

# Drought...How Much Longer?

Geronimo and Alligator Creeks Watershed Meeting

Seguin, Texas

June 10, 2013

Mark Lenz

Senior Service Hydrologist

National Weather Service

Austin/San Antonio

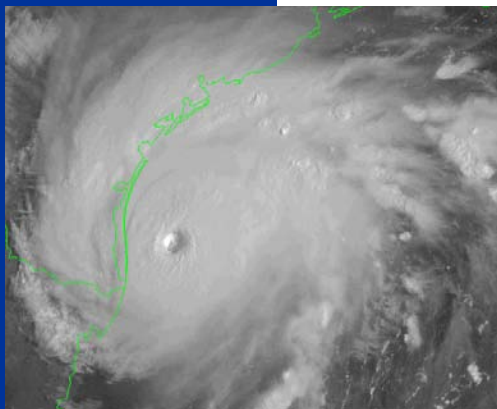
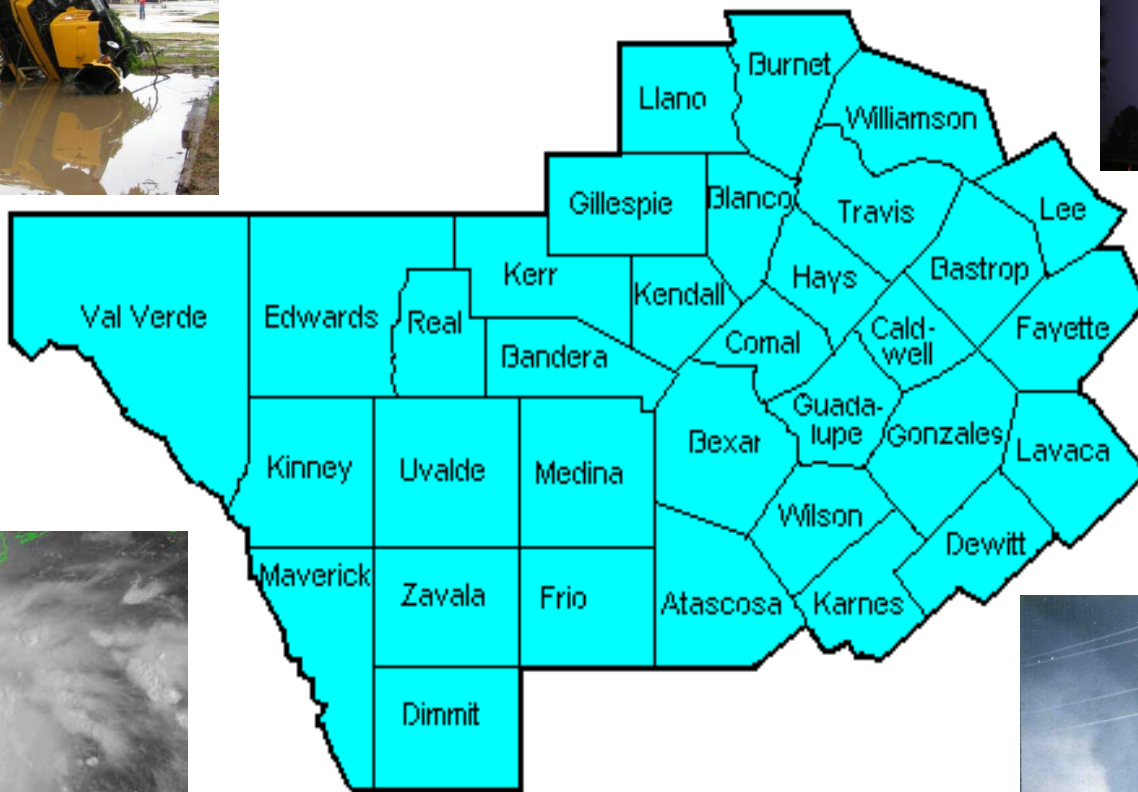


# National Weather Service

Austin/San Antonio  
Weather Forecast Office

Austin/San Antonio National Weather  
Service Office  
2090 Airport Road  
New Braunfels, TX 78130

# *Austin/San Antonio National Weather Service Office*



# NWS Forecast



- Severe Warnings
- Public forecast
- River Stage
- Aviation forecast
- Air Quality/Hazmat
- Fire Weather

✓ Climate Patterns

✓ Look back to 2011

✓ Current Status – Drought/Lakes

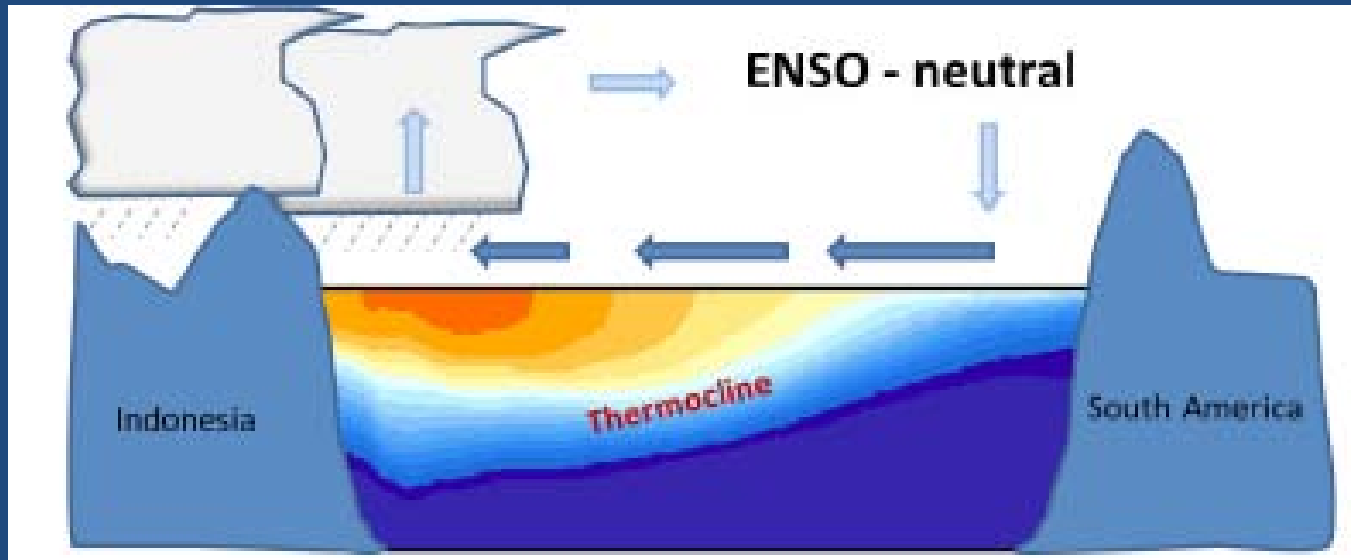
✓ Outlook - Short Term/Long Term



# Nino 3.4 Region

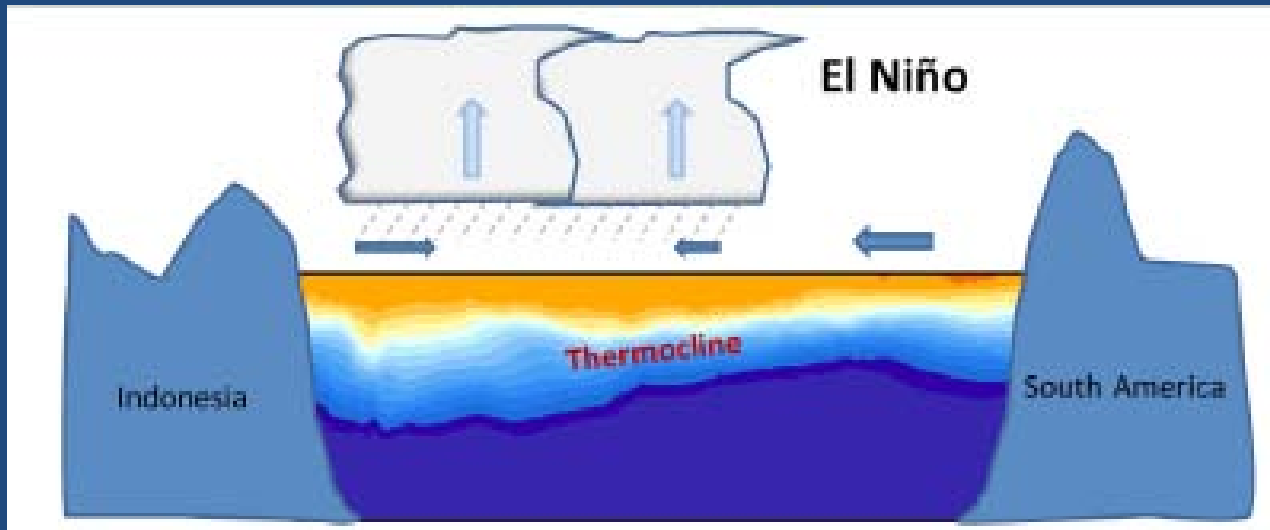






Enso-neutral – Strong trade winds blow from the east along the equator, pushing warm water into the western Pacific.





El Niño conditions occur when abnormally warm waters accumulate along the equator in the central and eastern Pacific Ocean associated with the weakening of the low-level easterly winds. Tropical rains that usually fall over Indonesia shift eastward.

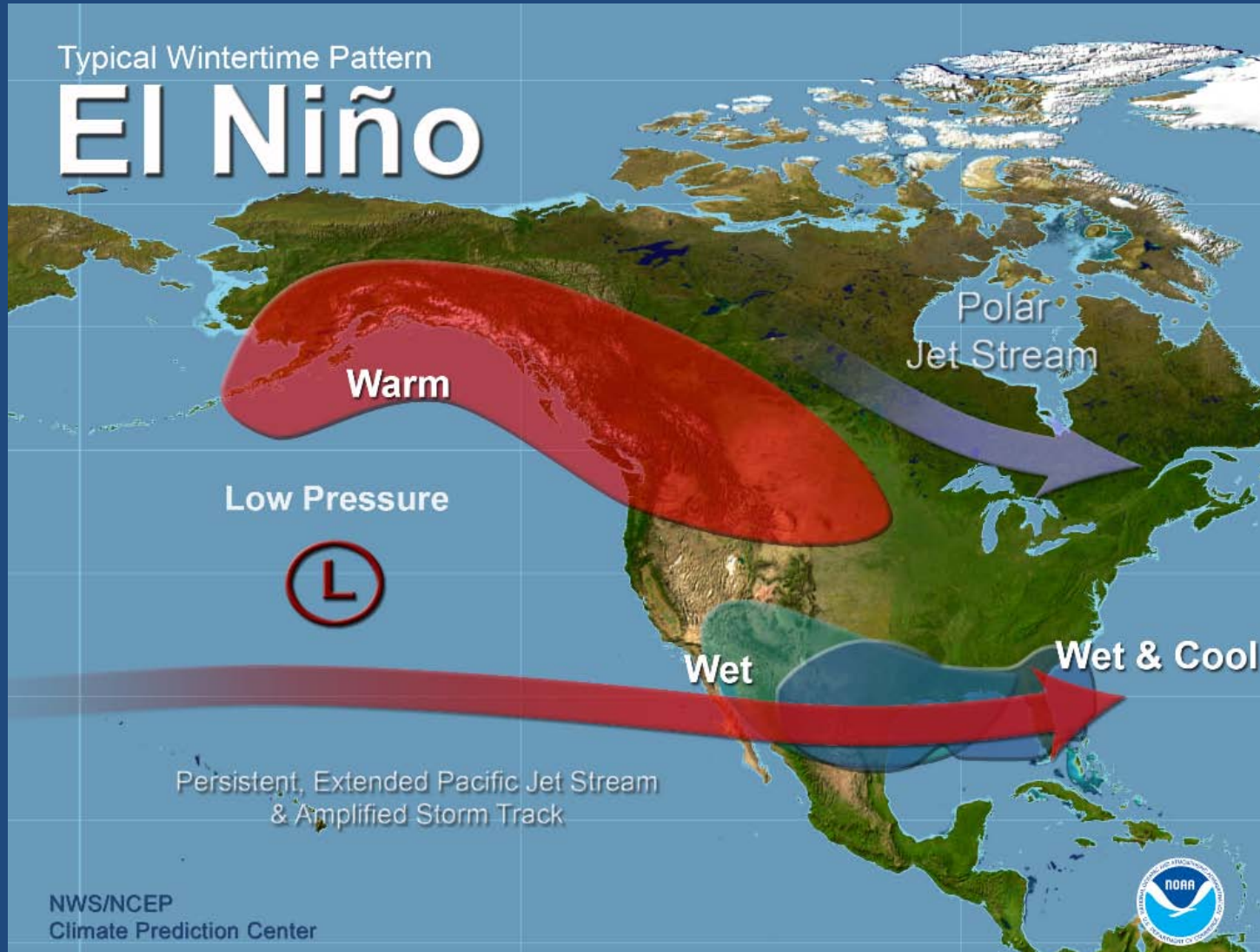


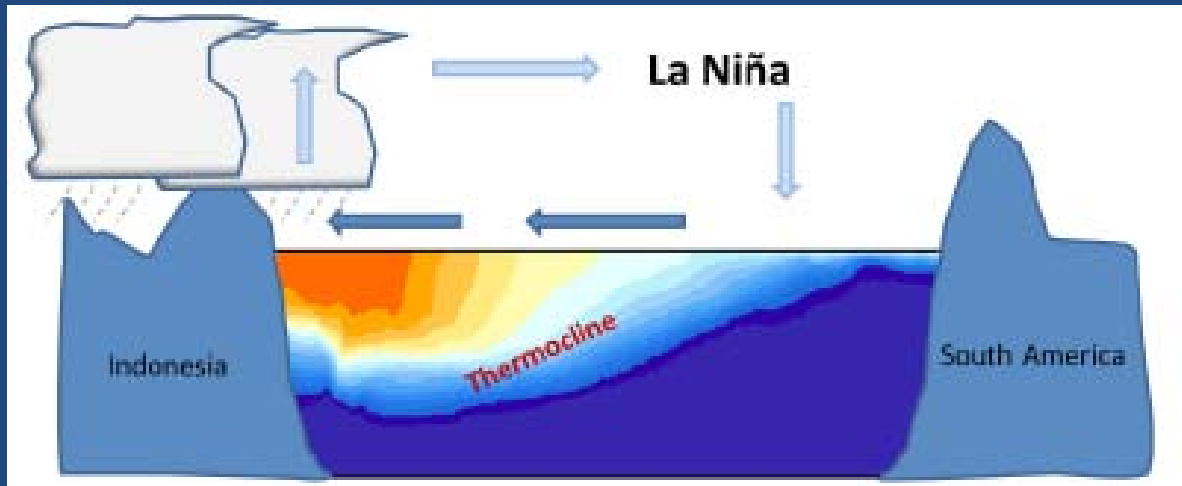


# El Niño

Typical Wintertime Pattern

## El Niño





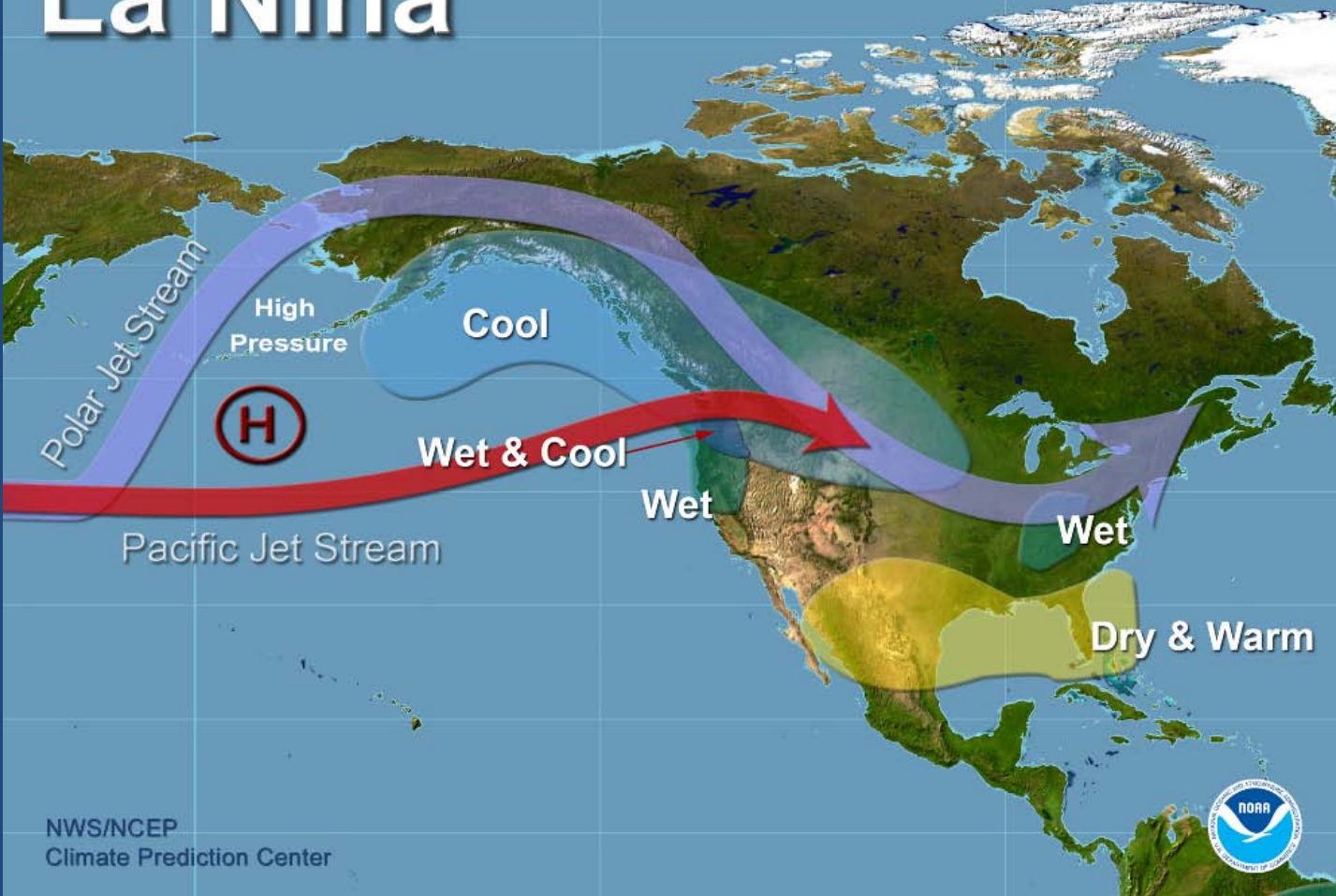
La Nina conditions occur when cooler-than-average waters accumulate in the central and eastern pacific, associated with the strengthening of the low-level easterly winds over the central tropical Pacific. Heavy rainfall is seen over Indonesia and Malaysia.



# La Niña

Typical Wintertime Pattern

## La Niña



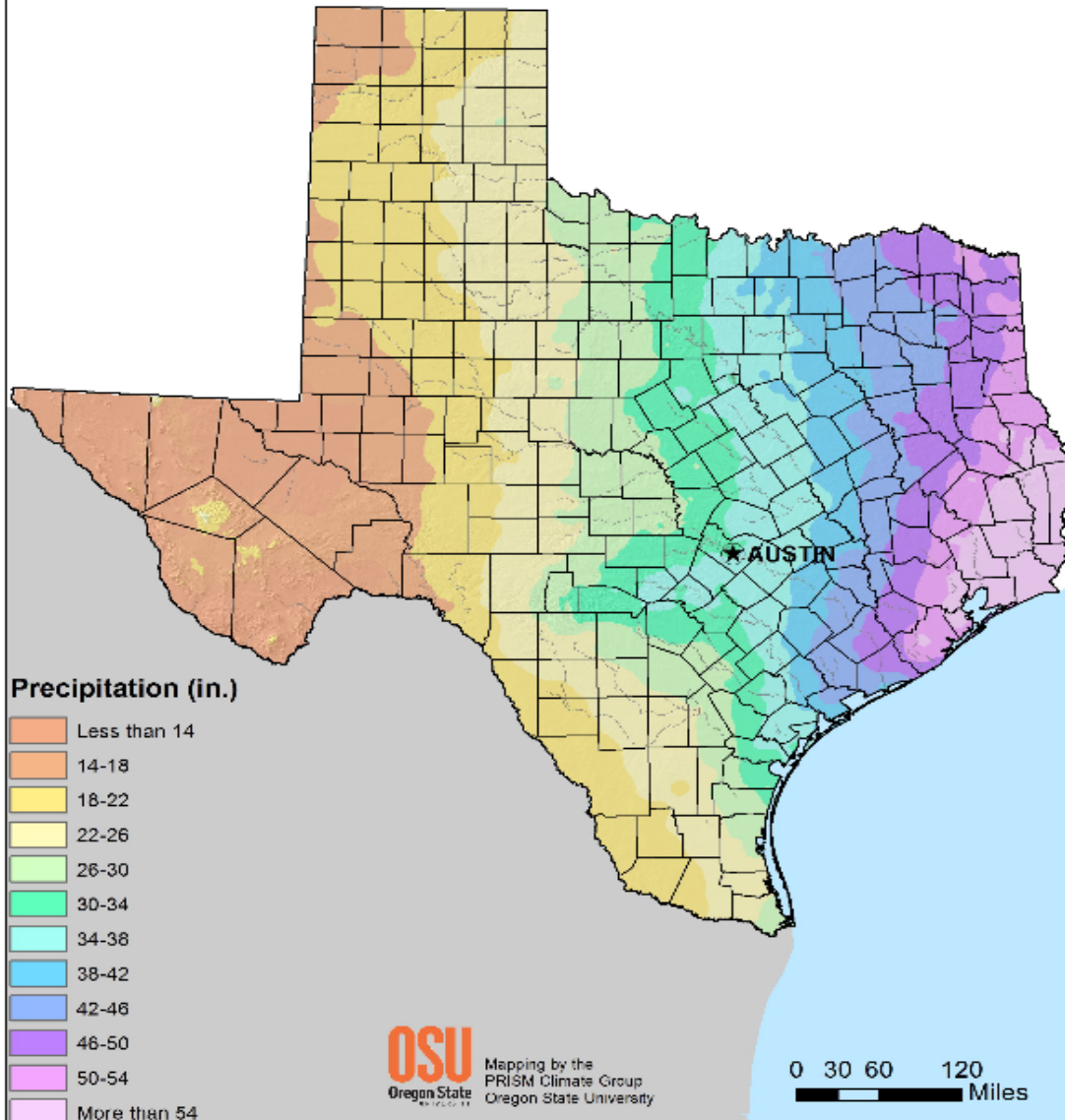




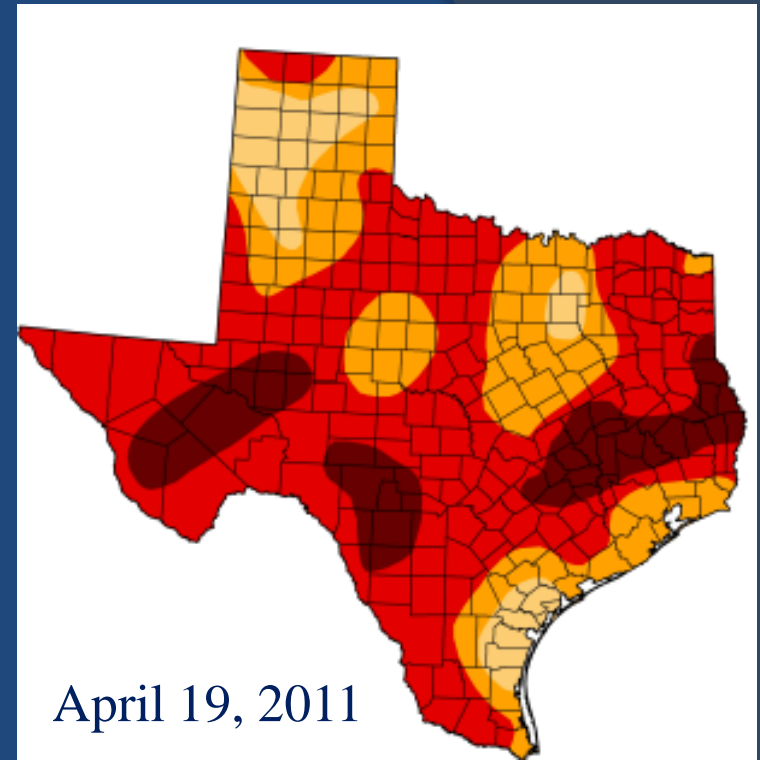
A running wildfire threatens a home on April 19, 2011 in Strawn, Texas. (Tom Pennington/Getty Images) # [🔗](#)

# Texas

## Mean Annual Precipitation (1981-2010)



First time since  
 October 17, 2000  
 Entire state in D1/D4



Texas

**Drought Severity**

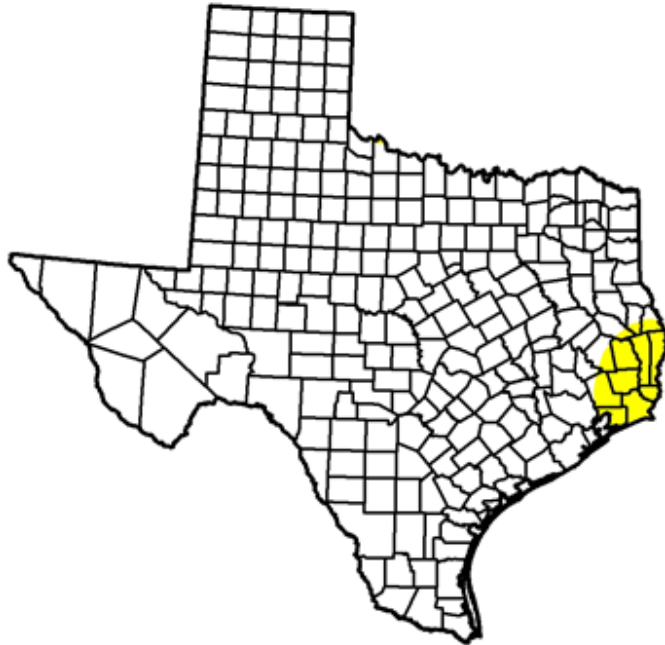
- D0 - Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Week	Nothing	D0-D4	D1-D4	D2-D4	D3-D4	D4
April 19, 2011	0.00	100.00	100.00	91.52	67.96	14.99
April 12, 2011	0.00	100.00	97.94	86.43	60.57	10.03
April 5, 2011	0.00	100.00	97.99	86.50	60.14	4.81
March 29, 2011	0.00	100.00	94.87	78.54	43.07	0.00

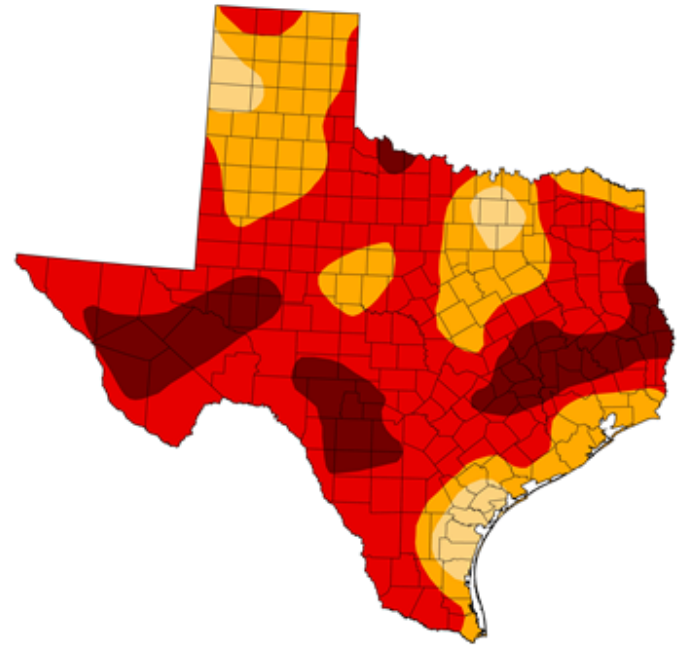
[http://www.drought.unl.edu/dm/dmtabs\\_archive.htm](http://www.drought.unl.edu/dm/dmtabs_archive.htm)

# Drought Monitor – County Level Maps

## April 27, 2010 vs April 26, 2011



April 27, 2010



April 26, 2011

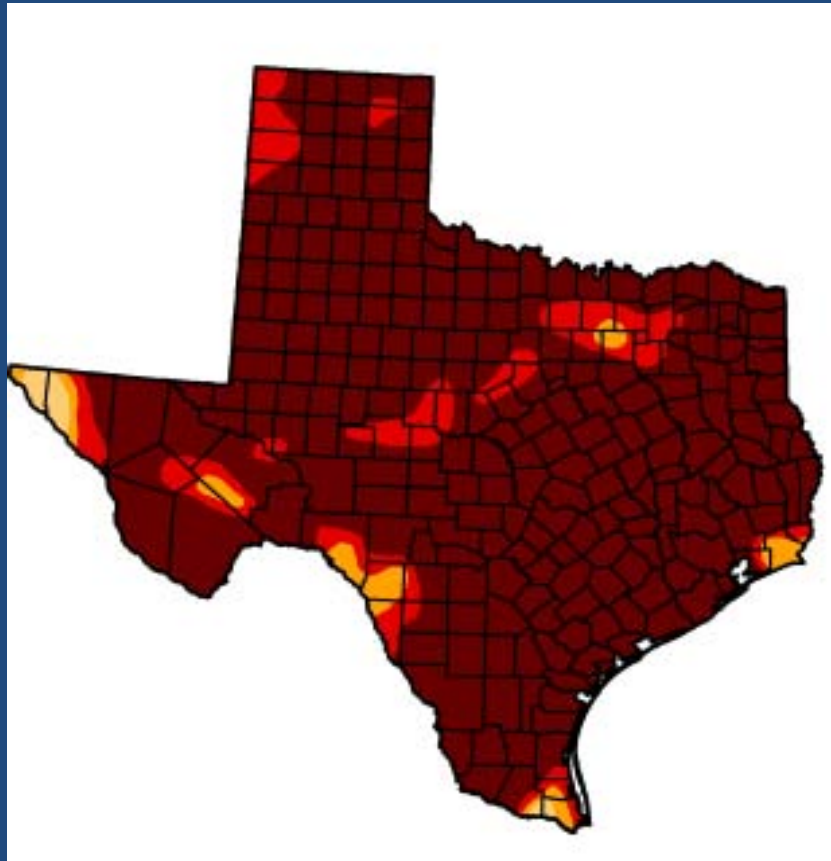
Week	Nothing	D0-D4	D1-D4	D2-D4	D3-D4	D4
April 27, 2010	96.94	3.06	0.00	0.00	0.00	0.00
April 26, 2011	0.00	100.00	100.00	94.97	70.42	17.16

<http://www.drought.unl.edu/dm/archive.html>



# Drought Monitor Map – September 13, 2011

<http://www.drought.unl.edu/dm/monitor.html>



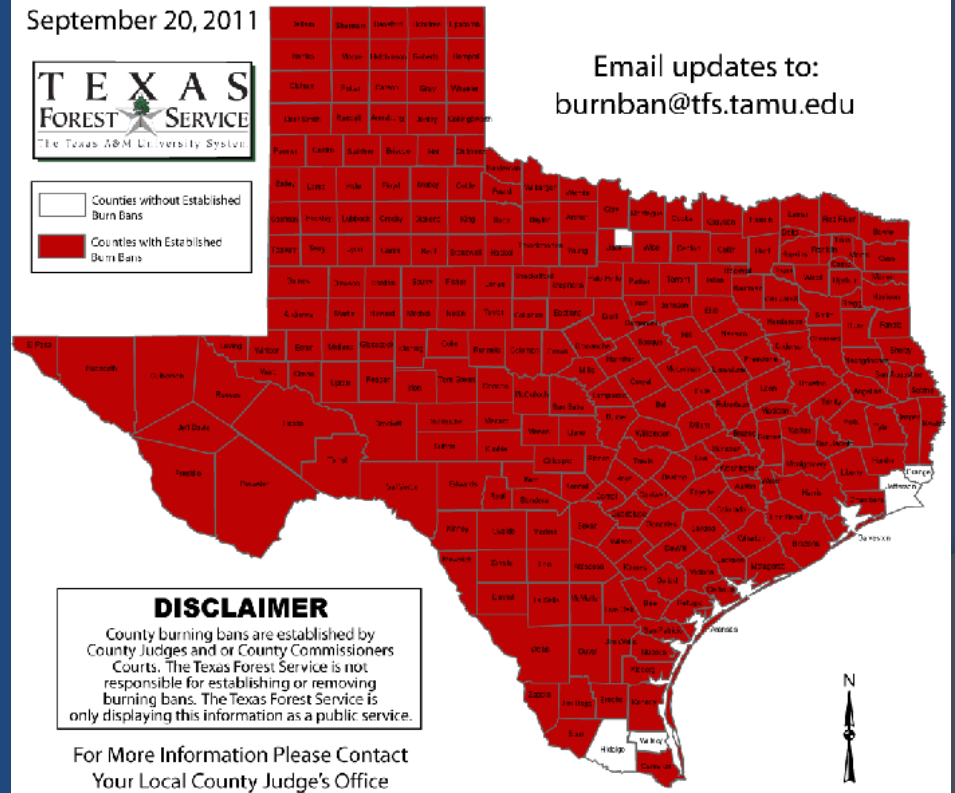
## Outdoor Burn Bans

September 20, 2011



Counties without Established Burn Bans  
 Counties with Established Burn Bans

Email updates to:  
[burnban@tfs.tamu.edu](mailto:burnban@tfs.tamu.edu)



### DISCLAIMER

County burning bans are established by County Judges and or County Commissioners Courts. The Texas Forest Service is not responsible for establishing or removing burning bans. The Texas Forest Service is only displaying this information as a public service.

For More Information Please Contact  
Your Local County Judge's Office

### Intensity:

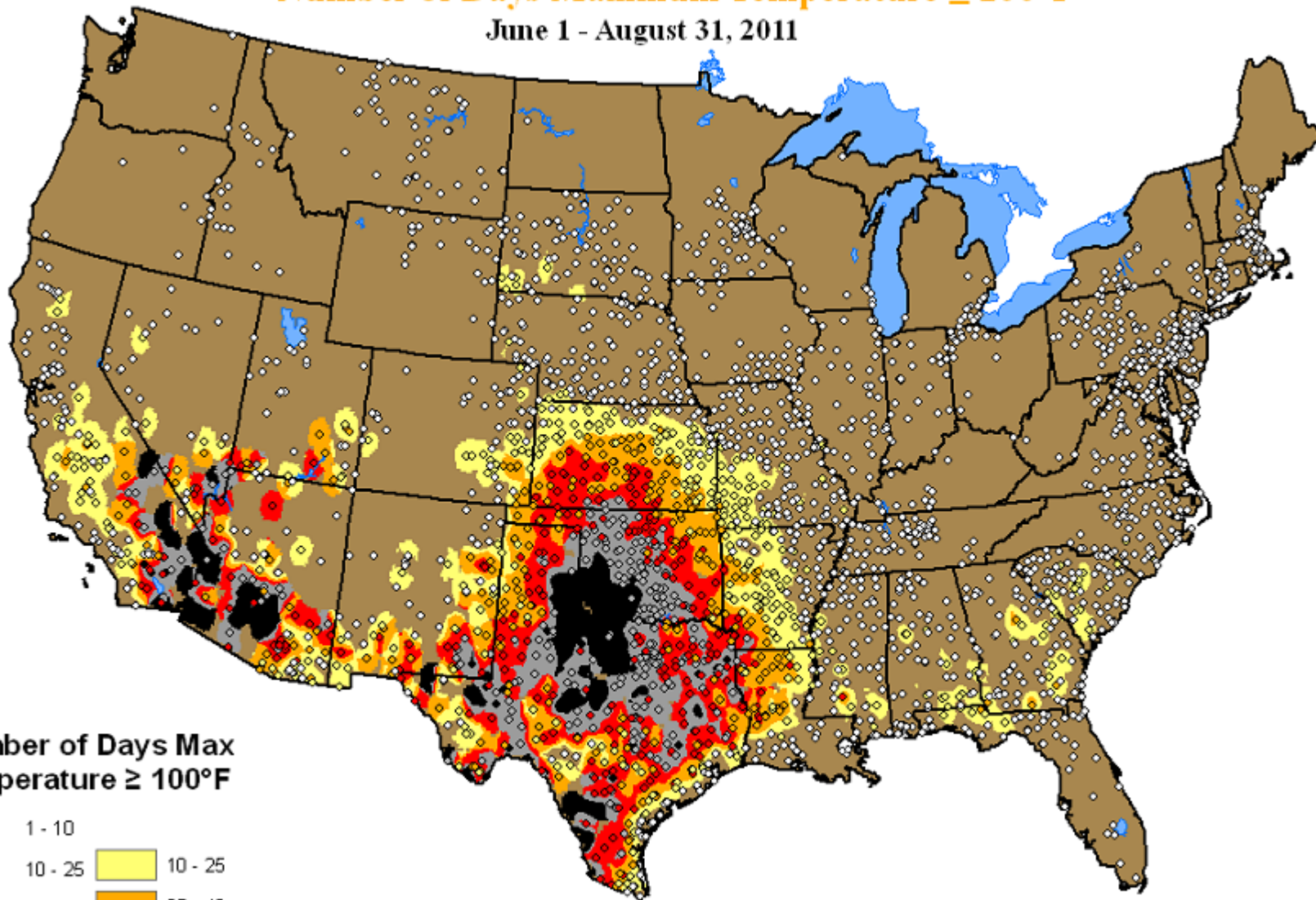
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

<http://tfsfrp.tamu.edu/wildfires/decban.png>

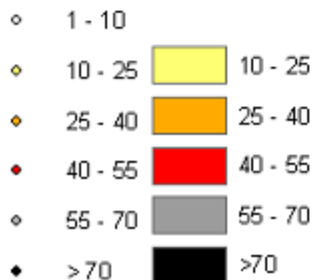
# Persistent Heat Engulfs Much of the Nation - Summer 2011

Number of Days Maximum Temperature  $\geq 100^{\circ}\text{F}$

June 1 - August 31, 2011



Number of Days Max  
Temperature  $\geq 100^{\circ}\text{F}$



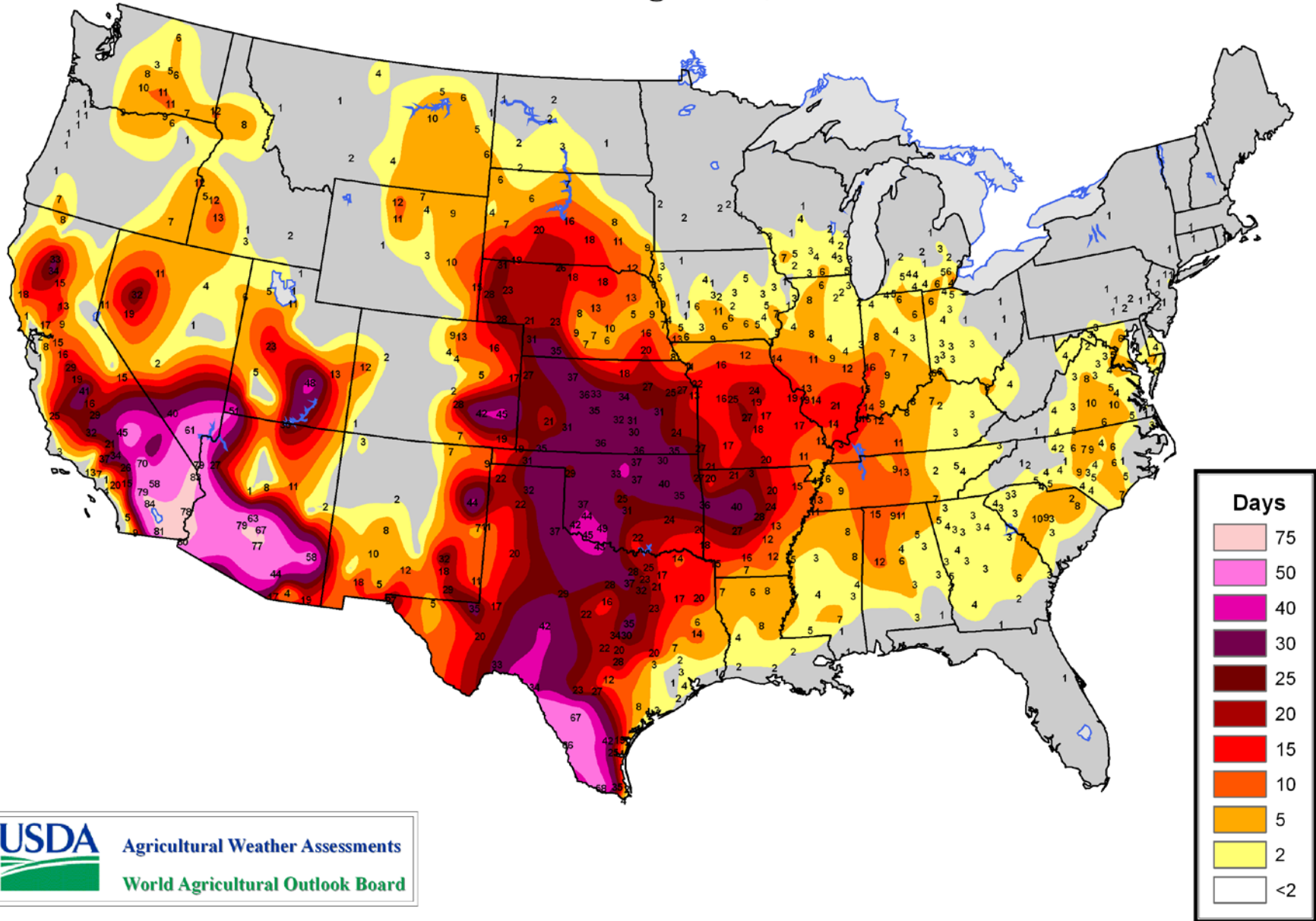
Total number of stations: 2776 (only includes 60 or more non-missing days).  
Leader: Laredo AP TX 90 out of 92 possible days.  
Preliminary data: full quality assurance not yet applied.  
Last updated: October 19, 2011



NOAA's  
National Climatic Data Center

# Number of Days $\geq 100^{\circ}\text{F}$

June 1 - August 31, 2012



Agricultural Weather Assessments

World Agricultural Outlook Board





Near Hockley, Texas

Photo by Dr. Nielsen-Gammon



Photo's Courtesy of  
Jay Janner  
Austin American-Statesman

# *October 1, 2010 through August 31, 2011*

- New Braunfels (BAZ) – Driest 8.08”
- College Station (CLL) – 3<sup>rd</sup> Driest 12.57”
- Austin Mabry (ATT)– 2<sup>nd</sup> Driest 11.02”
- Del Rio (DRT) – 8<sup>th</sup> Driest 6.68”
- San Antonio (SAT) – Driest 7.78”
- Austin Bergstrom (AUS) – 3<sup>rd</sup> Driest 9.78”
- City of Houston (IAH) – 2<sup>nd</sup> Driest 16.72”
- Houston Hobby (HOU) – 7<sup>th</sup> Driest 21.91”





# 2011-Texas had the warmest summer on record for the United States

- 
- Texas - 86.8 degrees F (warmest)
  - Oklahoma - 86.5 degrees F (2<sup>nd</sup> warmest)
  - Oklahoma 1934 - 85.2 degrees F (3<sup>rd</sup> warmest)
  - Louisiana - 84.5 degrees F (4<sup>th</sup> warmest)

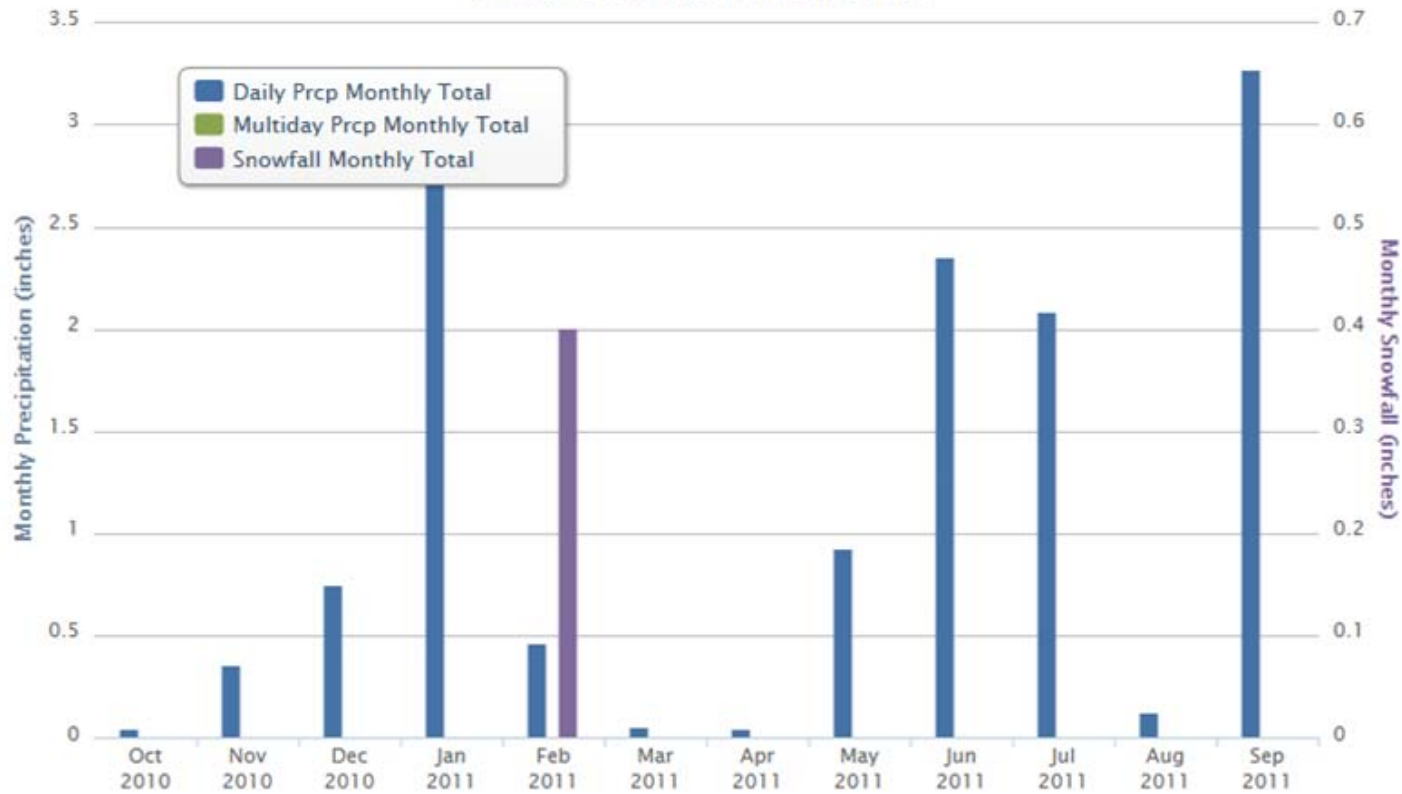
Monthly Prcp Totals Chart

Accumulated Prcp Chart

Daily Prcp Chart

Monthly Precipitation for the 2011 Water Year (Oct 2010 – Sept 2011)

Station: TX-CML-3 New Braunfels 3.1 WNW



13.61"



<http://www.cocorahs.org>



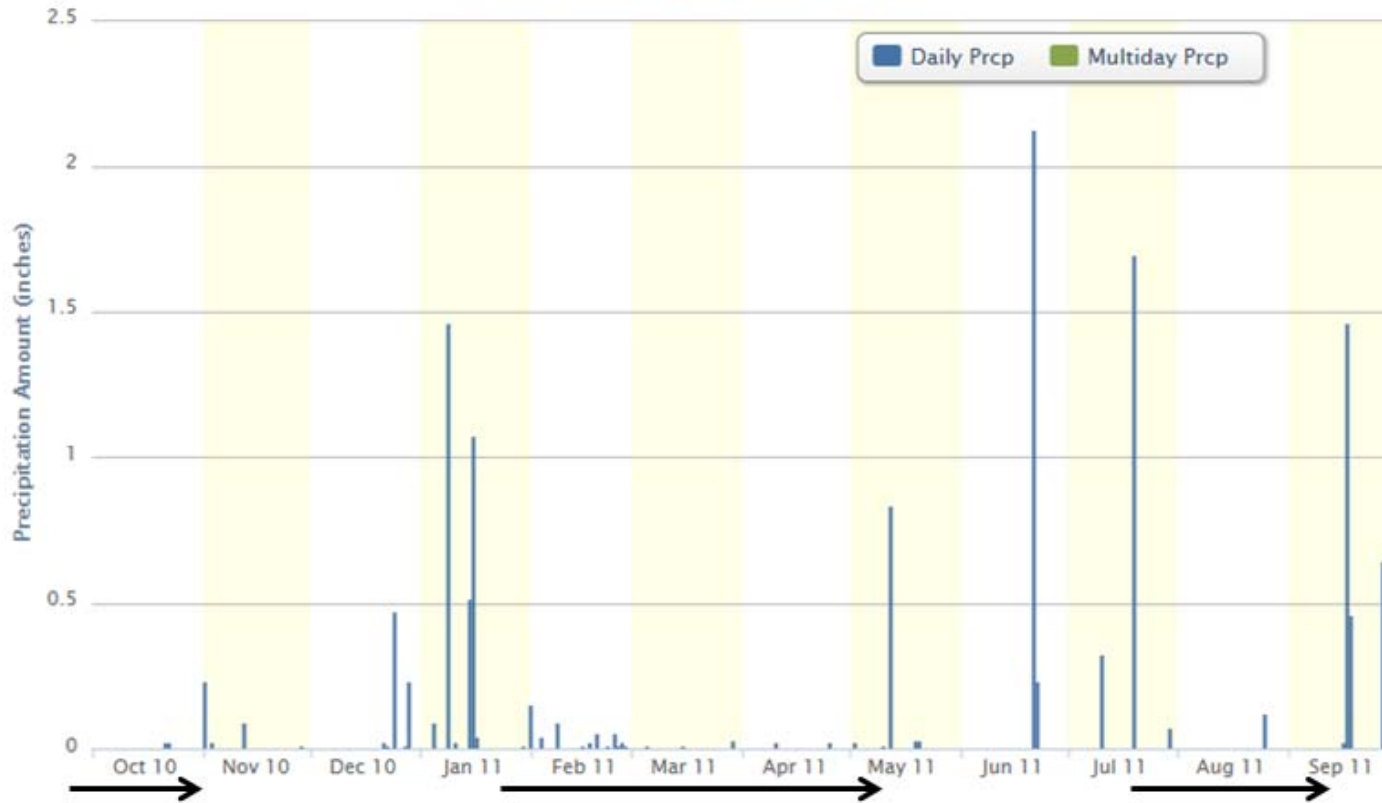
Monthly Prcp Totals Chart

Accumulated Prcp Chart

Daily Prcp Chart

### 2011 Water Year (Oct 2010 – Sept 2011) Daily Precipitation

Station: TX-CML-3 New Braunfels 3.1 WNW



13.61"



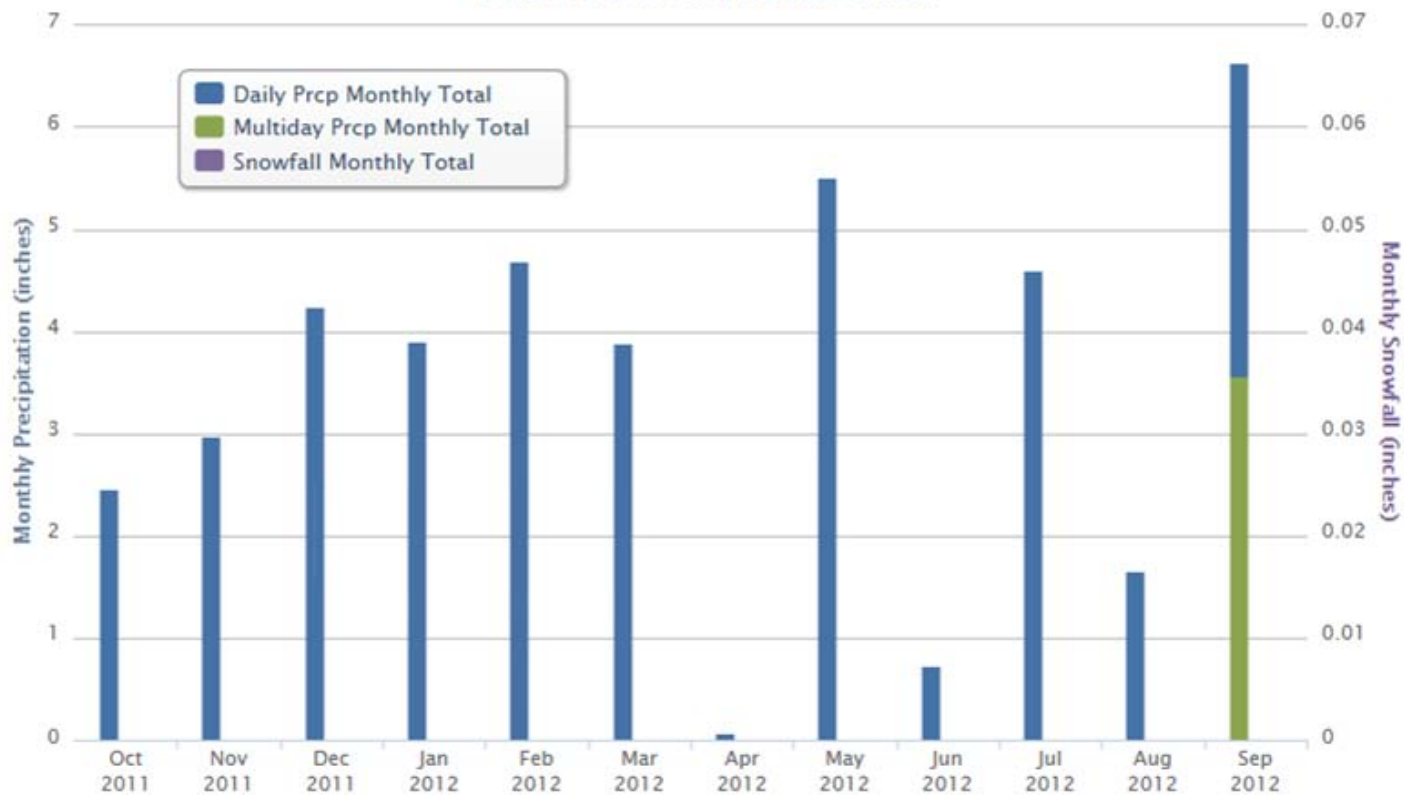
Monthly Prcp Totals Chart

Accumulated Prcp Chart

Daily Prcp Chart

### Monthly Precipitation for the 2012 Water Year (Oct 2011 - Sept 2012)

Station: TX-CML-3 New Braunfels 3.1 WNW



41.24"



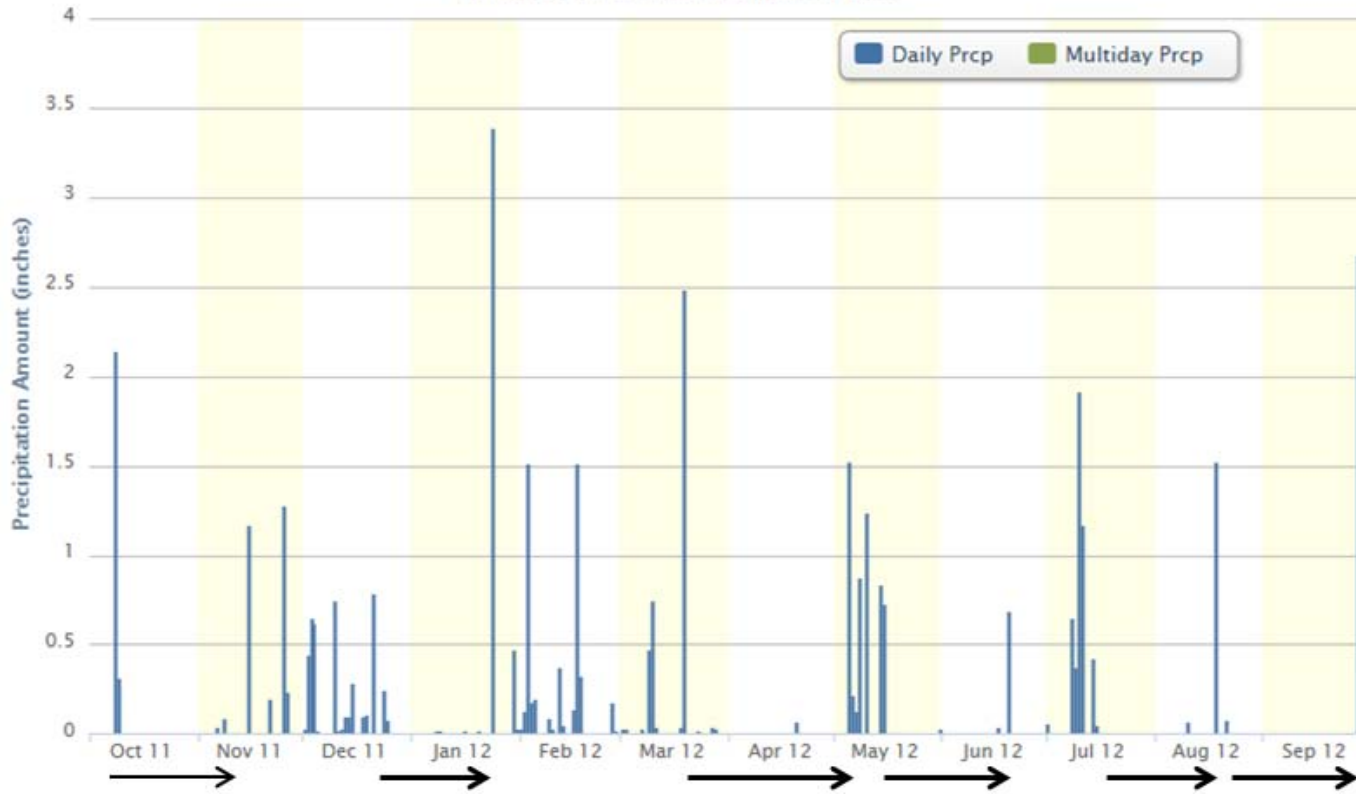
Monthly Prcp Totals Chart

Accumulated Prcp Chart

Daily Prcp Chart

### 2012 Water Year (Oct 2011 – Sept 2012) Daily Precipitation

Station: TX-CML-3 New Braunfels 3.1 WNW



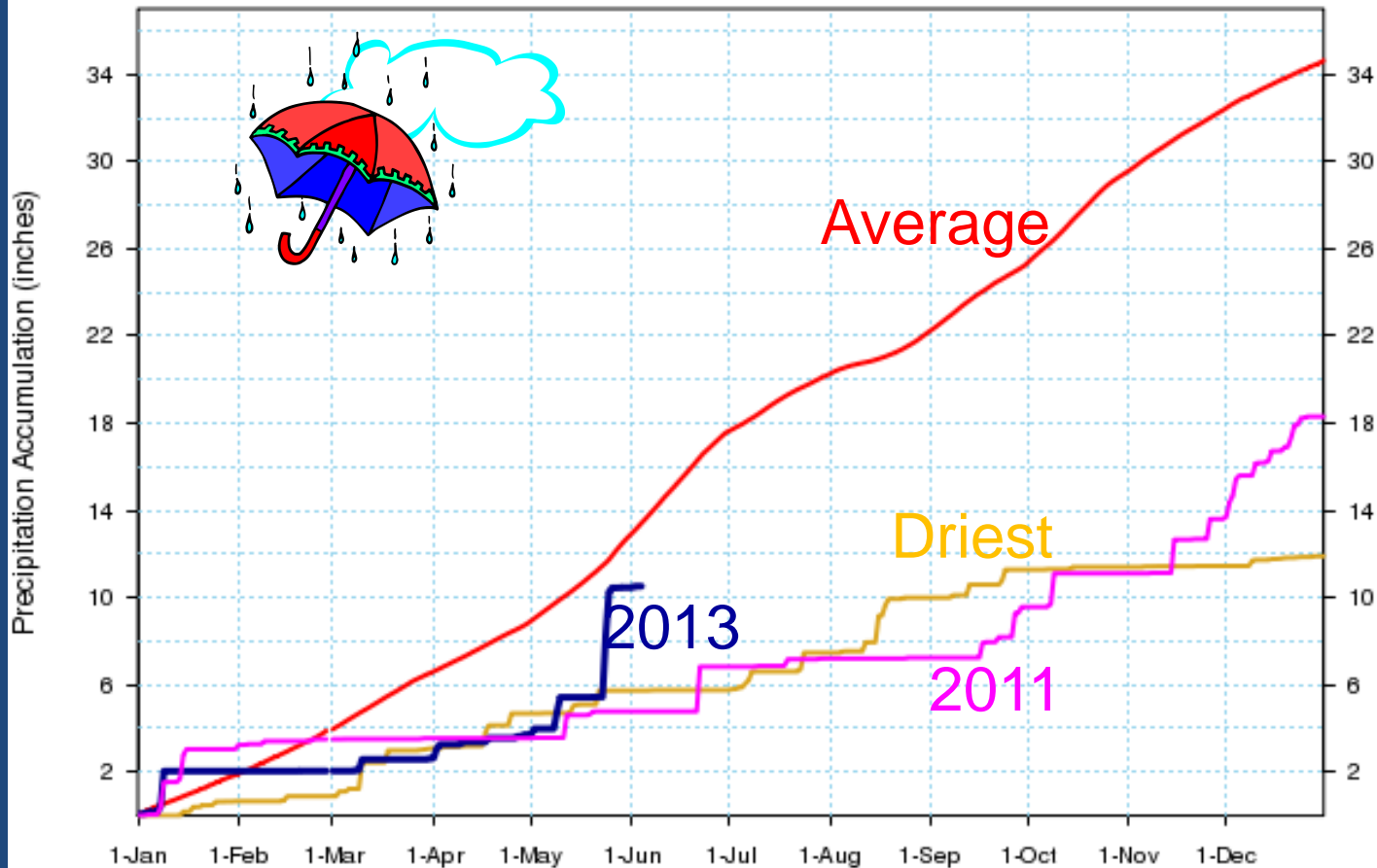
41.24"





The Texas Forest Service undertook controlled burns on Sunday, April 17, 2011 to get rid of fuel on the mountains around McDonald Observatory in the Davis Mountains of West Texas. Here, Black Mountain is burning. The Hobby-Eberly Telescope dome is at right.  
(Frank Cianciolo/**McDonald Observatory**) [↗](#)

## Precipitation Summary for NEW BRAUNFELS MUNI AP Jan 1 - Dec 31



Heavy dark blue line is precipitation accumulation for 2013. Smooth red line is normal. Magenta line is 2011.  
 Tan line is accumulation for driest period (2008).  
 Period of record for wettest and driest: 1998 - 2013.

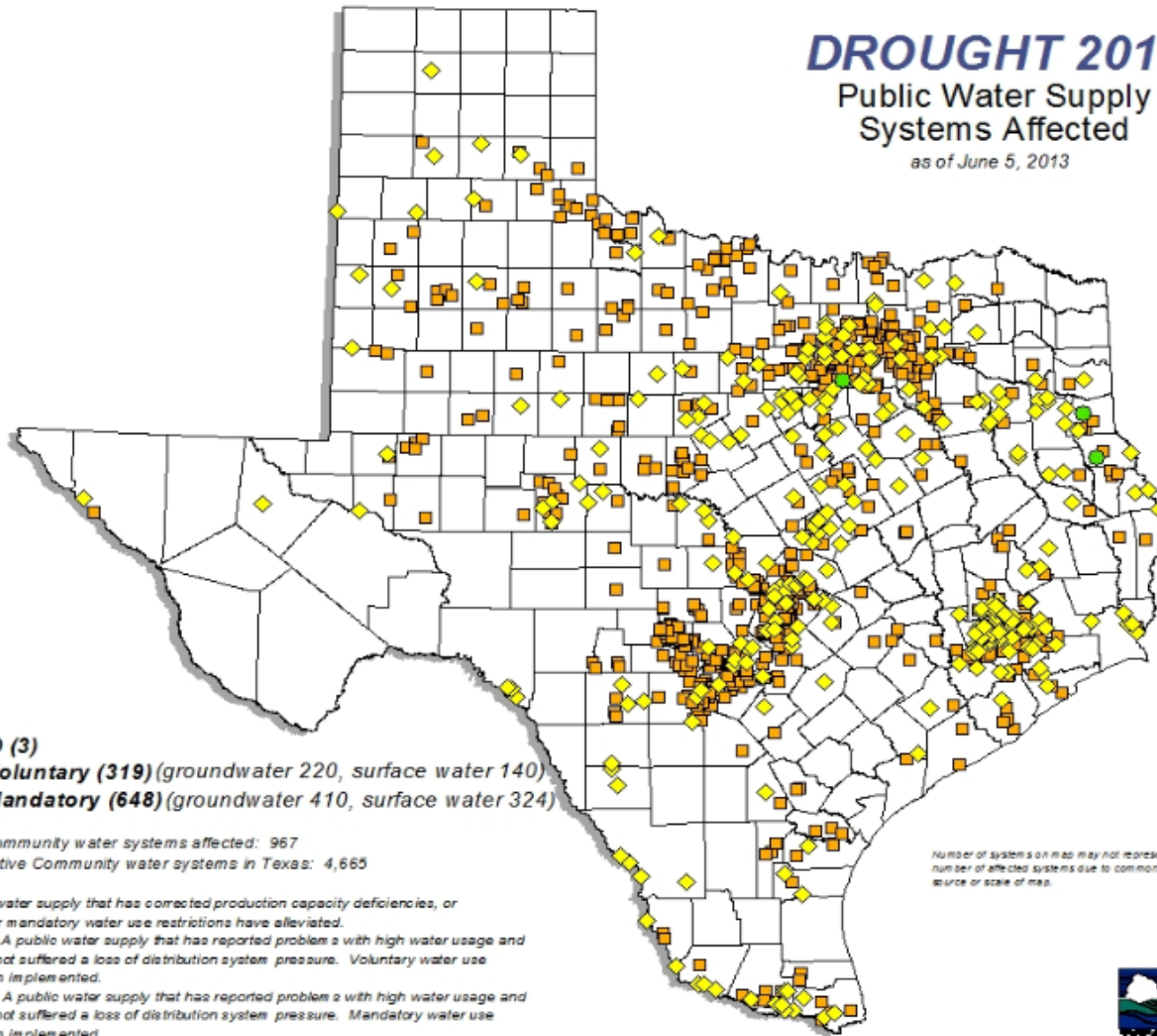




# DROUGHT 2013

## Public Water Supply Systems Affected

as of June 5, 2013



● **RESOLVED (3)**

◆ **WATCH - Voluntary (319)** (groundwater 220, surface water 140)

■ **WATCH - Mandatory (648)** (groundwater 410, surface water 324)

Total number of Community water systems affected: 967

Total number of active Community water systems in Texas: 4,665

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

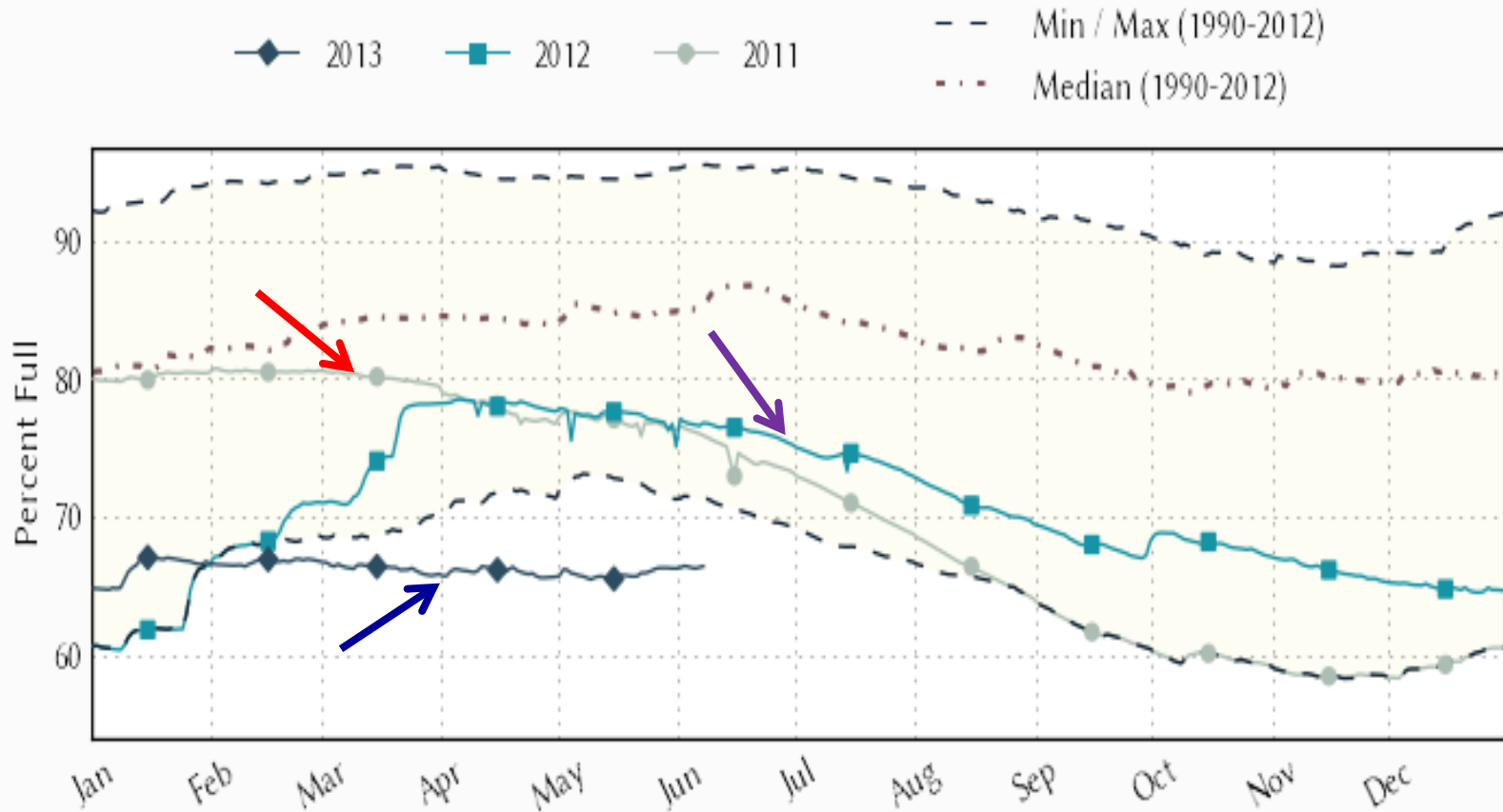
**Watch - Voluntary** A public water supply that has reported problems with high water usage and production, but has not suffered a loss of distribution system pressure. Voluntary water use restrictions have been implemented.

**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.



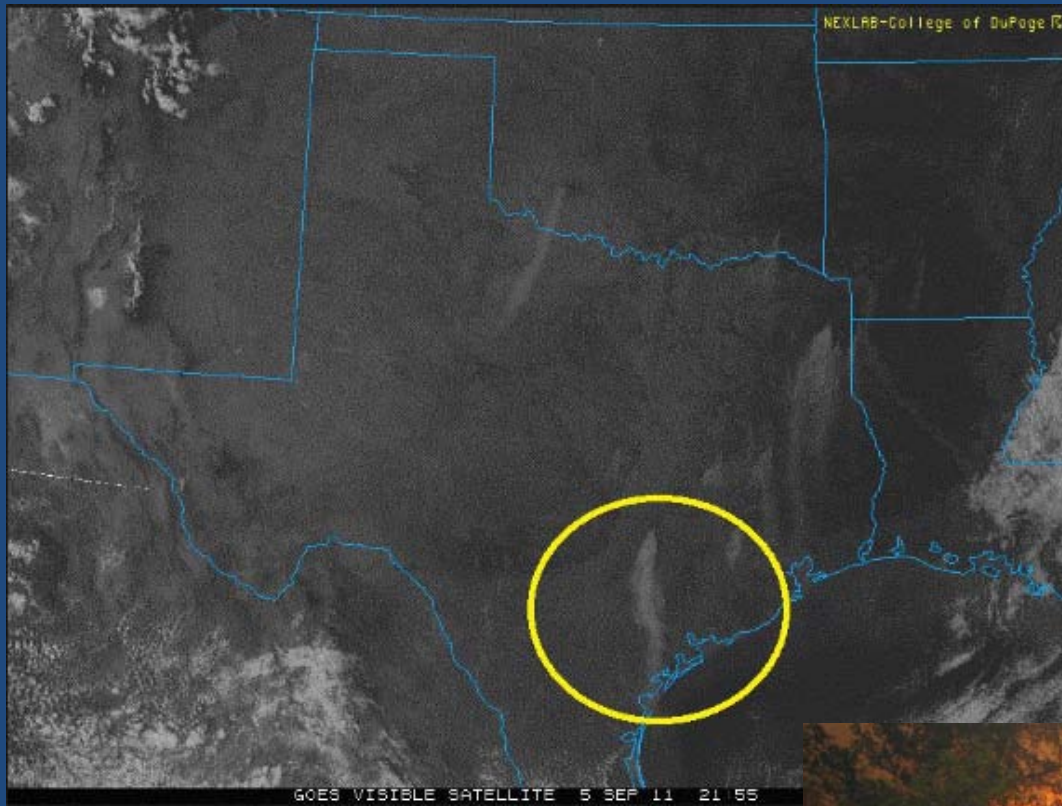
# Statewide 66.6% of Capacity – 6/7/2013



<http://waterdatafortexas.org/>

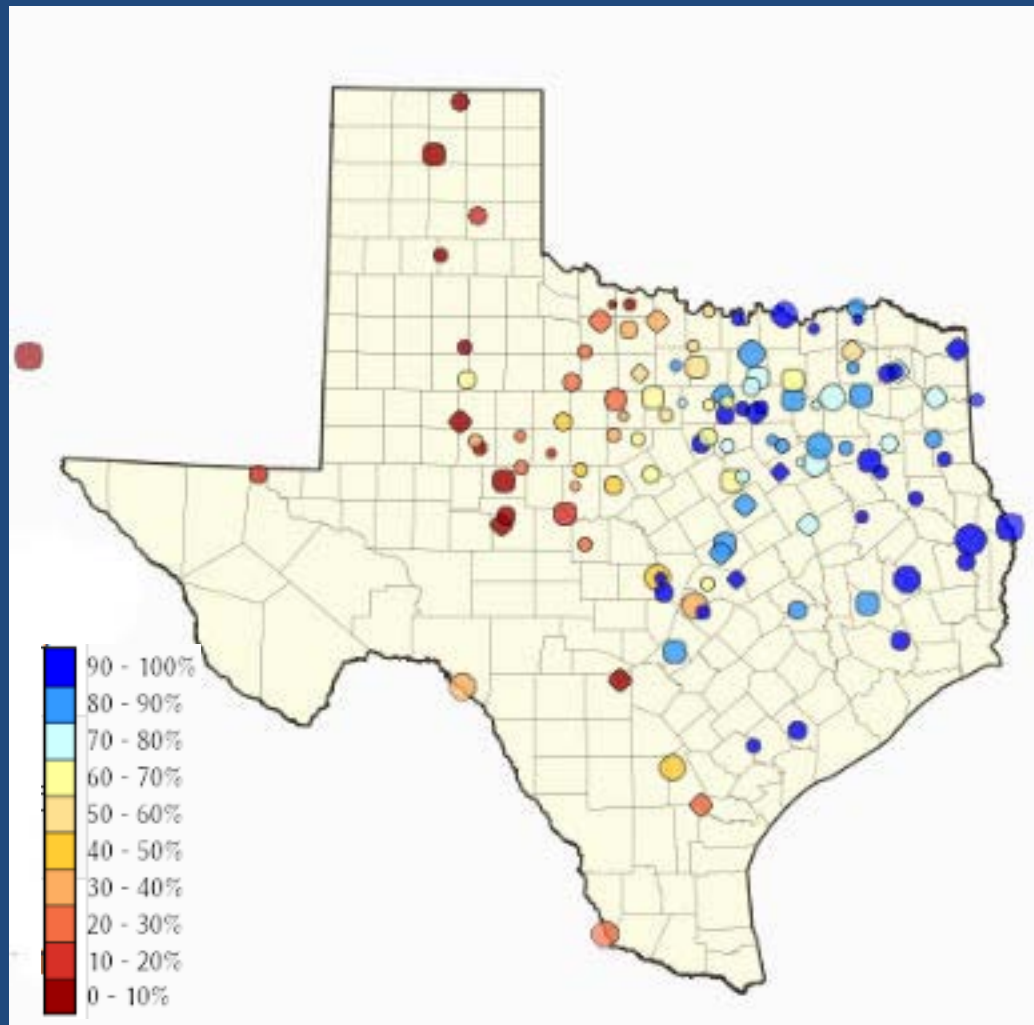






# Bastrop Wildfire September 2011





Most Reservoirs west of a line from Wichita Falls to Corpus Christi are less than 30% full!





<b>Location</b>	<b>Normal Pool</b>	<b>Current Level</b>	<b>Difference</b>
<b>Lake Amistad</b>	<b>1117.00</b>	<b>1056.6</b>	<b>-60.4 ft</b>
<b>Medina Lake</b>	<b>1064.20</b>	<b>981.8</b>	<b>-82.4 ft</b>
<b>Canyon Lake</b>	<b>909.00</b>	<b>900.0</b>	<b>- 9.0 ft</b>
<b>Lake Buchanan</b>	<b>1020.00</b>	<b>990.4</b>	<b>-29.6 ft</b>
<b>Lake Travis</b>	<b>681.00</b>	<b>628.6</b>	<b>-52.4 ft</b>
<b>Choke Canyon</b>	<b>220.50</b>	<b>200.4</b>	<b>-20.1 ft</b>
<b>Lake Corpus Christi</b>	<b>94.00</b>	<b>79.6</b>	<b>-14.4 ft</b>
<b>Falcon Lake</b>	<b>301.20</b>	<b>262.4</b>	<b>-38.8 ft</b>



# Medina Lake



- ❑ Medina Lake 5.4% of Capacity
- ❑ 82.4 ft below normal pool
- ❑ Only dry during the 1950s drought
- ❑ Could be dry late Summer/Fall 2013





<http://www.edwardsaquifer.org/>



# CONTINENTAL UNITED STATES HURRICANE STRIKES 1950-2011\*



## Saffir-Simpson Hurricane Categories (at Strike or Landfall)

Sustained Winds (MPH)	Category
74-95	Category 1
96-110	Category 2
111-130	Category 3
131-155	Category 4
>155	Category 5

There were no hurricane strikes in the U.S. for the years 2000, 2001, 2006, 2009, and 2010.

Due to density of storms in some locations, actual strike locations are approximate.

\* STRIKES- includes hurricanes that did not make direct landfall, but did produce hurricane force winds over land.



2005

Rita  
23 September

Dennis  
10 July

Katrina  
28 August




Wilma  
21 October

Emily  
17 July





# 2013 Hurricane Forecast

	NOAA	CSU
 Named Storms –	13-20	18
 Hurricanes –	7-11	9
 Major Hurricanes –	3-6	4 (Cat3/4/5)





Photo's From Gary McManus

## Drought Monitor Archives

Maps

Tables

Animations

1999 Archive

GIS Data

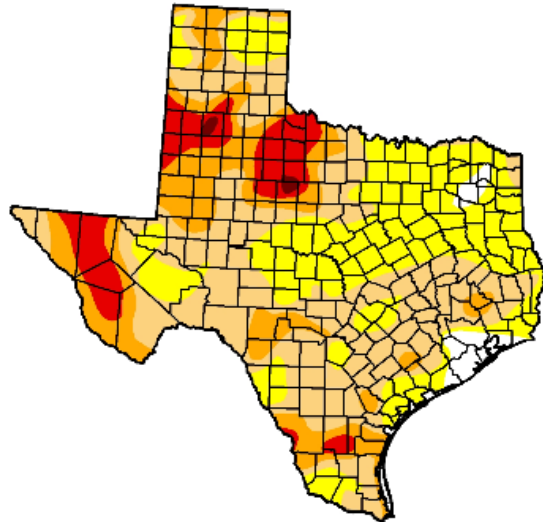
## Drought Severity

Texas

D0 - Abnormally Dry  
D1 Drought - Moderate

D2 Drought - Severe  
D3 Drought - Extreme

D4 Drought - Exceptional



June 5, 2012



June 4, 2013



Week	Nothing	D0-D4	D1-D4	D2-D4	D3-D4	D4
June 5, 2012	2.45	97.55	65.58	26.86	9.24	0.38
June 4, 2013	4.66	95.34	87.38	59.59	33.12	16.47

<http://droughtmonitor.unl.edu/archive.html>





# U.S. Drought Monitor

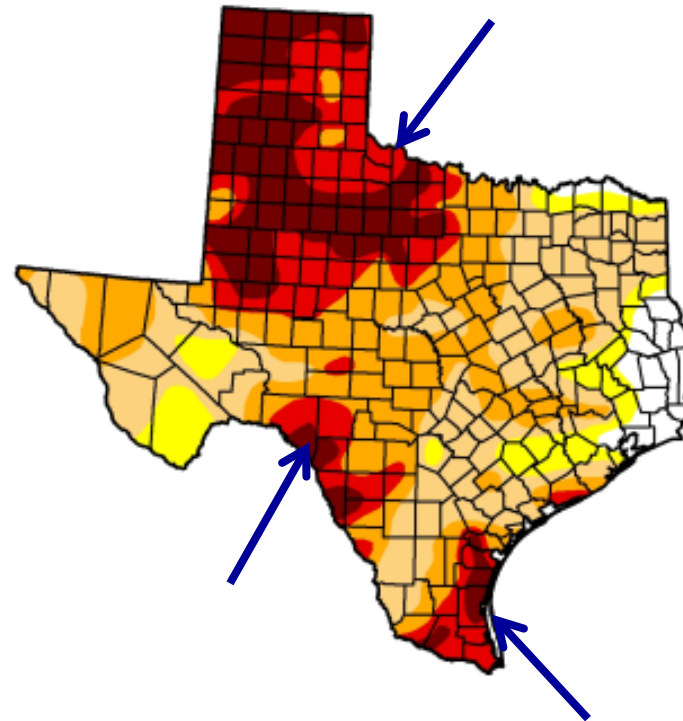
## Texas

June 4, 2013

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	4.66	95.34	87.38	59.59	33.12	16.47
Last Week (05/28/2013 map)	3.49	96.51	88.27	60.34	32.45	16.02
3 Months Ago (03/05/2013 map)	11.15	88.85	76.29	55.62	23.86	7.41
Start of Calendar Year (01/01/2013 map)	3.04	96.96	87.00	65.39	35.03	11.96
Start of Water Year (09/25/2012 map)	9.13	90.87	78.73	57.41	24.91	5.18
One Year Ago (05/29/2012 map)	2.63	97.37	59.18	26.58	10.16	0.73



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements

<http://droughtmonitor.unl.edu>



Released Thursday, June 6, 2013  
David Simeral, Western Regional Climate Center





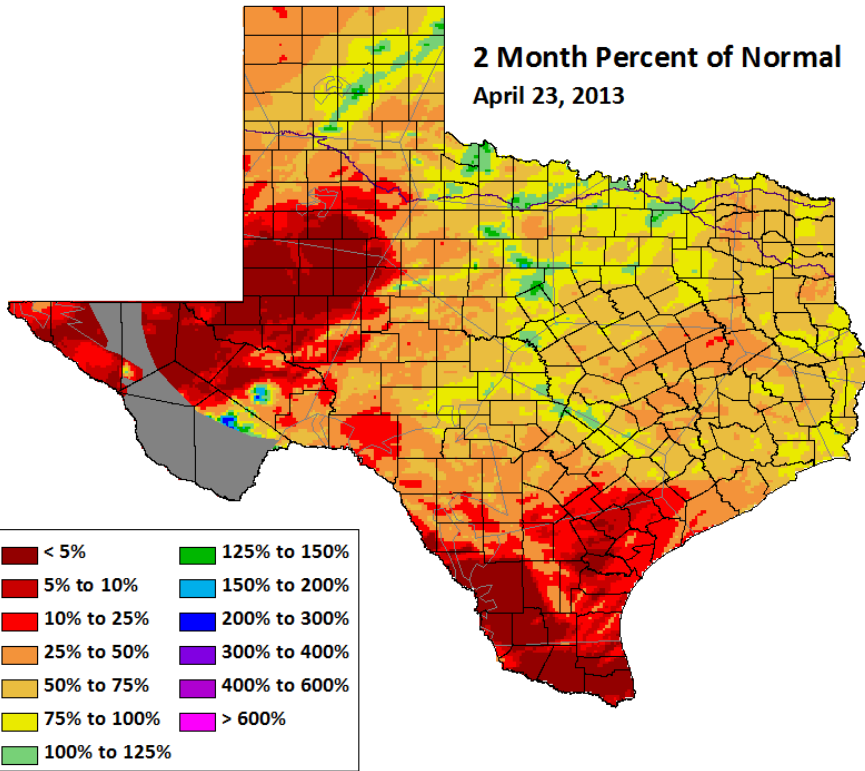
## Lightning in North Texas



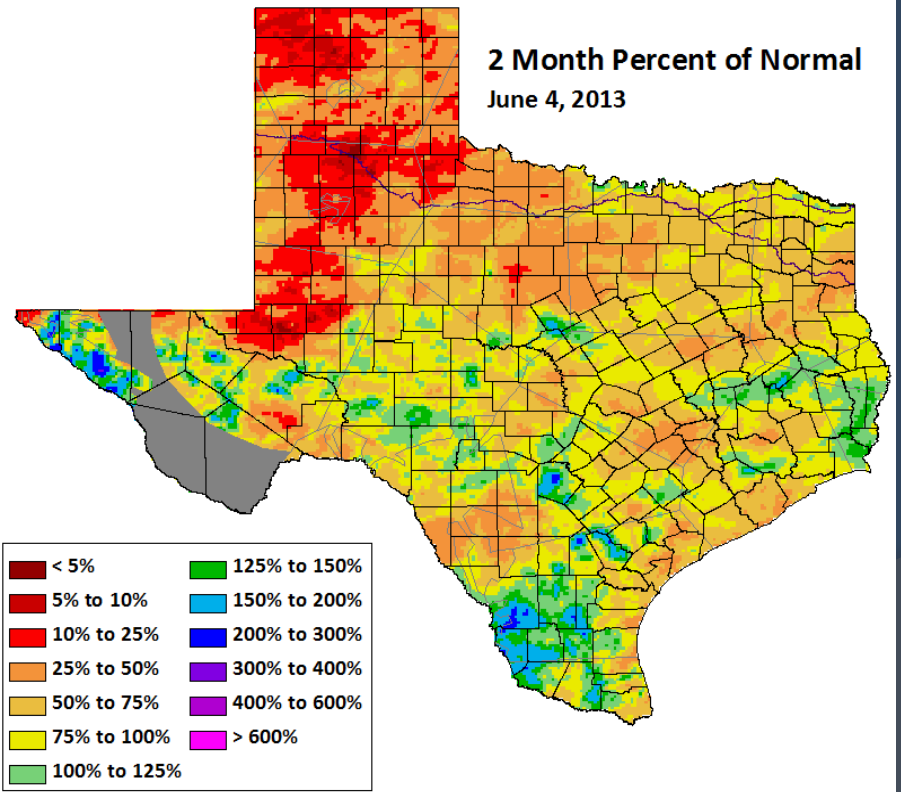
## Thunderstorm East of Austin

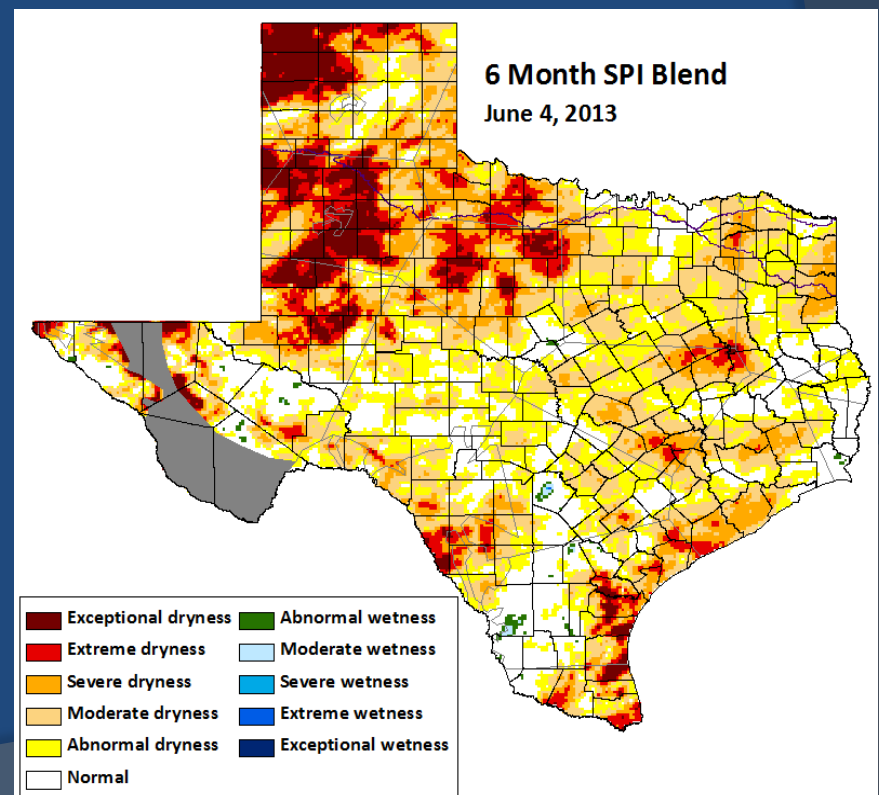
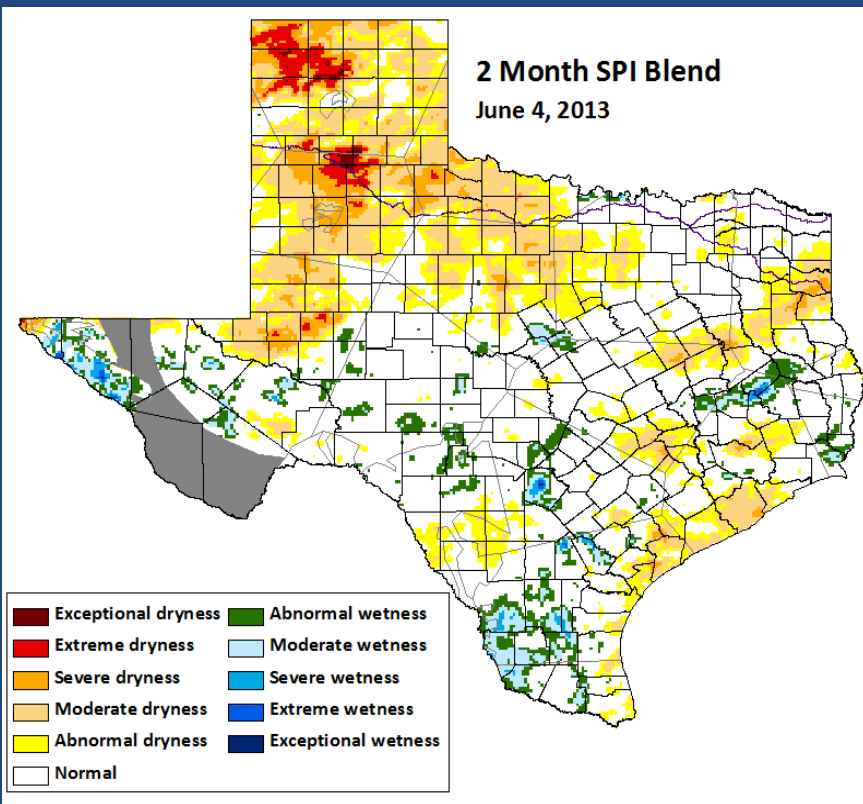


**2 Month Percent of Normal**  
April 23, 2013



**2 Month Percent of Normal**  
June 4, 2013

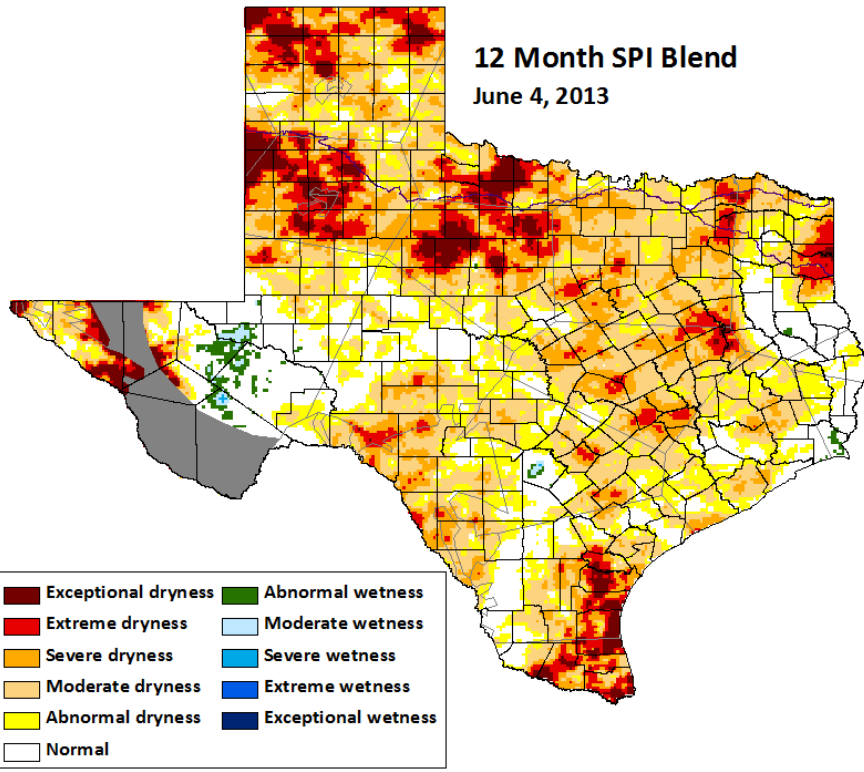




# Standardized Precipitation Index (SPI)

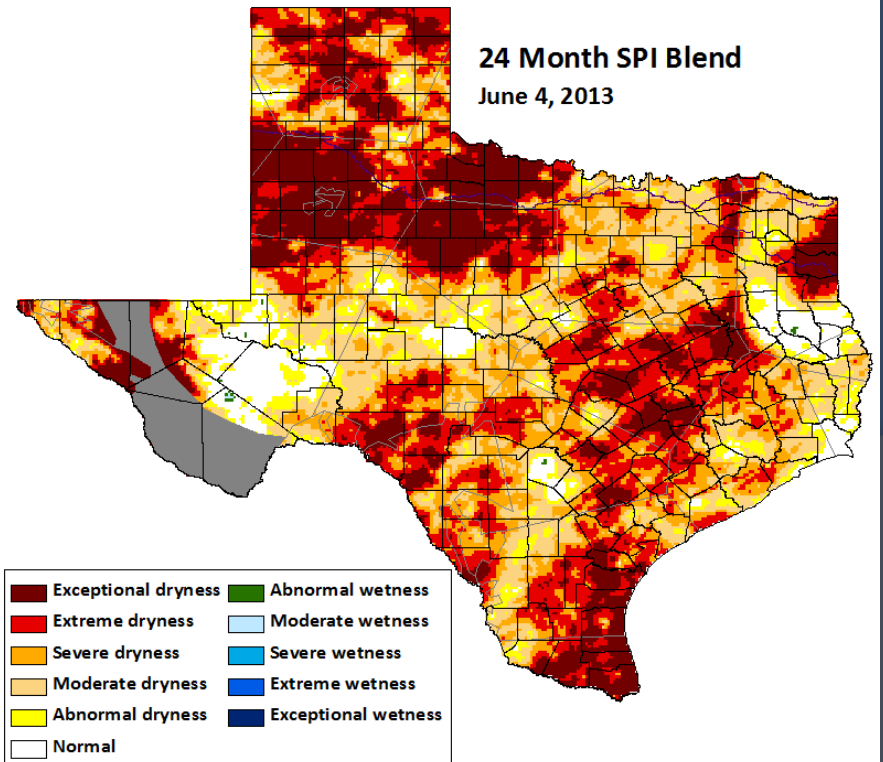
### 12 Month SPI Blend

June 4, 2013



### 24 Month SPI Blend

June 4, 2013



# Standardized Precipitation Index (SPI)

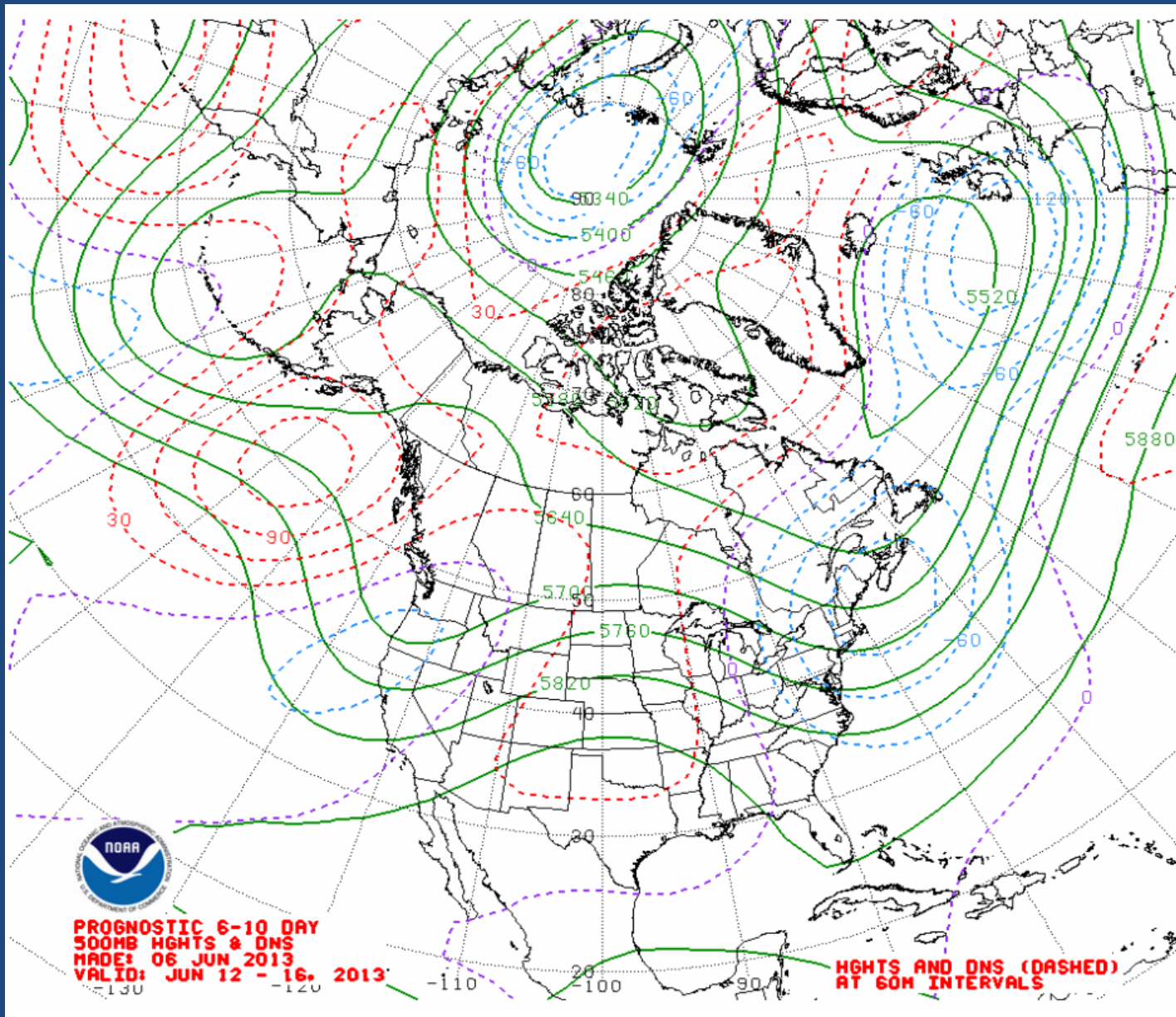


May 25, 2013  
San Antonio Flooding



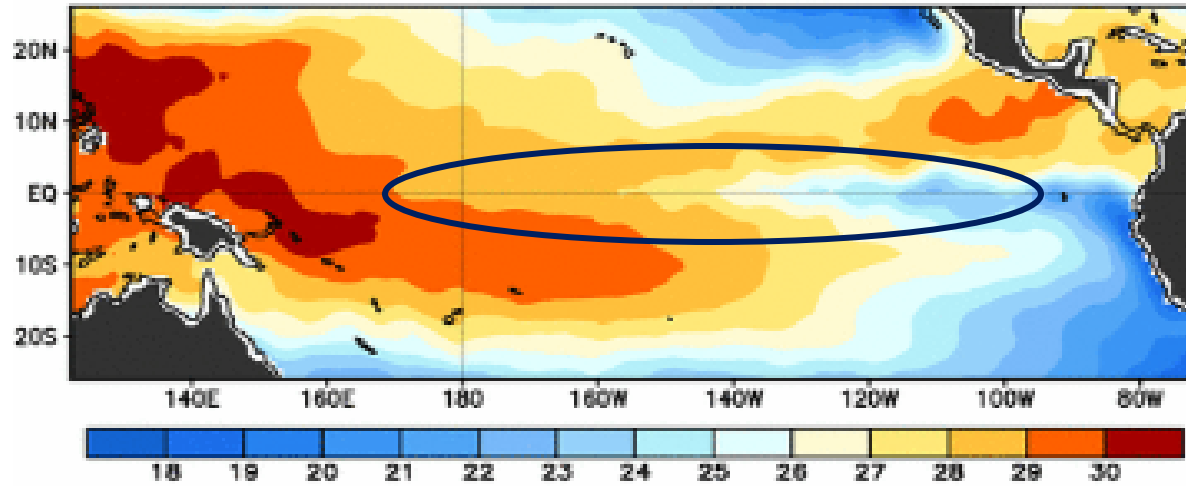
Bastrop Wildfire  
September 2011



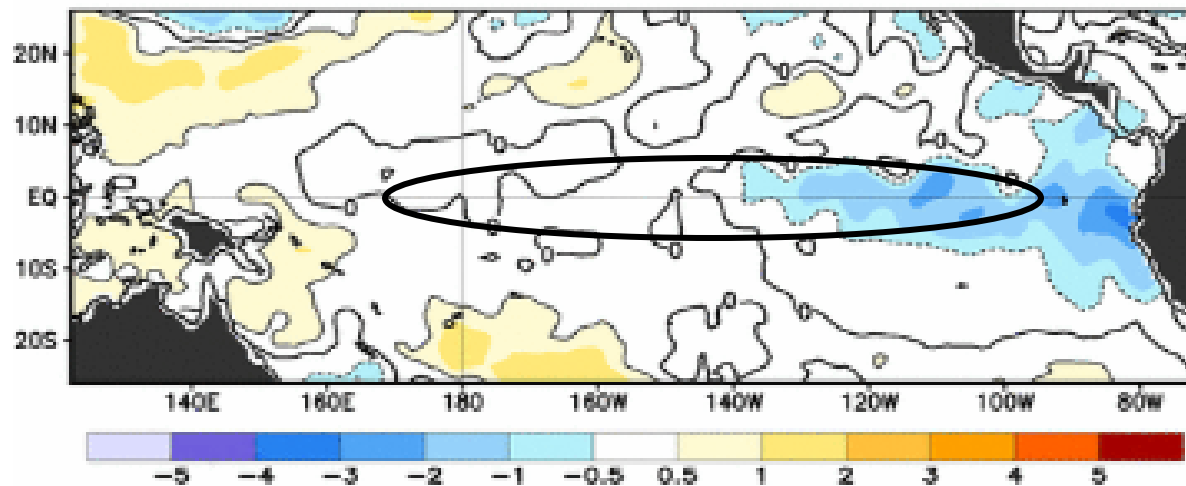


<http://www.cpc.ncep.noaa.gov/products/predictions/610day/610day.03.gif>

### Observed Sea Surface Temperature (°C)



### Observed Sea Surface Temperature Anomalies (°C)



7-day Average Centered on 29 May 2013



# Mid-May 2013 Plume of Model ENSO Predictions

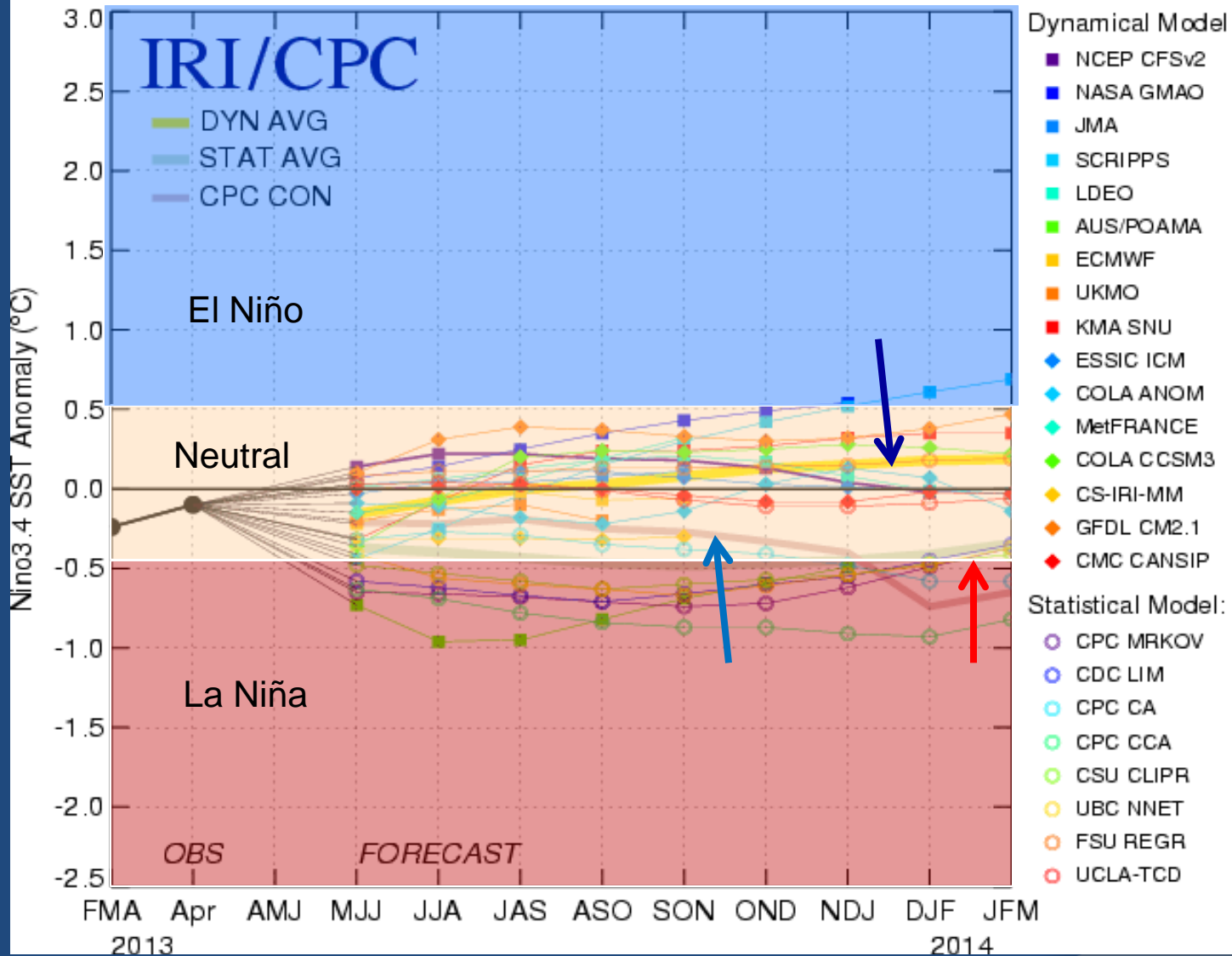
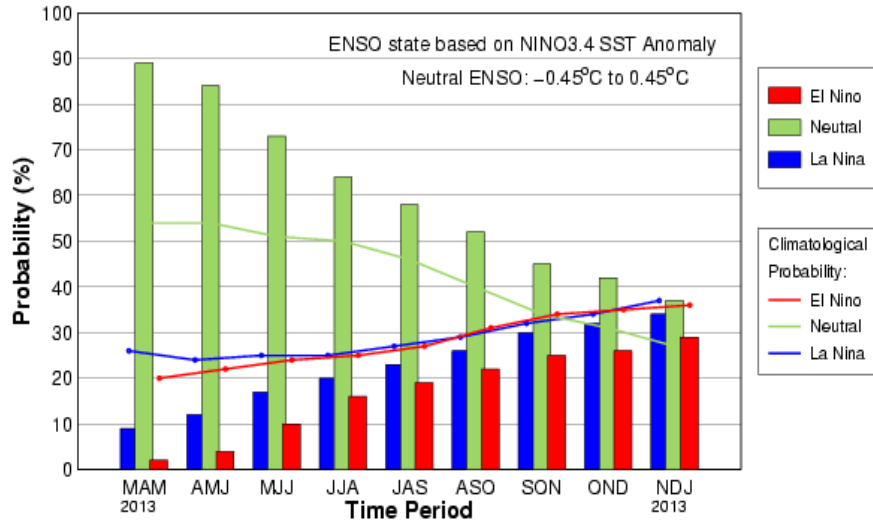


Figure provided by the International Research Institute (IRI) for Climate and Society (updated 14 May 2013).

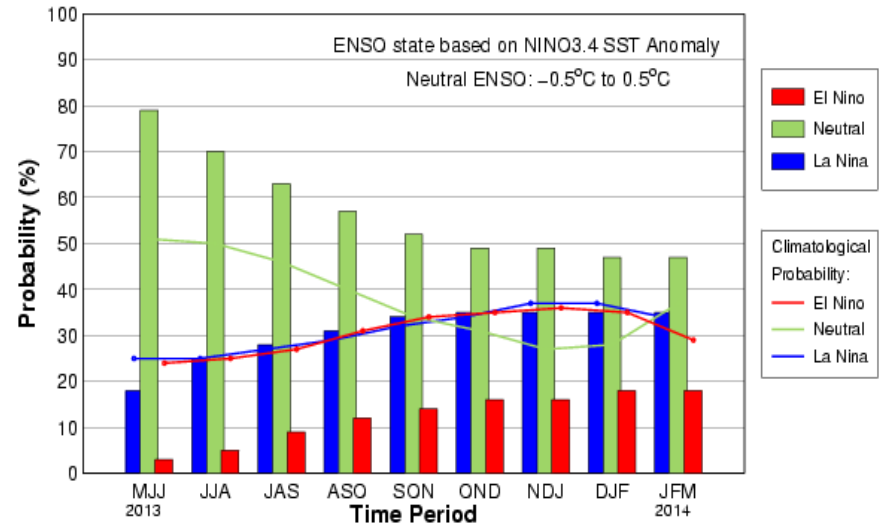


Early-Apr CPC/IRI Consensus Probabilistic ENSO Forecast



Season	La Niña	Neutral	El Niño
MAM 2013	9%	89%	2%
AMJ 2013	12%	84%	4%
MJJ 2013	17%	73%	10%
JJA 2013	20%	64%	16%
JAS 2013	23%	58%	19%
ASO 2013	26%	52%	22%
SON 2013	30%	45%	25%
OND 2013	32%	42%	26%
NDJ 2014	34%	37%	29%

Early-Jun CPC/IRI Consensus Probabilistic ENSO Forecast



Season	La Niña	Neutral	El Niño
MJJ 2013	18%	79%	3%
JJA 2013	25%	70%	5%
JAS 2013	28%	63%	9%
ASO 2013	31%	57%	12%
SON 2013	34%	52%	14%
OND 2013	35%	49%	16%
NDJ 2014	35%	49%	16%
DJF 2014	35%	47%	18%
JFM 2014	35%	47%	18%

# Outlook going into Summer

- ❑ ENSO-neutral conditions continue.
- ❑ Equatorial sea surface temperatures (SST) are near average across the western and central Pacific Ocean and below average across the eastern Pacific.
- ❑ ENSO-Neutral is favored into late summer 2013.



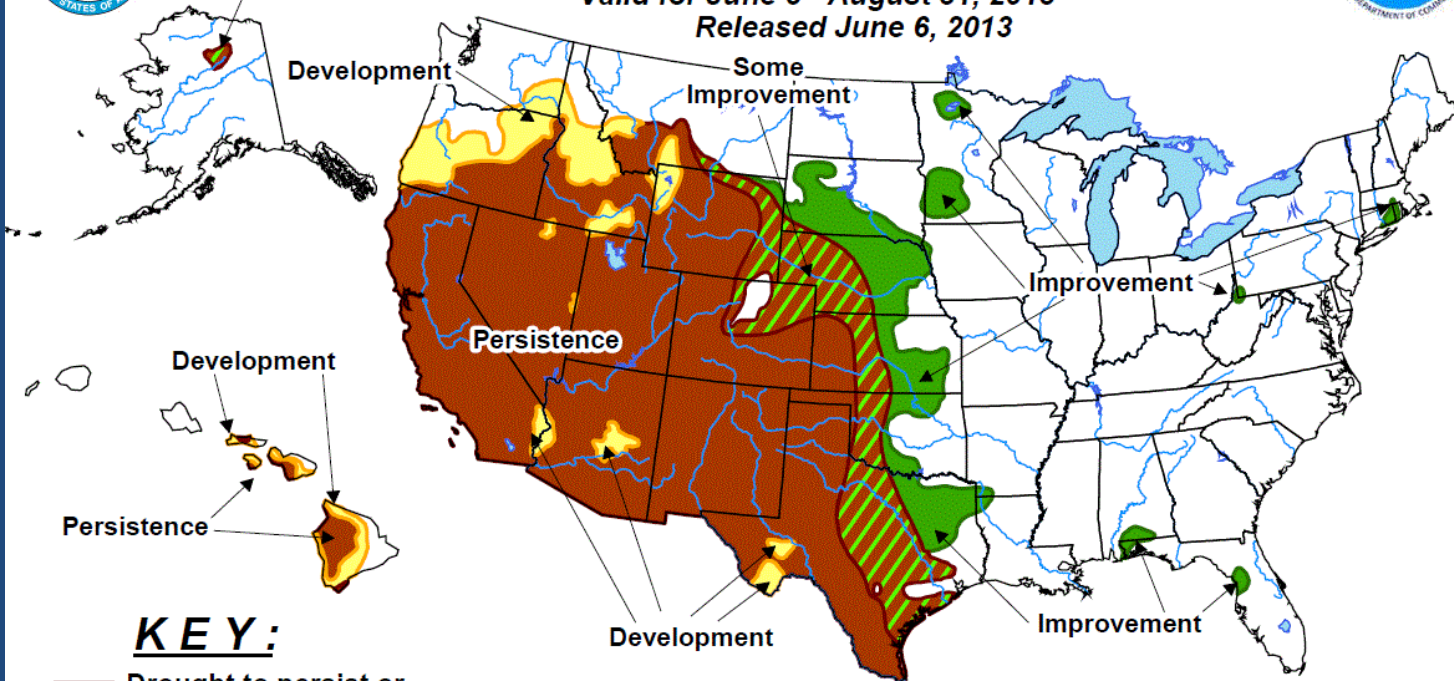


# U.S. Seasonal Drought Outlook





## Drought Tendency During the Valid Period

Valid for June 6 - August 31, 2013

Released June 6, 2013



### KEY:

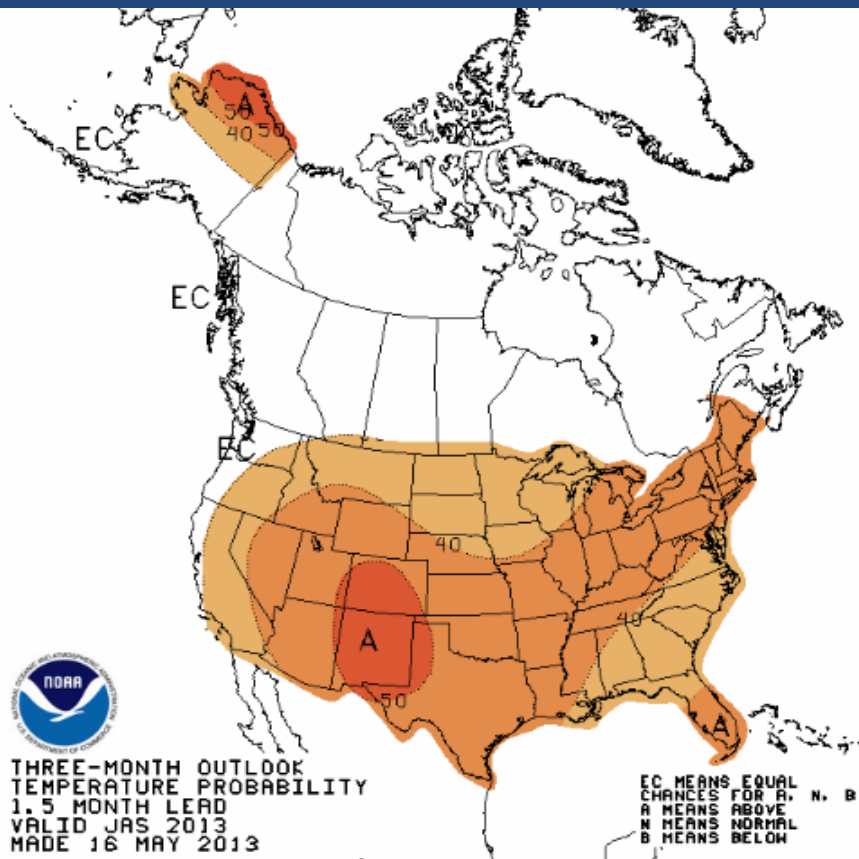
-  Drought to persist or intensify
-  Drought ongoing, some improvement
-  Drought likely to improve, impacts ease
-  Drought development likely

No Drought Posted/Predicted 

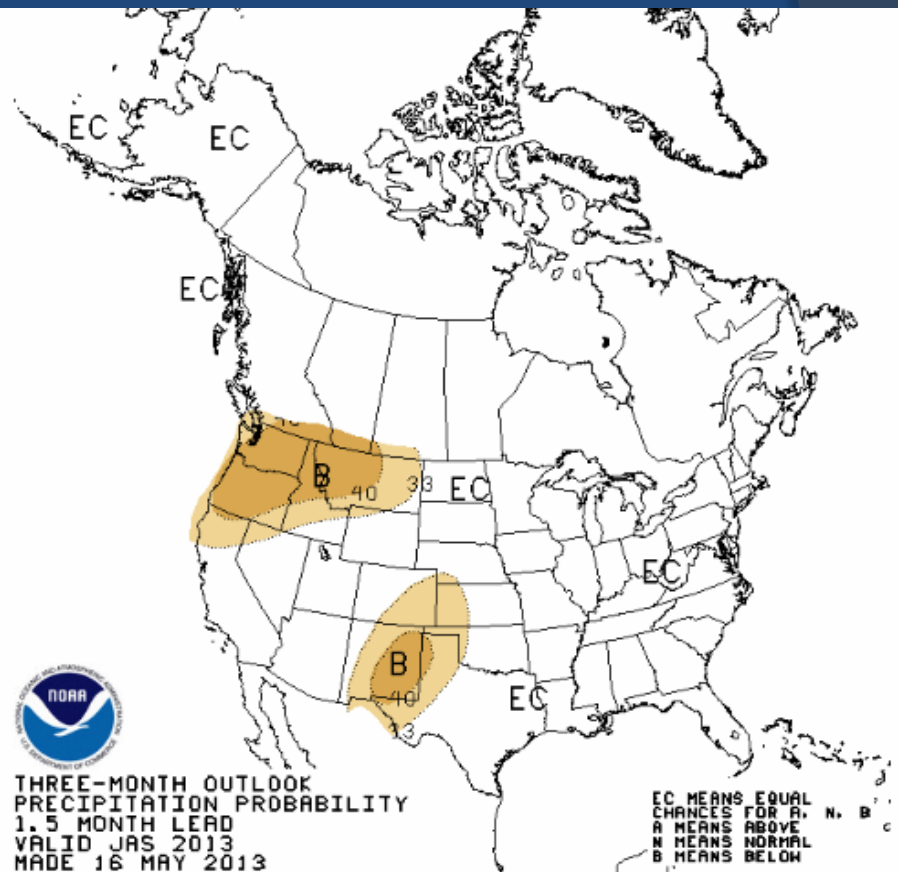
Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance. Use caution for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.

[http://www.cpc.ncep.noaa.gov/products/expert\\_assessment/season\\_drought.gif](http://www.cpc.ncep.noaa.gov/products/expert_assessment/season_drought.gif)

# Temperatures

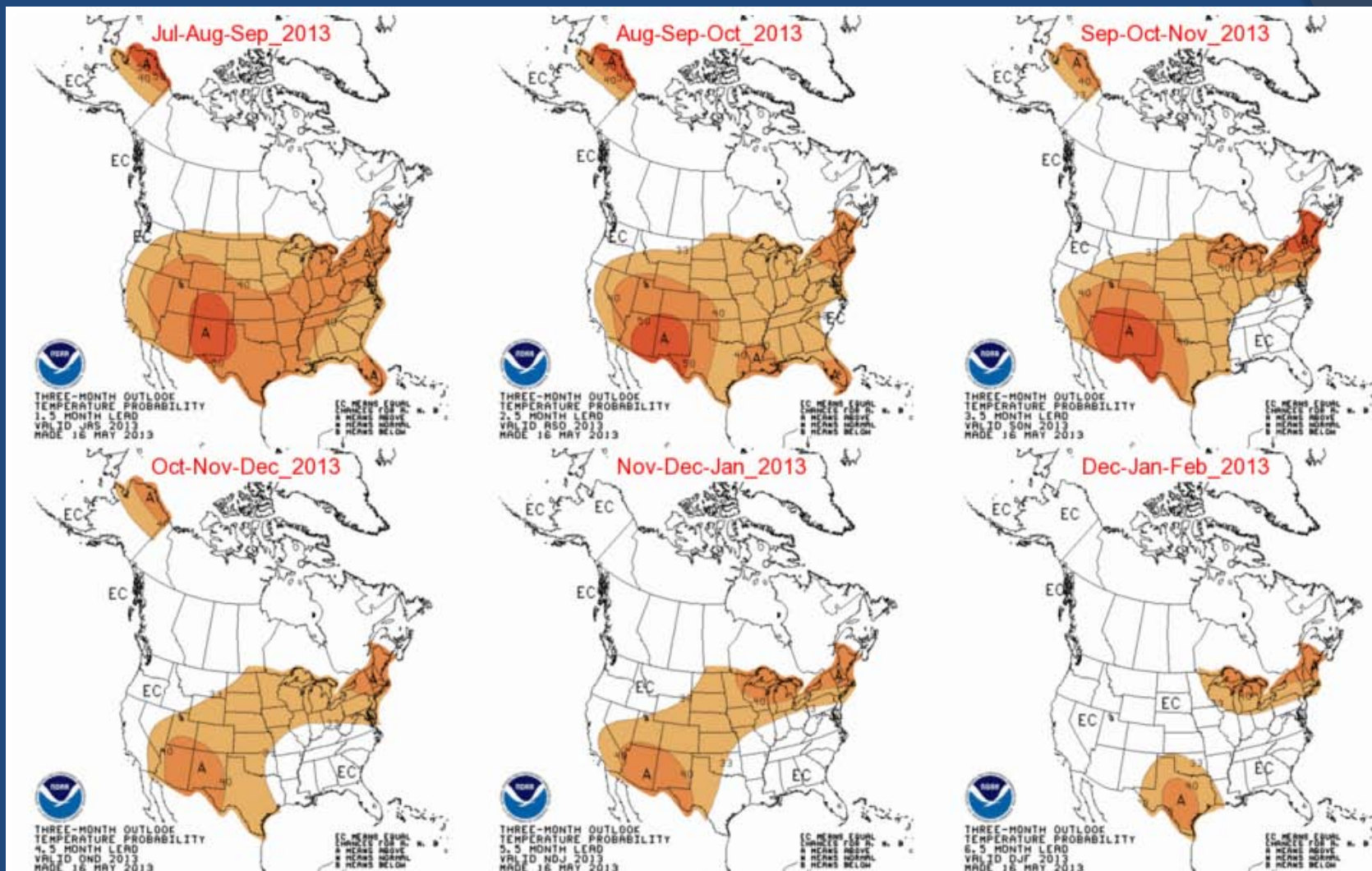


# Precipitation



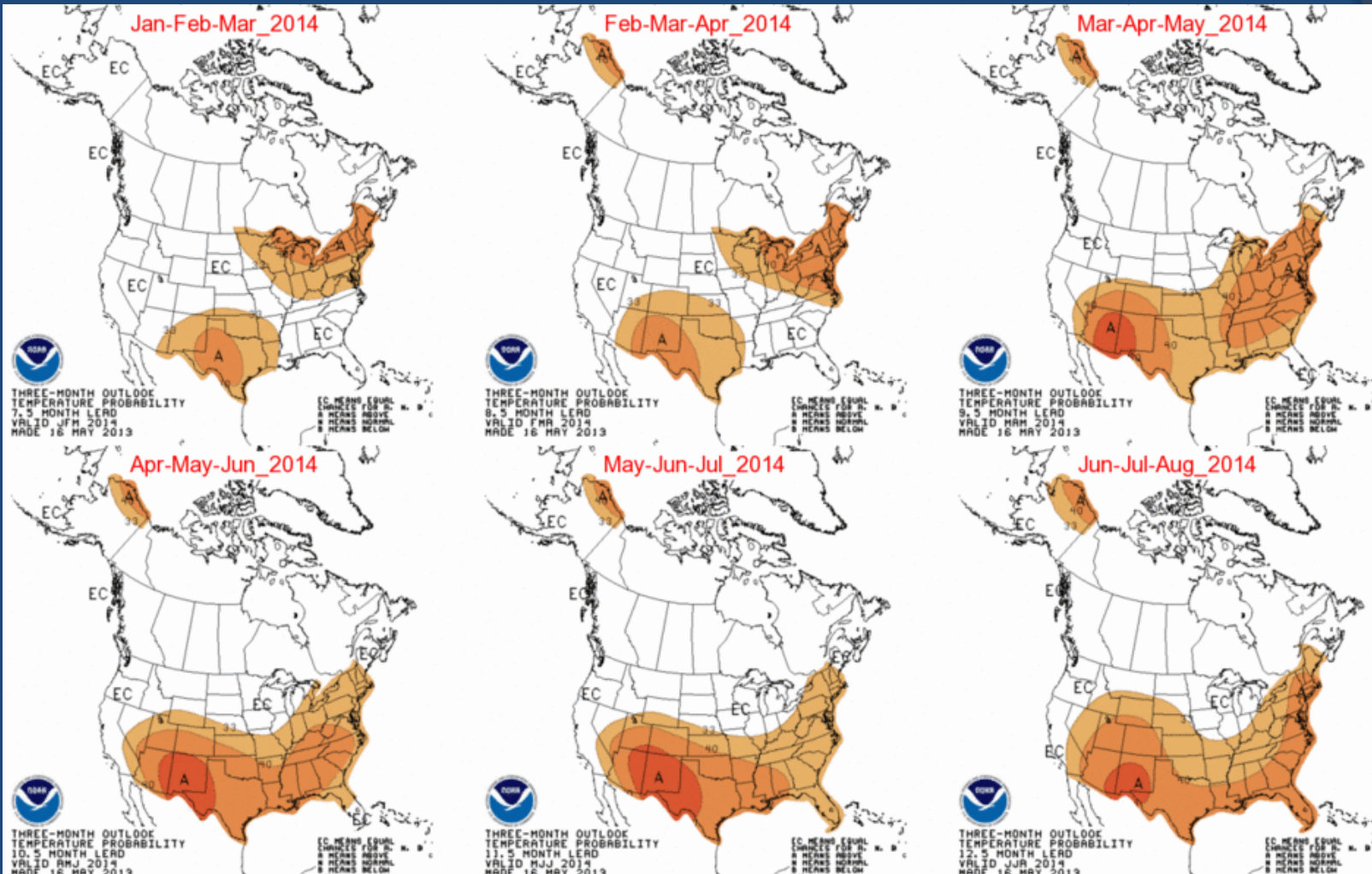


# Temperatures



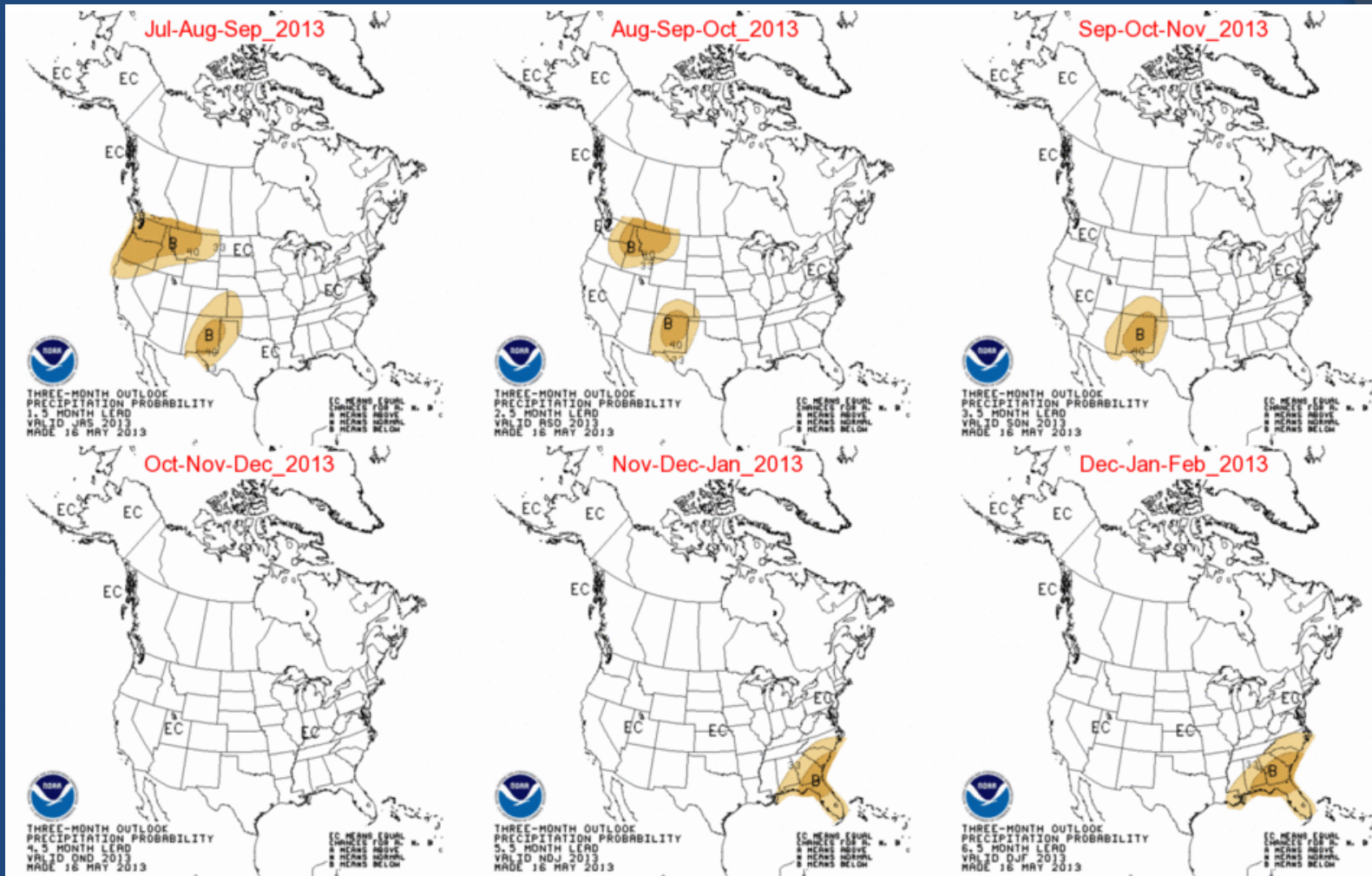
[http://www.cpc.ncep.noaa.gov/products/predictions//multi\\_season/13\\_seasonal\\_outlooks/color/churchill.php](http://www.cpc.ncep.noaa.gov/products/predictions//multi_season/13_seasonal_outlooks/color/churchill.php)

# Temperatures

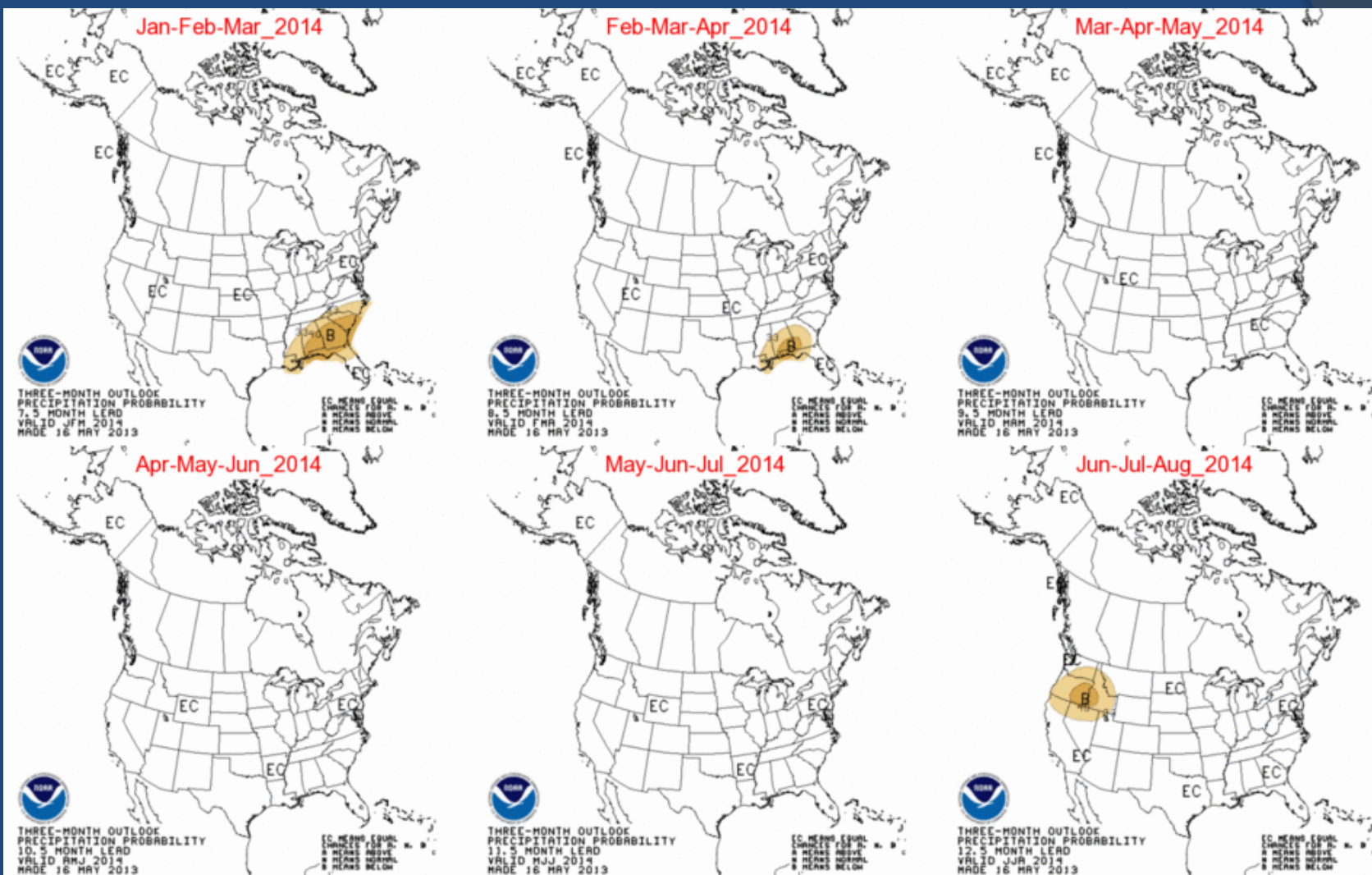




# Precipitation



# Precipitation







June 9, 2010



Summer 2008



July 2010



## Contact Information:

*Mark.Lenz@noaa.gov*

*830.629.0130 X228*

*[www.srh.noaa.gov/sanantonio](http://www.srh.noaa.gov/sanantonio)*

