

= Hurricane Isbell =

Hurricane Isbell was the final hurricane to affect the United States during the 1964 season . The eleventh tropical storm and sixth hurricane of that season , Isbell developed from a dissipating cold front in the southwestern Caribbean Sea on October 8 . The depression initially remained disorganized as it track northwestward , but strengthened into Tropical Storm Isbell on October 13 . Re @-@ curving northeastward , Isbell quickly strengthened further and reached hurricane status by later that day . Late on October 13 , Isbell made landfall in the Pinar del Río Province of Cuba . The storm continued strengthening and peaked as a Category 3 hurricane on the following day . Isbell moved northeastward and made landfall near Everglades , Florida , late on October 14 . After reaching the Atlantic on the following day , the storm began to weaken . Isbell turned northward and continued weakening , before transitioning to an extratropical cyclone while located just offshore eastern North Carolina on October 16 .

The storm produced strong winds throughout western Cuba . Hundreds of homes were destroyed , as were several tobacco warehouses . There was at least \$ 20 million in damage and four deaths in Cuba , three of them caused by collapsing houses in the Guane area . Several tornadoes in Florida caused significant damage . Throughout the state , 1 house was destroyed , 33 were severely damaged , and 631 suffered minor impact . Additionally , 66 trailers were destroyed and 88 were inflicted with major damage . Three deaths occurred in the state , one due to a heart attack and two from drowning in Florida Keys when their shrimp boat sank . Because the storm weakened considerably , impact in North Carolina was generally minor . The storm also spawned at least six tornadoes in the state , which demolished trailers and unroofed homes and other buildings in several communities . Damage throughout the United States totaled \$ 10 million .

= = Meteorological history = =

Hurricane Isbell was first identified as a weak tropical disturbance on October 7 , 1964 over the western Caribbean Sea . Situated to the south of a diffuse trough , the system remained weak and relatively disorganized as it moved generally northwest near Honduras and Nicaragua . Despite the presence of an upper @-@ level anticyclone , which promotes favorable outflow for tropical cyclones and aids in tropical cyclogenesis , a lack of distinct low @-@ level inflow inhibited intensification . Additionally , an area of warm mid @-@ tropospheric air was present within the cyclone . Though a disheveled system , it is analyzed to have become a tropical depression by 12 : 00 UTC on October 8 . The following day , the depression skirted the eastern coast of Honduras . Operationally , it was not until October 10 that the Weather Bureau initiated advisories on the depression . On that date , a weather reconnaissance mission into the system found a weak low @-@ level circulation with a barometric pressure of 1007 @.@ 3 mb (hPa ; 29 @.@ 75 inHg) and winds of 20 ? 30 mph (30 ? 45 km / h) in squalls . Throughout October 11 and 12 , the depression slowly executed a tight cyclonic loop over the northwestern Caribbean Sea . It finally organized into a tropical storm and was given the name Isbell by 00 : 00 UTC on October 13 after completing the loop and acquiring a north @-@ northeast trajectory .

Throughout October 13 , marked intensification of the cyclone occurred . Over a 24 ? hour span , ending at 18 : 00 UTC , its central pressure fell from 1005 mb (hPa ; 29 @.@ 68 inHg) to 979 mb (hPa ; 28 @.@ 91 inHg) which was reflected in Isbell 's winds more than doubling from 35 mph (55 km / h) to 90 mph (150 km / h) . Shortly thereafter , the storm made landfall in extreme western Cuba , near Guane , before emerging over the southeastern Gulf of Mexico . Isbell 's brief stint over land did not hinder development , which continued unabated until 12 : 00 UTC on October 14 at which time it reached its maximum intensity . Situated to the south of Key West , Florida , Isbell attained winds of 125 mph (205 km / h) which ranks it as a Category 3 hurricane on the modern @-@ day Saffir ? Simpson hurricane wind scale . Additionally , its central pressure bottomed out at 964 mb (hPa ; 28 @.@ 47 inHg) . Around this time , a new low @-@ pressure area formed 300 mi (480 km) to Isbell 's northwest over the Gulf in response to a powerful cold @-@ core low over the Mississippi Valley . The cyclonic flow of this second system brought cool , dry air from the north and

circulated it into the hurricane . This in turn caused the storm to become asymmetric in structure with radar imagery indicating little to no reflectivity along the western periphery of the hurricane .

The degrading structure of Isbell resulted in some weakening as it accelerated toward Florida . At 22 : 00 UTC on October 14 , the hurricane made landfall near Everglades City as a Category 2 with sustained winds between 100 and 110 mph (160 and 175 km / h) . Within five hours , the system cleared the Florida Peninsula and emerged over the western Atlantic Ocean north of West Palm Beach . The storm 's passage over land resulted in notable weakening , though Isbell remained of hurricane @-@ strength . During the afternoon of October 15 , the low that had formed the previous day induced a northward turn of the cyclone and directed it toward North Carolina , a result of what is known as the Fujiwhara effect . Thereafter , the two systems began to intertwine as Isbell began transitioning into an extratropical cyclone ; rapid weakening accompanied this phase . Isbell completed this process by 12 : 00 UTC on October 16 as it moved onshore near Morehead City , North Carolina . On October 17 the two non @-@ tropical systems merged into a single storm over the Outer Banks . Isbell 's remnants emerged back over the Atlantic Ocean on October 18 near the Delmarva Peninsula before accelerating northeast . The system was last noted on October 19 as it moved over Atlantic Canada .

= = Preparations = =

In Cuba , thousands were evacuated due to flooding lowlands . Advisories were broadcast and issued warning of the possibility of heavy rains and winds , isolated small hail , and possible isolated tornadoes in Florida from 21 : 00 UTC on October 14 to 02 : 00 UTC on October 15 . The aviation severe weather forecast also warned residents in south and central Florida of up to 0 @.@ 75 in (19 mm) of hail , gusts of up to 53 mph (85 km / h) , and the potential for tornadic activity . Flood warnings were also issued , with predictions of flooding 4 ft (1 @.@ 2 m) above flood stage . Emergency preparations at Key West 's weather office were made . In the morning hours of October 13 , the office alerted city , county , and military officials . In the afternoon , they completed office preparations and scheduling . On October 14 , the office requested radio stations to stay on the air and relayed hourly reports .

In North Carolina , some tidal flooding was also forecast . People were warned to tune to television and radio broadcasts . On October 15 , as Isbell rapidly crossed Florida , forecasters at the Charleston , South Carolina Weather Bureau warned of high tides of up to 12 ft (3 @.@ 7 m) , 5 ft (1 @.@ 5 m) above flood @-@ stage , from South Carolina into North Carolina . Owing to the continued northeastward movement of the storm , tides ultimately did not exceed 2 ft (0 @.@ 61 m) in South Carolina . Across coastal areas of North Carolina , alerts for severe thunderstorms , tornadoes , and high tides were raised ; however , the storm greatly diminished before reaching shore and little damage materialized . Moderate rains along the lower Neuse River basin were expected to prolong flooding triggered by Hurricane Hilda and its remnants earlier in October . Small craft advisories were raised northward to Provincetown , Massachusetts , through October 18 .

= = Impact = =

= = = Cuba = = =

Skirting the extreme western coast of Cuba on October 13 , the storm produced gusts estimated at 100 mph (160 km / h) in Pinar del Rio Province . The highest measured sustained winds were 85 mph (140 km / h) in Guane and 70 mph (110 km / h) at Rancho @-@ Boyeros Airport in the capital city of Havana . Additionally , pressures at the city fell to 979 mbar (hPa ; 28 @.@ 91 inHg) . Heavy rains caused rivers to over @-@ top their banks , forcing thousands of people to evacuate . Three fatalities occurred in Guane due to collapsing homes . A fourth fatality took place elsewhere in Cuba . Numerous homes were damaged or destroyed by the storm , with exact numbers unknown . The region 's tobacco crop also sustained considerable losses with fields and warehouses

destroyed . The damage to agriculture compounded economic losses in Cuba that resulted from Hurricane Flora in September 1963 , which devastated the nation , as well as impacts from Hurricanes Cleo and Hilda earlier in 1964 . The combined effects of Cleo , Hilda , and Isbell resulted in economic losses of approximately \$ 100 million in the country , of which at least \$ 20 million was directly attributed to Isbell .

= = = Florida = = =

Though Isbell struck the state as a Category 2 hurricane , no winds in excess of 100 mph (160 km / h) were reported . Measurements peaked at 90 mph (150 km / h) at both Everglades City and Indiantown . Hurricane @-@ force gusts were measured in Belle Glade , Fort Lauderdale , Key West , Pompano Beach , and West Palm Beach . Atmospheric pressures fell to 970 @.@ 7 mb (hPa ; 28 @.@ 67 inHg) in the Dry Tortugas and 977 @.@ 5 mb (hPa ; 28 @.@ 87 inHg) on the mainland in Juno Beach . Rainfall in the state was relatively limited owing to the brisk movement of the storm , though a frontal system immediately preceding the hurricane brought heavy rains to the state . A peak total of 9 @.@ 46 in (240 mm) was measured in West Palm Beach , though an estimated 80 % of this was attributable to the front . Amounts from the hurricane itself were likely around 5 in (130 mm) . No major storm surge was reported during Isbell 's passage due to greatly weaker winds in the back half of the storm . Tides in Key West rose 4 to 5 ft (1 @.@ 2 to 1 @.@ 5 m) above normal .

Throughout Florida , three people were killed in relation to the storm and no more than \$ 10 million in damage occurred , with more than half of which was attributed to agricultural losses . In addition , 76 people were injured , 12 of whom required hospitalization . Structural damage was relatively limited , with only 63 homes and businesses , mostly trailers , being destroyed ; 159 other structures sustained major damage while a further 631 experienced minor damage . The majority of damage from Isbell was not from the hurricane itself but rather tornadoes spawned by its outer bands . At least nine , and as many as twelve , tornadoes affected the state with the greatest effects being felt in the Miami metropolitan area . All storm @-@ related injuries were attributed to these tornadoes as well as the majority of structural damage . According to the National Climatic Data Center , four of these tornadoes were of F2 intensity .

Despite the close passage of the storm to the Florida Keys , damage in the area was light and amounted to \$ 175 @,@ 000 . Of this , \$ 125 @,@ 000 was attributed to structural damage . Hurricane @-@ force winds in the archipelago only lasted 15 minutes and gale @-@ force winds occurred over a 5 hour span . The brevity of damaging winds limited the effects of the storm . Most damage was constrained to downed trees , signs , and power poles . Two trailers were overturned , however , and an oil barge sank in the Key West Harbor . Two people drowned after their shrimp boat was destroyed . In and around the Fakahatchee Strand Preserve State Park , Royal Palms , and Royal Poincianas were defoliated by the hurricane 's winds . Downed trees and power lines in Collier County temporarily left many customers without phone and electrical service . Residents in nearby Lee Cypress stated that the effects from Isbell were worse than Hurricane Donna which struck the region as a Category 4 in September 1960 .

Palm Beach County was the most affected area , accounting for more than half of the losses , and approximately \$ 700 @,@ 000 in damage . One indirect death occurred when a man suffered a heart attack in Lake Worth while installing storm shutters . At least three tornadoes were spawned in Palm Beach County . The strongest was an F2 that struck a trailer park in Briny Breezes , damaging numerous trailers and injuring 22 people . Shortly thereafter the same tornado or possibly a second one struck Boynton Beach , injuring three people and damaging several structures . The event lasted roughly 20 minutes and the tornadoes moved along a path 10 mi (16 km) long . Another tornado in Boca Raton caused a number of minor injuries . In West Palm Beach , a twister that crossed the intersection of State Roads 802 and 809 damaged adjacent properties and injured several people . Throughout Palm Beach County , 492 homes suffered damage , while 36 mobile homes were demolished and 60 others were inflicted major impact . Additionally , 33 farm buildings and 9 small businesses were severely damaged or destroyed .

In Martin County , an F2 was spawned in Hobe Sound and affected the area near U.S. Route 1 . About 39 homes and 13 mobile homes were damaged , while two farm buildings and two businesses also received impact . The forth F2 tornado was spawned in Brevard County near Eau Gallie . It caused extensive damage and injured 17 people in the Orange Court trailer park . Collectively , 35 homes in Flagler and Volusia counties were damaged .

= = = The Carolinas and elsewhere = = =

Heavy rains associated with Isbell and a nearby non @-@ tropical low resulted in heavy rains across The Carolinas on October 15 and 16 . In and around the Columbia , South Carolina area , 3 to 6 in (76 to 152 mm) of rain fell , with a peak of 6 @. @ 11 in (155 mm) in the city itself . Significant flooding took place along all rivers in the state ; the Broad River crested at 32 @. @ 1 ft (9 @. @ 8 m) , its highest level since 1940 , in Blair . The Pee Dee River rose to 39 ft (12 m) at Cheraw by October 18 , roughly 9 ft (2 @. @ 7 m) above flood @-@ stage . The cotton crop sustained the greatest losses during the event , with damage estimated in excess of \$ 1 million . Along the coast , tides rose to 6 @. @ 2 ft (1 @. @ 9 m) , 2 @. @ 1 ft (0 @. @ 64 m) above normal , in Charleston Harbor . What little coastal flooding took place mostly resulted from wave run @-@ up rather than tidal flooding . Some beach erosion occurred in exposed areas .

Much of North Carolina was affected by Isbell with rain extending into interior parts of the state . Totals were generally light , however , and peaked at around 5 in (130 mm) in eastern areas . Some flash flooding took place in the Piedmont , though overall effects were minimal . In the Blue Ridge Mountains , the French Broad River topped its banks and prompted evacuations in Hot Springs and Marshall . The greatest impacts were felt along the Neuse River in Kinston within Lenoir County . Rains from Isbell exacerbated ongoing floods in the area , resulting in heavy damage to many homes . A man was swept away by swift currents near a Duke Energy steam plant in Cliffside ; however , it is unknown if he perished or was later rescued . Losses to the peanut crop were extensive , though no monetary value is available . With the storm arriving at low @-@ tide , no notable coastal flooding occurred . The significant weakening of Isbell prior to landfall also lessened the effects from wind as gale @-@ force winds were mostly constrained to coastal areas ; a peak gust of 75 mph (120 km / h) was measured in Elizabeth City .

Elsewhere along the East Coast , the remnants of Isbell produced generally light to moderate rain . A localized maximum of around 5 in (130 mm) occurred in Massachusetts as the system began to dissipate . Immediately following the storm , an unseasonably strong cold front brought near @-@ freezing temperatures to Virginia , resulting in frost . The combination of the cold air and the hurricane prevented any peanut bumper crop harvesting in the state .