National Weather Service
Storm Data and Unusual Weather Phenomena

September 1998

Location	Date	Time Local/ Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons Killed	Number of Persons Injured	Estimated Damage Property	Estimated Damage Crops	Character of Storm

TEXAS, Central Southeast

TXZ163>164-176>179-195>200-210>214-226>227-235>238

HOUSTON - TRINITY - MADISON - WALKER - SAN JACINTO - POLK - BURLESON - BRAZOS - WASHINGTON - GRIMES - MONTGOMERY - LIBERTY - COLORADO - AUSTIN - WALLER - HARRIS - CHAMBERS - WHARTON - FORT BEND - JACKSON - MATAGORDA - BRAZORIA - GALVESTON

07	**1700CST**	**3**	**0**	**287.2M**		**TROPICAL STORM**
12	**2359CST**					

Synoptic Situation...
On Monday September 7 (Labor Day) a tropical disturbance in the western Gulf of Mexico was increasing the pressure gradient along the Texas coast. A weak cold front had pushed south to near the Red River by Tuesday evening. At 4pm Tuesday the disturbance was upgraded to a Tropical Depression located about 250 miles south of Galveston. On Wednesday morning the cold front had sagged down to a Lufkin to Dallas line with a 1022 high pressure centered over the Ohio Valley. At 4 PM the depression was upgraded to a Tropical Storm and given the name Frances. Winds along the upper Texas coast were from the ENE 20 to 30 mph with gusts nearing 40 mph. The poorly organized Tropical Storm center of circulation was still located about 250 miles south of Galveston with maximum sustained winds of 40 mph. On Thursday the storm remained disorganized and was located about 190 miles south of Galveston. On Thursday afternoon the storm had deepened and maximum sustained winds had increased to near 60 mph. The surface ridge of high pressure had now shifted to the southeast centered over Tennessee increasing the pressure gradient and the winds along the upper Texas coast. Early Friday morning Frances neared the Texas coast near Port O#Connor. Winds along the upper Texas coast continued at 30 to 40 mph sustained winds with gusts near 50 mph at times. Frances moved inland just southwest of Victoria and remained nearly stationary throughout the day on Friday. On Friday evening Frances began moving to the north northeast. At 7 PM Frances was downgraded to a Tropical Depression as it moved to the northeast of Victoria. At 10 PM the remnants of Frances was located about 65 miles west of Houston and it was longer being tracked by the National Hurricane Center.

Tides....
Most of the damage along the coastal communities can be attributed to the high tides that persisted for nearly two days. The high tides in Galveston Bay also enhanced the flooding problems experienced further inland by the heavy rains. A Coastal Flood Watch was issued Monday night concerning the possibility of high tides beginning on Tuesday with tides expected to run 3 feet above predicted levels. On Tuesday afternoon the Coastal Flood Watch was updated to extend the watch into Wednesday with tides predicted to be 3 to 4 feet above predicted levels by Wednesday afternoon. At 4pm Tuesday Tropical Depression #6 formed in the Gulf of Mexico and a Tropical Storm Warning was issued for the Texas Coast from High Island to Brownsville. The Tropical Storm Warning implies Coastal Flood Warning is also in effect.. On Wednesday the tide forecast was updated with a forecast of tides 4 to 5 feet above predicted levels expected on Thursday. On Thursday the tide prediction for Friday called for tides increasing to levels of 4 to 6 feet above the predicted levels.

On the beach front at Galveston Pleasure Pier the tides rose above 4 feet above MLLW on Wednesday afternoon (Sept 9) and remained above this level until the Friday afternoon (Sept. 11). The maximum level was reached on Thursday evening when the gauge read around 7 feet above MLLW or about 4.5 feet above the predicted levels. In Galveston Bay a similar even took place. At Eagle Point the tides rose above 4 feet above MLLW on Wednesday evening (October 9) and stayed above this level until after midnight on October 12. The peak height reached was around 5.7 feet above MLLW during the early morning hours of October 10 which is 4.7 feet above the predicted levels.

Similar conditions were found along the entire upper Texas Coast from High Island to Matagorda and in the inland bays. With tides above 4 feet MLLW for 36 to 48 consecutive hours and winds in excess of 25 mph through the same period led to the destructive waves along the beach front. These destructive waves resulted in most of the dune systems from High Island to Sargent Texas being almost completely destroyed.

Winds and Pressure..
Winds ranged from 25 to 35 knots (29 - 40 mph) for over 24 hours starting around midnight on the September 10 and continuing til the early morning of September 11. The strongest wind recorded was 47 knots (54 mph) at Galveston Scholes Field around 6pm on Sept. 10. Other peak winds recorded around the area included 46 knots (53 mph) at Palacios and 31 knots (36 mph) at Houston Intercontinental Airport. at Palacios and 31 knots (36 mph) at Houston Intercontinental Airport.

The lowest atmospheric pressure recorded was at Palacios when the barometer read 29.38 inches at 254 PM on Sept. 11. Galveston recorded 29.48 inches at 529 am Sept. 11.

Rainfall...
Rainfall from Tropical Storm Frances began effecting the coastal areas during the morning on Thursday and conditions slowly spread inland Thursday afternoon and further inland early Friday morning. Over 4 inches of rain fell over all of the Houston/Galveston County Warning area. Over 10 inches of rain was common along the coastal counties of Matagorda...Brazoria.. .Galveston and Chambers and also over inland counties including Harris...Polk...San Jacinto and Washington. With tides already running 4 to 6 feet above normal the runoff from the rains was not able to easily runoff into the bays thus resulting in more widespread flooding of inland creeks and bayous especially early Friday morning.

River and Bayou Flooding...

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TEXAS, Central Southeast

September was an active month across the HSA with Tropical Storm Frances dumping 4 to 6 inches of rain over the region. Large areas received 8 to 10 inches of rain with some areas receiving more than 12 inches. The result was significant flooding in many areas. Flooding was exacerbated in many areas by tides 4 to 6 feet above normal. Significant rises occurred on the San Bernard River in Brazoria County from above Sweeny to the mouth on September 9th with flood stage exceeded on September 10th. This rise was mainly due to strong tidal influence. Significant rains began on September 10th and continued through the 12th. The majority of the rain occurred during the morning hours of September 11th as Frances made landfall.

By daybreak September 11th significant flooding was occurring in Harris County and the City of Houston. Homes in Jersey Village and Woodland Trails in northwest Houston along White Oak Bayou were flooding by 6:00 am. Most subdivisions along White Oak Bayou experienced house flooding. Homes were also flooded on Halls Bayou above I-45, on Brays Bayou at Lawndale near the confluence with the Houston Ship Channel, and on Armand Bayou near Spencer Highway in Pasadena. I-10 between the West Loop and downtown Houston and I-45 near North Main Street were closed by 9:00 am due to flooding from Buffalo and White Oak Bayous. State Highway 288 was closed due to flooding from Brays Bayou. In all more than 1400 homes and businesses were damaged or destroyed in this event.

In Brazoria County Chocolate Bayou near Alvin exceeded its banks in the channel above FM 1462 to the mouth at Chocolate Bay. Several minor roads were impacted by this flooding.

Significant flooding occurred on the San Bernard River above U.S. Highway 59 near Kendalton to the mouth. Primary flooding above fm 442 near Boling was due to backwater on the tributaries of Peach and West Bernard Creeks in Wharton County. While no homes were reported flooded several roads in the El Lobo subdivision were inundated. A combination of strong tidal influence and heavy rain produced the rise in the channel above Sweeny to the mouth. While low lying areas along the river were flooded the most significant impact was on barge traffic at the Phillips Petroleum Facility.

The Tres Palacios River in Matagorda County began rising at the rate of one foot an hour during the evening hours of September 10th resulting in moderate lowland flooding above State Highway 71 near Midfield to the mouth at Tres Palacios Bay. Significant backwater up Juanita Creek, about one mile upstream from the gaging station FM 456 was also noted. Several farm to market and county roads in Matagorda County were inundated by this flood. There were no reports of homes flooded, however, several areas were isolated due to the flooded roadways.

Flooding on East Mustang Creek near Louise in Wharton County closed FM 647 for several hours on September 12th. Secondary and minor roads near the creek were also inundated.

Several small, ungaged watersheds in Chambers, Galveston, Brazoria, Matagorda, Fort Bend, and Wharton Counties flooded. This resulted in the closing of many farm to market and county with several homes and subdivisions threatened. These included Dickinson Bayou in Galveston County, Oyster Creek in Brazoria County and Caney Creek in Matagorda County.

Water had receded on all but the San Bernard and Tres Palacios Rivers by the afternoon of September 12th. There were no deaths of serious injuries due to river flooding associated with this event. Galveston, Harris, Brazoria, and Matagorda Counties were declared disaster areas.

Impact and Damage...
Major impact and resultant damage occurred in Galveston, Harris, Brazoria and Matagorda counties of Texas. All four of these counties received a Presidential Disaster Declaration to help in the relief and recovery efforts. In these four counties total damage exceeded $286 million dollars. Most of this damage was along the coast and around Galveston Bay where high tides and winds destroyed dunes and personal property. Nearly 100 single family homes were destroyed along the upper Texas coast by the high tides and battering waves. Other damage was a result of inland flooding due to heavy rains mainly in Harris county along White Oak and Buffalo Bayous.

There were only 3 deaths that can be attributed to Tropical Storm Frances. A father and daughter drowned on Galveston Island while swimming in the surf during the day Monday. The third death occurred on Wednesday when a surfer drowned on the beaches of Surfside in Brazoria county while surfing the large waves.

Summary...
Tropical Storm Frances brought home how vulnerable the Texas Coast is to Tropical weather systems even if they do not achieve Hurricane Strength. Since Frances never achieved Hurricane strength the citizens along the upper Texas Coast never realized the damage that could result from #JUST A TROPICAL STORM#. With a long siege of high tides coupled with Tropical Storm Force Winds it was very similar to having a strong Category One Hurricane. The rains that accompanied the storm were fairly normal for a slow moving Tropical Storm but flooding was aggravated by the High Tides that were already in place when the heavy rains began. M?IW, M?IW, F?IW

MATAGORDA County

SARGENT	**10**	**1815CST 1816CST**	**0.2**	**25**	**0**	**5**	**15K**		**Tornado (F0)**

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Brief tornado touchdown in Sargent. Five minor injuries from flying debris.

BRAZORIA County

SOUTH PORTION	**10**	**2110CST**			**0**	**0**			**FLASH FLOOD**
	11	**0100CST**							

Flooding from T.S. Frances. Damage included in previous report.

MATAGORDA County

WADSWORTH	**10**	**2110CST**			**0**	**0**			**FLASH FLOOD**
	11	**0100CST**							

Flooding from T.S. Frances. Damage included in previous report.

GALVESTON County

SOUTH PORTION	**10**	**2310CST**			**0**	**0**			**FLASH FLOOD**
	11	**0745CST**							

Flooding from T.S. Frances. Damage included in previous report.

GALVESTON County

GALVESTON	**10**	**1909CST**	**0.5**	**25**	**0**	**0**	**10K**		**Tornado (F0)**
		1911CST							

Brief tornado touchdown on the west end of Galveston Island. House sustained structural damage.

BRAZORIA County

SOUTH PORTION	**11**	**0105CST**			**0**	**0**			**FLASH FLOOD**
		0500CST							

Flooding from T.S. Frances. Damage included in previous report.

FORT BEND County

KATY	**11**	**0300CST**			**0**	**0**			**FLASH FLOOD**
		0500CST							

Flooding from T.S. Frances. Damage included in previous report.

HARRIS County

COUNTYWIDE	**11**	**0300CST**			**0**	**0**			**FLASH FLOOD**
		1355CST							

Flooding from T.S. Frances. Damage included in previous report.

HARRIS County

LA PORTE	**11**	**0332CST**	**0.2**	**50**	**0**	**0**			**Tornado (F1)**
		0334CST							

Tornado touchdown caused moderate damage to homes and apartments. Damage included in T.S. Frances summary.

JACKSON County

SOUTH PORTION	**11**	**0345CST**			**0**	**0**			**FLASH FLOOD**

Flooding from T.S. Frances. Damage included in previous report.

HARRIS County

BAYTOWN	**14**	**0905CST**			**0**	**0**	**5K**		**FLASH FLOOD**
		1145CST							

High water on Desee Rd, Sterling Rd, and Main St.

LIBERTY County

HARDIN	**14**	**0905CST**			**0**	**0**	**5K**		**FLASH FLOOD**
		1145CST							

High water on CR 2099.

CHAMBERS County

WINNIE	**14**	**1345CST**			**0**	**0**	**5K**		**FLASH FLOOD**
		1455CST							

High water on HWY 124 near Winnie and on Bayshore Rd. in Oak Island.

JACKSON County

COUNTYWIDE	**16**	**0830CST**			**0**	**0**	**30K**		**FLASH FLOOD**
		1415CST							

Numerous county roads closed due to high water. Volunteer evacuations for low-lying parts of Edna around noon.

JACKSON County

COUNTYWIDE	**16**	**1430CST**			**0**	**0**	**15K**		**FLASH FLOOD**
		1900CST							

Still have 21 roads closed due to flooding.

BRAZORIA County

12 NW FREEPORT	**16**	**1432CST**			**0**	**0**	**15K**		**THUNDERSTORM WIND**

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TEXAS, Central Southeast

Roof damage to homes.