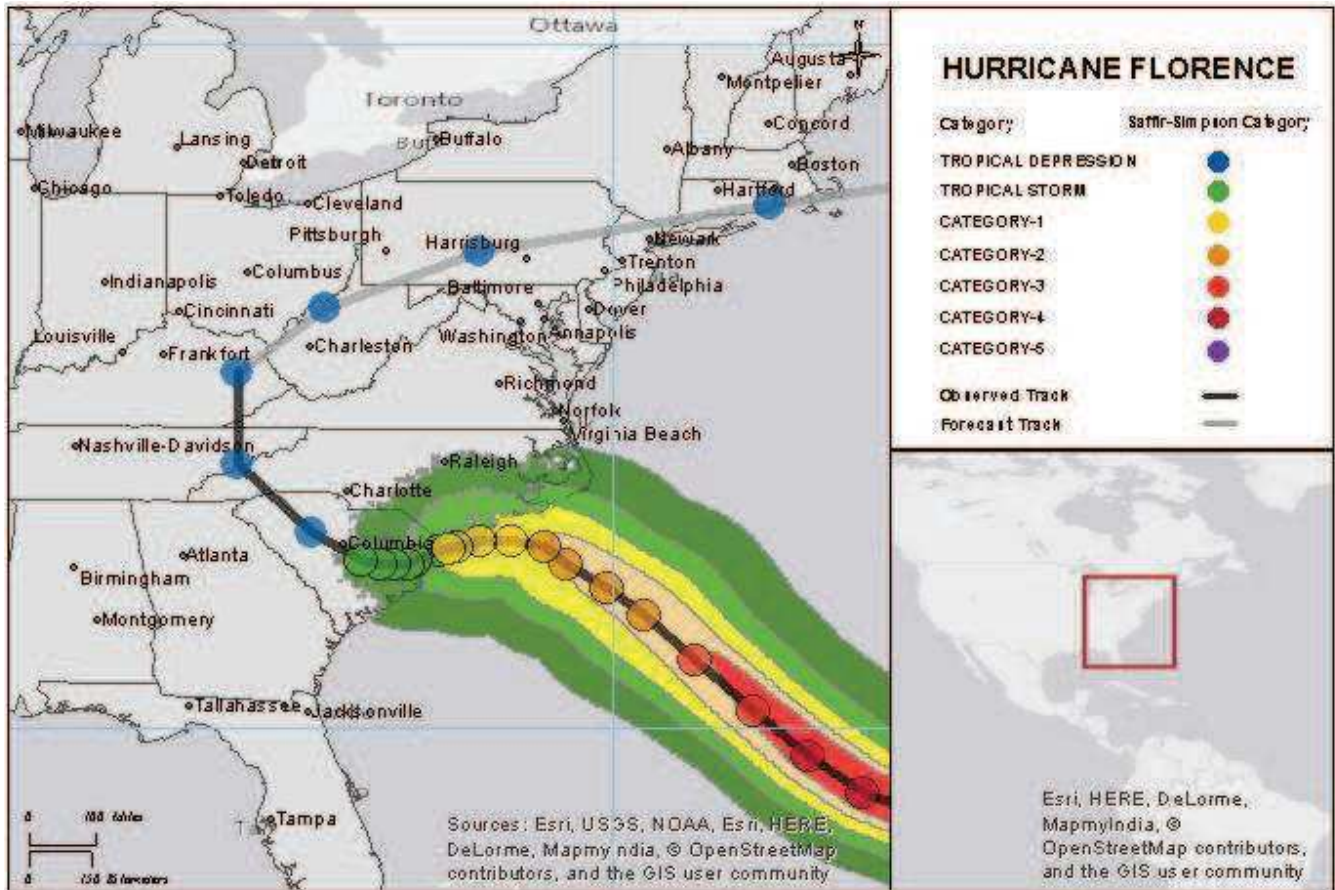


CAT-i Bulletin

Catastrophe Information

Report Date:
17 September, 2018

Hurricane Florence



Best Track and Wind Swath Estimates. SOURCE: Kinetic Analysis Corporation, National Hurricane Center

Summary

Hurricane Florence made landfall near Wrightsville Beach, North Carolina at 7:15 AM EDT (1115 UTC) September 14, according to the National Hurricane Center (NHC). Maximum sustained winds at landfall were 90 mph, a strong category-one hurricane on the Saffir-Simpson Scale. The storm slowed considerably at landfall causing prolonged exposure of affected areas to damaging wind gusts and significant rainfall. Significant flooding has been reported for areas of the Carolinas and Mid-Atlantic, with greatest severity in areas of eastern North Carolina. The storm has since weakened to a tropical depression while moving into the Ohio Valley. Florence should move through Pennsylvania and New England over the next day or so with an increase in forward speed, and the flood threat persists in the meantime. Downed trees and powerlines along with variable property damage have been reported along with significant to catastrophic flooding; the most severely affected areas are in eastern North Carolina. Media reports indicate at least 25 fatalities, and our thoughts and concerns are with those lost and directly affected by this event.

Meteorological Discussion

According to the NHC, Florence originated from a tropical disturbance that originally left the African coast and passed near the Cabo Verde Islands. Once a closed circulation developed with a clearly identifiable center of low pressure, the disturbance was classified as a tropical depression on August 31 at 5 PM EDT (21 UTC), about 70 miles south-southwest of the southernmost Cabo Verde Islands. The storm then gained intensity while moving towards the Central Atlantic. Florence was first classified as a hurricane by the NHC at 11 AM EDT (15 UTC) September 4, with maximum sustained winds of 75 mph. Florence then underwent a period of rapid intensification to acquire maximum sustained winds of 130 mph by 5 PM EDT (21 UTC) September 5, making Florence a category-four hurricane on the Saffir-Simpson Scale.

The storm then encountered aggressive wind shear which significantly disrupted the structure and strength of the storm. By 11 PM EDT September 6 (03 UTC September 7), Florence was a tropical storm with maximum sustained winds of only 70 mph. The storm was then deflected to the west-southwest and then west and gradually recovered structure and strength over warm waters and in an environment of reduced wind shear. Florence regained status as a category-one hurricane at 11 AM EDT (15 UTC) September 9, with maximum sustained winds of 75 mph.

Florence then underwent another period of rapid intensification over warm waters with reduced wind shear and good storm ventilation. By 12 PM EDT (16 UTC) September 10 the storm had strengthened to a category-four hurricane with maximum sustained winds of 130 mph. Florence then continued to strengthen to reach maximum sustained winds of 140 mph before passing well south of Bermuda. In the meantime, Florence had begun a gradual turn to the west-northwest as it followed the edge of a subtropical ridge to the north, and model guidance came into reasonable agreement in placing a significant hurricane somewhere just offshore of the U.S. Atlantic Coast later in the week. On this basis, the NHC issued hurricane and storm surge watches for areas of the Carolinas at 5 AM EDT (09 UTC) September 11, and these were upgraded to warnings for certain areas at 5 PM EDT (21 UTC) the same afternoon.

By the morning of September 12, Florence still retained maximum sustained winds of 130 mph (after a few periods of weakening due to eyewall replacement). However some disruption of structure due to aggressive wind shear became evident at this time, most likely due to a pocket of strong upper-level winds as observed by overflight data. Florence then began a steady weakening trend, and the inner core of the storm structure itself was disrupted. By 9 AM EDT (13 UTC) September 13 on approach to the Carolinas, Florence had weakened to carry maximum sustained winds of 110 mph, a category-two on the Saffir-Simpson Scale. While making final approach to the coast of the Carolinas, Florence was subject to increasing wind shear and increasing land interaction, which suppressed further development despite warm waters in the area.

According to the NHC, Florence moved ashore near Wrightsville Beach, North Carolina around 7:15 AM EDT (1115 UTC) September 14. Maximum sustained winds at this time were 90 mph, a strong category-one hurricane on the Saffir-Simpson Scale. A sustained wind of 77 mph and a gust to 100 mph was unofficially reported at Fort Macon, North Carolina. A sustained wind of 83 mph and gust to 106 mph was also unofficially reported at Cape Lookout, North Carolina. A storm surge of 10 feet above normal tide levels was reported at Morehead City, North Carolina.

While moving inland, steering currents weakened considerably as Florence sat between a weakness in the subtropical ridge. The slowed forward motion of the storm allowed heavy rainfall to persist over long duration, with excessive rainfall accumulations in areas of the eastern Carolinas. Catastrophic flooding and flash-began to occur as a result. The storm experienced rapid weakening after moving inland, and as of 5 PM EDT (21 UTC) September 14, the NHC downgraded Florence to a tropical storm. The storm was further downgraded by the NHC to tropical depression status at 5 AM EDT (09 UTC) September 16, at which time all remaining tropical storm warnings were cancelled by the NHC. By this time, the storm had drifted inland to about 40 miles west of Columbia, South Carolina, and the large footprint and circulation of the storm continued to produce heavy precipitation in the meantime. By the morning of September 17, extratropical transition was evident from Florence's appearance and the storm had begun to accelerate to the northeast by this time. Heavy rainfall remains an ongoing threat along with flooding and flash-flooding, and the National Weather

Service (NWS) maintains watches and warnings for areas under potential or active threat. Unofficial rainfall totals reported by the NWS in North Carolina thus far include 35.93 inches near Elizabethtown, 34.00 inches at Swansboro, 25.20 inches at Newport/Morehead City and 23.02 inches at Wilmington International Airport. Initial reports indicate that Florence may surpass rainfall records for known tropical cyclones in the Carolinas.

Impacts

Areas of the Carolinas and Mid-Atlantic have been affected by significant and widespread flooding, especially for areas of eastern North Carolina. Downed trees and powerlines with variable property damage due to wind have also been reported by media. As of Monday, more than 509,000 homes and businesses were still without power, down from 1.8 million customers who have experienced outages due to Florence. According to the Defense Department, about 13,500 military personnel have been assigned to help with relief efforts. It is too early to fully assess the scope and severity of this active event. However, initial media reports indicate that Karen Clark & Company estimates industry-insured losses of around USD 2.5 billion, with Moody's Analytics providing an initial estimate of economic losses between USD 17 billion and USD 22 billion. An earlier estimate from Corelogic had potential insured losses between USD 3 billion and USD 5 billion due to storm surge and wind (excluding inland flood), according to media reports.

North Carolina

Impacts have been reported in North Carolina due to both wind and flooding. Media reports indicate at least nineteen fatalities. Downed trees and powerlines along with light to moderate property damage have been reported over widespread areas. The flooding in North Carolina has been especially severe, and evacuation orders were still being issued today for areas under emerging threat. At least 900 people were rescued from floodwaters and 15,000 were in shelters, according to media reports.

In the town of New Bern, 455 water rescues were necessary due to flooding. Swift-water rescues were also necessary in the city of Wilmington on a peninsula between the Cape Fear River and the Atlantic Ocean. At last report Wilmington was isolated by floodwaters from the rest of North Carolina. Officials have indicated plans to airlift food and water to the nearly 120,000 affected while rescue efforts continue for those under active threat. Meanwhile roughly 100 miles from the coast, authorities ordered immediate evacuation of nearly 7,500 people near the Cape Fear River and the Little River. Further west in the south side of Charlotte, over 100 roads were underwater, and roads were also underwater further east in Union County, according to the National Weather Service.

Closure of I-95 was necessary due to floodwaters for about 60 miles from north of Fayetteville to U.S. 64. Meanwhile floodwaters rose up to 10 feet (3 meters) over highway 17 in the low-lying city of Leland just north of Wilmington. According to CSX officials, floodwaters caused a train derailment in Lilesville where several railcars derailed on Sunday evening. Media reports also indicate an agricultural concern for affected areas where floodwaters disrupt pits used to store animal waste.

South Carolina

The storm also rendered impacts to areas of South Carolina, where media reports indicate at least six fatalities. Several rivers are expected to reach or exceed flood levels this week with bridges overwashed on S.C. 9 over the Lumber River, S.C. 917, U.S. 501 over the Little Pee Dee River and S.C. 9 over the Waccamaw River, according to the Department of Transportation. Travel impacts have been reported, including a nine mile stretch of Interstate 95 closed in Dillon County due to severe flooding.

Meanwhile the towns of Marion and Mullins saw about 100 swift-water rescues early Sunday according to Marion County officials, and a mandatory evacuation order was issued for the residents near Black Creek. The Black Creek is expected to crest at 16.5 feet by 1PM EDT Tuesday, September 18.

By Sunday afternoon, the number of people in shelters was reduced to about 1,200. State government offices should reopen on Monday, according to the Governor. The University of South Carolina has also resumed classes as of Monday, according to media reports.

Sources: BBC, U.S. National Hurricane Center, U.S. National Weather Service, Reuters, Associated Press, The Weather Channel, New York Times

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