

= Hurricane Felix ( 1995 ) =

Hurricane Felix caused severe beach erosion along the East Coast of the United States in August 1995 . The seventh tropical cyclone , sixth named storm , and third hurricane of the 1995 Atlantic hurricane season , Felix developed from a tropical wave in the eastern Atlantic Ocean on August 8 . Although initially a tropical depression , it strengthened into Tropical Storm Felix later that day . Further intensification was slow , with Felix reaching hurricane status on August 11 . Under favorable conditions , Felix began to rapidly deepen while curving northwestward . Late on August 12 , Felix peaked as a low @-@ end Category 4 hurricane . However , it soon weakened rapidly to a Category 1 hurricane . Less than three days later , Felix passed only 75 mi ( 120 km ) southeast of Bermuda . Although it also posed a threat to the East Coast of the United States , Felix curved northward and then east @-@ northeastward while remaining offshore , thereby avoiding landfall . Felix briefly threatened Bermuda again , but weakened to a tropical storm and turned back to the northeast on August 20 . It accelerated east @-@ northeastward , and passed a short distance offshore of Newfoundland , where Felix transitioned into an extratropical storm on August 22 .

Large waves in Puerto Rico caused minor coastal flooding in Cataño . Near @-@ hurricane @-@ force winds in Bermuda downed trees and power lines , which left 20 @,@ 000 people without power . Rough surf on the island damaged a few boats and hotels . In addition , the passage of Felix postponed Bermuda 's 1995 independence referendum . Large waves produced by the storm affected nearly the entire East Coast of the United States . In New York , two houses were washed away in The Hamptons , and two boats capsized in Maine . While passing southeast of Newfoundland , Felix produced moderate rainfall and large waves across the island , although damage was minimal . Overall , Felix caused nine deaths due to drowning along the coasts of Rhode Island , New Jersey , and North Carolina . The storm did approximately \$ 2 @.@ 5 million ( 1995 USD ) in damage on Bermuda , while rough seas produced about \$ 132 @,@ 000 in losses along the United States coastline .

= = Meteorological history = =

A tropical wave exited the west coast of Africa on August 6 , and quickly showed signs of a developing circulation . After an increase in convection , or thunderstorms , the National Hurricane Center ( NHC ) classified the system as Tropical Depression Seven at 0000 UTC on August 8 , about 460 mi ( 740 km ) west @-@ southwest of the Cape Verde islands . With a strong ridge to the north , the nascent depression moved generally west @-@ northwestward , and the combination of favorable upper @-@ level conditions and warm sea surface temperatures allowed for gradual intensification . About 18 hours after the depression formed , the NHC upgraded it to Tropical Storm Felix . By August 9 , the storm had developed a large area of convection with associated outflow . After continuing to slowly intensify , Felix became a hurricane early on August 11 about 575 mi ( 925 km ) east of the Lesser Antilles .

Soon after becoming a hurricane , Felix developed a well @-@ defined eye as Hurricane Hunters began investigating the storm . Beginning at 1200 UTC on August 11 , the hurricane began undergoing rapid deepening , and by the next day , concentric eyewalls were observed , indicative of a strong storm . On August 12 , the Hurricane Hunters observed flight @-@ level winds of 164 mph ( 264 km / h ) , suggesting peak surface winds of 140 mph ( 220 km / h ) . At that time , Felix was located north of the Lesser Antilles , moving to the north @-@ northwest due to an approaching trough weakening the ridge . After peak winds , Felix weakened due to stronger wind shear and its eyewall replacement cycle . The eye became indistinct and opened on August 13 , and it became a minimal hurricane by August 14 with a broad inner core . Late on August 14 , Hurricane Felix turned more to the west @-@ northwest , after the trough that previously brought it northward split into two pieces of energy , one moving southward and the other moving northeastward . On August 15 , the hurricane passed about 75 mi ( 120 km ) south of Bermuda , and a building ridge was anticipated to allow Felix to continue its trajectory toward North Carolina .

Beginning on August 15 , the NHC began forecasting that the hurricane would make landfall on the

Outer Banks of North Carolina within two days . Early on August 16 , the eye became better defined , although the feature diminished within a few hours , and the NHC was on the verge of downgrading Felix to tropical storm status . A break in the ridge allowed Felix to turn to the north , bringing it about 150 mi ( 250 km ) east of the Outer Banks . An approaching trough turned the hurricane to a northeast drift , and there was initial uncertainty whether Felix would loop back to the west or recurve to the northeast . During this time , the system remained a minimal hurricane , maintaining a large eye about 60 to 80 mph ( 95 to 130 km ) in diameter , but with weak convection due to cooler air . After the trough that turned Felix to the east @-@ northeast bypassed it to the north , the hurricane turned to the southeast , executing a small loop while northwest of Bermuda . On August 20 , Felix weakened below hurricane intensity for the first time in nine days , due to cooler waters and increased wind shear . By that time , the convection was removed from the center , and another trough brought the storm to the northeast . While passing east of Newfoundland on August 22 , Felix became extratropical . The remnants continued to the northeast , eventually passing north of the United Kingdom on August 25 .

= = Preparations = =

While Felix was near peak intensity on August 12 , officials in Bermuda issued a hurricane watch for the island . A tropical storm warning was added the next day , which was upgraded to a hurricane warning on August 14 . The warnings were downgraded to a tropical storm warning and later discontinued after the hurricane bypassed the island . A tropical storm watch was later issued for Bermuda on August 19 late in Felix 's duration when it was drifting offshore the eastern United States . The threat of the storm caused flights to be canceled to and from the island .

Initial forecasts predicted a landfall on the Outer Banks of North Carolina , with winds of 100 mph ( 160 km / h ) ; however , these forecasts were made with great uncertainty . While Felix was still near Bermuda on August 15 , the NHC issued hurricane warnings for the eastern United States from Little River , South Carolina to Chincoteague , Virginia and including the Pamlico Sound , Albemarle Sound , and southern portions of the Chesapeake Bay . Tropical storm warnings were also issued from Chincoteague to near Manasquan , New Jersey , including the Chesapeake and Delaware bays . The watches and warnings remained in place until August 18 . Despite the lack of landfall , the NHC deemed the watches and warnings as appropriate due to the projected track .

The threat of the storm caused officials to issue evacuation orders for the Outer Banks of North Carolina , and about 200 @, @ 000 people left the island chain , including 125 @, @ 000 in Dare County . Evacuation orders were dropped and shelters were closed as the storm moved away . The loss of tourism revenue was estimated at \$ 1 @. @ 2 million in Currituck County alone , and the loss of revenue for businesses in the Outer Banks was estimated at \$ 4 million ( 1995 USD ) per day during the evacuations . Some people in Virginia Beach , Virginia also evacuated voluntarily . The storm delayed a search for the remains of the Civil War steamship USS Monitor off the coast of North Carolina . The United States Navy moved ships from Norfolk Naval Base to open waters to prevent damage along the docks from the high waves . Then @-@ Virginia governor George Allen declared a state of emergency due to the threat from the hurricane .

= = Impact = =

Though Felix did not make landfall , its large circulation created large swells across much of the western Atlantic Ocean . In Puerto Rico , 8 to 12 ft ( 2 @. @ 4 to 3 @. @ 7 m ) waves caused minor coastal flooding in Cataño .

While passing south of Bermuda , Felix produced sustained winds of 63 mph ( 102 km / h ) with gusts to 80 mph ( 129 km / h ) . The winds were strong enough to knock down trees and leave 20 @, @ 000 people without power , although most outages were quickly restored . Television service was also interrupted . The storm also destroyed a few fishing boats and damaged hotels along the island 's southern shore , where prolonged high surf caused considerable beach erosion . The Causeway connecting St. David 's Island with the mainland sustained some damage , contributing to

an estimated \$ 2 @. @ 5 million in losses on Bermuda . The hurricane 's passage postponed the scheduled vote for Bermuda 's independence .

While offshore the eastern United States , Hurricane Felix generated strong waves and rip currents that caused widespread coastal flooding and beach erosion , reaching as far south as Georgia and as far north as Maine . In North Carolina , high waves flooded high waves covered North Carolina Highway 12 during high tides , and three people were killed . Felix passed close enough to the state to produce wind gusts of 43 mph ( 68 mph ) in Buxton , which caused minor property damage , estimated at \$ 57 @, @ 000 ( 1995 USD ) . In some portions of North Carolina , the storm increased beaches due to the displacement of sand , including Long Beach which grew by 5 ft ( 1 @. @ 5 m ) . Beaches along the Outer Banks and Virginia were closed for several days , and about 200 people required rescue in New Hanover County , North Carolina . The Wakefield , Virginia National Weather Service likened the storm 's effects to " a strong nor 'easter " , with little damage in southeastern Virginia . In the months after the storm , beach nourishment occurred along the Outer Banks to repair the eroded coastlines , while in Virginia Beach .

The onshore flow from the hurricane disrupted a heat wave in Delaware and Maryland , while the rough surf caused beach erosion and beach closures . Several people were injured in New Jersey by the rough surf , and over 150 people required rescue in Cape May . Waves of 10 ft ( 3 @. @ 0 m ) in Atlantic City forced beaches to close for the first time since Hurricane Gloria in 1985 , and beaches were closed across the region for about five days . There was minor tidal flooding in the state due to astronomically low tides , although extensive beach erosion occurred after a week of strong waves ; in Ocean City , the storm eroded about 240 ft ( 73 m ) of beaches , leaving behind 10 ft ( 3 @. @ 0 m ) cliffs . Five people drowned in the state due to rough surf . While still offshore , Felix produced wind gusts of 36 mph ( 57 km / h ) in Atlantic City . On Fire Island in New York , the waves washed away two houses . In Rhode Island , 6 to 10 ft ( 1 @. @ 8 to 3 @. @ 0 m ) waves overturned a boat along the Sakonnet River , killing one passenger . Along Martha 's Vineyard in Massachusetts , waves reached 15 ft ( 4 @. @ 6 m ) , and several beaches were closed across the state . In Maine on Bailey Island , a woman required rescue after being swept away by a wave , who became hypothermic and injured due to cuts . Two lobster boats sank in the state , with one occupant requiring rescue and the other swimming ashore . Damage to the boats totaled \$ 75 @, @ 000 ( 1995 USD ) .

As Hurricane Felix was looping offshore the eastern United States , it produced swells of 26 ft ( 8 m ) along the Nova Scotia coast on an otherwise sunny day . Beaches were closed . Buoys near the Newfoundland coast recorded wave heights of 49 ft ( 15 m ) , while buoys farther offshore reported wave heights of 82 ft ( 27 @. @ 5 m ) . The outer rainbands of the storm dropped light rainfall , peaking at around 3 @. @ 43 mm ( 87 mm ) in northern Newfoundland . Offshore Caithness in Scotland , waves from the remnants of Felix submerged an experimental wave power station , damaging it further after previous waves damaged the system .