



## Volusia County Hurricane Irma Flood Warning Program Evaluation Report

### Synopsis

Hurricane Irma formed from an African Easterly Wave, more commonly known as tropical waves. It became a tropical storm on August 30 about 420 miles west of the Cabo Verde Islands in the far eastern tropical Atlantic Ocean, and quickly attained hurricane status on August 31st while still in the far eastern Atlantic about 650 miles west of the Cabo Verde Islands. Irma continued to gradually strengthen over the next several days as it tracked generally westward across the tropical Atlantic. By the time Hurricane Irma struck Barbuda in the northern Leeward Islands around 2 A.M. on Wednesday, September 6, it was a Category 5 hurricane with 185 mph winds. Five hours later, the eye of Irma moved over St. Martin, still with 185 mph winds, while the northern eyewall pounded Anguilla. That afternoon, Irma cut a path directly through the British Virgin Islands. After the southern eyewall raked St. Thomas, Puerto Rico was largely spared as the center passed about 45 miles north of San Juan. Hurricane conditions did occur on Puerto Rico's northeastern coast. Still a Category 5, Irma impacted portions of the Turks and Caicos Islands and the southeast Bahamas. From Friday evening September 8<sup>th</sup> through Saturday afternoon September 9<sup>th</sup>, Irma moved along the northern coast of Cuba. Interaction with land caused Irma to weaken from a Category 5 to a Category 3 before it began to pull away from the northern coast of Cuba late Saturday afternoon.

On Sunday morning, September 10<sup>th</sup>, Irma strengthened to a Category 4 hurricane as it accelerated toward the Florida Keys. The eye made landfall in Cudjoe Key as a 130 mph Category 4 at 9:10am. The center of Irma then made landfall in Marco Island at 3:35pm that afternoon as a Category 3 with 115 mph winds. The center moved into central Florida overnight and into northern Florida later on Monday as it weakened.



The hurricane continued northward across central Florida with hurricane conditions decreasing in areal coverage when Irma's center approached the Orlando and Tampa areas. Tropical storm conditions were experienced on both the west and east coasts of the state on 10 and 11 September. The center passed near Plant City at 0509 UTC 11 September, where a spotter reported a minimum pressure of 964.4 mb. At 0142 UTC, a couple of hours before the eyewall and strongest winds arrived, that spotter measured 10-second 7-meter winds of 63 kt and a gust to 71 kt. Reports from both sides of the state confirmed Irma's expansive wind field. For example, buoy 42036 offshore of Tampa in the Gulf of Mexico measured 44 kt sustained winds at 5-meters with a 10-min averaging period at 0420 UTC 11 September. Also in the Gulf of Mexico, at 0823 UTC that day, buoy 42039 offshore of Pensacola measured 37 kt sustained winds at an elevation of 4 meters. Off the east coast, buoy 41009 off of Cape Canaveral measured sustained winds of 56 kt at 4 meters. Irma moved across north-central Florida through early 11 September and then moved into southeastern Georgia late that day and early 12 September. Tropical storm conditions were reported across much of northern Florida, especially to the east of the center. The Jacksonville International Airport measured sustained 2 -minute 10 -meter winds of 51 kt at 1053 UTC 11 September with a gust of 75 kt. At the Gainesville Regional Airport, closer to where the center passed, a minimum pressure of 979.5 mb was observed at 1053 UTC with maximum sustained 2-minute 10-meter winds of 40 kt.

### **Storm Surge**

Even though Irma made landfall along the southwestern coast of Florida, the hurricane's large wind field produced significant storm surge flooding along the northeastern coast of Florida, where a maximum of 3 to 5 ft of inundation above ground level occurred from Cape Canaveral northward to the Florida-Georgia border.

### **Rainfall and Flooding**

Irma produced heavy rain across much of the state of Florida, and rainfall totals of 10 to 15 inches were common across the peninsula and the Keys. The maximum reported Storm -total rainfall was near Ft. Pierce, Florida, in St. Lucie County, where 21.66 inches of rain was measured between 9 and 12 September. The heavy rainfall caused flooding of streets and low -lying areas across much of the Florida peninsula. In Indian River County, 12 people were rescued from flood waters, and in Orange County residents were rescued from flooded homes. Heavy rains of 6 to 10 inches occurred across the Florida Keys. Flooding occurred on most rivers in northern Florida, and major or record flood stages were reported at rivers in Bradford, Clay, Marion, Flagler, Duval, Putnam, St. Johns, Nassau, and Alachua counties. The St. John's River set record flood stages at many locations in Duval County, causing major flooding in the Jacksonville metropolitan area, where hundreds of people were rescued.

Hurricane Irma caused record flooding in Volusia County, with riverine storm surge from the Indian, Halifax, Tomoka, and St Johns Rivers causing the majority of the flooding of structures. Flood depths exceeded those experienced during Hurricanes Charley, Frances and Jeanne in 2004. Approximately 300 homes flooded countywide. A riverine storm surge of six feet in some areas was estimated by the National Weather Service Melbourne Office.

## **Watches, Warnings, and Flood Warning System Performance**

For the United States, a hurricane watch was first issued for the southern Florida coastline from Jupiter Inlet southward on the east coast and from Bonita Beach southward on the west coast, including the Florida Keys, at 1500 UTC 7 September. Since sustained tropical-storm-force winds first reached the Florida Keys within the hurricane watch area around 2100 UTC 9 September, a lead time of 54 hours was provided. The hurricane watch area was upgraded to a hurricane warning at 0300 UTC 8 September, a lead time of 42 hours before the tropical-storm-force winds began. Hurricane watches and warnings were subsequently issued at various times for much of the remainder of Florida.

At various points in time, the NWS issued storm surge warnings for most of the Florida coast — from the Florida-Georgia border southward on the east coast and from the Ochlockonee River southward on the west coast, including the Florida Keys, Tampa Bay, and the lower portion of the St. Johns River north of the I-295 bridge.

Volusia County received its first hurricane watch from the NWS September 9, 2017, at 0300. The Volusia County Emergency Operations Center at that time was activated to Level 1, full activation, 24/7 operational periods. Volusia County Emergency Management immediately sent the Hurricane Watch to all 16 municipalities, county agencies, hospitals, Department Heads, City Managers, Emergency Support Function Leads, universities, the School District, and non-profit agencies via email and briefings at the EOC. The initial Hurricane Watch, as well as each additional Hurricane Watch, Warning, Flood Watch and Flood Warning were transmitted in the same manner as well as via the Emergency Management social media Twitter and Facebook accounts. Volusia County Emergency Management continuously monitored the NOAA real-time river gauges at this site - <https://water.weather.gov/ahps/> - which provided the ability to notify residents well in advance of the arrival of riverine surge.

Volusia County was under a Flood Warning for approximately two months. Throughout this time, Volusia County Emergency Management was able to keep the private and public sector informed in a timely manner of anticipated flooding.

The Volusia County Flood Warning Program performed admirably before, during, and after Hurricane Irma. The County's Flood Warning Program has evolved in sophistication significantly since the hurricane season of 2004.

Report prepared by: Volusia County Emergency Management