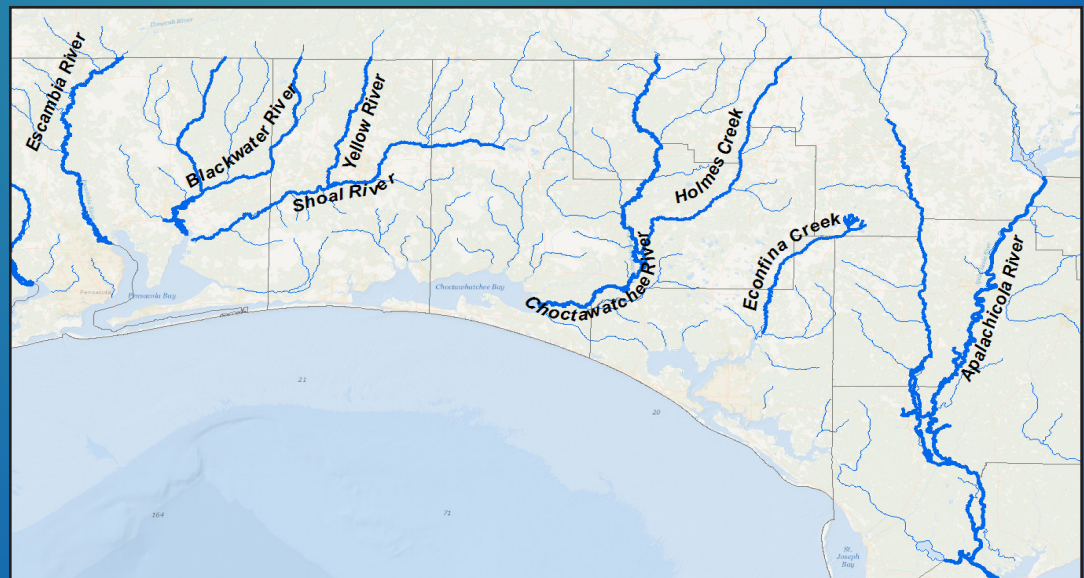


Figure 5. Northwestern Florida Rivers, ESRI, D North American 1983

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RECORDS AND IMPACTS

Surging flood waters and downed bridges and structures trapped residents inside their vehicles and homes, with many having to be rescued by emergency services. Evacuees could not return for days, not knowing if their homes and belongings were washed away or stolen. For those residents who did not evacuate, travel was restricted to boats (Figure 6).

Daily precipitation records broken:
Milton, FL: 8.00 in. (3/16)
Crestview, FL: 7.28 in. (3/17)
Niceville, FL: 7.12 in. (3/17)
Pensacola, FL: 6.05 in. (3/16)

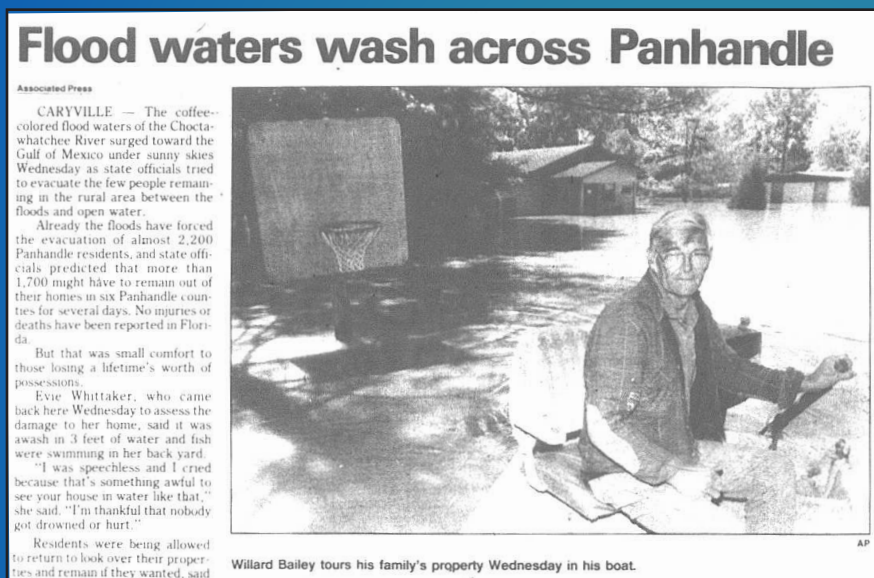


Figure 6. *St. Petersburg Times*, March 22, 1990.

Many health threats such as drowning, power outages, and waterborne, foodborne, and vector-borne diseases can occur with major flooding events. Florida reported no deaths in the March 1990 flooding, but 13 people died in Alabama (nine drowned and four traffic accident fatalities related to flooding).

Total damage reached \$3 million, with the Red Cross estimating 1,500 homes sustaining major damage.

- » FEMA declared Florida a major disaster zone on April 3, 1990.
- » Shelters opened in Caryville, Holmes, and Milton, FL.
- » The Salvation Army distributed supplies.
- » Water contamination occurred in Caryville, FL due to wells being completely inundated.
- » Much of I-10 and State Road 90 were shut down due to flooding or damage.

Damage to observation instruments and high waters led to estimations of river cresting in Florida. The following are recollections from the event, and some hydrological records:

- » The Choctawhatchee River (at Caryville, FL) broke peak discharge records greater than or equal to a 100-year reoccurrence interval, which is the highest since 1929.
- » The Blackwater River (at Milton, FL) crested at 25 feet, 13 feet above its flood stage.
- » The Apalachicola River was expected to crest 10 feet above flood stage, its highest since 1978.
- » The last observation from the Yellow River (between Milton and Crestview, FL) was that it was still rising at 12 feet over its banks.

FLASH FLOODING VULNERABILITY IN FLORIDA

In the southeastern United States, heavy rain events have been increasing in frequency over the past 20 years. In Florida, it is projected there will be both more dry days and more intense precipitation events in the future. In combination with changing land cover and use, these conditions could result in more flooding. The Flash Flood Potential Index (FFPI) is a scale that defines an area's risk to flash flooding based on pre-event land characteristics:

- » slope
- » land cover
- » soil drainability
- » land use

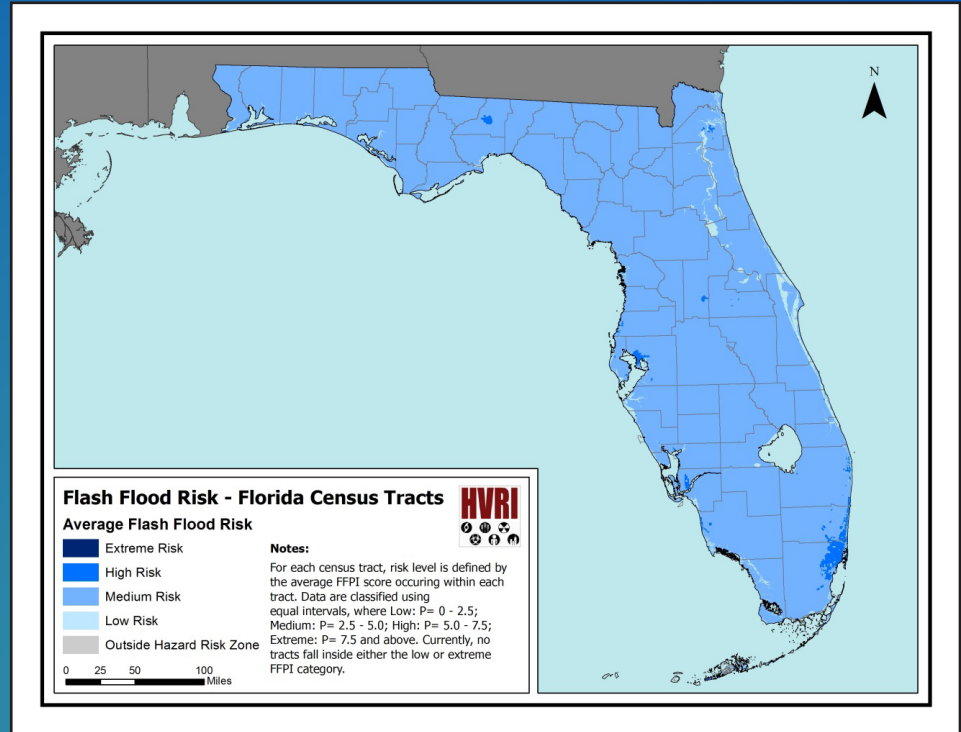


Figure 7. Flash Flood Risk map. Source: C. Emrich, University of South Carolina Hazards and Vulnerability Research Institute, 2014.

A FFPI was developed for Florida's geographical and topographical characteristics, creating an average risk per census tract. Each tract was classified into four risk classes (extreme, high, medium, and low) based on flash flood potential (Figure 7).

Urban regions with a high flash flood risk include areas surrounding Cape Coral, Jacksonville, Miami, Tallahassee, and Tampa. Overall, approximately 3.3 million people living in 24 counties are at high risk of flooding. Broward, Collier, Duval, Hillsborough, Lee, Leon, Miami-Dade, Palm Beach, and Pinellas counties each have more than 50,000 people living in areas with high average FFPI census tracts, including nearly 80% of tracts and nearly 2 million people in Miami-Dade County alone. Locations that are both physically and socially vulnerable are places where a combination of hazard and social adaptation practices can maximize positive outcomes. For more information, please see the Florida BRACE Vulnerability Assessment Report.

For more information, please contact the Florida Department of Health BRACE Program or visit www.floridahealth.gov.