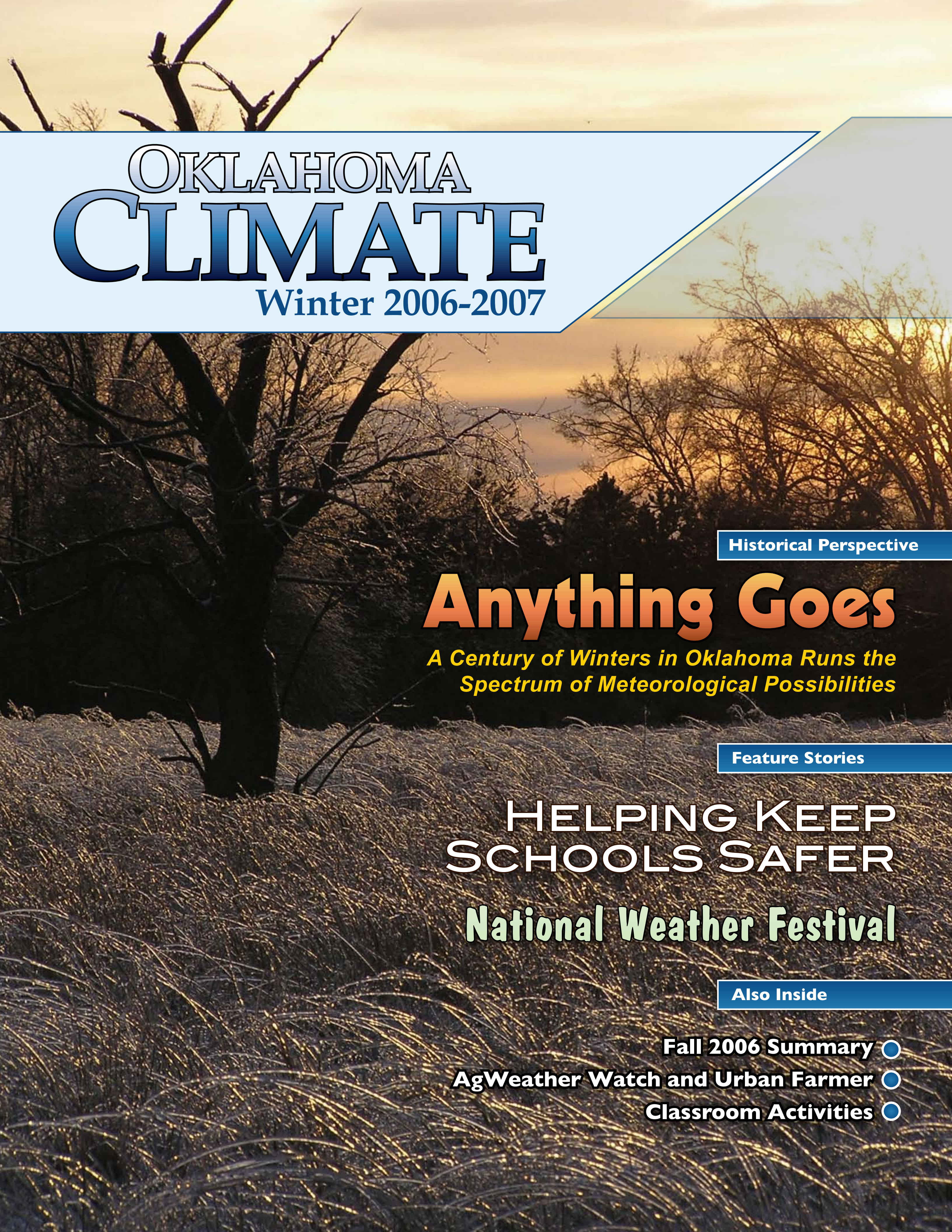

OKLAHOMA CLIMATE

Winter 2006-2007

Historical Perspective

Anything Goes

A Century of Winters in Oklahoma Runs the Spectrum of Meteorological Possibilities

Feature Stories

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Oklahoma Climate Winter 2006 - 2007

Cover Photo: "A Field of Ice" by Dianne M. Jones. If you have a photo that you would like to be considered for the cover of Oklahoma Climate, please contact Gary McManus at gmcmanus@ou.edu.

MESSAGE FROM THE EDITOR

Gary McManus

On November 16, 1907, the United States of America accepted a rather odd-shaped region of the southern Great Plains as its 46th state. This region, which appeared to be thrown together haphazardly, was actually an amalgam of Native American lands, frontier territory, and in the case of the Panhandle, simply land that nobody wanted. Named for the Choctaw words meaning "red people," Oklahoma was much more than that, of course. Already home to innumerable Native American tribes, freed slaves, as well as immigrants from around the world, the Sooner State became famous as a land of cowboys and farmers, statesmen and humorists. But above all else, Oklahoma became famous for its weather. From the disastrous Dust Bowl days to horrific F5 tornado tragedies, no other region on earth can boast of a more unique climate than our home of sanguine dirt and people. In celebration of Oklahoma's first 100 years of statehood, "Oklahoma Climate" will embark on a series of explorations into each season's centennial history.

Up first is a look back at 100 years of Oklahoma winters. Too often we get caught defining weather as that which has occurred in our lifetimes. Truth be told, Oklahoma's winters are ever evolving. Tornadoes, ice storms, heavy snow, and plain old boring sunny days...our winters run the gamut of weather phenomena. Is the current warming trend a fluke, or does it signal another change? Are the winters of our past a clue to what lies ahead? Our historical account of Oklahoma's winters will illuminate the past and attempt to foreshadow the future.

Our prime severe weather season is rapidly approaching. We present an article from the National Weather Service and their attempt to arm our local schools with the best possible tools to keep our kids safe. You can also read an account of the National Weather Festival, held at the new National Weather Center in Norman. This event is becoming more and more popular, so be sure to try and attend next year. This issue also debuts a brand new feature of "Oklahoma Climate". Each forthcoming issue will present a climate article from an OU student as a showcase for our future meteorologists. The first article is quite good, and quite apropos to our current battles with severe drought. Our photo section shows off our kids again as they frolic in the snow and ice of the past few months. Finally, our classroom article enlightens Oklahoma students (and adults) about the mysterious wet-bulb temperature. Although unknown by most people, this meteorological measurement is vital for forecasting severe winter weather.

In addition, be sure to read our regular features dealing with agricultural weather, weather safety, and a weather summary of the previous three months.

I sincerely hope you enjoy this issue of "Oklahoma Climate." If you have any questions or comments, please feel free to contact me at gmcmanus@ou.edu.

Anything Goes

Derek Arndt Assistant State Climatologist

Each of Oklahoma's four seasons comes in a splendid variety of flavors. Spring can be spectacular or serene; summer soggy or sweltering; autumn abundant or austere. These seasons can play out in a number of ways, but only winter can use pages from every season's script, regularly taking on characteristics of all four.

So mercurial is winter in the Sooner State that winter weather doesn't really dominate its own prescribed chunk of calendar. A typical winter in Oklahoma might best be described as a suspended autumn which slowly yields to spring, with intermittent tempests of bitter cold and soothing lulls of luxurious warmth. Moreover, during the 100 years of statehood, winter has even changed its average behavior - dramatically- over the years. It has also provided its own list of notable, majestic and tragic events.

The Big Picture

Winter in Oklahoma, defined as December-through-February on the climatologist's calendar, has delivered four fairly distinct eras since statehood. The first 20 years of statehood were marked by colder and drier winters, followed by quarter-centuries which were alternately, warm and wet, cold and dry, then warm and wet. For the most part, the changeover in precipitation patterns showed up a few years before changes in the temperature regime. An interesting consequence of this cycle: each generation of Oklahomans grew up in a different winter regime than the generation prior. Today's young adults grew up in the winters of the 1980s and 1990s, which were quite warm, and exceptionally wet. Their parents' tales of busting up icy ponds and watering holes are for the most part, a history heard but not experienced. The strength of the late-century warmth, and wetness, was striking: the three wettest winters on record (and seven of statehood's 15 wettest) occurred since 1984-85.

It's too early to say for sure, but if the timing of the pattern were to hold, the very recent dry winters (since the turn of the 21st Century) are right on schedule. And, if history is any indicator, the sharp cold of the 2006-07 winter might be a leading indicator of a shift back to colder seasons.

The Events

Climate facts about the evolution of winter are interesting, but winter's most evocative memories lie in its singular events, which changed many individual and collective histories of Oklahomans. Here are ten memorable winter phenomena from statehood.

The Snow

The 1910s, Oklahoma's first full decade as a state, might have produced the most tumultuous decade of winters on the ledger. First of all, it completely bucked Oklahoma's typical winter set up in that it was extremely wet, while bitterly cold. That combination produced some prolific snowfall. Beaver's seasonal snowfall total of 87" during the winter of 1911-12 still stands as the most observed in a three-month period in Oklahoma. A Christmas Day 1914 snowstorm dropped more than a foot of snow across much of southern and central Oklahoma. However, the relatively light winds and moderate temperatures (for a snowstorm) that accompanied made for one of the most memorable White Christmases in Oklahoma history, thirty years before the song was written. A late-December snowstorm in 1918 left much of the panhandle snowed in for weeks and railroad traffic was silent for several days.

While the teens might have dominated the decade-scale picture, the most spectacular individual events occurred much later in the state's first century. In February 1971, what had been a relatively uneventful winter gave way to three feet of snowfall in parts of northwestern Oklahoma. The assistance of the Oklahoma National Guard surely help prevent a great number of casualties among people and livestock, but nevertheless many cattle perished in drifts taller than men. The "Blizzard of '71" still stands as Oklahoma's snowfall event of record, but that record was challenged in late December 2006 when a powerful winter storm dumped several inches of snow across much of Oklahoma, but saved its best (or worst) for the western panhandle. While there were no official observing stations that matched the 1971 record at Buffalo, unofficial reports of three to four feet seemed justified by photos taken near Boise City.

The Violent

Winter is not immune from the violent storms and deadly floods that are more associated with Oklahoma' springtime months. This has much to do with winter's fleeting, on-off presence in the state. When cold air retreats northward, it is often replaced by a springlike composition of warm, moist air. Warm, moist air doesn't need the calendar to read "May" to fuel storms and heavy precipitation.

Once again, the 1910s delivered some of the most extreme examples of violent winter weather. On January 4, 1917 a tornadic thunderstorm ripped through much of Pittsburg County, destroying the Choctaw Boarding School in Vireton in the process. Sixteen of Oklahoma's schoolchildren were killed at the school, the fourth-highest total of tornado-related school-deaths in U.S. history. January 1916 saw widespread river flooding in northeast Oklahoma, as more than a foot of rain fell at Ft. Gibson. In February of 1975, six tornadoes scattered debris from Altus to Lindsay. Five of them were rated as F2 events, rivaling all but the most major springtime outbreaks. Three people were killed and dozens injured.

The Desiccated

Winter is easily Oklahoma's driest season. It is not unheard of for towns to go entire winter months without appreciable precipitation. So it is not surprising that drought-related extremes have made their mark on winter's history. In fact, one of Oklahoma's most famed climate events - the severe dust storms of 1935 that awakened the nation to the Plight of the Plains - began in earnest in February that year. H.P. Wahlgren, the USDA Weather Bureau's section chief for Oklahoma, understated the issue with the form that earned him his reputation as "The Melancholy Swede". In his monthly weather report, he wrote "Feed was scarce in some localities and prices were generally high."

Wildfire is nearly always an issue during Oklahoma's winters, but the burn seasons of 1995-96 and 2005-06, each of which saw about a million acres burned, were colossal. The statewide average precipitation for February 1996 was less than a quarter-inch, and temperatures soared easily into the 80s on multiple occasions. 2006 was a virtual repeat, with the added hazard of established long-term drought in the region. The wind and droughts that drove the fires were most of the story, but with an important flip side: the droughts that defined these seasons each came on the heels of nearly a decade of successive wet years, which enhanced the vegetative undergrowth that fueled the fires.

The Catastrophic

Oklahoma is famous for its tornadoes and violent weather, but the most damaging weather event that can strike the state is the ice storm. Freezing rain can take out thousands of square miles of infrastructure in just a few hours. Civil society's most basic services, power and transportation, can be halted by one storm system. December 1937 delivered major damage to northeastern Oklahoma, and exactly fifty years later, on Christmas Day of 1987, an ice storm shut down all of the airports in Oklahoma City and Tulsa. Each event caused damage into the millions, not to mention the price of economic disruption.

But Oklahoma's most impressive ice storm events came in the back-to-back-to-back winters of 2000-01 through 2002-03. Individually, the ice storms of December 2000 and January 2002 would have easily placed in Oklahoma's top five storm-related catastrophes. But the fact that they happened in back-to-back winters is almost unbelievable. The 2000 storm dumped up to four inches of ice, primarily on the southeast side of Interstate 44. Sixteen people lost their lives, primarily on treacherous roadways. Thirteen months later, similar amounts of ice pounded the rest of the state, roughly northwest of Interstate 44. Incredibly, each of Oklahoma's 77 counties was declared a major disaster area in the span of two consecutive winters. Although the magnitude of the following winter's storm (early December 2002) pales in comparison to the two previous whoppers, it was enough to disrupt power to thousands in western Oklahoma.

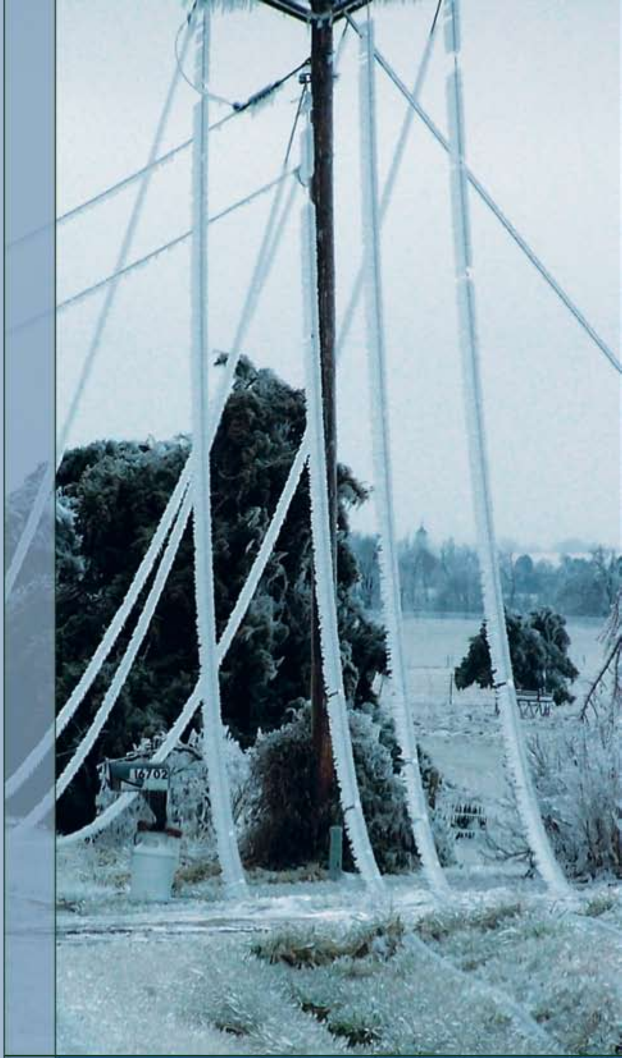
The Downright Cold

No discussion of Oklahoma winter would be complete without a discussion of the bitter cold temperatures that can find their way from the Arctic into the Sooner State. It can get pretty cold around here, but it hasn't been colder than it was on January 18, 1930 in Watts. Just before sunrise, the temperature dropped to a bone-chilling -27 degrees that tied a record set in Vinita during pre-statehood days, and hasn't been matched since.

In the monthly category, December 1983 stands out with perhaps the most outstanding cold snap in our history. It wasn't the coldest month on record; the afore-mentioned January 1930 takes that honor. But, when compared to other Decembers on record, the cold was amazing. The average temperature that month was 25.8 degrees, nearly five degrees colder than the runner up! For comparison, the average temperature for all Decembers is 39.1 degrees. Some locations in Oklahoma spent the month's last two weeks without ever coming back up above the freezing mark. Finally, back-to-back extreme seasons aren't limited to ice storms. The consecutive winters of 1977-78 and 1978-79 were the two coldest winters of statehood.

The Bottom Line

Winter in Oklahoma carries the flag for Oklahoma's "Anything Can Happen" weather reputation. It delivers a little bit of everything, and unashamedly steals from the other seasons to do it!



The Details

	Year	Statistics
Warmest Winter	1991-92	44.0°F
Coldest Winter	1978-79	31.4°F
Wettest Winter	1984-85	10.37 in.
Driest Winter	1908-09	1.24 in.

	Year	Statistics
Warmest January	2006	46.4°F
Coldest January	1930	23.5°F
Wettest January	1949	5.23 in.
Driest January	1986	0.04 in.

	Year	Statistics
Warmest December	1965	45.4°F
Coldest December	1983	25.8°F
Wettest December	1984	4.98 in.
Driest December	1950	0.10 in.

	Year	Statistics
Warmest February	1954	50.7°F
Coldest February	1978	26.6°F
Wettest February	1938	4.66 in.
Driest February	1996	0.18 in.

(more extreme values were observed during pre-statehood winters)

Helping Keep Schools Safer

by: Rick Smith, Warning Coordination Meteorologist
National Weather Service | Norman, OK

Public schools across Oklahoma are receiving a tool that will help keep students and staff safer and more informed about emergencies. NOAA Weather Radios (also known as Public Alert Radios) are being distributed to over 97,000 public schools in the United States. Radio distribution began in September of 2006, with a goal of having at least one weather radio in each public school. The school distribution program is sponsored by the Department of Homeland Security/ Citizen Corps, the Department of Commerce/National Oceanic and Atmospheric Administration (NOAA) and the Department of Education/Office of Safe and Drug-Free Schools.

Since many schools in Oklahoma already have weather radios, it is hoped the new radios can be used to replace older radios, or to allow the older radios to be used in gymnasiums, auditoriums, or other school buildings.

NOAA Weather Radio is a powerful safety tool, with dozens of alerts and a broadcast capability that ensures direct access to information on a wide range of emergencies. Whether it's a telephone outage disrupting 911 services, an approaching tornado, local roads overrun by flash floods, a derailed train posing a hazardous material threat, or an immediate need to be on the lookout for an abducted child, the radio sounds an immediate alarm.

The new radios are programmable, so that only alerts for selected counties trigger an alarm. This cuts down on the number of warning messages for counties far away, and leads to more confidence that if the radio's alarm sounds, there's important information pertaining to the local area.

In Oklahoma, it's not a question of "if" we'll need access to emergency information, it's a question of "when", particularly when it comes to severe weather. Oklahoma schools can use NOAA Weather Radio in combination with other information sources to keep informed about developing emergencies. Hearing and understanding critical warnings and other official information is a key component of any safety plan. Schools can monitor NOAA Weather Radio for specific information about their counties and communities, and take appropriate safety measures based on their established plans and procedures.

NOAA Weather Radio broadcasts originate from local National Weather Service Forecast Offices across the United States, and feature 24 hour a day broadcasts of weather information, ranging from basic forecast information, to historical data, to weather facts and trivia. When the weather turns dangerous, the routine broadcasts are replaced with specific information related to the threatening weather at hand, including the very latest county-specific watches, warnings and advisories.

Every school, home and business in Oklahoma should have a weather radio.

For more information about NOAA Weather Radios in public schools, visit the website at:

http://public-alert-radio.nws.noaa.gov.

SNOW SCHOOL!

PHOTOS FROM THE FIELD

NATIONAL WEATHER FESTIVAL

Fun for the Whole Family

By Andrea Melvin, EarthStorm Program Manager

Even on a cold, windy day the National Weather Festival drew a crowd of about 3,000 on November 4, 2006. The attendance nearly quadrupled any previous open house by the individual agencies. Hourly balloon launches were emceed by meteorologists from the local ABC, CBS, NBC, and Fox affiliates with help from children in the audience. The SMART-R radar and other research vehicles were on display for visitors to view the instruments used when tracking severe storms. Exhibitor booths were located in the National Weather Center Atria with informational handouts, festival t-shirts, and interactive displays. Visitors toured the National Weather Service and Storm Prediction Center offices. The windowed hallway allowed visitors to see the forecasters at work without disturbing them. The David L. Boren Auditorium was packed most of the day with visitors watching severe weather videos.

Outside, Oklahoma Mesonet staff were available at the National Weather Center's Mesonet tower to answer questions and explain how the network benefits Oklahomans. Next to the Oklahoma Mesonet tower was a section of the parking lot dedicated to the Storm Chaser Car Show. Weather enthusiast and storm spotters proudly displayed their weather instruments and ham radio equipment. Twenty-five cars and trucks were on display and eligible for special awards like: "Most Working Sensors", "Most Cutting Edge", "Meatwagon", and Most Hail Damage". If you looked real close, you probably spotted the many NWC agency staff wearing "Ask Me! I'm a Meteorologist!" buttons. These volunteers were available to answer those, "I've always wondered about..." questions.

The youngest visitors enjoyed the day eating funnel cakes and Indian tacos from the food vendors in addition to the many activities provided in the children's tent. They learned to map wind direction with Oklahoma Mesonet data and to classify clouds with the NWS Cloud Spotter Wheels, played Weather Jingo, made groundhog puppets, and took home severe weather safety posters for their walls. The activity booklet provided to visitors was sponsored by Republic Bank & Trust of Norman. Several school buses full of students spent their Saturday enjoying the event.

We hope the National Weather Festival will become just as popular to the state as the annual Medieval Fair or Jazz In June. Once the event is established locally, we hope to draw attendance from surrounding states.

FALL 2006 SUMMARY

By: Gary McManus

Fall brought much needed relief for drought-stricken areas in southern Oklahoma, while the northern half of the state saw drought intensification. Areas generally south and east of I-44 were near- or above-normal for the season; up to eight inches above normal in extreme east central Oklahoma. Unfortunately, the northeast was more than eight inches below normal. Temperatures cooled down at the beginning of September from the scorching triple-digits of the summer as if on cue, which helped fall's statewide average temperature to finish as the 37th coolest on record. Despite the ample precipitation in the south, the state still experienced the 43rd driest fall on record. Severe weather was sporadic at best. Three weak tornadoes touched down in southeastern Oklahoma on September 21. A powerful winter storm hit the state at the end of November, prompting blizzard warnings for the north. Up to 15 inches of snow and winds of 40 mph combined to produce drifts up to four feet high in that area.

Precipitation

North central Oklahoma suffered through its 4th driest fall since 1895, nearly seven inches below normal; a dismal statistic for an area already hard hit by drought. In contrast, the southeast corner of the state enjoyed its 25th wettest autumn season, nearly an inch above normal. The only other region of the state with surplus fall precipitation was the southwest at less than a half of an inch above normal, ranked as the 38th wettest autumn for that area. While north central Oklahoma's historical precipitation total was ranked the lowest, the northeast had the highest deficit at well over six inches, ranked as the 13th driest since 1895.

Temperature

While the state was cooler than normal as a whole during the fall by a half of a degree, a few parts were actually above normal. Western Oklahoma and small portions of eastern Oklahoma were from two to three degrees above normal. West central Oklahoma finished a tenth of a degree above normal, while the Panhandle was more than a degree below normal, the 27th coolest fall since 1895 for that area.

September Daily Weather

September 1-4: A rainy beginning to September, a narrow band of showers and storms settled in the northwest ahead of an approaching cold front on the 1st. The 2nd was cloudy and cool as a widespread rain fell across the state, with high temperatures a good 10-20 degrees below normal. The cool weather continued for the next couple of days. Low temperatures dropped into the 40s in the Panhandle, but still managed to remain in the 70s in southeastern Oklahoma. High temperatures were also modified somewhat, but remained more than 10 degrees below normal.

September 5-8: The next several days were almost autumnal under the influence of the surface high pressure system that built in following the cold front. High temperatures were in the 70s and 80s, and lows dropped predominantly into the 50s and 60s.

September 9-11: More rain on the 9th as another cold front approached the state. Amounts were light, but Beaver had a heaver storm dump well over an inch of rain on that location. Stronger storms, some severe, were in store for the state on the 10th and 11th. Hail to the size of golf balls fell in Roger Mills County, while winds gusted to 60 mph in several locations. High temperatures managed to return to seasonal averages by the 11th, rising into the 80s and 90s.

September 12-16: Strong northerly winds ushered in much cooler air on the 12th. High temperatures struggled into the 70s under cloudy skies and surface high pressure. A pleasantly cool night followed on the 13th with calm winds and lows in the 40s and 50s. The state began a slow warm up the next couple of days. Strong southerly winds in lieu of an approaching cold front pumped moisture up from the Gulf of Mexico which kept low temperatures in the 60s and 70s, while highs once again soared into the 90s. The winds at times gusted to over 40 mph in western Oklahoma, and over 30 mph in the remainder of the state.

September 17-18: Storms fired along a cold front moving through the state early on the 17th and spread southeastward. Oklahoma City broke its record for rainfall on the 17th, and Apache had over four inches. Three-inch amounts were recorded in southwestern and northeastern locations. High temperatures that day occurred soon after midnight, and remained in the 60s and 70s for the remainder of the day. Skies cleared from west to east on the 18th. Temperatures rebounded into the 70s and 80s later that day.

September 19-20: The 19th began clear and crisp with lows in the 40s and 50s. A beautiful afternoon followed under surface high pressure. High temperatures rose into the 70s and low 80s. Winds kicked up from the south later that night which allowed low temperatures to remain in the upper 50s and low 60s. Clouds increased due to an approaching upper-level storm, which also kicked up winds from the south at over 40 mph. Temperatures rose into the 80s.

September 21-23: The strong upper-level storm continued its march towards the state on the 18th. Non-thunderstorm related winds with gusts to over 60 mph struck in the west, and strong to severe thunderstorms fired later that day in the east. Two tornadoes touched down in Pushmataha County, but caused only minor damage. Both twisters were rated F0 in intensity. More severe storms ignited on the 22nd and 23rd in eastern Oklahoma, touched off by a slow-moving frontal system. Reports of severe winds and large hail were common with the storms. Throughout this three-day period, the southeastern one-third of the state reported a good general rainfall of 1-3 inches.

September 24-30: The 24th turned out clear and cool following the cold front's passage. Lows dropped to the 40s and 50s, and rebounded into the low- to mid-70s, which marked the coolest high temperatures across the state since May. The low temperatures the following morning dropped into the 30s and low 40s statewide, marking it as the coolest morning since May as well. A slow warm up after that, the high temperatures crept into the 80s and then 90s by month's end. Plenty of sunshine and light winds greeted Oklahoma on the 30th.

October Daily Highlights

October 1-7: The month's first eight days were hot and devoid of rainfall. Buffalo reached 100 degrees on the 2nd to set the mark as the month's highest temperature. A cold front passed through the state on the 4th, but lack of moisture prohibited any precipitation. The front did usher in a cooler air mass, but merely dropped maximum temperatures down to seasonable levels in the 70s and 80s.

October 8-10: An approaching upper-level storm system on the 8th finally brought precipitation to the state through the next three days. The precipitation fell mainly in the Panhandle on the 8th, with the Oklahoma Mesonet site at Goodwell recording over an inch. The rainfall spread eastward over the next two days with similar amounts in scattered locations. High temperatures on the 9th were dependent upon position relative to the front, ranging from the mid-50s in the northwest to the mid-80s in the southeast. Temperatures following the rain's exit from the state on the 10th varied between the 50s and 70s – a bit below seasonal norms.

October 11-14: After a pleasant, albeit cool, day on the 11th, a strong cold front jerked the state back to below normal on the 12th. Little precipitation fell with the front's passage, but winds gusting to over 30 mph from the north managed to make it feel much cooler than the 50-60 degree highs that were recorded for the day. The cold weather extended into the next day as low temperatures dropped into the 30s and 40s. A nice warm up allowed temperatures to rebound into the 70s later that afternoon. Clouds in the 14th did little to prevent the state from another warm up. High temperatures reached into the 70s once again, approaching 80 degrees in the south.

October 15-19: A large upper-level storm system brought a surge of moisture from the Gulf of Mexico over the state, triggering a soaking rainfall over the southeastern half on the 15th and 16th. A band of very heavy rainfall totals extended from southwestern Oklahoma through the east central region. Generally, much of south central and southeastern Oklahoma had between 3-5 inches of rainfall. High temperatures moderated with all the cloud cover and precipitation to remain mostly in the 60s, although a few 70s were reported. The 17th was rather sedate and dry. Low temperatures in the 40s and 50s, along with foggy conditions, made for a gray morning on the 17th. Highs bounced back into the 80s for the most part.

Another strong cold front cooled the state down and brought a bit more rainfall for the southeast on the 18th. Northerly winds gusted to over 35 mph near the front, and high temperatures were 20 degrees cooler than the previous day. Cold temperatures settled in for the 19th. Lows dropped to the 30s and 40s, but northerly winds made if feel 10 degrees colder. Just a bit of light rain in the morning gave way to sunny skies and highs 10-15 degrees below normal in the 50s and 60s.

October 20-24: Surface high pressure built in after the previous cold front on the 20th, bringing a cool, clear day. Yet another cold front made its way into the state on the 21st. Gusty north winds and highs in the mid-40s behind the front made for a very blustery day in the northwest. High temperatures ahead of the front still managed to reach into the 70s, but winds near the front reached 45 mph. Clear skies and light northerly winds helped drop temperatures below freezing over most of the state on the 22nd. Lows ranged from 18 degrees at Freedom to 38 degrees at Durant. Highs reached the 50s and 60s. The next two days saw a slow warm up as another upper-level storm approached from the west. High temperatures were in the 70s, with lows generally in the 30s.

October 25-31: Cloudy skies and rain enveloped the state overnight. The heaviest precipitation was reserved for the southeast where amounts over an inch were common. Some sun broke through the clouds, which allowed for temperatures in the 70s and 80s later that afternoon. Those places that remained cloudy only rose into the 60s. An upper-level storm was still approaching the state on the 26th, although there was little moisture this time around. Rainfall amounts were limited to less than an inch, with most areas receiving less than one-half of an inch. A dryline failed to produce severe weather, but did kick winds up from the south at over 30 mph. A cold front cooled the weather down again on the 27th and kicked up winds to over severe levels. Gusts up to 58 mph occurred in the far western sections of the state. The 27th through the 30th saw a quick warm up as the surface high pressure system moved off to the east. Highs reached into the 70s and 80s before a final strong cold front Halloween morning snapped temperatures back into the 40s and 50s for highs. The strong northerly winds brought wind chills into the 30s, but lighter winds rescued trick or treaters from the artic chill later that evening.

November Daily Highlights

November 1-3: Low temperatures plunged to the 20s and 30s over most of the state on the 1st, with a few teens in the far northwest. Sunny skies allowed the afternoon high temperatures to bounce back to the 50s and 60s. The following morning was even more frigid, with teens and 20s widespread. High temperatures that day remained 10-15 degrees below normal in the 50s. The dome of high pressure which had ushered in the cold air began to shift to the east on the 3rd. That, coupled with an approaching upper-level low pressure system, swung the winds around from the south at 20-30 mph, allowing high temperatures to bounce back into the 60s, along with a few 70s.

November 4-6: The air was decidedly more moist on the 4th, making for a cloudy and mild morning. Low temperatures managed to hover in the 40s over a good deal of the state, with a few 50s in the far southeast. Rain showers moved across far northeastern Oklahoma in the early morning hours, but precipitation amounts were very light. High temperatures rose into the 60s for the most part. Showers and storms were widespread on the 5th as the upper-level storm neared the state. Strong to severe thunderstorms struck west central Oklahoma early on the 5th. Some small hail was reported, and rainfall amounts of more than an inch accompanied the storms. Low temperatures managed to remain in the 40s and 50s with the cloud cover and rainfall. The southeastern one-third received the bulk of the storms and rainfall in the afternoon. Some areas along the Arkansas border saw nearly four inches of rain from the storms. In general, 1-3 inches fell across the southeastern one-third of the state. The thick cloud cover and rainfall kept most areas in the 60s and low 70s for high temperatures. The wet ground and calm winds made for a foggy morning on the 6th. Low temperatures were in the 40s and 50s. The clouds broke up in the afternoon to allow for plenty of sunshine and temperatures well above normal in the 60s and 70s.

November 7-10: Another foggy morning in central sections. Lows in the 30s and 40s gave way to highs in the 70s and 80s with southerly winds gusting over 15 mph. The 8th was the warmest day of the month across the state. Many places set records for high temperatures, with several locations setting all-time November high temperature records. The 8th started out warm with low temperatures in the 40s and 50s, and highs reaching into the 80s and 90s. The Oklahoma Mesonet sites and Alva and Freedom registered the state's highest temperatures of the month with 92 degrees. That tied the all-time November temperature record at Alva, previously set in 1950, and surpassed the 90 degrees recorded at Freedom in 2005 to set a similar mark. A cold front entered the state on the 9th and cooled the northwest down a bit. Temperatures rose into the 80s ahead of the front, but fell to the 70s behind the boundary. The front moved through on the 10th and brought the weather back to more seasonable levels. High temperatures in the 50s and 60s were accompanied by northerly winds at 35-40 mph.

November 11-15: A cool morning following the frontal passage on the 11th gave way to highs in the 50s. Light showers and highs in the 50s and 60s prevailed for the next couple of days. An approaching cold front and low pressure system meant increasing clouds on the 14th, and signaled a return of rain chances for the next two days. The more robust totals were once again in east central Oklahoma, where 1-2 inches fell. Other areas of the state generally saw less than a quarter of an inch, if at all. Winds gusted from the north at nearly 50 mph as the front moved through.

November 16-20: The northerly winds decreased as the low pressure system moved away from the region, being replaced by surface high pressure. Lows fell into the teens in northern Oklahoma on the 16th, but were in the upper 20s to low 30s elsewhere. Most of this period was the same, with lows in the 20s and 30s and highs in the 50s and 60s.

November 21-26: An extremely warm period brought about "Indian Summer" conditions over the next six days for most of the state. Highs reached to near 80 degrees on the 22nd and the following day, Thanksgiving, across much of the state. A weak cold front moved slowly into northwestern Oklahoma on the 24th but didn't create much of a temperature difference. The cool front became stationary across the northwest, with temperatures in the 60s behind the front and 70s ahead of the front. Oklahoma City set a record high on the 24th at 76 degrees. Temperatures continued warm through the 26th ahead of an approaching cold front and upper level storm system.

November 27-30: The next four days saw easily the coldest air of the season for the state, and one of the worst winter storms in years. A cold front moved slowly southeastward into the northwest on the 27th and promptly stalled, triggering a few showers in north central Oklahoma. Temperatures behind the front also remained in the 40s, while southerly winds ahead of the boundary warmed the state into the 70s. The cold air retreated into Kansas overnight on the 28th in the form of a warm front. The mild and humid air helped fuel showers and thunderstorms, some of which approached severe limits with hail and high winds. Low temperatures were well above normal in the 50s and 60s, which helped highs that day rise into the 70s. The bottom fell out on the 29th however, as an unusually strong cold front barreled through the state from the north just as a powerful upper-level storm system approached from the west. The two converged over Oklahoma and brought heavy rains, sleet, freezing rain, and snow to virtually the entire state through the 30th. The southeastern one-third of the state received mostly liquid precipitation, with a bit of sleet and freezing rain thrown in. Over six inches of rain fell in east central parts of the state. The northwestern half of the state had mostly snow, with up to 15 inches falling in the Bartlesville area. Winds gusting to over 40 mph prompted the NWS to issue blizzard warnings for portions of north central and northeastern Oklahoma, where the snow drifted to over three feet high. Much of the precipitation that fell in the northwestern half of the state will not be reflected in the November precipitation statistics since it is frozen and will not be tallied until it melts.

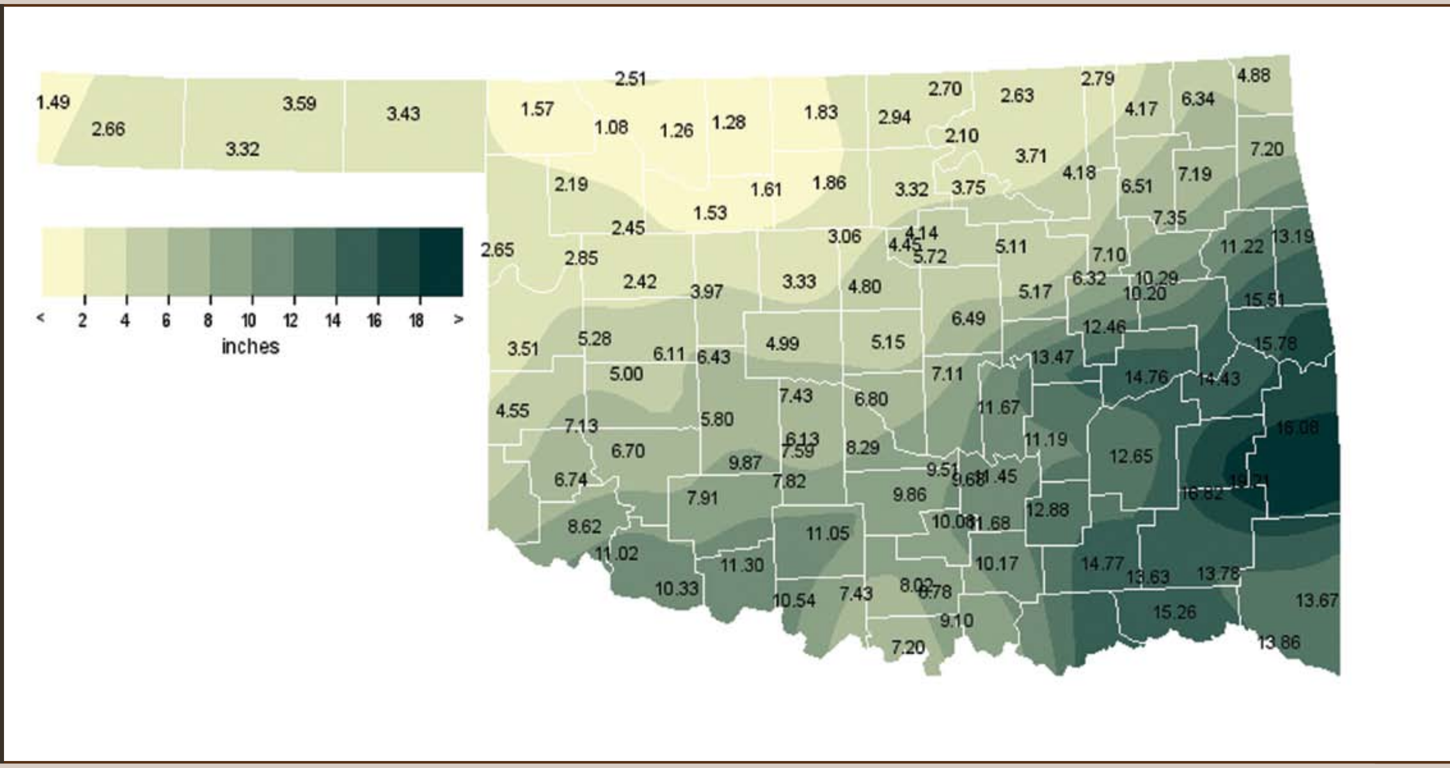
Fall 2006 Statewide Extremes

High Temperature	100ºF	Buffalo	October 2nd
Low Temperature	4ºF	Beaver	Nov. 30th
High Precipitation	19.21 in.	Talihina	
Low Precipitation	1.08 in.	Freedom	

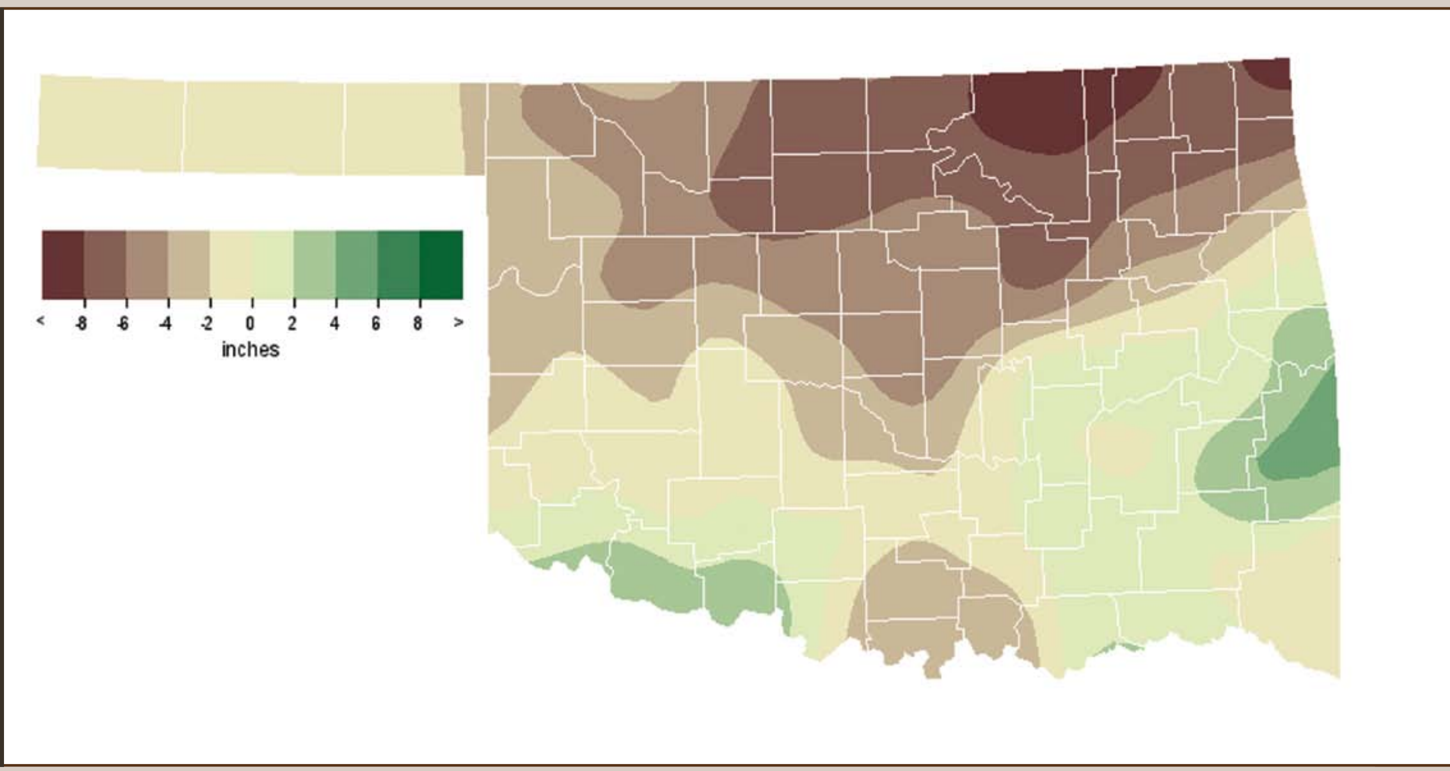
Fall 2006 Statewide Statistics

Temperature	60.2ºF	-0.5ºF	37th Coolest
Precipitation	7.30 in.	-2.71 in.	43rd Driest

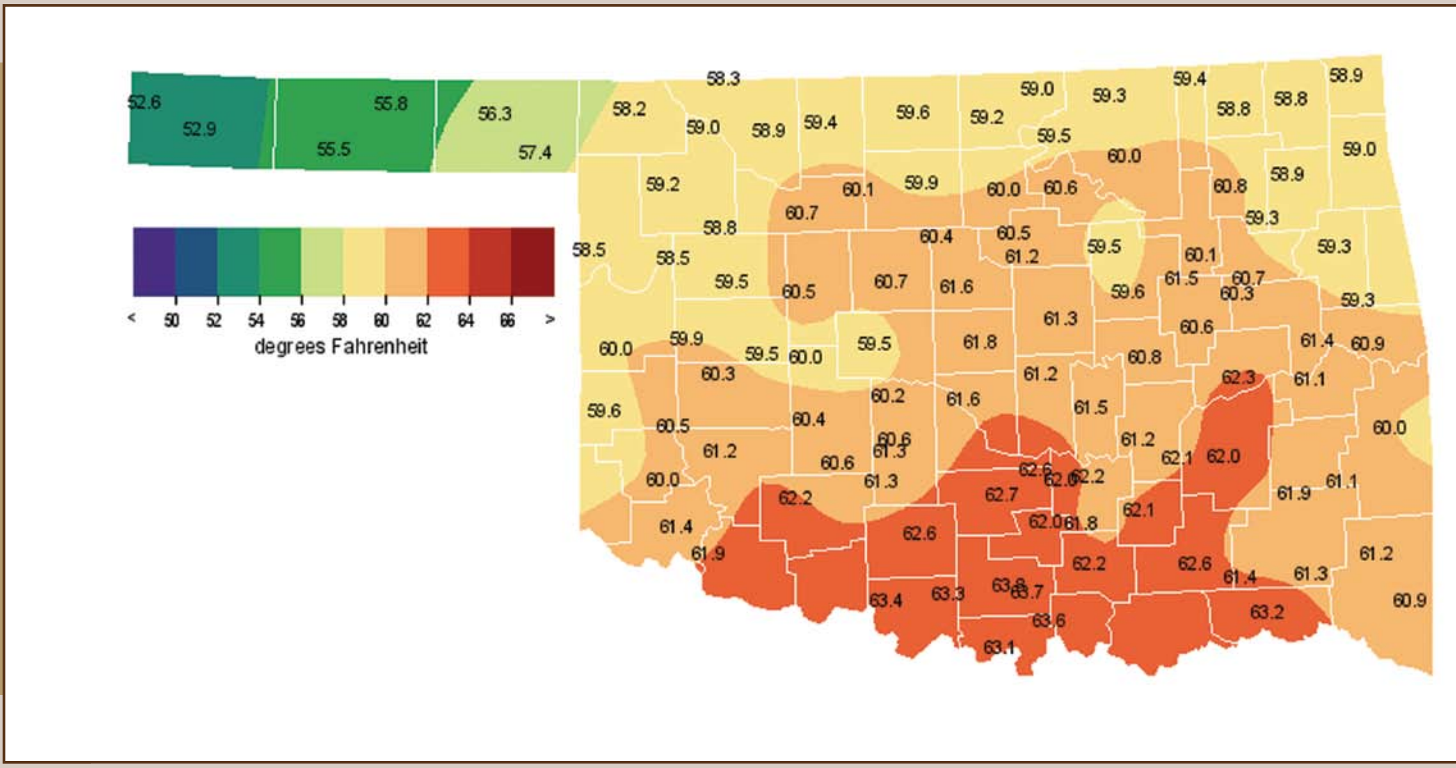
Observed Rainfall



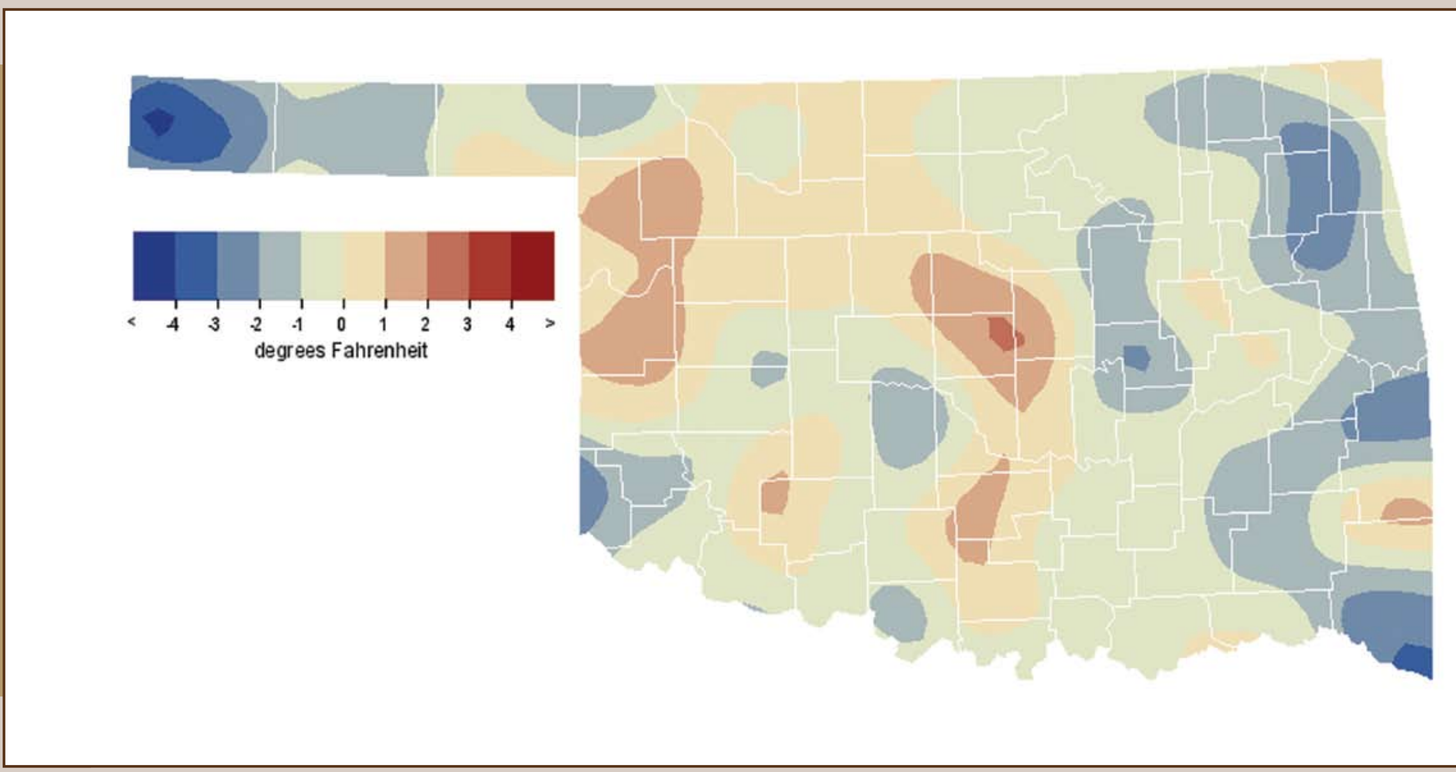
Rainfall Departure from Normal



Average Temperature



Temperature Departure from Normal



Fall 2006 Mesonet Precipitation Comparison

Climate Division	Precipitation (inches)	Departure from Normal (inches)	Rank since 1895	Wettest on Record (Year)	Driest on Record (Year)	2005
Panhandle	2.67	-1.76	26th Driest	10.34 (1941)	0.70 (1956)	2.62
North Central	2.04	-5.83	4th Driest	17.19 (1986)	0.97 (1910)	4.36
Northeast	5.35	-6.68	13th Driest	27.94 (1941)	2.60 (1948)	5.01
West Central	4.54	-2.78	35th Driest	20.71 (1986)	1.01 (1954)	4.25
Central	6.44	-4.14	34th Driest	20.42 (1923)	2.11 (1910)	4.30
East Central	12.52	-1.01	44th Wettest	22.86 (1923)	2.40 (1948)	3.11
Southwest	8.47	0.37	38th Wettest	18.40 (1986)	0.95 (1910)	5.25
South Central	10.14	-1.55	49th Wettest	24.03 (1923)	2.18 (1948)	4.59
Southeast	15.54	0.94	25th Wettest	25.15 (1984)	3.11 (1963)	4.30
Statewide	7.30	-2.71	43rd Driest	18.15 (1923)	2.44 (1910)	4.20

Fall 2006 Mesonet Temperature Comparison

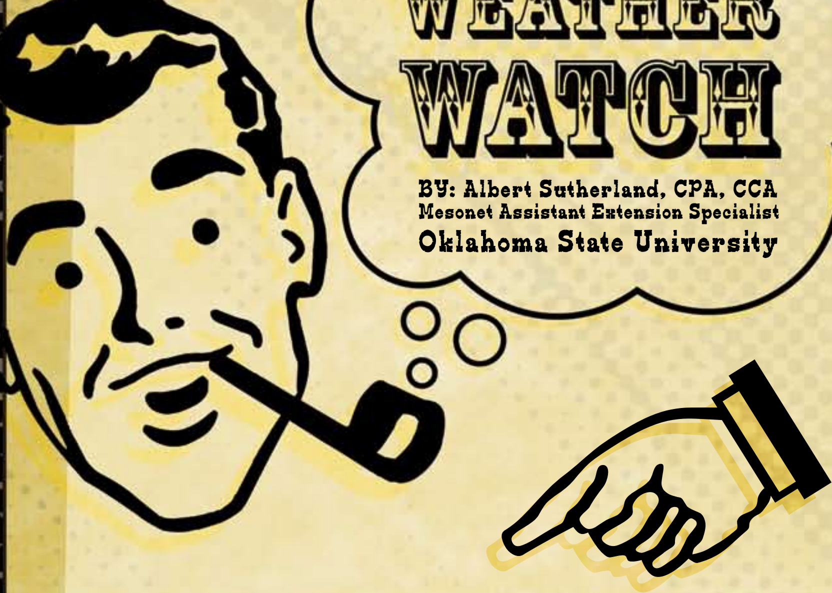
Climate Division	Average Temp (F)	Departure from Normal (F)	Rank since 1895	Hottest on Record (Year)	Coldest on Record (Year)	2005
Panhandle	55.9	-1.2	27th Coolest	62.7 (1963)	53.6 (1976)	60.7
North Central	59.4	-0.2	42nd Coolest	65.8 (1931)	56.0 (1976)	63.1
Northeast	59.6	-0.6	40th Coolest	66.6 (1931)	55.3 (1976)	63.6
West Central	59.8	0.1	54th Coolest	65.7 (1931)	55.9 (1976)	63.5
Central	60.8	-0.4	47th Coolest	67.3 (1931)	56.9 (1976)	65.1
East Central	61.0	-0.6	36th Coolest	67.6 (1931)	56.7 (1976)	65.7
Southwest	61.0	-0.8	28th Coolest	66.9 (1931)	57.1 (1976)	65.6
South Central	62.7	-0.1	46th Coolest	68.3 (1931)	57.8 (1976)	67.6
Southeast	61.4	-0.7	26th Coolest	68.3 (1931)	56.8 (1976)	66.3
Statewide	60.2	-0.5	37th Coolest	66.3 (1931)	56.2 (1976)	64.6

Fall 2006 Mesonet Extremes

Climate Division	High Temp	Day	Station	Low Temp	Day	Station	High Monthly Rainfall	Station	High Daily Rainfall	Day	Station
Panhandle	100	Oct 2nd	Buffalo	4	Nov 30th	Beaver	3.59	Hooker	1.59	Sep 2nd	Arnett
North Central	97	Oct 2nd	Cherokee	11	Nov 30th	Cherokee	3.32	Red Rock	0.75	Sep 10th	Seiling
Northeast	96	Sep 16th	Burbank	16	Nov 30th	Foraker	10.29	Porter	3.17	Sep 17th	Vinita
West Central	95	Sep 30th	Erick	7	Nov 30th	Erick	7.13	Retrop	2.16	Oct 15th	Retrop
Central	96	Sep 16th	Perkins	17	Nov 30th	Oilton	13.47	Okemah	3.98	Oct 15th	Bowlegs
East Central	96	Sep 16th	Webbers Falls	16	Nov 30th	Westville	15.78	Sallisaw	3.53	Oct 15th	Calvin
Southwest	96	Sep 16th	Tipton	10	Nov 30th	Hollis	11.30	Walters	5.41	Oct 15th	Walters
South Central	98	Sep 22nd	Newport	18	Nov 30th	Fittstown	14.77	Lane	5.37	Oct 15th	Byars
Southeast	97	Sep 16th	Antlers	20	Nov 30th	Wilburton	19.21	Talihina	3.85	Nov 29th	Talihina
Statewide	100	Oct 2nd	Buffalo	4	Nov 30th	Beaver	19.21	Talihina	5.41	Oct 15th	Walters

AGRICULTURE WEATHER WATCH

BY: Albert Sutherland, CPA, CCA
Mesonet Assistant Extension Specialist
Oklahoma State University



Much of Oklahoma has been blessed from rain events that started in October 2006 and continued into January 2007. The change is a welcome relief from the severe drought of 2005 and 2006.

The Oklahoma Mesonet 10-inch Fractional Water Index map shows excellent soil moisture for almost every Mesonet site. Even at 24 inches, many Oklahoma Mesonet locations show good soil moisture. The exceptions are Mesonet sites in Cimarron, Woods, Alfalfa, Grant, Kay, Major, Garfield, Noble, Blaine, Kingfisher, and Canadian Counties. These areas in north central Oklahoma and far western Panhandle did not receive significant rainfall until December 2006. The tan and brown areas in the 24-inch depth Fractional Water Index map from January 10, 2007 in Figure 1 easily identifies these areas of deeper dry soil. These areas received enough rain to wet the soils down to 10 inches, but not enough to reach the 24-inch depth. This trend also shows up in the Percentage of Normal Rainfall map for October 11, 2006 to January 8, 2007 in Figure 2.

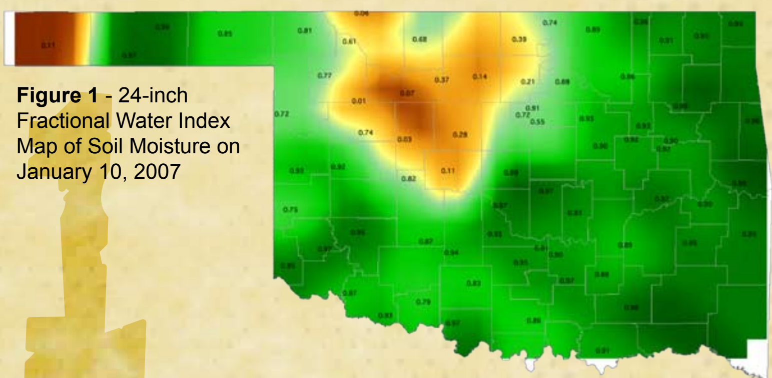


Figure 1 - 24-inch Fractional Water Index Map of Soil Moisture on January 10, 2007

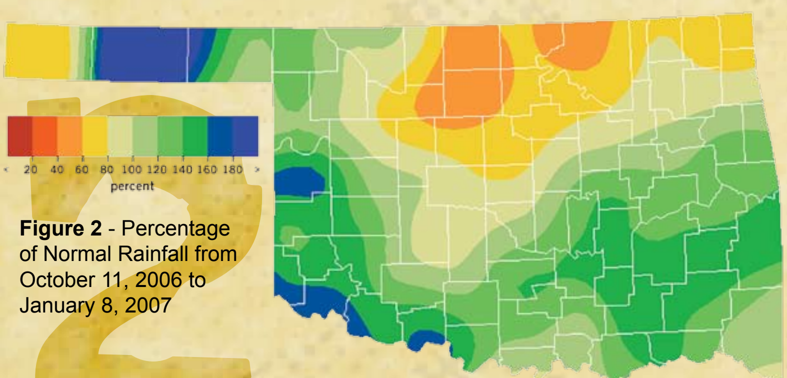


Figure 2 - Percentage of Normal Rainfall from October 11, 2006 to January 8, 2007

So does this mean the drought is over for most of Oklahoma?

Drought is a long-term event and drought relief also occurs over a long time period. While the upper soil moisture situation for many Oklahoma agricultural producers is better than it was in January 2006, deeper soil moisture has not been replenished. So the 2007 crop situation looks better than 2006, but ponds may still be dry or only just beginning to fill.

Pasture grasses may not recover for a number of years to come even with a return to adequate rainfall. The speed of grass recovery will be dependent on grazing pressure, available nitrogen, and rainfall timing and quantity. Stocking too many animals on already stressed pasture can dramatically delay grass recovery.

Wheat emergence has been sporadic due to scattered rainfall. Some of the best wheat in the state is in Canadian County, stemming from 1.87 inches of rain that fell on October 15, 2006. This is a testament of how critical a good autumn rain is in producing adequate fall and winter forage. The late start of many wheat fields greatly reduced wheat pasture for a second winter.

To access the products mentioned in AgWatch go to Oklahoma AgWeather at **http://agweather.mesonet.org**. Data on the Oklahoma Agweather Web site is from the Oklahoma Mesonet, managed in partnership by the University of Oklahoma and Oklahoma State University and operated by the Oklahoma Climatological Survey.

BY: ALBERT SUTHERLAND, CPA, CCA
MESONET ASSISTANT EXTENSION SPECIALIST
OKLAHOMA STATE UNIVERSITY

FEBRUARY

- Test lawn and garden soils. Contact your local County OSU Extension office for soil testing bags, pricing, and sampling information.
- Prune fruit trees.
- Spray peach trees with lime-sulfur soon after pruning and before bud swell to control peach leaf curl.
- Fertilize pecan and fruit trees based on a soil test. Without a soil test, the general recommendation is to apply one tenth of a pound of actual nitrogen per year of tree age per tree, up to a maximum of 3 pounds of actual nitrogen per tree for pecan, 1 pound of actual nitrogen per tree for apple and plum, and 0.5 pound of actual nitrogen per tree for peach, pear, and cherry.
- Fertilize ornamental trees and shrubs. Use a quick release fertilizer at a rate of 1 pound of actual nitrogen per 1,000 square feet of root area. Tree and shrub roots extend out 2-3 times the distance from the trunk to the branch ends (tree dripline).
- Trim dead blades from ornamental grasses. Trim as close to the ground as possible for the grass being grown.
- Fertilize fescue after mid-February. Use a quick release fertilizer at a rate of 0.5 to 1 pound of actual nitrogen per 1,000 square feet.
- Plant seeds for tomatoes and peppers for transplanting in early April and for flowers, such as wax begonia, seed geranium, impatiens, lobelia, salvia, verbena, and vinca, to be transplanted in late April.
- Shear evergreen shrubs and prune summer-flowering shrubs. Do NOT prune spring-flowering shrubs in February. Prune spring-flowering, just after they bloom.

MARCH

- This is an excellent month to plant trees and deciduous shrubs. This can help you tame the “planting bug.” You’ll have something to plant that can handle late March freezes.
- Fill in shady lawn areas by seeding with a blend of tall fescue and Kentucky bluegrass.
- Divide and replant summer-flowering perennials.
- Trim liriope, commonly referred to as monkey grass by hand clipping or with a high set mower in early March.
- Control weeds in flower beds.
- Spread compost or aged manure.
- Plant frost tolerant vegetables, such as beet, broccoli, cabbage, carrot, Swiss chard, kohlrabi, lettuce, onion, green peas, potato, radish, spinach, and turnip.
- Make plans for perennial and annual flowerbeds.

APRIL

- After mid-April, there is little danger of frost for most of Oklahoma. This is an excellent time to make a trip to your favorite nursery for annual and perennial plants.
- This is the month for planting evergreen shrubs. Planting in April avoids March freezes that can damage young, tender foliage.
- Apply a labeled fungicide to pine trees to control the devastating disease, Diplodia Tip Blight. Make the first application when pine tip candles have expanded to half their full size. When the disease is severe, make three applications at 10-14 day intervals.
- In the garden, set out tomato, pepper, and eggplant transplants. Plant sweet corn during the last week of March or in early April. Lima bean, green bean, cucumber, and squash do better once warmer temperatures arrive, typically after April 10.
- In the later part of April, fertilize bermudagrass turf areas with one pound of actual nitrogen per 1,000 square feet of lawn area. For zoysiagrass, cut this rate in half.

INTERPRETATION ARTICLE

By Andrea Melvin, EarthStorm Program Manager
& Derek Arndt, Assistant State Climatologist

For many people, wet-bulb temperature is an obscure weather variable or something they've never heard of. However, it can be useful in certain situations. It is related to the air's temperature and moisture content, and for that reason it is often used in situations that involve evaporation. And situations that involve evaporation involve energy, lots of it!

Many architects and builders look at long-term averages of wet-bulb temperature to estimate air conditioning costs, because wet-bulb temperature is a better indicator than the actual air temperature. Meteorologists also use wet-bulb temperature to diagnose heat and moisture during the threat of severe weather, because heat and moisture in the atmosphere are the sources of energy needed to create and maintain thunderstorms. It is also very useful in specific winter weather situations, because of its close relationship to evaporation.

First of all, evaporation isn't free: it requires energy from the environment around it. You have experienced this yourself if you've felt the chill of jumping out of a swimming pool in the wind, even when it's hot outside! In fact, your body depends on the energy associated with evaporation to cool itself. When your perspiration or water from the pool evaporates, you are providing the required energy with heating from your skin; this loss of heat lowers your temperature.

Let's see how evaporation is important during winter. Think about a typical, dreary, gray winter day. It's 40 degrees outside with a solid bank of clouds hanging a few hundred feet overhead. No precipitation is falling from the clouds...yet. If it's not foggy beneath the clouds, then the humidity is less than 100%. In other words, the air at the surface isn't saturated. Now, if precipitation begins to fall from those clouds into that unsaturated (dry) air, some of it will evaporate. This evaporation will take energy from the environment around it, which lowers the temperature. Eventually, the air will become saturated when the air temperature drops to meet the rising dewpoint temperature. But how will we know if the temperature will cool to 35 degrees, which will give us a cold rain, or 30 degrees, which will give us a frozen mess? Well, that's where wet-bulb temperature can be useful.

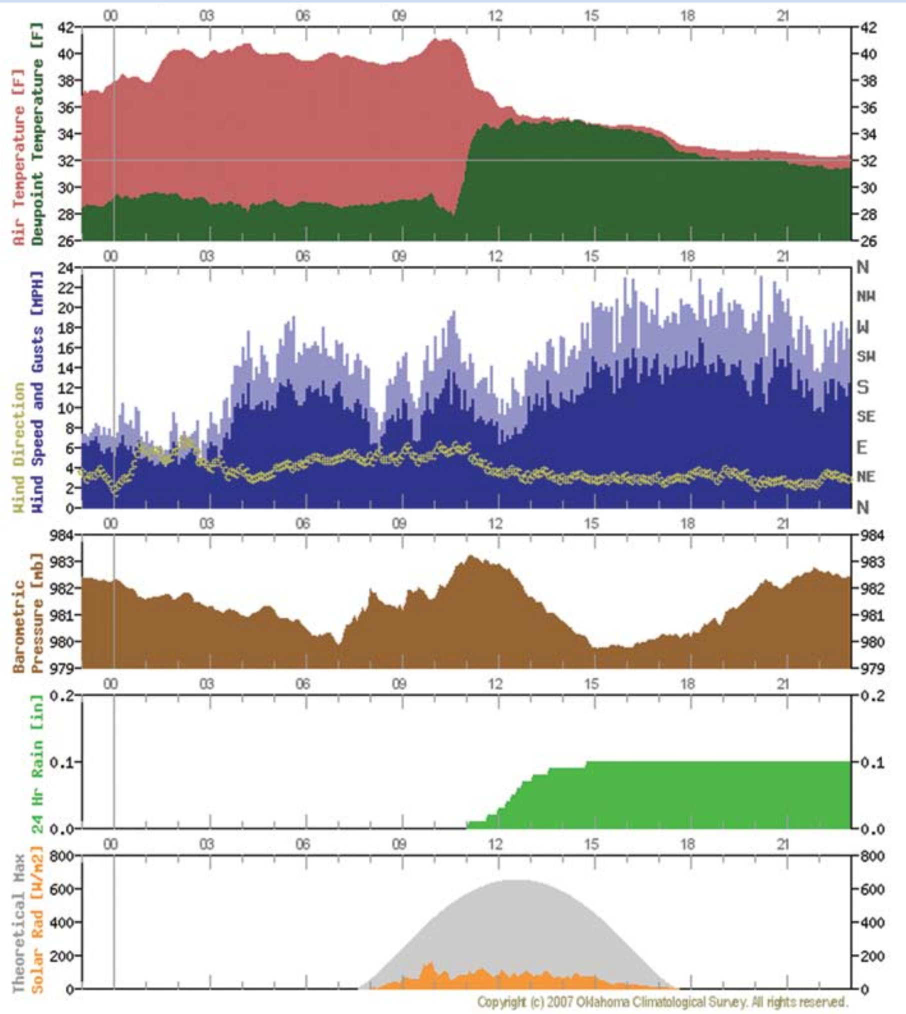
In this type of scenario, where precipitation continuously falls into a thin layer of unsaturated air, the wet-bulb temperature before the precipitation can give a rough estimate of the final temperature during precipitation. Many meteorologists will use the wet-bulb as a first-guess forecast of the ultimate temperature when precipitation begins on a dreary winter day. This process, where temperature falls as moisture rises during precipitation, is often called "wet bulbing" by meteorologists.

On January 16, 2001 a wet bulbing event occurred at the Washington Mesonet station (See Graph 1 – Note: wet-bulb temperatures are not shown on the graph.). At 10 am, the air temperature was 41°F and the wet-bulb temperature was 36°F before any precipitation began to fall. Notice how the temperature graph drops as the dewpoint temperature graph increases. The movement of these two graphs toward each other before any precipitation reaches the ground is an indication that wet bulbing is occurring. The rain did not begin to accumulate in the Washington rain gauge until 11:05 am. The 11:05 am air temperature was 38°F and the wet bulb temperature was 36°F. The total amount of precipitation collected at 11:05 am was 0.25 inches.

As long as the air mass at the surface stays in place, and isn't replaced by a front or strong winds, it can be fairly accurate. The precipitation doesn't even need to be that heavy, sometimes the most dramatic effect occurs when precipitation is very light.

You can get the current wet-bulb temperature on the Oklahoma Mesonet data pages (http://www.mesonet.org/public/). Try using it at home!

Graph 1 - Washington 24-Hour Meteogram (11:00pm CST Jan 16, 2001)



CLASSROOM ACTIVITY

1. In figure 1, the red numbers show the actual air temperature. Generally speaking, what are the temperatures in central and southern Oklahoma?

2. Although it is not shown on the map, there is light precipitation falling in northeast Oklahoma. In far northeast Oklahoma, air temperatures are 30 and 31. Why are these values critical during precipitation?

3. In figure 1, the dark blue numbers show wet-bulb temperature. Generally speaking, what are the wet-bulb temperature values in central and southern Oklahoma?

4. Shortly after the midnight map time, light precipitation began to fall at the Norman site, but most of it evaporated as it fell. How did the air temperature respond: did it cool, warm, or stay the same? Why?

5. Wet-bulb temperature can be used as a rough estimate of the resulting temperature when evaporating precipitation modifies the temperature. If precipitation develops as the Norman site, what is your estimate of the resulting temperature?

6. Look that the top panel of the Norman meteogram (figure 2). Shortly after midnight, light precipitation began and the temperature (pink trace) and dew point (green trace) "wet bulbed" to meet each other. At about what temperature did they meet? How does this value compare to the Norman wet-bulb temperature at midnight (figure 1)?

7. According to the meteogram, the wet-bulbing effect began at Norman about 12:30 am, but there was no precipitation observed until 3:00 am. If precipitation caused the wet-bulb effect (which it did), why did the rain gauge take an extra 2.5 hours to record precipitation?

Figure 1 - Oklahoma Mesonet observations at 12 midnight, February 5, 2002. Air Temperature is in bold red text. Wet-bulb temperature is in dark blue. At the time, light rain (not shown) was falling in northeast Oklahoma and was forecast to spread to the southwest.

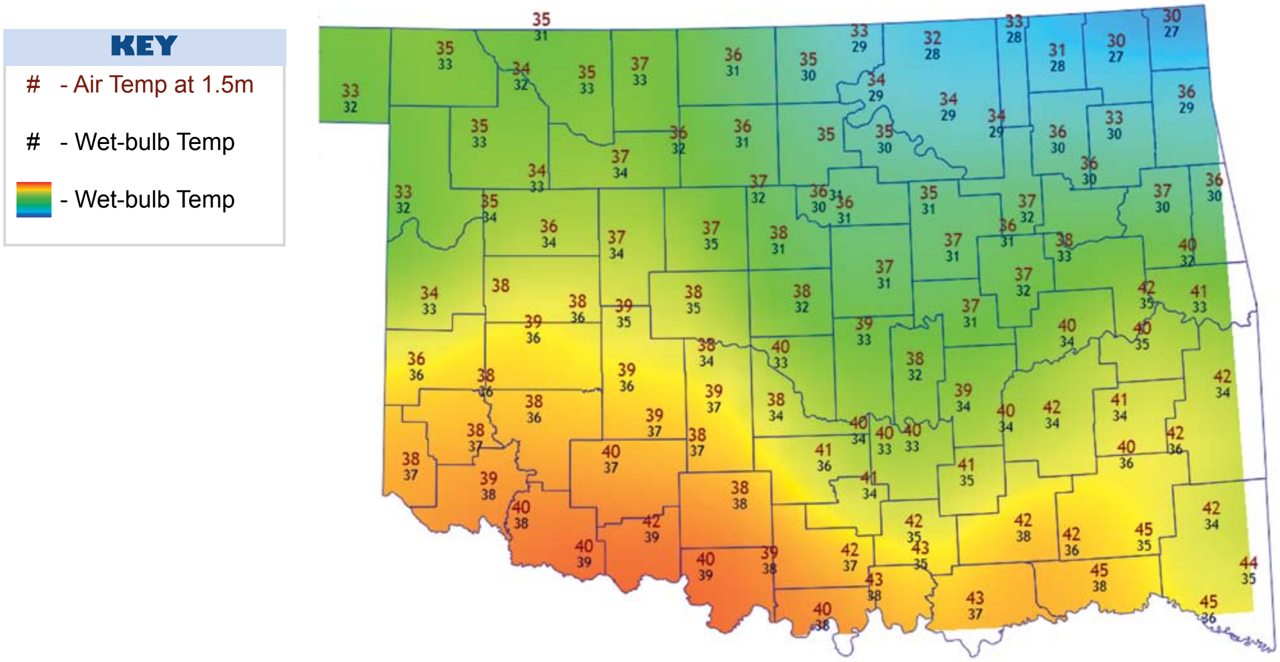
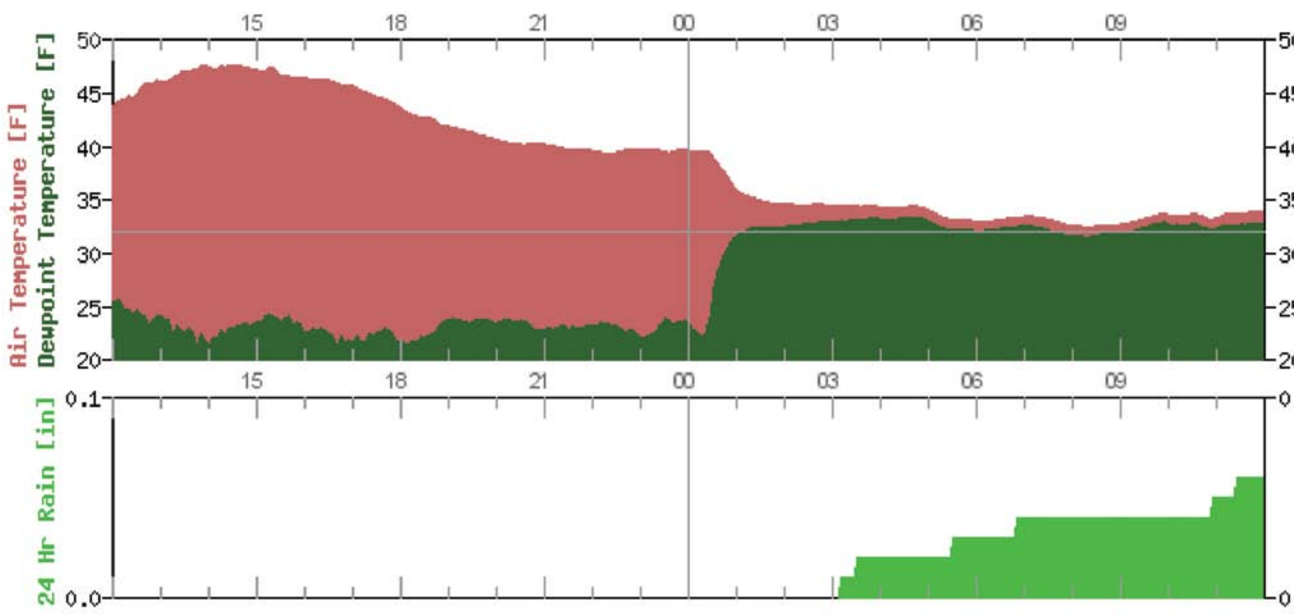


Figure 2 - Two panels from the Norman Mesonet meteogram of February 4-5, 2002. Time moves from left (noon on Feb 4th) to right (noon on Feb 5th). Midnight is the vertical gray line. The top panel shows air temperature (pink) and dewpoint temperature (dark green). The bottom panel shows rainfall accumulation during the period.



ANSWERS

Answers From Page 20

1. Air temperatures are about 40 degrees across most of the region, give or take a few degrees.

2. 32 degrees is the freezing point for water. When surface temperatures are below freezing, precipitation will be snow, sleet or freezing rain, instead of rainfall.

3. Wet bulb temperatures are in the mid-to-upper 30s across most of the region.

4. The air temperature dropped. Evaporation is a cooling process that takes heat from the environment. In other words, the air provided the energy required to evaporate the precipitation.

5. According to the wet-bulb temperature, the air near Norman would cool to about 34 degrees if precipitation occurred.

6. The temperature and dew point met at about 33 or 34 degrees. This is almost exactly the wet-bulb temprature that was observed before the precipitation began.

7. The precipitation almost completely evaporated between midnight and 3:00 am. This evaporation caused the ‘wet-bulbing’ effect (lower temperatures, higher dewpoints) on the the meteogram. At 3:00 am the atmosphere was saturated enough that precipitation survived in sufficient quantities to register in the rain gauge.

Focusing the Response on Drought Monitoring and Assessment in Real-Time

By Kodi Nemunaitis, Graduate Research Assistant

Oklahoma has a long and tragic history of droughts. The Dust Bowl years of the 1930s have been called the "darkest moment in the twentieth-century life of the southern plains". Drought is the most costly natural disaster in the nation, yet it receives little attention due to its creeping nature. Despite severe economic losses, scientists, agriculturalists, and policy makers have done little to prepare for drought. The consequences of poor drought planning and monitoring become more visible to public policy makers and American citizens every day. With the explosion of the mass media during the last few decades, drought coverage commands a larger audience than ever before, but only when its impacts are obvious. Today is the time to focus on the problems of drought policy. The National Integrated Drought Information System (NIDIS) was approved by the Western Governors' Association (WGA) in June 2004 and passed the House (H.R. 5136) and the Senate Commerce Committee (S.2751) in September 2006. A primary component of NIDIS will be to monitor drought conditions at the county level across the nation. While NIDIS is an interesting and drastic plan, additional issues must be addressed to implement an effective drought-monitoring plan

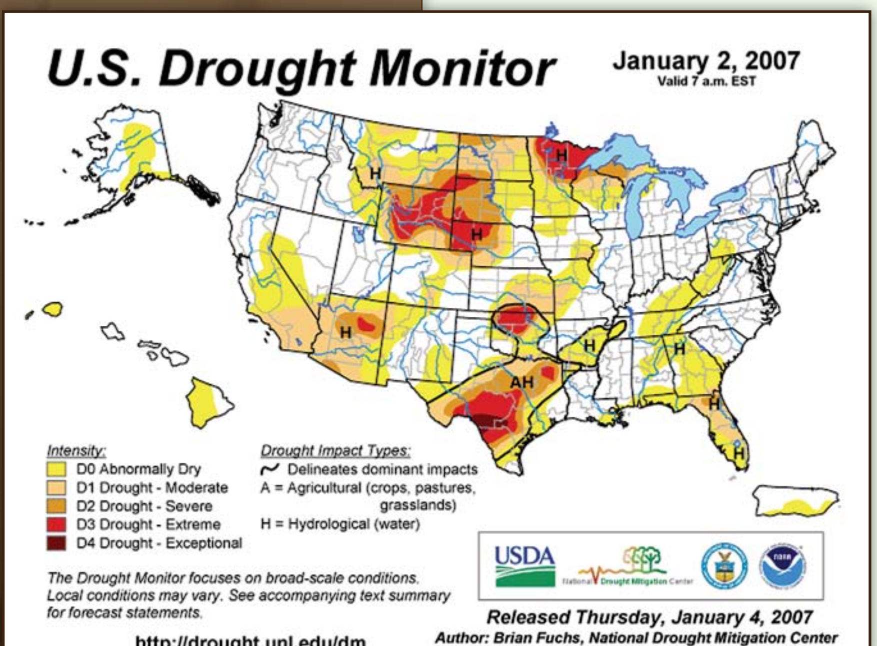


Figure 1 - Example of a product from the U.S. Drought Monitor (Courtesy NOAA).

While drought may seem like a simple concept, it is very difficult to define. For example, meteorological drought is defined as a period of abnormally dry weather. On the other hand, hydrological drought is a period where stream, lake, and ground water levels are unusually low. An induced drought is brought about by introducing agricultural, recreational, industrial, or residential consumption into an area that cannot naturally support it. The variety of definitions from several scientific fields demonstrates that drought is a difficult event to identify, which creates a challenge for scientists and policy makers. Its creeping nature and overwhelming costs have created a need for improved drought monitoring in the United States. No single government agency focuses on drought alone. Instead, several agencies provide limited drought information. The United States Drought Monitor (USDM; Fig. 1) is an excellent example of how various data sources can be used to show current drought conditions. The USDM combined with full funding of NIDIS would establish a focal point for all drought concerns.

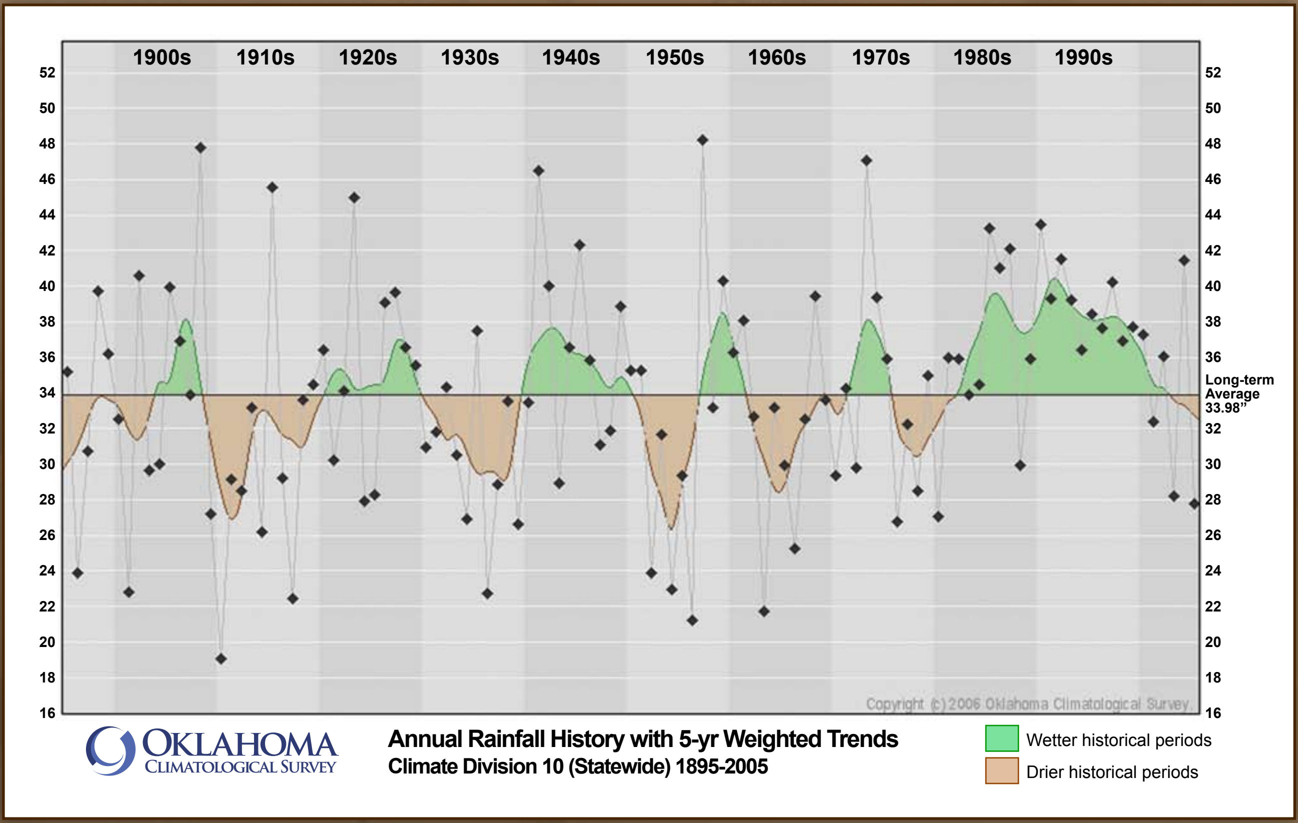


Figure 2. Example of a drought product from the Oklahoma Climatological Survey. Similar graphics are available at http://climate.ocs.ou.edu.

To improve drought assessment and response, additional drought monitoring equipment must be installed and maintained. The improvement of the National Weather Service (NWS) Cooperative Observer Program (COOP) network would provide high-quality data at more locations more frequently to improve drought monitoring and prediction. The National Research Council and many scientists across the nation have repeatedly called for an update of the COOP network. Even the WGA, an independent and impartial organization of Governors, in their proposal for NIDIS, has called for the COOP update to be a top priority. The continued funding and expansion of the United States Geological Survey stream gauge network are also extremely important. These tools should lead to better anticipation and evaluation of drought.

Remarkable improvements in drought monitoring already have been realized from state-level networks. Most notably, the Oklahoma Mesonet has become a model for future automated observation networks. Using the Oklahoma Mesonet, the Oklahoma Climatological Survey has realized great success in creating maps and producing text based information for drought monitoring and response at the state level (Fig. 2). The Mesonet's drought monitoring tools are updated daily and provide state decision makers and other members of the Oklahoma drought community the insight to make difficult decisions based on current water resources. For example, during the drought in the year 2000, data from the Oklahoma Mesonet provided critical evidence of the drought in Latimer County. The evidence was presented to the Oklahoma Water Resources Board and the Governor's Office. As a result, the Governor of Oklahoma signed a state declaration of disaster for Latimer County, which provided funds to address the situation.

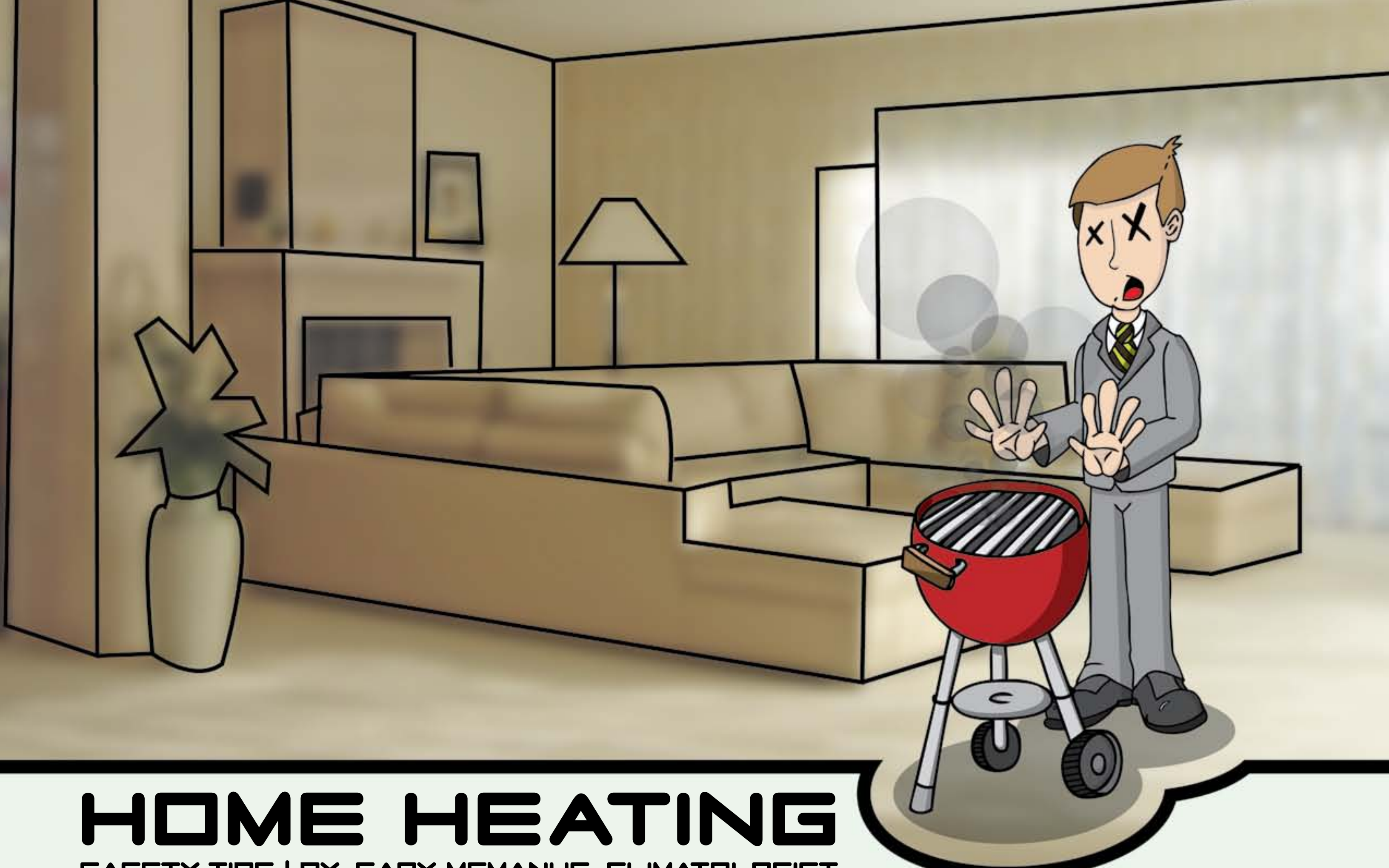
Another approach to increase the capability to monitor drought is through a National Farmer Cooperative network. Farmers, especially those receiving farm subsidiaries, could designate a small section of their land for placing soil moisture observing stations that meet federal standards. The benefits would be two-fold: more observations would become available, and the increased number of measurements would serve as a form of 'drought insurance' for farmers. If a drought occurred near a given farm, the data from each soil moisture site could be used to prove drought severity and could insure that farmers receive appropriate drought relief funds.

A well-planned outreach program can help educate policy makers and the public to minimize drought impacts and move the nation toward proactive, as opposed to reactive, drought planning. The drought-monitoring program must seek to educate the public about the purpose of NIDIS and the impacts associated with drought. Through education and proper practices, younger generations can better manage and conserve water resources to reduce drought problems. Lesson plans should be created for kindergarten through twelfth grade levels to focus on drought education, the drought-monitoring program, and water conservation. This will not only require participation between the Department of Education and drought officials (at federal, state, and local levels), but also environmental data from the drought-monitoring infrastructure. With education comes a greater awareness of drought that a new generation of policy makers, agriculturalists, business people, and scientists will possess.

Finally, schools at all levels of education should be able to compete for drought monitoring equipment. Although many schools across the nation have weather stations, those that do not should be encouraged to apply for rain gauge grants through the drought program. These equipment grants could provide the school with a rain gauge to record precipitation data for their school. Installation of the rain gauges could be coordinated through state level personnel and be based on federal standards of instrumentation sighting.

The NIDIS plan, supported by the WGA before Congress, is a step towards more accurate monitoring of drought. While implementation of a drought-monitoring program will be costly, it will be minor in comparison to the six to eight billion dollars the United States spends on drought each year.

The installation of a national system for drought monitoring and preparedness will come with a small initial expense in time and resources. However, the results of such a system ultimately will save our economy billions of dollars. A better understanding of the effects of drought may even save lives and personal property. With booming populations in the most drought-stricken areas of the United States, this creeping phenomenon can no longer be ignored.



HOME HEATING

SAFETY TIPS | BY: GARY MCMANUS, CLIMATOLOGIST

Space Heaters

- **Be cautious with portable space heaters**. During the months of December, January and February, heating equipment is the leading cause of home fires, according to the National Fire Prevention Association. About two-thirds of home heating fire deaths are caused by portable or fixed space heaters.
- **Place space heaters at least three feet away from anything combustible,** including wallpaper, bedding, clothing, pets, and people.
- **Never leave space heaters operating** when you are not in the room or when you go to bed. Don't leave children or pets unattended near space heaters.
- **Be sure everyone knows** that space heaters should never used to dry wet mittens or other clothing.

Ovens

- **Never use a kitchen stove or outdoor cooking grill for supplemental heat.** Burning gas in a closed house or apartment uses up oxygen and produces deadly carbon monoxide gases.

Candles

- **Keep candles away from combustible materials.**
- **Never leave children unattended in a room with lit candles, and be sure to keep candles**, matches and lighters out of the reach of children.
- **Never display lighted candles in windows** or near exits.
- **Do not use candles** for lighting if electric service is interrupted. Use flashlights only.

Fireplaces and Wood Stoves

- **Inspect fireplaces and wood stoves**. Use a sturdy screen when burning fires.
- **Burn only wood**—never paper or pine boughs.
- **Have your chimney connections and flues inspected** by a professional and cleaned if necessary prior to the start of every heating season.

Generators

- **Use generators carefully**. Never operate a portable generator inside your home, including the basement or garage.
- **Do not hook up a generator directly to your home's wiring**. The safest thing to do is to connect the equipment you want to power directly to the outlets on the generator.
- **Never connect a cord from a generator to a point on the permanent wiring system.** Doing so and back feeding power to your home is extremely dangerous.
- **Don't overload electrical outlets**. Be careful of extension cords that present hazardous walkways.

Additional Tips

- **Keep fire extinguishers handy** throughout your home. Get training from the fire department on how to use them. Consider installing other equipment, such as an automatic fire sprinkler system, in your home.
- **Have your furnace checked** to ensure its proper operation.

OKLAHOMA CLIMATOLOGICAL SURVEY

120 David L. Boren Blvd., Suite 2900
Norman, OK 73072-7305
phone: 405.325.2541 | **fax**: 405.325.2550
http://www.ocs.ou.edu | **email:** ocs@ou.edu