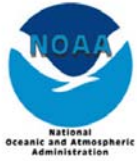


Galveston Storm of 1900



Galveston Hurricane September 8-9, 1900



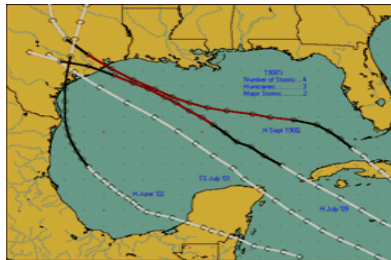
Damage



The Dead



Ruined Homes



Tracking Chart



Websites:

<http://www.ncdc.noaa.gov/oa/ncdc.html>
www.noaa.gov

<http://www.srh.noaa.gov/smg/tropic.htm>

<http://hurricanes.noaa.gov/>

<http://www.storm00.com/>

<http://www.srh.noaa.gov/tlh/tropical/>



SPECIAL REPORT ON GALVESTON HURRICANE

E By I. M. Cline, Local Forecast Official and Section Director.

The hurricane which visited Galveston Island on Saturday, September 8, 1900, is no doubt one of the most important meteorological events in the world's history. The ruin which it wrought beggars description and conservative estimates place the loss of life at the appalling figure, between 8,000 and 12,000.

A brief description of Galveston Island will not be out of place as an introductory to the details of this disaster. It is a sand island about thirty miles in length and one and one-half to three miles in width. The course of the island is southwest to northeast, parallel with the northeast coast of the state. The city of Galveston is located on the extreme east end of the island. To the northeast of Galveston is Bolivar Peninsula, a sand spit about twenty miles in length and varying in width from one-fourth of a mile to about three miles. Inside of Galveston Island and Bolivar Peninsula is Galveston Bay, a shallow body of water with an area of nearly 500 square miles. The length of the bay along shore is about fifty miles and its greatest distance from the Gulf coast is about twenty-five miles. The greater portion of the bay lies due north of Galveston. That portion of the bay which separates the island west of Galveston from the mainland is very narrow, being only about two miles in width in places, and discharges into the Gulf of Mexico through San Luis pass. The main body discharges into the Gulf between the Jetties; the south one being built out from the northeast end of Galveston Island and the north one from the most southerly point of Bolivar Peninsula. The ' channel between the Jetties is 27 to 30 feet in depth at different stages of the tide. There are channels in the harbor with a depth of 30 to 35 feet and there is an area of nearly 2,000 acres with an anchorage depth of eighteen feet or more. The mainland for several miles back from the bay is very low, in fact much of it is lower than Galveston Island, and it is so frequently overflowed by high tide that large areas present a marshy appearance. These in brief are the physical conditions of the territory devastated by the hurricane.

The usual premonitory signs which herald the approach of hurricanes were not present in this case. The brick-dust sky was not in evidence to the smallest degree. This feature which has been distinctly observed in other storms that have occurred in this section was carefully watched for, both on the evening of the 7th and the morning of the 8th. There were cirrus clouds moving from the southeast during the forenoon of the 7th, but by noon only alto-stratus from the northeast were observed. About the middle of the afternoon the clouds were divided between cirrus, alto-stratus and cumulus moving from the northeast. During the remainder of the 7th strato-cumulus clouds prevailed with a steady movement from the northeast. A heavy swell from the southeast made its appearance in the Gulf of Mexico during the afternoon of the 7th. The swell continued during the night without diminishing and the tide rose to an unusual

height when it is considered that the wind was from the north and northwest. About 5 a.m. on the morning of the 8th, Mr. J. L. Cline, Observer, called me and stated that the tide was well up in the low parts of the city and that we might be able to telegraph important information to Washington. He having been on duty until nearly midnight was told to retire and I would look into conditions. I hitched up my horse and drove to the Gulf where the swells were timed and I then proceeded to the office where I found that the barometer was only one tenth of an inch lower than it was at the 8 p.m., observation of the 7th. I then returned to the Gulf and made more detailed observations of the tide and swells and filed the following telegram addressed to the Central Office at Washington, D. C.:

"Unusually heavy swells from southeast, intervals one to five minutes overflowing low places south portion city three to four blocks from beach. Such high water with opposing winds never observed previously."

Broken stratus and strato-cumulus clouds predominated during the early forenoon on the 8th with the blue sky visible here and there. Showery weather commenced at 8:45 a.m., but dense clouds and heavy rain were not in evidence until about noon after which dense clouds with rain prevailed.

The wind during the forenoon of the 8th was generally north but oscillated, at intervals of five to ten minutes, between northwest and northeast and continued so up to 1:00 p.m. After 1:00 p.m. the wind was mostly northeast although as late as 6:30 p.m. it would occasionally back to the northwest for one or two minutes at a time. The prevailing wind was from the northeast until 8:30 p.m. when it shifted to the east continuing from this direction until about 10:00 p.m. after 10:00 p.m. the wind was from the southeast and after about 11:00 p.m. the prevailing direction was from the south or southwest. The directions after 11:00 p.m. are from personal observations. A storm velocity was not attained until about 1:00 p.m. after which the wind increased steadily and reached a hurricane velocity about 5:00 p.m. The greatest velocity for five minutes was 84 miles per hour at 6:15 p.m. with two miles at the rate of 100 miles per hour. The anemometer blew away at this time and it is estimated that prior to 8 p.m. the wind attained a velocity of at least 120 miles per hour. For a short time about 8 p.m. just before the wind shifted to the east there was a distinct lull but when it came out of the east and southeast. It appeared to come with greater fury than before. After shifting to the south at about 11:00 p.m. the wind steadily diminished in velocity and at 8 a.m. on the morning of the 9th was blowing at the rate of 26 miles per hour from the south.

The barometer commenced falling during the afternoon of the 6th and continued falling steadily but slowly up to noon of the 8th when it read 29.42 inches. From noon until 8:30 p.m. of the 8th the barometer fell rapidly and registered 28.56 inches, a fall of pressure of about one inch in eight and one-half hours.

After 8:30 p.m. the barometer rose at the same rapid rate that had characterized the fall. The barograph trace sheet during this storm, from noon September 6th to noon September 10th, is inclosed as Fig. No. 1. On account of the rapid fall in pressure, Mr. John D. Blagden, Observer, took readings of the mercurial barometer as a check on the barograph and his readings are as follows:

Time	Readings	Time	Readings	Time	Readings
5:00 PM	29.05	6:06 PM	28.86	7:15 PM	28.69
5:11 PM	29.00	6:20 PM	28.82	7:40 PM	28.62
5:30 PM	28.95	6:40 PM	28.75	8:00 PM	28.55
5:50 PM	28.90	6:48 PM	28.70	8:10 PM	28.53

These readings confirm the low pressure shown by barograph and indicate the great intensity of the hurricane.

Mr. Blagden looked after the instruments during the hurricane in a heroic and commendable manner. He kept the wires of the self-registering apparatus intact as long as it was possible for him to reach the roof. The rain gage blew away about 6:00 p.m. and the thermometer shelter soon followed. All the instruments in the thermometer shelter were broken except the thermograph which was found damaged but has been put in working order.

Storm warnings were timely and they had received a wide distribution not only in Galveston but throughout the coast region. Warning messages were received from the Central Office at Washington, D. C. on September 4th, 5th, 6th, 7th, and 8th. The high tide on the a.m. of the 8th with storm signals flying made it necessary to keep one man constantly at the telephone giving out information. Hundreds of people who could not reach us by telephone came to the Weather Bureau Office seeking advice. The public was earned over the telephone and verbally that the wind would go by the east to the south and that the worst was yet to come. People were advised to seek secure places for the night. As a result thousands of people who lived near the beach or in small houses moved their families into the center of the city and were thus saved. Those who lived in large strong buildings a few blocks from the beach thought that they could weather the wind and tide, one of whom is the writer of this report. Soon after 3:00 p.m. of the 8th conditions became so threatening that it was deemed essential that a special report should be sent at once to Washington, D.C. Mr. J. L. Cline, Observer, took the instrumental readings while I drove first to the bay, then to the Gulf and found that half the streets of the city were under water and added the following to the special observation at 3:30 p.m.: "Gulf rising, water cover streets of about half city." Having been on duty since 5:00 a.m. I, after giving this message to the Observer, went home to lunch. Mr. Cline went to the telegraph offices through water from two to four feet deep and found that the telegraph wires had all gone down, he then returned to the office and by inquiry learned that the long distance telephone had one wire still working to

Houston over which he gave the message to the Western Union Telegraph Office at Houston to be forwarded to Washington, D.C.

I reached home and found the water waist deep around my residence. I at once went to work assisting people who were not securely located into my residence until 40 or 50 people were housed therein. About 6:30 p.m. Mr. J. L. Cline, Observer, who had left Mr. Blagden at the office to look after the instruments reached my residence with water around his neck. He informed me that the barometer had fallen below 29.00 inches, no further message could be gotten off on account of all wires being down and he had advised everyone he could see to go to the center of the city and he thought we had better make an attempt in that direction. At this time, however, the roofs of houses and timbers were flying through the streets as though they were paper and it appeared suicidal to attempt a journey through the flying timbers. Many people were killed by flying timbers about this time while endeavoring to escape to town.

The water rose at a steady rate from 3:00 p.m. until about 7:30 p.m. when there was a sudden rise of about four feet in as many seconds. I was standing at my front door which was partly open watching the water which was flowing with great rapidity from east to west. The water at this time was about eight inches deep in my residence and the sudden rise of four feet brought it above my waist before I could change my position. The water had now reached a stage 10 feet above the ground at Rosenberg Avenue (25th Street) and Q Streets where my residence stood. The ground was 5.2 feet elevation which made the tide 15.2 feet. The tide rose during the next hour between 7:30 p.m. and 8:30 p.m. nearly five feet additional, making a total tide in that locality of about 20 feet. These observations were carefully taken and represent to within a few tenths of a foot the true conditions. Other personal observations in my vicinity confirm these estimates. The tide, however, on the bay, or north, side of the city did not obtain a height of more than 15 feet. It is possible that there was 5 feet of backwater on the Gulf side as a result of debris accumulating four to six blocks inland from the beach. The debris was piled up 8 to 15 feet in height. By 8 p.m. a number of houses had drifted up and lodged to the east and southeast of my residence and these with the force of the waves acted as a battering ram against which it was impossible for any building to stand for any length of time. And at 8:30 p.m. my residence went down with about 50 persons who had sought it out for safety, and all but 18 were hurled into eternity. Among the lost was my wife who never rose above the water after the wreck of the building. I was drowned beyond consciousness but recovered through being crushed by timbers and found myself clinging to my youngest child who went down with myself and wife. Mr. J. L. Cline joined me five minutes later with my other two children and with them and a woman and child we picked up from the raging waters we drifted for three hours and landed 300 yards from where we started. There were two hours that we did not see a house nor any persons and from the swell we inferred that we were drifting to sea which with the northeast wind then blowing

was more than probable. During the last hour that we were drifting, which was with southeast and south winds, the drift on which we were floating knocked several residences to pieces. When we landed about 11:30 p.m. by climbing over floating drifts to a residence on 28th and Avenue P. streets, the water had fallen four feet and it continued falling and on the following morning the Gulf was nearly normal. While we were drifting we had to protect ourselves from the flying timbers by holding planks between us and the wind and with this protection we were frequently knocked great distances. Many persons were killed on top of the drifting debris by flying timbers after they had escaped from their wrecked homes. In order to keep on top of the floating masses of wrecked buildings one had to be constantly on the lookout and continually climbing from drift to drift. Hundreds of other people had similar experience.

Sunday, September 9th, 1900, revealed one of the most horrible sights that ever a civilized people looked upon. About 3,000 homes, nearly half the residence portion of Galveston, had been completely swept out of existence and probably more than 8,000 persons had passed from life to death during that dreadful night. The correct number of those who perished will probably never be known for many entire families are missing. Where 20,000 people lived on the 8th not a house remained on the 9th and who occupied the houses may never be known in many instances. On account of the pleasant Gulf breezes many strangers were residing temporarily near the beach and the number of these that were lost can not yet be estimated. I inclose a chart, Fig. No. 2, which shows by shading the area of total destruction. Two charts of this area have been drawn independently; one by Mr. A. G. Youens, inspector for the local board of underwriters and the other by myself and Mr. J. L. Cline. The two charts agree in nearly all particulars and it is believed that this chart represents the true conditions as nearly as it is possible to show them. That portion of the city west of 45th street was sparsely settled. There were, however, several splendid residences in the south portion of this district. Many truck farmers and dairy men resided on the west end of the island and it is estimated that half of these are lost as but very few residences remain standing down the island. For two blocks inside the shaded area the damage amounts to at least 50% of the property. There is not a house in Galveston that escaped injury and there are houses totally wrecked in all parts of the city. All stores and supplies not over eight feet above the floors were badly injured, and much a total loss. The damage to buildings, personal and other property in Galveston County is estimated at about thirty million dollars. The insurance inspector for Galveston states that there were 2,636 residences located prior to the hurricane in the area of total destruction and he estimates 1,000 houses totally destroyed in other portions of the city making a total of 3,636 houses totally destroyed. The value of these buildings alone is estimated at five and one-half million dollars. The grain elevators which were full of grain suffered the smallest damage. Ships have resumed loading and work is being rushed day and night. The railroad bridges across the bay were washed away but one of these has been replaced and direct rail com-

munication was established with the outside world within eleven days after the disaster. Repairs and extension of wharves are now being pushed forward with great rapidity. Notwithstanding the fact that the streets are not yet clean and dead bodies are being discovered daily among the drifted debris, the people appear to have confidence in the place and are determined to rebuild and reestablish themselves here. Galveston being one of the richest cities of its size in the United States there is no question but that business will soon regain the normal conditions and the city will grow and prosper as she was before the disaster. Cotton is now coming in by rail from different parts of the state and by barge from Houston. The wheels of commerce are already moving in a manner which gives assurance for the future. Improvements will be made stronger and more judiciously. Those for the past 25 years have been made with the hurricane of 1875 in mind, but no one ever dreamed that the water would reach the height observed in the present case. The railroad bridges are to be built ten feet higher than they were before. The engineer of the Southern Pacific Company has informed me that they will construct their wharves so that they will withstand such a hurricane as the one we have just experienced. It appears that a sea wall which would have broken the swells would have saved much of the loss of both life and property. I base this view upon observations which I have made in the extreme northeastern portion of the city which is practically protected by the south Jetty; this part of the city has not suffered more than half the damage of other similarly located districts without protective levee suffered.

From the officers of the U. S. Engineer tug Anna I learned that the wind at the mouth of the Brazos River went from north to southwest by the way of west. This shows that the center of the hurricane was near Galveston, probably not more than 30 miles to the westward. The following towns have suffered great damage in the loss of life and property: Texas City, Dickinson, La torque, Hitchcock, Arcadia, Alvin, Kanvel, Erazcria, Columbia and Wharton. Other towns further Inland have suffered but not so seriously. The exact damage at these places can not be ascertained.

I attach to this a list of those lost in Galveston whose names have been ascertained up to the present time. This list contains 3,536 names.

I. M. Cline.

Galveston, Texas September 23, 1900

Copied:

10-31-57:ls



AFTER THE DISASTER