

Louisiana Hurricane History

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Climatology of Tropical Cyclones in Louisiana

“We live in the shadow of a danger over which we have no control: the Gulf, like a provoked and angry giant, can awake from its seeming lethargy, overstep its conventional boundaries, invade our land and spread chaos and disaster” - Part of “Prayer for Hurricane Season” read as Grand Chenier every weekend of summer (Gomez).

Some of the deadliest tropical storms and hurricanes to ever hit the United States have struck the Louisiana shoreline. Memorable storms include Andrew in 1992, Camille in 1969, Betsy in 1965, Audrey in 1957, the August Hurricane of 1940, the September Hurricane of 1915, the Cheniere Caminanda hurricane of October 1893, the Isle Dernieres storm of 1856, and the Racer’s Storm of 1837. These storms claimed as many as 3000 lives from the area....with Audrey having the highest death toll in modern times in the United States from any tropical cyclone, with 526 lives lost in Cameron and nine in Texas.

Louisiana has few barrier islands; therefore, the problem of overpopulation along the coast slowing down evacuation times, such as Florida, does not exist. New Orleans has high evacuation times due to a relative lack of major highways out of the city and dense populationInterstate highway 10 is virtually the only route of escape.

A lack of coastal irregularities and a generally smooth bottom to the Gulf of Mexico make Cameron Parish ideal to maximum wave damage along its shores (Morgan). The land in the lower sections of the state is slowly sinking and quickly eroding away. Nowhere is the sinking more evident than in New Orleans. Back in 1718, the levee system was only 3 feet high; today, the levees are 17 feet high. Some of the increases, though, are due to experience over a lengthy period of time through very strong hurricanes, which were seldom experienced in the early 1700's due to low population density.

Pressure. The stronger a hurricane gets, the lower its central pressure gets. It is a direct relationship. Below is a table showing the lowest ten pressures ever recorded across Louisiana since the Nineteenth Century.

<u>Pressure</u>	<u>Date</u>	<u>Location</u>
27.17"	8/29/2005	Buras
27.90"	8/17/1969	Garden Island
28.00"	9/09/1965	Houma & Grand Isle
28.01"	9/29/1915	New Orleans Harbor
28.15"	9/01/2008	Caillou Lake
28.20"	8/11/1856	Isle Dernieres

28.31"	8/26/1926	Houma
28.36"	8/06/1918	Sulphur
28.40"	10/3/1964	Franklin
28.56"	8/18/1969	Slidell

Winds. Major hurricanes have led to massive devastation through the years. Extreme structural damage is noted with storms of category three intensity of higher (winds of 111 mph and above). Below is a chart showing the highest wind gusts measured across the Bayou State over the years.

<u>Highest Gusts</u>	<u>Location</u>	<u>Date</u>
175 mph	Bayou Teche	8/26/1992
160 mph	Lower Plaquemines	8/17/1969
160 mph	Grand Isle	9/09/1965
150 mph	Oil Rig offshore SW Louisiana	6/27/1957
135 mph	Franklin	10/3/1964
130 mph	New Canal Lighthouse	9/29/1915
125 mph	Sulphur	8/06/1918
125 mph	New Orleans	9/20/1947
125 mph	Slidell	8/18/1969
120 mph	Thibodaux & Napoleonville	8/26/1926
120 mph	Abbeville	9/08/1974

Storm Surge. Storm surge flooding across Southeast Louisiana is greater than surrounding areas due to its orientation of being a “corner” along the coast. This means that the approximate angle made by the Mississippi Delta with the Gulf coast to the east is ninety degrees, which would amplify the piling up of water. In this case, Lakes Pontchartrain and Borgne are the targets. Another “corner” along the U.S. coast is New York City.

Rainfall. Heavy rains and flooding are the primary problem associated with tropical cyclones across the Pelican State. The worst aspect of tropical cyclones is that the weaker a system is, the more effective a rainmaker it tends to be. Also, tropical systems with large circulation patterns are most efficient at producing excessive rains that more intense hurricanes, mainly because intense hurricanes have decreased circulation patterns as they become more efficient at harnessing the warm and moisture for the ocean.

Recent examples of flooding across the state from tropical cyclones include Frances of 1998, Allison in 1989, Bonnie (NW Louisiana) in 1986, Juan in 1985, and Claudette in 1979. However, if it were not for the intermittent invasions from tropical cyclones, rainfall during the months of August, September, and October would average about 25% less that it currently does.

In most cases, the heaviest rain around a tropical storm or hurricane is dumped to the right of its track. Naturally, the slower a tropical system moves, the greater the rainfall a location can expect. When a cyclone interacts with old frontal boundary, a secondary rainfall maximum will occur at and to the north of the boundary in question. Luckily, Louisiana has very little topography, which makes rainfall amounts above 30" and landslides exceedingly rare events.

When a tropical cyclone transitions to a non-tropical low, dry air will wrap around the southern and eventually eastern side of the storm. Maxima in rainfall will occur just west and distant to the east of the track; the least amount of rain will fall in the system's "dry slot", a relatively cloud-free area south/southwest of a non-tropical low. Severe weather such as downbursts, tornadoes, and hail are more commonly seen as dry air intrudes into the cyclone's circulation.

In any event, rain will fall more distantly to the east of the center than it will to the west. Upward vertical motions/warm air advection will occur to the east of the center, while subsidence/cool air advection will occur to the west. This leads to a sharp contrast in weather to the west of the point of landfall, between continuous heavy rain with high temperatures hovering near 80, and sunny skies seen just to their west with high temperatures at or above 100 degrees. Below is a table showing the ten highest rainfall amounts ever reported in Louisiana with tropical cyclones.

Amount	Location	Dates
33.71"	Crowley	8/06-10/1940
31.66"	Abbeville	8/06-10/1940
29.92"	Thibodaux	6/5-11/2001
29.65"	Lafayette	8/06-10/1940
25.67"	Winnfield	6/23-7/7/1989
22.39"	Terrytown	9/10-14/1998
21.30"	Logansport	7/22-26/1933
21.00"	Larto Lake	8/29-9/5/2008
19.26"	Morgan City	9/15-19/1943
18.30"	Vinton	9/15-20/1963

Fatalities. The further you go back in time, the more people died from hurricanes. In the Twentieth century, there was a steep dropoff in the number of deaths from cyclones due to timely warnings by the National Weather Service, and also by information campaigns by the public and private sector about the dangers of these storms. Katrina (2005) shows that there is still much to do in regards to education and evacuation efforts for New Orleans. Below shows the ten most deadly storms ever to effect Louisiana.

<u>Fatalities</u>	<u>Dates</u>
2,000	10/1-2/1893
1,577	8/29/2005
526	6/27/1957
353	9/20/1909
275	9/29/1915
218+	8/10-12/1856
110	10/12/1886
81	10/3/1964
51	9/19-20/1947
47	8/11/1860

Movement. During most months of the hurricane season, tropical cyclones move northwest into the Pelican State. This is mainly due to the wind flow around the Azores/ Bermuda high pressure system, which is strongest in July. In June and October, storms are more likely to move in from the south and southwest. Cold fronts invading the state from the north and west would cause winds across the Bayou state to become south and southwesterly, quickly picking up any low pressure system lurking in the Gulf at the time.

Storms are most likely to stall across southwest Louisiana than any other portion of the state. A climatological "col area" referring to an area between distant low/high pressure cells where winds are nearly calm, exists across southwest Louisiana and southeast Texas during the summer. The Bermuda high (outside July) is normally too far east to exert much of a north/northwesterly motion on a storm while the Mexican Plateau low/trough is normally too far south to steer a system to the west. Also, this region can lie between segments of the subtropical ridge centered over the Southwest United States and near Bermuda, leaving the flow pattern aloft weak. This can cause storms to stall for days across that region; Juan (1985), Claudette (1979), and Allison (1989) are the most recent storms to stall near the Sabine River.

The list of hurricanes over the next few pages was compiled from numerous sources. The relative lack of storms before 1829 is due to population mainly being centered around New Orleans, and a lack of records from the few towns that existed elsewhere. The region now known as the state of Louisiana wasn't even settled until 1699. Many ships that may have encountered storms during the early period of this history took their secrets with them to the bottom of the Gulf of Mexico.

On average, since 1851, 0.7 tropical cyclones of tropical storm strength (2 tropical storms every 3 years), of which 0.3 are hurricanes (or one hurricane per 3 year period) should be expected somewhere within the state. A hurricane should make a landfall every 2.8 years. On the next page is a table of how many tropical storms and hurricanes have made a landfall per decade in Louisiana since 1851, using statistics from the National Hurricane Center in West Miami, Florida.

Tropical Cyclone Strikes by The Decade

Decade	Hurricanes	Tropical Storms	Total
1850's	2	0	2
1860's	6	2	8
1870's	3	4	7
1880's	6	2	8
1890's	3	5	8
1900's	2	4	6
1910's	2	3	5
1920's	3	2	5
1930's	2	5	7
1940's	3	7	10
1950's	2	7	9
1960's	4	0	4
1970's	4	2	6
1980's	4	2	6
1990's	2	1	3
2000's	6	6	12
	===	===	===
	54	52	106

Louisiana Hurricanes - 1527 through 2009

Date	Name	Landfall	Wind	Category	Dead	Min Cent Pres
1527, 10/23	-	Mouth of MS	-	-	-	-
1722, 9/22-4	-	New Orleans	-	-	-	-
1740, 9/23	-	Mouth of MS	-	-	-	-
1772, 9/02	-	West of Mobile	-	-	-	-
1776, ?	-	New Orleans	-	-	-	-
1778, 10/7-10	-	Mouth of MS	-	-	-	-
1779, 8/18	-	New Orleans	-	-	-	-
1779, 10/7-10	-	New Orleans	-	-	-	-
1780, 8/24	-	New Orleans	-	-	-	-
1781, 8/23	-	New Orleans	-	-	-	-
1794, 8/31	-	New Orleans	-	-	1+	-
1800, 8/?	-	New Orleans	-	-	-	-
1811, ?	-	New Orleans	-	-	-	-
1812, 8/19-20	-	Isle Dernieres	-	-	45	-
1813, 8/19	-	N Gulf Coast	-	-	-	-
1819, 7/25-8	-	Bay St. Louis	-	-	43	-
1821, 9/15-7	-	Bay St. Louis	-	-	35	-
1831, 8/16	Great Barbados	Isle Dernieres	-	-	1500	-
1837, 10/5-7	Racer's Storm	Cameron	-	-	105	-
1846, 4/03	Extratropical?	Mouth of MS	-	-	-	-
1852, 8/26	Number 1	Pascagoula, MS	115	3	-	961
1855, 9/15-16	Number 5	Mouth of MS	125	3	-	-
1856, 8/10-2	Isle Dernieres	Isle Dernieres	150	4	200+	934
1860, 8/11	Number 1	SE Louisiana	125	3	47	-
1860, 9/14-5	Number 4	Mouth of MS	105	2	-	-
1860, 10/2-3	Number 6	Atchafalaya	105	2	13	-
1865, 9/12-3	Number 4	Johnson's Bayou	105	2	23	-
1866, 7/12-13	Number 1	Louisiana Coast	105	2	-	-
1867, 10/3-4	Number 7	Venice	105	2	-	-
1871, 10/1-4	Number 7	Galveston, TX	80	1	4	-
1879, 8/22-3	Number 3	High Island	105	2	2	964
1879, 9/01	Number 4	Morgan City	120	3	1	-
1882, 9/14	Number 3	Sabine Pass	105	2	-	-
1886, 6/13-4	Number 1	Sabine Pass	100	2	-	-
1886, 10/12	Number 10	Sabine Pass	120	3	110	-
1887, 10/16-9	Number 13	SE Louisiana	85	1	-	-
1888, 8/18-20	Number 3	SE Louisiana	110	2	-	-

Date	Name	Landfall	Winds	Category	Dead	Min Cent Pres
1893, 9/6-8	Number 8	Morgan City	100	2	-	-
1893, 10/1-2	Number 10	Mouth of MS	130	3	2000	948
1897, 9/12	Number 2	Beaumont	85	1	-	-
1900, 9/7-8	Galveston HU	Galveston, TX	145	4	0	936
1901, 8/14-5	Number 4	Grand Isle	90	2	10	973
1906, 9/26	Number 6	Pascagoula	110	2	-	958
1909, 7/21	Number 4	Freeport, TX	115	3	2	959
1909, 9/20	Number 8	Thibodaux	120	3	353	952
1915, 8/15-7	Number 2	Galveston, TX	130	3	-	940
1915, 9/29	Number 6	Lockport	130	3	275	944
1916, 10/18	Number 14	Pensacola	110	2	-	970
1918, 8/06	Number 1	Cameron	120	3	34	955
1920, 9/21-2	Number 2	Isles Dernieres	100	2	-	975
1923, 10/16	Number 7	Point Au Fer	80	1	-	983
1926, 8/25-7	Number 3	Houma	115	3	25	959
1934, 6/16	Number 2	Morgan City	80	1	7	966
1938, 8/14	Number 2	Cameron	75	1	1	1001
1940, 8/6-10	Number 2	Cameron	80	1	6	972
1941, 9/22-24	Number 2	Texas City, TX	120	3	-	958
1942, 8/19-21	Number 1	Galveston, TX	80	1	-	969
1943, 7/26-27	Number 1	Galveston, TX	100	2	-	969
1947, 9/19	Number 4	New Orleans	80	1	51	966
1948, 9/3-4	Number 5	Timbalier Bay	80	1	-	989
1956, 9/24	Flossy	Grand Isle	100	2	8	980
1957, 6/27	Audrey	Sabine Pass, TX	145	4	526	946
1960, 9/14	Ethel	Port Eads	90	1	-	981
1961, 9/11	Carla	Port Lavaca	145	4	39	931
1964, 10/3	Hilda	Salt Point	115	3	81	959
1965, 9/10	Betsy	Grand Isle	125	3	0	941
1969, 8/17-18	Camille	Pass Christian	190	5	-	909
1971, 9/16	Edith	Pecan Island	100	2	3	977
1974, 9/7-8	Carmen	Point Au Fer	120	3	3	937
1977, 9/6	Babe	Cailliou Bay	75	1	-	995
1979, 7/11	Bob	Terrebonne Bay	75	1	1	986
1985, 8/16	Danny	Pecan Island	90	1	0	988
1985, 9/02	Elena	Gulfport	115	3	19	959
1985, 10/29-31	Juan	Atchafalaya	85	1	-	971
1986, 6/26-7	Bonnie	Sabine Pass, TX	85	1	1	992
1988, 9/09	Florence	Port Eads	75	1	-	988
1992, 8/26	Andrew	Atchafalaya	115	3	2+	955
1995, 10/04	Opal	Pensacola, FL	115	3	0	942
1997, 7/18	Danny	Grand Isle	85	1	-	988

Date	Name	Landfall	Winds	Category	Dead	Min Cent Pres
1998, 9/27-28	Georges	Pascagoula, MS	110	2	2	987
2002, 10/03	Lili	Vermilion Bay	75	1	-	969
2005, 8/29	Katrina	Mouth of the MS	125	3	1577	923
2005, 9/24	Rita	Johnson's Bayou	115	3	-	935
2007, 9/13	Humberto	Vinton	75	1	-	989
2008, 9/01	Gustav	Mouth of the MS	100	2	-	961
2008, 9/13	Ike	Point Bolivar, TX	75	1	-	951

Spanish Conquistadors and the Storm of 1527



Beginning in the year 1519, Spanish conquistadors began plundering the New World for the sake of their motherland. Names such as Ponce de Leon, Fernando Cortes, and Coronado began exploring the area around the Gulf of Mexico and sent a “quinto”, Spanish word for one-fifth, of their earnings to the king. To the left is an artist’s rendition of a Spanish galleon, which would normally be used to send the royal “quinto” back to Spain.

October 23rd, 1527: The earliest reference that can be found to a storm in the Gulf of Mexico occurred on a voyage of Panfilo de Narvaez, whose nemesis was Fernando Cortes. His luck usually turned out to be bad, and this mission was no exception. He was sent to settle Florida, until forced to leave by hostile natives and hunger.

His five boats of less than 250 men hugged the coast and sailed westward. As they were passing the Mouth of the Mississippi river, a storm caught the barges and “tossed them like driftwood” (ChiPMan). This occurred nearly 155 years before La Salle “rediscovered”, and then lost the location of, the Mouth of the Mississippi river

Hurricanes of the Eighteenth Century

Hurricane dates occurring up to 1752 converted from Julian to Gregorian calendar

September 22-24th, 1722: This is the first well-documented hurricane to have hit Louisiana. It initially moved through the Lesser Antilles on September 11th, later making landfall west of the Mouth of the Mississippi on the 23rd, then passing through Central Louisiana. This same storm most likely recurved northeast into South Carolina, as they reported 3 days of flooding rains around the 27th.

Winds of hurricane force lasted fifteen hours beginning at 10 PM on the 22nd and ending shortly after noon on the 23rd. Storm surges were three feet at Bayou St. John and eight feet in the Mississippi River. Thirty six huts were destroyed, including the area hospital. These buildings were hastily constructed in 1717-18 when New Orleans was initially selected to be the capital of the Louisiana Company after a hurricane devastated Dauphin Island (Sullivan). The St. Louis church was destroyed. Food crops were lost in Biloxi. This storm was responsible for the moving of Mobile from 27 miles above the Mouth of the Mobile River to its present day site.

Ships were reported to be sunk in the harbor during this hurricane. Three pirogues loaded

with fowl, corn, and other goods were lost up towards the Tensas. The level of the Mississippi river rose eight feet due to the hurricane. In 1718, a three foot high levee was built to protect New Orleans from both river and tide overflow. This proved inadequate, as older area settlements used the devastation of New Orleans in the "Great Hurricane of 1722" as final proof of that city's unsuitability as the capital of Louisiana, following a great flood by only three years.

A "**rude little fort**" was built in the marshes near the Mouth of the Mississippi River. This location was discovered by Sieur de la Salle in 1682, lost, then found again before being inhabited by 1699. It was named La Balize, french for "The Seamark". In 1721, the first lighthouse-type structure, rising 62 feet out of the muck and mire, was constructed at that location. It was one of the first permanent settlements inside the current boundaries of the state of Louisiana.

September 23rd, 1740: Hurricane struck Mouth of the Mississippi River. Destroyed a large portion of the crops and left many colonists without shelter. The storm, along with others following it in the 1740's, removed all traces of the original habitation at La Balize. A new island was formed during the same time frame, called San Carlos. On this island, the Balize was re-established.

September 4th, 1766: A hurricane strikes the Texas coast near Galveston and plays a role in early Louisiana history. The ship *Constante* was lost in the storm about 45 miles east of Calcasieu Pass, and the nearby bayou was named "Bayu del Constante", or Constance Bayou (Morgan).

August 31st-September 4th, 1772 (Bernard Roman's Hurricane): Hurricane originating near Jamaica on the 28th of August moved north and northwest into the Central Gulf Coast just west of Mobile. Its effects were far reaching. In Pensacola, it destroyed most of the wharves. The most devastation occurred in the vicinity of Mobile and the Pasca Oocolo River. Being on the west side of this storm, the worst inundation occurred at the back of the Chandeleurs, Grand Gozier, and Breton Isles and cut new channels within the islands. New Orleans itself enjoyed a sunny day with light winds, though tides along the coast ran above normal.

All shipping at the Mouth of the Mississippi was driven into the marshes. This included the ship *El Principe de Orange*, which only had 6 survivors. The Spanish merchant brigantine *Nuestra Señora del Amparo* was also wrecked.

1776: A hurricane struck New Orleans. It produced some damage.

October 7-10th, 1778: There was a great storm surge that destroyed the establishments of the Balize, Bayou St. John, and Tigouyou in the Louisiana delta. All structures were wiped out of existence.

August 17-18th, 1779: A hurricane made landfall at New Orleans. At the time, Spain had declared war on Great Britain. Almost all of Bernardo de Galvez' ships (Governor of New Orleans) that were to be used to secretly seize the British post at Baton Rouge were grounded or destroyed, thus ruining his plans for invasion until the 27th. The only ship that escaped disaster was *El Volante*. Among the ships wrecked was the *America La Reseda*. Some of the ships were found in the middle of woods after the storm!

Wind and rain began on the night of the 17th. Full violence of the storm was attained by 3 am. All houses, piroughs, barges, and boats were decimated; these included an American Frigate, the *Morris*. This vessel was loaded with gunpowder to be used in the American Revolution against the British in Illinois (Barnes). Fields were leveled and all crops, stock, and provisions were lost.

During this storm, William Dunbar made observations that uncovered the true nature of tropical storms and hurricanes; that they had a progressive forward movement and that the winds revolved around a vortex at the center. He witnessed the 5-6 minute calm at New Orleans, before the wind reversed and equaled its previous fury (Sullivan). His findings were presented to the American Philosophical Society in 1801.

October 7-10th, 1779: A hurricane is reported to have affected New Orleans. This storm may be the same as the one listed above in 1778 with the same dates.

August 24th, 1780: A hurricane worse than the one in August 1779 swept over the province of Louisiana striking New Orleans; destroying crops, tearing down buildings and sinking every vessel and boat afloat on the Mississippi River and on area lakes...the town was leveled. It was during this storm that Dunbar noted the tornadoes formed around tropical storms and seldom lasted more than 5 to 10 minutes.

This was of no comfort to the inhabitants of the area, who were distraught after these two storms, an excessively cold winter and a very rainy summer. This residents wrote the Spanish sovereign not to abandon the country, regardless of the adverse blows of nature.

August 23rd, 1781: A hurricane is reported to have struck New Orleans. It may be a reference to the previous storm, as no data as been found to support its presence.

August 18th, 1793: A strong tropical storm hit New Orleans and destroyed unharvested crops and devastated rural sections of the province. Four merchantmen were wrecked on the Mississippi; two were American ships from Philadelphia.

August 31st-September 1st, 1794: A hurricane that had moved through Cuba on the 27-28th struck New Orleans on the 31st and produced considerable crop damage. The storm surge moved inland from Balize westward to the Plaquemines, as much as 10 feet in places, totally engulfing Fort St. Phillip, drowning their chief engineer. Large hail was also noted in the

storm; an unusual event in a tropical cyclone. Nine hours of high wind tormented what is now Avoyelles Parish on September 1st as the storm continued marching northward. Many lives, cattle, and horses perished in the storm.

August 1800: A hurricane is reported to have struck New Orleans.

Hurricanes of the Early Nineteenth Century

1811: Hurricane struck New Orleans.

August 19-20th, 1812: A hurricane struck just west of New Orleans. At 5 PM on the 19th, winds began out of the northeast in New Orleans. Winds increased to a “perfect hurricane” at 11 PM. Winds abated after 2:30 PM on the 20th. Nearly all buildings suffered, including those made of brick. The market house in New Orleans was demolished. The Church of the Covenant lost its roof. All window panes at City Hall were broken. Fifteen feet of water covered the city. Extensive damage occurred to trees. The levee was destroyed. The storm surge submerged areas south of the city. Plaquemines parish was under as much as 15 feet of Gulf waters, where 45 drowned (National Intelligencer). Sugar crops suffered severely.

Damage was significant to their naval base. The U.S. brig *Enterprise* was shoved ashore, dragging her anchors. The *Viper* lost her main mast, and suffered additional damage. Fort St. Phillip in Plaquemines parish went fully underwater, with most within the fort drowning. Only six of 60 ships on the Mississippi river were considered worth repairing. At least 10 perished from the ship *Harlequin*. The beach of Lake Pontchartrain was strewn with vessel fragments, their cargo, and victims of the cyclone. Nearly 100 people died during the storm. Losses totaled \$6 million.

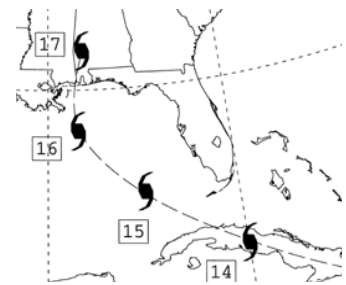
Some public panic set in when after the storm rumors spread that the British had taken over Fort St. Phillip; this storm struck during the thick of the War of 1812 and the fort was controlled by Americans at the time. In fact, the British fleet approaching the area was scattered widely across the Gulf during the storm. Fort St. Phillip itself went underwater.

August 19th, 1813: A hurricane affected Gulf coast and was considered very destructive.

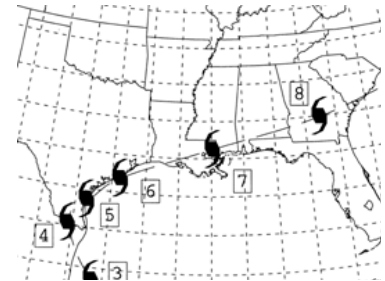
July 25-28th, 1819: Hurricane affected coast from Louisiana to Alabama. It struck Bay St. Louis. New Orleans was at the fringe of the storm and suffered no severe damage. Ships at the Balize suffered a strong gale for 24 hours that only grounded three ships. Lakes Pontchartrain and Borgne rose five to six feet during the storm, with farms along the lakes flooded by the storm tide. Forty one lives were lost on the U.S. Man of War schooner *Firebrand*, a 150 ton gun ship, while it lay off the west end of Cat Island. At

least 43 people died in all.

September 15-17th, 1821: A second, much larger yet weaker hurricane struck near Bay St. Louis. The gale continued for over 24 hours at New Orleans, beginning at 6 PM on the 15th and Boufouca. A dozen willow trees were the main casualties there. The storm was more damaging at Petite Coquille, where four soldiers drowned when an eight foot storm surge overwashed the island. The fort there was nearly swept away. The schooner Brisk was driven onto the Middle Ground in the Mississippi Delta after becoming dismasted on the 16th (it was saved on the 23rd). The U.S. Schooner Enterprize was cast away off Cat Island (Louisiana Courier). At least thirty-five lives were claimed by the storm.



August 16-17th, 1831: The Great Barbados hurricane, very destructive, hit just west of Last Island, just west of Baton Rouge. It was considered the strongest hurricane across southeast Louisiana since 1812 and killed 1500 people along its path from Barbados to New Orleans. A fishing village on Grand Isle was destroyed when the tide rose six feet. Barataria saw the greatest damage as the town and its inhabitants were swept out to sea (Louisiana Courier). Sugarcane crops suffered severely from Baton Rouge to Pointe a la Hache. Orchards and gardens in Plaquemines parish sustained considerable damage. A total of 260 perished statewide, with 150 from Barataria.



August 28-29th, 1831: A strong tropical storm struck southwest Louisiana. High tides were seen west of Lake Borgne...gales raged in New Orleans overnight on the 28-29th. Gales were much more severe near the Sabine River and across central Louisiana near Opelousas and Attakapes. Cotton was ruined in Baton Rouge and Alexandria due to the heavy rains and winds. High winds were noted as far northwest as Fort Jessup, southwest of Natchitoches.

October 5-7th, 1837 (Racer's Storm): The Racer's Storm hit Matamoras, Mexico and caused great devastation to the Texas coast while recurving northeast and striking Louisiana just east of Cameron on the 6th. It then moved east along the Gulf coast and headed out into the Atlantic by the 10th (track on the right). Storm surges of 8 feet above the normal high tide on Lake Pontchartrain. The original wooden Bayou St. John lighthouse, the first of its kind built by the United States outside the original 13 colonies, was swept into obscurity.

New Orleans experienced a gale on the 5th and 6th, destroying chimneys, awnings, and many area roofs. The City Exchange on Lewis Street, which was under construction at the time, suffered much damage. All wharves along the Mississippi coast were washed away with the tide. The storm caused widespread flooding and considerable damage to shipping; all boats, including four steamboats, perished in the storm.

Lower portions of New Orleans were submerged. Many buildings were damaged or carried away. Crops were seriously damaged along both sides of the Mississippi, particularly sugar cane and cotton. Six lives were lost. See Texas Hurricane History for more on the earlier history of this storm.

September 14th, 1839: This storm struck Charley's Lake (later known as Charleston, Lake Charles). An "appearance of rain" was noted on the 14th. Rain began on the 15th with a "hard wind". The rainfall increased in intensity on the 16th. By the 17th, the rain and wind subsided, yet cloudiness lingered. The only reference found of this storm was in the T. Rigmaiden Diary.

June 19th-23rd, 1840: Another possible reference to a tropical cyclone for Charley's Lake (Charleston, Lake Charles) was found in the Rigmaiden Diary. An all-day rain began on the 19th and continued for days. Winds increased by the 21st, as corn was "blown down in the field". The center passed west of the village, as a "hard south wind" blew across the region. Rain continued through the 23rd.

June 11-15th, 1844: Charleston (Lake Charles) experiences another storm. During the 10th and 11th, threatening skies brought the promise of rain. On the 12th they delivered; a "very hard rain" developed. A continuation of the deluge on the 13th led to the bending of area corn stalks and the washing away of a bridge. Rain continued through the 15th.

April 3rd-4th, 1846: A hurricane hits Balize, near the Mouth of the Mississippi. The system could have been a strong nontropical low similar to the March storm of 1993 due to the date of occurrence. The storm cut a boat channel between Cat Island, a place named for what the French thought were cats on the island (but turned out to be raccoons) and its lighthouse.

Southwest Louisiana saw the fury of this cyclone as well. It rained throughout the 3rd with a "very hard wind". Flooding developed at Charleston (Lake Charles) of the 4th, causing waters to encroach upon area residences and sweeping away fences. Six inches of rain were measured with the storm. Intermittent rain continued through the 7th.

September 5-8th, 1846: A "hard rain" developed in Charleston (Lake Charles). Windy conditions on the 6th were accompanied by a noticeable rise on area rivers. Rain continued through the 7th and the river stage peaked on the 8th or 9th. No significant damage was noted. The rains throughout Louisiana that year made sugar cultivation difficult; most of it fell between February and August. Yields dropped 25-50% as Baton Rouge totaled 116.6 inches of rain that year (Wade, Lawson).

Hurricanes of the Late Nineteenth Century

August 25-26th, 1852: A tropical storm formed north of Haiti on the 19th before moving west through the Florida Straits, and then northwest into the Mouth of the Pascagoula River on the night of the 25th. It was hardly noticed on Lake Pontchartrain. Four new channels were cut through the Chandeleurs. The storm claimed the 55 foot tall Chandeleur Island lighthouse and replaced the area with a broad, ten-foot deep lagoon (Cipra). The keepers of the light were rescued 3 days later, on the verge of starvation. The schooners *Josephine* and *Walter M.* went ashore Cat Island.

September 15-16th, 1855: A hurricane swept out of the Gulf across Fort St. Phillip and Lake Borgne, before moving inland in Mississippi. It was considered the worst hurricane since 1819 and was felt as far east as Apalachicola Bay. Its pressure pattern was compact as the pressure at New Orleans fell to a mere 29.93" at 7 AM on the 16th (Henry). At Proctorville, the wharf and bathhouses fell victim. Water was four feet deep on Proctor's Landing. At Lake Borgne, water began to rise during the afternoon of the 15th. A "smart breeze" was blowing at sunset. It had increased to a "perfect hurricane" by midnight. A number of homes were destroyed.

At Cat Island, the light keeper's dwelling was wrecked and its lighthouse was left in "severe peril". Most structures along the Mississippi Coast were swept away. The Atchafalaya and Ship Shoal lightships were torn from their moorings and grounded. Both lightships were repaired and returned to service in 1856 (Cipra). The ship *Venice* was pushed onto the banks of the Mississippi by the strong gale and sprung a leak. The steamer *J.S. Chenoweth* sank to the bottom of the Mississippi.

August 10-12th, 1856: Hurricane strikes Isle Dernieres, Last Island, a pleasure resort south-southwest of New Orleans. The highest points were under five feet of water. The resort hotel was destroyed, along with the island's gambling establishments. Over 200 people perished, and the island was left void of vegetation and split in half. Only one terrified cow remained on the island after the catastrophe. Last Island is now only a haven for pelicans and other sea birds. The steamer *Nautilus* foundered during the storm. The lone survivor clung to a bale of cotton and washed ashore sometime later.

Every house in the town of Abbeville was leveled. Rain from the storm flooded the Mermentau River and destroyed crops along bottom lands. Area rice fields in Plaquemines parish went under several feet of salt water. Nearly all rice was lost to the storm. Orange trees were stripped of their fruit. The rain total at New Orleans reached 13.14". In Lake Charles, it rained most of the day on the 12th.

1860: Number 1 on August 11th: On the fourth anniversary of the Last Island Disaster, another hurricane made landfall across southeast Louisiana. A twelve foot storm surge

inundated the Mississippi Delta (Landsea, personal communication). The old site of Proctorville (now Yscloski) had hardly a house that remained standing and its lighthouse was leveled. The lighthouse at Bayou St. John was destroyed. The light keeper's dwelling was demolished, and the Cat Island tower was devastated. Cat Island was inundated, causing 300 cows to drown. The Mississippi rose three feet during the storm.

Storm surges were seen eastward along the entire Mississippi shore. The sugar cane crop laid in ruin. Trees were uprooted in Plaquemines parish at the Balize (Pilottown). Up to ten feet of water invaded from the Gulf. Crops of rice and corn were entirely ruined. The influence of the storm extended eastward to Pensacola, where it rained 3.03" and a strong gale ensued on the 11th. Over 47 people died...damages totaled \$260,000.

1860: Number 2 on September 14-15th: Another hurricane struck near the Mouth of the Mississippi, worst at Pilottown. The gale raged for about 20 hours across extreme southeast Louisiana, and large hail fell. Every building in Balize was either blown down by the wind or washed away by the storm surge, which reached ten feet in height. The lower portions of Plaquemines Parish were covered by several feet of water, drowning several people.

The third Bayou St. John lighthouse was damaged beyond repair. Tides rose to six feet above the high tide mark. All wharves along the south side of Lake Pontchartrain were destroyed. But it was no better in Mississippi...the lighthouse at Bay St. Louis was swept away along with one of its hotels. In total, damages exceeded \$1 million.

1860: Number 3 on October 2nd-3rd: A third hurricane within seven weeks produced severe damage to houses, businesses, boats, and crops as far inland as Baton Rouge. Winds and tides were similar to the previous cyclone in September. The storm made landfall at the Atchafalaya Bay and swept northeast. It only carried with it a 12 to 15 inch storm surge at Port a la Hache; the low level of inundation was likely due to its rapid movement. The sugar crop, along with the machinery employed in producing it, laid in ruin. Heavy losses were reported in Vermilion, Feliciana, Albermarle, Bayou Lafourche, Pointe Coupee, St. Bernard, and Terrebonne as well. Eleven miles of railroad track were washed out near New Orleans, where the rain total was 5.02 inches during the storm. Many livestock and 13 lives were lost.

This system continued northeast and produced the highest winds Natchez had seen since the Devastating Tornado of 1840. Trees fell in great numbers across Concordia Parish as they experienced stiff north winds. Gales were seen eastward to Pensacola, as with the first storm of 1860.

September 28-October 1, 1863: A tropical storm made landfall in southwest Louisiana on September 29th, and moved east-northeast across the state, becoming an extratropical cyclone during its passage through Louisiana. Limbs were removed from trees by the wind at Sabine Pass. The Yankee schooner Manhasset was captured by the Confederates at Sabine Pass as it was driven shore by the cyclone. Two and a half days of rain within the Atchafalaya swamp caused troops movements to come to a stand still at Morgan's Ferry. The rains in Louisiana

broke a drought at New Orleans, where winds initially kicked up dust across the city in advance of the storm's rain shield. In the wake of the storm, temperatures fell to comfortable levels within the Crescent city.

Just on the Louisiana side of the Sabine River lies a vast expanse of marshland near the coast. Within this region is the town of **Johnson's Bayou** (now referred to as Johnson Bayou). French fur traders traversed the area during the 1700's in order to barter with the local Native American tribe, the Attakapas. The first permanent settler was Daniel Johnson, who arrived in 1790. Like other places in the South, cotton was their primary crop. It was cutoff and virtually isolated from the outside world, until 1960.

September 12th-13th, 1865: This hurricane struck extreme Southwest Louisiana. It is considered weaker than Audrey in strength and smaller in areal extent. Niblet's Bluff was completely destroyed. One person died in Johnson's Bayou where many homes were leveled. The area around Calcasieu (Big) Lake was inundated by the storm surge. Grand Chenier was also put under water by the storm where several more people died. Fragments of furniture and homes were found afloat several miles up the Calcasieu. Twenty-five people lost their lives to the hurricane, most at Leesburg (Cameron).

The tides were high as far east as the Mississippi River, where rain and high winds were noted on the 13th. Extensive flooding occurred in Feliciana Parish. The entire Balize settlement and Pilottown were slowly abandoned in the years prior to the storm; everything left in the area was obliterated. The ship *Lone Star* wrecked while in Galveston Bay, and vessels trying to save the survivors almost foundered as well.

October 22nd-23rd, 1865: Hurricane affected Louisiana coast.

July 12-13th, 1866: A storm moved westward offshore Louisiana. At 28.5N 87.3W, a three-masted schooner was seen dismasted on the 11th in heavy seas. Winds "blew hard" at New Orleans for a few hours on the evening of the 12th. Tides increased until daybreak on the 13th.

The Timbalier Bay lighthouse saw the most action along the Louisiana coast. "Ugly, threatening weather" hit on the 12th. Three feet of water surrounded the tower. Wave action knocked away two brick piers, as 24 hours of pounding surf broke against the lighthouse. The keeper became spooked by the combination of weather conditions and loneliness, and promptly resigned (Cipra).

August 15-18th, 1866: On the 15th, the fringe of this system reached New Orleans. Conditions became stormy with winds out of the northeast. The rain subsided by the 16th, but breezy conditions continued. Steady rain set in again on the 17th at sunset. Southwest Pass saw high tides and stormy weather on the 18th as the winds became southeast. New Orleans rained

for the remainder of the day.

Proving the previous keeper at the Timbalier Bay lighthouse correct in judgement, “gale-driven” seas again invaded from the Gulf of Mexico. The temporary light and nearby dwelling house were demolished. The new keepers clung to a buoy for days, riding out the storm (Cipra).

October 3rd-6th, 1867: On the 1st, cloudiness set in at New Orleans as a fresh breeze developed, accompanied by showers. A storm was discovered off the coast of Brownsville/ Clarksville on the 2nd. On that day, a regatta was held on Lake Pontchartrain. A “spanking breeze” from the northeast and squalls played havoc with their race. During the 3rd, a gale developed at New Orleans, and the city became flooded due to the high seas and heavy rains. The saw mill and bath houses were blown away. At Milneburg, houses were swept away. The storm recurved northeast and east, within 70 miles of the Texas and Louisiana coastline.

At the Mouth of the Mississippi, a “fearful gale” blew by midnight on the night of the 4th. The pressure fell to 28.80" during the tempest. The river had been churned into a “seething foam”. Telegraph lines in the area were downed. Three houses at Pilottown were leveled. The system briefly made landfall near common day Venice, before moving east towards Florida.

The hurricane was severe, driving “pyramidal seas” against the Ship Shoal lighthouse, strongly shaking the tower, and splashing oil for the light out of its reservoir. The light was extinguished for six hours, and the lighthouse took on a northeast lean afterwards. The Shell Keys lighthouse was demolished...its keeper was killed. The screw piles that connected the Southwest Reef lighthouse to the Gulf bottom were bent and twisted.

The Spanish bark *Carmen* went ashore. A coal barge was sunk. The *Eclipse* became lodged in mud. Heavy winds and rain continued through the 6th across southeast Louisiana. Rice crops in Plaquemines parish experienced great damage.

October 3rd, 1868: A hurricane passed just offshore the southeastern tip of the state, before hitting Apalachicola the next day. The West Rigolets lighthouse suffered \$5000 in damage during the storm.

Early September 1870: A storm flattened sugar cane throughout St. Mary parish (Wade). Due to the date of occurrence, and extent of the damage, this may have been a tropical storm. No other information has been found about this system.

June 2-3rd, 1871: A tropical cyclone that struck Galveston also impacted Louisiana. New Orleans flooded due to the excessive rainfall, giving the appearance of a “submerged city” after the storm.

June 8-9th, 1871: A second tropical storm made landfall, this time just west of Galveston. Strong southeast winds were felt at New Orleans. Heavy rains began around 3 PM on the 8th. At Berwick’s Bay, a “terrific gale” set in on the 9th. Southwest Pass also saw these strong winds.

Rain fell in torrents across the area...aggravating the flooding from the storm the week before. Milneburg went underwater. Lake Charles experienced winds approaching hurricane force. Corn and cotton were in ruin...fruit trees were uprooted "by the score". The old courthouse was damaged beyond repair. Many cattle and hogs drowned in Leesburg, the town now known as Cameron (Benoit).

A tornado touched down at Chatawa, 95 miles from New Orleans. It was 100 feet wide and was on the ground 10 to 15 minutes. A school house was razed to the ground. Numerous trees were uprooted, including 100 peach and pear trees. The schooner *Confidence* was sunk by the storm at Manchac bridge. See the Texas Hurricane History for what the storm did across southeast Texas.

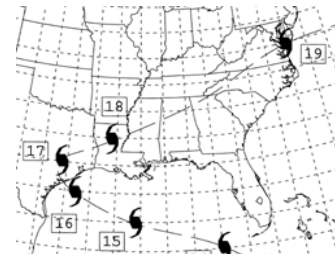
October 1st-4th, 1871: Heavy rains and winds started across southeast Louisiana with this cyclone on the 1st. Large trees were blown down. Walls of burnt buildings crumbled before the storm's fury. New Orleans saw "unprecedented rainfall" in the period between 6 PM of the 2nd and 3rd; six to ten inches were measured. Homes were unroofed and telegraph poles fell. Damage was estimated at \$5,000.

Southwest Pass saw a "very heavy gale" from the southeast start at 10 PM on the 2nd, becoming northeast by the 3rd. The pilot boats *Louis Geran*, *Oriental*, *Hays*, and *Cornelia* were beached. The *Robert Bruce* was thrown ashore and became "a perfect wreck". Its pilot and boat keeper clung to the boat for 30 hours before being rescued by the tug *Wicaco*. Four on the *Bruce* perished during the storm.

July 4th, 1874: A hurricane that struck the coast near Indianola, Texas also left its mark on Louisiana. Torrents of rain fell in the city of New Orleans...setting a 24 hour rainfall record for July of 7.52".

The creation of Port Eads. Attempting to make the Mississippi navigable, James Andrews and James Eads embarked upon creating jetties to clear a deep channel to the Gulf of Mexico. Direct communication by telegraph to New Orleans was established, and a small town named Port Eads quickly developed in the river's delta. Weather observing began at the site soon afterward. The channel was used regularly by shipping in 1876 (Barry).

September 15-18th, 1875: On the 15th, the fringe of this hurricane first affected Louisiana. Ships foundered, even in the protected harbor of New Orleans. The schooner *Mabel* sailed out of the Mouth of the Mississippi river, never to be heard from again. On the 17th, a strong south wind developed across southern Louisiana. As the hurricane moved eastward out of Texas, Calcasieu and Lake Charles saw the wind shift with “terrific force”. Tides at Shell Island were higher than during the Isle Dernieres disaster of 1856.



In St. Mary parish, the “tremendous equinoctial storm” damaged cotton, prostrated sugar cane, and caused a thirty-four hour deluge that turned the surrounding prairie into a “vast sheet of water” (Wade). Isle Piquant saw a number of houses destroyed and fences leveled. At New Orleans, the squall came in from the west later that evening. Winds of 36 mph did a number on the steamer *Natchez*. It collided with the ferry *Louise*, linked up with the boat and they drifted down the Mississippi. After brushing past the *C.H. Durfee* and *Belle Rowland*, the *Natchez* was re-secured. The pressure fell to 29.30" at Southwest Pass at noon on the 18th. The *Greenleaf* dragged its anchor and went ashore.

August 22nd-23rd, 1879: This hurricane made landfall in Louisiana. At Lake Charles, winds increased out of the northeast beginning at 9 AM on the 22nd, then veered to the east and southeast after dark. According to the Lake Charles Echo, winds were sustained at 40 mph. The Weekly Calcasieu Gazette reported that during the “night we had a perfect hurricane.” Several old buildings were blown down and the spire from the Catholic Church was torn off. Trees were uprooted; fences and chimneys were destroyed. Great damage was done to the rice crops, gardens, and orchards.

In Cameron Parish, damage was greater. A “tidal wave” swept from the southeast across the west bank of Calcasieu Pass, stranding no less than 12 vessels high and dry after the storm. Some of the schooners were propelled far inland. The lighthouse was “wrenched” 6 inches to the west, its beacon blown away. Two seamen were tossed overboard from the New York brig *Casatell*. Many of the dwellings were destroyed. Some floated away into the Gulf of Mexico without a trace. Hundreds of cattle were rolled “head over tail,” struggling vainly to keep their heads above water, yet still drowned. The new two-story church in Johnson’s Bayou was leveled. The damage was considered far worse at Grand Chenier.

In Vermilionville (Lafayette), the steeple of the Catholic church fell in. Trees were downed and crops of cotton were damaged. At Broussardville, the Catholic chapel was severely damaged along with roofs being blown away and the schoolhouse moved several feet. New Iberia and Franklin saw some homes destroyed and many roofs blown off. Scarcely a building was left unharmed between Morgan City and New Iberia. Destruction to the sugar cane and fruit crop was considered “appalling.” Extreme southeast Texas experienced the full fury of this cyclone.

September 1st, 1879: This hurricane struck the coast just west of Morgan City only ten days

after the last. In Abbeville, light rain began to fall on the night of the 31st. By 7 AM on the 1st, a “perfect gale” was uprooting trees along with damaging homes and fences. Winds died down after 3 PM. Bridges were washed away by the rain and flooding. Their Catholic church’s roof partially fell under the weight of a tree, causing its bell to fall to the ground. Many trees toppled across St. Mary and Iberia parishes.

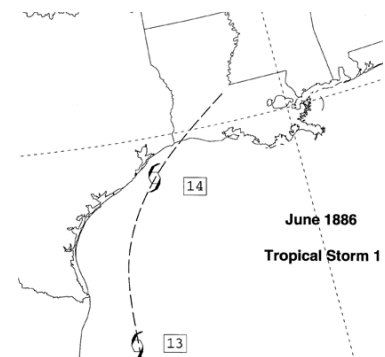
Damage was greatest around Morgan City, where the pressure fell to 28.70". Sugar houses on the Teche were damaged. The Centreville Catholic and the Morgan City Presbyterian churches were flattened. Saw mills at Jeanerette were destroyed. The wind was so intense between Morgan City and Jeanerette that trees were defoliated as if it was winter; estimated between 75 and 80 mph between New Iberia and Morgan City. Fifteen cabins, a couple churches, and the local saw mill also fell victim to the storm. Berwick Bay rose nine feet and flooded all the streets of Morgan City.

In Opelousas, crops were wrecked throughout the parish with over ½ of the cotton and most of the corn in ruin. Trees were downed as well. The steamer *Daniel Boone* was sunk. The steamers *Sammy* and *E.W. Fuller* were forced well inland; in the case of the latter, several miles inland from Bayou Sale. Damage estimates were around \$½ million. Twenty mules and five cattle fell victim. One human life was lost.

September 9th, 1882: A hurricane affected extreme southeast Louisiana. Port Eads reported 92 mph winds and a pressure of 29.38" with the storm. One half of the rice crop in Plaquemines Parish was destroyed by the Gulf inundation. At Quarantine, the ground was submerged; people took refuge in the government warehouse. When it made landfall in Pensacola, a great deal of crops, shipping, and buildings suffered there as well.

September 14th, 1882: A strong tropical storm made landfall in Southwest Louisiana. That night, a “hard wind and rain” visited Lake Charles, described as a “lively gale”. Port Eads had winds up to 70 mph and a pressure of 29.38". Abbeville reported no damage with the storm.

June 13-21st, 1886: This marginal hurricane passed inland near Calcasieu Pass (track on the right). The inundation of the storm surge extended several miles inland, reaching its highest point at 10 AM. Winds blew hard in Lake Charles, damaging ½ of the corn crop across southwest Louisiana. The storm was most severe at Calcasieu Pass, causing extensive flooding. An English barge was blown ashore, and several schooners experienced much damage. The schooner *Agnes* was left on the north side of Big (Calcasieu) Lake.

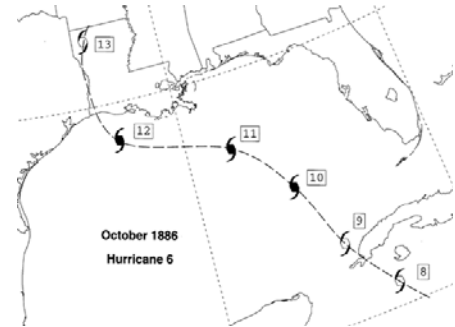


Sabine Pass was covered by seven feet of water. An eight foot storm surge placed the Sabine Pass lighthouse under five feet of water. In Edgerly, several sheds were leveled and roofs were blown off area homes. Johnson’s Bayou reported all stock drowned and crops lost. A large watermelon crop laid in ruin; an orchard in the area had fruit “whipped

off” the trees; twenty-five had considerable damage. A few outhouses were blown away. By the 21st, waters were at their highest on Lake Charles, flowing onto Ryan Street. Residents said the water was “as high as it ever gets.”

More rain-induced flooding occurred further north. Marksville received heavy rains on the 15th and 16th, with significant flooding around Bayou Pierrite. Excessive rainfall was seen at Alexandria; 21.4 inches there. In Jackson Parish, southwest of Monroe, the rains were a relief to crops yet still caused flooding of area creeks.

October 11-13th, 1886: Another more powerful hurricane hit near Sabine, Texas (track on the right). The inundation from the Gulf extended 20 miles inland at the point of landfall. It blew “almost a hurricane” for 36 hours, from the night of the 11th until the morning of the 13th. Port Eads reported 70-100 mph winds at 7 PM on the 11th. The Mississippi jetties were demolished. New Orleans had a pressure of 29.79". At Southwest Pass of the Calcasieu River, near Leesburg (Cameron), the water got as high as nine feet deep at the lighthouse. All cattle and crops were gone after the storm.

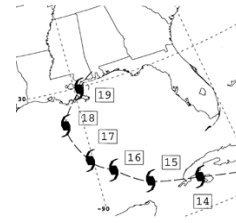


Cameron Parish suffered greatly as the storm was worst at Johnson Bayou. The Peveto Beach hotel might have been washed away if a large number of cattle had not taken refuge in the building! Winds began to increase out of the south at 4 PM, becoming a gale by 7 PM, and a full-blown hurricane by 8 PM. By 11 PM, a storm surge of 12 feet had swept inland and the first buildings began to fall. Survivors sought refuge in buildings or by clinging to floating debris. All waters had receded by noon the next day.

Nearly every house in the vicinity was removed from its foundation. The storm washed away the lighthouse keeper’s brick quarters at the old Sabine Pass lighthouse, on the Louisiana side of the Sabine River. Many families abandoned Johnson’s Bayou soon after the tempest. The twin city of Radford was destroyed, never to be rebuilt. Most of its refugees fled into Texas. Seven thousand area cattle perished in the storm. Between 175-200 perished in all, 110 of which were from Johnson’s Bayou.

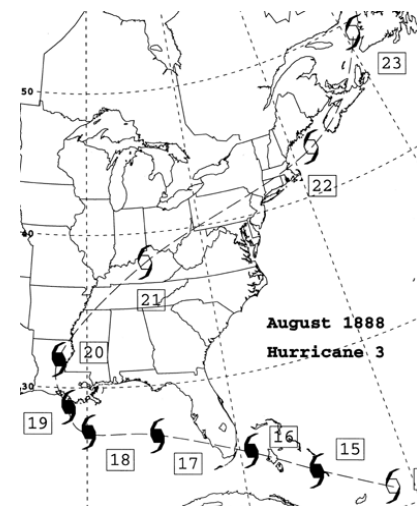
The storm wreaked havoc to crops statewide, especially area cotton and rice fields across southwest Louisiana; half the corn crop was lost in Sugartown. One unoccupied house at the edge of town in Lake Charles was blown down. In Plaquemines Parish, the entire rice crop was in ruin. Wreckage along the Lower Mississippi coast was reported to be “terrible”, causing \$250 thousand in damage. Considered similar to Audrey in its effects. Texas endured its share of destruction as well.

October 16-19th, 1887: A hurricane struck southeast Louisiana. On the 16th, a strong northeast wind blew across the area. Winds continued strong until the 18th, when winds rose to “a regular storm”. Rain was steady until the 19th when skies cleared, but the wind remained. The cyclone caused much destruction in New Orleans, where the pressure fell to 29.22”; they received their heaviest rain in years.



Great damage was done to cane and cotton crops around Abbeville. Iberville Parish had considerable damage to area outhouses and the sugarcane crop. In Algiers, trees were blown down. Such flooding occurred that people had to “wade to work”. On the 29th, a call went out in the Abbeville Meridional for the formation of a “New State Weather Service” for Louisiana; over twenty states had formed such an organization under the U.S. Signal Corp as of that time.

August 18-20th, 1888: The “severest and most extensive” hurricane that had impacted Louisiana since the Racer’s Storm in 1837 affected much of northern Gulf coast (track on the left). In New Orleans, all electric light, telegraph, and phone wires went down on Sunday night. The height of the storm was Monday morning. Winds of 90 mph howled through New Orleans.

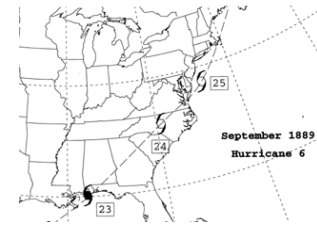


The Teche also felt the storm. Sugar houses and sheds were blown down. Franklin had many homes with roofs blown off and leveled. Two churches in Morgan City were almost demolished. Local wharves were also damaged. The rice crop suffered severely. Much wind damage was noted in Plaquemines, St. James, Donaldsonville, Houma, Convent, and Tigerville (which was renamed Gibson two weeks later after the senior Louisiana Senator in power at the time).

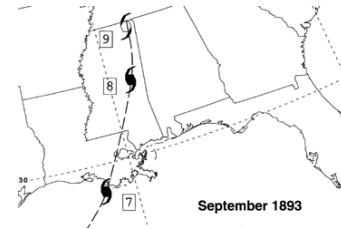
Rain totals of three to four inches were common across southern and central Louisiana. New Orleans set a 24 hour rainfall record for August on the 19th, when 8.9” of rain fell; 14.14” was measured that week. Almost the whole city was submerged during the tempest. Maurepas had 11.48” of rain. All this water led to extensive flooding in Mandeville.

Rice, sugarcane, corn, and cotton crops were a total loss in sections of southern Louisiana. Grand Coteau lost much of its fruit crop. Several churches and homes were completely destroyed. Steamboats and sail boats were driven ashore. The steamers *Keokuk*, *W.G. Little*, and *Laura* sank during the tempest. Trees were uprooted across the area. Several people perished in the storm. Damage ran about \$2.7 million with the worst occurring in southeast Louisiana. Half the total was due to crops, another third due to coal sunk in New Orleans harbor.

September 22nd, 1889: A hurricane accelerated northeast out of the Gulf of Mexico and struck the southeastern tip of the state near Venice before moving into the western Florida panhandle (track on the right).



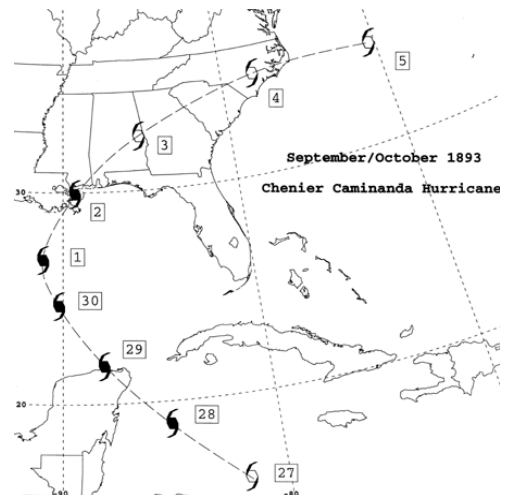
September 6-8th, 1893: This hurricane produced a great amount of damage to a small area of the state as it moved northeast out of the Gulf of Mexico into southeast Louisiana. Lockport in Lafourche Parish was partially destroyed; the storm there lasted from the night of the 6th until the afternoon of the 8th. Abbeville saw a stiff east breeze on the 7th that became a gale that afternoon and evening with heavy rain; over five inches in all.



The heaviest rains were confined to southeastern sections of the state; highest totals were from Franklin (15.20") and Donaldsonville (10.69"). Twenty-four hour rainfall records were set for the month of September at Donaldsonville (7.74" on the 7th), Emilie (8" on the 6th), and Wallace (9.29" on the 7th). St. Martin and St. Mary Parishes had the worst losses in the state to cotton, rice, and sugar. Oranges saw extensive damage in eastern Feliciana Parish.

The Deadliest Hurricane in Louisiana History: Chenier Caminanda, October 1893

October 1st-2nd, 1893 (Chenier Caminanda Hurricane): An unheralded storm of great violence moved from the Gulf across the southeastern United States (track on the right). It devastated about 500 miles of coastline from Timbalier Bay to Pensacola. Settlements along Lake Borgne, the Lower Mississippi, and the islands along the coast from the mouth of Bayou Lafourche east to the Chandeleurs saw the brunt of the hurricane. Landfall was between New Orleans and Port Eads on October 1st. Winds of 100 mph were estimated at Grand Isle and at Pointe a la Hache. High winds were noted as far west as Abbeville. A schooner four miles north of Pascagoula reported a pressure of 28.65".



At dusk on the 1st, hurricane force winds overspread the coast. At 10 PM., as winds continued to increase, water began covering the coastal island. A gigantic wave then crashed

upon the shore of the north end of Grand Isle, destroying all before it. Winds went calm between 11 PM and midnight, as the eye passed overhead. Winds increased out of the north thereafter, before tapering off by dawn.

Areas from Bayou Lafourche to the Balize received the wrath of this hurricane. New Orleans itself was flooded. Buras was nearly completely destroyed, as only two homes were left standing. Their Catholic church was swept off its pillars and left in ruin; it would be 12 years before it was rebuilt. The towns of Neptune, Ostrica, Point Pleasant, and Doullut experienced major damage. Sixty percent of Plaquemine parish's orange crop was destroyed.

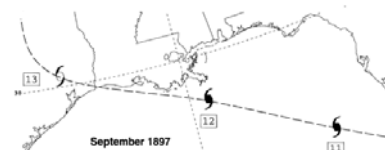
Bohemia ceased to exist. Quarantine station was completely leveled. Grand Prairie, Home Place, and Venice also suffered greatly. The St. James chapel in Nicholls was razed to the ground. The Point a la Hache courthouse saw \$5000 in damage. Total damages exceeded \$21,000. After the storm, many of the survivors from Chenier Caminanda moved to Lafourche parish and founded the town of Leeville. Others settled in Grand Isle, Cut Off, Golden Meadow, and Lockport (Armstrong).

The storm surge was as high as 15 feet in Louisiana Bays, 16 feet at Chandeleur Island. The Barataria Bay lighthouse was almost destroyed. The Chandeleur Island lighthouse suffered a several foot tilt; waves at times washed over the lantern which was 50 feet above sea level. Severe damage was dealt to the Lake Borgne lighthouse; its roof sheared off by the wind. Hotels and summer homes on Grand Isle no longer existed. Two thousand people died (779 from Cheniere Caminanda and 250 from Grand Lake); actual counts of dead at the time ranged from 1848 to 2448. Immense destruction of shipping occurred, islands were stripped of vegetation, and property losses near \$5 million were seen with the storm. Four churches were blown down across the state. In stature, it was considered more than an equal to the 1856 hurricane.

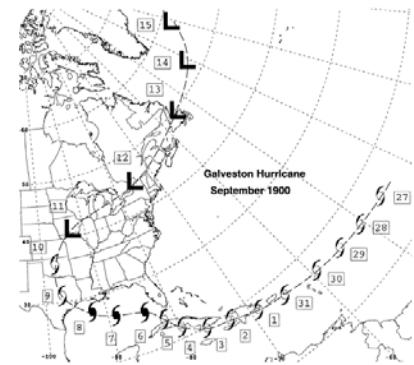
Two hundred survivors sought refuge at the Port Pontchartrain lighthouse, and its female light keeper was publicly recognized for this act. One of the survivors was rescued from a makeshift raft off the South Pass of the Mississippi River eight days later, almost 100 miles from where he started in Cheniere Caminanda. The schooner Elmira capsized in Buras, but was driven seven miles upstream to Point Pleasant due to the force of the storm surge. Also of interest, a man named Jean Henriot wrote a poem about the storm. He was a resident of that island at the time and left the island to settle in Westwego soon after. The poem was handed down from generation to generation, before finally fully appearing in print in 1973 (Plaisance). Another poem about this hurricane was published in the Daily Picayune in October 1893.

September 12-13th, 1897: A hurricane struck the Louisiana coast south of Port Eads, then moved west-northwest into southeast Texas as a significant tropical cyclone on the 13th, an event that would be repeated in 1940 (track on left). Winds were 72 mph at Port Eads. In Abbeville, winds were stiff out of the east on the 12th. The storm vented its fury between dusk and 10 PM, waning after 11.

Damage was inflicted upon the pear, pecan, cotton, and rice crops. At Cheniere Au Tigre, boats and schooners were badly damaged and washed up on the beach. Wind mills were blown down. Area cattle sought refuge on Pecan Island. At Calcasieu Pass, the only damage noted was to cotton and growing crops.



September 7-9th, 1900 (Galveston Hurricane): This strong hurricane invaded Galveston with deadly results. This storm also affected Louisiana while on its way to Texas (track on right). Cameron Parish saw hurricane-force winds. Johnson Bayou was inundated by the storm surge, but there was no loss of life. Between that night and the 9th, winds in Abbeville were strong out of the east. Gale force winds spread as far inland as DeRidder and as far east as New Orleans. Tides in the surrounding bayou were the highest since the Indianola Hurricane in 1875. Rice was threshed by the wind. Winds only reached 31 mph out of the northeast at Port Eads. At Cheniere au Tigre, a few calves drowned. Damage was considered light, compared to what happened in Texas.



Hurricanes of the Early Twentieth Century

August 14-15th, 1901: A hurricane formed northeast of Puerto Rico and moved west through Southern Florida and the eastern Gulf of Mexico. The cyclone turned northward, moving ashore Grand Isle on the 14th. The 5-min average winds reached 56 mph at Port Eads before the anemometer blew away and a 24 hour rainfall record was set there for the month of August, 7.64". River stages along the Mississippi river at New Orleans rose to a level of seven feet during the storm, producing much flooding. Levee breaks around New Orleans flooded the city. Buras reported 4 feet of water in town. The only building not destroyed at Port Eads was the lighthouse. Total Louisiana damages exceeded \$1 million. Ten lives were lost.

September 25-26th, 1906: This hurricane moved westward through the Caribbean before turning north-northwest through the Yucatan Channel. The system made landfall at the Mouth of the Pascagoula River. Gales were experienced along the Lower Mississippi Delta. Winds gusted to 49 mph as the pressure fell to 29.15" at New Orleans. The Lake Borgne lighthouse was most likely destroyed in this storm, though Cipra dates the destruction as occurring on the 10th (Cipra). A 24-hour rainfall record was set at Collinston for the month of August, when 4.55" accumulated on the 25th.

July 21st, 1909: The hurricane that caused great damage across Texas also left its mark on southwest Louisiana. Gale-force winds affected Cameron and Vermilion Parishes, on top of the storm surge. Hundreds of cattle drowned in the marsh. Cotton from Grand Chenier to Sabine Pass was in ruin. Two lives were lost in Cameron Parish.

On September 20-21st, 1909, a hurricane passed over Berwick Bay before passing inland between Baton Rouge and New Orleans. Winds of 80 mph were reported at Thibodaux. The pressure at Abbeville bottomed out at 28.68". Extensive damage occurred in New Orleans to coal barges, railroads, communication lines, crops, and much property public and private when winds reached 66 mph at 7 PM. Churches in Smoke Bend, Kaplan, Montegut, Pierre Part, and Elton were damaged. Crowley saw a 35% loss to its rice crop. Cotton and sugarcane suffered greatly across greatly across Southwest Louisiana, east of the Calcasieu River. Almost every mill in Iberia parish sustained damage. About 20% of the cotton crop was damaged.

Significant delays to rail traffic were caused by wreckage strewn across the line from Avondale westward to Morgan City and New Iberia. The launch Maine was sunk in Grand Bay during the tempest. Many sailing vessels were swept ashore near the Rigolets. Damages totaled \$6 million. The storm killed 353 people and its 15 foot storm surge inundated much of southern Louisiana.

June 1912: A tropical storm with 60 mph sustained winds moved inland into south-central Louisiana. The Teche rose 4.5 feet in only 24 hours, flooding sugar crops for up to three days (Wade).

August 15-19th, 1915 (Saltwater Storm): A hurricane made landfall just west of Galveston. Gales howled throughout Cameron and Vermilion Parishes... and as far east as Mobile. Produced tides of 11 feet at Cameron (called Leesburg at the time), ten feet at Grand Cheniere, and 9.5 feet at Marsh Island; Grand Isle reported water 6 feet deep across the city. This Gulf intrusion flooded the Chenier plain of southwest Louisiana and southeast Texas, leading to the demise of Cameron parish's orange-growing industry (Gomez). Heavy rains also fell across the state, as

seen on the table to the right.

The lightkeeper at the Sabine Pass lighthouse had to turn the lens by hand, as vibrations caused by the wave action put the clockwork out of order. At Sabine Bank, 17 miles offshore the Mouth of the Sabine, damage was noted. Damage estimates for Louisiana and Texas totaled around \$50 million.

Twenty-four hour rainfall records For August set during the 1915 storm		
Merryville	17 th	8.71"
Logansport	18 th	7.37"
Plain Dealing	19 th	3.81"
Liberty Hill	19 th	2.92"

September 29th, 1915: A violent hurricane reached New Orleans after tracking through the Caribbean and Gulf of Mexico on a parabolic course. The ten foot high levee protecting the city at the time began to be questioned as not being high enough after the passage of this storm (Orleans Levee District). The pressure fell to 28.01" on a ship in the New Orleans harbor. Burrwood's winds reached 140 m.ph. for five minutes and were sustained at or above 107 mph for two straight hours (Cline). New Orleans saw as high as 98 mph. Franklin had 14.43" of rain during the storm, while New Orleans saw over eight inches. Nearly every building in New Orleans received damage. Over 50% of U.S. Highway 90 along the Mississippi coast was destroyed.

Storm surges up to 12 feet ran ashore the northern coast of Grand Isle and 13 feet at the west end of Lake Pontchartrain. The New Canal lighthouse was heavily damaged as winds of 130 mph raged, and the pressure fell to 28.11", which at the time set a record for the lowest pressure measured on land in the United States (Cipra). Ninety-nine out of 100 buildings were destroyed in the town of Leeville. The sugar crop was damaged. Thirteen million

Twenty-four hour rainfall records For September set in 1915 hurricane		
Franklinton	30 th	10.28"
Paradis	29 th	9.00"
Pearl River	30 th	6.60"
Hammond	30 th	6.40"
Dutchtown	29 th	3.50"

dollars of damage, \$5 million in New Orleans alone, were caused and 275 people died. Many of those who perished refused to leave low lying areas in advance of the storm, despite ample warning.

October 17-18th, 1916: A large hurricane hit Pensacola after accelerating northward through the Gulf of Mexico. Gale-force winds lashed Lower Plaquemines Parish. The storm produced damage as far west as Burrwood. Heavy rains fell statewide, with Burrwood receiving nearly a foot of rainfall.

Twenty-four hour rainfall records For October set in 1916 hurricane		
Burrwood	17 th	7.95"
Franklin	17 th	5.90"
Napoleanville	16 th	4.61"
Collinston	18 th	3.41"
Kelly	13 th	3.13"

August 6th, 1918 (Merryville Tornado/Cheniere-au-Tigre Storm): A hurricane originating south of Jamaica struck Cameron Parish. The storm affected places as far west as Orange, Texas and as far east as Jennings. It struck without warning. Winds at Lake Charles were estimated to be near 100 mph; Sulphur reported a pressure of 28.36" and winds as high as 125 mph. Johnson's Bayou saw a 2 1/2 foot storm surge while Morgan City recorded a three foot surge. Leesburg (Cameron) itself saw little damage. However, homes in Grand Chenier and Creole were swept away by the storm surge.

The main route between Leesburg (Cameron) and Lake Charles was a ship named the *Borealis Rex*. It left on the morning of the 6th and fought rising winds to try to get back to port in Lake Charles. When she entered Prien Lake, strong winds drove the boat against the shore. The passengers ran out to a nearby home to ride out the storm. When winds reversed out of the north in the early afternoon, the Rex was forced a mile downstream where it sank in 8-10 foot waves. Lowest pressure noted on the vessel's barometer before capsizing was 29.06". The boat was resurrected, refurbished, and back in commission by the spring of 1919. Its bell ended up at the Methodist church until it was blown off the roof by severe thunderstorms on February 12, 1998.

The tempest killed three pilots at Gerstner Field, one of the first air fields in the country, which was located near Holmwood. It destroyed seven hangars and 96 airplanes. Only its Big lake Gunnery School survived, which assisted with relief work after the storm. In Lake Charles, the synagogue Temple Sinai was severely damaged. The old Presbyterian church was

demolished. A portion of the M.E. church was detached and "blown to pieces" (Millet). Area sawmills were destroyed. The damage was most severe in the Goosport milling district, where fires added to the destruction caused by the wind. The fires were so bright that DeQuincy could see a red glow in the southern sky.

Westlake was "a scene of desolation" as most buildings were leveled. Very few Sulphur businesses were left standing. The Union Sulphur Mines saw the greatest monetary losses, which totaled \$3 million. Further north, DeQuincy was heavily damaged by high winds. Several homes and businesses there met their fate. Thirty- four lives were lost across the state of Louisiana. Timber losses were calculated at \$1 million, while the destruction of the saw mills incurred a loss of \$1 million. In all, \$5 million dollars in damage occurred.

September 11-14th, 1919: A hurricane moved westward off the coast of Louisiana. Gales were experienced in Lower Plaquemines parish. The pressure at Burrwood fell to 29.60" as winds peaked at 52 mph. Lake Pontchartrain became a "raging sea". A six foot storm surge was recorded 40 miles west of Grand Isle, and lesser invasion of the coast was seen elsewhere in the state. This system went on to devastate Corpus Christi, and was similar to Carla of 1961 in effects across Louisiana.

September 21-22nd, 1920: A hurricane moving through the western Caribbean sea, making landfall in Honduras and the Yucatan peninsula before moving north-northwest through the central portion of Louisiana. The pressure fell to 28.99" at Houma. Fishing villages along Lake Borgne experienced gales on the east side of the system, at times gusting to 48 mph. Trees were uprooted and lines were downed. As one of the lines fell, a man fell victim. Winds of 60 mph were seen as far east as Bay St. Louis. Winds reached 90 mph at Grand Isle. A twenty-four hour rainfall record was set at Kelly for the month of September when 1.60" was recorded on the 22nd. The sugar crop was damaged. Tides up to six feet were reported in the Mississippi Sound. Tides did considerable damage at Grand Isle and Manilla Village. The storm killed one and produced \$1.45 million in damage.

October 16th, 1923: This minimal hurricane hits state near the Mouth of the Mississippi river. Heavy rains were seen eastward to Pensacola. The pressure fell to 29.25" at Morgan City and the tide rose 3.6 feet. As the storm accelerated north and northeast, rains spread north to Lake Superior.

August 25-27th, 1926: A hurricane struck near Houma. The steamship Cody, while lying 220 miles east southeast of Galveston reported 75 mph winds while the Argon saw northeast winds of 100 mph near 27N 90.5W. The pressure bottomed out at 28.31" in Houma with estimated winds of 100 mph at Grand Isle. Morgan City witnessed 60 mph winds howl through town. Over five inches of rain fell. New Orleans gusted to 52 mph as the pressure sank to 29.37". Burrwood's winds peaked at 50 mph while the pressure fell to 29.55".

At Houma, the sugarhouse was wrecked at Southdown plantation. The Episcopal church was "smashed". Ninety percent of the sugar cane was gone after the storm. Serious damage occurred between New Orleans and Baton Rouge. Lutchter, Caryville, Burnside, and Gismer saw streets

full of wreckage which became nearly impassable. Many trees were uprooted and barns were removed from their foundations. Thibodaux and Napoleonville experienced winds of 120 mph. Houses fell as telephones splintered in the wind. The town of Thibodaux lost three churches, a warehouse, and ten stores.

At Glenwood and Madewood, more than thirteen inches of rain fell in less than 12 hours. Rainfall records set during the cyclone are listed on the right. The pecan orchard in Shriever was gone. Early rice and cotton were beat down at Crowley. Baton Rouge plunged into darkness as \$20,000 in damage occurred to its electric company. More than seventy passengers from the Southern Pacific trains were marooned on a

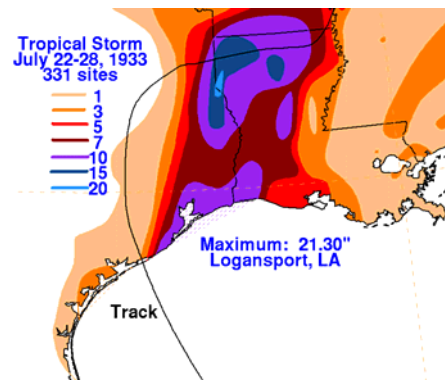
Twenty-four hour rainfall records for August set during the 1926 hurricane

Donaldsonville	26 th	14.47"
Avoca Island	25 th	12.06"
Pearl River	26 th	8.60"
Morgan City	25 th	8.50"
Franklin	26 th	8.45"
Houma	25 th	8.04"
Baton Rouge	26 th	7.50"
Cinclare	26 th	5.56"
Amite	26 th	5.34"
Reserve	26 th	5.20"
Clinton	25 th	5.00"

railway ferry barge in the Mississippi when two tugboats towing it grounded.

A boat sank at Donaldsonville. The New Canal lighthouse was again damaged, instigating a project to raise the structure by three feet after the storm. The third Timbalier Bay lighthouse was tipped to the northwest. A ten foot storm surge was reported at Timbalier Bay; tides as high as 15 feet overwashed the southern coast of Terrebonne Parish, north of Isle Derniere. Twenty-five people died and four million dollars in building damage occurred as it moved northwest towards Shreveport.

July 22-28th, 1933: Originating in the Caribbean sea, this cyclone crossed the Yucatan peninsula as a tropical storm on July 20th, this tropical storm moved northwest into the middle Texas coast late on the 22nd near Matagorda Bay. The storm then tracked slowly eastward after reaching northeast Texas for several days and brought heavy rainfall as it moved slowly inland across northeast Texas and northern Louisiana as an extratropical low. An area of over 25,000 square miles saw an average of 12.5", mainly across the northwest half of Louisiana and the east portion of the



Piney Woods of Texas. A small area of the central Texas/ Louisiana border measured over twenty inches of rain. Logansport recorded 21.3" over a four day period, with 18 inches falling in one day, setting a 24-hour rainfall record for July at that location. San Patricio creek, north of Converse, went on a rampage, ceasing railroad and highway traffic through the area. A severe thunderstorm struck Alexandria at 3:45 am on the 25th, breaking windows, downing trees, and

damaging area roofs. Rainfall at Alexandria reached 9.75” on the 25th which set a 24-hour rainfall record for July. Northwest Louisiana would not see a rain event of its equal from a tropical cyclone until June-July 1989 (Allison).

June 16-17th, 1934: Morgan City was hit by this hurricane. Not a single building there escaped unharmed. Chimneys tumbled, roofs were torn off, and numerous windows were smashed. Winds blew between 75 and 100 mph at Morgan City. Baton Rouge experienced 60 mph winds uproot trees and halt work on the state capitol. Pressure fell to 28.52" at Jeanerette. Winds only reached 35 mph at New Orleans, where the pressure fell to 29.34".

Heavy rains deluged the state. Effects from the hurricane were felt as far east as Gulfport, Mississippi. To the north of Ferriday, the local American Legion post was unroofed. Stormy weather extended as far north as Memphis, Tennessee. A storm surge of 12 feet inundated the region around Oyster Bayou. Boats ran aground as the Gulf invaded the state from the south. The storm killed seven and produced \$2.6 million in damage.

Twenty-four hour rainfall records set during the June 1934 storm

Lafayette	17 th	9.68”
Franklin	16 th	8.65”
Melville	17 th	7.10”
Abbeville	17 th	5.00”

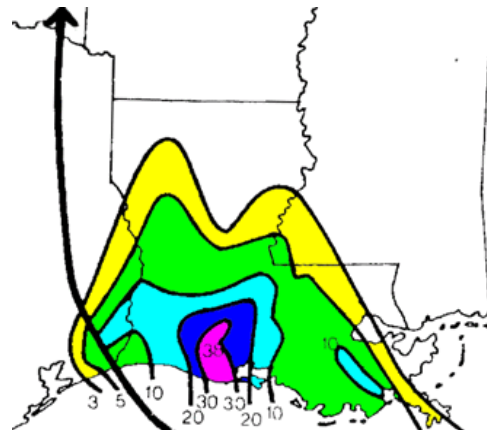
August 14-16th, 1938: A hurricane which hit the shoreline east of Cameron caused \$250 thousand worth of damage in Louisiana. The Coast Guard cutter Saranac played a vital role as it relayed coastal conditions throughout the tempest. The fury of the storm struck Cameron at 6 pm and Lake Charles at 8 pm on the 14th. Trees were uprooted throughout Cameron parish. Grand Chenier reported winds of hurricane force. Lake Charles recorded a pressure of 29.56" and wind gusts to 60 mph around 7:30 PM. The greatest damage to the city occurred in the Goosport and South Ryan areas.

Twenty-four hour rainfall records set during the August 1938 storm

Jennings	15 th	13.88”
Ville Platte	15 th	10.50”
Cheneyville	15 th	9.76”
Jonesville	16 th	7.98”
Urania	15 th	5.85”
Alexandria	15 th	3.85”
Pollock	15 th	3.36”
Monroe	15 th	3.12”
Bastrop	15 th	2.71”
Colfax	18 th	1.74”

Jennings measured a 13.88” deluge on the 15th. The Old Spanish Trail (U. S. Highway 90) became impassible due to the flooding east of Welsh. Homes flooded in Grand Marais, southeast of Roanoke. Storm surges along the southwest Louisiana coast were four to five feet. Shrimp boats were reportedly beached near Creole. The Intracoastal Ferry, loaded with four cars and 20 people, broke its cable and “whirled downstream,” crashing onto the river bank after traveling one-half mile. One person died in Lake Jackson.

August 6-10th, 1940: This hurricane with sustained winds of 80 mph created a path of damage as it traveled slowly offshore the coast of Louisiana into southeast Texas. Hurricane-force winds only extended ten miles on either side of the storm. Several feet of water from the Gulf of Mexico invaded Grand Isle, while fifteen feet of water inundated sections between there and Golden Meadow. Cameron went under two feet of sea water. Calcasieu Pass reported at 4.8 foot storm surge and western portions of Lake Pontchartrain saw a 6.4 ft. surge. Lake Pontchartrain churned into a “foaming mass.” Part of the bridge



between Thunder Bayou and the nearby chenier was washed away. Railroad tracks were flooded east of New Orleans.

Southeast Louisiana was raked by “strong, puffy winds”...at New Orleans they peaked at 53 mph. Sugar was left in ruin in Houma. Pressures fell to 29.35” at Burrwood and Grand Isle. Several houses at Delacroix Island and Shell Beach were leveled by the winds. Gale-force winds overspread southwest Louisiana, with winds reaching 48 mph at Lake Charles. Winds at Cameron reached 70 mph while their pressure fell to 29.10” at 7 am on the 7th, making it their strongest storm since October 1886. Thirteen oil derricks were blown down in the Cameron Meadows oil field, located eight miles northeast of Johnson’s Bayou. Due to the high winds and frayed nerves of the residents tying up the phone lines, ham radio became the only reliable method of communication during the storm...a method of communication still used during storm situations.

Twenty-four hour rainfall records For August set during the 1940 storm		
Crowley	9 th	19.76”
Lafayette	9 th	19.63”
Gueydan	8 th	17.60”
Abbeville	9 th	17.50”
Grand Coteau	9 th	16.07”
Lake Arthur	9 th	11.60”
Melville	9 th	9.40”
Hackberry	8 th	9.12”
Lake Charles	8 th	8.91”
Pecan Island	7 th	8.09”
Atchafalaya	9 th	8.00”
Leesville	8 th	7.58”
Schriever	7 th	6.05”

When the winds began to slacken, torrents of rain fell across southern Louisiana, with over half of the state reporting five inches of rainfall. Debilitating flooding was endured across Acadiana with Crowley receiving 33.71" of rain over a five day period (Aug 6-10). Other locations receiving high rainfall totals included Abbeville (31.66”) and Lafayette (29.65”). Lafayette received 19.63” during their wettest 24 hour period. Miller Island reported 37.5" of rain, with 23.8" within a 24 hour period. Rainfall records at the National Weather Service office in Lake Charles were set for August 7th and 8th which still stand today (6.77" and 4.84" respectively), with 8.91” falling within a 24 hour period. Entire towns and cities were evacuated

through the 12th due to the flooding. Gueydan went under six feet of flood waters. The business district of Crowley was submerged by two feet. Bayous flooded within St. Landry parish, with refugees fleeing to Opelousas. The flooding was described as worse than during the 1927 crevasse within Acadiana. Almost 2 million acres of land went underwater by at least one foot. Low areas remained inundated until mid-October (LMRCSCC II). A raging fire in the town of Iowa burned down Shell Oil's district offices and supply warehouses as it could not be fought due to the flooding in its vicinity.

Pecans were "shredded." Both flora and fauna were forever altered by this environmental catastrophe. Cotton and corn crops experienced significant losses. Large losses were also seen in the sugar crop in the Teche. Huge losses to area livestock and muskrats (75,000 head) were caused by the massive flooding. The flock of dwindling whooping cranes was scattered across southwest Louisiana. By 1947, only one remained. Nutria, being farmed in Acadiana for their pelts, escaped their farms and began their coastal expansion (Gomez).

The schooner J.W. Clise was abandoned during the cyclone 135 miles south of the Mouth of the Mississippi; its crew was rescued. A barge laden with pilings for use in construction overturned near the Southern Yacht Club in New Orleans. Damage totaled \$9 million, but only six lives were lost. An evacuation of 18,000 people from the flood zone most likely limited the death toll. The press in southwest Louisiana attributed the low loss of life to good preparation by residents due to guidance from the newly-opened Weather Bureau office, then housed east of Lake Charles at the Calcasieu parish airport (now known as Chenault field).

September 22nd-24th, 1941: This hurricane which struck Texas City, Texas caused hurricane force winds to move through western Cameron parish. Winds gusted to 60 mph at Lake Charles, where the pressure fell to 29.48". Tides rose to 4.8 feet above mean lower low water at Cameron. Glenmora established a new 24-hour rainfall record for September (3.50"). The Calcasieu river flooded slightly near Cameron due to backwater flooding. The Old Spanish Trail (U.S. Highway 90) flooded between Lake Charles and Westlake.

August 19-22nd, 1942: A hurricane paralleled the shore before moving westward into Galveston. Hurricane-force winds raged in the vicinity of Johnson's Bayou. Winds only gusted to 28 mph at Lake Charles, where 2.12" of rain fell. Other locations measured greater rainfall, with new 24-hour rainfall records for August becoming established at DeQuincy (2.25" on the 21st), Monroe Dam (3.18" on the 19th), and Rodessa (8" on the 22nd).

July 25-28th, 1943: This hurricane which surprised Houston and led to the era of hurricane reconnaissance first formed off southeast Louisiana. Burrwood reported 36 mph winds from the northeast, first indicating the incipient tropical storm on the 25th. Winds gusted to 36 mph at Lake Charles on the 27th. Gales were seen to the south and west of Lake Charles. Heavy rains fell at DeQuincy, with 7.65" on the 28th alone.

September 15-19th, 1943: A dying tropical storm made landfall in southern Louisiana, east of Lake Charles. Storm tides reached four feet in Lake Pontchartrain. Very heavy rain occurred throughout Southern Louisiana, with 19.26" falling at Morgan City. A number of 24-hour

rainfall records for the month of September were set, including Chandaleur Lighthouse (12.25” on the 18th), Pecan Island (9.55” on the 17th), and Belle Chasse (8.57” on the 18th).

August 22nd, 1947: A hurricane passed offshore Grand Isle. Sabine Pass reported a 3.6 foot storm surge as the storm hit the Upper Texas coast.

September 19-20th, 1947 (George): The Weather Bureau forecast office in Miami, while operating with the military, named this hurricane George. Naming began in the Pacific Fleet during World War II as a method of discerning one storm from another. This system of naming was unofficially continued by the Weather Bureau until 1953, without being highly publicized (Barnes).

Twenty-four hour rainfall records set during the 1947 hurricane		
Bogalusa	20 th	6.06”
Pollock	20 th	4.88”
Weyanoke	19 th	4.80”
Winnfield	20 th	4.52”
Gum Springs Tower	20 th	4.33”
Montgomery	19 th	4.20”
Hickory Grove	19 th	3.93”
Urania	20 th	3.92”
Riverton Dam	20 th	3.83”
Columbia	19 th	3.41”
Grand Cane	20 th	3.00”
Monroe Dam	20 th	2.52”
Sterlington Dam	20 th	2.00”

This category two hurricane with an eye 25 miles in diameter passed directly over New Orleans. Hurricane-force winds first reached the Mississippi and Louisiana shores at 6 AM and New Orleans at 8 AM. During its second year of operation, wind gusts to 125 mph were estimated at Moisant International Airport (highest gust measured was 112 mph) and the pressure fell to 28.57”.

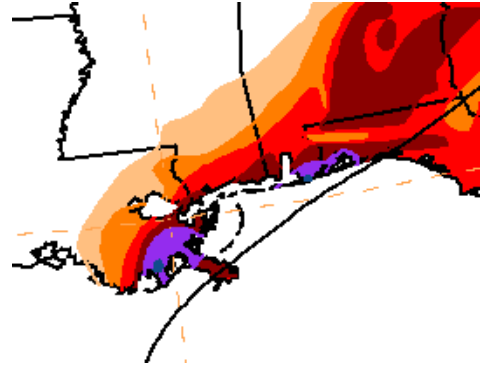
As the storm passed over Baton Rouge at 2:15 PM, Harding Field saw sustained winds of 96 mph, with gusts estimated at 120 mph. Hurricane-force winds reached as far inland as Melville by 4 PM. Lafayette experienced squalls to 45 mph and a pressure of 29.37” while the storm was located over southeast Louisiana. Lake Charles gusted to 48 mph with a lowest pressure of 29.35”.

A 15.2 foot storm surge overcame the Bay St. Louis seawall, spreading saltwater from the Gulf of Mexico well inland. Ostrica saw an 11.5 foot surge and Shell Beach experienced an 11.2 foot storm surge. Water was up to six feet deep in Jefferson Parish over a 31 square mile area. The air fields at Moisant were under two feet of water, closing the airport. This storm demonstrated the dire need for tidal protection levees for New Orleans. Much of the city (8.9 square miles) was flooded, and \$110 million in damage was produced. A small sailboat broke from its moorings at the Southern Yacht Club and broke up against the Lake Pontchartrain seawall. The storm claimed 51 victims, 12 in Louisiana.

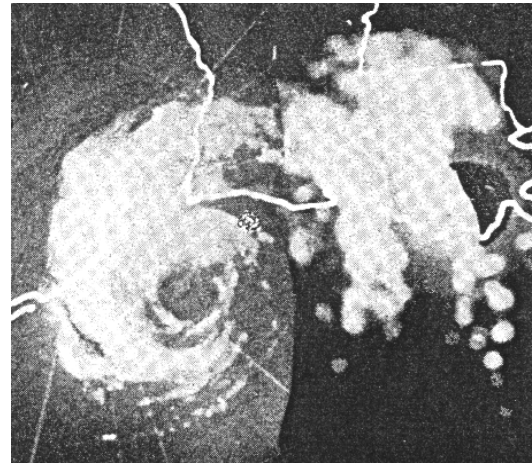
September 3-4th, 1948: A hurricane moved ashore Timbalier Bay. Moisant International Airport observed 90 mph gusts as the pressure at the Huey Long Bridge fell to 29.21”. Trees were uprooted in New Orleans. Heavy damage was done to oil rigs and other equipment offshore Grand Isle. Grand Isle was cutoff from the mainland when five feet of water flooded area roadways. Crops suffered wind and rain damage. Heavy rains fell at Amite (4.60”), Covington (7.20”), New Orleans (4.29”), and Reserve (5.80”) on the 4th. Storm surges of five feet occurred at Ostrica Lock and 4-5 feet along the Chandeleurs. Damage estimates were near \$888 thousand.

Late Twentieth Century Hurricanes

September 24th, 1956 (Flossy): Hurricane Flossy completely submerged Grand Isle and caused extensive coastal erosion as it moved across the Mississippi Delta. Burrwood reported winds to 90 mph and a lowest pressure of 29.03." Rain totals were excessive across southeast Louisiana, with a maximum of 16.70" at Golden Meadow. Hundreds lost their homes in the storm. Cattle were drowned and citrus, sugar cane, and pecan crops were heavily damaged. The eastern sections of the New Orleans seawall were overtopped, flooding 2.5 square miles. A storm surge of 13 feet was seen at Ostrica Lock. The storm killed 15 and \$22 million in damage was produced.



June 27th, 1957 (Audrey): The most destructive hurricane to strike southwest Louisiana was Audrey. She formed in the southwest Gulf of Mexico and moved due north, becoming the strongest hurricane ever to form in June. Warnings were issued 24 hours before landfall. However, the storm sped up its forward motion overnight on the 26th, catching residents and meteorologists alike in the area by surprise. Audrey moved ashore near the Texas/Louisiana border on the morning of the 27th causing a disastrous storm surge. Picture to the right, courtesy of the U.S. Air Force, is a radar composite from early on the morning of June 27th.



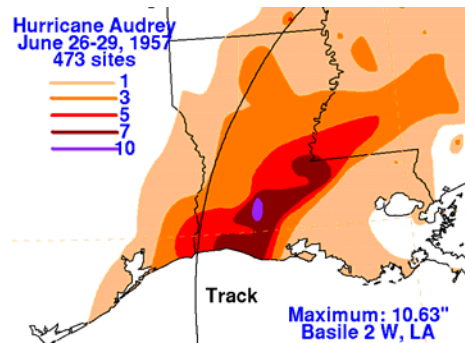
Gulf waters began to surge ashore during the early morning hours. Some in Cameron fled to the courthouse...the only structure that survived Audrey. Others were more unfortunate. Wood-frame houses floated like boats inland, in some cases, landing many miles away from their original location. Most were found along the Intracoastal Waterway after the storm. Over 1.6 million acres of land were flooded by the storm surge and headwater flooding along the rivers of southwest Louisiana. The storm surge began to recede early that afternoon. Many who survived the storm rebuilt, but few were placed on pilings. Storm surges of six feet or more extended from Galveston, TX along the coast to Cocodrie, LA. The highest storm surge measured was 12.4 feet west of Cameron. In Vermilion Parish, the storm surge pushed inland to Perry, just south of Abbeville, and put Pecan Island under feet of saltwater. Much of St. Mary Parish was also inundated by Audrey. Waves associated with the storm were monstrous, indeed. In the

Gulf, seas of 45 to 50 feet were reported. Waves at Cameron reached as high as 20 feet above mean sea level; this was on top of the storm surge.

Hurricane-force winds were experienced from Port Arthur, Texas eastward to Mobile, Alabama. Highest winds were reported to 96 mph at the NWS site at the Lake Charles Air Base (now Chenault Field) with reports up to 105 mph in Lake Charles. A pressure of 905 hPa, or 26.74", was reported by offshore oil platforms as Audrey neared the coast. An unofficial report of 185 mph winds was received from an oil rig, however this could have been associated with a severe thunderstorm embedded within Audrey's eye wall. Oil company tenders reported 150 mph winds which, although they are unofficial, are believed to be reasonably accurate. Rayne saw major damage to homes, businesses, and crops.

Church Point had many trees uprooted during the storm. High winds in Baton rouge blew out windows from the skyscraper Capitol. Two homes on Bayou Grosse Tete near Plaquemines were blown over (Menard). Heavy rainfall fell to the east of its track across southwest and central Louisiana.

Two tornadoes were spawned; one in New Orleans and the other in Arnaudville. Out of the 100,000 buildings that experienced damage, several thousand were destroyed.

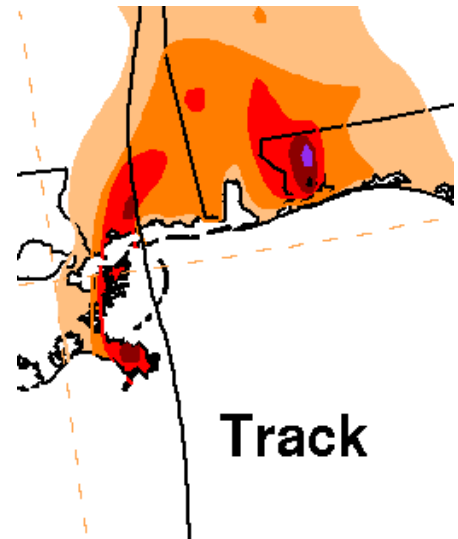


Between 90 and 95 percent of the buildings in Cameron and Lower Vermilion Parishes were damaged beyond repair. The shrimp boat *Bert H. Walling II* sank in the Calcasieu channel below Cameron, its crewmen rescued. Two 50 foot long fishing boats were thrown onto Main street (Louisiana Highway 82) in Cameron. An offshore oil rig was shoved ashore, destroying four fuel storage tanks along the way. The tanker Tillamook had the misfortune of being within the eye of Audrey between 4 and 10 AM on the 27th. In an interesting coincidence, Audrey had the help of a ship named *Audry*. This ship of Lake Arthur demolished a home in Cameron on its way inland.

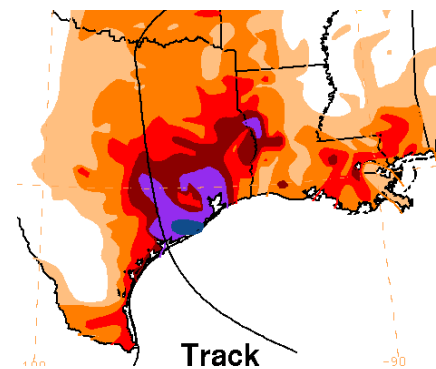
One of the more curious aspect of the storm was the exodus of wildlife preceding it. On the evening before landfall, thousands of crawfish were seen fleeing the marshes around Cameron. A few enterprising locals decided to collect them and put them in their freezer, unaware of the significance of this event. Needless to say, these crawfish were never brought to a boil the following day, as planned.

Masses of dead cattle, alligators, snakes, nutria, and muskrats blocked portions of the Intracoastal canal (Menard). A dead cow was found on top of a telephone pole two days after the storm moved inland. The total lives lost during Audrey stands at 416; most of them were in Cameron Parish. Damages in Louisiana totaled \$120 million.

September 15th, 1960 (Ethel): Hurricane Ethel quickly developed into a major hurricane the central Gulf of Mexico before moving accelerating northward along the extreme southeast sections of the Mississippi Delta, and weakened as it moved inland at Biloxi. Hurricane-force winds were seen in Lower Plaquemines parish. Venice had sustained winds of 90 mph with gusts to 104 mph at 4:15 AM. Burrwood saw gusts to 69 mph. The highest tide noted was seven feet above mean seal level on Quarantine Bay at 4 AM CST. Storm surges inundated the coast from the Mouth of the Mississippi east to St. Marks, Florida. Heavy rainfall was restricted to near and east of its track within the Mississippi delta, with the maximum within Louisiana measured at Quarantine, where 7.45” was measured.

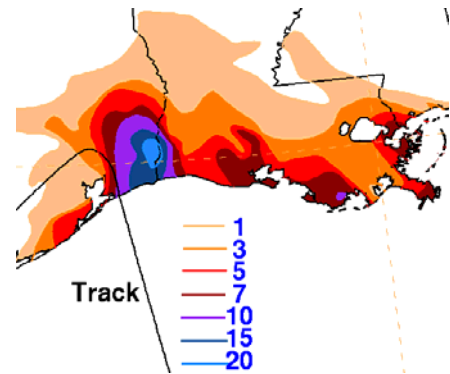


September 11-13th, 1961 (Carla): Hurricane Carla caused severe erosion along the entire coast in mid-September. Winds gusted to 56 mph at Lake Charles. Ten tornadoes were spawned across the state. Carla smashed a \$50,000 fishing pier in Holly Beach and a row of houses along the coast. Road damage reached \$300,000. At Hackberry, a large oil storage tank was displaced 6-7 miles northwest of its original location. This caused \$300,000 in damages. Grand Isle received flooding, but no structural damage.

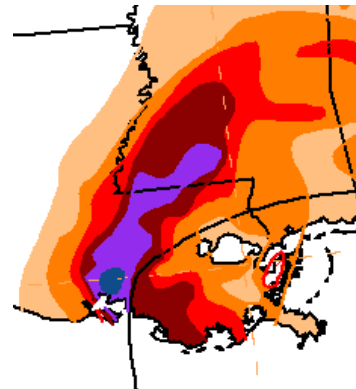


Damage was also seen along the Calcasieu Ship Channel northward to Lake Charles. Some oil rigs offshore were moved 8 to 10 feet towards the coast, despite being anchored 8 feet deep into the Gulf bottom. "Storm surges" of over 5 feet were seen along the Mississippi Delta and up to 7.6 feet at Cameron. In all, 3.6 million acres of land was inundated by the storm. Damage was seen along the Calcasieu ship channel northward to Lake Charles. A tornado touched down in Leeswill shortly after dawn on th 13th, where six lives were lost. Power outages and heavy rains were experienced as far east as Baton Rouge. Ten tornadoes were spawned by Carla within Louisiana. Heavy rains within the state were primarily in west-central Louisiana, with a maximum of 13.90” measured at Many. This rainfall led to minor flooding along the upper Calcasieu river. Total damages in Louisiana reached \$25 million, even though the Pelican state escaped the brunt of the cyclone. As the cyclone spun its way through the Midwest, flash floods struck Kansas and Missouri. President John F. Kennedy declared much of Louisiana a disaster area, along with Texas, Kansas, and Missouri.

September 16-19th, 1963 (Cindy): A rapidly developing storm in the northwest Gulf of Mexico, Cindy moved northward onto Galveston Island on the morning of the 17th. That afternoon, Cindy moved west to southwest, paralleling the Texas coastline just inland. Louisiana was in the moist eastern side of the tropical cyclone which led to heavy rains west of the Atchafalaya swamp. The rains were badly needed, as Texas and Louisiana were in the grips of a severe drought that began in early 1962. An area of over 15 inches of rain fell over the Sabine Basin in western Calcasieu and Beauregard parishes, though the absolute maximum fell just on the Texas side of the border. The only death reported was of a man who drowned while evacuating an oil rig south of Cameron. Total damages were estimated at \$12.5 million.



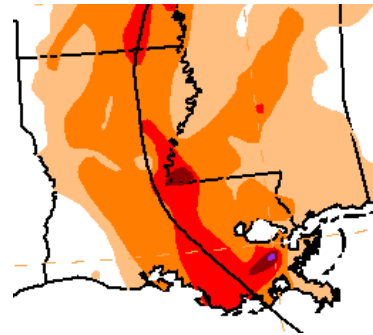
October 2-3rd, 1964 (Hilda): Hurricane Hilda caused severe coastal erosion and local flooding, along with 39 associated deaths as it hit Salt Point. Tornadoes were spawned at Golden Meadow, Galliano, Larose, Kenner, Metairie, and New Orleans. The Larose Tornado alone caused 24 of the deaths and a staggering 345 injuries. St. Joseph's chapel in Lydia was completely destroyed. The 115-year old St. Nicholas church in Patoutville was left in ruins after the storm. Sugar cane in the Teche was severely damaged. A large water tower collapsed on the Erath City Hall, which killed around ten people.



Franklin reported a pressure of 28.40" and winds estimated at 135 mph. Winds of hurricane force spread across much of southeast Louisiana. Over ten inches of rain fell across the Atchafalaya swamp and the southwest corner of Mississippi. Jeanerette measured 17.71" of rain. New Roads and Baton Rouge saw excessive rainfall amounts over a 24 hour period (10.1" and 8.9" respectively). Between storm surge flooding and fresh water flooding, three million acres of land were inundated.

The Gulf invaded Cocodrie up to a depth of 7.8 feet and Point Au Fer up to 10 feet. Offshore, the *Oil Driller*, 100 miles south of Morgan City, had their anemometer pegged at 120 mph throughout the night of the 2nd/3rd. Waves over 50 feet high punished the rig for hours that night. Damage totaled \$100 million.

September 9-10th, 1965 (Betsy): Hurricane Betsy, after producing great damage in Florida while meandering westward in the Florida Straits, accelerated to an unusually fast forward motion of 22 mph through the Gulf of Mexico, came ashore Grand Isle as a major hurricane where winds gusted to 160 mph. The sea level pressure dropped to 28.00" at Grand Isle and Houma, which up to that time was the lowest pressure measured within the Bayou state. Port Eads gauged winds of 136 mph with gusts to 145 mph. Winds gusted to 125 mph and the pressure fell to 28.75" at New Orleans on the 9th. Winds gusted above 100 mph across much of southeast Louisiana, and a stripe of over five inches of rain fell along and east of its track as far north as Tallula. Hurricane-force gusts reached as far west as Lafayette and as far inland as St. Landry parish. Alexandria and Monroe experienced wind gusts in excess of 60 mph. More than 27,000 homes were destroyed statewide by Betsy.

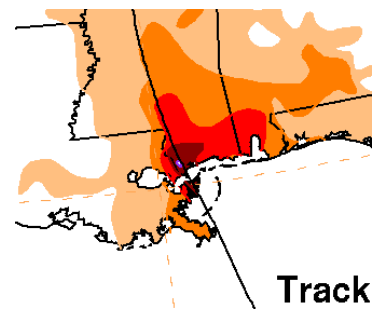
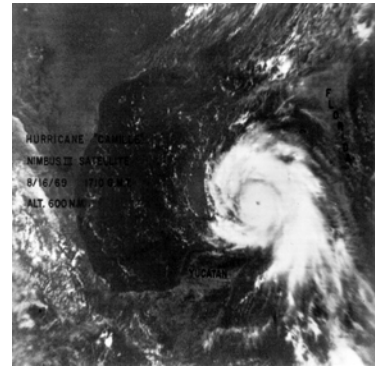


A ten foot storm surge was produced causing New Orleans its worst flooding in decades...enduring days underwater. Water depths reached up to nine feet deep in eastern New Orleans and Chalmette. Grand Isle saw a 15.7 foot surge wash over its northern coast. Practically all buildings in Grand Isle were either severely damaged or destroyed. Across Louisiana, 2.4 million acres was inundated by the storm. To the right is a picture of hurricane specialists working Betsy. John Hope (to the left) later worked for the Weather Channel in 1982.



Storm surges were seen as far east as Mobile. Hundreds of ships, tugs, and barges were sunk or driven aground from New Orleans to Baton Rouge. The Mississippi river rose more than 10 feet at New Orleans and crested at 15.5 feet at Baton Rouge. Following the storm, the levee was elevated to 12 feet by the Orleans Levee Board. Offshore and coastal oil installations, along with public utilities, reported unprecedented damage. The highest rainfall amount measured within Louisiana was 12.21" in New Orleans at Callender Field. Fall crops were in ruin, particularly sugar cane, cotton, and pecans. Many livestock drowned. Damage throughout southeast Louisiana totaled \$1.4 billion and 81 lives were lost, 58 of which in Louisiana. This was the largest loss in life in the state from a tropical cyclone since Audrey eight years before.

August 17-18th, 1969 (Camille): The most intense hurricane known to ever make landfall in the United States also made its mark in Louisiana. After developing in the northwest Caribbean sea, the storm rapidly strengthened as it moved north-northwest through the Yucatan channel and southeastern Gulf of Mexico. To the right is an image of Camille while it lurked off the Southwest coast of Florida on the 16th, provided courtesy of the National Climatic Data Center (NCDC). The pressure fell to 27.90" on Garden Island...the lowest measured within Louisiana at that time. Winds gusted to 125 mph at Slidell while their pressure fell to 28.56". Almost total destruction was seen from Venice to Buras as intense winds estimated at 160 mph moved into lower Plaquemines and St. Bernard parishes on the evening of the 17th. In Washington parish, Angie saw estimated winds of 130 mph howl through town. Trees fell in large numbers, with widespread damage also done to utility lines, homes, and businesses.

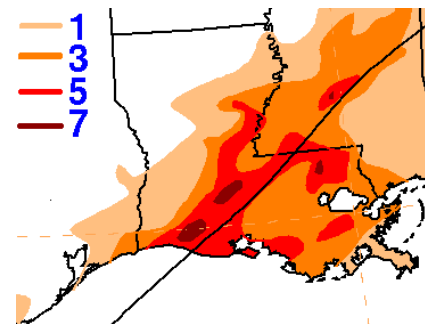


Ostrica Lock measured a storm surge of 16 feet. Water overwashed U.S. Highway 90 to a depth of ten feet. A

total of 860,000 acres of land were inundated by Camille's storm surge in Louisiana. The heaviest rains associated with Camille were restricted to the Mouth of the Mississippi river and the easternmost border between Louisiana and Mississippi, where seven inches of rainfall were measured.

Offshore oil platforms, as well as onshore oil refineries and storage tanks, took a beating during the hurricane. Almost 100 vessels, including tugs, barges, crew boat, and freighters were either grounded or sunk in lower Plaquemines parish. Three perished statewide. Damages across the state totaled \$199 million.

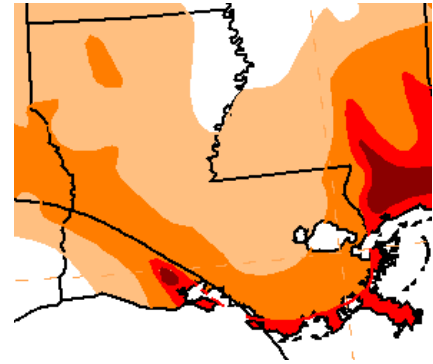
September 16th, 1971: Edith, a relatively small hurricane, moved inland that day near Pecan Island. Peak winds at Cameron were 69 mph with gusts to 96 mph. The pressure fell to 29.11" at Lafayette as winds gusted to 69 mph. Morgan City saw gusts to 72 mph. The sugar crop was damaged in the Teche. Storm surges ranged from 5 to 8 feet along the Louisiana coastline... highest in Vermilion and Cote Blanche Bays. Several tornadoes spun up, with the most serious in East Baton Rouge tracking seven miles. The heaviest rains were concentrated along and just left of its track across the Atchafalaya swamp, with the maximum amount reported at Lake Arthur, where 8.29" was measured. Some damage



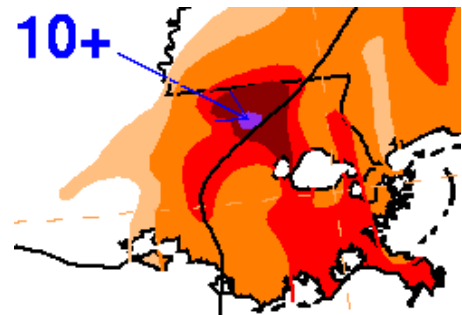
occurred but Edith caused no deaths across Cameron or Vermilion Parishes.

September 7-8th, 1974 (Carmen): Carmen moved inland just east of Vermilion Bay near Point Au Fer after crossing the Gulf of Mexico as a major hurricane. Winds reached 110 mph at the Bayou Boeuf oil rig near Ameila, 100 mph with gusts to 120 mph at the KROF radio station in Abbeville, and 85 mph at Morgan City. Damage was generally confined to the sugar crop and offshore oil installations. Piers at Marsh Island succumbed to 15 foot seas pounding the coast. Morgan City lost its power and telephone service.

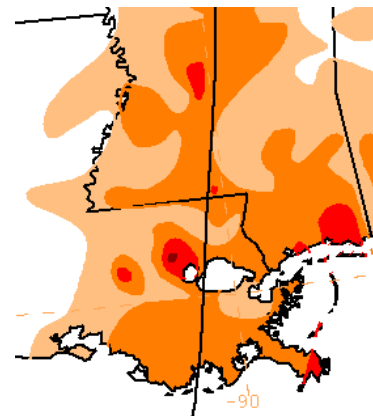
Two tornadoes were spawned on the morning of September 8th: One in Franklin at 4 AM which destroyed a service station, and another at Kaplan at 9 am. Tides of 4-6 feet above mean sea level went ashore along the coasts of St. Mary, Terrebonne, Lafourche, Jefferson, and Plaquemines Parishes. The heaviest rain fell along its track, and well east of the center along the central Gulf coast. The maximum amount was reported was 9.20", which fell eight miles south of Kaplan. Total damages from the hurricane reached \$150 million. Three deaths were indirectly associated with Carmen.



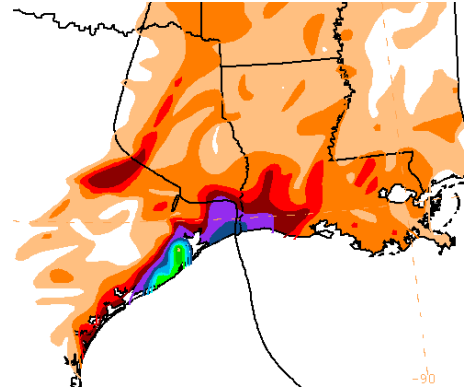
September 5th, 1977 (Babe): Babe developed in the Gulf of Mexico as a subtropical storm as it became vertically stacked with the upper level low which caused it formation. It moved northward into Southeast Louisiana and briefly reached hurricane status prior to landfall. After landfall, the storm finally took on tropical characteristics fully by gaining central convection. Heavy rains fell east of the Vermilion river across southeast Louisiana, with 10.70" measured at Pine Grove Fire Tower. Wind and water damage occurred in St. Mary, Iberia, and St. Martin parishes.



July 11th, 1979 (Bob): Hurricane Bob struck Terrebonne bay on the 11th. It was a very well-behaved storm and was quite predictable in track and strength. Highest storm surge reported was 5.02 ft on the north end of the causeway bridge across Lake Pontchartrain. The pressure fell to 29.28" at Moisant Field, as winds gusted to 44 mph during the storm. Heavy rains fell mainly east of the Atchafalaya swamp, with a maximum of 7.16" recorded Springville Fire Tower. One tornado was reported in Slidell. One person died, being blown off his roof as he was nailing it down during the hurricane. Damages totaled \$2.3 million to property, and \$1 million to the rice and sweet potato crops.



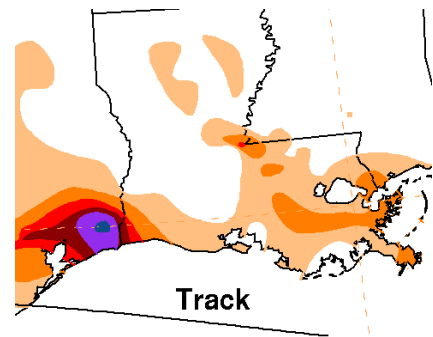
July 24-27th, 1979 (Claudette): As Bob was moving back out into the Atlantic off the North Carolina coast, a new tropical depression was sighted midway between Africa and the Lesser Antilles. It briefly became a tropical storm, named Claudette, as it approached Puerto Rico. The system took a track which nearly dissipated the system, as it moved across Hispaniola and Cuba before entering the Gulf of Mexico.



As the cyclone moved towards the upper Texas coast, its motion slowed to a crawl. This left the Pelican state to the right of the system for two days, leading to very heavy rains.

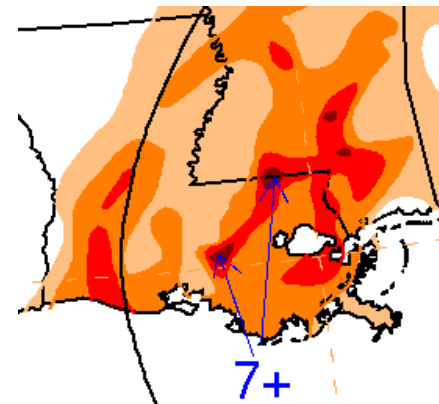
Over a foot of rain fell across southwest Louisiana. However, Texas saw the worst of the storm when 43 inches of rain fell at Alvin.

September 5th, 1980 (Danielle): A tropical depression formed about 100 miles offshore the Mississippi Delta, and paralleled the coast towards the west while it intensified into a tropical storm. A small tropical cyclone, Danielle still brought high winds and seas to the state of Louisiana. The highest rain totals seen with the cyclone were in Hackberry (4.91”), Baker (4.98”), and Old River Lock along the Red river (5.09”). High winds and waves south of Grand Isle caused a jack-up barge to collapse. Four men were thrown



into the Gulf, but only three were rescued. Some beach erosion occurred with this system. As it moved into Texas, heavy rains ended a drought within the Lone Star state.

August 15-16th, 1985 (Danny): On the 12th, a tropical depression formed in the northwestern Caribbean sea. As it moved through the southern Gulf of Mexico, the cyclone became a tropical storm, and was named Danny. Danny strengthened into a hurricane on the 15th just offshore Louisiana, before it came ashore near Pecan Island August 16th. In Abbeville, winds gusting to 114 mph blew off the roof of a school. High winds destroyed an airplane hangar in Iowa. Trees were uprooted throughout southern and central Louisiana. Thirty-nine tornadoes were spawned throughout the Southeastern United States, most occurred as Danny



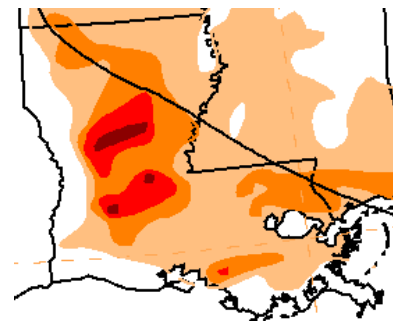
tracked northeast through Alabama and Tennessee. Only three touchdowns were noted across Louisiana.

Storm surges of eight feet were seen along the coast of south-central Louisiana. Highway 46 near Hopedale in St. Bernard Parish was impassable due to the high waters. The pier at Grand Isle State Park was damaged, while a pier near Slidell was demolished. Coastal erosion was greatest in Terrebonne and lower Jefferson parishes. Heavy rains fell near and east of its track, with the highest total of 8.91” measured at Kentwood. Seven injuries were reported, but no one died in the storm. Six of the injuries were due to the capsizing of a 41-foot sailboat near the Timbalier Islands. Sugar cane and soybean crops were damaged extensively. Total damages were estimated to be near \$14 million.

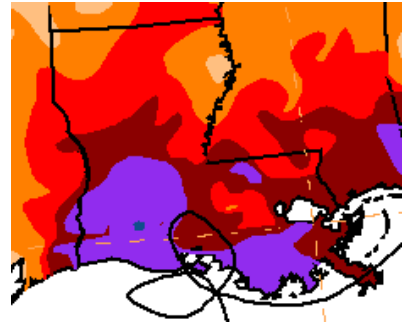
September 2nd, 1985 (Elena): Elena formed over Cuba, and made a clockwise loop in the northeast Gulf of Mexico just offshore Cedar Key before being steered west-northwest to the central Gulf coast. The image to the right was taken by the Space Shuttle just prior to landfall. The cyclone went ashore the Mississippi coast near Biloxi as a major hurricane and was the second of three hurricanes to hit the state that season. Elena continued its west-northwest track through southern Mississippi and northern Louisiana, before recurving through Arkansas and Missouri. Even as its surface circulation weakened, its mid-level circulation continued producing heavy rains across the lower Mississippi valley through the 5th before the system completely dissipated.

Many chose to evacuate southeast sections, with 400,000 fleeing the state. Elena entered Washington Parish as a category one hurricane and downed numerous trees. Heavy rains fell primarily across central Louisiana, with a maximum of 8.85” measured at Gorum Fire Tower.

October 27-31st, 1985 (Juan): Juan formed in the Gulf of Mexico on October 25th due to the formation of an upper level low and developed within a cool environment. This large storm drifted northward, looping near southern Louisiana between the 28th and the 30th while weakening back into a tropical storm. The highest wind gust recorded at NWS Lake Charles was 49 mph, which became the highest recorded during the month of October since records began in 1939. Over ten inches of rain fell across Imperial Calcasieu as well as portions of southeastern Louisiana, with Galliano receiving 17.78”. To the right is an image of Juan in the Gulf of Mexico taken by the NOAA-9 polar orbiting satellite.

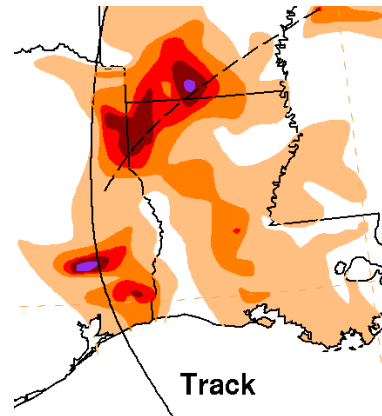


Storm surges reached eight feet at Cocodrie. Highway LA 1 south of Leesville and Highway LA 3090 near Fourchon were destroyed. Three bridges were washed out near Lacombe on LA 434. Levees were overtopped in Lockport, Marrero, Oswego, and Myrtle Grove; this added to the already serious flooding. Two hundred cattle were drowned in Terrebonne Parish. Grand Isle was under four feet of water while 1200 residents were trapped on the barrier island.



Offshore, conditions were far worse. An oil rig 35 miles south of Leesville collapsed, then smashed into a neighboring rig while in 20 foot seas and hurricane force winds late on the 27th. The ship Miss Agnes sank during a rescue operation 60 miles south of Morgan City that day. The rig AM Howard capsized early on the 29th. The boat Kiwi sank while in the Atchafalaya Bay. This all led to nine lives being lost offshore. Total damages exceeded \$300 million and 12 people died in all. Damages from Danny, Elena, and Juan across Louisiana totaled \$2.5 billion and 19 people perished.

June 26th, 1986 (Bonnie): Bonnie, a minimal hurricane, moved ashore just southwest of Sabine Pass on the 26th, then moved northward through East Texas before recurving northeast into Arkansas on the 27th. Some beach property was damaged in Cameron Parish with water damaging coastal roadways in Western Cameron Parish. Five tornadoes were caused by Bonnie in Louisiana; three in DeSoto and Webster Parishes alone, located in the northern section of the state.

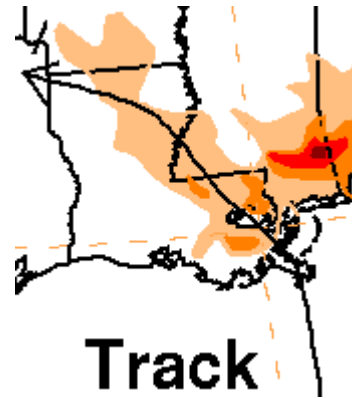


At 2 AM CST on the 27th, a period of 10-14 hours of heavy rain fell in Northwest Louisiana in Caddo, Bossier,

and Northern DeSoto Parishes, causing extensive flash flooding between 5 and 9 AM CST. The highest rainfall total was 9.92" measured one mile north of Mooringsport. Interstate highway 20 was under 5 feet of water. Highways US 71 and LA 1 were cut by flash flooding. Flooding alone caused \$10 million in damages. Only one person died in the storm, when winds overturned his fishing boat in Cross Lake.

September 9th, 1988 (Florence): A coastal trough developed over the Western Gulf of Mexico on September 1st at the tail end of an old frontal zone. It moved into Southeast Louisiana on the 4th, but began drifting south again as a strong high pressure system dived south out of Canada. On the 6th, it had moved southwest into the Western Gulf of Mexico before drifting back to the east on the 7th. It finally developed enough tropical characteristics to be designated a tropical storm, and moved north toward Louisiana.

It rapidly strengthened and became a hurricane before striking Port Eads on the 9th. However, the system had begun weakening as dry air began to intrude into the western portion of the circulation. It became extratropical by the 11th, as dry air continued to wrap around the western semicircle. The low dissipated later that day, as it drifted northwest over Oklahoma.



Highest winds reported were at New Orleans Lakefront Airport, which received a gust to 61 mph. Lowest pressure noted inland was 29.26" at New Orleans Naval Air Station. Highest rain total with the system was 4.47" at Abita Springs Fire Tower.

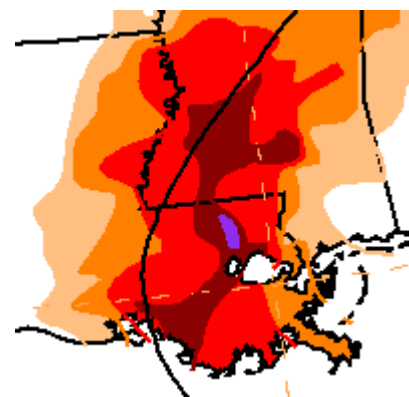
Significant beach erosion occurred along Grand Isle. Trees were downed, mostly in Orleans Parish. The storm surge flooded LA 300 near Delacroix. Total damages were estimated near \$2.5 million.

August 26th, 1992 (Andrew): Andrew formed in the tropical north Atlantic, and remained a tropical storm as it tracked northeast of the Leeward Islands. After escaping an environment of vertical wind shear, Andrew strengthened markedly north of the Greater Antilles, becoming a category five hurricane which slammed into South Florida on August 24th before striking the Louisiana coastline on the 26th.

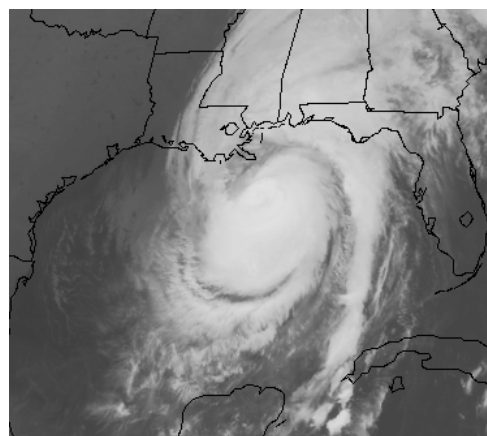


Seven people died and 94 were injured across Southern Louisiana during Andrew. Winds reached hurricane force from Lafayette eastward to the Atchafalaya. The highest gusts reported were: 39 mph at Lake Charles Regional Airport, 66 mph at Moisant International Airport in New Orleans, 71 mph at Lafayette Regional Airport, 83 mph at Salt Point in St. Mary Parish, 104 mph at the Lafayette Parish Courthouse, 153 mph at the New Iberia Emergency Operating Center, and 173 mph at the Drilling Barge on Bayou Teche in St. Mary Parish.

Rainfall totals from Andrew exceeded 5 inches over a four day period from August 24-28 in many locations...with Robert receiving 11.02" and Hammond receiving 11.92". The storm surge moved inland from Lake Borgne westward to the Vermilion Bay...the highest surge reported was at 6.48 feet at Bayou Dupre. An F3 tornado struck LaPlace and stayed on the ground until reaching Reserve in St. John the Baptist Parish which caused 2 of the deaths. Around 1 1/2 million people evacuated across Southern Louisiana with damages estimated near 1 billion dollars in Louisiana.



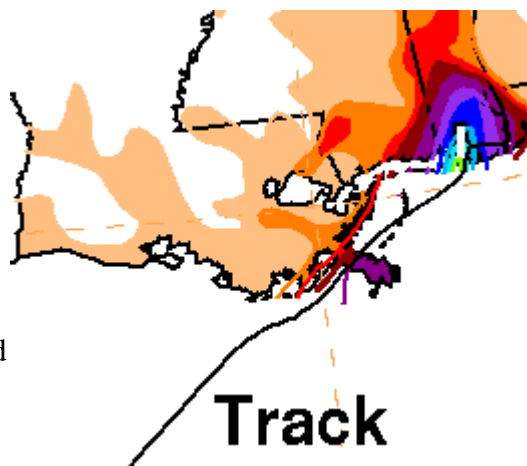
October 4th, 1995 (Opal): Opal, after moving aimlessly in the Bay of Campeche for days at the beginning of October, moved northeastward, passing 150 miles off the Mississippi Delta towards the Florida panhandle on the morning of the 4th. Rainfall amounts were greater than two inches across Southeast Louisiana. Winds in extreme Plaquemines Parish were near 60 mph with gusts to hurricane force. To the right is an infrared satellite picture of Opal, taken on the 4th by GOES-8.



Damage occurred to area roofs and also to some mobile homes. Gale force winds were seen in Southern Lafourche, Jefferson, and East St. Bernard Parishes. Storm surges were 3 to 5 feet from Grand Isle eastward. Significant damage occurred across the barrier islands of Southeast Louisiana. Ten thousand people evacuated the region. One person was injured when the large flag he was lowering became a parasail, tossing him high into the air and causing significant injuries.

October 5-8th, 1996 (Josephine): A gale center in the Western Gulf of Mexico that became Josephine teamed up with a strong high pressure ridge over the Southeast United States. This caused strong east to northeast winds, inducing tides to 4 feet above normal along the entire Louisiana coast. The highest tide noted was 5.5 feet at Bayou Bienvenue, near Lake Borgne. Highway 1 was under a foot of water. A few homes and roads were also flooded in Orleans and St. Bernard Parishes, outside the flood control levees. Damages totaled \$5.5 million.

July 17-18th, 1997 (Danny): A cluster of showers and thunderstorms moved off the Louisiana coast on July 13th, leaving strong winds and damage in its wake in Southern Louisiana. A low level circulation became apparent south of Houma early on the afternoon of the 14th and drifted slowly southwest. By the 16th, the low had stalled near 27N 92W...about 150 miles offshore. By late in the day, the system had developed into a tropical depression. Early on the 17th, the center jumped about 80 miles to the east-northeast and the system began to intensify rapidly.

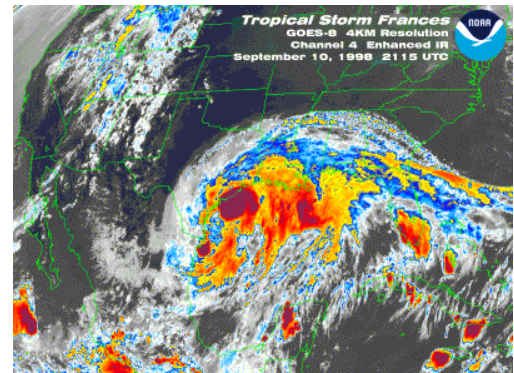


Danny had formed that morning and became a hurricane by the next day as it slowly moved east-northeast. Winds gusted to 95 mph at Grand Isle, just as the center made a brief landfall on the morning of the 18th, before progressing over to Mobile to cause copious amounts of rain in the vicinity of Dauphin Island as the system stalled again late on the 19th through early on the 21st.

Danny then moved northward to Western Alabama before making a hard right, moving across Atlanta and Raleigh-Durham. As it moved across North Carolina, it became a tropical storm again and moved northeast off the lower Virginia coast on the morning of the 24th, becoming an extratropical storm just off Nantucket the next evening.

The storm surge measured 5.4 feet at Grand Isle, which caused significant flooding to the island along with moderate to severe beach erosion. Rain totaled 11.40" at Buras, where 170 boats sustained damage. Much heavier rains were saved for southern Alabama, where Danny stalled after it passed by the Bayou State. Ninety-one businesses and 173 houses experienced damage in Plaquemine and Jefferson Parishes.

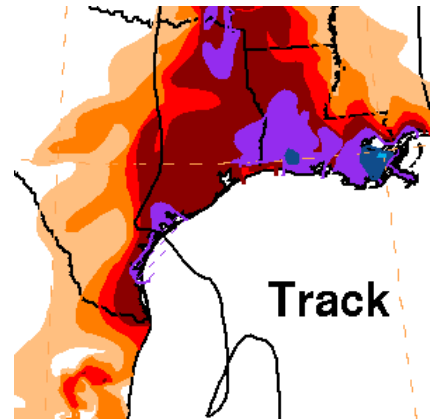
September 10-14th, 1998 (Frances): On the 7th, an area of disturbed weather formed in the Central Gulf of Mexico. It was complex with a broad area of low pressure, induced by a nearby upper low to the west of the circulation. Strong easterly winds had barely relaxed after Charley, which had just made landfall in Texas, before redeveloping. Air Force aircraft investigated the system on the 8th, and a tropical depression was found 220 miles southeast of Corpus Christi. It moved very little over the next 24 hours, slowly strengthening into a tropical storm by the 9th. Strong winds along the



Louisiana and Texas coasts increased, resulting in a large area of coastal flooding. Sabine Pass was cut off to travel by land on the 10th and remained so for the next week, until Hermine passed by to the east.

Frances began to move north on the 10th, and the drought-ending rains began. A large area of tropical storm force winds buffeted the coasts of Louisiana and Texas, worsening the coastal flooding and leading to backwater flooding of area rivers, as water was no longer able to drain into the Gulf of Mexico. Meacom's pier was nearly destroyed. San Luis Pass pier was damaged. Grand Isle went underwater, but water never reached the homes as they were on pilings rising up from the island. Tides ran as high as 5.4 feet at Cameron and Sabine Pass. Five homes in Constance Beach fell into the Gulf, while sand piles up on Holly Beach. Offshore oil platforms saw howling winds reaching as high as 90 mph in gusts.

The system strengthened and moved north as feeder bands moved inland, increasing the rainfall across the region. The deluge caused a large area of 10 inches of rain or more across southern Louisiana and eastern Texas. The highest rain totals noted were 21.10" at Terrytown in Southeast Louisiana and 14.62" at the Lacassine Wildlife Refuge, ten miles south of Lake Arthur. The pressure induced by all the rain in New Orleans caused manholes to be blown skyward. Sections of I-10 in New Orleans and Houston were underwater on the 11th. Roads and bridges were submerged near Corpus Christi. Numerous towns evacuated in the face of flash flooding.

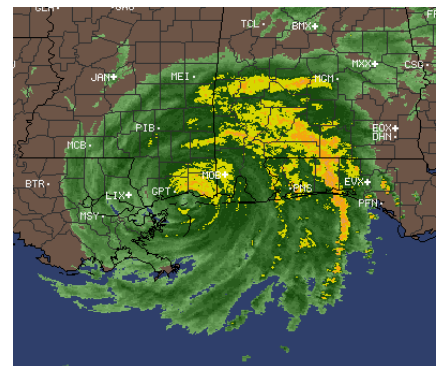


The center made landfall at midnight on the night of the 10th near Matagorda, Texas and became stationary again on the 11th, prolonging the wind and rain. During the 12th, the system resumed its northerly course through East Texas before accelerating into Iowa on the 14th. Rains of five inches or more soaked Mississippi, Oklahoma, Arkansas, Kansas, and Missouri.

At least 8 tornadoes touched down across the state on the 11th and 12th. Seven tornadoes wreaked havoc across South Central Louisiana near Lake Arthur, Estherwood, Basile, Oberlin, and Lafayette. A Lafourche parish man was killed when a tornado destroyed his mobile home.

The coastal flooding and beach erosion were the worst seen since Carla (1961). River flooding was significant across East Texas and Louisiana. A major disaster declaration was issued for Cameron, Jefferson, Lafourche, and Terrebonne parishes. Over \$10 million in damage was experienced across Southwest Louisiana and Extreme Southeast Texas.

September 27-28th, 1998 (Georges): In mid-September, a tropical storm formed in the East Atlantic. It moved west-northwest and became a major hurricane as it approached the Lesser Antilles. Georges left a trail of destruction as it raked the Virgin Islands and most of the islands of the Greater Antilles. Over \$2 billion in damages occurred as Georges terrorized the West Indies. The hurricane struck the Mississippi coast at Category 2 intensity. Winds gusted to 55 mph at New Orleans Lakefront

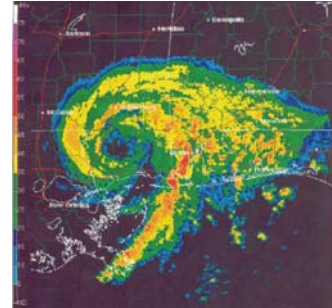


Airport...the pressure fell to 29.37".

Storm surges above seven feet overflowed some of the land surrounding Lakes Pontchartrain and Borgne...a storm surge of 8.9 feet was noted at Northeast Gardene Bay, east of Pointe a la Hache. A large number of fishing camps were damaged or destroyed along Lake Pontchartrain. Two died from Georges in Louisiana.

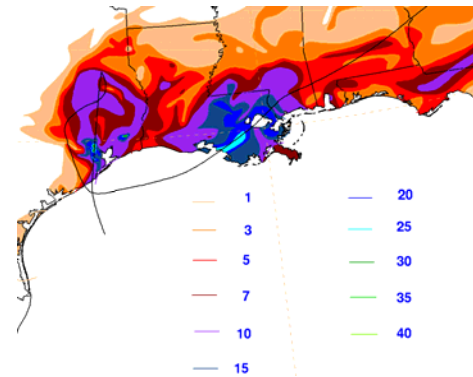
Early Twenty-First Century Hurricanes

June 4-11th, 2001 (Allison): A tropical wave moved off the west coast of Africa on May 21st. Tracking westward, it moved through the tropical Atlantic and Caribbean Sea...reaching the eastern Pacific Ocean on June 1st. A low level circulation formed on the 3rd south of Vera Cruz, and this system moved north into southeast Mexico steered by deep southwest flow. It emerged into the Bay of Campeche on the 4th as an area of thunderstorms, and guided north-northwest through the western Gulf of Mexico.



The low became increasingly organized, and became a tropical storm about 80 miles south of Galveston Texas. Steered by the subtropical ridge off the southeast, Allison moved north into Texas that evening, eventually tracking as far inland as Lufkin by the morning of the 7th. After already dropping ten or more inches of rain across portions of Texas and Louisiana, the cyclone began to move southward as a ridge over New Mexico strengthened just as the high off the southeast flattened and moved southeast.

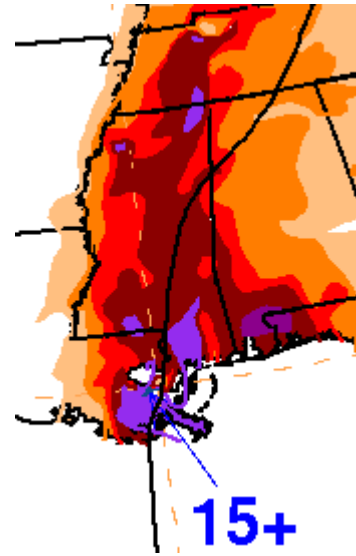
This set the stage for massive flooding in southeast Texas on on the 7th and 8th. The highest totals noted were 40.68 inches at Moore Road Detention Pond in Jefferson County, Texas, with 36.99 inches at the Port of Houston Texas, and 29.86 inches at Thibodaux Louisiana. Portions of Houston, Beaumont, Thibodaux, Lafayette, New Orleans, and Baton Rouge saw severe flooding from this excessive rainfall. Rains would continue into the 11th, as Allison moved back off the Texas coast, paralleling the coast of Louisiana before making a second landfall in the Teche



region of the Bayou State.

Reintensifying over land as it tracked through southeast Louisiana and southwest Mississippi, Allison formed an eye feature during the morning of the 11th, a rare accomplishment for a tropical cyclone over land. The system moved swiftly east-northeast crossing southern Mississippi and Alabama, central Georgia, and South Carolina, being steered by the subtropical jet stream to its north. Allison would continue moving northward along the East coast through the 16th. One person died due to the storm as a tornado in Zachary knocked a tree onto his truck.

September 23-27th, 2002 (Isidore): A tropical wave moved off the coast of Africa on September 9th accompanied by a large area of thunderstorms. The convective activity decreased significantly as the system moved toward the west-southwest during the next few days. As the wave approached the 50th meridian longitude, the shower activity began to increase and an upper-level anticyclone became evident over the system. Shortly after noon on the 14th, the system became a tropical depression as it approached Trinidad. As it moved west-northwestward and interacted with the South American landmass, it weakened back into tropical wave in the eastern Caribbean Sea. As the tropical wave emerged into western Caribbean Sea, it redeveloped a closed circulation and regained tropical depression status on the morning of the 17th. Strengthening into a tropical storm after midnight on the 18th,



the tropical cyclone moved very slowly toward the northwest, passing just west of Jamaica. Isidore then moved very slowly toward the west-northwest across the Cayman Islands and strengthened, as it became a hurricane shortly after noon on the 19th. Isidore reached its peak intensity of 125 mph after noon on the 21st.

Isidore meandered for 24 to 36 hours over northern Yucatan and weakened to a minimal tropical storm. It moved northward over the Gulf of Mexico where the circulation expanded but the cyclone never redeveloped an inner core of strong winds due to its extremely warm, and stable, core. Isidore regained central convection as it made landfall with winds of 65 mph just west of Grand Isle, Louisiana just after midnight on the 26th. Once it moved inland, Isidore weakened to a tropical depression and moved north-northeastward across the southeastern United States, producing torrential rains. It became an extratropical storm over southwestern Pennsylvania during the early afternoon of the 27th, and was then absorbed into a frontal zone. One died at Port Fourchon due to rip currents in advance of Isidore. Damaged totaled \$330 million, mostly within Louisiana.

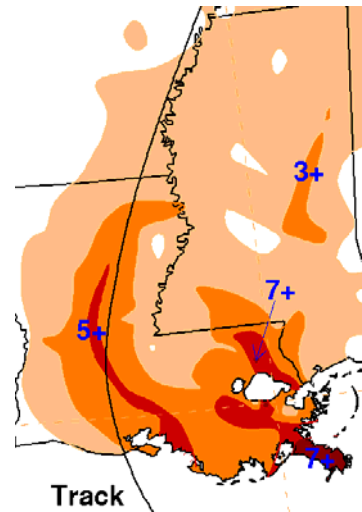
October 2-5th, 2002 (Lili): Lili originated from a tropical wave that moved over the tropical Atlantic Ocean from the west coast of Africa on September 16th. The wave developed a low-level cloud circulation center midway between Africa and the Lesser Antilles on the 20th and eventually into a tropical depression on the 21st about 900 n mi east of the Windward Islands. Tracking around the southwestern periphery of the subtropical ridge, the system moved just north of due westward at near 25 mph, crossed the Windward Islands as a developing tropical storm on the 23rd and then its winds briefly reached 70 mph on the 24th. The storm weakened to an open tropical wave on the 25th and 26th in the east central Caribbean Sea as its organization was disrupted by vertical wind shear. Lili re-acquired a low-level closed circulation on the 27th

when its forward speed slowed towards 6 mph by the 28th while beginning a slow northward jog around the north coast of Jamaica. The storm dumped heavy rain on Jamaica and also Haiti.

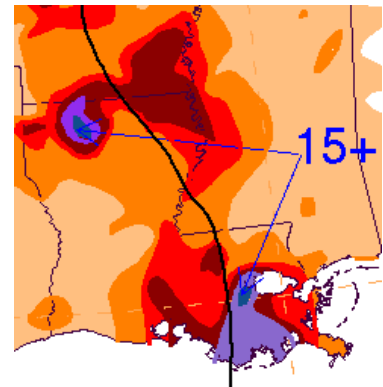
Resuming a west-northwestward track, Lili became a hurricane on the 30th, while passing over Cayman Brac and Little Cayman Islands. The center of the hurricane moved over the southwest tip of the Isle of Youth on the morning of October 1st, and over western mainland Cuba a few hours later, with wind speeds as high as 105 mph.

Gradually accelerating its forward speed towards 18 mph, Lili turned northward and made landfall on the Louisiana coast on the 3rd, with an estimated 90 mph maximum wind speed after rapidly weakening during the 13 hours prior to landfall. Lili was absorbed by an extratropical low on the 4th while moving northeastward near the Tennessee/Arkansas border. Sugar cane fields were flattened across southern portions of the state. Damages totaled \$830

million within the state. One person died due to carbon monoxide poisoning in Crowley due to the running of a generator.



October 6-12, 2004 (Matthew): The origin of Matthew can be traced to a tropical wave that moved across the west coast of Africa on September 19th, moving closely to Tropical Storm Lisa and another large disturbance in the tropical Atlantic. The wave crossed the Lesser Antilles on the 29th and interacted with a westward moving upper-level low. Cloudiness and showers increased as the wave moved very slowly westward, trailing the upper-level low. The shower activity associated with the wave reached the Bay of Campeche on October 5th and gradually became better organized while moving little. An upper-level ridge became established over the convection leading to falling pressures in the area.



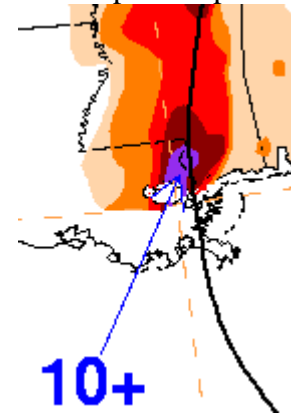
On the 7th, a broad area of low pressure had formed just east of Tampico, Mexico. The system continued to become better organized while moving little and became a tropical depression on the morning of the 8th about 180 n mi southeast of Brownsville Texas. By that afternoon, the cyclone strengthened into Tropical Storm Matthew. Initially, the cyclone moved toward the east and east-northeast, but then gradually turned to the northeast and north steered by a large mid- to upper-level low over western Texas. Matthew reached its peak intensity of 45 mph and a minimum pressure of 997 mb early in the afternoon of the 9th. Matthew's center made landfall just west of Cocodrie, Louisiana early in the morning on the 10th as a minimal tropical storm. Thereafter, Matthew weakened to a depression before crossing the upper jet and becoming an occluded cyclone. It continued moving northeastward across the Mid-Mississippi and lower Ohio valleys before becoming absorbed by a frontal wave in the Great Lakes on the morning of the 14th. A tornado touched down near Golden Meadow, which damaged the roof of

a trailer. Extensive beach erosion occurred at Grand Isle, as the storm surge reached 5.85 feet at Frenier.

August 29th, 2005 (Katrina): This horrific storm formed from a tropical wave...becoming a depression about 175 miles southeast of Nassau in the Bahamas on August 23rd. It developed into a tropical storm on the 24th. Katrina moved northwestward through the Bahamas...and then turned west-southwest into South Florida before turning sharply south-southwest through Miami/Dade county as a minor hurricane, dumping heavy rainfall to the left of the track, and high winds to southeast Florida and the Florida Keys.

As the system emerged into the Gulf of Mexico the storm strengthened, reaching category five status on the 28th about 250 miles south-southeast of Burrwood, Louisiana. Its central pressure fell to 902 mb...the fourth lowest on record for the Atlantic Basin and lowest inside the Gulf of Mexico...later that day. Katrina slowly recurved...moving through lower Plaquemines Parish south of Buras with 140 mph winds at 6:10 AM on the 29th. Katrina made a second landfall near the mouth of the Pearl River at 10:00 AM...with maximum sustained winds near 125 mph.

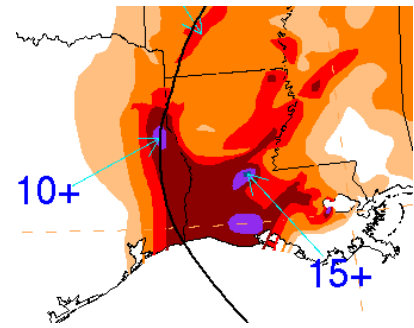
Katrina weakened as it moved inland to the north-northeast but was still a hurricane 100 miles inland near Laurel, Mississippi. Katrina continued to weaken and became a tropical depression near Clarksville, Tennessee on the 30th. Katrina accelerated east-northeastward and was absorbed into a developing extratropical cyclone to its northeast as it reached central Pennsylvania. The lowest pressure recorded was 27.17" at Buras. The highest wind gust was estimated at 123 mph at the NASA Michoud Assembly Facility. The maximum rainfall recorded within Louisiana was 14.82" at Big Branch.



Katrina will likely be recorded as the worst natural disaster in the history of the United States...producing catastrophic damage and untold casualties in the New Orleans area and along the Mississippi Gulf Coast. As of August 10, 2006, the death toll was designated as 1577 within the borders of the Pelican state. Damages totaled \$81 billion within the United States.

September 23-25th, 2005 (Rita): Rita was an intense, destructive, and deadly hurricane that devastated extreme southeast Texas and southwest Louisiana. It formed off an old frontal zone, and developed into a tropical depression on the 17th just east of the Turks and Caicos Islands and moved westward, becoming a tropical storm on the afternoon on the 18th and a hurricane on the 20th as it moved through the Florida Straits. The center of Rita passed just south of Key West before it emerged into the Gulf of Mexico and rapidly intensified. Maximum sustained winds increased to 175 mph on the 22nd while moving through the central Gulf of Mexico, and its pressure fell to 897 hPa, the 3rd lowest on record for the Atlantic Basin and the lowest reported from the open waters of the Gulf of Mexico.

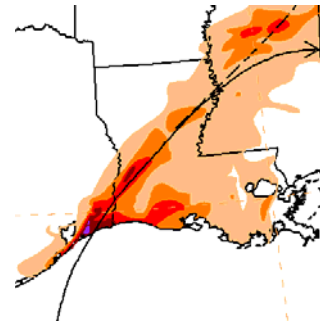
Easterly gales into Lake Ponchartrain led to renewed flooding in the Ninth Ward of New Orleans. A significant shearline aloft lured Rita more northwesterly, and the storm weakened as it moved away from the warm waters of the loop current. Landfall occurred at 2:30 AM between Sabine Pass and Johnsons Bayou, LA while a category three hurricane. Rita slowly weakened as it accelerated inland, and maintained at least tropical storm strength when it crossed back into northwest Louisiana. The cyclone moved northeast and merged with a frontal wave on the 26th.



Heavy rains fell near and east of the track of the hurricane, with the highest total in Louisiana recorded at Bunkie, where 16 inches fell. A C-MAN station along the Sabine River recorded a gust of 99 mph. The lowest pressure recorded within Louisiana was . A storm surge of 15 feet was recorded at Cameron, with Gulf waters invading Calcasieu lake, which subsequently caused an eight foot storm surge at Grand Lake. The storm surge moved up the Calcasieu river as far as the Interstate 10 bridge in Lake Charles. Waters as deep as 6 feet submerged portions of downtown Lake Charles. Most, or all, of Vermillion, Iberia, and St. Mary parishes south of Louisiana highway 14 and U.S. highway 90 were submerged. The towns of Holly Beach, Cameron, Creole, Grand Chenier, and Pecan Island were nearly completely destroyed. A storm surge of 4-7 feet inundated southeast Louisiana as well. Ninety tornadoes were spawned by the hurricane across Alabama, Mississippi, Louisiana, and Arkansas. One died in Louisiana from Rita. Damages from the cyclone totaled \$10 billion.

September 13-14th, 2007 (Humberto): A broad low pressure area formed along a surface trough in the western Gulf of Mexico. An area of thunderstorms formed on the northern end of the trough, which forced the development of a new, well-defined low pressure area. The system organized into a tropical depression on the morning of the 12th. Rapid development ensued, and within 18 hours of becoming a tropical depression Humberto became a tropical storm and then a hurricane as it headed north-northeast into the Golden Triangle of Southeast Texas during the early morning hours of the 13th, becoming the most rapidly developing tropical cyclone known to develop close to land in the Atlantic Basin. Weakening slowly after landfall, Humberto regained tropical storm and then tropical depression status as it moved through Louisiana into Mississippi. Its surface circulation was left behind across Louisiana as west-southwest vertical wind shear carried its mid-level center northeastward.

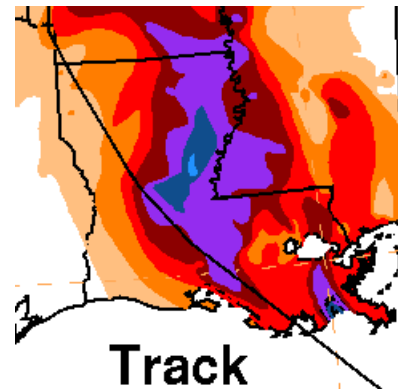
According to surface analyses and satellite imagery, as Humberto's mid-level circulation continued progressing northeast, it spawned a new low pressure area in Georgia which forced the original circulation southeast towards northern Florida before dissipation. As the mid-level center continued progressing, a third cyclone in southeast Virginia developed and moved northeast into the western Atlantic, absorbing the second low. A total of 13,000 lost power statewide during Humberto's passage. Overall property damage was estimated at \$50 million across Texas and Louisiana.



August 31-September 3rd, 2008 (Gustav): A tropical wave moved across the tropical North Atlantic ocean. It brought squally weather to the Windward Islands before entering the Caribbean Sea. The system developed due to favorable upper level conditions, and became Tropical Depression Seven by August 25th, and a tropical storm later that day. While approaching Hispaniola, strengthening continued and Gustav reached hurricane strength early on the 26th. The cyclone moved across southwest Haiti before dropping southwest towards Jamaica due to strengthening high pressure to its north and northwest. The system, then a tropical storm, nearly reached hurricane strength before moving near Jamaica.

Clearing the island, Gustav regained hurricane strength and rapidly intensified into a category four hurricane which struck western Cuba on the 30th. A combination of land interaction with western Cuba and an upper level low to its west kept Gustav on a slow weakening trend until its final landfall in southeast Louisiana on September 1st. The system slowed to a crawl across northwest Louisiana and southwest Arkansas on the 2nd and 3rd, dropping heavy rainfall across east-central Louisiana, Arkansas, and southwest Mississippi.

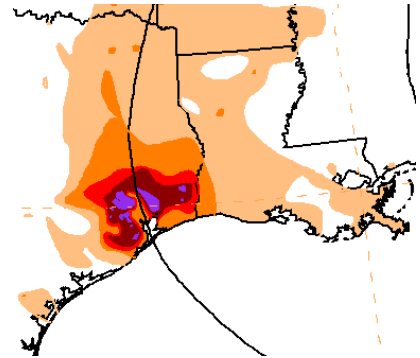
Heavy rains fell along and east of its track within east-central and south-central Louisiana and western Mississippi, with the highest total measured of 21 inches at Larto Lake. Winds gusted to 117 mph at Southwest Pass. The lowest reliable pressure observed was 28.15" at Caillou Lake. Eleven tornadoes touched down within the state borders. A storm surge of 12-13 feet swamped the Mississippi Delta, and a 9-10 foot surge in southeast Louisiana overtopped some flood walls and levees in New Orleans, though flooding due to surge in New Orleans was not widespread. Seven perished from Gustav in Louisiana.



September 12-14th, 2008 (Ike): A tropical wave left the coast of Africa on August 28th. The system slowly organized, becoming a tropical depression, then a tropical storm, on September 1st. The cyclone moved westward for much of its lifetime as the subtropical ridge extended westward to its north. By the 3rd, Ike had become a hurricane, then a major hurricane as it rapidly intensified underneath an upper level high. Ike wavered between category two and four strength due to northerly vertical wind shear and eyewall replacement cycles. On the 7th, Ike

moved through the southeast Bahamas into eastern Cuba. Briefly emerging into the northwest Caribbean, Ike remained a hurricane through its next landfall across western Cuba on the 9th. Land interaction appears to have made Ike a larger cyclone after interacting with western Cuba, and its central pressure fell significantly on the 10th as it moved over the Loop Current. The large system strengthened back into a category 2 hurricane, which moved west-northwest through the Gulf of Mexico around the periphery of the subtropical ridge.

On the 12th, Ike became slightly more compact as it moved into a confluent zone between the subtropical ridge to its east-northeast and troughing across the Plains. This allowed maximum sustained winds to increase despite a relatively constant central pressure. Ike developed a banding-type eye, and moved into Galveston, Texas, and weakened as it moved into through eastern Texas and Arkansas. Heavy rains were confined to its track, and amount were limited under five inches across Louisiana. The main effect from Ike was storm surge. Across southeast Louisiana, the surge was limited to 3-6 feet. Surge heights increased significantly west of Grand Isle, reaching 17 feet at Cameron, which overspread the parish. Two died in Louisiana and overall damaged reached \$19.3 billion.



Acknowledgments

During the initial three year journey in preparing this Louisiana Hurricane History in the late 1990's, many people helped along the way. The base framework for the document was a one page public information statement sent out annually from the New Orleans office during the mid 1990's which was subsequently expanded. Roger Erickson, WCM at Lake Charles, helped in locating some of the material locally for this work while I was stationed at the Lake Charles, Louisiana forecast office. A great deal of support was given by management on this endeavor: the list includes Ellie Pittman (former Data Acquisition Program Manager (DAPM) at Lake Charles), Steve Rinard (former Meteorologist in Charge at Lake Charles), and Rick Gravitt (current DAPM at Lake Charles). Photographs taken during Danny, Frances, and Georges are used with the permission of A. J. Sisco, their photographer.

A significant amount of research was acquired from other sources. All tracks from 1886 onward were provided in the database done by Neumann, et al, and maintained by the National Hurricane Center in West Miami, and generated using nMAP software at the Hydrometeorological Prediction Center (HPC) in Camp Springs, MD. Information from the metadata regarding changes to the tropical cyclone database at the Hurricane Research Division was used for a few storms in the late nineteenth century. Some United States Signal Corp and Army Surgeon records were obtained from the Library of Congress concerning a few of the systems in the 19th century. The Washingtonian Division of the Martin Luther King library in Washington, D.C. was utilized for searching newspaper records on microfilm for the 1812

hurricane. Rainfall graphics used in this document were constructed by the author while developing a tropical cyclone rainfall database between 1999 and 2010, using data primarily supplied by the National Climatic Data Center in Asheville, North Carolina for the United States. Most of the satellite imagery used was provided by the National Climatic Data Center in Asheville, North Carolina. Many visits to McNeese State University in Lake Charles, LA and Louisiana State University in Baton Rouge provided a volume of newspaper articles, along with unique pieces from their respective archives.

Work was coordinated with John Guiney (formerly at the Slidell office) and Henry Diaz at the Climate Diagnostics Center in Boulder, Colorado. Posthumously, David Ludlum, Ivan Ray Tannehill, Gordon Dunn, Jose Fernandez-Partagas, and David Cipra are to be honored; without them much of the information on storms before 1871 could have been lost to history.

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