

# Precipitation forecast and outlook into 2015

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- **El Niño is coming?!**
- **CPC forecasts into early 2015**
- **What does El Niño mean for this part of the World?**
- **Other forecast tools**
- **Executive Summary**

After a flirtation with La Niña during much of last year, El Niño arrived in May, or so it seems for now.

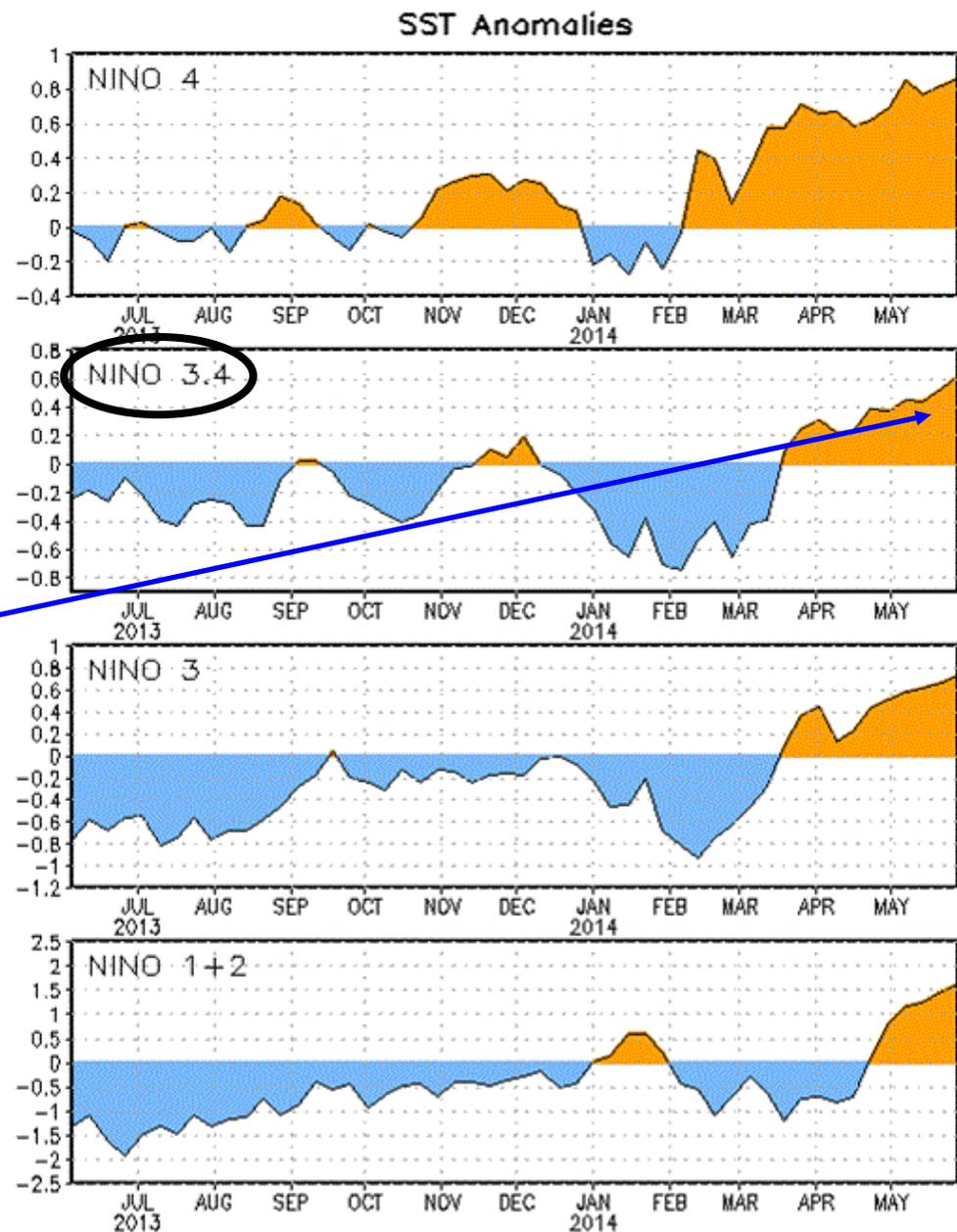
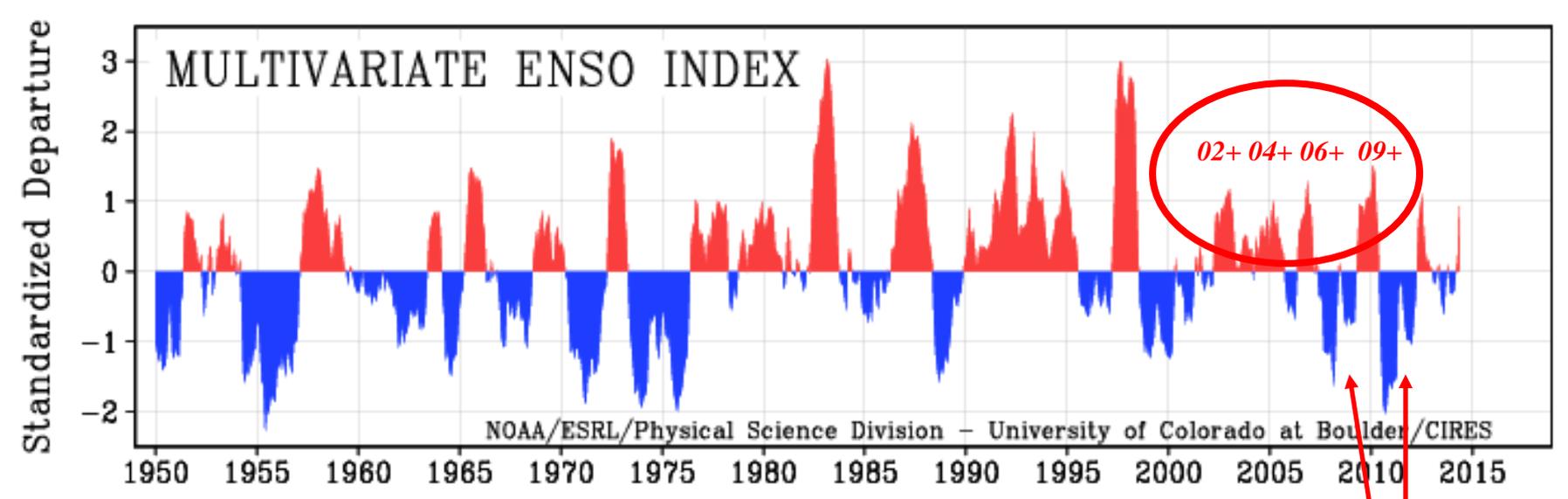
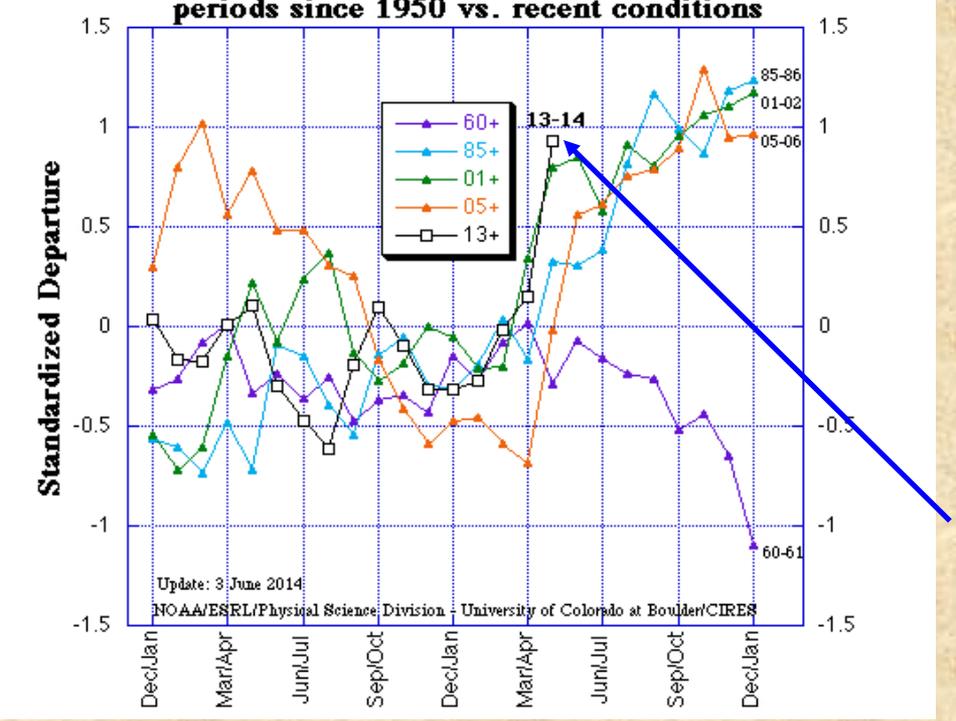


Figure 2. Time series of area-averaged sea surface temperature (SST) anomalies ( $^{\circ}\text{C}$ ) in the Niño regions [Niño-1+2 ( $0^{\circ}$ - $10^{\circ}\text{S}$ ,  $90^{\circ}\text{W}$ - $80^{\circ}\text{W}$ ), Niño-3 ( $5^{\circ}\text{N}$ - $5^{\circ}\text{S}$ ,  $150^{\circ}\text{W}$ - $90^{\circ}\text{W}$ ), Niño-3.4 ( $5^{\circ}\text{N}$ - $5^{\circ}\text{S}$ ,  $170^{\circ}\text{W}$ - $120^{\circ}\text{W}$ ), Niño-4 ( $5^{\circ}\text{N}$ - $5^{\circ}\text{S}$ ,  $150^{\circ}\text{W}$ - $160^{\circ}\text{E}$ ). SST anomalies are departures from the 1981-2010 base period weekly means.

[http://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/ens\\_o\\_advisory/ensodisc.html](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ens_o_advisory/ensodisc.html)



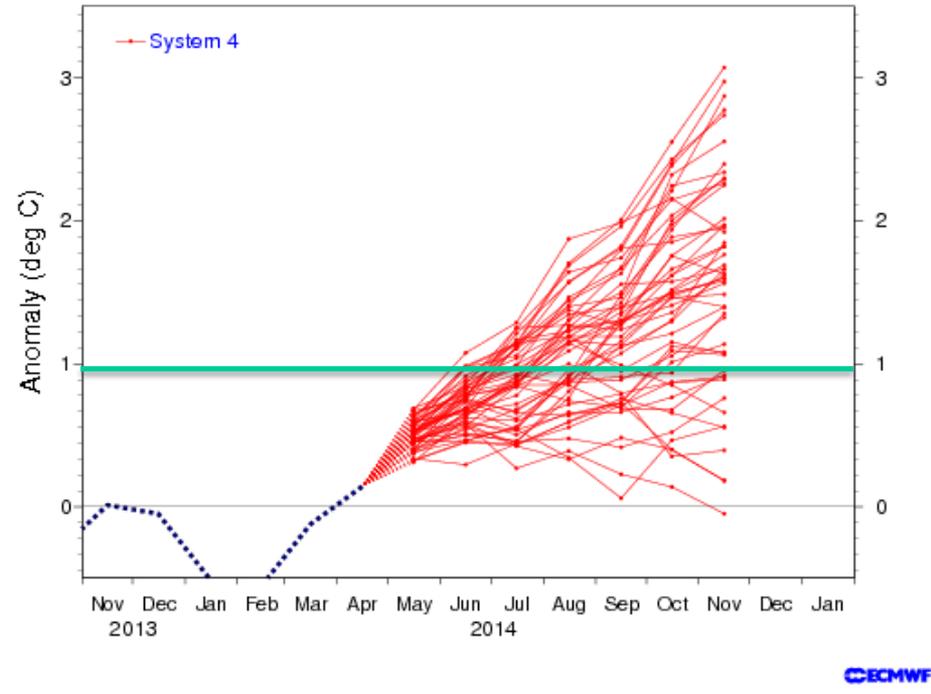
Multivariate ENSO Index (MEI) after neutral August-February periods since 1950 vs. recent conditions



*Last seven years have seen two ‘double-dip’ Las Niñas in a row, followed by a brief excursion to what looked like an El Niño event in 2012, and a return to ENSO-neutral or weak La Niña conditions for much of the last year.*

*ENSO conditions often change during our spring season. This year towards El Niño indeed, in fact, this is one of the biggest one-month increases of the MEI on record. <http://www.esrl.noaa.gov/psd/enso/mei>*

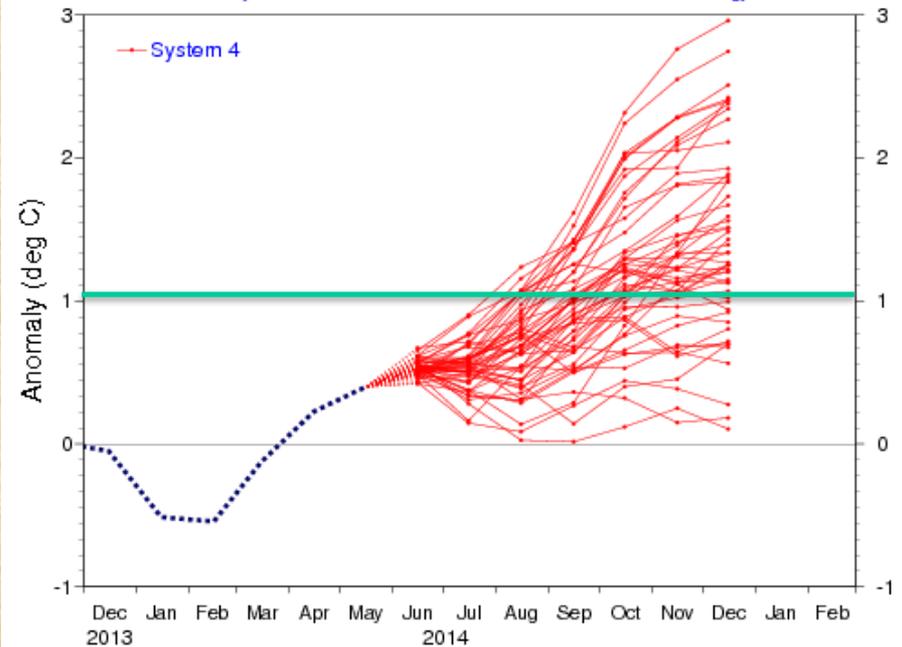
NINO3.4 SST anomaly plume  
ECMWF forecast from 1 May 2014  
Monthly mean anomalies relative to NCEP OIv2 1981-2010 climatology



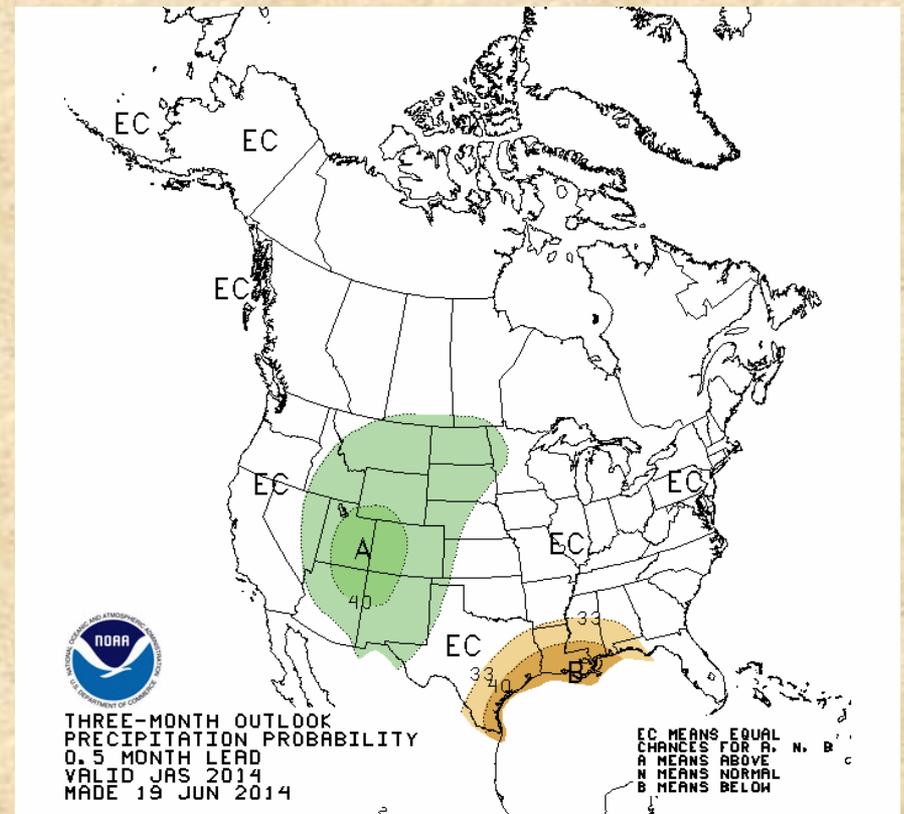
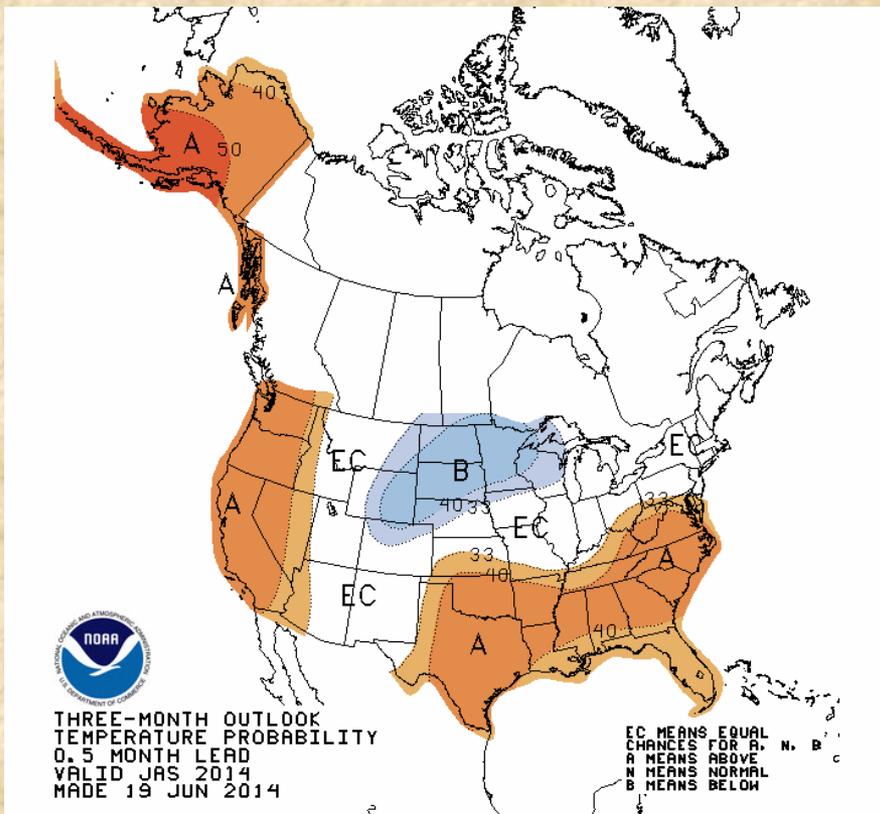
The ECMWF May 2014 forecast (left) was the third since March to guarantee a significant El Niño event, since only one of its 50 ensemble members dipped below 0° C through November 2014. In fact, the median value of +1.5° C by November 2014 was the highest of any model.

The ECMWF June 2014 forecast (right) is a bit slower to ramp up through the summer. The median peak value has dropped closer to +1.2° C, but it remains one of the most bullish ones within the IRI plume (*not shown*).

NINO3.4 SST anomaly plume  
ECMWF forecast from 1 Jun 2014  
Monthly mean anomalies relative to NCEP OIv2 1981-2010 climatology



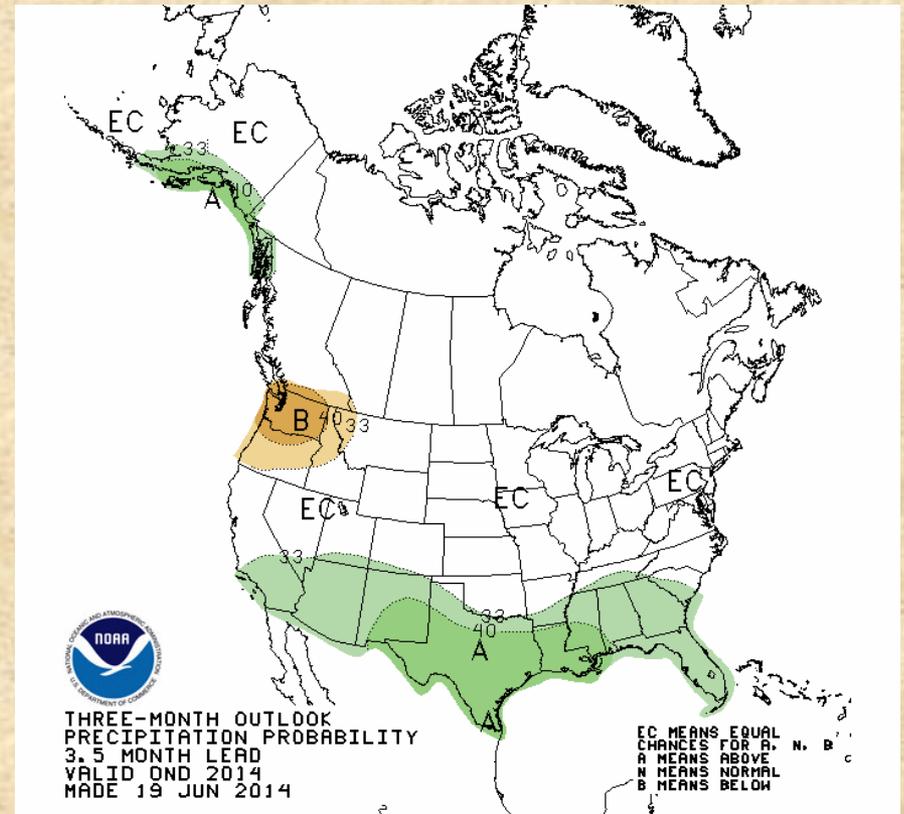
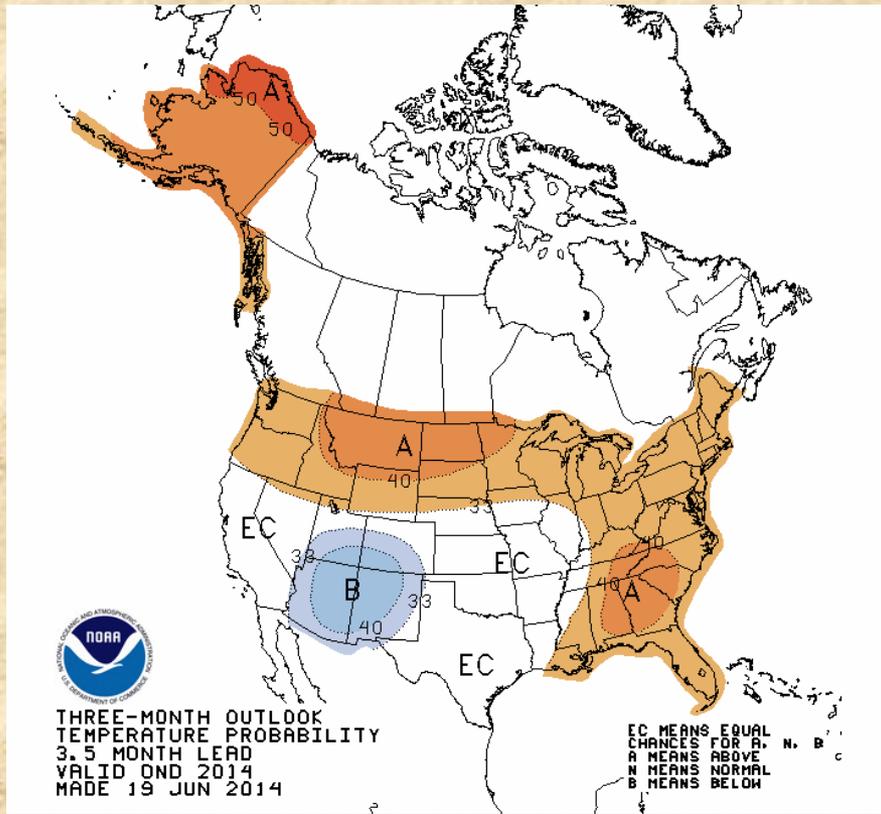
# Climate Prediction Center Summer Forecasts



**Texas can anticipate a warmer-than-average summer according to CPC (left). Their moisture forecast is wetter-than-average to the west, and drier-than-average to the southeast. *This was driven by their coupled forecast model (CFS).***

Source: <http://www.cpc.ncep.noaa.gov/products/predictions/>

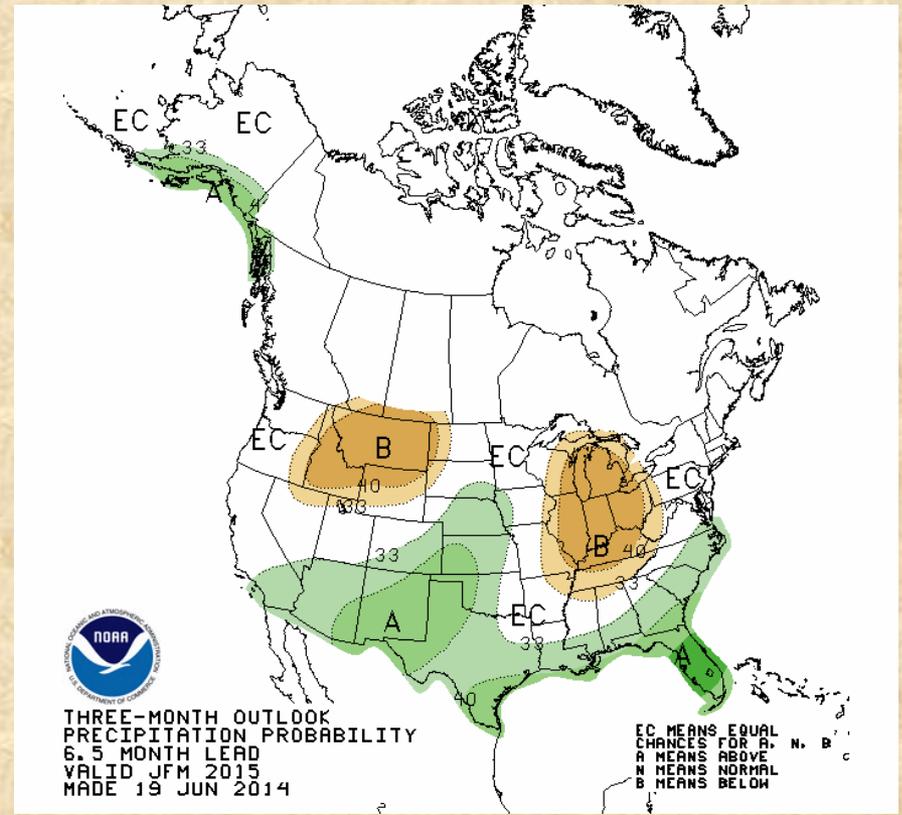
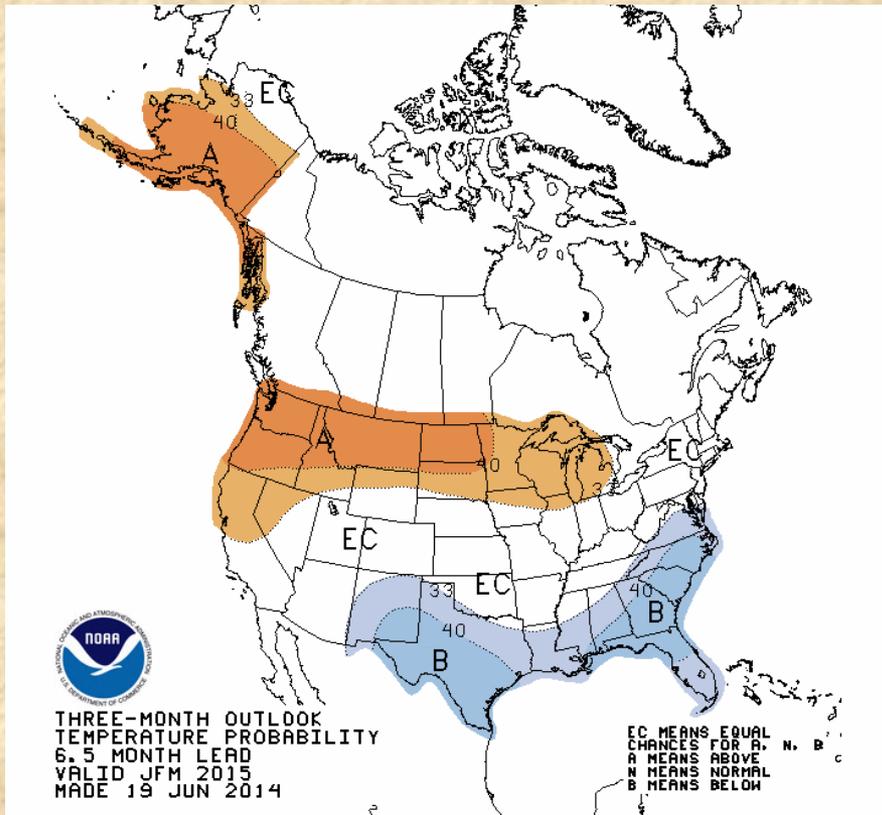
# CPC Fall Forecasts



**Texas has climatological odds for temperatures this fall according to CPC (left). The moisture forecast is wetter-than-average, especially in the south. *This is consistent with anticipated El Niño conditions.***

Source: <http://www.cpc.ncep.noaa.gov/products/predictions/>

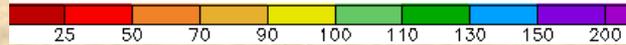
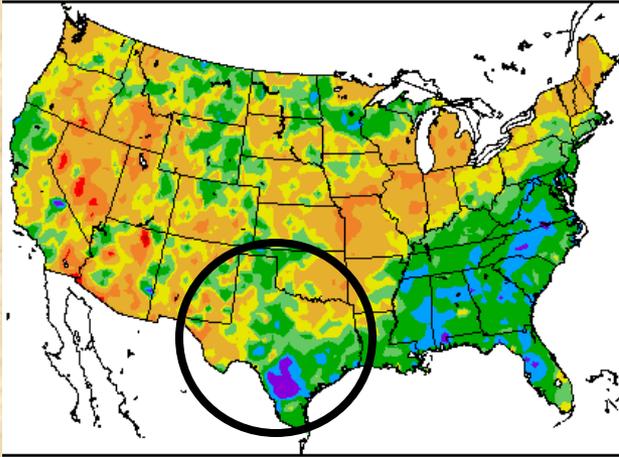
# CPC Winter Forecasts



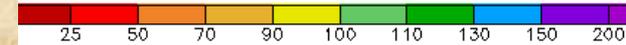
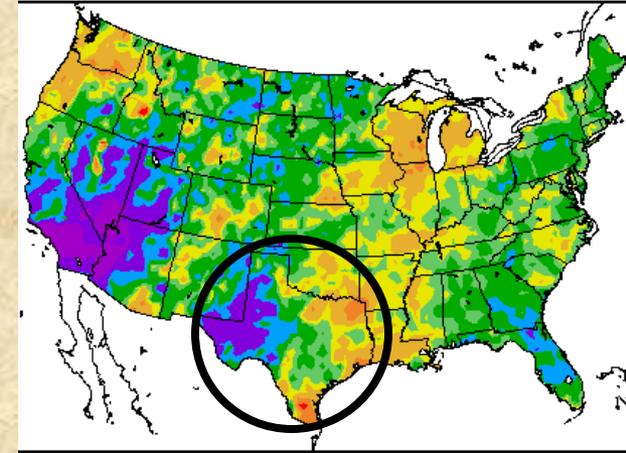
Texas can expect a chilly winter according to CPC (left). The moisture forecast is wetter-than-average. *This is also consistent with El Niño.*

Source: <http://www.cpc.ncep.noaa.gov/products/predictions/>

Percent of Normal Precipitation (%)  
7/1/2002 - 6/30/2003



Percent of Normal Precipitation (%)  
7/1/2004 - 6/30/2005

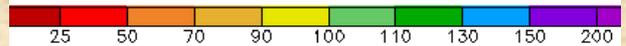
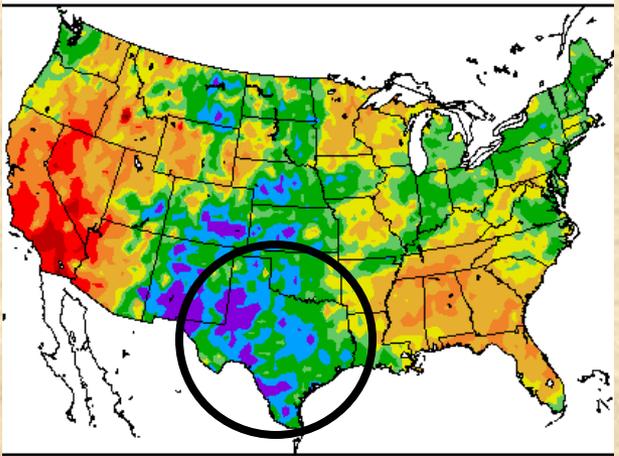


*How have recent  
Los Niños fared?*

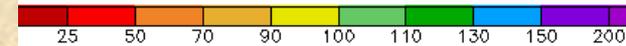
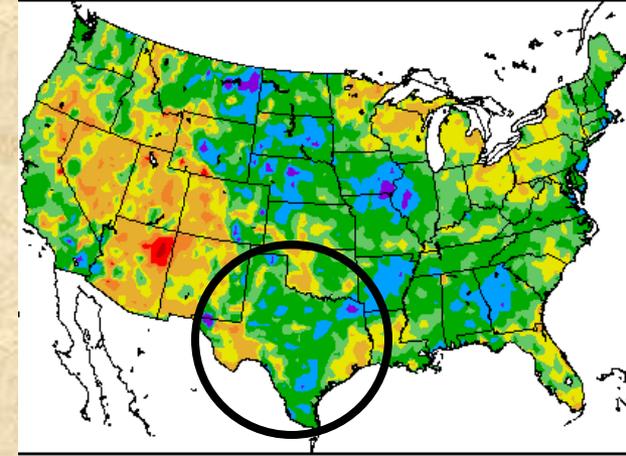
*Near-normal or  
better for most of  
Texas!*

**2002-3 (top left); 2004-5 (top right); 2006-7 (bottom left), and 2009-10 (bottom right).**

Percent of Normal Precipitation (%)  
7/1/2006 - 6/30/2007

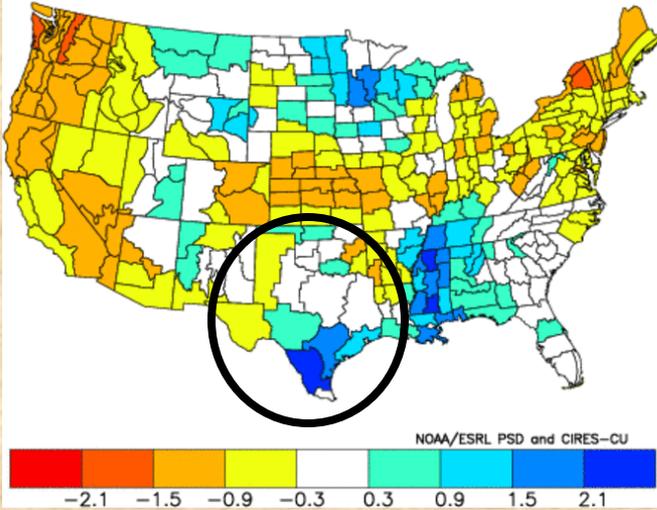


Percent of Normal Precipitation (%)  
7/1/2009 - 6/30/2010

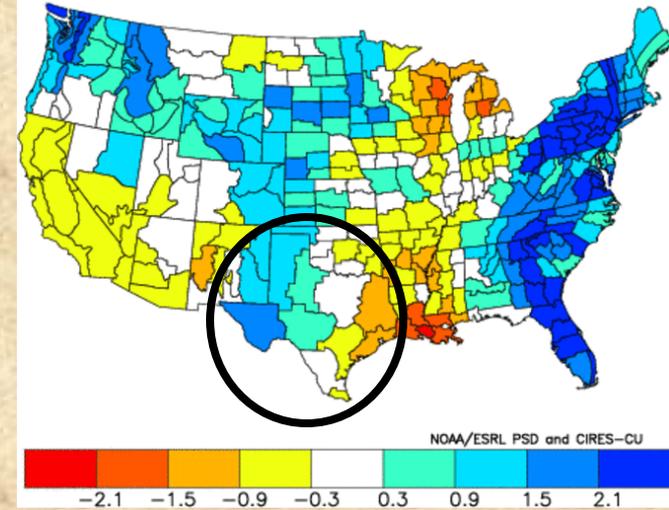


<http://www.hprcc.unl.edu/maps/current/>

NOAA/NCDC Climate Division Standardized Precipitation Anomalies  
Jul to Sep 2002  
Versus 1951–2010 Longterm Average



NOAA/NCDC Climate Division Standardized Precipitation Anomalies  
Jul to Sep 2004  
Versus 1951–2010 Longterm Average

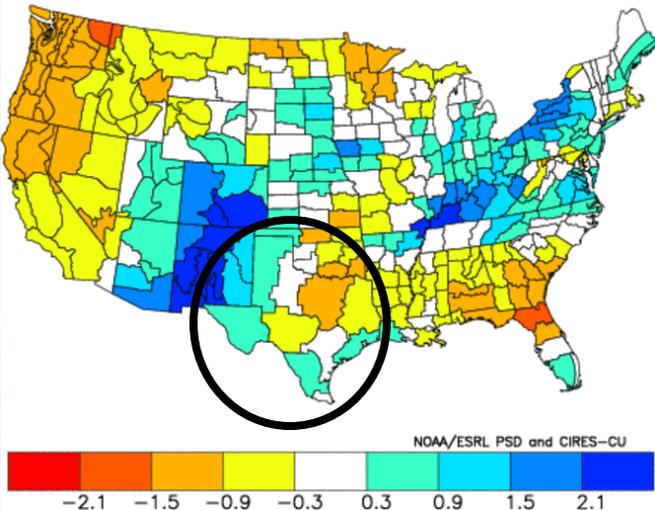


*How have recent  
Los Niños fared?*

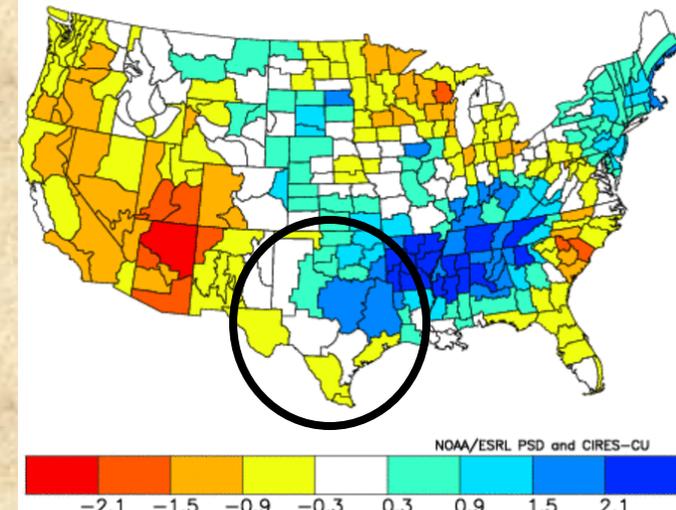
*July-September:  
'A mixed bag'*

**2002-3 (top left); 2004-5 (top right); 2006-7 (bottom left), and 2009-10 (bottom right).**

NOAA/NCDC Climate Division Standardized Precipitation Anomalies  
Jul to Sep 2006  
Versus 1951–2010 Longterm Average

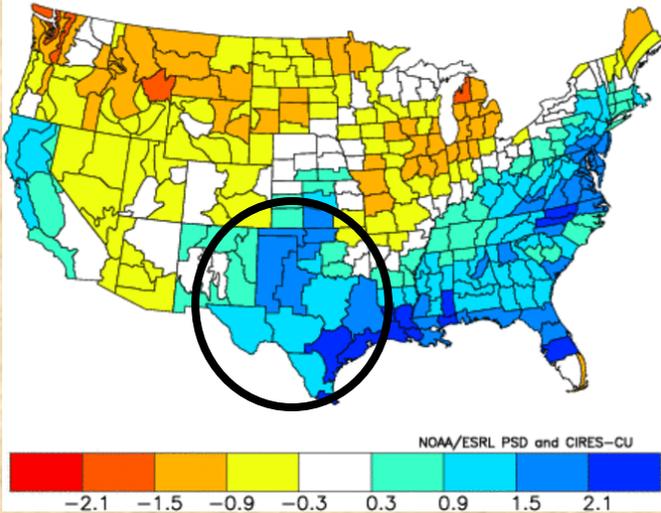


NOAA/NCDC Climate Division Standardized Precipitation Anomalies  
Jul to Sep 2009  
Versus 1951–2010 Longterm Average

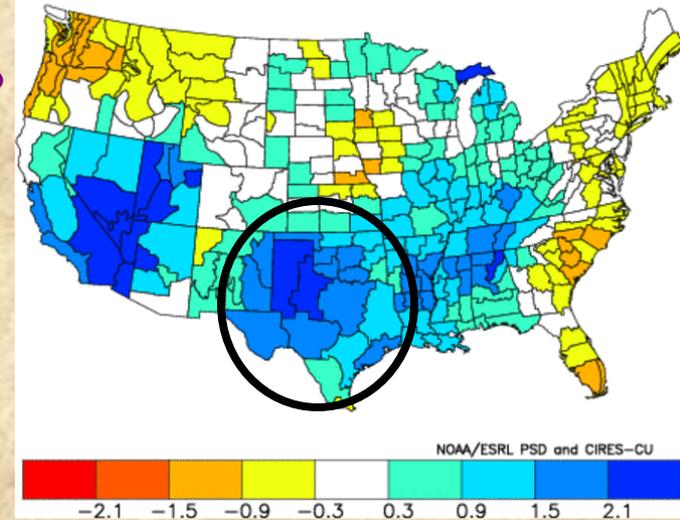


<http://www.esrl.noaa.gov/psd/data/usclimdivs/>

NOAA/NCDC Climate Division Standardized Precipitation Anomalies  
Oct to Dec 2002  
Versus 1951–2010 Longterm Average



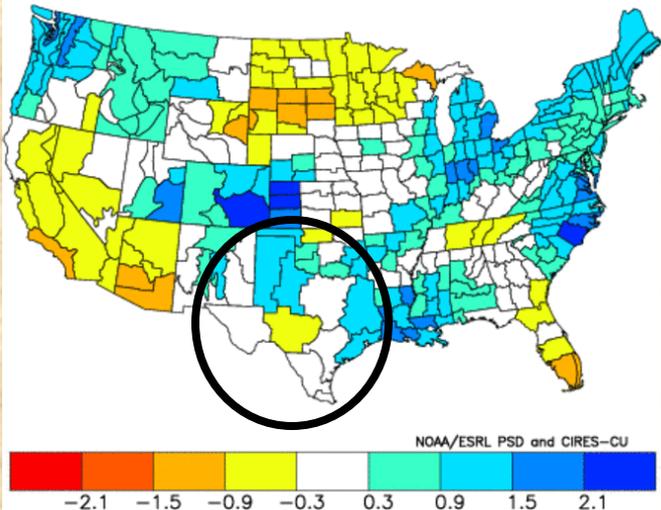
NOAA/NCDC Climate Division Standardized Precipitation Anomalies  
Oct to Dec 2004  
Versus 1951–2010 Longterm Average



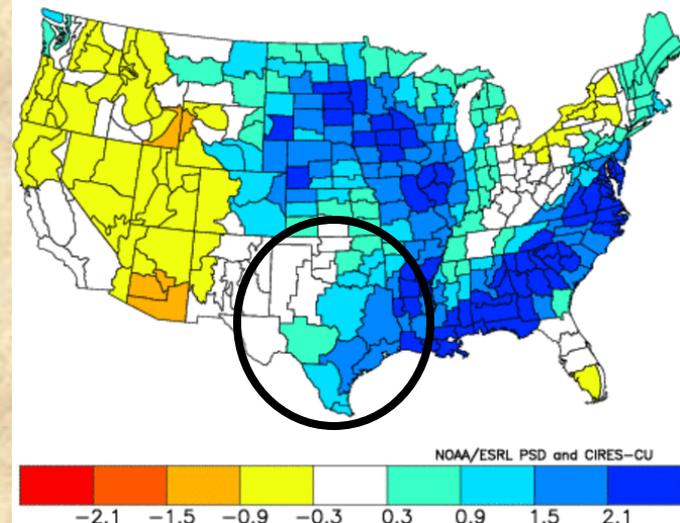
*How have recent  
Los Niños fared?  
October-December:  
mostly wet!*

**2002-3 (top left); 2004-5 (top right); 2006-7 (bottom left), and 2009-10 (bottom right).**

NOAA/NCDC Climate Division Standardized Precipitation Anomalies  
Oct to Dec 2006  
Versus 1951–2010 Longterm Average

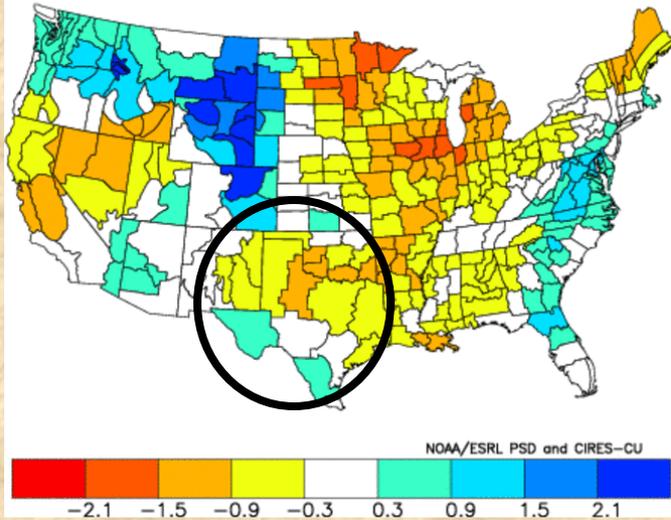


NOAA/NCDC Climate Division Standardized Precipitation Anomalies  
Oct to Dec 2009  
Versus 1951–2010 Longterm Average



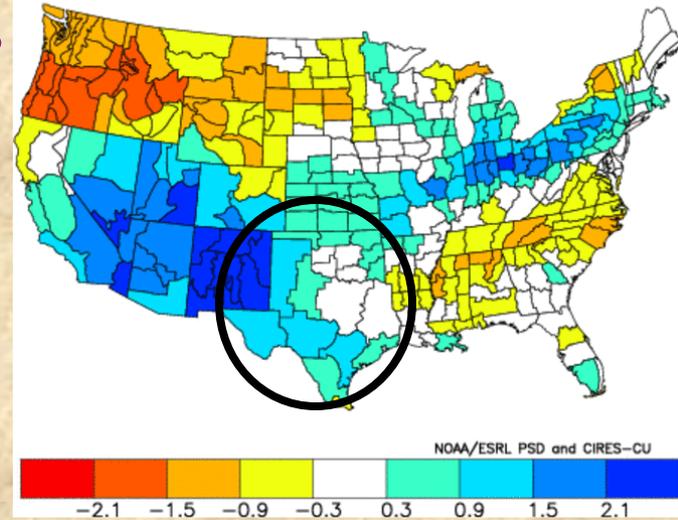
<http://www.esrl.noaa.gov/psd/data/usclimdivs/>

NOAA/NCDC Climate Division Standardized Precipitation Anomalies  
Jan to Mar 2003  
Versus 1951–2010 Longterm Average



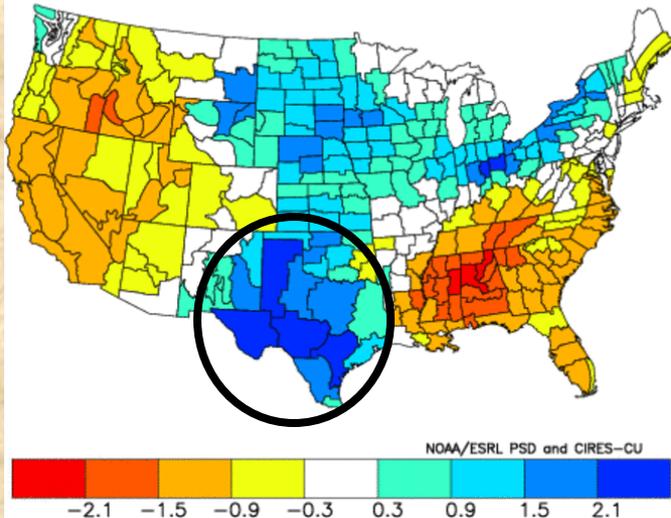
*How have recent  
Los Niños fared?  
  
January-March:  
Except for 2002-03,  
near-normal to  
moist*

NOAA/NCDC Climate Division Standardized Precipitation Anomalies  
Jan to Mar 2005  
Versus 1951–2010 Longterm Average



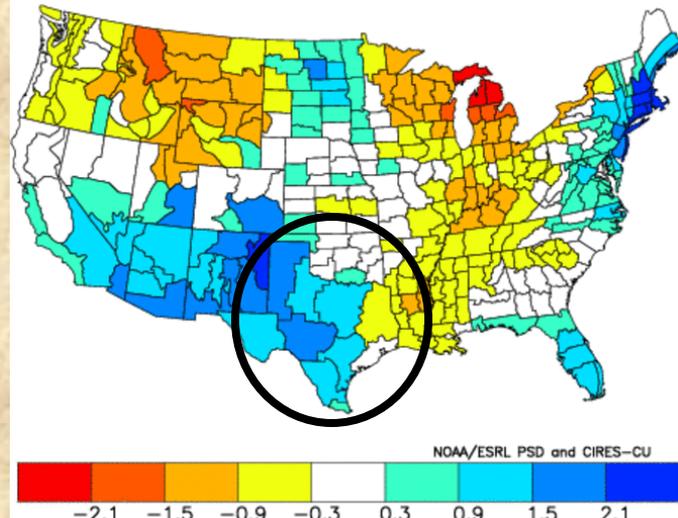
**2002-3 (top left); 2004-5 (top right); 2006-7 (bottom left), and 2009-10 (bottom right).**

NOAA/NCDC Climate Division Standardized Precipitation Anomalies  
Jan to Mar 2007  
Versus 1951–2010 Longterm Average



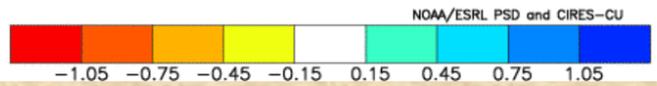
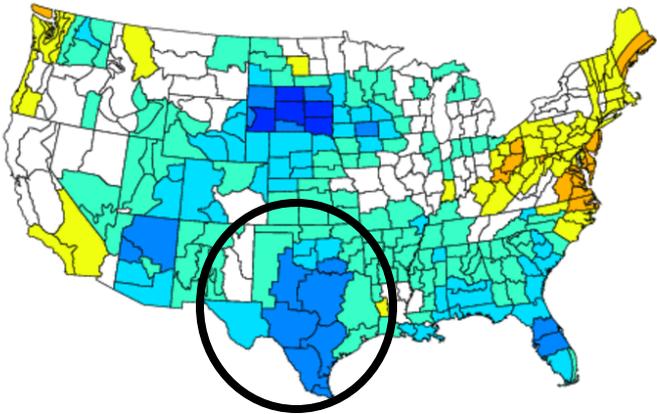
*<http://www.esrl.noaa.gov/psd/data/usclimdivs/>*

NOAA/NCDC Climate Division Standardized Precipitation Anomalies  
Jan to Mar 2010  
Versus 1951–2010 Longterm Average

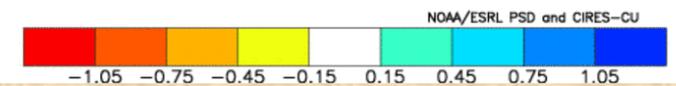
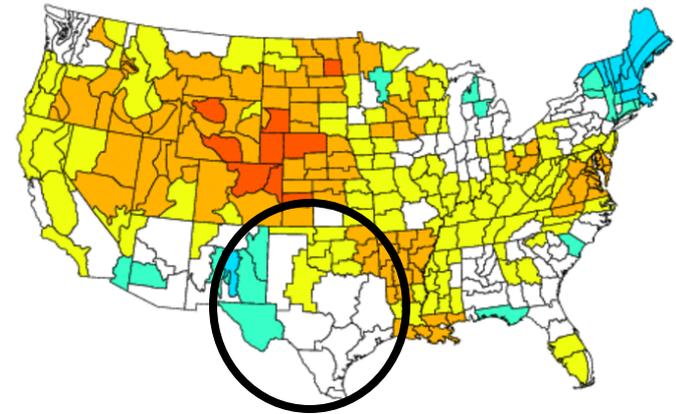


# Back to 2014: May Precipitation (sanity check)

NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
 May 1957,1965,1972,1982,1991,1997,2009  
 Versus 1951-2010 Longterm Average

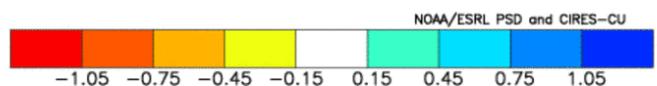
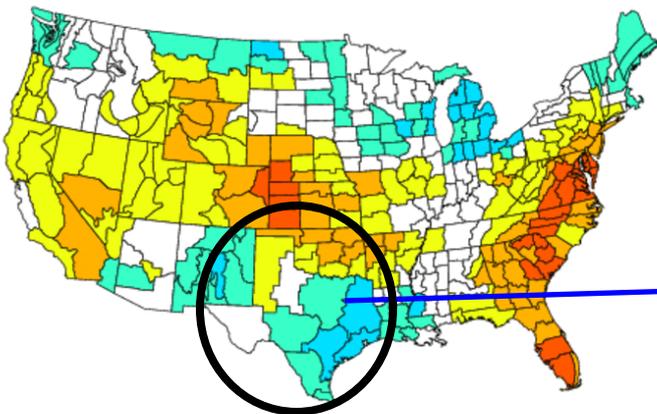


NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
 May 1951,1976,1986,1994,2002,2006,2012  
 Versus 1951-2010 Longterm Average

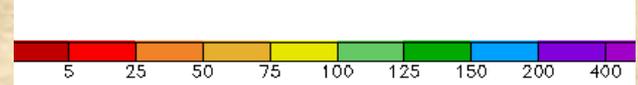
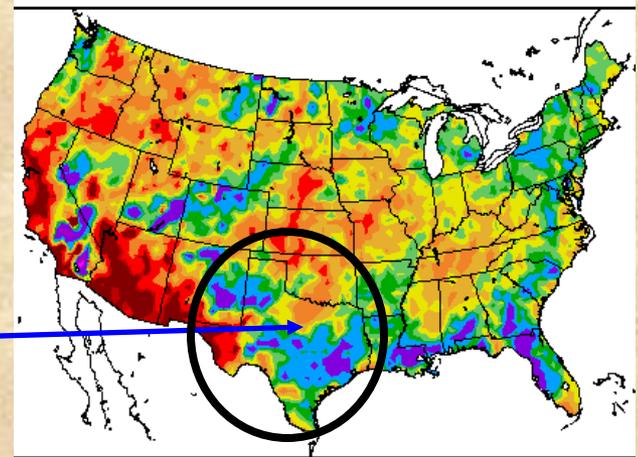


**Strong El Niño in JJA (top left); weak El Niño in JJA (top right); positive PDO (bottom left – based on Mar-Apr), and observations (bottom right).**

NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
 May 1965,1986,1994,1997,2004,2006  
 Versus 1951-2010 Longterm Average



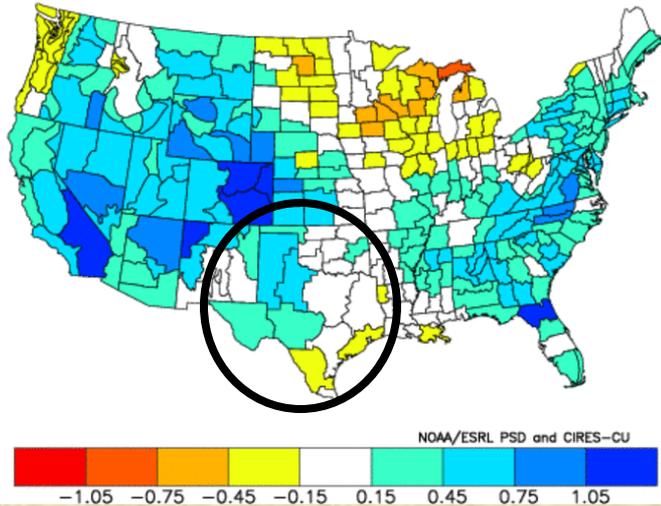
Percent of Normal Precipitation (%)  
 5/1/2014 – 5/31/2014



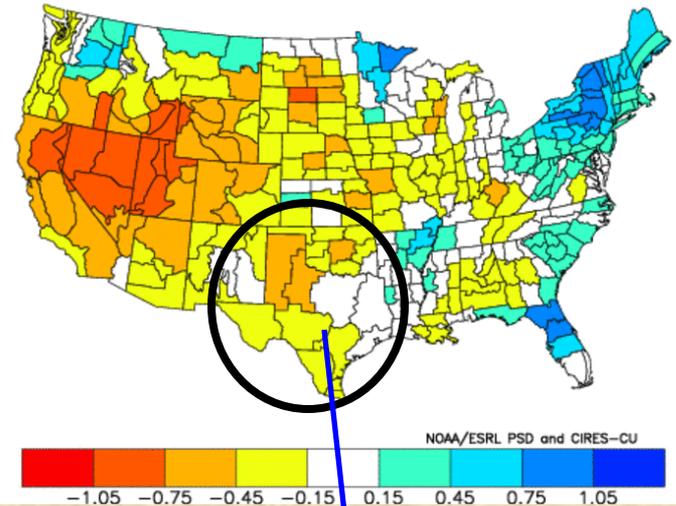
<http://www.esrl.noaa.gov/psd/data/usclimdivs/>

# Back to 2014: June Precipitation (sanity check)

NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
 Jun 1957,1965,1972,1982,1991,1997,2009  
 Versus 1951-2010 Longterm Average

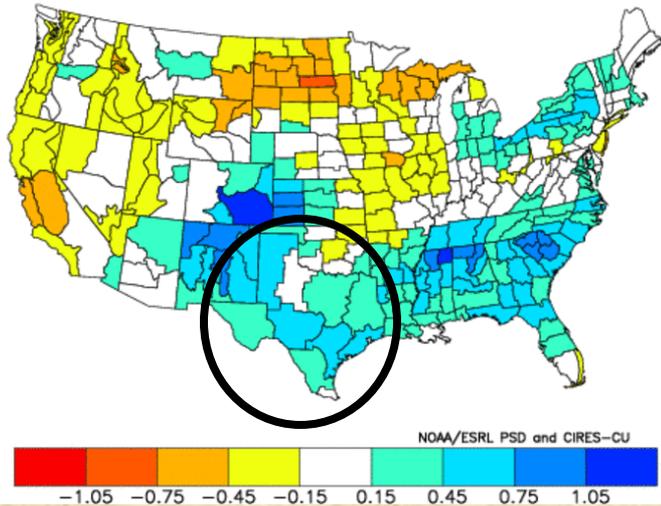


NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
 Jun 1951,1976,1986,1994,2002,2006,2012  
 Versus 1951-2010 Longterm Average

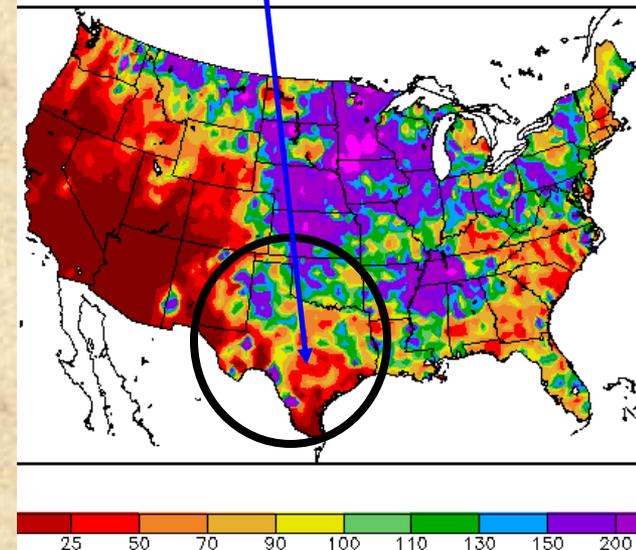


**Strong El Niño in JJA (top left); weak El Niño in JJA (top right); positive PDO (bottom left – based on Mar-Apr), and observations (bottom right).**

NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
 Jun 1965,1986,1994,1997,2004,2006  
 Versus 1951-2010 Longterm Average



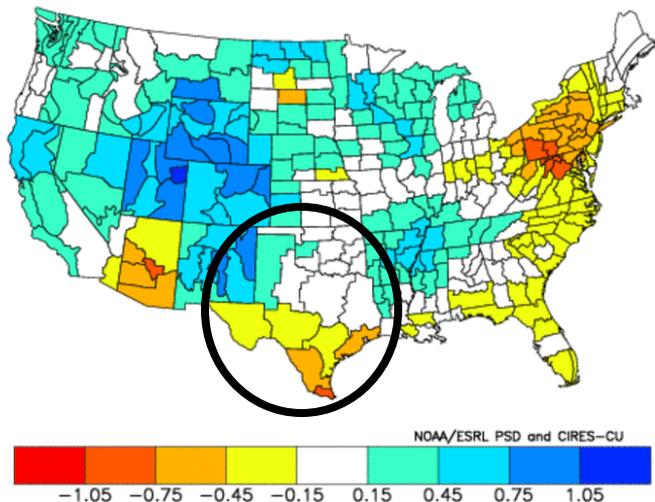
Percent of Normal Precipitation (%)  
 6/1/2014 - 6/21/2014



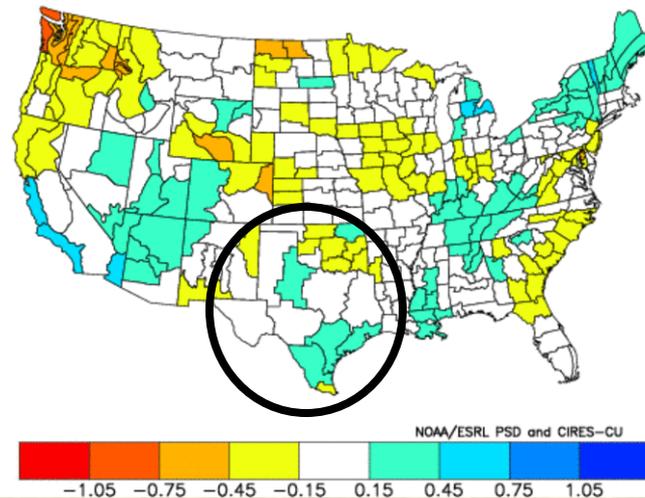
<http://www.esrl.noaa.gov/psd/d ata/usclimdivs/>

# July-September: Precipitation

NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
Jul to Sep 1957,1965,1972,1982,1991,1997,2009  
Versus 1951-2010 Longterm Average



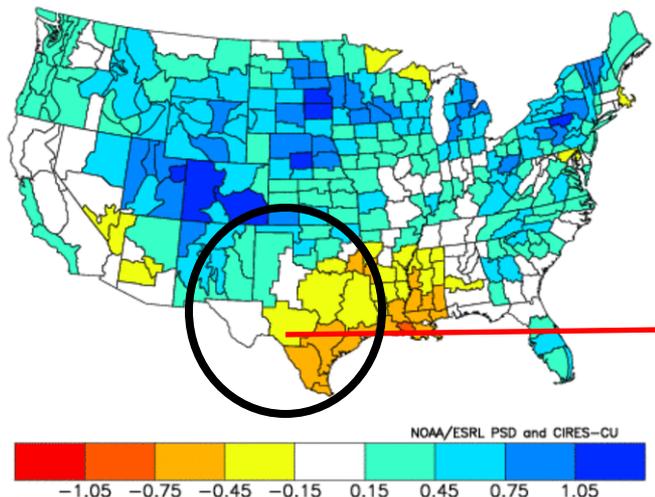
NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
Jul to Sep 1951,1976,1986,1994,2002,2006,2012  
Versus 1951-2010 Longterm Average



<http://www.esrl.noaa.gov/psd/data/usclimdiv/>

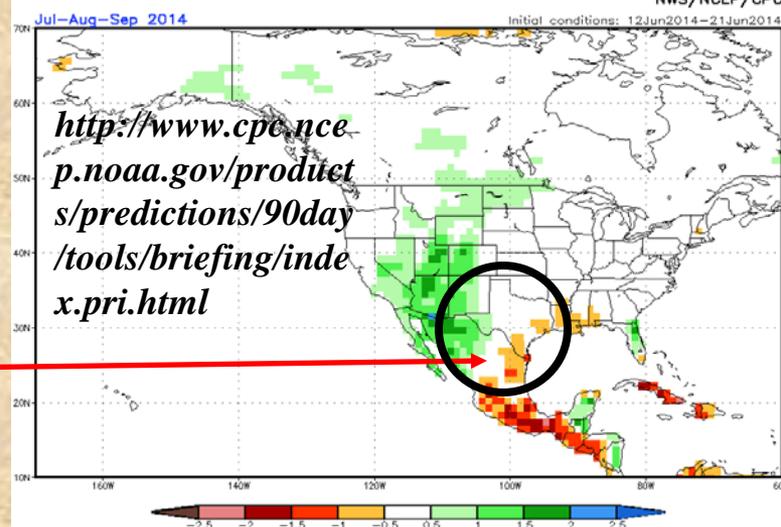
**Strong El Niño in JJA (top left); weak El Niño in JJA (top right); positive PDO (bottom left – based on Mar-Apr), and CFS forecast (bottom right). *Weak anomalies in TX!***

NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
Jul to Sep 1965,1986,1994,1997,2004,2006  
Versus 1951-2010 Longterm Average



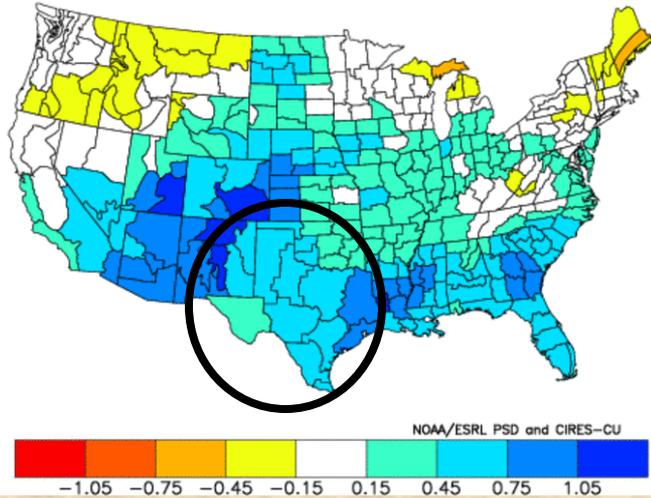
CFSv2 seasonal standardized Prec anomalies

NWS/NCEP/CPC

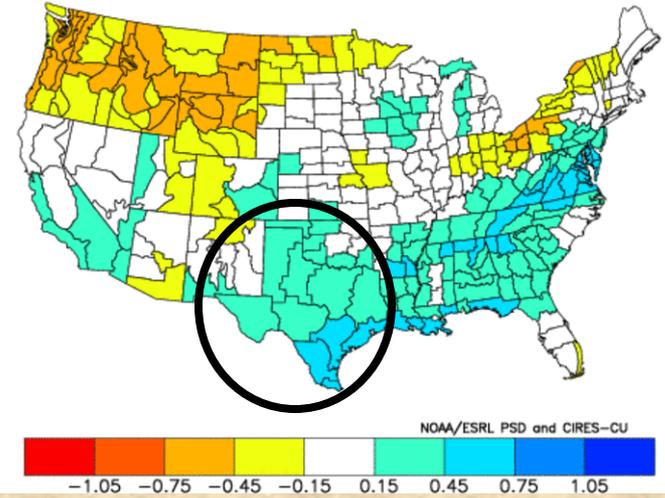


# October-December: Precipitation

NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
Oct to Dec 1957,1965,1972,1982,1986,1994,1997,2006  
Versus 1951-2010 Longterm Average



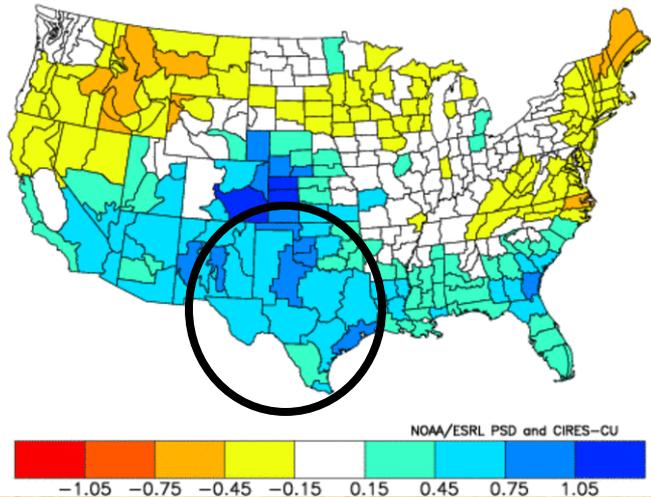
NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
Oct to Dec 1951,1963,1976,1979,1991,2002,2004,2009  
Versus 1951-2010 Longterm Average



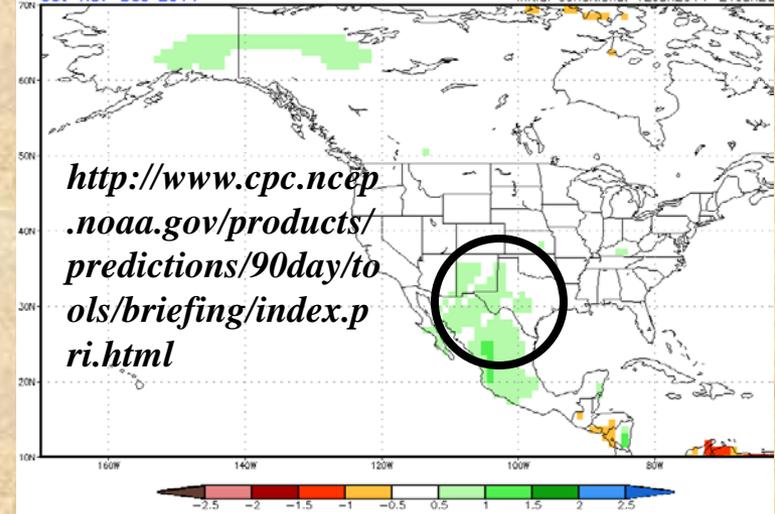
<http://www.esrl.noaa.gov/psd/d ata/usclimdivs/>

**Strong El Niño in SON (top left); weak El Niño in SON (top right); positive PDO (bottom left – based on Mar-Apr), and CFS forecast (bottom right). *Consistently “moist” in TX!***

NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
Oct to Dec 1965,1979,1986,1994,1997,2004,2006  
Versus 1951-2010 Longterm Average



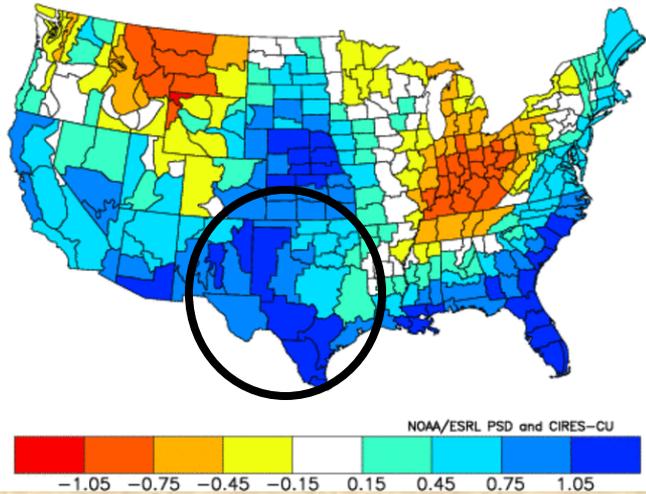
CFSv2 seasonal standardized Prec anomalies  
NWS/NCEP/C  
Oct-Nov-Dec 2014  
Initial conditions: 12Jun2014-21Jun2014



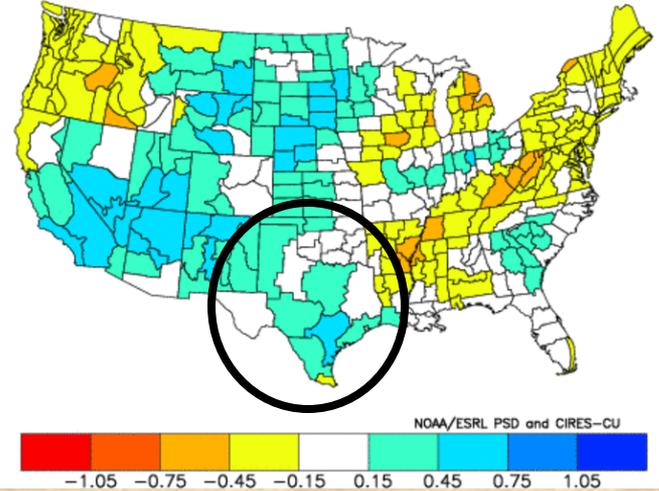
<http://www.cpc.ncep.noaa.gov/products/predictions/90day/tols/briefing/index.p ri.html>

# January-March: Precipitation

NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
Jan to Mar 1958,1966,1973,1983,1987,1992,1998,2010  
Versus 1951-2010 Longterm Average

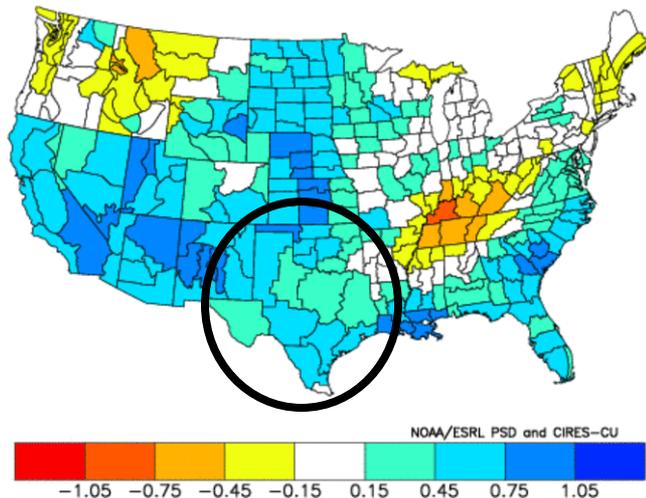


NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
Jan to Mar 1964,1969,1977,1980,1995,2003,2005,2007  
Versus 1951-2010 Longterm Average



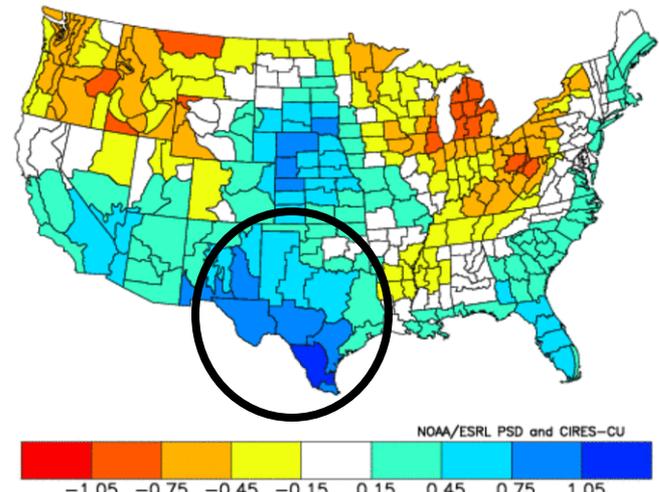
**Strong El Niño in DJF (top left); weak El Niño in DJF (top right); positive PDO (bottom left – based on Mar-Apr), and negative PDO (ditto; bottom right). *Root for strong event!***

NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
Jan to Mar 1966,1980,1987,1995,1998,2005,2007  
Versus 1951-2010 Longterm Average



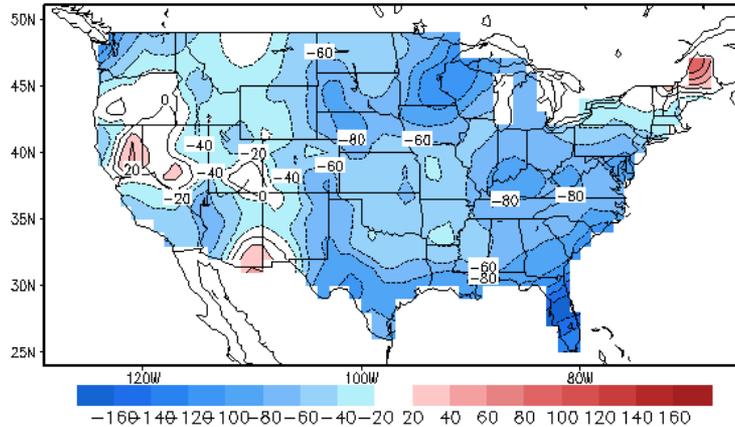
<http://www.esrl.noaa.gov/psd/data/usclimdivs/>

NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
Jan to Mar 1958,1964,1969,1973,1977,1992,2003,2010  
Versus 1951-2010 Longterm Average

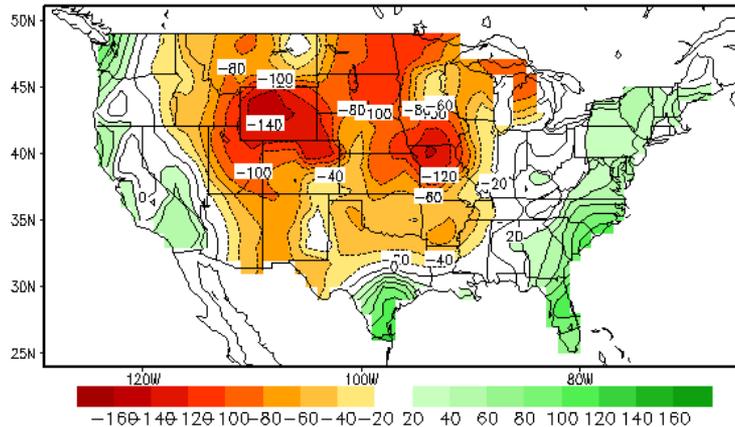


# Soil Moisture Analogue Forecasts

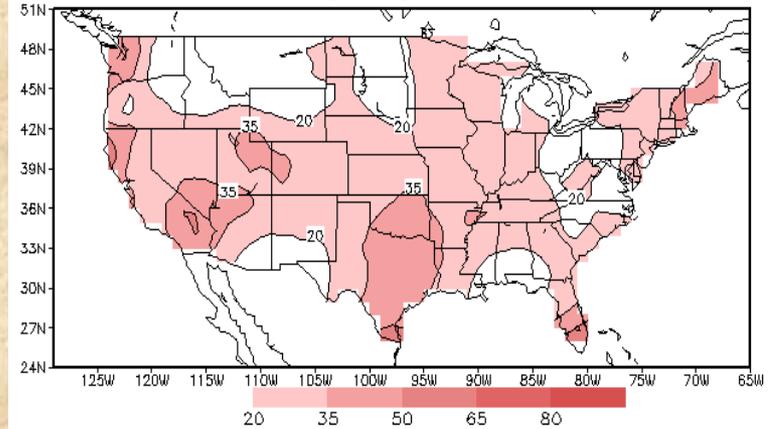
Lagged Averaged Temperature Outlook for JAS 2014  
units: anomaly (sdX100), SM data ending at 20140621



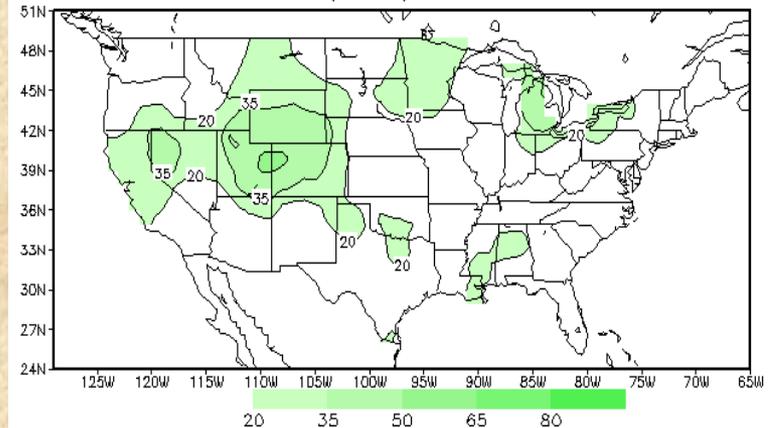
Lagged Averaged Precipitation Outlook for JAS 2014  
units: anomaly (sdX100), SM data ending at 20140621



lead 1 skill of temperature CAS forecast for JAS  
units: correlation (X100) based on 1981-2005



lead 1 skill of precipitation CAS forecast for JAS  
units: correlation (X100) based on 1981-2005



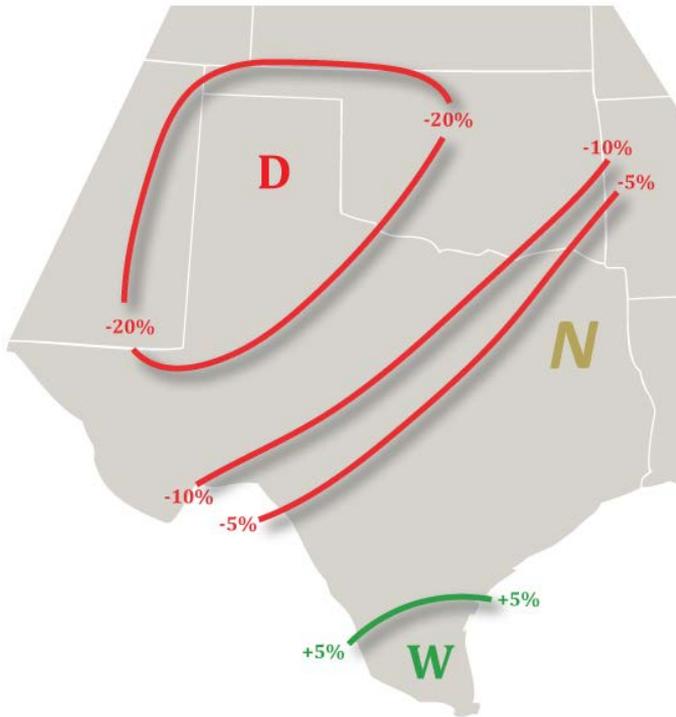
**The CPC soil moisture tool anticipates unusual combination of cool & dry summer over northern TX, supported by limited historical skill (*and weak El Niño*).**

<http://www.cpc.ncep.noaa.gov/products/predictions/90day/tools/briefing/>

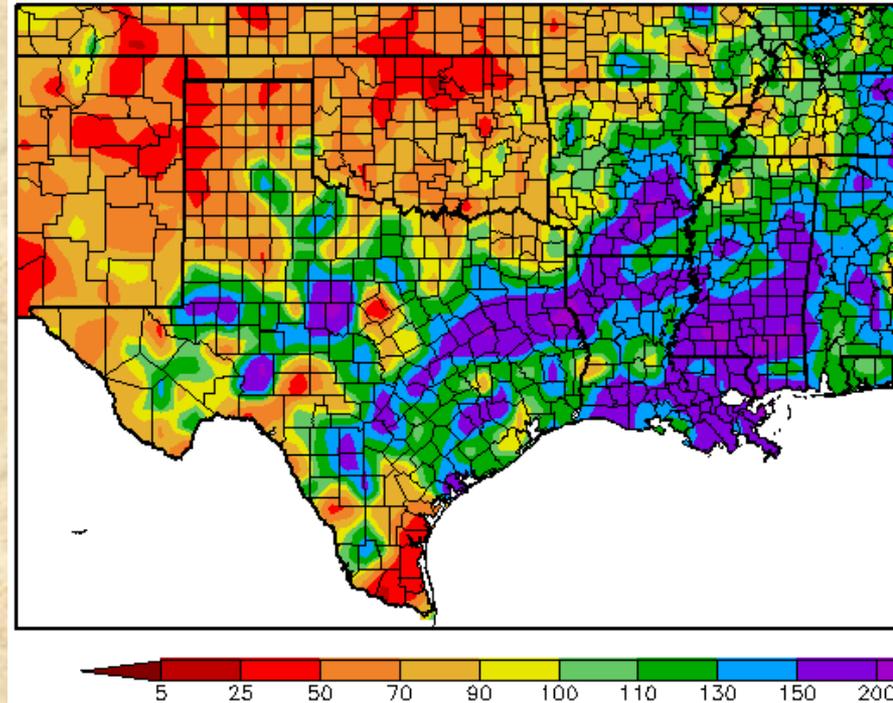
# Postmortem: Statistical Forecast for Jul-Sep 2012

## Experimental PSD Precipitation Forecast Guidance

JUL - SEP 2012 (Issued June 29, 2012)



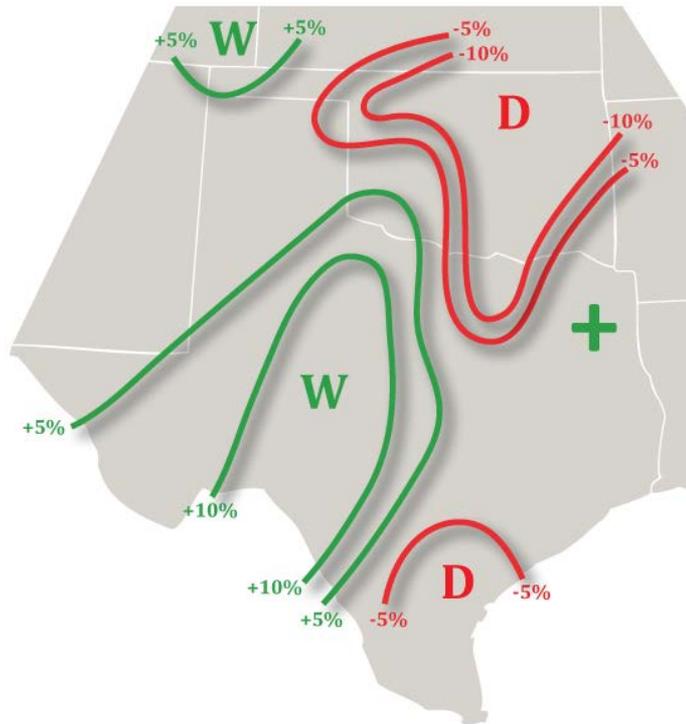
## Percent of Normal Precipitation (%) 7/1/2012 - 9/30/2012



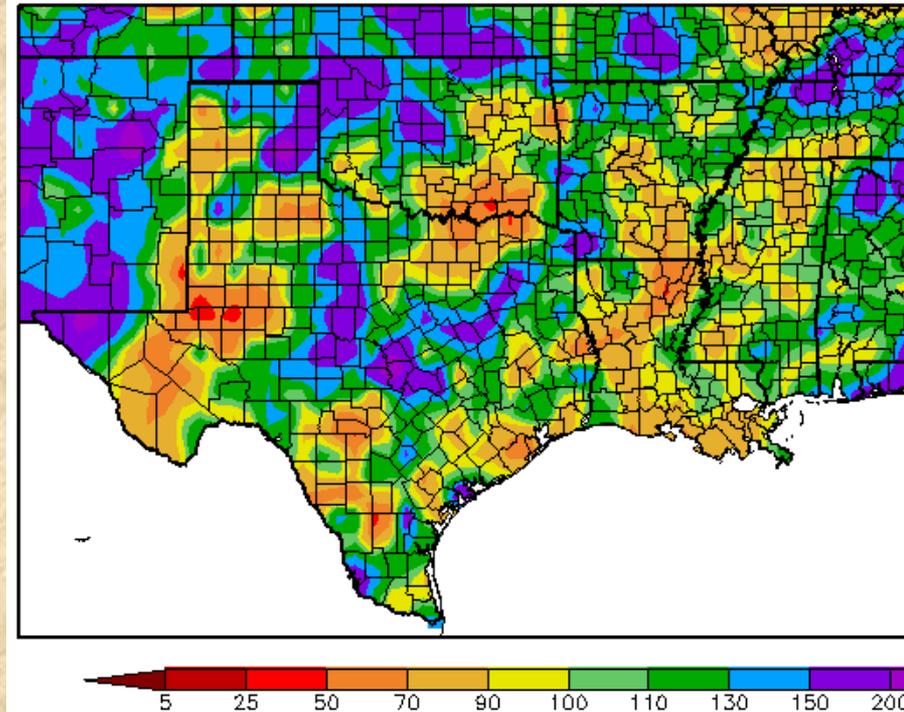
**My statistical forecast for July-September 2012 (left) was dry over the northwestern half of TX, and near-normal to wet towards the Gulf Coast. The actual precipitation anomalies (right) matched the general sense of this forecast, with the glaring exception of a dry southern tip of TX.**

# Postmortem: Statistical Forecast for Jul-Sep2013

Experimental PSD Precipitation Forecast Guidance  
 JUL – SEP 2013 (Issued May 23, 2013)

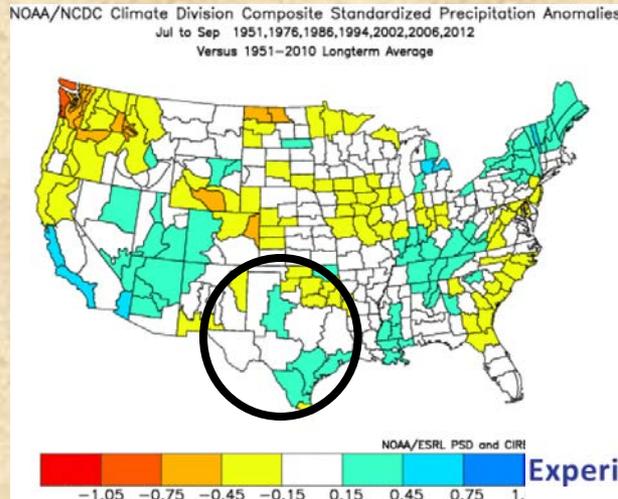
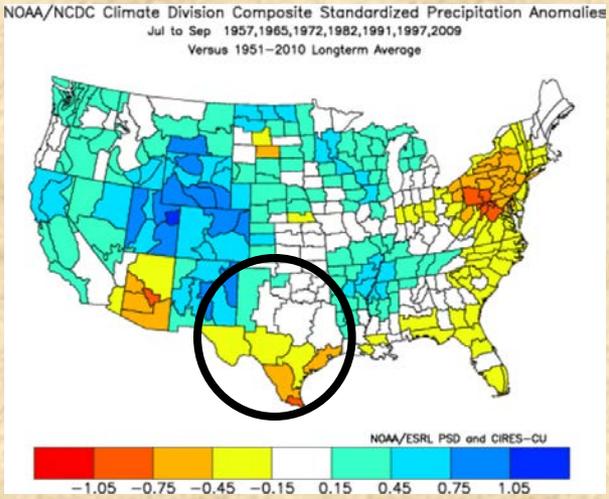


Percent of Normal Precipitation (%)  
 7/1/2013 – 9/30/2013

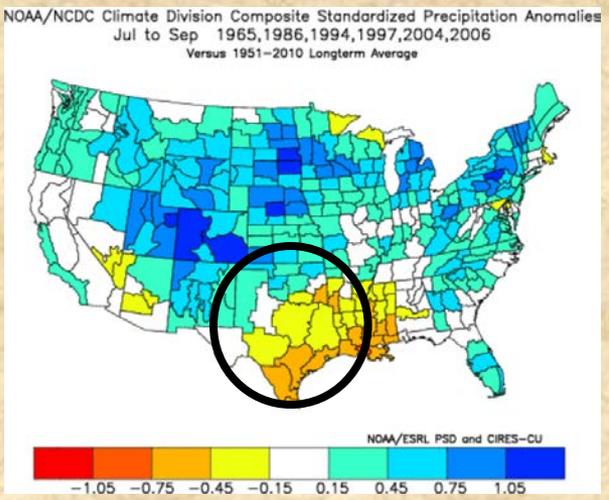


**My statistical forecast for July-September 2013 (left) was dry over OK and southernmost TX, and wet from western TX into panhandle of OK. The actual precipitation anomalies (right) were not as well-matched as in 2012.**

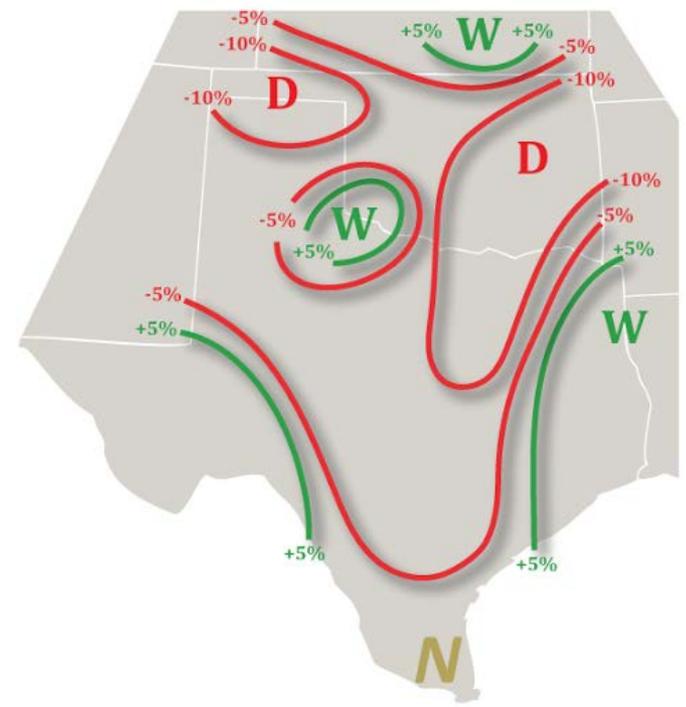
# Statistical Forecast for July-September 2014



## Experimental PSD Precipitation Forecast Guidance JUL - SEP 2014 (Issued June 20, 2014)



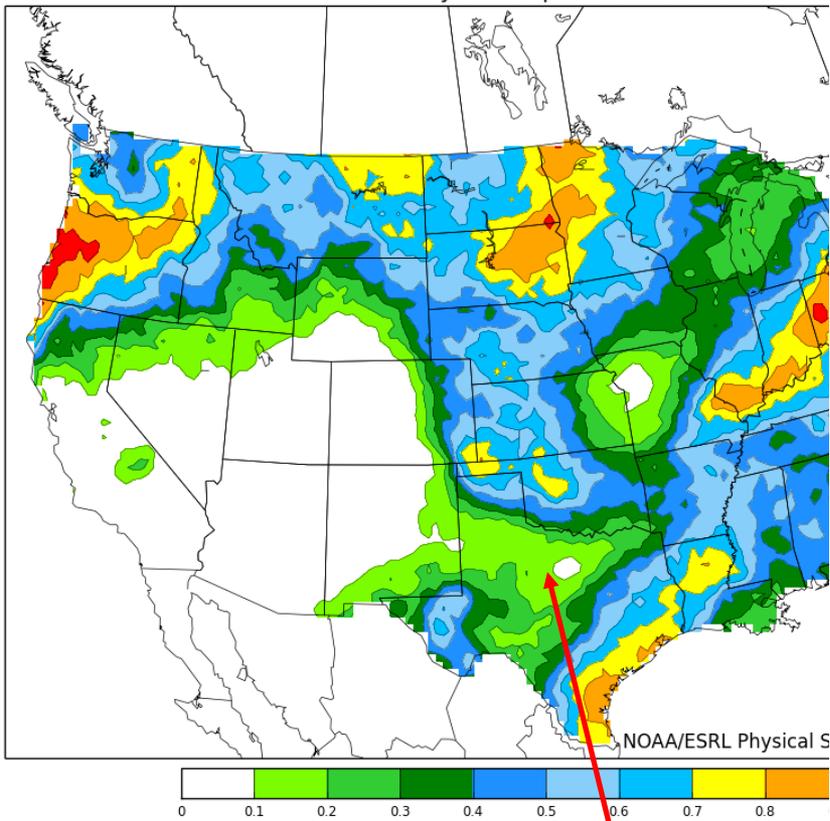
**My statistical forecast for July-September 2014 (right) resembles overall positive PDO with El Niño composite (left) more than strong (top left) or weak El Niño (top right) templates.**



# What can we expect in next two weeks?

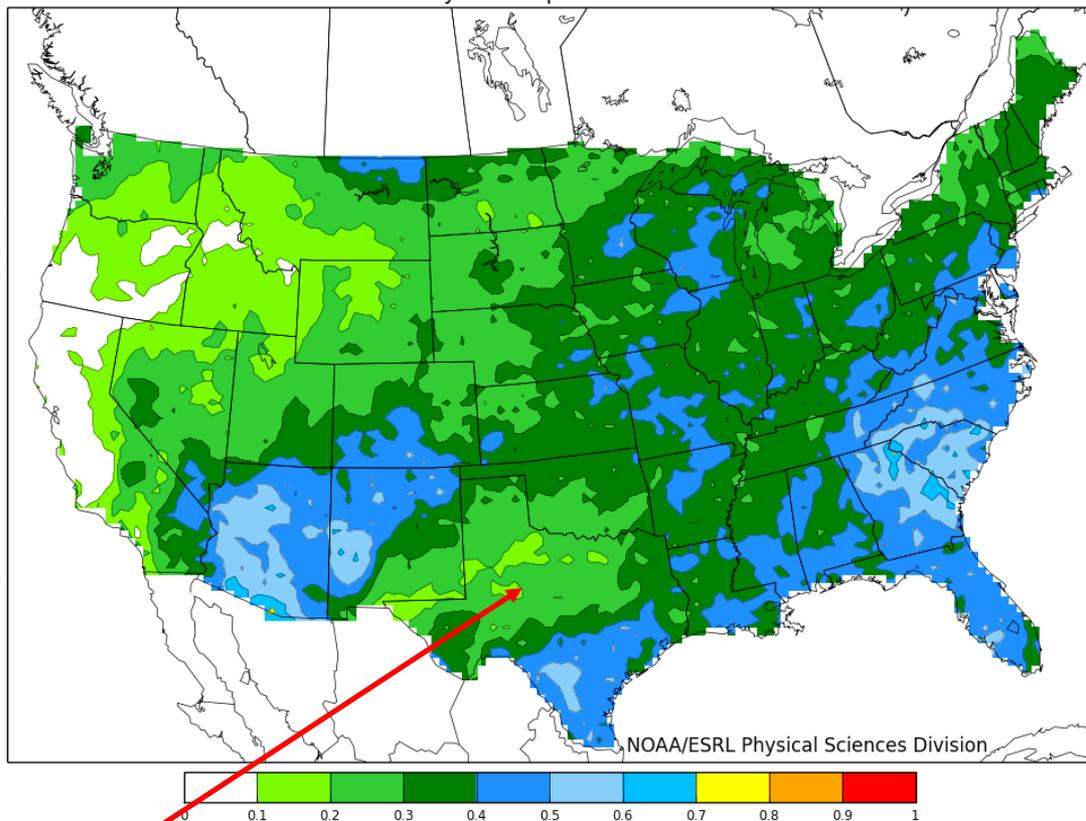
000-168hr fcst from 00Z Tue Jun 24. Valid 00Z Tue Jun 24 -  
Calibrated with 1985-2010 Reforecast2 data.

Probability of Precip > 67th Percentile



168-336hr fcst from 00Z Tue Jun 24. Valid 00Z Tue Jul 01 - 00Z Tue Jul 08  
Calibrated with 1985-2010 Reforecast2 data.

Probability of Precip > 67th Percentile



*Next week looks wet from OK northwestward and over southeastern TX (left), while the following week (right) shows the 1<sup>st</sup> hint of a monsoon onset from AZ into CO, whereas much of TX stays **dry**.*

- While El Niño/La Niña can provide decent guidance for climate outlooks in the U.S., this did not apply to two years of ENSO-neutral conditions. Since April 2014, El Niño has raised its head, but is not ‘firing on all cylinders’ (yet). *A recent switch to positive Pacific Decadal Oscillation (PDO) values – even if only temporary – tends to reinforce El Niño-like behavior in this part of the world.*

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- Once an El Niño event gets going, it typically last through our winter season, sometimes well into the next year. On average, the stronger events have a more reliable wet ‘signal’ in Texas than weaker events. The current forecast is for a moderate event.

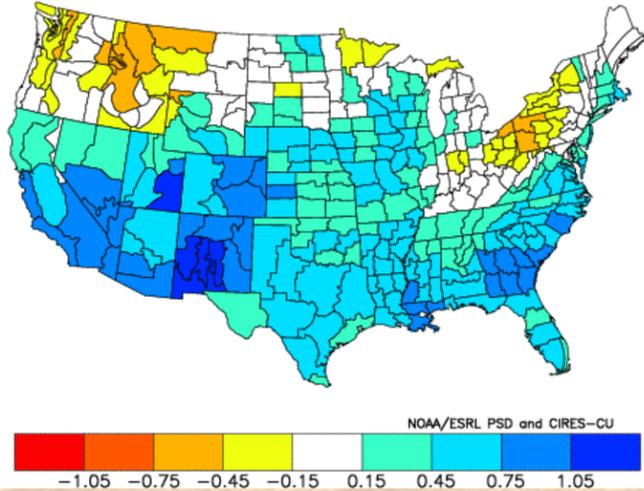
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- My experimental precipitation forecast for the summer is on the dry side, consistent with weak El Niño conditions. I expect wetter forecasts later this year -

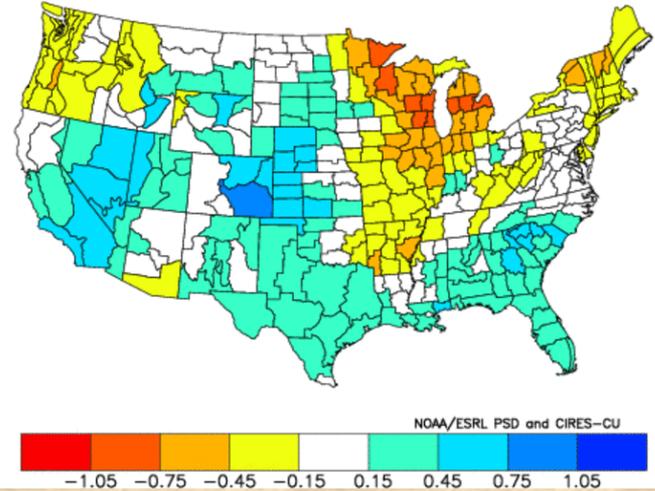
*Stay tuned!*

# July-June: Precipitation

NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
Jul to Jun 1957-58,1965-66,1972-73,1982-83,1986-87,1991-92,1997-98,2009-10  
Versus 1951-2010 Longterm Average

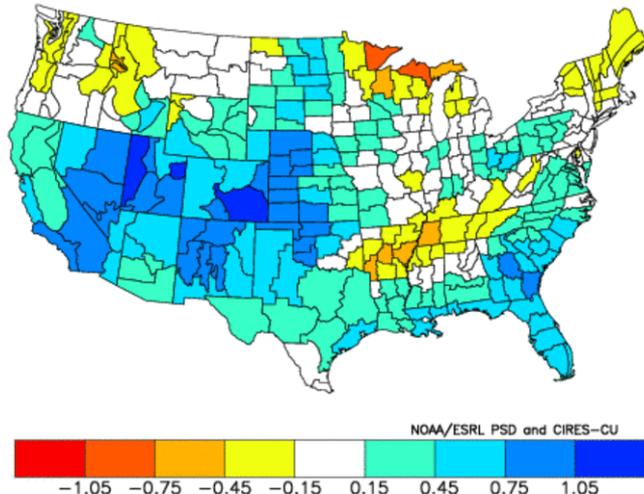


NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
Jul to Jun 1963-64,1968-69,1976-77,1979-80,1994-95,2002-03,2004-05,2006-07  
Versus 1951-2010 Longterm Average

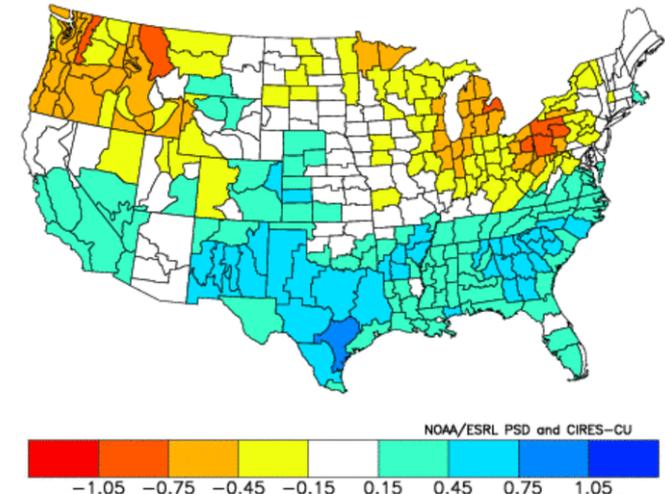


**Strong El Niño in DJF (top left); weak El Niño in DJF (top right); positive PDO (bottom left – based on Mar-Apr), and negative PDO (ditto; bottom right).**

NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
Jul to Jun 1965-66,1979-80,1986-87,1994-95,1997-98,2004-05,2006-07  
Versus 1951-2010 Longterm Average



NOAA/NCDC Climate Division Composite Standardized Precipitation Anomalies  
Jul to Jun 1957-58,1963-64,1968-69,1972-73,1976-77,1991-92,2002-03,2009-10  
Versus 1951-2010 Longterm Average



<http://www.esrl.noaa.gov/psd/data/usclimdi>  
vs/