

= Hurricane Kyle (2008) =

Hurricane Kyle was the eleventh tropical storm and sixth hurricane of the 2008 Atlantic hurricane season . It formed from a strong tropical disturbance that tracked across the northeastern Caribbean Sea in the third week of September . As a low pressure area , it moved slowly across Puerto Rico and Hispaniola , dumping torrential rains across those islands .

By September 24 , it began to track northward away from the islands , and developed enough strong thunderstorm activity near its center and a well @-@ defined enough circulation to be deemed a tropical storm on September 25 . It strengthened to a hurricane on September 27 west of Bermuda . It made landfall in Nova Scotia as a Category 1 hurricane late on September 28 , then became extratropical shortly afterward .

The precursor to Kyle produced torrential rainfall over Puerto Rico , resulting in six fatalities and \$ 48 million in damages . Little impact was recorded in Hispanola and Bermuda as the system tracked northward . Along the eastern United States , rough seas resulted in two fatalities and as the storm made landfall in Canada , heavy rains fell in eastern Maine . In Canada , Kyle had relatively little impact , leaving \$ 9 million in damages and no fatalities .

= = Meteorological history = =

Hurricane Kyle began as a weak area of low pressure associated with a tropical wave that moved off the west coast of Africa on September 12 . The system tracked in a general westward direction with little convective development and tracked over the Leeward Islands on September 18 . An upper @-@ level trough situated over the eastern Caribbean Sea interacted with the wave , resulting in an increase in shower and thunderstorm activity . The following day , a larger surface circulation developed as the low moved towards the northwest . The wave later became separated from the low , with the wave continuing towards the west and the low tracking to the northwest . The National Hurricane Center (NHC) , at this time , were not anticipating significant development of the low as strong wind shear inhibited deep convection from forming . Around 1400 UTC on September 21 , a Tropical Cyclone Formation Alert (TCFA) was issued for the system as convection developed around the center of circulation .

Around 0000 UTC on September 25 , the disturbance was sufficiently organized to be declared a tropical depression . Shortly after , the NHC issued their first advisory on the system as it intensified into a tropical storm , assigning it the name Kyle . The center of the storm was slightly elongated but moderate wind shear continued to impact the circulation . Kyle track northward in response to an area of high pressure east of Bermuda and an area of low pressure along the eastern United States . The sheared structure of the storm led to problems with recording the intensity of the storm throughout the day . Hurricane Hunters continuously flew into the storm to record information ; however , their estimates were considered too high as the storm was disorganized .

Late on September 26 , shear began to relax and deep convection redeveloped around the center of circulation and the forward motion of the storm began to increase . Several hours later , the storm made a sudden northwest jump due to a passing shortwave trough . By this time , Kyle was just below hurricane @-@ status , with sustained winds up to 70 mph (110 km / h) . Continued organization led to the storm attaining hurricane intensity at 1200 UTC on September 27 while located about 345 mi (555 km) west of Bermuda . Upon attaining this intensity , the storm became embedded within an area strong , divergent , upper @-@ level winds . Increasing in forward motion , the center of Kyle was located along the southwestern edge of the deep convection .

By September 28 , the storm began to struggle maintaining its intensity due to increasing shear and cooling sea surface temperatures ; around 1200 UTC that day , the NHC assessed Kyle to have reached its peak intensity with winds of 85 mph (140 mph) . Several hours later , the barometric pressure of the storm decreased to 984 mbar (hPa ; 29 @. @ 06 inHg) , the lowest during its existence . Around this time , the hurricane began to undergo an extratropical transition as it approached Nova Scotia . By the end of September 28 , little deep convection remained around the center of Kyle . Buoys nearby the storm recorded seas in excess of 36 ft (11 m) and hurricane

@-@ force winds as it neared landfall . It was estimated that Kyle made landfall near Yarmouth , Nova Scotia around 0000 UTC on September 29 with winds of 75 mph (120 km / h) . This marked the first time since Hurricane Juan in 2003 that a hurricane made landfall in Canada , exactly five years , to the day , prior . Shortly after landfall , the storm weakened below hurricane @-@ status and completed its transition into an extratropical cyclone . Throughout September 29 , the remnants slowed and the system attained frontal features . The following day the system moved over the Gulf of Saint Lawrence before being absorbed by another large extratropical cyclone .

= = Preparations = =

= = = Puerto Rico and Haiti = = =

On September 22 , about 3 days before the system had formed into a tropical storm , its significant rainfall in the eastern Caribbean prompted flash flood warnings in Puerto Rico and the British Virgin Islands . In the Dominican Republic a green alert was issued for provinces in the eastern part of the nation . The next day yellow alerts were issued for eight provinces and red alerts in eight more . Evacuations began in vulnerable San Pedro de Macoris , La Romana , and Barahona and San Jose de Ocoa . The system moved westward on September 23 , threatening Haiti with its rains which prompted the issuance of heavy rain warnings and a red alert warning by the nation 's government .

= = = Bermuda = = =

Early on September 26 , Tropical Storm Kyle was deemed to be a threat to Bermuda and a tropical storm watch was issued for the islands . Later that day the watch was upgraded to a tropical storm warning as the storm neared the island . The following day , the warning was discontinued as Hurricane Kyle bypassed the island .

= = = New England and Atlantic Canada = = =

On September 27 , the state of Maine issued its first hurricane watch in seventeen years with the predicted path to approach the eastern part of the state . The last hurricane watch issued for Maine was associated with Hurricane Bob in 1991 . Eastern Maine 's power company , Bangor Hydro @-@ Electric , prepared for potential outages and planned to have additional crews on duty . The system turned and missed the state , though .

The Canadian Hurricane Centre issued watches and warnings for parts of Nova Scotia and New Brunswick on September 27 , concurrent with the Maine warnings . New Brunswick Power indicated that repair crews were on standby and neighbouring utilities have been called to assist if needed . The Red Cross in New Brunswick also were checking equipment and supplies to meet any need that might arise . Hours before landfall , a hurricane warning was issued for portions of Nova Scotia . This was the first hurricane warning ever in Canada (tropical storm and hurricane advisories were not issued in Canada prior to 2004 , a policy changed due to Hurricane Juan in 2003) .

= = Impact = =

= = = Puerto Rico = = =

The precursor to Kyle produced record breaking rains over Puerto Rico from September 21 to 23 . With isolated maxima in excess of 30 inches (760 mm) , rivers breached their flood walls and flooded low @-@ lying areas . In Patillas , a 500 @-@ year 24 ? hour rainfall event took place , with 22 @. @ 03 in (559 @. @ 5 mm) falling from 8 a.m. on September 21 to 8 a.m. on September 22 . Some rivers rose more than 25 ft (7 @. @ 6 m) in 12 hours , leading to severe flooding . Three

deaths were directly blamed on the system as a result of the floods and mudslides . Another three deaths were indirectly related due to stress induced heart attacks . Mudslides , triggered by the torrential rain , closed highways and schools . Damage to agriculture on the island was estimated to be \$ 23 million and structural damage was estimated at \$ 25 million , for a total of \$ 48 million . In addition to the system 's rainfall , its winds whipped up 10 ft (3 m) waves along the island 's southern coast .

= = = Hispanola = = =

Heavy rains on September 23 , produced by the tropical wave which would eventually become Kyle , caused renewed flooding in the already flood @-@ stricken areas of the Dominican Republic and Haiti . The Orangers River overflowed its banks , flooding parts of Jacmel , severely damaging homes . By September 26 , flash flooding impacted areas recovering from previous floods in the Dominican Republic . Rainfall totals in eastern parts of the Dominican Republic exceeded 16 in (410 mm) .

= = = Bermuda = = =

Between September 25 and 26 , the outer bands of Kyle brought sustained winds up to 45 mph (75 km / h) and heavy rains that amounted to 1 @.@ 53 in (39 mm) during the two @-@ day span in Bermuda . The heaviest rainfall fell mostly on the western coast of the island as a narrow band of moderate rainfall tracked through . No structural damage or injuries resulted from the passage of Kyle in Bermuda .

= = = Northeast United States = = =

Kyle produced high waves along the coast of Rhode Island as it moved northward . A newly married couple were killed when high waves knocked the wife into the rocky shores . Her husband jumped in to save her but was overcome by the waves himself . The bodies of the couple were found days later . Large swells produced by Kyle , enhanced by a strong onshore flow , caused significant beach erosion along the New Jersey coastline . Cuts up to 6 ft (1 @.@ 8 m) in beach dunes were recorded . Heavy rains from Kyle caused flash flooding in Hartford County , Connecticut , flooding six cars and numerous basements . Total damages in Hartford were estimated at \$ 40 @,@ 000 .

Rainfall up to 5 in (127 mm) in Massachusetts caused a river in Somerset to overflow its banks , flooding nearby areas with 2 feet (0 @.@ 6 m) of water . A large sinkhole formed on County Street and several cars were stranded in the floodwaters . Two people had to be rescued by boat when their car was overcome by the floodwaters . In addition , numerous basements were flooded . Damages in Bristol County were estimated at \$ 25 @,@ 000 . A mobile home park in Plymouth County was inundated with 2 @.@ 5 ft (0 @.@ 7 m) of water , causing one home to shift off its foundation . Damages to the homes were estimated at \$ 50 @,@ 000 .

As the storm made landfall in Nova Scotia , the outer bands produced heavy rains and strong winds over eastern Maine . Wind gusts were recorded up to 45 mph (75 km / h) in coastal Hancock County . The strong winds toppled trees , leaving 500 customers without power . Rainfall generally amounted from 3 to 4 @.@ 5 in (76 @.@ 2 to 114 @.@ 3 mm) , with a maximum of 7 @.@ 15 in (181 @.@ 61 mm) in Sedgwick Ridge . The heavy rains flooded several roads , causing traffic delays and road closures throughout southeastern Maine . Throughout the Northeast United States , two people were killed and damages were estimated at \$ 115 @,@ 000 .

= = = Canada = = =

Upon making landfall , Kyle produced a 2 @.@ 6 ft (0 @.@ 79 m) storm surge in combination with high tide and a new moon . In southwestern Nova Scotia , high winds downed numerous trees and power lines . A ship reported a wind gust of 96 mph (154 km / h) near Shelburne and a boat was

reported to have been swamped nearby . The highest rainfall was recorded in Bon Accord , New Brunswick at 2 @. @ 8 in (72 mm) . Light rainfall , up to 1 @. @ 6 in (41 mm) fell over Prince Edward Island and Nova Scotia . A buoy in Georges Bank recorded a wind gust of 79 mph (128 km / h) . According to Nova Scotia Power Corporation at the height of the storm , winds knocked out power to more than 40 @, @ 000 customers . While in New Brunswick , strong winds and heavy rainfall were strong enough to knock power out for approximately 2 @, @ 300 customers across the province . Gusting winds resulted in the Confederation Bridge , linking New Brunswick and Prince Edward Island , being closed to high @- @ sided vehicles for 7 ½ hours . No fatalities were reported in Canada , and damages were minor , totaling to \$ 9 million .

= = Aftermath = =

On October 1 , President George W. Bush declared Puerto Rico major disaster area . The declaration allowed federal assistance to reach affected communities in the United States Commonwealth . Residents who met the requirements to receive federal aid were eligible for funding for temporary housing . People who lost their jobs due to the flooding were eligible for unemployment grants for 26 weeks starting the day of the disaster declaration . Residents were able to receive up to \$ 200 @, @ 000 for home damages ; up to \$ 40 @, @ 000 in personal possession losses ; and up to \$ 2 million for business losses . By October 17 , more than \$ 5 @. @ 6 million in disaster aid was approved for 20 @, @ 284 residences . Community Relations teams visited about 7 @, @ 000 people . Out of the 4 @, @ 140 small @- @ business loans applications , only 288 were submitted by this time . By October 25 , the amount of funds nearly doubled , reaching \$ 11 million . At this time , more than , 24 @, @ 500 residents applied for disaster loans . Survey teams checked over 18 @, @ 000 homes for flood @- @ related damages at this time also . Funding reached \$ 16 @. @ 5 million by November 7 , with 29 @, @ 000 people requesting federal assistance . By December 5 , funding for 37 @, @ 000 residents reached \$ 23 @. @ 1 million . At this time , the deadline for federal assistance requests was set for January 15 , 2009 . On January 2 , 2009 , funding for small businesses was being provided , with \$ 6 million being contributed . Grants for residents also reached \$ 25 million . After the flooded rivers crested and receded , bulldozers began clearing mud covered streets .