

FLORIDA HURRICANE SEASON 2004



Figure 1. Boca Raton News, August 15, 2004.

Bonnie, Charley, Frances, Ivan, and Jeanne are five names Florida cannot forget. Regarded as one of the most active, destructive, and costly hurricane seasons of the past century, 2004 had five landfall impacts in just six short weeks. But not only was the quantity of storms devastating, the caliber of each was just as harmful, with three of the storms major hurricanes (Category 3 or greater). This historic season wreaked nearly \$40 billion in damage collectively, with nearly 100 Florida deaths. Sequential landfalls compounded destruction, halting reconstruction and clean-up efforts with no relief. Consistent power outages, flooding, wind damage, impassable roadways, and evacuations were a common sight for the months of August and September, with many years of repair ahead.



This touchstone event summary highlights an exceptional weather event, the 2004 hurricane season, 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.

2004 Florida Hurricane Season

WHY SO MANY STORMS?

The conditions in the Atlantic Ocean were very favorable for tropical cyclogenesis during the 2004 season (Figure 2). Although only five storms made landfall in Florida, August was a record month with eight storms occurring over the 31-day period.

The Accumulated Cyclone Energy (ACE) for 2004 was 257% of the 1951-2000 median, meaning there was a lot of available energy for storms to strengthen. An El Niño cycle, which has tendencies for suppressing hurricane activity in the Atlantic, was declared by the end of the 2004 season. However, due to its weakness, its effects were not heavily felt, allowing for this active season.

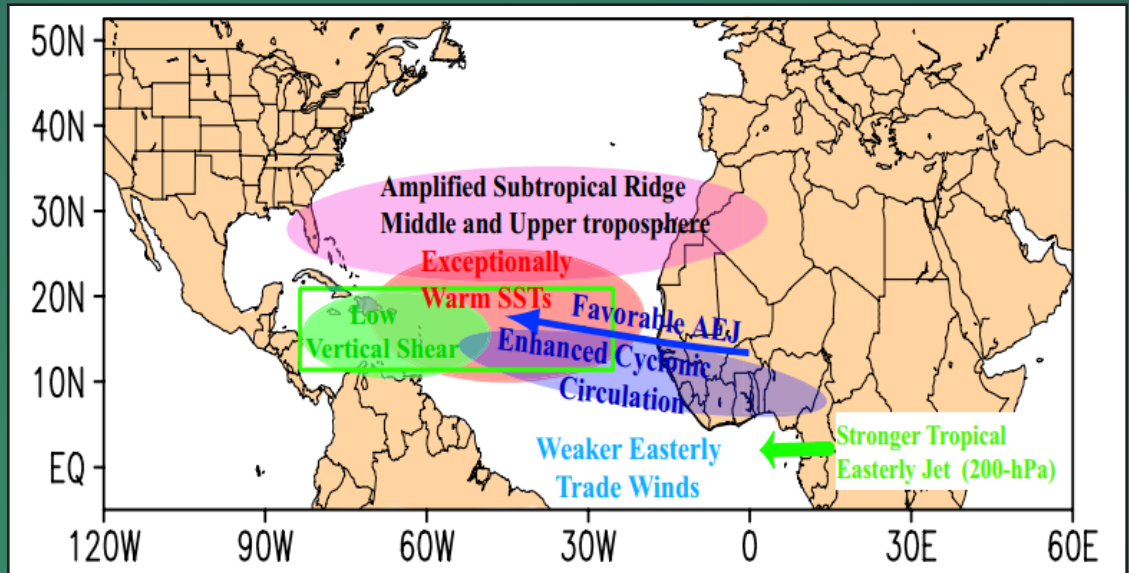


Figure 2. 2004 map of favorable conditions for tropical cyclone development, National Center for Environmental Predictions (NCEP).

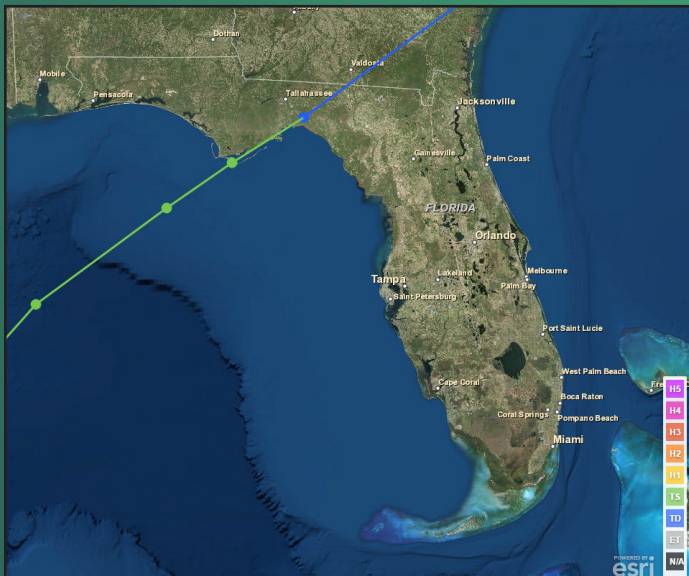


Figure 3. Tropical Storm Bonnie, *Hurricanes in History*, National Hurricane Center (NHC).

TROPICAL STORM BONNIE

Traveling northwest as a tropical storm, Bonnie struck the Florida Panhandle on August 12, 2004, with sustained winds of 45 mph (Figure 3). With small storm surge and mild precipitation, its impact on Florida was minimal, although Bonnie did produce a tornado in North Carolina that killed three people. Striking Florida just one day before Hurricane Charley, the occurrence of back-to-back landfalls within a 12-hour period had not happened since 1906, breaking a 98-year record.



2004 Florida Hurricane Season

HURRICANE CHARLEY

Although small in size, Hurricane Charley was a strong Category 4 hurricane that struck Charlotte County, FL on August 13, 2004 (Figure 4). In roughly a 30-hour period, rapid intensification grew Charley from a Category 2 to a Category 4 hurricane with maximum sustained winds nearing 150 mph at landfall. Producing catastrophic damage on the coast, inland through Florida, and up the east coast of the U.S., Charley brought loss of life and immense structural damage to everything in its path. The first of three major hurricanes to make landfall in Florida of 2004, Charley was the strongest hurricane to strike the entire U.S. since Hurricane Andrew in 1992.

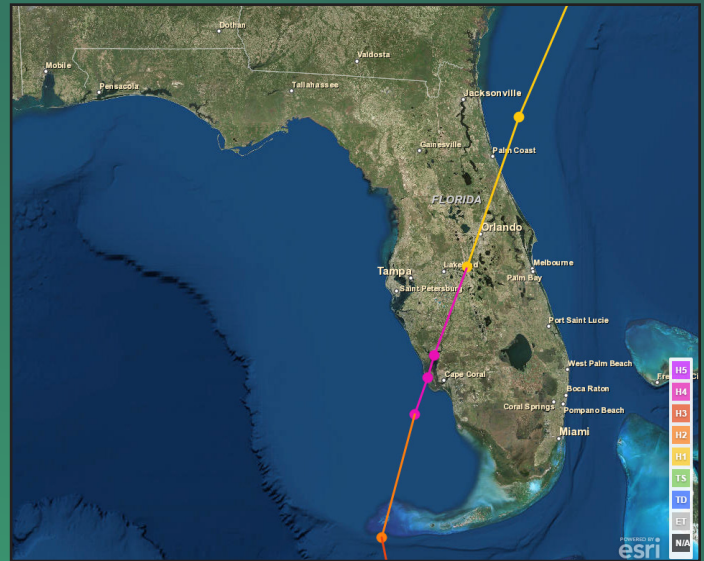


Figure 4. Hurricane Charley, *Hurricanes in History*, National Hurricane Center (NHC).

"If Hurricane Charley was a one-round heavyweight knockout, Hurricane Frances is turning into a 15-round middleweight fight," said Orange County Chairman Rich Crotty.

The Bradenton Herald, September 6, 2004

HURRICANE FRANCES

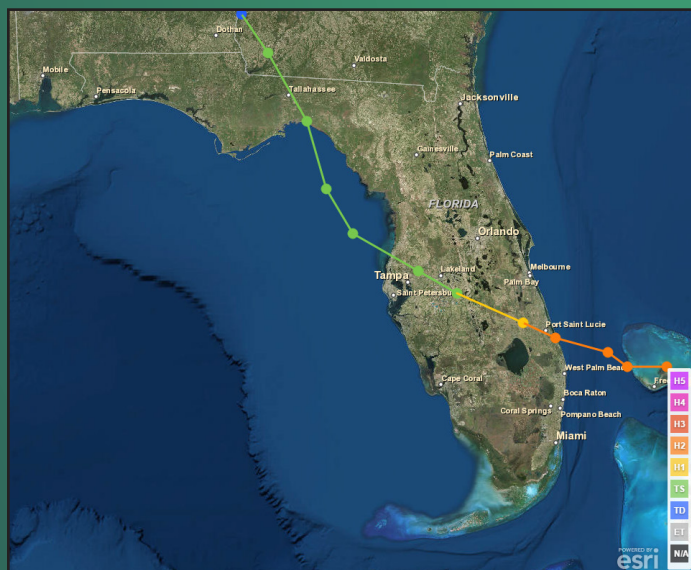


Figure 5. Hurricane Frances, *Hurricanes in History*, National Hurricane Center (NHC).

Hurricane Frances made its initial landfall in Martin County, FL on September 5, 2004, as a Category 2 hurricane. After traveling northwest across the peninsula, Frances crossed into the Gulf of Mexico making a second landfall in Wakulla County, FL on September 6, 2004 as a tropical storm (Figure 5). Frances produced significant storm surge along the Gulf of Mexico and Atlantic coasts of Florida, with some areas as high as 8 feet above mean sea level. Widespread heavy rain, freshwater flooding, and tornadoes occurred in Florida and the southeastern U.S.



2004 Florida Hurricane Season

HURRICANE IVAN

Hurricane Ivan made its initial landfall in Gulf Shores, AL, on September 16, 2004, as a Category 3 hurricane (Figure 6). A long-lived system and very large, Ivan was comparable to the size of Texas. Just to the east, north Florida took a severe hit being in the right front quadrant of the hurricane. Strong sustained winds of 120 mph, 10 to 15 ft. storm surge, several tornadoes, and ceaseless rain impacted much of southern Alabama, Mississippi, Louisiana, and northern Florida.

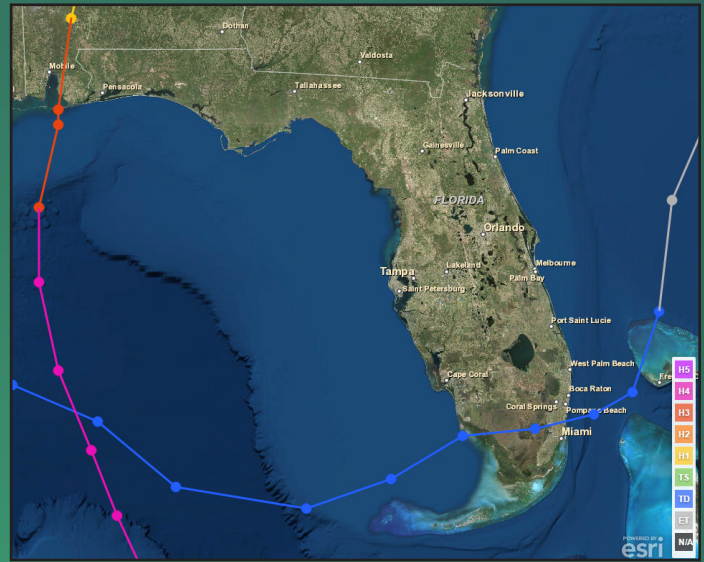


Figure 6. Hurricane Ivan, *Hurricanes in History*, National Hurricane Center (NHC).

The second of three major hurricanes to impact Florida in the 2004 season, Ivan traveled into the southeastern U.S., weakened, and moved back out into the Atlantic Ocean. Existing pressure systems and circulations pushed Ivan back to the west, and on September 21, 2004, made landfall in Broward County, FL, as a tropical depression.

"It's a total loss, water came in about eight feet and it just pushed everything right out, off the foundation," Taylor said. "I'm gonna cry, and then I'm gonna rebuild."

The St. Augustine Record, September 17, 2004

HURRICANE JEANNE

On September 26, 2004, Hurricane Jeanne struck St. Lucie County, FL, (Figure 7) with maximum sustained winds of 120 mph (Category 3), the third of the three major hurricanes to strike Florida in the 2004 season. Moving to the northwest across central Florida, Jeanne eventually dissipated, reaching the mid-eastern U.S. Jeanne's impacts were felt hard in that it essentially tore through the same locations as Hurricane Frances just 3 weeks later, bringing strong storm surge, winds, and rain.

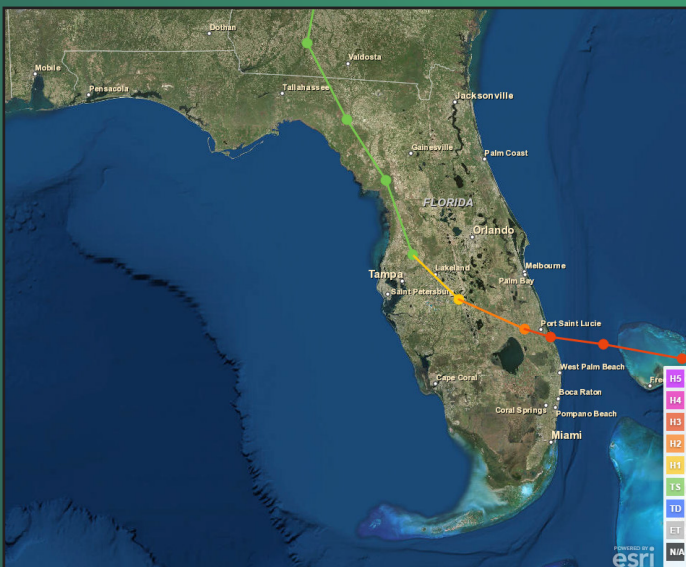


Figure 7. Hurricane Jeanne, *Hurricanes in History*, National Hurricane Center (NHC).



2004 Florida Hurricane Season

IMPACTS AND HEALTH

The continual battering of incoming storms, many of which repeatedly passed over the same areas in Florida, impacted assessment, clean-up, and reconstruction efforts. Any advances in aid or rebuilding were slowed and put off due to new incoming storms. The sequential landfalls made attributing damages and losses to a particular storm difficult. Consistent flooding, recurring wind damage and storm surge, lengthy power outages, downed bridges and roads, and unsafe water sources continued without relief. Many residents evacuated their homes only to end up in the shifting path of storms. Thousands remained in shelters for weeks, not knowing if they had homes to return to (Figure 8).

Florida Impacts Hurricane Charley

\$14 billion

9 direct and 24 indirect deaths
Hurricane Frances

\$8 billion

5 direct and 32 indirect deaths
Hurricane Ivan

\$8 billion

14 direct deaths

Hurricane Jeanne

\$6.8 billion

3 direct deaths

Source: National Hurricane Center Official Reports

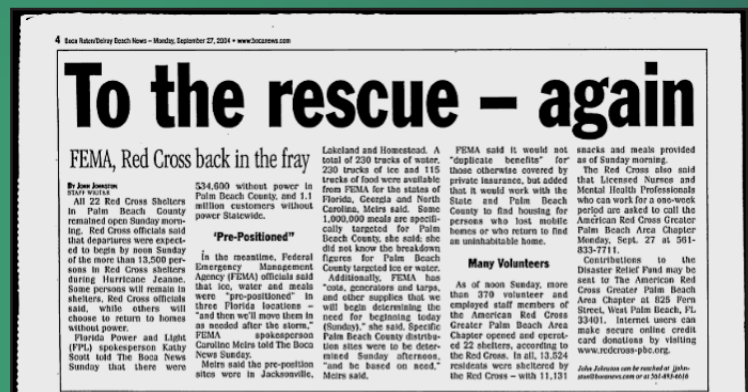


Figure 8. Boca Raton News, September 27, 2004.



Figure 9. Hurricane Charley damage, David Bujak, Florida Memory.

- » No U.S. state has been affected by four hurricanes in one season since Texas in 1886.
- » Ivan is the 5th costliest hurricane to strike the U.S., while Charley is the 6th.
- » The names Charley, Frances, Ivan, and Jeanne have been retired from the official list of Atlantic Hurricane names due to their immense destruction (Figure 9).



HURRICANE VULNERABILITY IN FLORIDA

WINDS AND SURGE

In comparison with other states, Florida has experienced the greatest number of landfalling hurricanes. Projections indicate that while there may be a decrease in the total number of tropical cyclones in the Atlantic Ocean, there could be more intense hurricanes (Category 3-5) in the future. Potentially, hurricane winds can affect any county in Florida, and storm surge can potentially affect any coastal county, but some counties have a higher risk than others.

The potential impact of storm surge on Florida's coastline was calculated using the National Oceanic and Atmospheric Administration's Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model. All of south central Florida, depending on the direction of the storm, and counties along the Gulf Coast are at highest risk of storm surge. In a Category 5 hurricane, 5.6 million people living in 38 counties are at extreme or high risk of storm surge (Figure 10).

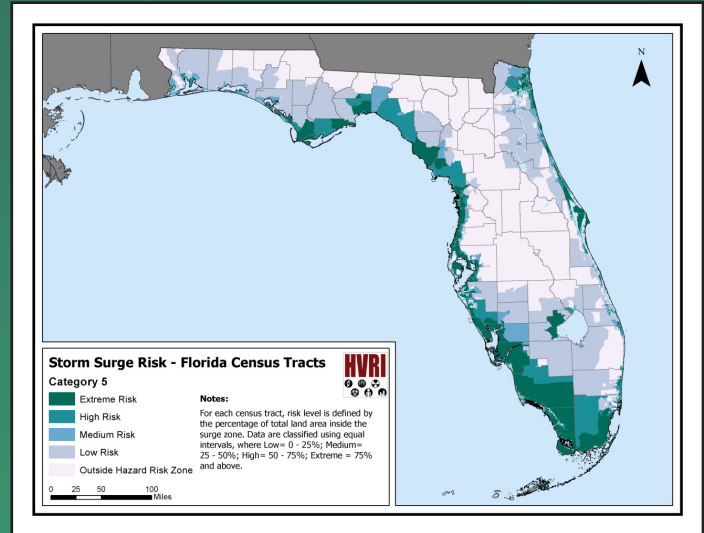


Figure 10. Category 5 storm surge risk in Florida. Source: C. Emrich, University of South Carolina Hazards and Vulnerability Research Institute, 2014.

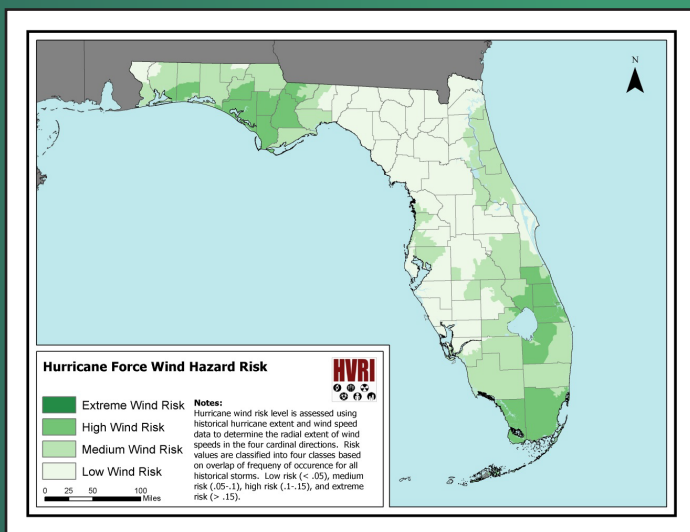


Figure 11. Hurricane force wind hazard risk in Florida. Source: C. Emrich, University of South Carolina Hazards and Vulnerability Research Institute, 2014.

The potential impacts of tropical storm- and hurricane-force winds in Florida were calculated using Extended Best Tract data for 1988-2012 and an idealized buffer around storm tracks for 1952-1987. The Panhandle and south Florida are at highest risk of hurricane-force winds. Overall, approximately 2.9 million people living in 19 counties are at extreme or high risk of hurricane-force winds (Figure 11).

Locations that are both physically and socially vulnerable are places where a combination of hazard and social adaptation practices can maximize positive outcomes. For outcomes for each case scenario, please see the Florida BRACE Vulnerability Assessment Report.

For more information, please contact the Florida Department of Health BRACE Program or visit <http://www.floridahealth.gov>.

