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WELCOME MESSAGE FROM THE METEOROLOGIST-IN-CHARGE: JUSTIN WEAVER

Hello and welcome to the winter 2010 edition of the National Weather Service (NWS) Lubbock West Texas Twister Newsletter! As Meteorologist-in-Charge at NWS Lubbock, I oversee all aspects of our meteorological, hydrological and climatological programs. It is the responsibility of NWS Lubbock to provide the citizens of the South Plains, Rolling Plains and extreme southern Texas Panhandle with timely and accurate weather warnings, forecasts and data.

As we head into and through the winter months, NWS Lubbock will be on-duty 24 hours a day providing forecasts, watches and warnings for hazards such as heavy snow, freezing rain, damaging winds and wildfire conditions. And speaking of winter weather, I would like to thank all of our dedicated cooperative weather observers that report their data each and every morning. I would also like to remind them that their accurate and timely snowfall measurements are extremely critical to our decision making. during winter storms.

Finally, I want to make sure all of our readers know that the NWS is a Federal Government agency under the National Oceanic and Atmospheric Administration of the U.S. Department of Commerce. Of course that means we are funded by the American taxpayer and I would like to invite you for a tour of our facility in Lubbock. Just drop me an email at **Justin.Weaver@noaa.gov** if you would like to make a visit to our office. Otherwise, we hope you enjoy the latest edition of our newsletter and wish you all a safe and joyous holiday season!

2010 YEAR IN REVIEW
BY: FELECIA BOWSER

A wide variety of weather affected West Texas in 2010. However, 2010 can still be classified as average in terms of severe weather. The winter of 2010 was plagued with a few winter storms. One winter storm of note that occurred on January 28th resulted in 175 weather-related auto accidents in Lubbock County alone, due to widespread snow and ice accumulations. A few wildfires, high winds and heavy rainfall occurred throughout the early spring. A few tornadoes developed in April. One particular tornado event occurred on April 22nd in Motley and Cottle Counties. Two strong tornadoes developed from a long-lived supercell thunderstorm near the town of Cee Vee. One was rated an EF2 and the other an EF3 on the Enhanced Fujita Scale; which ranges from EF0 to EF5.

Weak tornadoes, downburst winds and hail-ridden thunderstorms besieged the area in late spring, with flooding events rounding out the beginning of the summer season. In late summer into early fall, thunderstorm wind speeds in excess of 70 mph, caused tree, roof and structural damage across the South Plains. In late October, a strong thunderstorm complex generated rounds of heavy rainfall and hail up to the size of baseballs across portions of the South Plains. Unfortunately, these storms occurred a couple of weeks before the cotton harvest and caused at least $47 million in crop damage to several farms across Terry County.

This newsletter also includes articles of high impact rain events in 2010 and a long-range outlook for this winter and spring. We hope you enjoy this newsletter!

1970 Lubbock Tornado 40th Anniversary
By: Joe Jurecka

May 11, 1970 started out as just another day but it would make history for both Lubbock and the meteorological community. Two tornadoes struck the city that night. The first, which touched down around 8:30 pm near Broadway Street and present-day Martin Luther King Jr. Boulevard, was relatively minor and traveled northeast along the Idalou highway. At 9:35 pm, the second and more violent tornado touched down near 19th Street and University Avenue and for the next half hour wreaked havoc on the city. In that period of time, 10,000 automobiles were damaged, thousands of homes were affected and 26 people perished.

Despite the traumatic events, many positive outcomes have resulted from that fateful day. Dr. Ted Fujita, from the University of Chicago, performed a detailed study of the tornado damage which was rated F5 on the scale ranging from F0 to F5. The collaboration with Dr. Fujita and Texas Tech faculty ultimately led to the creation of the Wind Science and Engineering Research Center where many advances have been made to help make structures more resistant to tornado winds. In an effort to further refine damage surveys, the Fujita scale has been enhanced to account for different construction methods and structures.

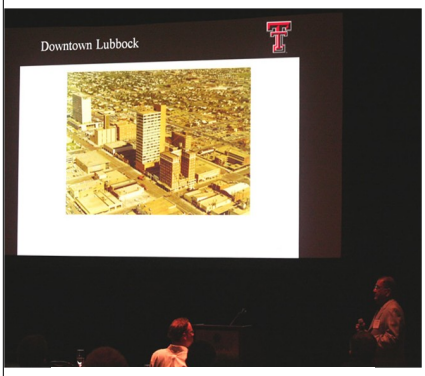
From a meteorological perspective, the event significantly expanded tornado and severe storm research. Insight gained from this research has led to much refinement for tornado forecasting techniques as well as technological advances including our nation's network of Doppler radars. Today, we have a much greater ability to identify the meteorological conditions which support tornado development and detection. Still, there remains much work to be done in this field and research projects, such as the recently completed Verification of the Origins of Rotation in Tornadoes Experiment (VORTEX) II, will help us get closer to understanding severe storm environments and evolution. In turn, this will lead to more accurate forecasts and warnings in an effort to protect life and property.

Tornadoes remain a threat to people here in West Texas and vigilance via keeping up with the latest outlooks, watches, and warnings will go a long way to keeping your family safe. Statistics show that mobile home dwellers are ten times more likely to be killed in a tornado than in a well constructed home. Form a tornado plan with your family and take action when the weather threatens.

Since 1970, Lubbock, Texas commercial development and population growth has been greatest to the south and southwest of Loop 289.

An aerial photograph of the damage caused by the tornado at the Lubbock regional airport. The arrow indicated the location of the Lubbock Weather Bureau office in 1970.

2010 Severe Weather Conference
By: Justin Weaver



Keynote speaker Dr. Kishor Mehta (lower right) opens up the presentations with a talk on the 40th anniversary of the 1970 Lubbock tornado.

The National Weather Service (NWS) Forecast Office in Lubbock and Texas Tech University (TTU) sponsored a Severe Weather Conference on February 17-19, 2010 at the Overton Hotel and Conference Center in Lubbock, Texas. The purpose of the conference was to provide an opportunity for research and operational meteorologists to discuss issues and present research on a broad spectrum of severe weather topics.

The conference was attended by 115 individuals representing twelve NWS research and forecast offices, three universities (TTU, Texas A&M, University of Oklahoma) and six media outlets (from Lubbock, Amarillo and Midland). There were 26 presentations during the conference on topics such as the 1970 Lubbock tornado, Greensburg, KS tornado, tropical cyclone tornadoes, lightning observations and mapping, phased array radar, hurricane wind and wave damage assessment, VORTEX 2 research project and many other topics concerning instrumentation and wind engineering.

The keynote addresses were all by well-respected experts in their field, such as Dr. Kishor Mehta, Dr. Charles Doswell, Roger Edwards, Tim Marshall, Dr. Pam Heinselman, Dr. Chris Weiss, and Don Burgess. Several TTU graduate students also presented their research. The conference concluded with an optional tour of TTU West Texas Mesonet and Wind Science and Engineering Laboratory facilities at Reese Center. The conference was provided free to all attendees and was funded by the Cooperative Program for Operational Meteorology, Education and Training, NWS (Lubbock and Southern Region Headquarters, Fort Worth), and the Texas Tech University Student Chapter of the American Meteorological Society.

If you would like more information about the presentations that took place at the conference, please visit the following website:

http://lubsvrconf.org/

Local and regional media were on-hand to participate in and report on the conference. In this picture, Matt Laubhan, chief meteorologist at KLBK-TV in Lubbock interviews Justin Weaver, Meteorologist-In-Charge of the National Weather Service office in Lubbock.

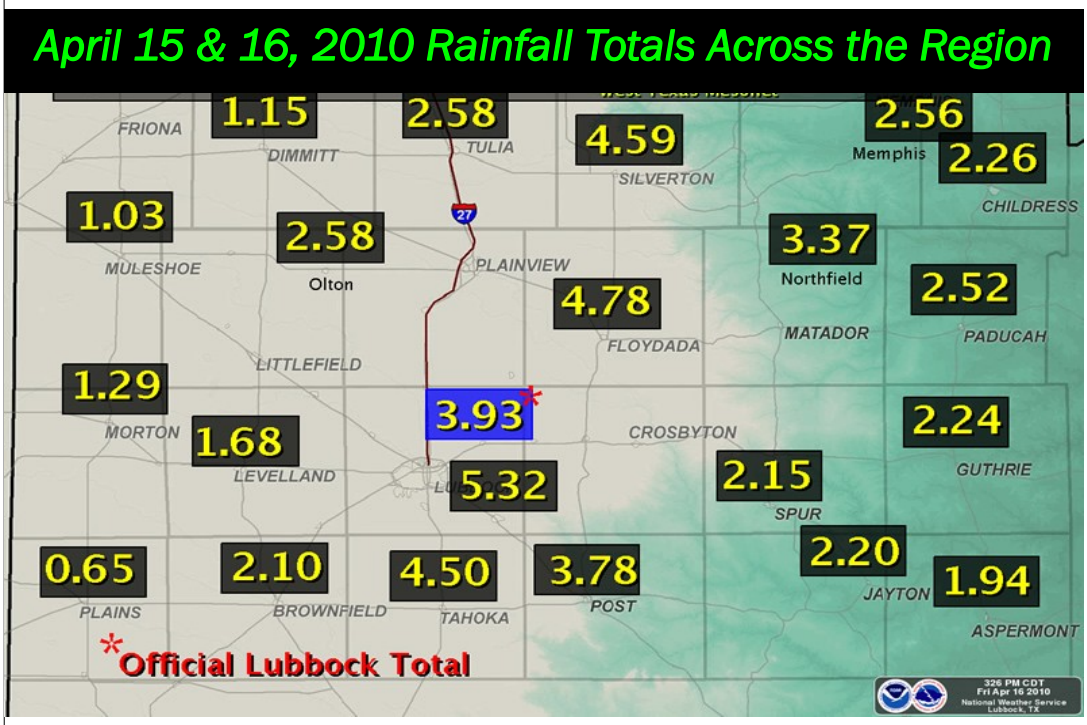
Picture of a tornado simulator recently constructed at the Texas Tech Wind Science and Engineering Laboratory at Reese Center. In addition to visualizing a tornadic circulation, this simulator will be used to collect critical information to infer how tornado winds may affect structures.

April 15th-16th, 2010: Heavy Rainfall Event
By: Gary Skwira and Mark Conder

On April 15th and 16th, 2010, a slow moving storm system moved out of the desert southwest across West Texas. As the storm approached, deep moisture flowed northwest from the Gulf of Mexico into West Texas. Widespread rain showers spread northward out of the Permian Basin and over the South Plains following the track of the upper-level circulation. Various smaller scale circulations also enhanced the rainfall locally. The result was record-setting rainfall for much of the region, especially from the southern South Plains into the south-central Texas Panhandle.

Daily rainfall records were broken Thursday and Friday at the official observation site at the Lubbock International Airport. As of 5 pm on Friday, 4.02 inches of rain had fallen in 48 hours at the Lubbock Airport. This is also the most rainfall from a single event in April and the second-most rain recorded for the entire month at Lubbock. The 10-plus inches recorded for the year-to-date at that point at Lubbock was the wettest start to the year in recorded history. In Lubbock, the excessive rainfall caused several road closures and even a roof collapse near Texas Tech University. Widespread flooding problems were also reported across the area although most of the problems were minor. The map below shows some selected rainfall totals from across the area as of 3 pm on Friday April 16th.

Did you know that official rainfall and snowfall totals for Lubbock come from the Lubbock Preston Smith International Airport?



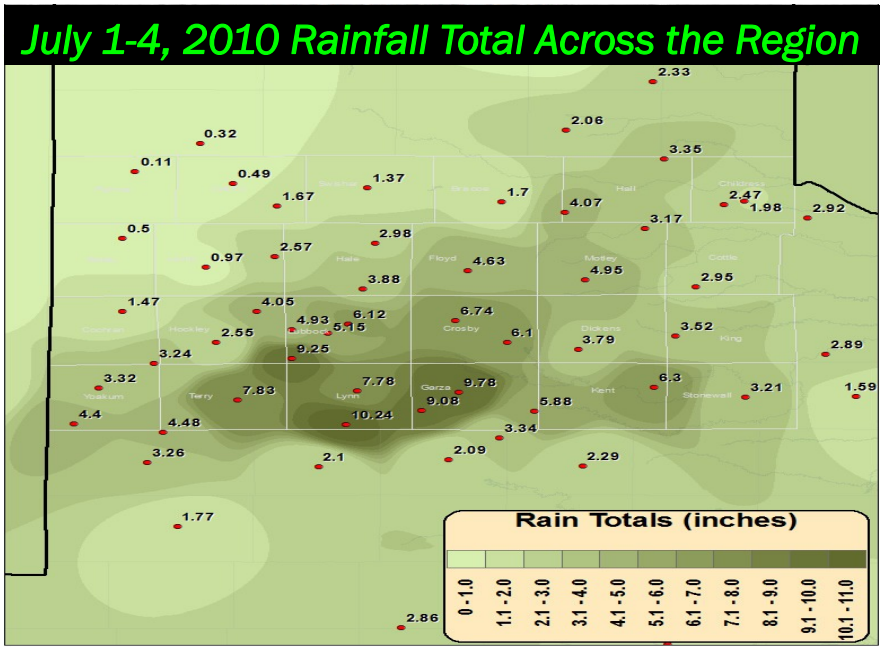
A playa lake floods the parking lots of the Wal-Mart at the corner of at Frankford Avenue and 4th Street.

July 1st-4th, 2010: Independence Weekend Rains
By: Gary Skwira and Mark Conder

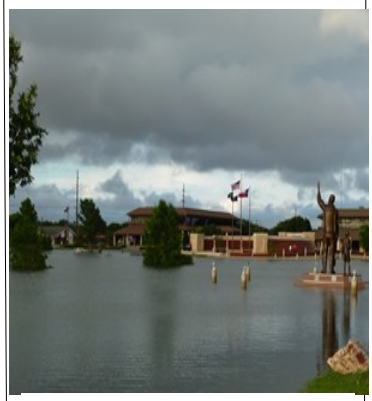
The July 4th holiday weekend brought rounds of heavy rain that resulted in areas of flooding and flash flooding across portions of the South Plains and Rolling Plains. Over a four day period, from July 1st through the 4th, many locations from the southwest South Plains through the southeast Texas Panhandle and the entire Rolling Plains received over 3 inches of rain, with a swath of 5 to 10 inches plus from Terry County eastward through Lubbock, Lynn, Dickens, Garza and Kent Counties. The West Texas Mesonet site located 1 mile north of O'Donnell recorded a 4-day total of 10.24 inches of rain, much of which fell late on the 3rd (Saturday) and early on the 4th (Sunday). The Lubbock Airport officially recorded a 4-day total rainfall of 6.12 inches, and set daily rainfall records on the 2nd and the 3rd, when 2.19 inches and 3.27 inches were recorded, respectively. Thanks to heavy rain early in the month, July 2010 finished with a total of 7.14 inches, making it the second wettest July on record. The wettest July on record was in 1976 when 7.20 inches fell.

The rounds of widespread heavy rainfall in July were a product of deep tropical moisture interacting with several slowly moving upper level disturbances that tracked overhead. The stage for heavy rainfall was initially set, in part by Hurricane Alex. Alex came ashore late on the 30th of June, about 100 miles south of Brownsville, Texas, as a strong category 2 tropical cyclone. Alex weakened and eventually lost its identity as it tracked westward into the higher terrain of Mexico, but plentiful amounts of tropical moisture were transported northward into West Texas. Once the moisture was in place, all that was needed was a trigger, which was supplied by several subtle, but efficient, upper level disturbances which brought several rounds of heavy rain. Initially the heavy rain caused nuisance flooding, mostly around playa lakes and other low lying and poor drainage areas. Then, to top it off, a more intense area of tropical rain developed during the evening of the 3rd and tracked slowly eastward, bringing copious amounts of precipitation. Some locations saw another 5 to 10 inches of rain with this final round of torrential rain, which resulted in many areas of flooding and flash flooding, especially across parts of Lynn, Lubbock and Garza Counties. Numerous roads were inundated with water and many roads were closed. Swelling playa lakes flooded cars, roads and homes, and several high water rescues occurred. Portions of Lubbock, Post and Ransom Canyon were particularly hard hit. A stretch of Farm-to-Market Road 669 was washed out by flowing flood waters south of Post, and large stretches of Highway 380 on the Caprock west of Post were covered in water.

The heavy rain tapered off and shifted east Independence Day, but runoff from all the rain then created river flooding. Specifically, the Double Mountain Fork of the Brazos River rose rapidly above flood stage near Justiceburg. The river crested at 20.66 feet, almost 2 feet above flood stage, the afternoon of the 4th. At its peak, the river briefly touched the I-beams of the Highway 84 Bridge near Justiceburg, but it remained 2-3 feet short of flooding the highway. All this water dumped into Lake Alan Henry and pushed the lake nearly 10 feet above the operational spillway.



Where were you during this 4th of July rainfall event?



Picture taken at Huneke Park on 82nd Street and Nashville Avenue!

Lubbock National Weather Service participates in a unique educational outreach project

BY: Andrew Pritchett

In March 2010, the National Weather Service in Lubbock participated in an important educational outreach project with the Science Spectrum using ITV (Interactive Television). Through this ITV project NWS meteorologists Felecia Bowser, Matthew Ziebell, Andrew Pritchett, and Jerald Meadows were afforded the opportunity to present information and answer questions on some of the hazardous weather that occurs across West Texas to elementary and middle school aged students across Region 17 of the Texas Education Service Center. The theme of the lesson was "Wild Weather", so weather events described included thunderstorms, tornadoes, lightning, hail, and flooding. In addition, safety information was also presented to the students, such as where to seek shelter if a tornado threatens at home or school and what to do if they are caught outside in a thunderstorm. Students were also encouraged to discuss a weather safety plan with their parents when they got home. Some of the most popular questions that students asked the meteorologists included "How does a tornado form?", "What causes it to rain?", "How strong can hurricanes and tornadoes get?", and "What do you need to do to become a meteorologist?" What made this educational opportunity so unique was that the presentations were delivered remotely using television equipment in the Science Spectrum. As a result, meteorologists were able to talk to several different classes across Region 17 at the same time and were able to reach hundreds of students. The ITV presentation was certainly a terrific opportunity to discuss local severe weather events and promote awareness and safety.

Meteorologist Matthew Ziebell (far right) remotely interacts with students across Region 17 at the Science Spectrum in Lubbock.

Did you know that the National Weather Service in Lubbock, Texas is co-located with the Science Spectrum?

Come check out our weather exhibit located on the third floor of the Science Spectrum

NWS Lubbock Hosts 2010 Annual Aviation Weather Safety Workshop

By: Andrew Pritchett

On September 21, 2010, the National Weather Service in Lubbock held its annual Aviation Weather Safety Workshop on site at the Science Spectrum, the same facility that houses the local Weather Forecast Office (WFO). The workshop was conducted in the Science Spectrum mini-theater, complete with theater style seating and excellent audio and visual aids. The event was organized by meteorologist Joe Jurecka, who is also a commercial pilot. Joe gave a presentation entitled "Local Hazards and Tips for Pilots" which discussed some of the adverse weather conditions that local pilots should look out for. Other topics covered at the workshop included a brief overview of the National Weather Service by Meteorologist-In-Charge, Justin Weaver, "Cloud Recognition Training for Pilots" by Warning Coordination Meteorologist and General Aviation pilot, Jody James, and "Mountain Wave Induced Turbulence" by Senior Meteorologist, Todd Lindley.

In addition, meteorologist Matthew Ziebell led a roundtable discussion with the group on the aviation services that are provided by WFO Lubbock. The discussion included thoughts on the aviation forecasts and warnings that the meteorologists at WFO Lubbock provide to airlines and pilots, as well as the need for any additional services. The roundtable discussion provided the meteorologists at WFO Lubbock an excellent opportunity to interact with some of their primary customers, general aviation pilots.

The workshop was very well received by the 38 pilots in attendance. Most mentioned that they appreciated the effort by the office to reach out to them and were pleased with the quality of the training they received. Several pilots noted in their feedback forms that their understanding and awareness of aviation weather improved significantly by attending the workshop and expressed interested for additional workshops in the future. Overall, the workshop was a huge success and the staff of WFO Lubbock is looking forward to continuing to promote weather safety and providing the best possible services to the local aviation community.

Would you be interested in attending this workshop in the future? Stay tuned to upcoming events by visiting our website at:

www.weather.gov/lub

Meteorologist Matthew Ziebell leads a roundtable discussion regarding aviation services provided by WFO Lubbock.

Almost 40 pilots attended the Aviation Weather Safety Workshop.

La Niña Returns: What This Means For The 2010 Winter Season
By: Jody James

Last winter, West Texans experienced a wet winter with plenty of snow. Some locations recorded over 20 inches of snow, which is nearly double the average annual snowfall. One of the reasons for the exceptionally snowy winter was due to the atmospheric/oceanic phenomenon known as El Niño that was in place. The El Niño/La Niña cycle (also known as ENSO, the El Niño Southern Oscillation) is defined by warmer or cooler than normal sea surface temperatures in the central and eastern Pacific Ocean near the equator.

El Niño is associated with warmer than normal sea surface temperatures, and usually results in wetter than normal conditions in the Southern Plains during the winter months. The opposite condition is La Niña, which is associated with below normal sea surface temperatures in that same region, along with consistent atmospheric features. The changing ocean temperatures affect ocean currents and the average positions of atmospheric jet streams. As the subtropical and polar jets shift north or south, short term climatological changes ensue.

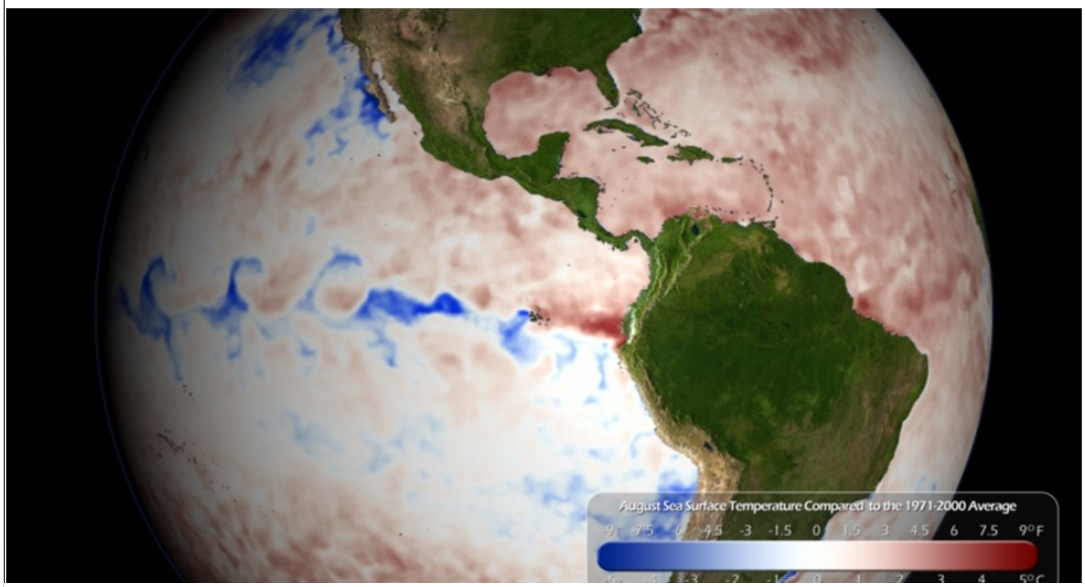
The ocean temperatures in the central and eastern Pacific near the equator have cooled significantly in the past few months, and we now have La Niña conditions present. The current forecast by the Climate Prediction Center suggests that La Niña will last through the Northern Hemisphere winter, 2010-2011, with sea surface temperatures reaching at least 1.5 degrees Celsius below normal. Currently, in what is called the Niño 3.4 region in the Pacific, weekly average ocean temperatures are already running about 1.5 degrees Celsius below normal, or about 2.7 degrees below normal Fahrenheit.

El Niño means "The Boy" or "The Christ Child" in Spanish named for the time of year, when this phenomena was observed.

La Niña (the opposite phase of El Niño) means "The Girl"

To be classified as a full-fledged La Niña "episode", the average sea surface temperatures must be at least 0.5 degrees Celsius below normal for at least 5 consecutive months. The last La Niña episode occurred in 2007-2008, and the last strong La Niña episode started in 1998 and continued into 2000. Typically the effects of El Niño or La Niña are most pronounced in the Southern Plains during the winter months. La Niña winters are typically warmer and drier than normal. During previous "strong" La Niñas events, defined as sea surface temperatures 1.5 degrees Celsius below normal or greater, temperatures in Lubbock have averaged around 4 degrees above normal during the climatological winter months of December, January, and February. The precipitation during that same time in Lubbock was 15 percent below normal for the first winter of that episode (1998-99), and 41 percent below normal for the second winter (1999-2000). No rainfall occurred during two months of those consecutive La Niña winters - in February, 1999, and again in January, 2000.

In summary, the odds favor a dry and warm winter for West Texas in 2010-2011, especially if the current La Niña continues to strengthen as forecast. The other issue that may become more important with time is the threat of wildland grassfires. Heavy rains this past summer have resulted in tall grasses and heavier than normal vegetative cover. As those grasses dry out (cure), they become potential "fuel" for fires. With plenty of fuel and drier/



August (2010) Sea Surface Temperatures – Departure from Normal. Blue depicts temperatures below normal, while red represents temperatures above normal. Image Courtesy of the NOAA Environmental Visualization Laboratory.

Very Active Wildfire Season Possible Across the South Plains This Winter

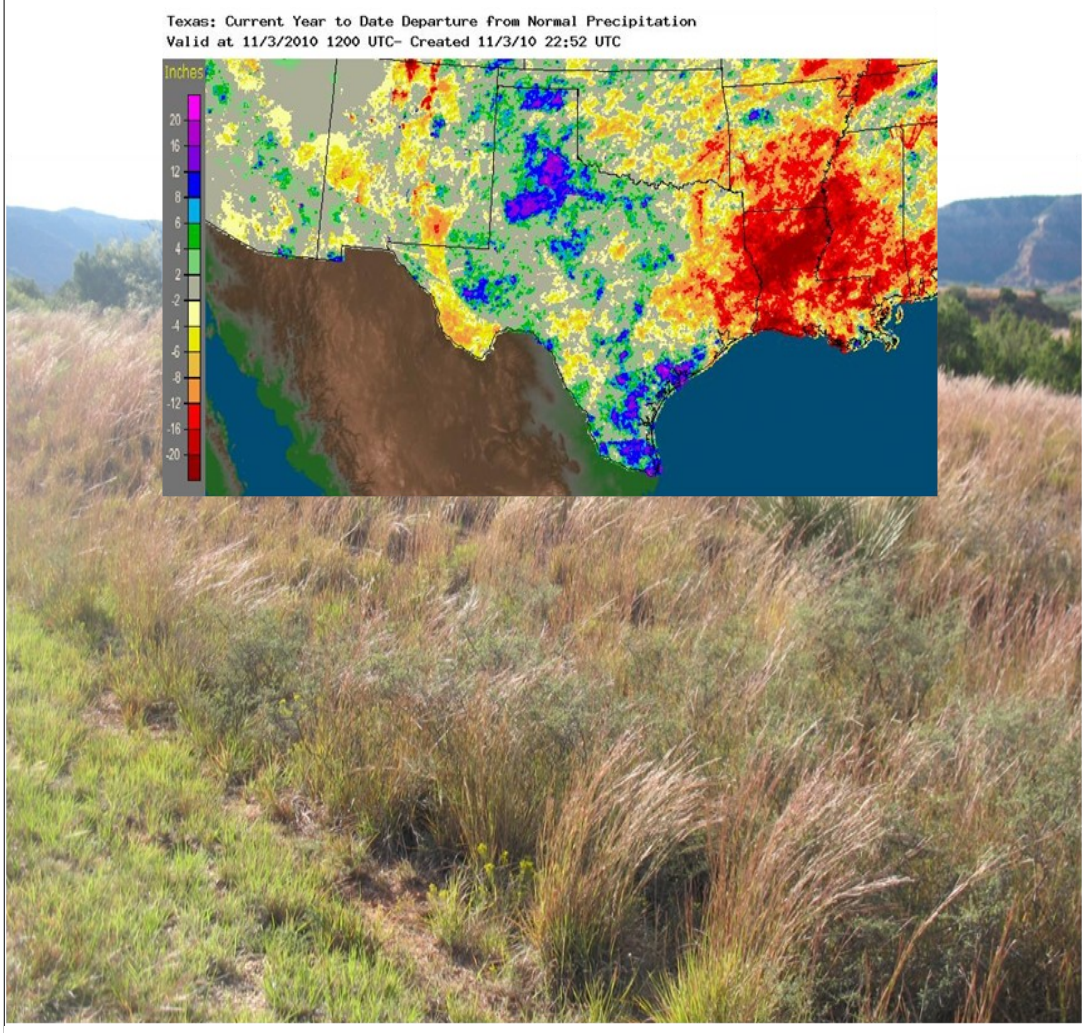
By: Ron McQueen

Above normal rainfall this year over much of the southern plains has led to exceptional growth of fine fuels such as grasses. Grasses this year in many areas resemble the tall grass prairies typically found further east. Grasses are a common fuel for fire in the southern plains; and their abundance this fall has heightened concerns for possible wildfires, especially if drought concerns pan out.

The National Weather Service monitors for possible fire weather concerns. Of course the actual development of a fire cannot be anticipated. But when strong winds combined with low relative humidity and responsive fuels are expected, the National Weather Service will issue a Fire Weather Watch up to 2 or 3 days in advance, or a Red Flag Warning within 24 hours.

If you plan any burning this fall or winter, make certain winds will remain at safe levels so there will be no ability for fire to spread into unintended areas. And, keep track of burn bans in your area. A good resource is the Texas Forest Service: **http://texasforestservice.tamu.edu/main/default.aspx**.

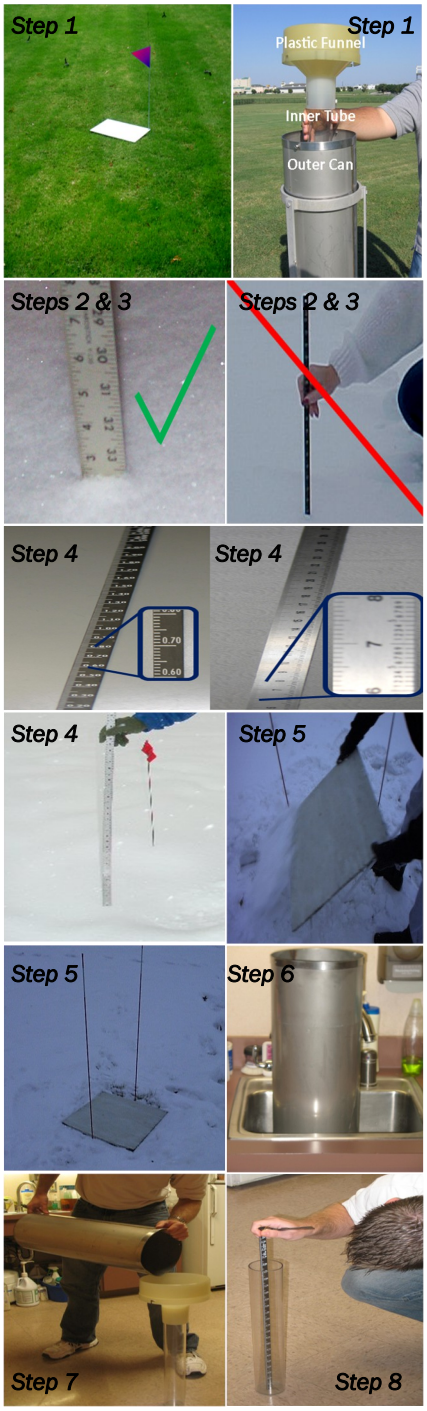
Did you know that County burning bans are established by County Judges and or County Commissioners Courts?



Thick grass at Caprock Canyons State Park near Quitaque (October) with year-to-date departure from normal precipitation (inset) - blue to violet colors indicate 8 to 16 inches more rainfall than normal from the southern South Plains through much of the Rolling Plains.

Proper Technique To Measuring Frozen Precipitation

By: Felecia Bowser



As the winter season gets underway, precipitation falling in the form of snow may occur. As a result, there are proper ways to measure snowfall that will aid to ensure accuracy for the data collected at the National Weather Service in Lubbock, Texas. Below are easy step-by-step instructions cooperative observers can use to precisely measure snowfall.

Step 1: Make sure the snowboard provided by the National Weather Service is in an open area and away from obstructions such as a fence and trees. It may be difficult to see the snowboard when the ground is covered with snow so attach a wire with a flag to help. Also, remove the funnel top and inner tube from the rain gauge so that snowfall may be captured within the outer tube.

Step 2: When it is time to measure the snowfall, bring along a snow measuring stick that has increments of inches and feet. The National Weather Service rain measuring stick will be off by a factor of 10 when measuring snow depth. Therefore, multiply by a factor of 10 to get the correct depth.

Step 3: Put the snow measuring stick in the middle of the snow pack on the snow board, and read off where the top of the snow pack ends. If snow has blown off the snow board, take the measurement on level ground where snow has collected. If drifting snow has occurred, measure multiple places and take an average. ***This is called the snowfall*** and is recorded to the nearest tenth of an inch.

Step 4: For ***Snow Depth***, multiple measurements will need to be taken around the snow board to account for drifting. The average of these measurements is considered the depth given to the nearest ***inch***. (Example scenario: If the average snow depth is greater than or equal to 1.5 inches round ***up*** to the nearest whole number = 2.0 inches. If the average is less than 1.5 inches round ***down*** to the nearest whole number =1.0 inch.). For measurements less than 1/2 inch the amount will be recorded as a ***Trace***.

Step 5: Wipe the snow off the snowboard and set the clean snowboard onto a freshly fallen snow spot. Press the snowboard down a bit to make sure it is settled.

Step 6: Once you know the measured snow depth, bring the snow filled rain gauge inside your home. Fill a sink about one-third full of hot water and set the rain gauge down into the sink. This way you can get a melted snowfall measured amount.

Step 7: Once the snow is melted, pour the liquid into the National Weather Service inner tube. ***Note: Using the funnel top will help to ensure all the liquid gets inside the inner tube.***

Step 8: Use the National Weather Service measuring rain stick that show values of 0.01 inch increments, to measure the melted snow. ***This is called the water equivalent.***

Step 9: Write down the snowfall amount, snow depth and water equivalent values onto your B-91 Form.

Important note:

Since snow melts and settles, taking measurements while it is still snowing or fairly soon after it stops is important. This is because some or all of the snow may have melted by the "official" observation time in the morning!

Step 4 Example:

Let's say you measure a snow depth of 1.3 inches. In this scenario you would round down to the nearest whole number (1) and record a snow depth of 1.0 inch.

Winter Weather Safety Tips
By: Felecia Bowser

Vehicle Prepardeness And Safety

- Plan ahead and check your local forecast for expected weather conditions. To get road conditions, call your local Department of Transportation.
- Fully check and winterize your vehicle before starting your travel.
- Let someone know your time tables and your primary and alternate travel routes.
- If you encounter sleet or freezing rain, drive with extreme caution. Even 4-wheel drive vehicles have difficulty on icy roads.
- Keep your gas tank near full to prevent ice from forming in the fuel lines
- If you are planning to travel into an area which experiences significant winter storms, carry a winter storm survival kit that may consist of the following: blankets, flashlights, non-perishable calorie dense snack foods, sand, tow rope,

Dressing For The Weather

- Wear loose-fitting, lightweight clothing in several layers.
- Outer garments should be tightly-woven and water-repellant.
- Wear a hat. Nearly ***half*** of your body heat loss is from the top of your head.
- Wear gloves or mittens (mittens which are snug at the wrist are better than gloves).
- Try to stay dry. Remove layers of clothing to prevent perspiration and subsequent chill.

Preparing Your Home

- The primary concerns are the potential loss of power and telephone service. If winter weather conditions last for more than a day, then a shortage of supplies may also be a concern.
- Have a flashlight and extra batteries available.
- Use a battery-powered ***NOAA Weather Radio*** and a portable radio to receive emergency information.
- If you have a fireplace or wood stove, make sure you have a good supply of firewood. Learn to use any emergency heating sources properly, to prevent a fire.
- Keep extra medicine, baby items, and first-aid supplies on hand.

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For the latest weather forecast visit us on the web at www.weather.gov/lub

The staff at the National Weather Service in Lubbock, Texas knows how to have fun and enjoy winter weather! Taken on February 11, 2010.

2009-10: Promotions, Hires, And Retirees

Felecia Bowser: Promoted to General Forecaster (selected on station)

Joe Jurecka: Promoted to General Forecast (selected on station)

Jerald Meadows: Meteorologist Intern (new hire from WFO Amarillo)

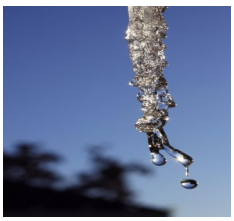
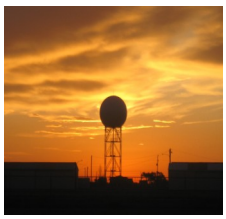
Andrew Pritchett: Meteorologist Intern (new hire from WFO Huntsville)

Jeff Vitale: Promoted to General Forecaster (selected on station)

Mike Turner: Observations Program Leader (new hire from WFO Melbourne)

Jerry English: Observations Program Leader retired on April 30th

Bruce Haynie: Promoted to Electronics Systems Analyst (selected on station)

Carl Hill: Electronics Systems Analyst retired on June 2nd

Eric Adams: Electronics Technician (new hire from WFO Tulsa)