= Tropical Storm Dean (2001) =

Tropical Storm Dean was a strong tropical storm that affected at least twelve islands along its path from the tropical Atlantic Ocean to east of Atlantic Canada in August 2001 . Dean developed from a tropical wave on August 22 over the Lesser Antilles , and was initially predicted to intensify further to reach hurricane status . However , strong wind shear quickly weakened Dean to cause it to dissipate on August 23 . The remnants turned northward , and redeveloped on August 26 to the north of Bermuda . Located over warm waters and in an area of favorable conditions , Dean steadily strengthened while moving to the northeast , and peaked just below hurricane status on August 27 about 465 miles (750 km) southwest of Newfoundland . The storm subsequently weakened over cooler waters , and became extratropical on August 28 .

The precursor tropical wave dropped heavy rainfall and produced moderate winds throughout the Lesser Antilles , though no serious damage was reported . In Puerto Rico , rainfall of up to 12 @.@ 7 inches (322 mm) produced widespread flooding across the island . Thousands were left without power or water , and two houses lost their roofs from the storm . The passage of Dean resulted in $ 7 @.@ 7 million (2001 USD , $ 9 @.@ 4 million 2008 USD) in damage in Puerto Rico . The storm produced light to moderate rainfall in Bermuda and later in Newfoundland , though no damage was reported .

= = Meteorological history = =

A large tropical wave with minimal convection moved off the coast of Africa near Dakar between August 14 and August 15 . It moved westward , and gradually developed thunderstorms across the wave axis . On August 21 , while located about 450 miles (725 km) east of the Lesser Antilles , convection increased further within the system , though unfavorable upper @-@ level wind shear prevented rapid development . It continued to become better organized , and though a Reconnaissance flight into the system reported strong winds , it lacked a surface circulation . Late on August 21 the wave passed through the northern Lesser Antilles , and subsequent to a decrease in wind shear the system became much better organized on August 22 . A surface circulation formed , and the system developed into Tropical Storm Dean on August 22 near Saint Croix . Dean was upgraded directly to a tropical storm due to the presence of 50 mph (80 km / h) winds in the storm .

Reconnaissance Aircraft and surface reports confirmed the existence of a circulation . Dean moved northwestward at 22 mph (35 km / h) , under the influence of the Bermuda High to its northeast . The storm strengthened slightly to reach winds of 60 mph (95 km / h) later on August 22 , though the circulation was exposed on the western edge of the convection due to the storm 's quick forward motion and persistent wind shear . Initial forecasts predicted the shear to decrease , allowing Dean to attain hurricane status with winds of over 80 mph (130 km / h) . However , an upper @-@ level trough produced an increase of shear over the storm , and by August 23 Dean weakened to a tropical depression . Hours later , the circulation dissipated , and Dean degenerated into a tropical wave to the east of the Bahamas . Regeneration was considered unlikely at the time .

The remnants of Dean turned to the north , and became embedded within a large mid @-@ level trough off the East Coast of the United States . Convection increased around the system early on August 24 . The system became better organized , with indications of a broad surface circulation forming about 400 miles (645 km) west @-@ southwest of Bermuda . However , a reconnaissance flight into the remnants of Dean reported a broad low pressure area with the strongest winds and convection located far from the area of minimum pressure , indicating it had some non @-@ tropical characteristics . The weak disturbance passed to the west of Bermuda early on August 25 , and subsequently began to drift to the northeast . The remnants of Dean produced convection near its developing circulation , and on August 26 , while located 220 miles (350 km) north of Bermuda the system organized sufficiently enough to be re @-@ classified a tropical depression . Operationally , the National Hurricane Center did not re @-@ initiate advisories until fifteen hours later .

The depression continued to the northeast , and re @-@ strengthened into Tropical Storm Dean

early on August 27 while located 580 miles (930 km) south of Halifax , Nova Scotia . The convection became better organized , and Dean steadily strengthened as it tracked northeastward . A ship near the center of Dean confirmed the storm re @-@ developed . The convection near the center greatly organized , and an eye feature began to develop . Remaining over warm waters , Dean continued to strengthen and reached peak winds of 70 mph (110 km / h) late on August 27 while located about 465 miles (750 km) southwest of Cape Race , Newfoundland . The eye feature failed to develop further , and after maintaining its peak intensity for 12 hours Dean weakened over progressively cooler waters . The convection quickly diminished , and on August 28 Dean became extratropical while located 145 miles (235 km) east @-@ southeast of Cape Race , Newfoundland . The extratropical storm continued northeastward until being absorbed by a frontal low on August 29 .

= = Impact and preparations = =

= = = Caribbean = = =

About a day before Dean developed , the National Hurricane Center advised interests in the northern and central Lesser Antilles to monitor the progress of the storm . Routine statements issued by the National Hurricane Center warned for the possibility of strong winds and heavy rains . However , because Dean formed after it passed the islands , no tropical cyclone warnings or watches were issued . The precursor disturbance dropped heavy rainfall on Saint Martin of around 5 inches (129 mm) .

The precursor disturbance to Tropical Storm Dean produced 1 @.@ 07 inches (27 mm) of rain in Saint Thomas , where winds reached 40 mph (64 km / h) with gusts to 48 mph (77 km / h) . On Saint Croix , the system produced 0 @.@ 49 inches (12 mm) of rain and peak wind gusts of 47 mph (76 km / h) . There , minor flooding was reported . Moderate wind gusts downed small trees and branches in Saint Croix and Saint John , and some roads were damaged in Saint John , as well . Heavy rains and gusty winds caused power outages throughout the U.S. Virgin Islands . The passage of Tropical Storm Dean resulted in minor damage totaling to $ 20 @,@ 000 (2001 USD , $ 24 @,@ 400 2008 USD) .

Tropical Storm Dean dropped heavy rainfall across Puerto Rico , peaking at 12 @.@ 7 inches (322 mm) in Salinas . Winds were generally light across the island . The passage of Dean resulted in widespread flooding in eastern and southern Puerto Rico , collapsing two bridges and one road . Several highways were under water , and one car was swept away by the floodwaters . The four inside the vehicle were later rescued and unharmed . Throughout the island , about 1 @,@ 320 houses were flooded , and two houses experienced collapsed roofs . The rains left various towns without power or water . By the night after the storm passed the island , more than 16 @,@ 000 were without power , while almost 70 @,@ 000 lacked potable water . Over 130 people were evacuated from low @-@ lying areas to hurricane shelters . Two people were injured in Peñuelas , and three were injured in Nagüabo when the ceiling of a day care center collapsed , though no deaths occurred on the island . One airline canceled seventeen flights in and out of the island , and one cruise line was required to alter its path to both Dean and earlier due to Tropical Storm Chantal . Damage in Puerto Rico totaled to $ 7 @.@ 7 million (2001 USD , $ 9 @.@ 4 million 2008 USD) , of which $ 2 @.@ 1 million (2001 USD , $ 2 @.@ 6 million 2008 USD) was from agricultural damage .

= = = Bahamas , Bermuda , and Canada = = =

Shortly after Dean formed , the government of the Bahamas issued a tropical storm warning for the southeastern Bahamas and the Turks and Caicos Islands . When the storm weakened and ultimately dissipated , the warnings were canceled . The remnants of Dean produced unsettled conditions across Bermuda , including a wind gust of 41 mph (66 km / h) and light rainfall of 0 @.@

31 inches (8 mm) . The passage of Dean resulted in the coldest day of August 2001 on the island . Dean produced wind gusts peaking at 63 mph (103 km / h) in Newfoundland , along with rainfall up to 4 @.@ 2 inches (107 mm) in eastern Newfoundland . On land , wave heights reached 30 feet (9 @.@ 3 m) , while a buoy offshore reported a peak wave height of 47 feet (14 @.@ 4 m) .