

Drought Preparedness Council



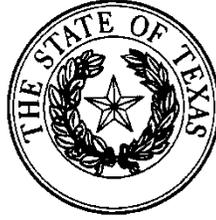
End-of-Year Report 2009

Compiled by the
Texas Division of Emergency Management
Jack Colley, Assistant Director
P.O. Box 4087
Austin, Texas 78773-0223
<http://www.txwin.net/dpc/>

For additional copies of this report, contact:

**Preparedness Section
Division of Emergency Management
Texas Department of Public Safety
P.O. Box 4087
Austin, Texas 78773-0023**

**Telephone: 512/424-2450
Facsimile: 512/424-2444**



DROUGHT PREPAREDNESS COUNCIL

RICK PERRY
Governor

5805 N. Lamar Blvd.
P.O. Box 4087
Austin, Texas 78773-0220
Phone: (512) 424-2138
Fax: (512) 424-2444
April 30, 2010

JACK COLLEY
Council Chairman

TO: The Honorable Rick Perry, Governor, State of Texas
The Honorable David Dewhurst, Lieutenant Governor, State of Texas
Ms. Esperanza Andrade, Secretary of State, State of Texas
The Honorable Robert Duncan, President Pro-Tempore of the Senate, State of Texas
The Honorable Joe Straus, Speaker of the House, State of Texas
The Honorable Steve Ogden, Chairman, Senate Finance Committee, State of Texas
The Honorable Kip Averitt, Chairman, Senate Natural Resources Committee, State of Texas
The Honorable John Carona, Chairman, Senate Committee on Transportation & Homeland Security, State of Texas
The Honorable Jim Pitts, Chairman, House Appropriations Committee, State of Texas
The Honorable Allan Ritter, Chairman, House Natural Resources Committee, State of Texas
The Honorable Yvonne Gonzalez-Tourelles, Chairman, House Agriculture & Livestock Committee, State of Texas
The Honorable Pete Gallego, Chairman, House Criminal Jurisprudence Committee, State of Texas
Mr. Ray Sullivan, Chief of Staff, Office of the Governor
Mr. Josh Havens, Texas Governor's Office of Homeland Security

FROM: Jack Colley, Chairman, Drought Preparedness Council

SUBJECT: Drought Preparedness Council End-of-Year Report for 2009

On behalf of the State Drought Preparedness Council, I forward the attached report for your information. The report provides an overview of the organization and responsibilities of the council, and summarizes its accomplishments during the year of 2009 with respect to coordination, technical assistance, direct assistance, and public outreach. Also included is a summary of projected Council activity along with various drought indices that reflect the level of drought experienced during the year 2009.

I extend thanks to all members of the Council for their ongoing work regarding drought mitigation and response activities. A listing of Council members with appropriate contact information is included as well.

Sincerely,

A handwritten signature in cursive script that reads "Jack Colley".

Jack Colley, Chairman,
Drought Preparedness Council

Jack Colley, Chairman
Texas Division of Emergency Mgmt

Lance Williams, Member
Texas Department of Agriculture

Carla Baze, Member
Texas Department of Transportation

Chris Loft, Member
Texas Commission on Environmental
Quality

Michael Dunivan, Member
Texas Forest Service

John Sutton, Member
Texas Water Development Board

Dr. Travis Miller, Member
Texas Cooperative Extension

David A. Van Dresar, Member
Texas Alliance of Groundwater Districts

Thomas Walker, Member
Office of the Governor
Economic Development & Tourism

Gus Garcia, Member
Texas Department of Rural Affairs

Richard Egg, Member
State Soil & Water Conservation Board

Cindy Loeffler, Member
Texas Parks & Wildlife Department

Suzanne Burnham, Member
Texas Department of State Health Services

Dr. John W. Nielsen-Gammon, Member
Office of the State Climatologist

Alfonso Royal III
Texas Department of Housing and
Community Affairs

The Council is chaired by Jack Colley of the Texas Division of Emergency Management, and is composed of state agencies concerned with the effects of drought and fire on the citizens of the State of Texas. The attached report was compiled and provided by representatives listed below. Points of contact, telephone numbers, and website addresses are also provided.

Jack Colley, Texas Division of Emergency Management, (512) 424-2443,
fax (512) 424-2444, website: <http://www.txdps.state.tx.us/dem>

John Sutton, Texas Water Development Board, (512) 463-7988, fax (512) 463-9893,
website: <http://www.twdb.state.tx.us>

Chris Loft, Texas Commission on Environmental Quality, (512) 239-4715,
fax (512) 239-4770, website: <http://www.tceq.state.tx.us>

Richard Egg, Texas State Soil & Water Conservation Board, (254) 773-2250,
fax (254) 773-3311, website: <http://www.tsswcb.state.tx.us>

Lance Williams, Texas Department of Agriculture, (512) 463-3285, fax (800) 835-2981,
website: <http://agr.state.tx.us>

Dr. Travis Miller, Texas AgriLife Extension Service, (979) 845-4808, fax (979) 845-0456,
website: <http://texasextension.tamu.edu/>

Cindy Loeffler, Texas Parks & Wildlife Department, (512) 912-7015, fax (512) 707-1358,
website: <http://www.tpwd.state.tx.us>

Michael Dunivan, Texas Forest Service, (830) 997-5426, website: <http://txforestservice.tamu.edu>

Carla Baze, Texas Department of Transportation, (512) 416-3270, fax (512) 416-2941,
website: <http://www.dot.state.tx.us/>

Suzanne Burnham, Texas Department of State Health Services, (512) 801-9816, fax (512) 458-7472, website: <http://www.dshs.state.tx.us/>

Thomas Walker, Office of the Governor, Economic Development & Tourism, (512) 936-0258,
fax (512) 936-0520, website: <http://www.governor.state.tx.us/divisions/ecodev>

David A. Van Dresar, Texas Alliance of Groundwater Districts, (979) 968-3135, fax (979) 968-3194,
website: <http://www.texasgroundwater.org/>

Dr. John W. Nielsen-Gammon, Office of the State Climatologist, (979) 862-2248, fax (979) 862-4466, website: <http://www.met.tamu.edu/osc/>

Gus Garcia, Texas Department of Rural Affairs, (512) 936-7876, fax (512) 936-6776,
website: <http://www.orca.state.tx.us>

Alfonso Royal III, Texas Department of Housing and Community Affairs, (512) 475-4273, website:
<http://www.odhca.state.tx.us>

DROUGHT PREPAREDNESS COUNCIL END-OF-YEAR REPORT 2009

Distribution List

The Chairman of the Senate Finance Committee	1
The Chairman of the Senate Natural Resources Committee	1
The Speaker of the House	1
The Chairman of the House Appropriations Committee	1
The Chairman of the House Natural Resources Committee	1
The Governor's Policy Office	1
The Lt. Governor's Policy Office	1
The Legislative Budget Board (DPS)	1
The Legislative Budget Board (TCEQ)	1
The Governor's Economic Development and Tourism Division	1
Texas Alliance of Groundwater Districts	1
The Texas Office of State-Federal Relations	1
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The United States Army Corps of Engineers	1
The Federal Emergency Management Agency	1
The United States Department of Housing and Urban Development	1
The National Weather Service	1
The United States Bureau of Reclamation	2
The United States Forest Service	1
The United States Geological Survey	1
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End-of-Year Report – 2009

I. INTRODUCTION

Most of the State was much drier than normal for the first eight months of 2009, continuing a trend of abnormally dry weather that persisted through 2008 and the latter stages of 2007. By the summer of 2009, much of the southern half of Texas was in an exceptional drought that encompassed nearly 20% of the State. A study done by the Office of the State Climatologist found the 2009 drought to be the worst on record for nine counties in South Central and South Texas. The summer drought was compounded by extreme summer heat, with several of the large cities in South Texas recording the warmest month ever in July 2009, with August 2009 not far behind.

At the height of the drought, the Texas AgriLife Extension Service estimated the financial loss in the State of Texas alone to be \$3.6 billion, a number that could grow to over \$4 billion by the end of the year. Beginning in September 2009, a shift in the global weather to an El Niño pattern brought much needed precipitation to drought stricken areas of Texas. The pattern is expected to persist through the Northern Hemisphere winter, which historically brings above normal precipitation to most of Texas. By the end of 2009, the drought situation was greatly improved, with only 4% of Texas in “Severe Drought”, 2% in “Extreme Drought”, and no areas in “Exceptional Drought.”

January 2009 was drier than normal across the entire State, with less than 10% of the State receiving at least one inch of precipitation. The La Niña phase of the El Niño-Southern Oscillation was firmly entrenched, and little to no precipitation was reported in the Edwards Plateau and South Central Texas, the two regions with “Extreme” and “Exceptional” drought conditions entering 2009. Most of the Edwards Plateau received less than 0.10 inch, while most of South Central Texas received less than 0.25 inch of January precipitation.

February 2009 continued a trend seen the past six months of drier than normal weather across Texas, with only areas in extreme Southeast Texas picking up significant precipitation. Little to no rain was reported along and near the Texas portion of the Rio Grande River, while areas further to the north and east did not fare much better. Only Central, North Central, and East Texas received more than an inch of February precipitation outside of far Southeast Texas, but drought conditions in these regions deteriorated during the month. The March 3, 2009 United States Drought Monitor (USDM) depicted all of Texas with at least “Abnormally Dry” conditions and 44% of Texas with at least “Severe Drought” conditions.

March 2009 brought more significant precipitation than in any of the previous 6 months. However, drought conditions were only improved in East Texas, a region that received six to eight inches of precipitation with isolated areas above 10 inches. A welcome storm system pushed through the state from March 12-15, dumping two to five inches on Central Texas. Austin and San Antonio were wetter than in a normal March, but both areas were still considered to have “Exceptional Drought” conditions. Elsewhere, another dry month in the western half of Texas brought an expansion of “Extreme Drought” conditions through most of the Edwards Plateau and as far north as Nolan County in the Low Rolling Plains. Months of dry weather in the Victoria vicinity meant an expansion of “Exceptional Drought” conditions from South Central Texas to the Middle Texas coast during March.

April 2009 brought much needed precipitation to drought stricken areas in the Edwards Plateau region and northern South Central Texas as several storm systems made way

through Texas. Eleven tornadoes struck the panhandle on April 16, with over 5 inches of precipitation reported in areas near Lubbock. The extreme precipitation caused widespread flooding across Central and Southeast Texas, particularly in Houston. However, a drier than normal April in the southern half of South Central Texas, the Southern, and Lower Valley regions intensified the drought and expanded "Exceptional Drought" conditions westward to Maverick County and southward to Brooks County in South Texas. Dryness over the past several months leading up to April, saw an introduction of "Extreme Drought" conditions in the Wichita Falls vicinity and "Severe Drought" conditions in the Trans-Pecos region. A storm system on April 28-29 brought heavy precipitation to North Texas, an area devastated by wildfires. The Red River Region north of the Metroplex, received approximately six to eight inches.

May 2009 resumed the trend of dry months with below normal precipitation across the entire State except the Trans-Pecos and Northeast regions. May is normally a climatologically wet month in many of the areas suffering drought. The month's dryness was particularly bad news. A strong cold front, responsible for flash flooding and power outages, brought considerable rains to Northeast Texas on May 2 and Southeast Texas on May 3. After months without significant precipitation, two separate storm systems brought needed rainfall to South Central and Deep South Texas within 10 days on May 16 and May 25. Plentiful May rainfall brought improvement to drought conditions in the Wichita Falls vicinity near the Rio Grande in Webb and Zapata counties and in the Edwards Plateau. However, large May precipitation deficits in South Central Texas saw deterioration to "Exceptional Drought" conditions near Austin and to areas north and east of town.

June 2009 was extremely dry in the areas of Texas with "Exceptional Drought" conditions entering the month, with less than 0.50 inch of rain in a large portion of the State from South Central Texas to the Lower Valley. By the time June ended, San Antonio officially endured the driest 22-month period since records began back in 1885. The official Edwards Aquifer J-17 Bexar Index well dropped at a staggering rate of three to six feet per week in June due to the hot and dry weather. The driest May-June period on record in Houston and Galveston, no measurable June precipitation in College Station, and exceptionally warm temperatures were factors in the rapid expansion of drought northeastward by the end of June. College Station deteriorated from "Abnormally Dry" to "Extreme Drought" conditions and Houston from "No Drought" to "Severe Drought" conditions in just a few weeks. An abundance of rain fell in June 2009 in the western half of Texas, eliminating drought in most areas except the far northern Panhandle. With more than five inches of precipitation, the City of El Paso reported major flooding problems by the end of the month. Jones and Shackelford counties improved to "Severe Drought" conditions with near normal June precipitation.

July 2009 saw an entrenchment of drought in South Texas, with some regions suffering through the worst drought since precipitation records began in the 19th century. Compounding the situation was the fact July 2009 was possibly the hottest month South Texas has ever experienced. A persistent upper level ridge created almost an entire month of sunny and dry weather and suppressed convective activity normally seen in July. Austin/Mabry, College Station, Corpus Christi, San Antonio, and Victoria set records for highest mean temperature for any month on record. By the end of the month, Victoria only received 38 inches of precipitation over the past 23 months, compared to 66 inches received the first nine months of 2007. During the first seven months at Port Mansfield, only an inch of rain had fallen while College Station ended 56 consecutive days without measurable rain on July 19th. With the exception of the Lower Valley, all of South Texas had "Exceptional Drought" conditions by the end of July. The storm tracks in July stayed in the northern half of Texas where rainfall for the month was quite plentiful and at times

excessive. Midland received approximately 6.55 inches, more than three times its normal July rainfall. The Edwards Plateau and Low Rolling Plains more than doubled normal July totals. Portions of Cass, Harrison, Upshur, and Wood counties in Northeast Texas received more than 10 inches of precipitation and flooding became a major concern by month's end. While "Abnormally Dry" conditions existed by the end of July in much of North Central Texas, a tight gradient between "Abnormally Dry" to "Exceptional Drought" conditions existed in Central Texas. For instance, northern Lampasas County reported "No Drought" conditions while just to the south, southern Burnet County was reporting "Exceptional Drought" conditions. Globally, the El Niño-Southern Oscillation officially entered the warm El Niño phase which normally brings above normal precipitation to Texas during the winter months.

August 2009 was another month with below normal precipitation and historically hot conditions in areas suffering through "Exceptional Drought" conditions in South Texas. Although drought suffering areas were generally dry, the second to last week of August was probably the peak of the 2009 summer drought as the last week of August brought beneficial rainfall to areas of South Texas. Scattered amounts of two to four inches of rain fell in Duval and Jim Wells counties while an estimated four to six inches of precipitation fell in parts of Jackson and Wharton counties. However, less than an inch of August precipitation fell in most of South Central Texas, the Coastal Bend, and Southern Edwards Plateau regions. The August 2009 year-to-date precipitation in San Antonio was only 8.43 inches, a departure from normal of 13.09 inches. Corpus Christi had a 2009 deficit of 15.70 inches with only 4.10 inches of precipitation over the first eight months of 2009. Austin/Mabry, Corpus Christi, McAllen, and San Antonio all followed up their warmest month ever in July 2009 with their second warmest month ever in August. McAllen set or tied 17 daily maximum temperatures in more than half the days in August, while finally ending its string of 49 consecutive 100-degree days on August 29. Late-month convective activity in the Houston area provided drought improvement and a steeper gradient between "Abnormally Dry" to "Exceptional Drought" conditions in Southeast Texas. The beneficial late August rains in the Rio Grande Valley provided some drought improvement to Duval, Jim Hogg, Webb, and Zapata counties. Abundant precipitation in the northern Panhandle, in some instances eight to 10 inches for the month, eliminated drought conditions that existed going into August.

September 2009 was wetter than normal for the majority of drought-stricken South Central Texas, which provided some much needed relief to the region, though long-term precipitation deficits were still large. For the month, San Antonio was three inches above normal with 6.35 inches of rainfall. Austin/Mabry and Austin/Bergstrom both recorded nearly seven inches of precipitation for the month. Overall, September rainfall was on the order of five to eight inches in the region of "Severe" to "Exceptional Drought" in South Central Texas. However, a significant area of the Gulf Coast from Matagorda County to Kleberg County remained drier than normal in September, only deepening the "Exceptional Drought" conditions that plagued the region through the summer. September brought remarkable improvement to the drought situation in the Lower Valley with widespread monthly rainfall totals of five to ten inches. Brownsville received 9.43 inches of precipitation in September leading to the elimination of the drought by the end of the month after starting September in "Extreme" to "Exceptional Drought" conditions. For the first time in 2009, both Victoria and Corpus Christi received above normal precipitation. Victoria ended the month with 6.44 inches. Corpus Christi received more rainfall in September than had fallen the first eight months of the year combined. "Exceptional Drought" conditions shrank considerably in South Central Texas to Bastrop, Caldwell, and Guadalupe counties by the end of September, while the "Exceptional Drought" was still in full force for several counties in the Coastal Bend Region.

October 2009 brought above normal precipitation for most of the eastern half of the State and the northern Panhandle, improving areas in South Central Texas from “Exceptional Drought” to “Abnormally Dry” conditions by the end of the month. The month of October featured a progressive weather pattern throughout its entirety with several storm systems passing through North Texas, East Texas, South Central Texas, and the Upper Coast. The most prominent weather feature in October saw the remnants of Hurricane Rick providing abundant moisture to a cold front that swept through the State from October 22 and 23. A large swath just to the west of the I-35 corridor in Central Texas picked up 4-6” of rainfall from this system. San Antonio picked up 11.90” of precipitation, its 9th wettest overall month on record. For the second straight month, Austin/Mabry and Austin/Bergstrom recorded nearly seven inches of precipitation which nearly eliminated the year-to-date precipitation deficit at Mabry. Several systems dumped flooding rainfall in East Texas in October, with several tornadoes reported in extreme Northeast Texas and Northwest Louisiana on October 29. A small area of the Coastal Bend including all of Nueces County, most of Jim Wells County, northern Kleberg County, and eastern Duval County was still designated as experiencing “Exceptional Drought” conditions by the end of October after another month of lackluster precipitation. Areas of Southwest Texas near the Rio Grande only received one to two inches of precipitation in September and October combined, and experienced “Extreme Drought” conditions by the end of the month.

November 2009 was drier than normal across most of Texas. However the areas that did receive above normal precipitation greatly welcomed the rainfall. The November dryness in North Central and Northeast Texas helped alleviate flooding. However a dry autumn in the southern Panhandle led to the development of “Abnormally Dry” conditions by the end of the month. San Angelo, Abilene, Midland, Wichita Falls, Lubbock, and Amarillo typically do not see much precipitation in November, but the past month’s dryness was particularly extreme. After an unusually dry first two weeks across the entire State, a low in the Gulf of Mexico brought rainfall to the core of the drought region in South Texas by the middle of the month, with a broad region picking up more than three inches of precipitation. Aransas County was hardest hit with radar estimates of more than 10 inches of rain on November 19 and additional rainfall on November 20. By the end of the month, the beneficial November rainfall in the Coastal Bend region led to the complete elimination of “Exceptional Drought” conditions, with both Corpus Christi and Victoria much wetter than normal for the month. November ended on a cold note as a front sweeping through the State brought snowfall to the Panhandle and below freezing temperatures to the majority of North Texas.

December 2009 began exceptionally cool throughout the entire State, featuring a storm system that brought snowfall to the majority of the State and record breaking cold temperatures to South Texas. Parts of the Trans-Pecos region received more than a foot of snowfall, while Houston received an inch of snow to set a record for the earliest accumulation of snowfall. The most snow in Southeast Texas fell near Boling with four inches, while Wharton County received three inches of snow. Record low temperatures were set on December 5 in Austin, College Station, Houston Intercontinental and Hobby, Victoria, Del Rio, Harlingen, Corpus Christi, and McAllen. The warm El Niño phase was expected to remain through the end of Northern Hemisphere winter. This pattern normally brings above normal precipitation to most of Texas, particularly in South Texas, which should help alleviate any existing drought conditions.

II. COUNCIL AND COMMITTEES ORGANIZATIONAL CHART AND RESPONSIBILITIES

DROUGHT PREPAREDNESS COUNCIL

Chair: State Drought Manager, Texas Department of Public Safety,
Texas Division of Emergency Management (TDEM)

- Advises the Governor on significant drought conditions
- Reports to the Legislature regarding significant drought conditions in the State
- Liaison with federal agencies

Council Member Agencies: Texas AgriLife Extension Service (AgEx), Texas Department of Agriculture (TDA), Governor's Office of Economic Development and Tourism (EDT), Texas Department of State Health Services (DSHS), Texas Department of Housing and Community Affairs (TDHCA), Texas Forest Service (TFS), Texas Commission on Environmental Quality (TCEQ), Texas Parks and Wildlife Department (TPWD), Texas State Soil and Water Conservation Board (TSSWCB), Texas Water Development Board (TWDB), Texas Department of Transportation (TxDOT), Texas Alliance of Groundwater Districts (TAGD), Office of the State Climatologist (OSC), Texas Department of Rural Affairs (TDRA).

Federal Agency Participants: United States Army Corps of Engineers (USACE), Federal Emergency Management Agency (FEMA), Housing and Urban Development (HUD), National Weather Service (NWS), United States Bureau of Reclamation (USBR), United States Forest Service (USFS), United States Geological Survey (USGS), United States Public Health Service (USPHS), International Boundary and Water Commission (IBWC), Natural Resources Conservation Service (NRCS), Rural Development (RD), Farm Service Agency (FSA), United States Fish and Wildlife Service (USFWS).

Drought Planning and Coordinating Committee	Drought Monitoring and Water Supply Committee	Drought Technical Assistance and Technology Committee	Drought Impact Assessment Committee																																																																								
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<ul style="list-style-type: none"> • Conduct drought response planning and prepare State Drought Preparedness Plan • Recommend specific revisions for a defined state response to drought-related disasters • Ensure effective coordination among state, local, and federal agencies in drought-response planning 	<ul style="list-style-type: none"> • Assess and report on meteorological conditions and forecasts • Assess and report on hydrological conditions and forecasts • Assess and report water use and demand forecasts • Assess and report water supply conditions and forecasts • Make recommendations concerning when to activate state drought response plan 	<ul style="list-style-type: none"> • Advise regional water planning groups on drought-related issues in the regional water plans • Maintain database of water suppliers and provide a means for communicating possible emergency conditions • Coordinate technical and financial assistance and outreach for drought contingency planning to drought-impacted communities 	<ul style="list-style-type: none"> • Public reporting of drought monitoring and water supply conditions. • Assess and report potential impacts of water shortages on the public's health, safety, and welfare • Assess and report potential impacts of water shortages on economic development • Assess and report the potential impacts of water shortage on agricultural and natural resources 																																																																								

* Denotes Committee Chair

III. COUNCIL ACCOMPLISHMENTS

The Drought Preparedness Council, through its member agencies, has accomplished the following during 2009:

A. Coordination Activities

1. Worked with local, state, federal officials, and the U.S. Congressional delegation from Texas to ensure farmers and ranchers were kept at the forefront of drought planning and informed of assistance.
2. Coordinated with and provided assistance to local water suppliers regarding drought and water conservation education efforts.
3. Collaborated with federal, state, and academic officials on drought and climatic monitoring activities.
4. Maintained a drought-related website with combined state agency drought information.
5. Created the semi-monthly drought index illustrations to communicate drought conditions in the State and summaries for the statewide monthly Drought Preparedness Council Situation Report.
6. Coordinated resource mobilization and use of federal and interstate assets to minimize wildfire threats to people and property.
7. Provided input and evaluation to the U.S. Department of Agriculture (USDA), the National Oceanic and Atmospheric Administration (NOAA), and the National Drought Mitigation Council (NDMC) Drought Monitor.
8. Collaborated with the United States Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS) and the TAMU Spatial Sciences laboratory to develop a map using NEXRAD weather maps and historic rainfall databases of estimated forage losses in small grains, perennial improved grasses, rangeland grasses, and summer annuals by county for use by the USDA-Farm Service Agency (FSA) in adjusting insured forage yield losses due to drought.
9. Coordinated the statewide drought evaluation process used to review drought condition indicators.
10. Coordinated with TDRA, TCEQ, TWDB, DSHS, and other sources to fund water projects for local communities through the various Texas Community Development Block Grant (TxCDBG) Program funds.
11. As part of the Texas Border Interagency Committee, TDRA coordinated water-funding strategies in colonias with the EPA, Border Environment Cooperation Commission (BECC), NADBank, USDA-RD, HUD, OAG, ORCA, TCEQ, TDHCA, TXDOT, and SOS.
12. TDA was an active partner in the Drought Joint Information Center (JIC) providing information as well as facilitating information from the JIC to producers.

13. TDA coordinated with the USDA-Farm Service Agency (FSA) to encourage the implementation of new disaster assistance programs passed in the 2008 Farm Bill.

B. Technical Assistance Activities

1. TCEQ provided onsite technical assistance to 1 retail public water supply system for the development of water conservation and/or drought contingency plans.
2. TCEQ directed concentrated efforts to assist 32 investor-owned public water suppliers in preparing their drought contingency plans by amending their tariffs to ensure the enforceability of those plans.
3. Provided additional drought planning assistance by regional staff in annual inspections and targeted visits to water utilities.
4. Maintained drought and water resource monitoring capabilities.
5. Developed and maintained official State drought data and information files.
6. Coordinated technical assistance of Council member agencies to deal with drought-related environmental hazards such as wildfires.
7. The Office of the State Climatologist distributed real-time weather information and forecasts through the Texas A&M Department of Atmospheric Sciences website.
8. The Office of the State Climatologist distributed historical weather and climate data and summaries for the State by telephone, fax, e-mail, and the internet.
9. The Office of the State Climatologist provided raw weather data and expertise to other state agencies developing weather and rainfall-related agricultural products.
10. In conjunction with the United States Department of Agriculture, TSSWCB provided 217 soil and water conservation districts with technical assistance for the development and application of resource management plans to reduce the severity of the impacts of future drought conditions on agriculture in Texas.
11. TDA continued to develop Financial and Risk Management (FARM) Assistance computer software. This software will aid farmers and ranchers in managing and marketing decisions by analyzing alternatives during periods of drought. It allows the end user to calculate risk components prior to making costly financial decisions and subsequently project what the future financial condition of the operation will be. It can also be used for exit planning during drought situations. Conducted hundreds of interviews with farmers and ranchers to assess their level of risk.
12. Assisted county personnel in planning water-related educational programs, water conservation demonstration projects, developing newsletters, and responding to clientele.
13. Assisted personnel from groundwater and soil and water conservation districts in developing educational meetings, newsletters, and projects.
14. Contributed articles for newsletters to the Texas Agricultural Irrigation Association.

15. Provided technical assistance and site reviews to suggest the best appropriate funding source with applicants accessing TxCDBG funds for water projects through TDRA.
16. The TWDB completed renovations of its drought information website to include real-time drought indices data and monthly drought situation reports.

C. Direct Assistance Activities

1. TDRA awarded Planning Capacity/Building funds to 25 communities totaling \$916,681.
2. TDRA awarded Community Development Block Grant funds for water and drought-related needs to 85 communities totaling \$21,716,614.
3. TDRA awarded nine STEP grants to communities totaling \$1,502,011.
4. TDRA awarded four Colonia Fund Construction grants to communities totaling \$1,493,194.
5. TDRA awarded two Urgent Need grants to communities totaling \$145,580.
6. TCEQ reviewed 138 drought contingency and water conservation plans to ensure minimum required elements are included in those plans. Continued to assist entities to ensure that minimum rule requirements were met.
7. TCEQ responded to 875 drought-related phone calls.
8. TCEQ monitored and provided staff assistance through a hotline number for drought-related issues.
9. TSSWCB coordinated over \$1,880,131 in water conservation technical assistance grants to 216 soil and water conservation districts to assist farmers and ranchers in developing and implementing soil and water conservation practices.
10. TSSWCB continued the brush control program begun in September 1999. The Legislature approved \$1,840,926 for fiscal year 2009 to continue the program. In 2009, the cumulative brush control for water enhancement in the program was nearly 793,000 acres of rangeland and riparian areas infested with mesquite, juniper, and salt cedar.
11. TDA instituted the Disaster Resource Information Packet (DRIP) which contained contact information for state and federal agencies including disaster programs available for drought. This information was made available on the TDA and the Agricultural Drought Task Force websites.

D. Public Outreach Activities

1. TCEQ maintained a "Watch List" of 218 community water systems that implemented mandatory or voluntary water use restrictions in 2009.
2. Responded to inquiries for drought information and data from the media, public, and government entities.

3. Investigated ways to improve the small-scale monitoring of meteorological, hydrological, and water supply drought.
4. Provided drought and drought forecasting information to ranchers through association publications.
5. Maintained drought information on websites to assist farmers, ranchers, and agribusinesses in making informed decisions.
6. Maintained several websites with significant electronic resources on drought, water conservation, water efficient agricultural production systems, water efficient maintenance of turf grass and landscapes, and other topics accessed by several million viewers annually.
7. Participated in numerous workshops, seminars, and demonstrations on water conservation and drought management techniques.
8. TCEQ presented drought information at five workshops and seminars.
9. Created and maintained internet websites with detailed information on drought-related issues, including crop and weather information.
10. TDA provided agribusiness-specific press releases, radio spots, and interviews regarding current drought conditions and the availability of drought assistance.
11. TDA operated the Hay Hotline in an effort to connect hay suppliers with Texas ranchers and farmers in need of hay.
12. TDA requested and received hay waiver authorization from the Office of the Governor which allowed wide loads of hay to be transported quickly around the State, particularly to the drought stricken areas.
13. TFS issued statewide news releases and public service announcements focusing on annual events and/or activities connected with the increased risk of wildfires. These publicity efforts focused on the potential for wildfires related to early spring cleanup operations, fireworks use around Fourth of July and New Year's celebrations, end of school and summer outdoor vacation activities, opening of hunting seasons, fall yard cleanup, National Fire Prevention Week, effects of first hard frosts, and holiday fire safety.
14. TFS mobilized interagency wildfire prevention teams to areas of the State experiencing significant wildfire danger due to drought and/or wildfire incidence. These teams conducted intensive regional fire prevention efforts utilizing a variety of activities including news releases, public service announcements, flyers, exhibits, press conferences, fire-line interviews, civic programs, and other publicity avenues. These efforts were aimed at increasing public awareness of the high-to-extreme danger of wildfires, the prevalent causes of wildfires, and possible safety measures to prevent wildfires from occurring. Publicity efforts also included educating homeowners and homeowner associations on how to incorporate fire safety into landscape design and building construction.
15. TFS continued to display the innovative "Living on the Edge" traveling exhibit van and trailer which focuses on wildfire safety and other resource issues related to rural

and suburban living adjacent to or within undeveloped land. Fire-safe landscaping, fire-resistant building materials, and fire safety measures are incorporated into this interactive mobile exhibit which has been set up at trade shows, fairs, and firefighter meetings across the State.

16. TFS created and publicized the availability of fire safety, fire danger, and fire-safe landscaping information on the internet via web pages maintained by the Texas Interagency Coordination Center.
17. TFS conducted numerous fire safety programs for schools and youth groups, and provided educational materials for use by teachers.
18. Created and maintained Internet websites with detailed information on drought-related issues including crop and weather information.
19. Updated drought websites to provide documents useful for public officials and agricultural concerns.

IV. IMPACT ASSESSMENTS

A. Agriculture

The dry weather experienced by much of Texas in 2008 extended into 2009 and severely damaged agricultural operations. The intensity and area affected by drought in Texas steadily increased over the fall, with producers facing critically dry conditions coming into January 2009. Agricultural producers over most of the State, with the exception of parts of East Texas experienced short to very short surface soil moisture. The majority of Central Texas, the Edwards Plateau, South and Southwest regions of the State were in severe to exceptional drought. With little or no surface or subsurface soil moisture available to crops or forages and with evaporated livestock water ponds, ranchers were forced to begin the long process of culling herds, finding supplemental feed and hauling water.

By February, Agricultural conditions continued to decline as the drought spread across the State. Dry weather conditions over most of the Rio Grande Valley, the Gulf Coast, Central and North Texas severely limit progress towards planting of field crops. Wheat and oat conditions continued to decline. The conditions of the wheat and oat crops in February were reported at 38% and 18% of normal, respectively. Top soil moisture ranged from 67 to 99 percent short to very short in all ten Texas climate zones. Availability of grazing and/or stock water for livestock was problematic across most of the State, with particularly dire conditions in Central Texas. Many livestock operators are faced declining availability of water as stock ponds dried out. Virtually no winter pasture was available for livestock with the exception of parts of East and North Texas.

Coming into March, crop, forage and livestock conditions continued to decline with 44% of the State in "Severe" to "Exceptional Drought", and 100 percent forage and water supplies were limited or nonexistent for much of the State's livestock herd including much of the Gulf Coast, Southwest, Central and West Central Texas. Lack of water, forage and hay resulted in the loss of thousands of cattle as livestock operators struggled to maintain herds in desperate conditions. Livestock auctions were active as ranchers continued to liquidate herds. Dry conditions, wind, and warm weather created dangerous fire conditions on farms and ranches. The wheat and oat crop conditions were grim across the State with only the Northern Blacklands crop maintaining good to

excellent growing conditions. Few dryland crops were planted in Central or South Texas due to dry soils and no prospect of rain.

Thundershowers in April brought some relief to parts North Central and East Texas. However, most of Southern, Southwestern, West and the Panhandle regions did not receive significant precipitation of the last month, outside of the heavy rains in the northern panhandle. Parts of North, Northeast and East Texas received heavy rains which relieved the majority of the immediate concerns related to agricultural drought. Approximately 48% of the State remained under "Severe" to Exceptional Drought" conditions, up from 44% in March. Lack of water, forage and hay resulted in the loss of thousands of cattle as livestock operators have struggled to maintain herds in desperate conditions. Livestock auctions were active as ranchers continued to liquidate herds. Dry conditions, wind, and warm weather created dangerous fire conditions on farms and ranches.

The wheat and oat crop conditions continued to decline across most of the State through March and April, although significant improvement were observed in North Central and East Texas. Crop surveys in early April indicated that 64% of the wheat and 83% of the oat crop was rated poor to very poor at the point in the growing season. Freeze losses associated with the arctic front on the last week of March and the second week of April were exacerbated by advanced maturity associated with drought.

Significant rains relieved most of the drought conditions across the Plains, Far West, North and East Texas in late May and June, but not before over one million acres of dryland cotton were lost in the High Plains. Several farmers planted failed cotton acres during June rains and successfully produced sorghum and other crops. An early October freeze across the plains resulted in harvest problems for cotton.

The drought continued unabated for Central and South Texas until rainfall brought relief. Record breaking heat and drought continued for through July and August for the majority of the regions. On July 21, Texas AgriLife Extension published estimated drought losses to the agricultural industry which totaled \$3.6 billion in direct losses to agricultural producers, with \$2.6 billion in damage to crop producers and \$974 million attributed to the livestock sector.

Drought and freeze injury resulted in a very limited dryland wheat or oat crop, with 61.3 million bushels of wheat and 2.82 million bushels of oats harvested, down 38% and 44% from 2008 and 56% and 30% respectively from 2007.

The Texas AgriLife Extension service responded to this crisis, interacting with their clientele through a variety of planning and programming efforts. In 2009, the AgriLife Extension participated in 132 workshops, planning sessions, and other drought programming. Extension clientele documented 25,026 contact hours with 8,111 participants and a total of 723,605 contacts through a variety of outreach technologies. Topics included drought monitoring, planning, and management in urban and rural environments for water conservation, livestock, crop, and forage management as well as selection and management of landscape species.

The Texas AgriLife Extension Service worked with state and federal partners in a Joint Information Center (JIC) to establish a one stop drought information clearinghouse, <http://agrilife.tamu.edu/drought>, for the Agricultural Drought Task force initiated by the Texas Division of Emergency Management. This website is continually updated with news from the contributing agencies as well as containing a "Resources for Drought" section which provided data on federal and state resources for drought, weather,

climate, drought, stream flow, and a variety of other resources to inform the public on local and national drought conditions. The success of the multiagency drought task force and the JIC resulted in the creation of a wildfire JIC which is operating in collaboration with the drought JIC. AgriLife Extension also maintains a website, <http://texashelp.tamu.edu/004-natural/droughts.php>, that maintains a large number of resources to provide response and management information on drought.

AgriLife Extension specialists completed an economic estimate of drought losses in Texas on July 21, determining that Texas agriculture has suffered a \$3.6 billion dollar loss through that date. A press release on drought loss was widely published, with 147 citations on a national basis in print and broadcast media. This is one of several drought related news releases that can be found on the drought JIC website and at <http://agnews.tamu.edu>. Extension faculty was involved in local, State, and national news on radio, television, and in printed media to discuss drought related information.

B. Wildfire

Long-term drought conditions carried over from 2008 to 2009 without much relief until September. South Central Texas was largely impacted as drought conditions rivaled those witnessed in the drought of the 1950's. Large fires occurred in both the winter and summer fire seasons over the majority of the State. The situation required the Texas Forest Service (TFS) to bring in additional firefighting resources from other states to combat the problem. In 2009, TFS responded to 1,357 fires burning 361,698 acres.

Attachment 4, the Fire Risk Potential Report, refers to the collection of 2007 Keetch-Byram Drought Index maps. The Keetch-Byram Drought Index (KBDI) is used to assess the danger for spontaneous or otherwise unplanned outdoor fire. The numeric value of the index, ranging from 0 to 800, is an estimate of the amount of precipitation needed to bring the soil back to saturation and is expressed in hundredths of an inch. The index's relationship to fire danger is that as the numerical value increases, vegetation is subjected to increased moisture stress. The KBDI is one of many tools that aid fire planners in making sound, cost effective decisions regarding the protection of lives and property.

C. Water Utilities

In 2009, 342 community water systems implemented voluntary or mandatory water-use restrictions on customers. The communities used established triggers from Drought Contingency Plans to better manage diminishing sources of existing water supply and above average demands during drought conditions to prevent the loss of basic water service to customers and the resulting drought impacts.

D. Reservoirs

Conservation storage in the State's major reservoirs has declined due to the drought lasting from 2008-2009 in a 23 month period beginning in 2008. At the end of December 2007, the State's 109 major reservoirs stored approximately 27.7 million acre-feet of water while at the end of November 2009, the combined conservation storage reduced by 1.9 million acre-feet to 25.8 million acre-feet.

E. Groundwater

Groundwater levels declined at all five TWDB monitoring wells that had records at the end of 2007 and near end of 2009: 8.07 feet in Southwest Castro County, 10.92 foot in Tarrant County, 11.8 feet in Coryell County, 4.21 feet in El Paso, and 20.1 feet in San Antonio.

While groundwater levels were in a rising period in Harris County that started early 1980s, there was a clear decline in Hansford County, Southwest Castro County, Coryell County, Smith County, and El Paso.

F. Wildlife

The historic drought of 2009 possibly contributed to wildlife die-offs, however native wildlife has evolved to bounce back from the drought, and a bigger issue is how human water use is changing the equation, and how drought underscores the need for water planning and conservation.

At the J.D. Murphree Wildlife Management Area near Port Arthur, drought delivered the second half of a one-two punch that started with Hurricane Ike in late 2008. The lack of rainfall meant freshwater marshes at Murphree WMA inundated by Hurricane Ike were not flushed of salt water. The brackish marshes were saltier than usual, and suffered the same stresses as freshwater marshes. Little fresh water was available for use by mottled duck broods, which will likely lead to a very low production of mottled ducks this season. Mottled ducks are the only Texas year-round resident duck, and are prized by hunters and wildlife biologists. They have declined for the past 30 years due to habitat loss and other factors, so drought effects added stress to an already stressed population. Alligators and amphibians were unable to recolonize areas inhabited before Hurricane Ike because of salt water, and populations of these animals will likely remain depressed for the next several years.

Down the coast at the Aransas National Wildlife Refuge, drought contributed to the worst winter on record for the world's only wild flock of endangered whooping cranes. After an encouraging multi-year comeback in which flock numbers grew each year, this was the first decline since 2001. Once numbering only 21 birds on earth, the species reached a population high last winter of 270. However, the flock experienced higher-than-average mortality last year, as 23 cranes died over the course of the winter. Refuge biologists attributed the high mortality to lower food and freshwater availability associated with the severe drought of the last two years. Canadian biologists reported reproduction on the nesting grounds was also lower than usual during Summer 2009, and, with only 22 chicks sighted in August, it is unlikely the species will reach a new high this year.

In the Edwards Plateau of Central Texas, at spots like Garner State Park, there were reports of non-native axis deer dying from starvation coupled with cold weather earlier this year. TPWD wildlife biologists reported poor range conditions with thin prickly pear. Even feral hogs appeared thin.

In the Trans-Pecos region of West Texas, last summer TPWD wildlife biologists observed a considerable drop in the pronghorn antelope population in portions of Jeff Davis and Presidio Counties, although overall Trans-Pecos pronghorn populations remained only slightly below the 30-year average. The specific causes are not known,

but biologists believe there were several compounding factors, including how much of the affected area received no measurable rainfall from November 2007 to June 2008. A scorching one-two punch of prolonged low rainfall and record high temperatures in Central and Southern Texas stressed fish and other aquatic creatures, especially rare species that depend on spring flows, and decreased river flows sent salt content in mid-coast bays soaring. A key problem was low dissolved oxygen in the water caused by low flows. TPWD and U.S. Fish and Wildlife Service scientists transplanted stands of endangered native Texas wild rice to deeper water sections along the San Marcos River, where for the first time since the record drought of the 1950s botanists reported exposed river bed in certain areas.

In some areas lake levels were low. As lake levels decrease, fishing can improve if water level declines are gradual enough so populations have a chance to adjust. Biologists emphasize the importance of controlling invasive species and restoring native habitat so aquatic ecosystems are better able to handle pressures such as drought. In addition to low rainfall and water levels, some western lakes were impacted by toxic golden alga blooms and associated fish kills.

On the central coast, where drought-stricken rivers such as the Colorado and Guadalupe drain into bays and estuaries, low river inflows equate to high bay salinity. Although this high salt content is at the upper reaches of fish tolerance levels for Aransas populations, there has been a fairly gradual salinity increase since early 2008, so marine organisms have been able to adapt fairly well. Oysters suffered from high salinity, as did some less tolerant species of ecologically important seagrass such as widgeon grass.

Rains received late in the year assisted habitat conditions but there is still room for improvement. For example, this year's buck antler growth which is most likely not better than average throughout the Edwards Plateau region, or with the fawn production that is also not better than average. But if it continues to rain throughout the fall and winter, the stage is being set for better antler growth and fawn production next year.

G. ROADWAYS

Drought continued to impact roadways, especially as a contributing factor of longitudinal cracking. In statewide sampled pavement, the percentage of pavement exhibiting longitudinal cracking increased by four percent. It increased from a level of 38.90% during FY 2008 to 42.90% during FY 2009. In an informal comparison, pavements with the most decline in scores appeared to be those over naturally-shifting soils impacted by drought.

The Texas Department of Transportation (TxDOT) continually monitors the condition of state-maintained highways. Pavement conditions are formally recorded in TxDOT's Pavement Management Information System and published annually.

V. COUNCIL PROJECTIONS (Long-range Forecast)

The exceptional drought conditions which covered Central and South Texas during the summer of 2009 were eradicated due to widespread, abundant precipitation during the autumn and early winter. As of early February 2010, only 0.4% of the State was designated as experiencing drought conditions, all of which is "Moderate Drought" and located in Kinney, Maverick, Uvalde, and Zavala counties. Based on the expectation of continued and significant wintertime precipitation in the small region currently with drought conditions, the entire State is likely to be drought-free by the beginning of spring 2010.

A significant El Niño continues to be present in the equatorial Pacific and is expected to remain in place into the spring of 2010, though its magnitude is expected to lessen over the next couple of months. El Niño normally brings cooler than normal temperatures and greater than normal precipitation across Texas. The Climate Prediction Center (CPC) anticipates a high probability for above normal precipitation through April across all of Texas. The probability of wetter than normal conditions is greatest in South Texas, which is the region devastated by drought conditions during most of 2009.

As the year progresses into late spring and summer and the El Niño-Southern Oscillation likely enters a neutral phase, the picture is less certain. Summertime precipitation is mostly convective making it unpredictable, and this is reflected in long range precipitation forecasts. Through the end of 2010, the seasonal precipitation outlooks produced by the CPC have equal chances of above normal, near normal, and below normal precipitation, even into the winter of 2010-2011.

The warm summer temperatures can accelerate soil moisture evaporation during dry periods, as evidenced in 2009. Most of Texas has an equal chance of warmer than normal, near normal, or cooler than normal temperatures for summer of 2010 according to the CPC. However, temperatures are forecasted to be above normal across both the Desert Southwest and Southeastern United States. Therefore, both Far West Texas and Southeast Texas are forecasted to have greater than equal chances of above normal summer temperatures.

Though the impacts of drought lessened significantly over the past few months, uncertainty in the precipitation forecast beyond early spring means drought has a possibility of returning to Texas in 2010. Drought Preparedness Council member agencies continue their mission of assisting the State and its citizens lessen the devastating effects of drought. Member agencies will continue to work with local officials in an effort to guard against drought-related impacts as well as to educate the public on the efficient use of water resources. Public outreach efforts such as publications, radio and television announcements, workshops, meetings, and seminars continue to be valuable tools used in this strategy.

VI. DROUGHT INDICES AND GRAPHS

The following indices are used to represent the various means of measuring drought conditions. An explanation follows as to their use, and the graphics illustrate drought conditions and changes over monthly time periods.

Standard Precipitation Index (SPI) (Attachment 1)

The SPI was designed to quantify the precipitation deficit for multiple time scales. These time scales reflect the impact of drought on the availability of the different water resources.

Palmer Drought Severity Index (PDSI) (Attachment 2)

The PDSI is a "meteorological" drought index and responds to weather conditions that have been abnormally dry or abnormally wet. The Palmer Index provides decision-makers with a measurement of the abnormality of recent weather for a region, an opportunity to consider current conditions in a historical perspective, and a spatial and temporal representation of historical droughts.

Crop Moisture Index (CMI) (Attachment 3)

The Crop Moisture Index (CMI) is an index that uses a meteorological approach to monitor week-to-week crop conditions. It was designed to evaluate short-term moisture conditions across major crop producing regions. It is based on the mean temperature and total precipitation for each week within a Climate Division, as well as the CMI value from the previous week-to-week crop conditions.

Fire Risk Potential Report (Attachment 4)

The Fire Risk Potential Report refers to mid-month Keetch-Byram Drought Index (KBDI) maps. The Keetch-Byram Drought Index is a drought index specifically used for fire potential assessment. The numeric value of the index, ranging from 0 to 800, is an estimate of the amount of precipitation (in hundredths of an inch) needed to bring the soil back to saturation. The KBDI is directly correlated to fire danger; as the index increases, the vegetation is subjected to increased moisture stress.

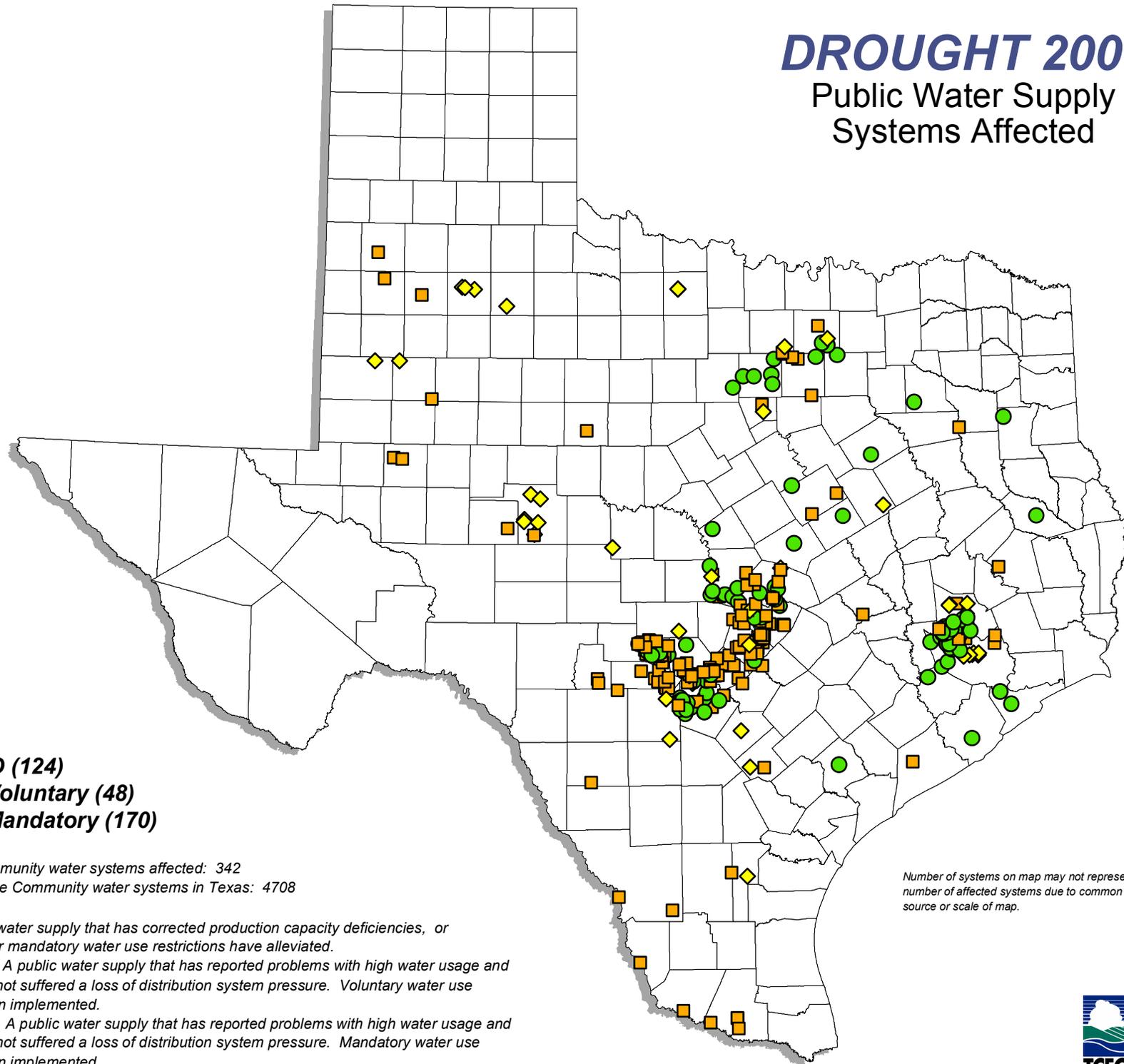
Public Water Supply Watch Map (Attachment 5)

The Texas Commission on Environmental Quality (TCEQ) maintained a drought database, also referred to as the "Watch" list, which included a listing and a map of public water systems experiencing drought-related problems. The "Watch" list was updated regularly. The TCEQ priority classification system for the database is as follows: (1) Emergency, (2) Priority or Outage, (3) Watch, and (4) Resolved.

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DROUGHT 2009

Public Water Supply Systems Affected



- **RESOLVED (124)**
- ◆ **WATCH - Voluntary (48)**
- **WATCH - Mandatory (170)**

Total number of Community water systems affected: 342
Total number of active Community water systems in Texas: 4708

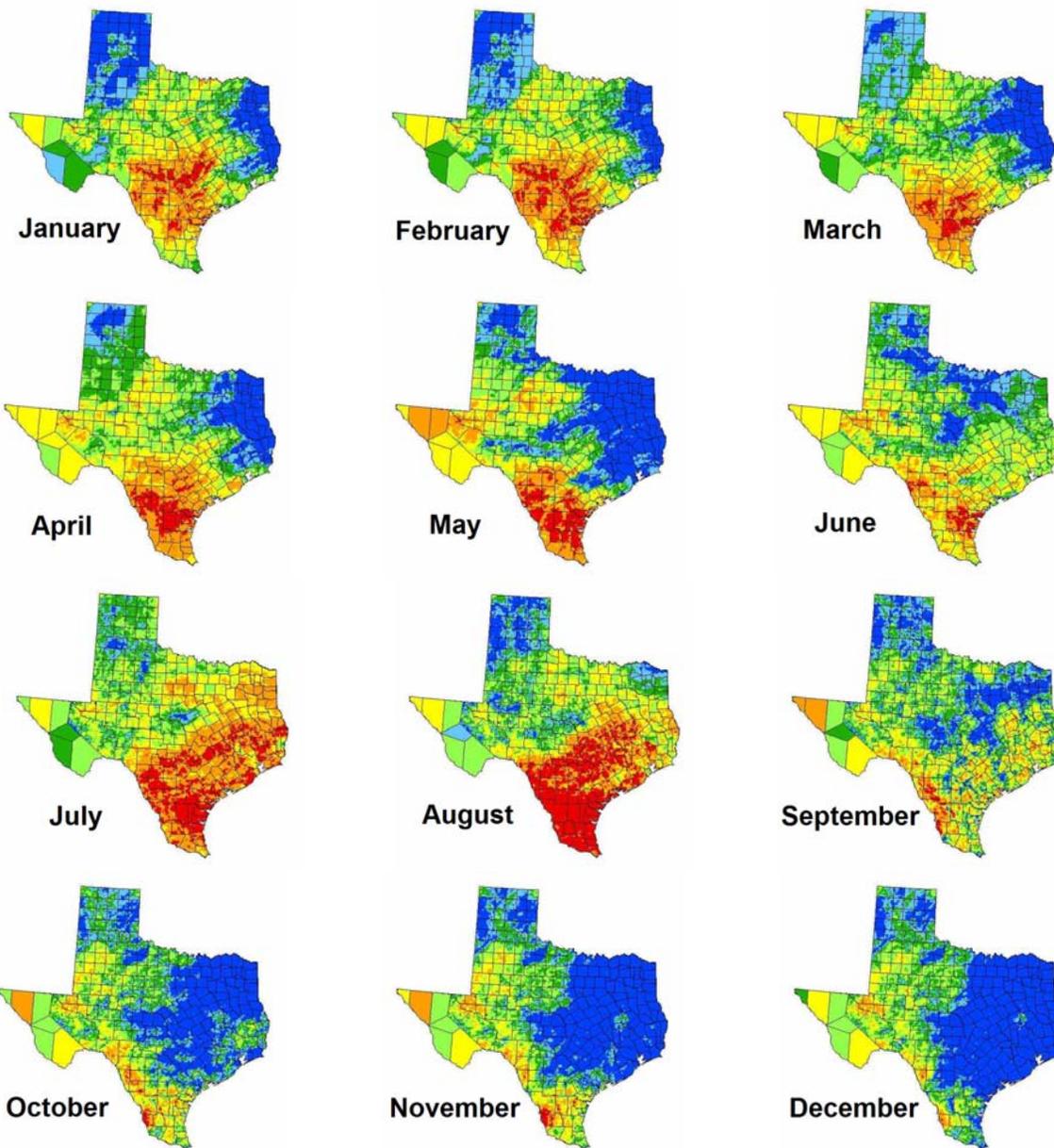
Resolved A public water supply that has corrected production capacity deficiencies, or drought conditions for mandatory water use restrictions have alleviated.

Watch - Voluntary A public water supply that has reported problems with high water usage and production, but has not suffered a loss of distribution system pressure. Voluntary water use restrictions have been implemented.

Watch - Mandatory A public water supply that has reported problems with high water usage and production, but has not suffered a loss of distribution system pressure. Mandatory water use restrictions have been implemented.

Number of systems on map may not represent total number of affected systems due to common water source or scale of map.

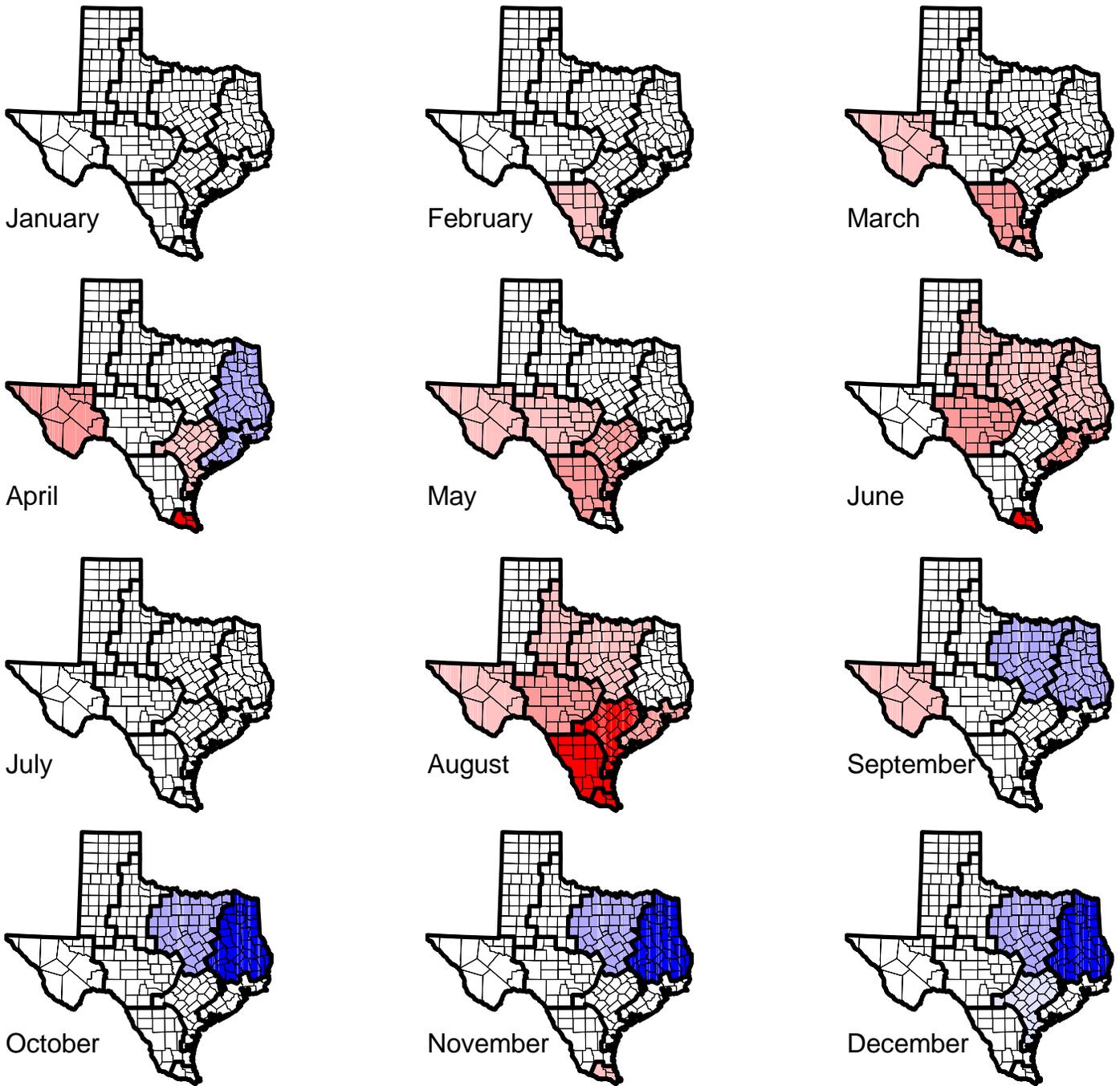
Attachment 4. Fire Risk Potential Report for 2009



Mid-Month Keetch-Byram Drought Index

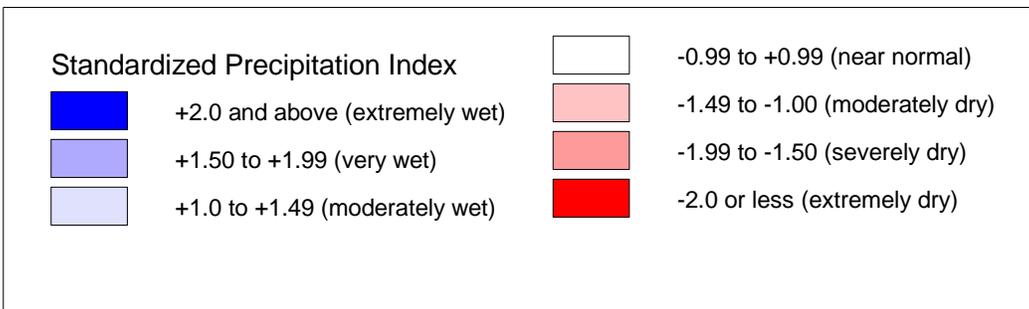
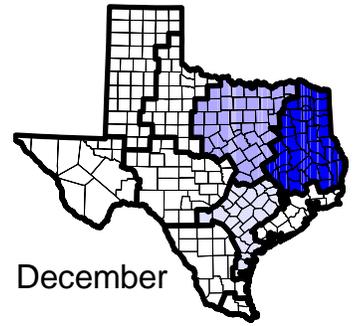
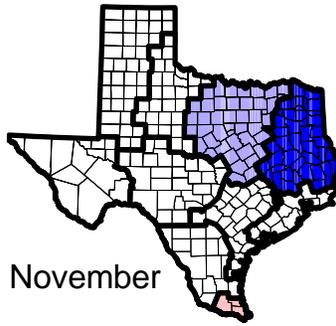
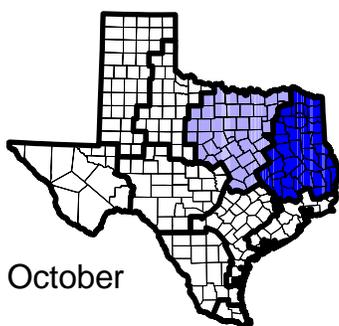
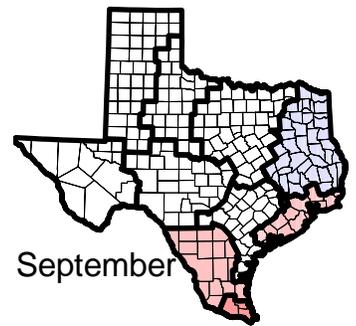
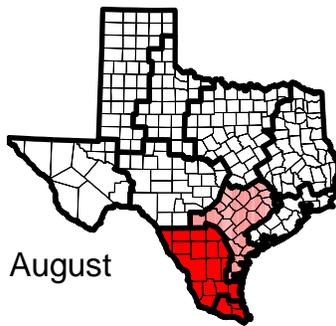
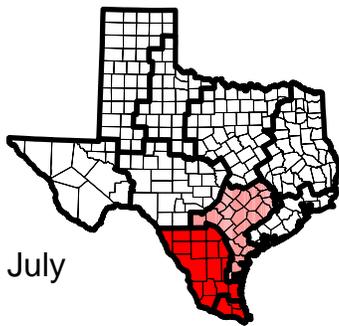
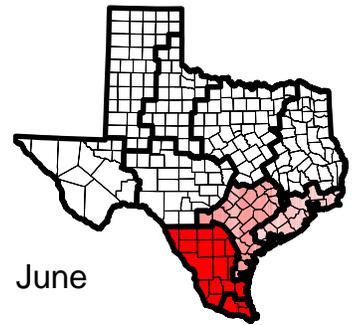
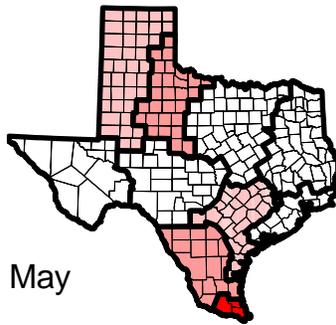
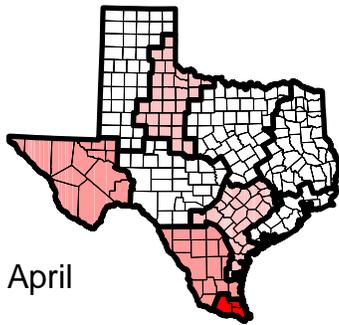
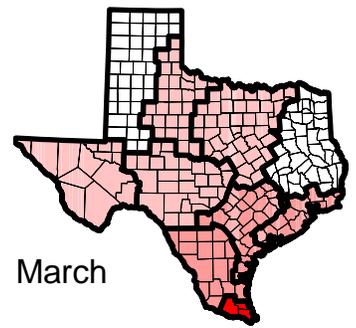
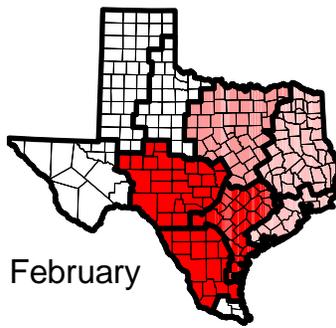
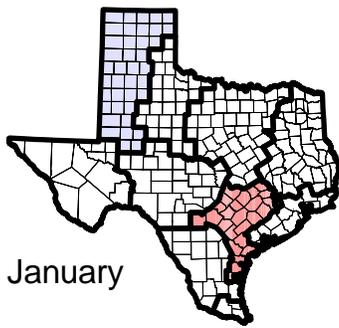
	0 – 200	} Soil moisture and large class fuel moistures are high and do not contribute much to fire intensity. Typical of spring dormant season
	200 – 300	
	300 – 400	} Typical of late spring; early growing season. Lower litter and duff layers are drying and beginning to contribute to fire intensity.
	400 – 500	
	500 – 600	} Typical of late summer, early fall. Lower litter and duff layers contribute to fire intensity and will burn actively.
	600 – 700	
	700 – 800	} Often associated with more severe drought and increased wildfire occurrence. Intense, deep-burning fires with significant downwind spotting can be expected. Live fuels can also be expected to burn actively at these levels.

Attachment 3. Crop Moisture Index 2009



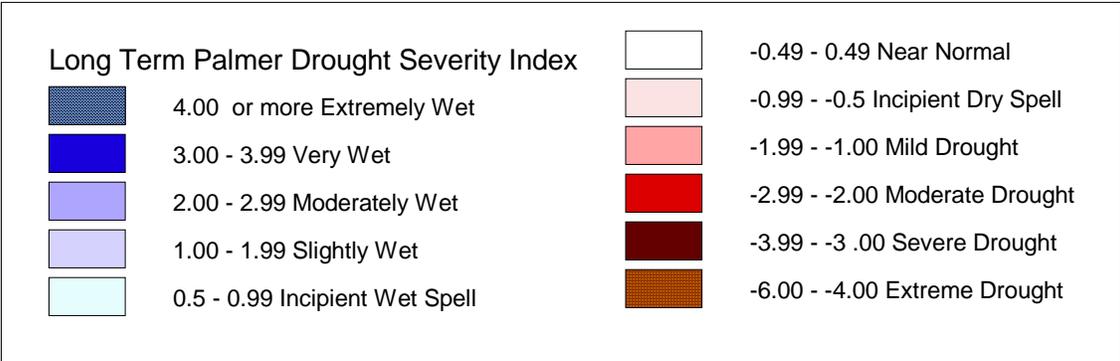
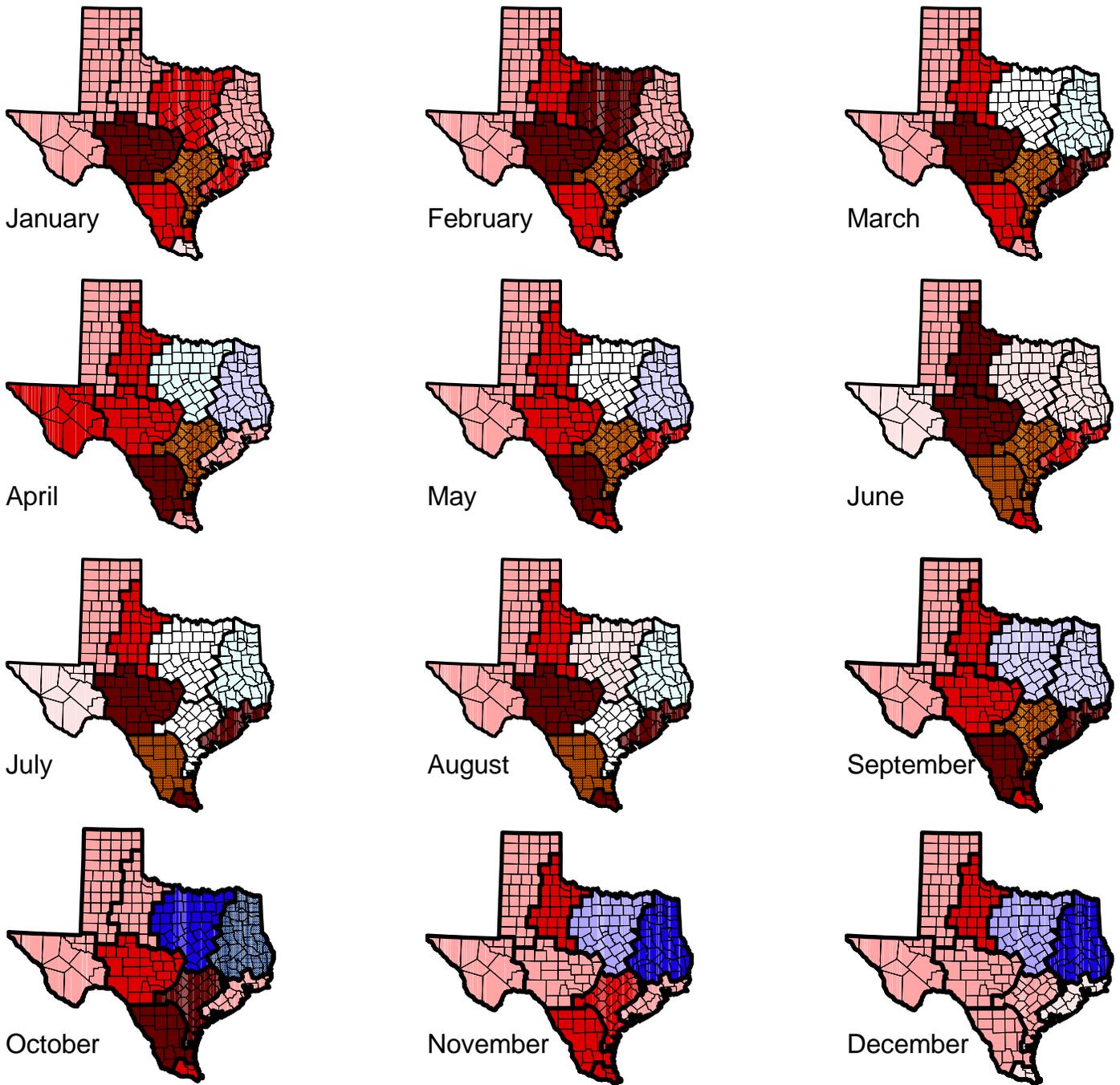
Data courtesy of the Climate Prediction Center, NCEP, NWS, NOAA

Attachment 1. Six Month Standardized Precipitation Index 2009



From NCDC, 2009

Attachment 2. Long-Term Palmer Drought Severity Index 2009



Data courtesy of the Climate Prediction Center, NCEP, NWS, NOAA.