

= Hurricane Alex ( 2010 ) =

Hurricane Alex was a rare June hurricane and the first tropical cyclone to develop in the 2010 Atlantic hurricane season . Originating from an area of disturbed weather on June 25 , 2010 , it slowly developed in the western Caribbean Sea and struck Belize as a strong tropical storm . After entering the Gulf of Mexico , Alex became very large and encountered conditions favorable for gradual development . Early on June 30 , the cyclone attained hurricane status as it approached northeastern Mexico , the first June hurricane in the Atlantic basin since Hurricane Allison in 1995 , and the storm rapidly intensified just off the coast of Tamaulipas . Alex came ashore near Soto la Marina as a Category 2 hurricane on the Saffir @-@ Simpson Hurricane Wind Scale .

Alex caused the deaths of at least 51 people along its path , and produced over \$ 1 @.@ 8 billion ( 2010 USD ) in damage . The precursor of the hurricane produced substantial rainfall across the Greater Antilles , causing one death in the Dominican Republic . Fourteen people were killed in Central America as a result of flooding during the first landfall of Alex . In Mexico , the storm 's outer rainbands killed three people in Acapulco , one person in Oaxaca , and another in Chiapas . At its final landfall , Alex caused at least fifteen deaths in Nuevo León , eight in Coahuila , six in Guanajuato , and one in both Tamaulipas and San Luis Potosí ; an additional twenty persons were reported missing .

Alex triggered widespread power outages throughout northeastern Mexico and southern Texas . Damage was most evident in the Monterrey metropolitan area , which faced what Nuevo León governor Rodrigo Medina de la Cruz described as , " the worst weather phenomenon in its history . " Following Alex 's final landfall , a state of emergency was declared for most of Nuevo León , portions of Tamaulipas , and Texas . Widespread flooding from the storm affected 500 @,@ 000 people throughout northeast Mexico , and ruined over 200 @,@ 000 hectares ( 500 @,@ 000 acres ) of crops in the region , equivalent to 11 % of the region 's total farmland .

= = Meteorological history = =

The weather system from which Hurricane Alex developed was first discernible as a disturbance in the Intertropical Convergence Zone ( ITCZ ) on June 17 , 2010 . Over the next few days , most of its associated thunderstorm activity was embedded within the ITCZ . The National Hurricane Center ( NHC ) first mentioned it as a candidate for tropical cyclone formation on June 20 , while it was crossing the Windward Islands into the southeastern Caribbean Sea ; at the time , some upper @-@ level wind shear was present , leading to conditions only marginally favorable for development . The system moved through the Caribbean , and on June 21 , it developed to the extent that the NHC assessed a 50 % chance of development into a tropical depression within 48 hours . The next day , however , the feature deteriorated as thunderstorm activity spread across the Greater Antilles , although the upper @-@ level regime remained favorable for eventual redevelopment .

On June 24 , a low @-@ level circulation had gradually become better established to the south of Jamaica , although it was displaced from its poorly organized convection . By 1800 UTC , a surface low @-@ pressure area had formed about 105 miles ( 165 km ) to the northeast of Cabo Gracias a Dios , Nicaragua , but due to a lack of persistent thunderstorm activity , it was not yet considered a tropical cyclone . Later that day , convection increased over the center of circulation , and atmospheric pressures dropped across the region . Late on June 25 , Hurricane Hunters verified the development of a surface low pressure area , which , combined with the increase of thunderstorm activity , indicated the system was a tropical depression . Accordingly , the cyclone was classified as Tropical Depression One at 2200 UTC , while located about 345 miles ( 555 km ) to the east @-@ southeast of Chetumal , Quintana Roo . After the end of the hurricane season , the National Hurricane Center revised their analysis and estimated that the system had actually become a tropical depression at around 1800 UTC . At the time of its formation , the depression was moving to the west @-@ northwest , steered by a high pressure system over the northern Gulf of Mexico . An anticyclone positioned over the storm created an environment of minimal wind shear , and the depression quickly intensified . At 0900 UTC on June 26 , it obtained tropical storm status and was

given the name Alex .

As Tropical Storm Alex progressed through the western Caribbean Sea towards the Yucatán Peninsula , it developed a large field of clouds accompanied by well established outflow throughout its circulation . Its inner structure was initially disorganized , although by late on June 26 , it became better defined . At about 2100 UTC , as the tropical storm approached the Belize coast , a Hurricane Hunters flight reported winds of 65 mph ( 100 km / h ) ; early on June 27 , Alex made landfall just north of Belize City at this intensity . Upon moving ashore , an area of convection increased over the center , and the convection initially became better defined as it crossed the Yucatán Peninsula . While most tropical cyclones weaken and become disorganized after landfall , Alex seemed to become stronger when viewed on radar and satellite imagery ? the National Hurricane Center noted in one of its forecast discussions that the cyclone 's structure more closely resembled a hurricane than a deteriorating storm . Still , after enough time over land , convective activity markedly decreased , and Alex weakened to tropical depression status as it approached the peninsula 's western coastline . Late on June 27 , the depression emerged into the Gulf of Mexico with a large overall convective structure but little thunderstorm activity near the center due to the interaction with land .

When Alex was still located over the Yucatán Peninsula , the NHC remarked upon the potential for significant strengthening . Because of low wind shear and very warm water temperatures in the Gulf of Mexico , the possibility existed that Alex could intensify into a major hurricane ? a Category 3 storm on the Saffir - Simpson Hurricane Wind Scale ? before its next landfall . Early on June 28 , thunderstorm activity had reformed over the center , and the depression re - intensified into a tropical storm . For the next day , the combination of dry air , increasing wind shear and slightly cooler water temperatures prevented significant convection from developing over the center . At the same time , Alex was moving slowly off the northwest coast of the Yucatán Peninsula , and the environment 's conditions became more favorable for intensification as the tropical storm tracked away from the coast . The circulation envelope of Alex remained very large , and by June 29 , the storm 's rainbands covered the entire western half of the Gulf of Mexico ; rainfall was reported along the Texas and Louisiana coasts , even while the center was still several hundred miles offshore . The tropical storm continued to strengthen , and based on reports from Hurricane Hunters , it is estimated that Alex attained hurricane status at 0300 UTC on June 30 , about 255 miles ( 415 km ) southeast of Brownsville , Texas .

Upon becoming a hurricane , Alex was located in a moist , low shear environment , which led to steady intensification on June 30 . The pressure continued to fall ? a sign of an intensifying cyclone ? with a more rapid drop occurring that afternoon and evening . The hurricane strengthened into a Category 2 storm late on June 30 as it approached the northeastern Mexican coast . At 0200 UTC on July 1 , Alex made landfall at peak strength , with maximum sustained winds of 105 mph ( 165 km / h ) , gusts of 125 mph ( 205 km / h ) and an unusually low central pressure of 947 millibars ( 28 @ . 0 inHg ) in the municipality of Soto la Marina in the Mexican state of Tamaulipas . After the storm , the National Hurricane Center revised the landfall intensity estimate , showing Alex was even stronger when it struck the Mexican coast , with sustained winds of 110 mph ( 175 km / h ) and a central pressure of 946 millibars ( 27 @ . 9 inHg ) . Several hours after moving ashore , the storm weakened to Category 1 status , and its structure began to deteriorate . However , deep convection persisted around the center . By 1200 UTC , Alex had weakened into a tropical storm ; by 0000 UTC July 2 , the Sierra Madre Oriental disrupted Alex 's core , causing the storm to weaken into a tropical depression and dissipate over San Luis Potosí . However , the interaction with the mountain range caused orographic lift on the eastern side of the storm after the center of circulation had ceased to exist , producing torrential rainfall throughout northern and central Mexico . Following the dissipation of Alex , divergence at the 200 mb atmospheric pressure level ( approximately at 10 km ( 6 @ . 2 mi ) of altitude ) , a ridge of high pressure located over southern Texas , and Alex 's residual moisture interacted to produce intense convection over Nuevo León , Tamaulipas and Coahuila for the next 72 hours .

= = Preparations = =

== Caribbean ==

Immediately after the storm formed on June 25 , a tropical storm warning was issued for the entire east coast of Quintana Roo on Mexico 's Yucatán Peninsula . Shortly thereafter , the tropical storm warning was extended to include the east coast of Belize . Late on June 25 , the Government of Honduras issued a tropical storm warning for the islands of Roatan , Guanaja and Utila . A tropical storm watch was also issued from Limón to the border with Guatemala .

== Western Gulf Coast ==

As Alex neared hurricane strength on the evening of June 28 , a hurricane warning was issued for the coast of Texas south of Baffin Bay to the mouth of the Rio Grande . The Mexican government also issued a hurricane warning from the Rio Grande south to La Cruz . A tropical storm warning was posted for coastal Texas from Baffin Bay northward to Port O 'Connor . Governor of Texas Rick Perry declared a state of disaster in 19 counties and ordered the deployment of Texas Military Forces personnel ( including 80 citizen @-@ soldiers of the Texas State Guard Medical Brigade ) to the Rio Grande Valley . President Barack Obama also declared a state of emergency , freeing federal funds for 25 counties in Texas .

On June 29 , authorities began evacuations of residents of coastal areas in the Tamaulipas municipalities of Soto la Marina , Matamoros and San Fernando municipalities . On June 30 , the state 's civil defense agency and education secretary announced that schools would be closed throughout the state during the storm . Thirteen shelters were opened in Reynosa , twenty @-@ two in Matamoros , and ten in San Fernando ; a total of 3 @,@ 000 people sought protection from the storm in the three municipalities . Throughout the state , 20 @,@ 000 people were asked to evacuate to safer areas . Nuevo León schools were also ordered to be closed for at least 24 hours ; the Universidad Regiomontana , Universidad de Monterrey and Universidad Autónoma de Nuevo León followed suit . In Monterrey , mandatory evacuations alongside the Santa Catarina River were ordered , as well as the evacuation of 5 @,@ 000 families in the highlands of the city . Throughout the state , a total of 90 shelters were opened . Coahuila did not close its schools , expecting Alex to reach the state as a tropical depression or weaker , but asked its schools to not take attendance .

Prior to Alex making landfall , the Brownsville , Texas National Weather Service issued a flood watch for the southernmost region of the state . The storm was expected to produce heavy rainfall for up to 18 hours , which had the potential to cause significant flooding in poor drainage areas , especially those flooded by Hurricane Dolly in 2008 . Officials opened hurricane shelters , and voluntary evacuations were put into place for South Padre Island ; at least 1 @,@ 000 people sought shelter in Cameron and Hidalgo counties .

== Impact ==

== Caribbean and Central America ==

The tropical wave from which Alex developed produced rainfall across the Greater Antilles in the central Caribbean Sea . In the Dominican Republic , the rainfall triggered flooding that prompted the evacuations of over 3 @,@ 000 people , mostly due to swollen rivers . In the capital city of Santo Domingo , 160 houses were flooded , and one person was killed by the storm ; one additional person was reported missing . In nearby San Juan de la Maguana , more than 500 homes were inundated . In neighboring Haiti , minor flooding was reported in Gonaïves . The Jamaica Meteorological Service issued a flash flood warning for its entire island in response to the tropical wave producing thunderstorms across the nation .

Fourteen people were killed in Central America as a result of flooding related to Alex : six in

Nicaragua , six in El Salvador , and two in Guatemala . In El Salvador , the national chapter of the Red Cross evacuated over 150 families from La Paz and Sonsonate departments . The El Salvador government reported nine injuries , and 5 @, @ 000 people in the country evacuated their residences ; the majority of the evacuees was temporarily relocated to 55 shelters . Alex inflicted damage to 349 homes , 31 schools and 10 bridges , and 27 highways were compromised or blocked . In Guatemala , 350 homes and eight highways were damaged , affecting 9 @, @ 000 people ; 2 @, @ 000 sought shelter in the country . A landslide was reported in a village in Santa Lucía Utatlán , along with flooding in Flores . Corn , bean , and potato crops were damaged in Suchitepéquez , San Marcos and Jutiapa departments . The National Emergency Management Organization of Belize reported that property damage in the country was minimal .

= = = Gulf of Mexico = = =

According to the Mexican government , Alex stopped the production of 420 @, @ 000 barrels ( 67 @, @ 000 m<sup>3</sup> ) of oil per day from the Gulf of Mexico , which corresponds to a quarter of the country 's total oil production . Pemex evacuated 66 personnel from oil rigs offshore of Tamaulipas and Veracruz , Petrobras evacuated its oil rig in the Gulf , while Royal Dutch Shell evacuated 930 personnel from its rigs in the area . In total , six rigs and 69 production platforms faced evacuations , causing 21 % of U.S. Gulf oil output and 14 % of U.S. Gulf natural @- @ gas flows to remain offline .

The storm was expected to impact operations regarding the Deepwater Horizon Oil Spill , with both containment and cleanup operations being affected by repercussions from the storm ( such as wave action and wind direction ) . Although Alex stayed relatively away from the site , the storm caused BP to delay plans to increase oil capture from the leak by a week . Tarballs from the spill as large as apples washed onshore around Grand Isle , as well as other parts of Louisiana , Alabama and Florida , from high storm tides created by the hurricane .

= = = Southern Mexico = = =

In Chiapas , one person from Guatemala died and four others were injured when their bus rolled over as it traveled over a damaged highway . The state 's civil defense system reported that 984 families from 17 municipalities were evacuated to shelters , and that Alex 's torrential rainfall also produced 23 landslides in six counties of the state . On June 30 , a mudslide knocked down a tree onto a 115 @- @ kV transmission line near El Vergel , causing 82 cities and towns in the municipalities of Villaflores and Villa Corzo to lose power ; 32 @, @ 000 residents were left without electricity from this outage alone . Power was restored the same evening . In Yucatán , a boat carrying seven passengers capsized ; all were eventually rescued . In Campeche , 937 dwellings suffered minor damage as a result of the storm .

Prior to its second landfall , Alex caused one death in the state of Oaxaca when a wall collapsed on a dwelling in San Juan Chapultepec , killing the woman who was sleeping inside . Near San Francisco Ixhuatán , the Ostuta river breached its banks , flooding 1 @, @ 000 homes . Farther upstream , in Reforma de Pineda , over 100 families were affected by the river 's rise , which flooded their homes with 3 @. @ 3 ft ( 1 m ) of water . Overall , 3 @, @ 500 families were affected by the storm in the state .

The outer rainbands of Alex caused three deaths in Acapulco , Guerrero , after a retaining wall collapsed over the occupants of an improvised shack in a vacant lot . The investigation that followed found that the wall had been built without structural enforcements , and that the torrential rainfall had weakened the wall 's foundation .

= = = Northeastern Mexico = = =

The storm 's most significant effect in the region was excessive rainfall , which was reported throughout the region . In Tamaulipas , between 3 @. @ 829 to 12 @. @ 421 in ( 97 @. @ 25 to 315 @. @ 5 mm ) of precipitation were reported at weather stations statewide . In Nuevo León , an

average of 9 @. @ 5 in ( 242 mm ) of rain was reported statewide up to July 1 . The pluviometer at Estanzuela reported that a total of 35 in ( 890 mm ) of rainfall were recorded ; in Arroyo Seco , in San Pedro Garza García , a total of 23 @. @ 1 in ( 588 mm ) of precipitation was recorded between June 29 and 6 a.m. on July 1 . Other rainfall stations in Monterrey recorded between 14 @. @ 163 in ( 359 @. @ 75 mm ) and 24 @. @ 4 in ( 619 mm ) of rain , while Santa Catarina recorded 23 @. @ 297 in ( 591 @. @ 75 mm ) of precipitation . The Comisión Nacional del Agua ( CNA ) noted that the storm rainfall totals greatly exceed the totals produced by Hurricane Gilbert in 1988 , which only produced 11 in ( 280 mm ) of rain in the city .

The historic rainfall caused several dams to fill throughout northeast Mexico . In Nuevo León , due to the heavy rainfall , CNA also began water discharges of 25 @, @ 200 cubic feet per second ( 713 m<sup>3</sup> / s ) from the La Boca Dam in Santiago , 58 @, @ 200 cu ft / s ( 1 @, @ 648 m<sup>3</sup> / s ) from Cerro Prieto in Linares , and 109 @, @ 000 cu ft / s ( 3 @, @ 080 m<sup>3</sup> / s ) from Cuchillo Dam in China ; the dams were at 98 % , 114 % , and 124 % of operating maximum capacity , respectively . Cuchillo Dam saw water inflows of 145 @, @ 400 cu ft / s ( 4 @, @ 118 m<sup>3</sup> / s ) . The water releases from these dams raised a state of alert in Tamaulipas , which was slated to receive the discharged water . In Coahuila , the rainfall caused La Fragua Dam to release 35 @, @ 000 cu ft / s ( 1 @, @ 000 m<sup>3</sup> / s ) of water into the Rio Grande , and Amistad Dam to reach 119 % of normal operating capacity . In the case of the latter dam , the excess storage in Amistad Lake sparked fears of flooding in downstream municipalities , although the possibility of overtopping of the dam was discarded by the Mexican section of the International Boundary and Water Commission . However , contingency plans were put in place to prepare for the crest of the Sabinas River , a tributary of the Rio Grande , and the subsequent crest on the Rio Grande itself , which was expected to carry at least 140 @, @ 000 cu ft / s ( 4 @, @ 000 m<sup>3</sup> / s ) due to additional inflows from other tributaries . At one point , the Rio Grande was clocked at 195 @, @ 000 cu ft / s ( 5 @, @ 530 m<sup>3</sup> / s ) due to its many flooded tributaries . The river 's rise forced the evacuation of 40 families in Piedras Negras , and required the closure of the Gateway to the Americas International Bridge and Colombia ? Solidarity International Bridge between Nuevo Laredo , Tamaulipas and Laredo , Texas on July 8 . The bridges were expected to be closed until at least July 10 . The rise of the Escondido River forced the evacuation of 1 @, @ 000 families in Villa de Fuente , as the river rose to carry 23 @, @ 000 cu ft / s ( 650 m<sup>3</sup> / s ) through the town .

The rainfall also caused Venustiano Carranza Dam in Coahuila to fill completely ; the large water pressure in the dam forced the dam 's gates shut , and cranes were employed to open them . The rest of the gates were unable to be opened due to lack of electrical power , sparking fears of a potential dam overtopping or rupture . The municipality of Anáhuac in Nuevo León was evacuated after reports early on July 6 that the dam had overtopped ; Anáhuac 's municipal president stated that the flood could cause the " total destruction " of the city . On July 7 , as water releases from the dam were increased to 120 @, @ 000 cu ft / s ( 3 @, @ 300 m<sup>3</sup> / s ) , the town was reported to be 9 @. @ 8 ft ( 3 m ) underwater , with more discharge expected . Personnel from the Mexican Army and the city 's prison population were evacuated from Anáhuac that same day . In San Luis Potosí , the rainfall from Alex was beneficial , as it caused increases in dam water levels of up to 20 % in very dry areas .

===== Tamaulipas =====

Along the coast , 13 ft ( 4 m ) waves were reported when the storm came ashore . Following the hurricane 's landfall in Tamaulipas , a 25 @- @ year @- @ old man was rescued from a storm drain . 60 @, @ 000 people in San Fernando lost power , as did all of Ciudad Victoria , the capital of the state . Throughout the state , 256 @, @ 000 people were left without electricity . Heavy winds and rainfall knocked down billboards and trees in the capital , but no injuries were reported in the city . The storm dropped 10 inches ( 250 mm ) of rainfall in Matamoros , flooding 120 colonias , and leaving six of the 120 underwater . About 400 neighborhoods of Matamoros , comprising 80 % of the city , were flooded . Some areas of the city were under 1 ft ( 0 @. @ 30 m ) of water , forcing 4 @, @ 000 people to shelters . In Reynosa , 80 colonias were flooded , and 15 trees were uprooted ; in Río

Bravo , seven neighborhoods were flooded . In Nuevo Laredo , three young persons were rescued from a flooded arroyo . The San Fernando River also breached its banks , flooding communities in San Fernando and Méndez . The overflow of the Rio Grande following water discharges from Nuevo León isolated two communities in Miguel Alemán . One death was reported in the state on July 7 when a man died while trying to cross a flooded river .

Throughout the state , the storm and resultant floods damaged at least 6 @, @ 000 homes , 202 schools , and 500 businesses . Additionally , 28 roadways and bridges were damaged , and left over 193 @, @ 000 power consumers lost electric service . Property damage was placed at \$ 1 @. @ 084 billion ( 2010 MXN ; 83 @. @ 8 million USD ) in the 19 municipalities of the state that were declared federal disaster areas .

= = = = Nuevo León = = = =

In Nuevo León , fifteen people were confirmed to have died : one bricklayer who died after a housing unit under construction collapsed on top of him ; two men and a woman who died after their vehicle rolled over and crashed into a semi @-@ trailer truck due to the intense rainfall ; a 25 @-@ year @-@ old who was swept away by swift currents and pinned against a fence ; an elderly man who died after a wall toppled over him , a woman who died after a large boulder from a rock slide fell on her home , and a young man who fell onto the Arroyo Topo Chico . Eight more bodies were found after floodwaters began receding , although one is believed to have been washed away from a cemetery . Twenty people in Nuevo León were reported missing .

According to the Comisión Federal de Electricidad , 4 @, @ 000 customers lost electric power in the Monterrey metropolitan area , as did 61 @, @ 000 people statewide . 18 wells lost power , leaving 110 @, @ 000 without water service in the municipalities of Santa Catarina and García . Heavy flooding occurred along the Santa Catarina River in Monterrey , normally a dry river bed that flows into the Rio Grande , causing it to reach a record flow of 88 @, @ 000 cu ft / s ( 2 @, @ 500 m<sup>3</sup> / s ) . The flooded stream washed away multiple parked vehicles , a popular flea market , and sport facilities built within a riverside greenway . The Santa Catarina River also destroyed about 45 kilometres ( 28 mi ) of Monterrey 's main arterial streets . Multiple washouts caused the closure of the divided highway between Monterrey and Saltillo , Coahuila . In San Nicolás de los Garza , the Arroyo Topo Chico exceeded its banks , forcing multiple street closures . An explosion and fire occurred on a bridge in the Guadalupe municipality when a transformer fell on an old gas pipe . No injuries were reported due to the fire . In Linares , the rainfall from Alex 's remnants caused a wing of the municipal townhouse , which was built in 1896 , to collapse . The building was listed as a protected historic building . A bridge on the Pilón River collapsed in Montemorelos , rupturing a 24 @-@ inch oil pipeline in the process . However , the valves on both ends of the pipeline section were closed , minimizing the leak over the river , and the leak was not expected to adversely impact drinking water supplies in El Cuchillo Dam . Hurricane Alex affected the infrastructure of 1 @, @ 077 schools in the state , 60 of which were severely damaged and 552 held intermediate damage . Nationwide disruption in Internet connection and cell phone services was caused by damage to optical fibers , backbone nodes and telephonic central stations in Monterrey . Additionally , Telefónica reported damage to its network in Monterrey and Saltillo , causing intermittent unavailability of telecommunication services . Preliminary estimates of the damage in the state rose to \$ 10 billion ( 2010 MXN ; \$ 762 million USD ) ; final damage estimates released on August 5 totaled \$ 16 @. @ 9 billion ( 2010 MXN ; 1 @. @ 35 billion USD ) statewide .

= = = = Coahuila = = = =

In Coahuila , rainfall from Alex 's remnants caused a small dam in an ejido in Castaños to overtop , forcing the evacuation of 50 people in the municipality 's seat . The ensuing flood rose 3 @. @ 3 ft ( 1 m ) and damaged 15 homes . The coal @-@ producing region of the state was left isolated after the Álamos River broke its banks . Hundreds of residents in Nueva Rosita and Sabinas were evacuated ; in the latter case , the Sabinas River flooded to become 980 ft ( 300 m ) in width ,

causing 400 ? 500 homes to go underwater . Some bridges on Mexican Federal Highway 57 were covered in water . Thousands of citizens in Ciudad Acuña were evacuated when the Arroyo Las Vacas flooded after 40 in ( 1 @,@ 000 mm ) of rain fell on nearby mountain ranges . The flood damaged 1 @,@ 000 homes , damaging urban infrastructure , power , water and telecommunication services ; 500 people sought refuge in shelters . The loss of power caused 40 maquiladoras to suspend their activities , stopping 16 @,@ 000 workers . The rainfall caused damage in 15 municipalities of Coahuila , affecting 10 @,@ 000 people , and causing at least \$ 1 billion ( 2010 MXN ; \$ 76 million USD ) in damage in the state .

= = = United States = = =

In southern Texas , the feeder bands on the northern side of the hurricane began producing tropical @-@ storm @-@ force winds throughout Cameron , Willacy and Kenedy Counties starting on June 30 . The highest reported sustained wind was of 51 mph ( 82 km / h ) at the southeast tip of Port Isabel . The strongest gust occurred over the Queen Isabella Causeway , where a wind speed of 66 mph ( 106 km / h ) was measured . Sustained winds of 39 mph ( 63 km / h ) and gusts of 53 mph ( 85 km / h ) were measured in Bayview .

The feeder bands also produced heavy rainfall , leading to flooding on South Padre Island . A storm surge of 3 @.@ 5 feet ( 1 @.@ 1 m ) was reported on the island , causing moderate beach erosion . However , more significant damage was avoided as the bulk of the 4 feet ( 1 @.@ 2 m ) storm tide hit South Padre and Port Isabel at low tide . Nine tornadoes were confirmed to have touched down in the state in association with the storm , one of which overturned a mobile home . Other tornadoes caused mainly minimal damages to trees and shrubbery . About 9 @,@ 000 customers lost power throughout Texas .

Large amounts of precipitation fell throughout the Lower Rio Grande Valley , with 6 to 9 inches ( 150 to 230 mm ) of rainfall recorded throughout the region . Brownsville Airport had 6 @.@ 80 inches ( 173 mm ) of precipitation in a 36 @-@ hour period . The 5 @.@ 86 inches ( 149 mm ) of rain that fell alone on June 30 broke the daily rainfall record of 3 @.@ 80 inches ( 97 mm ) from 1995 . McAllen , Texas , measured 6 @.@ 66 inches ( 169 mm ) of rain on June 30 , which now constitutes the city 's wettest June day on record . In Houston , more rain fell on the first two days of July than the average rainfall for the entire month of July . Some parts of the city received nearly 12 inches ( 300 mm ) of rain over three days , causing scattered street flooding .

Flooding caused by the rainfall from the remnants of Alex caused the Rio Grande at Foster Ranch , in far western Texas , to exceed 31 ft ( 9 @.@ 4 m ) , well above the flood stage at 14 ft ( 4 @.@ 3 m ) and the record stage at 25 @.@ 9 ft ( 7 @.@ 9 m ) . Combined with the rainfall produced by Tropical Depression Two , the Rio Grande was under flood conditions for much of the month of July . About \$ 10 million ( 2010 USD ) of agricultural damage was reported in Hidalgo County from Alex .

= = Aftermath and records = =

= = = Government response = = =

Following the storm 's final landfall , Mexico 's Secretariat of National Defense deployed 800 troops to Nuevo León and Tamaulipas under Plan DN @-@ III @-@ E to help aid operations . The troops enforced mandatory evacuations of 3 @,@ 337 residents of San Fernando and Soto la Marina in Tamaulipas . Throughout Nuevo León , 60 @,@ 000 people were evacuated from their homes . In Tamaulipas , 263 @,@ 000 people were affected by Hurricane Alex , and 2 @,@ 260 homes were flooded . In Coahuila , 80 @,@ 000 were affected by Alex 's remnants , leaving 30 % of the municipalities of the state without communication with the outside world . 20 @,@ 000 were considered total losses , most of them in Sabinas . Approximately 500 @,@ 000 people were affected by floods throughout northeastern Mexico .

The Secretaría de Gobernación declared a state of emergency in 21 of Nuevo León 's 51

municipalities , freeing federal disaster funds for use in aid operations . An additional 10 municipalities were placed under the state of emergency on July 8 . A similar declaration was made for 8 municipalities in Oaxaca , and for 14 municipalities in Tamaulipas ; the state of emergency in Tamaulipas was later expanded to 30 municipalities . Mexican President Felipe Calderón requested adding resources to the federal disaster fund , as the \$ 3 billion ( 2010 MXN ; \$ 235 million USD ) it held would not be sufficient to face the damage in Coahuila , Nuevo León and Tamaulipas . In the months following the storm , a total of \$ 4 @. @ 8 billion ( 2010 MXN ; \$ 375 million USD ) was released by the federal and state governments to aid in the reconstruction of the disaster areas in Nuevo León and Tamaulipas . In Texas , Governor Rick Perry activated the state 's search and rescue capabilities in Laredo and San Antonio . This activation was due to the flooding on the Rio Grande Valley , which was expected to worsen due to the approach of Tropical Depression Two to the area affected by Alex .

Even after its dissipation , Alex continued causing deaths throughout Mexico , particularly due to flooding . One death was reported in Tamaulipas and another one in San Luis Potosí ; another six were reported to have died in Guanajuato as a result of Alex . In Coahuila , eight people died after a plane crashed while surveying the water discharges from dams in the state ; the Coahuila secretary of public works and the municipal president of Piedras Negras were among the victims .

### = = = Infrastructure = = =

The storm caused severe devastation in Nuevo León , and in particular throughout the Monterrey metropolitan area . State governor Rodrigo Medina de la Cruz noted that the city of Monterrey had " collapsed due to the worst weather phenomenon in its history . " In the municipality of Santa Catarina alone , 50 @, @ 000 people were affected , with property damage being estimated at \$ 1 @. @ 2 billion ( 2010 MXN ; 93 @. @ 5 million USD ) . Residents from three colonias in García had to be permanently relocated as 800 homes were destroyed ; the storm caused \$ 900 million ( 2010 MXN ; 70 million USD ) in damage in the municipality . The flooding Santa Catarina River destroyed four bridges in Monterrey ; at least 60 bridges were damaged statewide . Governor Medina also announced on July 3 the allocation of \$ 1 @. @ 4 billion ( 2010 MXN ; \$ 107 million USD ) for repairs to Monterrey 's arterial streets . Municipalities in the metropolitan area used contraflow during part of the day to re @- @ establish traffic in sections where the arterial streets bordering the Santa Catarina River were damaged only in one direction . The repairs to Monterrey 's main roadways were estimated to take up to three months to complete .

Railway traffic throughout the state was paralyzed , as some train bridges collapsed , and extensive damage was found in the track ballast in multiple rail lines . Kansas City Southern Railway reported it expected a net loss of five cents per share on its annual earnings due to the stoppage affecting its Mexican subsidiary . The company later reported a drop of \$ 33 million ( 2010 USD ) in revenue due to hurricane damage . The damage to the railway infrastructure caused automotive part shortages throughout North America . General Motors was forced to cancel shifts at plants in Michigan , Missouri and Kansas . Ford also idled production in its Oakville , Ontario assembly plant , and suffered two @- @ week delays in U.S. deliveries of its Fiesta model due to the rail track damage . The damage to the road system paralyzed a route used by 40 % of the trade between the United States and Mexico , as 22 @, @ 000 trucks were stalled after damage to the Nuevo Laredo ? Monterrey highway .

Alex destroyed the potable water infrastructure in portions of Nuevo León , causing widespread shortages of water . The damage to the water infrastructure was described as being of " unexpected magnitude , " with 160 @, @ 000 left without water a week after the storm made landfall . The standing water left following the rainfall caused concern of outbreaks of various diseases , including cholera . Consequently , the population was warned to boil or otherwise disinfect water to prevent disease . In areas where the storm 's impact made it difficult to boil water due to the unavailability of gas or stoves , 70 @, @ 000 jars with colloidal silver were distributed . Additionally , laboratory testing of refuse coming from individuals with gastrointestinal illnesses commenced as a precaution to identify outbreaks of cholera and other diseases , and over 82 @, @ 000 vaccines



were applied throughout the region . Following the storm 's passage , PROFECO announced fines of up to \$ 2 @. @ 5 million ( 2010 MXN ; \$ 191 @, @ 000 USD ) to merchants guilty of price gouging when selling bottled water . This occurred after the agency received complaints of 1500 % markups when compared to bottled water 's pre @-@ storm price . On July 7 , the agency announced it had applied sanctions to 20 businesses who were found overcharging for bottled water .

= = = Economic and environmental effects = = =

According to estimates from the Mexican Secretariat of Agriculture , Livestock , Rural Development , Fisheries and Food ( SAGARPA ) , 504 @, @ 000 acres ( 203 @, @ 800 ha ) of farmland were damaged as a result from Alex in northeastern Mexico , corresponding to 11 % of the total farmland in Tamaulipas , Nuevo León and Coahuila . Most of the agricultural damage occurred in Tamaulipas , where 270 @, @ 000 acres ( 110 @, @ 000 ha ) of sorghum and 200 @, @ 000 acres ( 80 @, @ 000 ha ) of maize were damaged , corresponding to 15 @. @ 6 % of the entirety of the state 's farmland , and 76 % of the state 's maize crop ; 1 @, @ 700 acres ( 700 ha ) of grapefruit and limes were also damaged , corresponding to 15 % of the state 's citrus production . Two thousand heads of cattle were also lost in Nuevo Laredo . In Nuevo León and Coahuila , most of the damage was to animal husbandry ; in Nuevo León , 3 @, @ 645 heads of cattle , 3 @, @ 580 goats , 7 @, @ 265 sheep and 194 horses were lost , while in Coahuila , 3 @, @ 709 goats , 258 cattle and 56 sheep were killed .

The storm also affected commerce throughout the region . The Mexican Secretariat of Economy calculated that Alex affected 2 @, @ 500 small and medium enterprises in Nuevo León , 500 in Tamaulipas , and 500 ? 700 in Coahuila . In Monterrey , the local chapter of the Confederation of National Chambers of Commerce reported that in the first two days after Hurricane Alex affected the city , businesses in the city lost \$ 750 million ( 2010 MXN ; 58 million USD ) . Overall , the lost business due to Alex is expected to total about \$ 2 billion ( 2010 MXN ; 156 million USD ) .

As floodwaters receded from the Pesquería River in Escobedo , Nuevo León , the remnants of a 15 @, @ 000 @-@ year @-@ old mammoth were discovered by local residents . It is believed that the remains were carried from the state of Coahuila to Escobedo by the floodwaters . The remnants were identified and dated by personnel from the Instituto Nacional de Antropología e Historia .

= = = Meteorological records = = =

Alex was the first Atlantic hurricane in the month of June since Hurricane Allison in 1995 , and the strongest in terms of wind speed since Hurricane Alma in 1966 . Its barometric pressure recording of 946 mbar ( 27 @. @ 96 inches ) is the most intense from any Atlantic hurricane in June , although Hurricane Audrey in 1957 ties this intensity . Alex is thus tied for the most intense June Atlantic hurricane on record overall . However , as Audrey 's pressure was estimated , Audrey 's actual pressure might be as low as 925 mbar .