



# Flood Alley Flash

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## Serving South Central Texas



Howdy and welcome to the inaugural edition of the Flood Alley Flash. This twice-a-year publication from your National Weather Service Forecast Office Austin/San Antonio will highlight a variety of weather, water and climate information from around South Central Texas. From updates to our technology to weather stories of interest to upcoming events, you will find it all here. Located at the New Braunfels Municipal Airport, your National Weather Service Forecast

Office provides weather and flood warnings, daily forecasts as well as meteorological and hydrologic data for much of South Central Texas. We are committed to and take pride in this responsibility and are ready to serve you! We would love to hear from you if you have any comments about this newsletter or our webpage. Our contact information is located on the left column of this page and also on the last page. We hope that you enjoy the Flood Alley Flash!

## CoCoRaHS wants YOU!

CoCoRaHS stands for Community Collaborative Rain, Hail & Snow network. It is a grassroots network of volunteer weather observers who measure rain, hail, and snow. This information is then collected through the CoCoRaHS website. These reports are plotted on a map on the CoCoRaHS website, and are used by a variety of individuals and

groups, such as farmers, teachers, engineers, and of course, the National Weather Service. You can even access past rainfall information. Anyone of any age can become a CoCoRaHS observer—all it requires is a desire to observe and report weather observations. For more information, please visit the CoCoRaHS website, “because every drop counts!”

# Climate Review: Summer of 2008

BY: ROBERT BLAHA, SENIOR FORECASTER AND CLIMATE FOCAL POINT

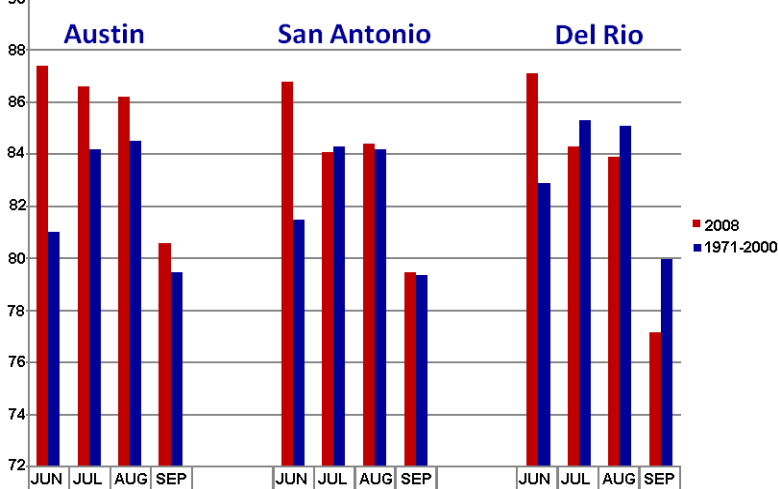
June this year was very warm and dry - more like August than June. More rain came in July and August, which helped moderate the heat. Temperature moderated more over the west part of South Central Texas, where rainfall amounts were more plentiful, while from the eastern Hill Country to parts of Central Texas, including the Austin area, the warmth continued, and less rain was observed. Despite the increased rainfall in July and August,

drier conditions and a few very warm days returned in September. Austin Mabry had the 2<sup>nd</sup> warmest June to September period since 1854, including fifty days which reached 100 degrees in 2008! This was the 3<sup>rd</sup> most 100 degree days in any year. June of 2008 ended up being the warmest on record at Austin Mabry since 1854. The hottest days at Austin Mabry came July 14<sup>th</sup> and August 3<sup>rd</sup>, when the high was 105. San Antonio's June to September temperatures tied with 1934 and 1964 for the 12<sup>th</sup> warmest since 1885. After recording the 2<sup>nd</sup> warmest June, conditions moderated at San Antonio in July and August, as more showers came to the area. The highest summertime temperature at San Antonio International Airport was 102 on June 19<sup>th</sup>. In September, a few days were nearly as hot as earlier in the summer.

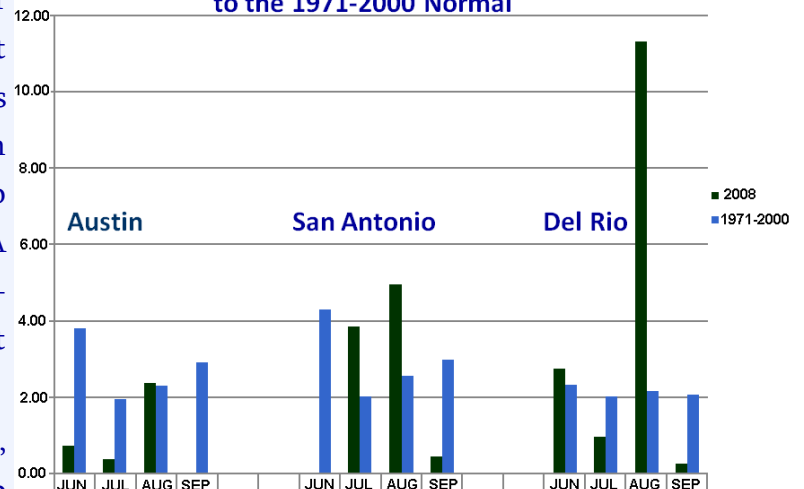
On September 2<sup>nd</sup> and 13<sup>th</sup>, 100 degree temperatures returned to the eastern half of South Central Texas. The high of 104 on September 13<sup>th</sup> was the warmest day of the year at New Braunfels. A high of 103 at San Antonio Stinson that day tied with June 19<sup>th</sup> for the hottest summer day. Record daily highs of 100 at San Antonio International Airport and 99 at Austin Bergstrom were also set on September 13<sup>th</sup>. At Del Rio, after having the 6<sup>th</sup> warmest June, temperatures from July through September were moderated due to wetter weather patterns across West Texas. May of 2008 tied with May 1991 for the 9<sup>th</sup> warmest May at Del Rio. Coincidentally, September of 2008 tied with September 1991 for the 9<sup>th</sup> coolest September at Del Rio. The hottest day at Del Rio this year reached 107 on May 10<sup>th</sup>. During the period from June to September, the hottest temperature at Del Rio reached 103 on June 16<sup>th</sup>, June 19<sup>th</sup>, and August 10<sup>th</sup>. A cool front on September 14<sup>th</sup> and 15<sup>th</sup> moderated conditions for a week across South Central Texas, but it warmed up again late in September.

What about rainfall? June and September, usually wetter months on average, ended up very dry in 2008. June 2008 rainfall was less than 25 percent of normal at many locations, except at Del Rio,

Average June to September Temperature in 2008 Compared to the 1971 to 2000 Normals



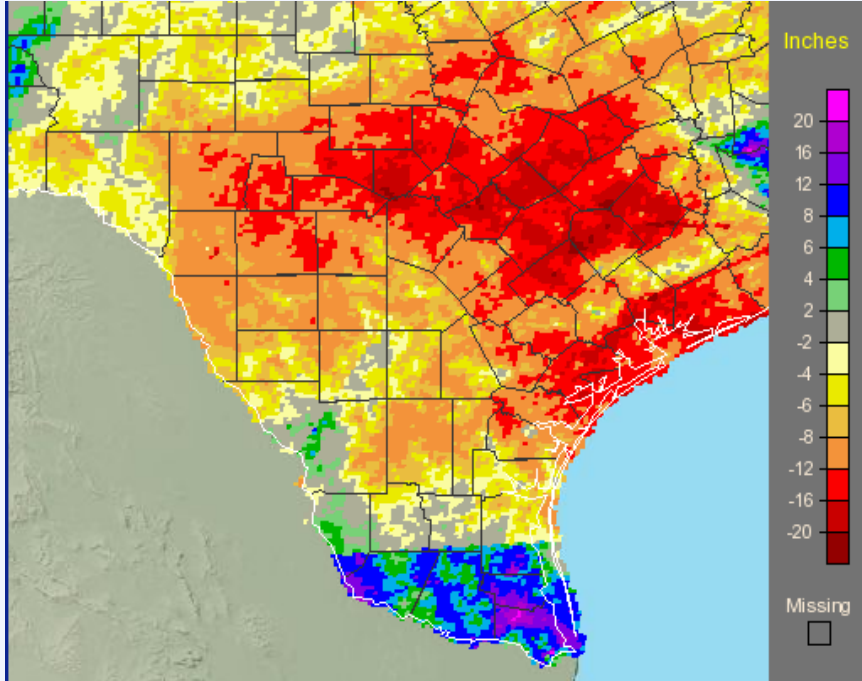
June to September 2008 Rainfall Compared to the 1971-2000 Normal



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where June 30<sup>th</sup> rainfall of 2.34 inches made June slightly wetter than usual. June 2008 was the 2<sup>nd</sup> driest June at San Antonio, with only 0.01 inches of rain, in a month where normal is 4.30 inches. At Austin Mabry only 0.74 inches of rain fell in June, 3.07 inches below the normal of 3.81 inches. July and August were the wettest months



The picture above shows departures from normal rainfall amounts for January through October, 2008.

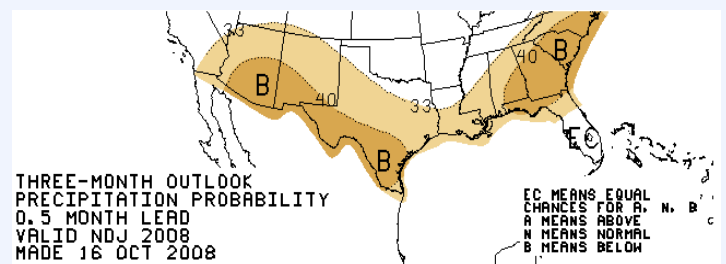
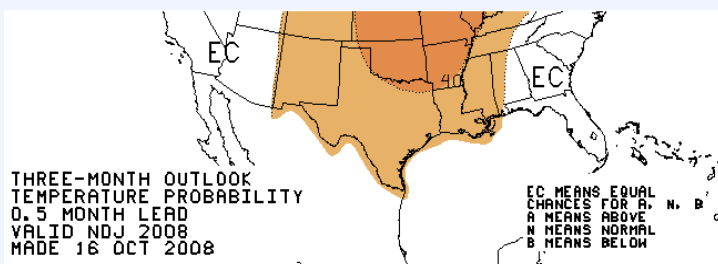
that San Antonio had seen since August of 2007. After a relatively dry July, August was the wettest month that Austin had since April, and ended up only slightly above average. Rainfall in July and August was less plentiful at Austin compared to the area from San Antonio to the Rio Grande. During the month of August, heavy rain events pushed the monthly total at Del Rio to 11.32 inches. This made August 2008 the 2<sup>nd</sup> wettest August, behind the all-time record of 20.93 inches in August of 1998. On August 29<sup>th</sup>, Del Rio had 6.09 inches of rain, a record for August 29<sup>th</sup> and the 7<sup>th</sup> wettest daily rainfall at Del Rio since 1906. Rainfall in September dropped off significantly across South Central Texas. September 2008 was a tie with

September 1931 for the 3<sup>rd</sup> driest at Austin Mabry since 1856. September 2008 was the 8<sup>th</sup> driest at Del Rio since 1906, and 9<sup>th</sup> driest September at San Antonio since 1871.

**W**ant even more information? We have a wealth of climate information such as observed weather, El Niño resources, normals and extremes, and much more. To get started, please visit our [Climate website](#).

## *Climate Outlook*

**T**he latest climate outlook from the Climate Prediction Center (CPC) indicates higher chances for above normal temperatures for November through January. The precipitation outlook shows higher chances for below normal rainfall for this time frame. Click on either picture for a U.S. scale view, or visit the [CPC website](#). These three-month outlooks are updated by [CPC](#) on the third Thursday of each month.



# Science Scoop: GIS

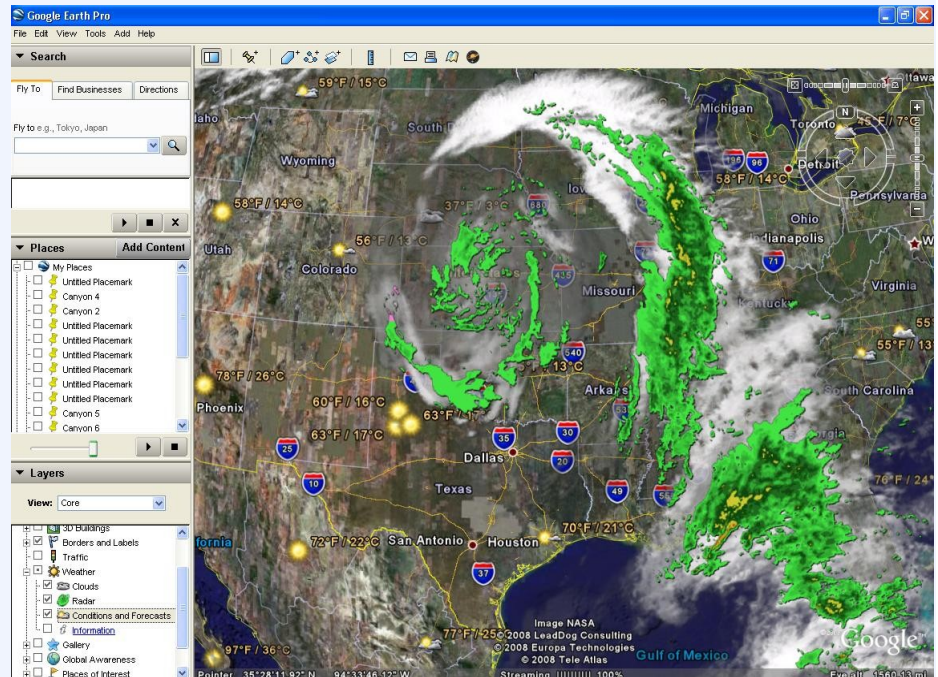
BY: MARIANNE SUTTON

**G**IS (Geographic Information System) refers to a collection of software, hardware, and geographic information used to collect, store, analyze, and display data which is linked to a location. This geo-referenced data can be anything such as a topographical overlay of a particular region, or a plot of lakes, rivers, and streams, or even a display of census information. Given the broad scope of what GIS entails, this technology can be used in countless applications. For

example, a grocery store company may want to open a new location, so the company would then create a map with overlays of population densities, existing grocery store locations, and roadways to find the best place for a new store. So where does the NWS fit in this picture?

Weather and climate information are a natural fit with GIS. Integrating real time, climatic, or forecasted weather information with geographic features enables the capability of viewing the placement of meteorological features over a particular geographic location. For example, you can view radar data in relation to specific

locations such as your home or travel route, or where you are in relation to a tornado warning. This integration of geographical and meteorological data provides you with the means to make better weather-sensitive decisions. NWS weather data is available in a number of free GIS viewers. These programs take shapefiles (.shp) or key markup language (KML) and display them on top geographic layers. The [NWS GIS website](#) has a list of GIS references to help you get started using and viewing GIS files.



*A Google Earth map with overlays showing radar and cloud coverage.*

## Mark Your Calendar!



Upcoming Safety Awareness:

November 13, 2008 - [Texas Winter Weather Awareness Day](#)

February 22-28, 2009 - [Texas Severe Weather Awareness Week](#)

March 16-20, 2009 - [National Flood Safety Awareness Week](#)



SKYWARN:

February 21, 2009 - Austin, Texas

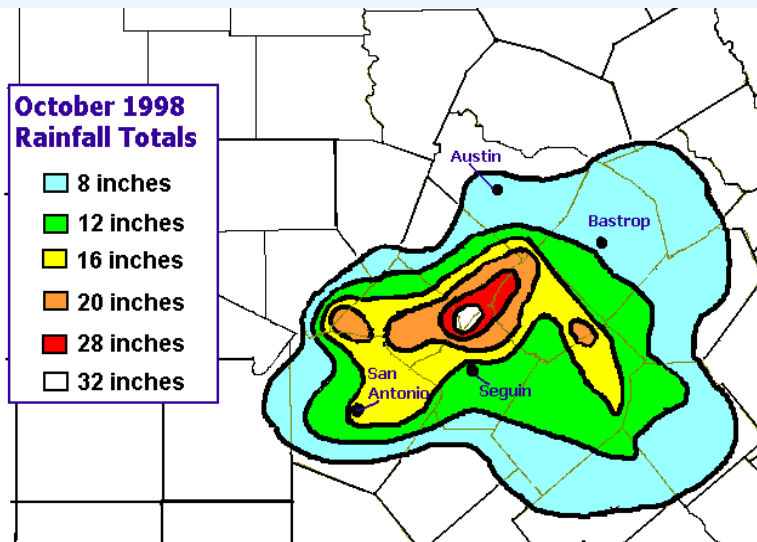
More dates to come soon! Check our [SKYWARN website](#) for updates.

# Remembering the Great October Flood of 1998

BY: PAUL YURA, WARNING COORDINATION METEOROLOGIST

This October marked the 10 year anniversary of flooding rains that devastated much of Central and South Central Texas in October 1998. During the evening of October 16<sup>th</sup>, 1998, a cold front drifted slowly southeastward into West Central Texas ahead of a very slow-moving upper level trough of low pressure over West Texas. Deep moisture was in place across South Central Texas as Pacific tropical moisture in the middle and upper atmosphere was pouring into the state from Pacific hurricanes Madeline and Lester. As the front, tropical moisture, and upper level storm came together over South Central Texas, it resulted in a historic flood.

Rain started early Saturday morning on October 17<sup>th</sup> and continued through Sunday October 18<sup>th</sup>. Rainfall amounts on October 17<sup>th</sup> and 18<sup>th</sup> from northern Bexar County to southeast Kendall County, most of Comal County and southern Hays County ranged from 15 to 22 inches. Nearly 30 inches of rain fell in southern Hays County just south of San Marcos. (See image to the left)



Rainfall totals for the month of October, 1998 are displayed above. Note the 32 inch bulls-eye near San Marcos. 30 of those inches fell between October 17-18.

flood stage from Saturday, October 17<sup>th</sup> through Sunday, October 18<sup>th</sup>, with a majority continuing to flood through Monday, October 19<sup>th</sup>. Rivers across the area reached or exceeded record stage heights, resulting in widespread flooding in the flood plains of streams, creeks and rivers. 18 floods of record were reported across area streams, creeks, and rivers. Damage and destruction to livestock, agriculture, roads, bridges, homes, and businesses significantly exceeded that of previous flooding. Thousands to tens of thousands of livestock were killed, and nearly 3,000 homes were destroyed, with an additional 8,000 or so homes damaged. Nearly 1,000 mobile homes were destroyed and another 3,000 were damaged. As the flood waters in the San Marcos and Guadalupe rivers rushed downstream toward the Gulf of Mexico, additional historic floods resulted in more devastation in Seguin, Cuero, Gonzales, and Victoria.

According to the Texas Department of Public Safety, 31 people drowned during the floods with the majority of those deaths occurring in automobiles. The total property damage was estimated to be near 1 billion dollars. 10,000 people were displaced from their homes and hundreds of high water rescues were performed across all of Central and South Central Texas.

This event broke rainfall records across South Central Texas. 11.26 inches of rain fell on October 17<sup>th</sup>, 1998 at the San Antonio International Airport, breaking the maximum daily rainfall record of all time in San Antonio. The previous record was 6.83 inches on September 9<sup>th</sup>, 1921. New monthly records for October rainfall (18.07 in.) were set as well as the largest 24-hr rainfall (13.35 inches) from October 17<sup>th</sup>-18<sup>th</sup>, 1998. Austin received 6.24 inches of rain at Robert Mueller Airport on October 17<sup>th</sup>. In many locations the rainfall surpassed both the 100 and 500 year flood values.

All rivers, creeks and streams along and east of a San Antonio to Austin line remained at or above

# Co-op Corral

BY: MARIANNE SUTTON



*From left: Patrick McDonald, Hydrometeorological Technician (HMT); Gillespie County Judge Mark Stroether; Billy Teague, honoree; and Joe Arellano, Meteorologist In Charge (MIC). Photo taken by Billy Teague's daughter, Mrs. Holly O'Neill.*

honors outstanding accomplishments in the field of meteorological observations. Only 26 Holm awards are presented each year across the United States. We are proud and honored to have awarded Billy Teague of Fredericksburg and Steve Sands of San Marcos Holm Awards for their dedication. Billy Teague was also a recipient of an Edward Stoll Award, which recognizes 50 years of weather observations.

In addition, the following Length of Service Awards have been presented by NWS Austin/San Antonio since January 1, 2008:

- Jan. 31 - John Klose of Bertram - 40 Yrs.
- Feb. 1 - Liz Lindig of Johnson City - 25 Yrs.
- Mar. 1 - Claudia Ball of Hudspeth River Ranch - 20 Yrs.
- May 15 - Stuart J. Haby of Vanderpool - 45 Yrs.
- May 16 - Charles Chaney of Utopia -15 Yrs.
- Aug. 7 - Marcy and Jimmy Rutledge of Carrizo Springs -10 Yrs.
- Aug. 20 - Elmer Booth of Charlotte - 45 Yrs.
- Aug. 26 - Marvin and daughter Tammy Gazaway of Ingram -15 Yrs.
- Oct. 8 - Mr. & Mrs. Virgil Habenicht of Sisterdale - 15 Yrs.
- Oct. 8 - Mrs. Lanette Edmondson of Kendalia - 30 Yrs.
- Oct. 8 - Donna Gessner of Cedar Creek - 10 yrs.
- Oct. 14 - Alene Cottrell of Dime Box - 20 yrs.
- Oct. 17 - Henry Netardus of Jourdanton - 30 Yrs.

The Cooperative Weather Observer Program (Co-op Program) is administered by the National Weather Service as a supplemental source of weather data. As part of the program, nearly 12,000 volunteers across the country collect information such as temperature, precipitation amount, soil temperature, and evaporation. The National Weather Service supplies the equipment, and the observers collect the data and then send it to the local NWS office. The data is then relayed to the National Climatic Data Center in Asheville, North Carolina, where it is permanently archived.

To honor and recognize the achievements of these volunteer observers, the National Weather Service has a Cooperative Weather Observer Awards Program. This October, two Cooperative Weather Observers assisting the Austin/San Antonio NWS office were awarded the prestigious John Campanius Holm Award. This national recognition



*Pictured are Joe Arellano, MIC, and Steve Sands, honoree. Photo taken by Pat McDonald, HMT.*

For additional information about the Co-op Observers Program, please visit our [Co-op Program](#) website.

# Tracking the Tropics

BY: BOB FOGARTY

The Atlantic Hurricane Season runs from June 1 through November 30 each year. There is nothing magical about these dates; this is simply when most tropical cyclones (the generic term for tropical storms and hurricanes) occur. The peak of the season is in early to mid September which is when, on average, the most activity takes place. The average hurricane season (1965-2006) will bring 11 named storms with six becoming hurricanes and two of those reaching major hurricane strength. There is usually a sequence of events which gets us to a major hurricane. An area of showers and thunderstorms over the tropical ocean organizes into a closed low pressure area and is called a tropical depression. At this stage the strongest winds are less than 39 mph. As the depression strengthens, it will become a tropical storm when its strongest winds reach 39 mph. Now it gets a name. If it continues to gain intensity, and the winds get up to 74 mph it is called a hurricane. To simplify things hurricanes can be designated by categories on the Saffir-Simpson scale which ranges from 1 to 5 with 5 being the strongest and most destructive. A major hurricane is one that reaches category 3 or higher.

So how is the 2008 season stacking up against normal? Thus far we have had 16 tropical cyclones form in the Atlantic Basin (this includes the Atlantic, Caribbean Sea, and the Gulf of Mexico) with 15 of them reaching tropical storm strength. Seven of these storms have become hurricanes and four of those were major hurricanes. The tables below list the tropical storms and hurricanes, the dates they occurred, and the maximum wind speed they attained. For the hurricanes, the Saffir-Simpson category associated with the strongest winds is also listed. As you can see this has already been an above average year for the Atlantic Basin.

## 2008 Tropical Storms

Name	Dates	Maximum Strength
Arthur	May 31-Jun 2	40 MPH
Cristobal	Jul 18-23	65 MPH
Edouard	Aug 3-5	65 MPH
Fay	Aug 15-24	65 MPH
Josephine	Sep 2-6	65 MPH
Laura	Sep 29-Oct 1	60 MPH
Marco	Oct 6-8	65 MPH
Nana	Oct 12-14	40 MPH

## 2008 Hurricanes

Name	Dates	Maximum Strength	Maximum Category
Bertha	Jul 3-20	120 MPH	3
Dolly	Jul 20-24	100 MPH	2
Gustav	Aug 25-Sep 2	150 MPH	4
Hanna	Aug 28-Sep 7	80 MPH	1
Ike	Sep 1-14	145 MPH	4
Kyle	Sep 25-29	80 MPH	1
Omar	Oct 13-18	125 MPH	3

How has Texas been doing this year? It is safe to say that this has been a very active year in Texas with three storms making landfall in our state. The first was Hurricane Dolly which came ashore July 23 on South Padre Island. Dolly was a category 2 hurricane with maximum winds of 100 mph. The center of Dolly moved inland to near Laredo and produced a tornado in San Antonio on the 24<sup>th</sup>. Tropical Storm Edouard made landfall in the McFaddin National Wildlife Refuge southwest of Port Arthur on August 5. The strongest winds at that time were 65 mph. This storm moved into a fairly sparsely populated area and thankfully didn't do a lot of damage.

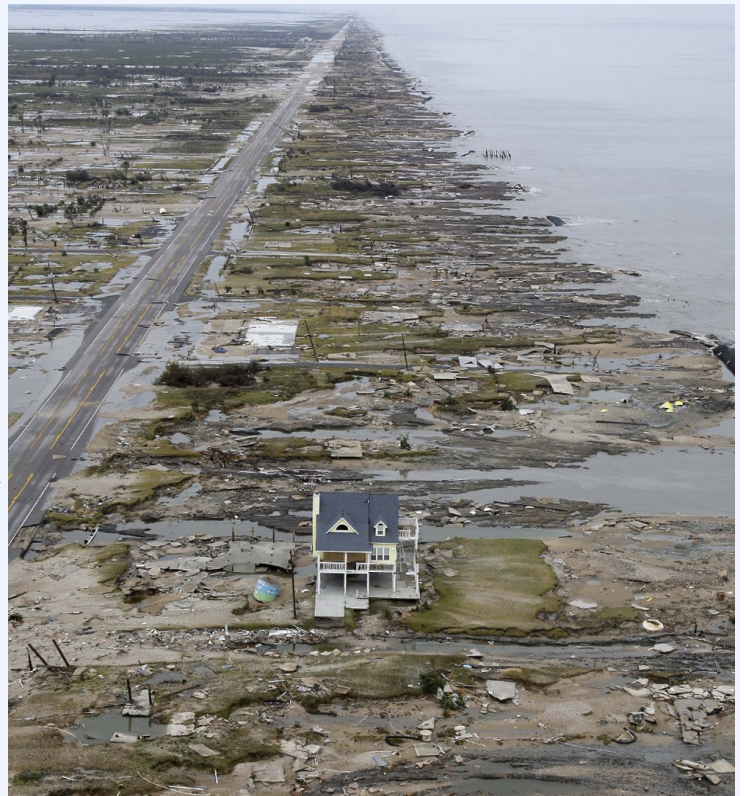
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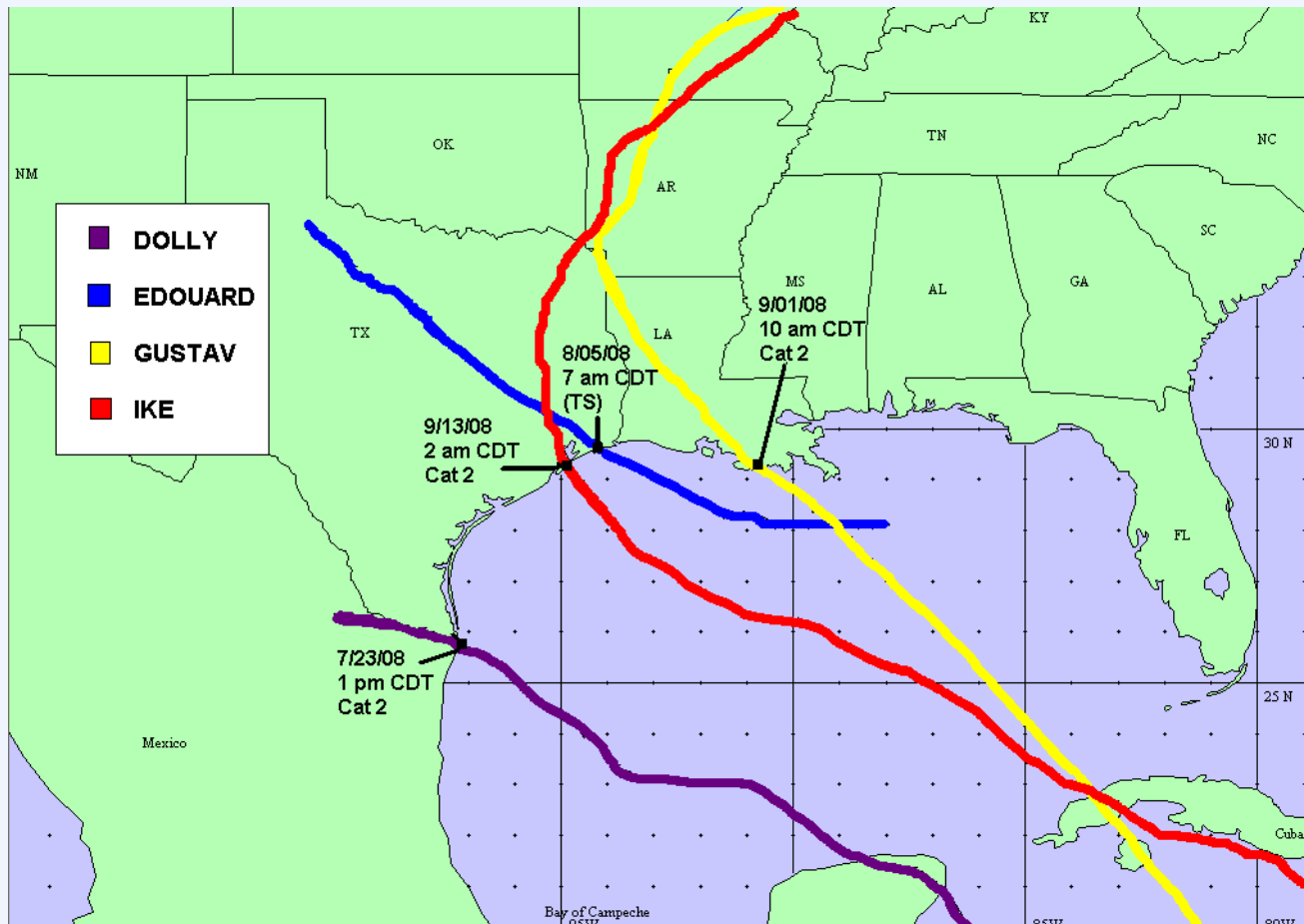
**H**urricane Ike, however, was a much different story. This tragic storm moved across Galveston Island on September 13. Ike was a category 2 storm with maximum winds of 110 mph when it made landfall. Ike caused considerable damage and deaths in Galveston and along the coast north and south of there. In addition, the storm produced torrential rains and flooding as it moved into the center of the country. The effects of Ike were felt from Texas to the Ohio River Valley.

**T**he picture to the right shows some of the destruction near Galveston, Texas caused by Hurricane Ike. For additional information on this hurricane, please refer to [NOAA's Hurricane Ike website](#).

**F**or more information about tropical weather, visit the [National Hurricane Center's Website](#).



*Hurricane Ike damage at Port Bolivar, Texas. The solitary house had been rebuilt after Hurricane Rita to withstand a Category 5 hurricane.*



*The above graphic depicts tropical cyclones in 2008 impacting Texas or Louisiana. Labels indicate time of landfall of the center of the storm, and category at landfall.*



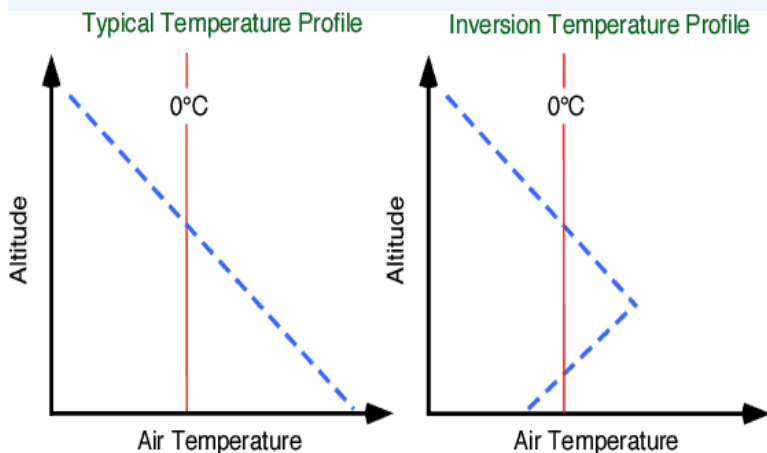
# Weather Words

BY: MARIANNE SUTTON

**Temperature Inversion:** In general, as height above the ground increases, temperatures decrease. However, with an inversion, temperatures increase as height increases. An inversion can occur due to several reasons, one of which is when warmer air ahead of a warm front moves over a layer of cooler air. Another way for an inversion to develop is when the outgoing radiation from the surface of the Earth is higher than the incoming radiation from the Sun, ie, during the overnight hours.



*Rising smoke is stopped from spreading higher by an inversion.*



*The picture on the left represents a normal temperature profile. The picture on the right depicts an inversion.*

With enough moisture in the lower levels of the atmosphere, fog will develop below the inversion. This occurrence is the most commonly recognizable indication of an inversion. On days when there is thick fog or haze which seems to be “trapped”, it’s because there is an inversion keeping it from lifting. Another interesting feature of an inversion is that it can cause sound waves under the inversion to travel farther than normal. Sometimes, blasting operations will have to wait until an inversion breaks, otherwise windows can break several miles away from the blast site!

## *Interested in a Guest Speaker or Tour?*

The National Weather Service Forecast Office in New Braunfels Texas offers guest speakers and office tours to adults and school children. Our office here in New Braunfels is a small facility, so tour groups of more than 15 people are discouraged and cannot be handled without significant coordination. In the cases of large groups, we suggest contacting our office to arrange for a speaker to come to your location or meeting place. We can provide any length of presentation talking about a wide variety of weather topics including severe weather, [Skywarn](#), tornadoes, hurricanes, flooding, weather preparedness, and careers in meteorology. We provide this service free of charge and would love the opportunity to be a guest speaker at club meetings, schools, civic organizations, etc. We do ask that you call and request a guest speaker at least a month in advance so scheduling can be arranged. For further information, please see our [website regarding tours](#), or contact Paul Yura, Warning Coordination Meteorologist at (830) 629-0130, ext. 223, or, send an email to [Paul.Yura@noaa.gov](mailto:Paul.Yura@noaa.gov).

If you have any questions or comments, please let us know! Our mailing address is: NWS Austin/San Antonio, 2090 Airport Rd., New Braunfels, TX 78130. Or, contact Paul Yura at (830) 629-0130, ext. 223 or, you may send an email to [Paul.Yura@noaa.gov](mailto:Paul.Yura@noaa.gov).