= Meteorological history of Hurricane Jeanne =

The meteorological history of Hurricane Jeanne lasted for about two weeks in September 2004 . Hurricane Jeanne was the eleventh tropical cyclone , tenth named storm , seventh hurricane , and sixth major hurricane of the 2004 Atlantic hurricane season . It formed from a tropical wave on September 13 near the Lesser Antilles , and encountered favorable enough conditions to reach tropical storm status . Jeanne strengthened further in the eastern Caribbean Sea , becoming a strong tropical storm and developing an eye before striking Puerto Rico on September 15 . Remaining well @-@ organized , it attained hurricane status before hitting the eastern tip of the Dominican Republic on September 16 .

Hurricane Jeanne steadily weakened while crossing eastern Hispaniola , and on September 17 it briefly weakened to tropical depression status after reaching open waters . Its original circulation dissipated as a new one reformed closer to the main area of thunderstorms . Turning northward , Jeanne slowly reorganized and again reached hurricane status on September 20 . It executed a clockwise loop to the west , weakening due to upwelling upon reaching its path again . Jeanne encountered favorable conditions as it continued westward , and it reached major hurricane status before crossing the northern Bahamas on September 25 . The next day , it struck Martin County , Florida in nearly the same location as Hurricane Frances just weeks before . Jeanne weakened over land while turning the northwest , deteriorating to tropical depression status over Georgia on September 27 . It turned northeastward , becoming extratropical on September 28 before dissipating on September 29 after merging with a cold front .

The hurricane produced heavy rainfall across its path , including in Haiti where precipitation caused devastating mudslides ; over 3 @,@ 000 deaths were reported in the country . Heavy rainfall also occurred during its landfalls on Puerto Rico and Florida , resulting in river flooding . In its strongest landfall , the hurricane produced strong winds across an area earlier affected by Hurricane Frances and , in some locations , by Hurricane Charley . Late in its duration , the combination of moisture from Jeanne and cool air resulted in a tornado outbreak that extended from Georgia through the Mid @-@ Atlantic states .

= = Formation and first landfall = =

The origins of Hurricane Jeanne were from a tropical wave that moved off the coast of Africa on September 7 . Containing a scattered area of moderate convection , the wave tracked westward at 12 ? 17 mph (19 ? 28 km / h) , located to the south of a large ridge . The system initially showed no signs of development , with unfavorably dry air persisting across the region . On September 11 , convection became slightly better organized , and the next day broad cyclonic turning became evident . However , overall development was hindered by upper @-@ level wind shear from Hurricane Ivan in the Caribbean Sea , as well as from an upper @-@ level low to the north of the wave .

Late on September 12 , while approaching the northern Lesser Antilles , convection increased and became better organized around an area of increased cyclonic turning . Environmental conditions became more favorable , allowing for the development of a low pressure area and for banding features to increase . Late on September 13 , with the formation of a broad low @-@ level circulation , it is estimated the system developed into Tropical Depression Eleven about 70 mi (110 km) east @-@ southeast of Guadeloupe .

Upon first becoming a tropical cyclone , the depression was located to the south of the subtropical ridge , resulting in a west @-@ northwest track which brought the center over Guadeloupe . The circulation was initially broad , and dry air temporarily entrained the northwest quadrant of the storm . However , environmental conditions were favorable enough for further development , with a deepening trough to its west providing beneficial flow . Banding features improved around the circulation , and the National Hurricane Center upgraded the depression to Tropical Storm Jeanne on September 13 about 135 mi (220 km) southeast of Saint Croix . While crossing the Lesser Antilles , the storm brought locally heavy rainfall , with a total of 12 inches (305 mm) reported in

Guadeloupe .

Tropical Storm Jeanne quickly organized over the eastern Caribbean Sea , developing a tight inner core and well @-@ defined outflow as it tracked over warm water temperatures of about 84 ° F (29 ° C) . Initially , the storm was forecast to attain hurricane status before crossing Puerto Rico . However , its organization deteriorated by early on September 15 , with radar imagery tracking a low @-@ level circulation moving away from the convection . The temporary weakening was due increased shear and dry air . At 1600 UTC on September 15 , Jeanne made landfall near Guayama , Puerto Rico with winds of 70 mph (115 km / h) , and as it moved ashore it was in the process of developing an eye . Across the territory , the storm produced heavy rainfall , peaking at 23 @.@ 75 inches (605 mm) on Vieques Island . Rainfall across the region resulted in moderate to severe river flooding , with several river stations in Puerto Rico reporting historical levels . Light winds , generally around tropical storm force , affected the region as well .

= = Second landfall and reorganization = =

Tropical Storm Jeanne remained over Puerto Rico for about eight hours , during which it maintained its eye feature and well @-@ defined inner core of convection . It intensified over the Mona Passage , and attained hurricane status as it struck the eastern tip of the Dominican Republic on September 16 . Continuing slowly west @-@ northwestward near the coast , Jeanne quickly weakened to tropical storm status , and by 24 hours after landfall its convection had deteriorated as the eye feature dissipated . Late on September 17 , it emerged into the Atlantic Ocean as a tropical depression , after having dropped torrential rainfall across Hispaniola . Catastrophic flooding and mudslides were experienced in Haiti , including in the coastal city of Gonaïves , and over 3 @,@ 000 deaths were reported in the country .

On September 17 , while it was over Hispaniola , the National Hurricane Center issued a forecast that predicted Jeanne to make landfall near Savannah , Georgia in about five days . However , the forecast noted uncertainty in regards to the steering currents , which depended on the movement of the remnants of Hurricane Ivan and a ridge building behind it . After it left the nation as a tropical depression , the original center of circulation tracked westward away from the convection and dissipated . However , a new circulation developed closer to the convection , and Jeanne regained tropical storm status on September 18 . By then , the mid @-@ level circulation associated with Hurricane Ivan had combined with a trough to weaken the ridge located across the western Atlantic Ocean ; this caused Jeanne to track northward through the Turks and Caicos Islands .

As it tracked northward , the storm failed to organize at first , due to the influence of an upper @-@ level low to its south . The circulation became broad and elongated , as well as removed from the deepest convection . However , after moving away from the low , the convection became better organized and more associated with the convection . After some initial slow organization continued , an area of deep convection developed over the center midday on September 20 . An eye developed within the convection , and late on September 20 Jeanne re @-@ attained hurricane status about 350 mi (570 km) east @-@ northeast of the Abaco Islands in the Bahamas .

While intensifying as a tropical storm , the National Hurricane Center faced difficulties in the future track of Jeanne , based on two major divergences between computer hurricane models . One scenario involved the storm accelerating east @-@ northeastward to the south of a trough , following the path of Hurricane Karl to its east . The other scenario involved Jeanne turning southeastward and looping westward due to a building ridge . By early on September 20 , the official forecast followed the first scenario , though later that day , officials changed the forecast to indicate the turn to the south .

= = Peak intensity and final landfall = =

Hurricane Jeanne steadily intensified as it turned eastward , developing a 52 mi (83 km) wide eye . A motion to the southeast began on September 22 , and around the same time it reached winds of 100 mph (160 km / h) , making it a Category 2 hurricane on the Saffir @-@ Simpson scale . At the

same time , the National Hurricane Center forecast to turn westward and later northwestward , with its projected five @-@ day track within 60 mi (100 km) of Cape Fear , North Carolina . The westernmost outlier during one model run was the NOGAPS model , which predicted a continued westward motion across central Florida . The official forecast changed early on September 23 to bring Jeanne across northeastern Florida , though initially the cyclone was predicted to turn northeastward and hit South Carolina as a hurricane .

By September 23 , Jeanne had begun a slow westward motion , with its previously well @-@ defined eye becoming ragged . It moved slowly over waters it traversed just four days prior , causing upwelling ; this is the process in which a stationary storm causes the water temperatures to decrease by bringing the cooler , deeper waters to the surface . As a result , Jeanne weakened to a minimal hurricane midday on September 23 , though it was forecast to re @-@ intensify and attain major hurricane status . By early on September 24 , the winds had decreased to 80 mph (130 km / h) ; its convection weakened in intensity , and the eyewall eroded due to dry air entrainment . However , as Jeanne moved toward an area of warmer waters , deep convection redeveloped around the eye . Its favorable upper @-@ level environment allowed the outflow to become better defined , with a large eye and nearby dry air being the primary restraining factors for development . At 1200 UTC on September 25 , Jeanne attained major hurricane status , and two hours later it made landfall on Abaco Island .

After it had been previously forecast to turn northwestward and track along the northeastern Florida coast , the forecast shifted 24 hours prior to moving ashore to a landfall point in the east @-@ central portion of the state ; the change was due to the persistence of the ridge to its north . The hurricane moved over Grand Bahama Island , and in the Bahamas it produced wind gusts of up to 130 mph (210 km / h) . As it approached the Florida coastline it did not strengthen much further , due to an eyewall replacement cycle ; this is the process in which an outer eyewall forms , causing the original eye to shrink and dissipate due to lack of moisture . At 0400 UTC on September 26 , Jeanne made landfall with peak winds of 120 mph (195 km / h) on the southern end of Hutchinson Island near Stuart , Florida , with an eye 50 mi (85 km) in diameter . The hurricane moved ashore in almost the same location as Hurricane Frances , which made landfall 21 days prior .

Upon moving inland in east @-@ central Florida , the hurricane produced a storm tide of up to 10 feet (3 m) in St. Lucie County . In New Smyrna Beach , the storm tide washed away much of the beach to the east of the city seawall . Overall impact from the storm tide was less than expected , due to the storm hitting at low tide . Jeanne produced peak winds of 120 mph (195 km / h) in a very small north of the center near Sebastian , though the National Hurricane Center noted the possibility of the strongest winds remaining over water . The National Weather Service office in Melbourne recorded sustained winds of 91 mph (147 km / h) , which was the strongest official sustained wind reading ; stronger readings were not available due to widespread power outages along its track . Wind gusts peaked at 128 mph (206 km / h) in Fort Pierce . In addition to the winds , the hurricane dropped heavy rainfall in the vicinity of its eyewall , peaking at 11 @.@ 97 inches (304 mm) in Kenansville . The rainfall caused freshwater flooding , as well as increased levels along the St. Johns River . The hurricane also produced several eyewall mesovortices and tornadoes near where it moved ashore .

= = Dissipation = =

As Hurricane Jeanne moved inland , its inner eyewall dissipated , and its outer eyewall quickly became less distinct . It turned west @-@ northwestward over the state , curving around the western periphery of the ridge to its northeast . By 14 hours after landfall , Jeanne weakened to tropical storm status near the Tampa Bay area . In western Florida , offshore winds produced a tide of 4 @.@ 5 feet (1 @.@ 4 m) below normal in Cedar Key ; however , after the storm passed the area , the onshore winds produced above normal tides . Despite initial forecasts that it would emerge into the Gulf of Mexico , the storm remained over land and continued to slowly weaken . Early on September 27 , dry air became entrained into the southern periphery of the circulation , which diminished the thunderstorms to the south . After turning northward , Jeanne entered

southern Georgia and weakened into a tropical depression .

As it moved northward , Jeanne continued to drop moderate to heavy rainfall , including over 7 inches (175 mm) in southern Georgia . A cold front across the region caused the depression to accelerate northeastward , combining moisture from the Gulf of Mexico with cool and stable air over the Carolinas . This combination produced severe thunderstorms across the region , spawning six tornadoes in Georgia , eight in South Carolina , and eight in North Carolina .

After crossing into Virginia , Jeanne transitioned into an extratropical cyclone by September 29 near Washington , D.C. In Wilmington , Delaware , the storm spawned an F2 tornado . Across the Mid @-@ Atlantic and New England , moisture from the storm produced light to heavy rainfall , with totals of over 7 inches (175 mm) near Philadelphia and Nantucket . Subsequent to becoming extratropical , the remnants of Jeanne turned eastward , exited into the Atlantic Ocean , and merged with a cold front .