# From Drought to Floods
# What's Next?

## May 18, 2016

**Gary McManus**
**State Climatologist**
**Oklahoma Mesonet**
**Oklahoma Climatological Survey**

# Want to know more about Oklahoma's drought / water cycle?

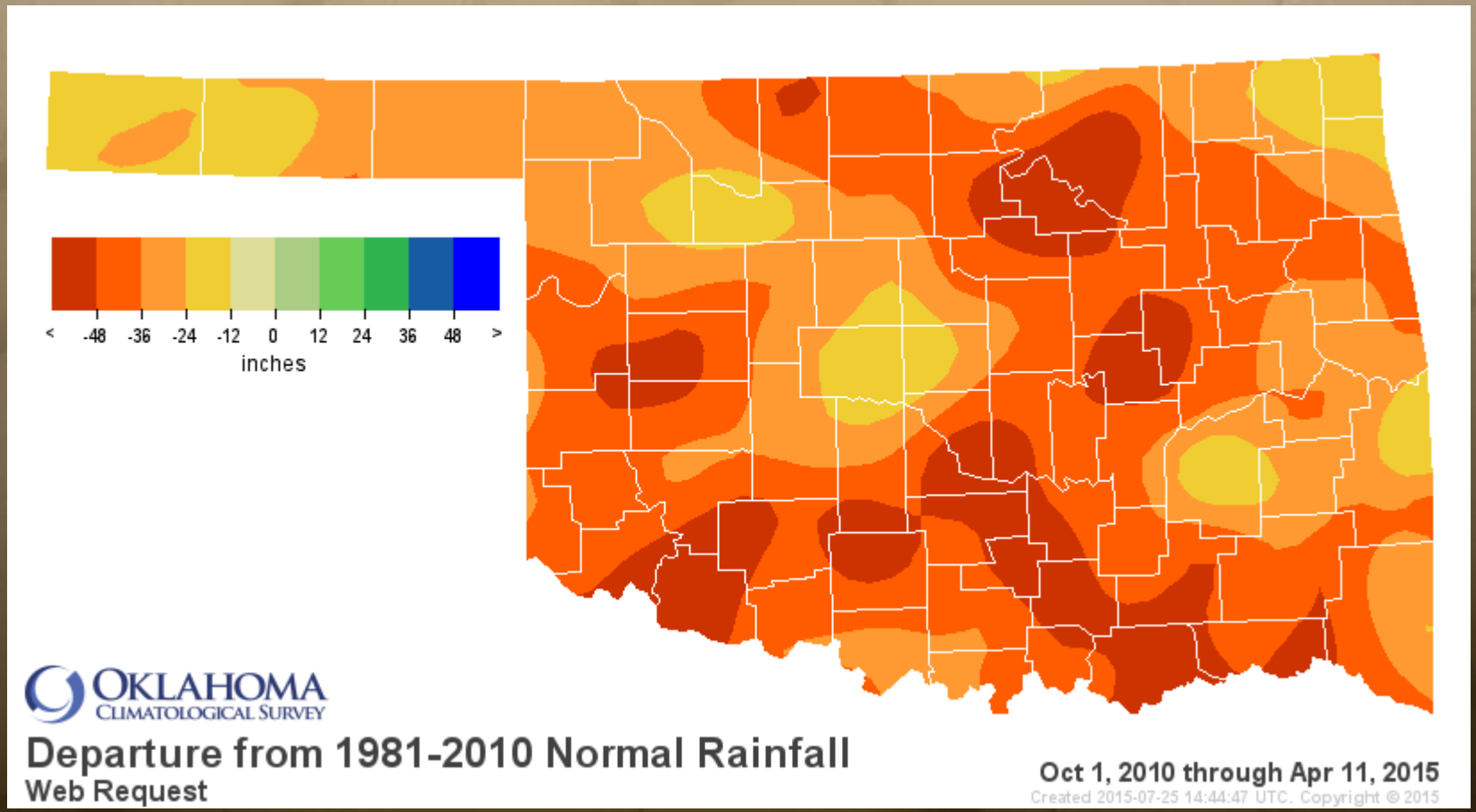
## Just look at the last 6 years!

# Synopsis of our 2010-16 Weather

- Drought "begins" October 2010
- Intensified through summer 2011
- Intermittent relief through early 2015
- El Nino intensifies in 2015, "Super El Nino" brings final end to drought
- 2015 becomes wettest year on record
- January thru mid-April dry, warm…WILDFIRES!
- Active weather pattern to the rescue
- El Nino fading…La Nina on the horizon

# How did we get here

# Oct. 1, 2010-Apr. 11, 2015




**36.4 inches below normal statewide (50+ in some areas)**

# The drought at its worst

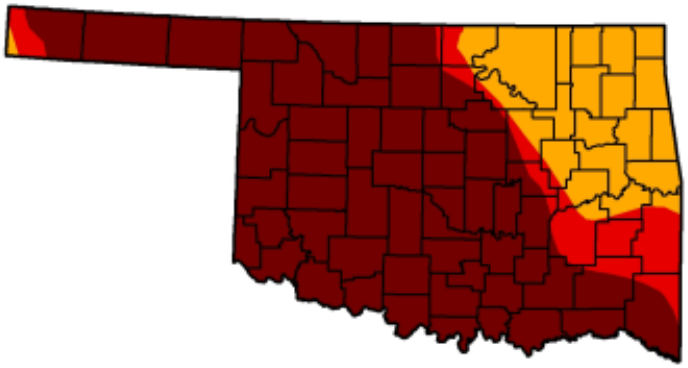
## U.S. Drought Monitor

**October 4, 2011**
Valid 7 a.m. EST

### Oklahoma

*Drought Conditions (Percent Area)*

| | None | D0-D4 | D1-D4 | D2-D4 | D3-D4 | D4 |
|---|---|---|---|---|---|---|
| Current | 0.00 | 100.00 | 100.00 | 100.00 | 78.97 | 69.82 |
| Last Week (09/27/2011 map) | 0.00 | 100.00 | 100.00 | 100.00 | 78.97 | 66.42 |
| 3 Months Ago (07/05/2011 map) | 0.00 | 100.00 | 93.77 | 60.75 | 44.18 | 32.78 |
| Start of Calendar Year (12/28/2010 map) | 13.82 | 86.18 | 47.90 | 1.50 | 0.00 | 0.00 |
| Start of Water Year (09/27/2011 map) | 0.00 | 100.00 | 100.00 | 100.00 | 78.97 | 66.42 |
| One Year Ago (09/28/2010 map) | 66.28 | 33.72 | 4.21 | 0.00 | 0.00 | 0.00 |



*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**

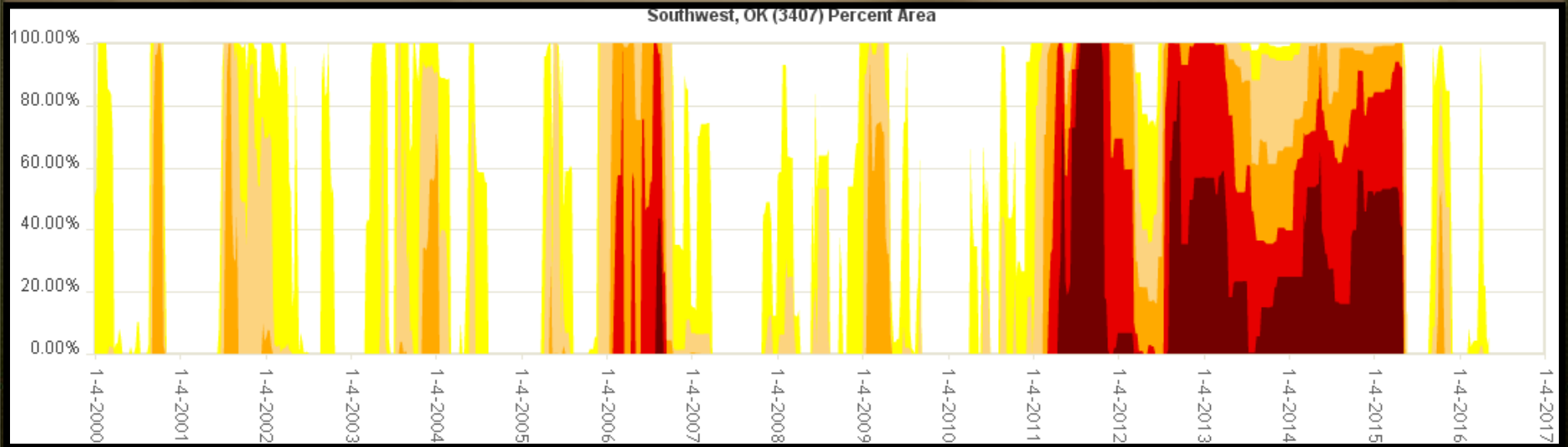
USDA National Drought Mitigation Center

***Released Thursday, October 6, 2011***

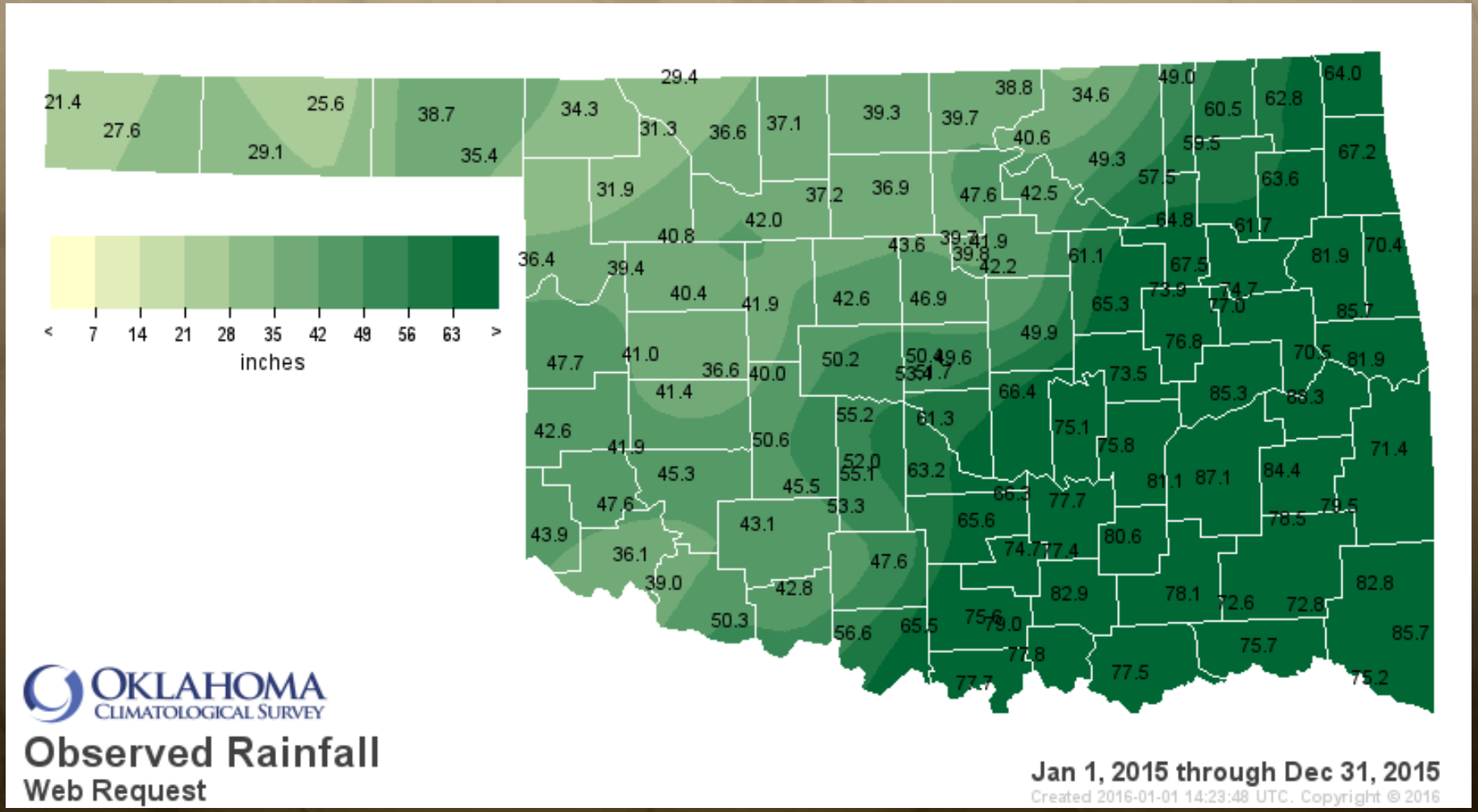
**70% of the state in D4 drought**

# Southwest OK Drought 2000-2016

## More drought than not!



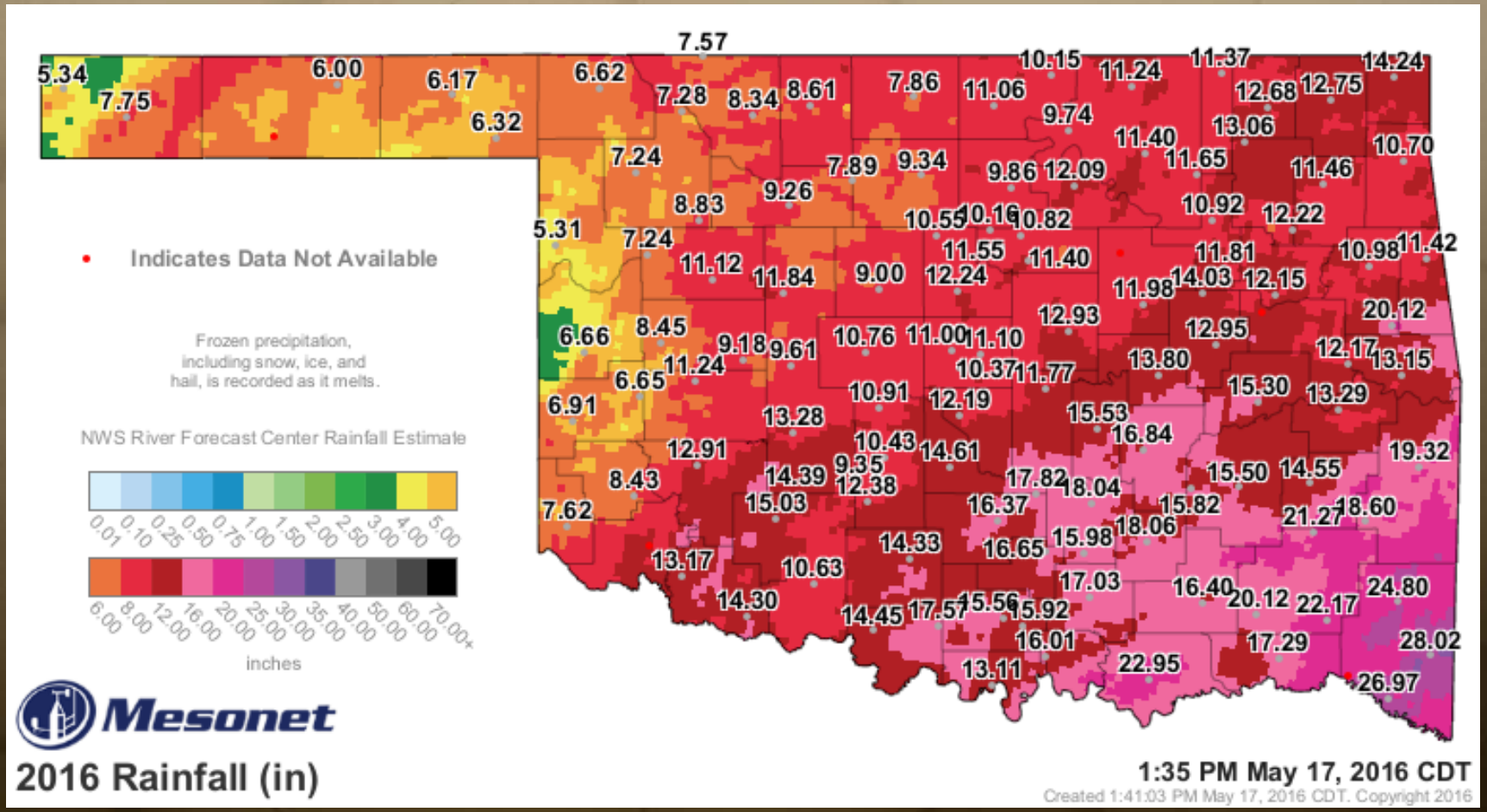
# 2015: A Drought Buster!



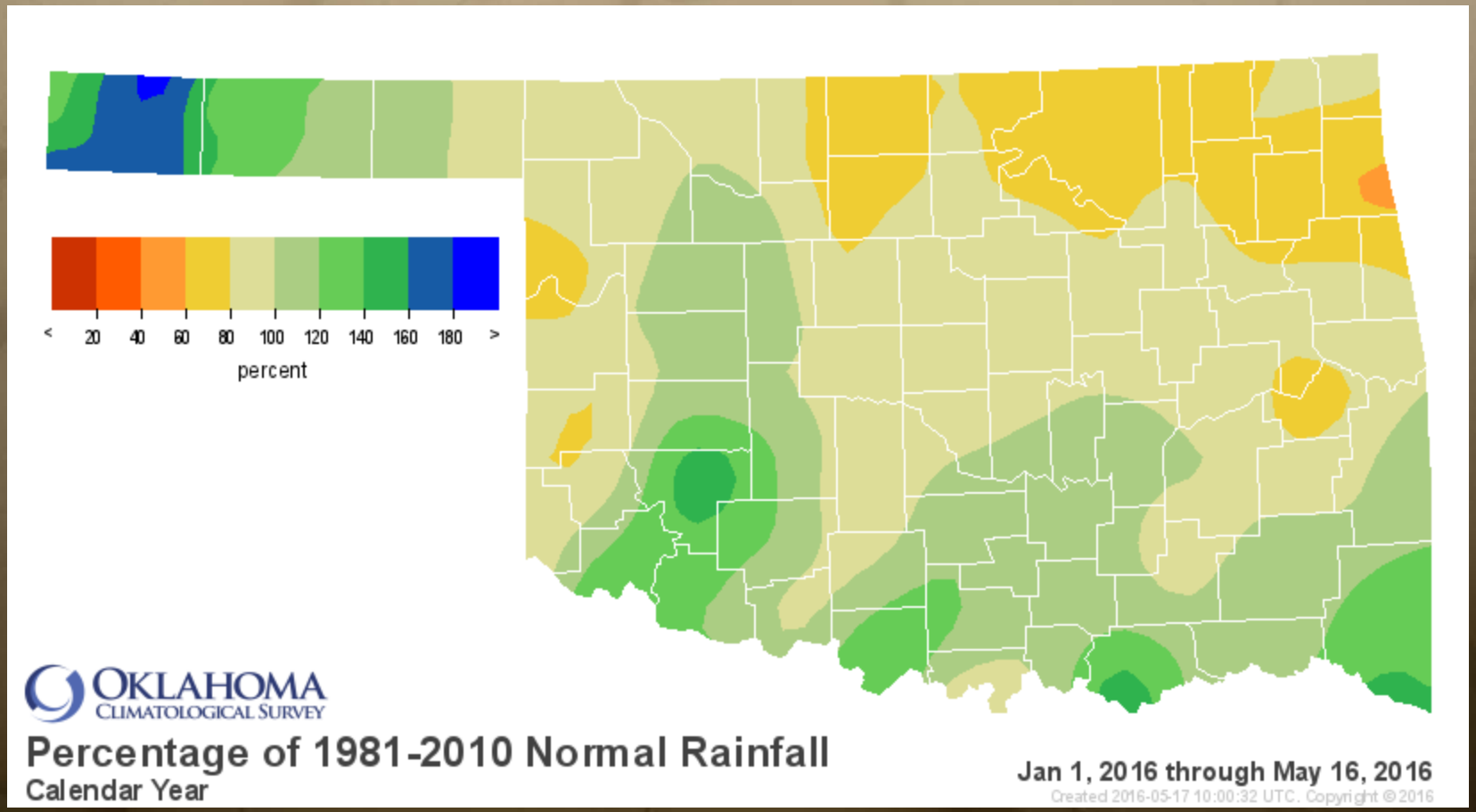

**2015's statewide avg. of 53.49" obliterates previous record holder, 1957's 47.88 inches (5.61")**

# Where are we now?

# Mesonet Rainfall 2016 thus far

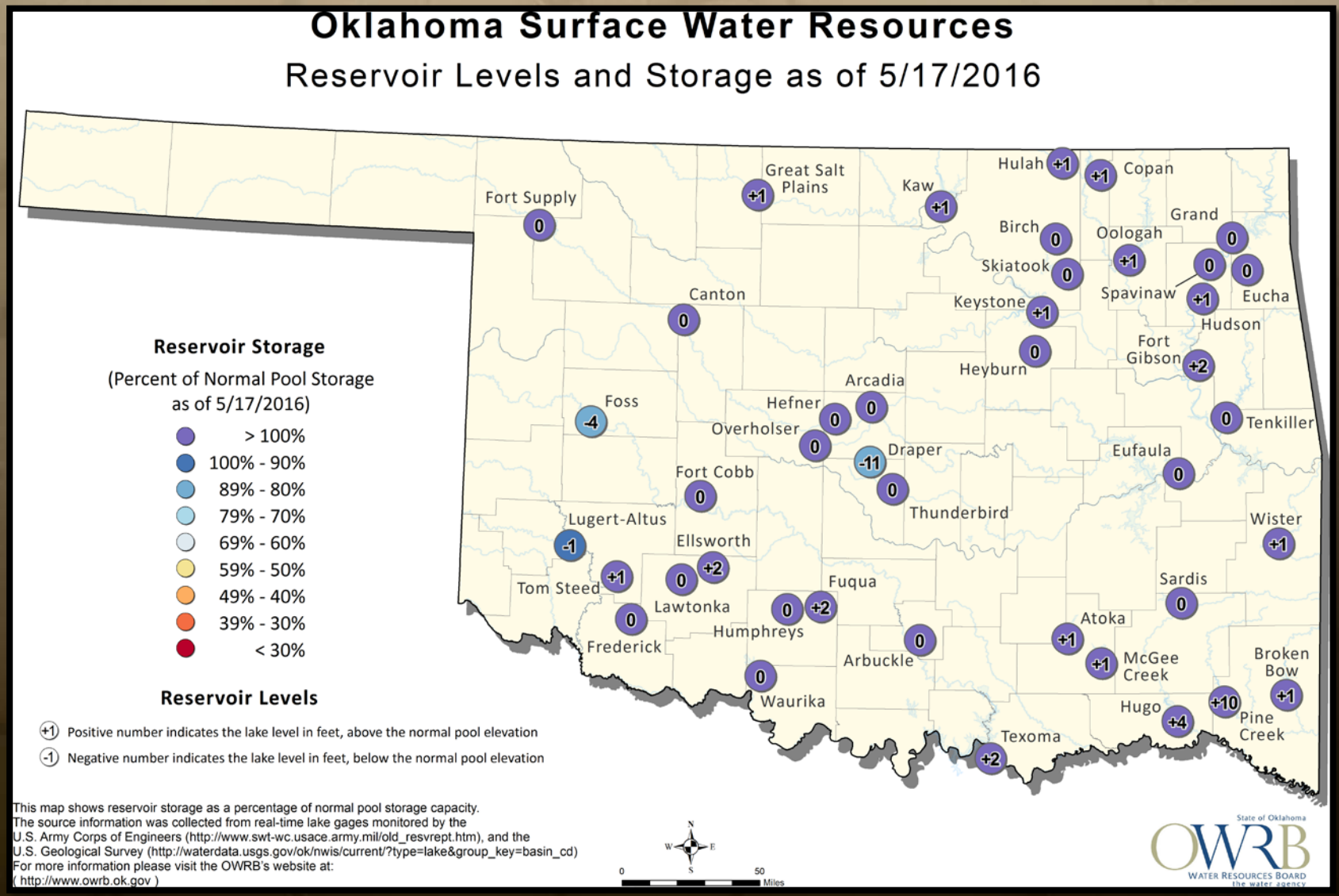


# Percent of Normal



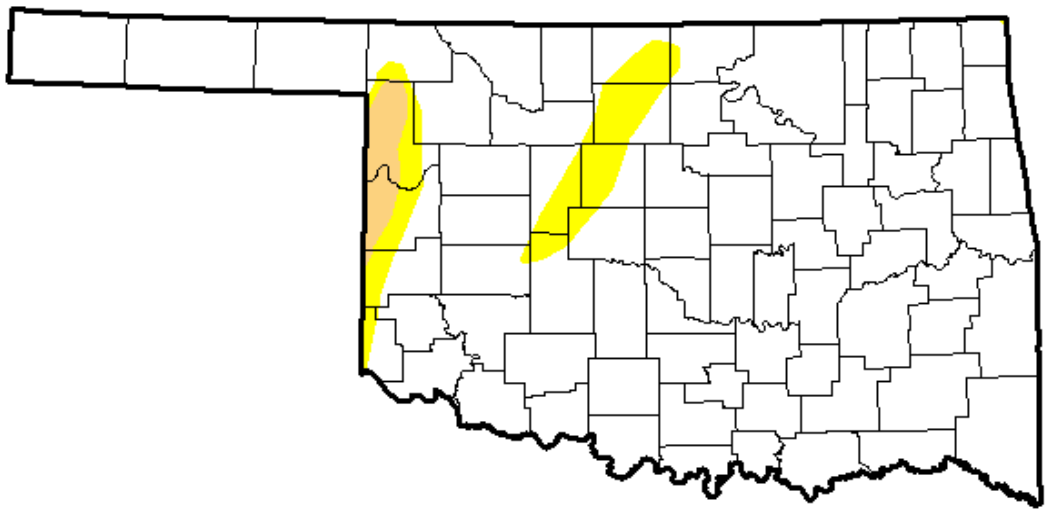

**Haves and have nots**

# Lakes are in great shape!



# *U.S. Drought Monitor*

# Oklahoma



## May 10, 2016

*(Released Thursday, May. 12, 2016)*

Valid 8 a.m. EDT

*Drought Conditions (Percent Area)*

| | None | D0-D4 | D1-D4 | D2-D4 | D3-D4 | D4 |
|---|---|---|---|---|---|---|
| **Current** | 92.85 | 7.15 | 1.67 | 0.00 | 0.00 | 0.00 |
| **Last Week** 5/3/2016 | 87.75 | 12.25 | 1.67 | 0.00 | 0.00 | 0.00 |
| **3 Months Ago** 2/9/2016 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Start of Calendar Year** 12/29/2015 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Start of Water Year** 9/29/2015 | 52.60 | 47.40 | 16.79 | 6.37 | 0.97 | 0.00 |
| **One Year Ago** 5/12/2015 | 39.66 | 60.34 | 47.39 | 24.52 | 3.72 | 0.00 |

*Intensity:*

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

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

**Author:**

*Brian Fuchs*

*National Drought Mitigation Center*

**http://droughtmonitor.unl.edu/**

# Oceanic Influences On Oklahoma's Climate: "Teleconnections"

Typical Wintertime Pattern

# La Niña

Polar Jet Stream

High Pressure

H

Cool

Wet

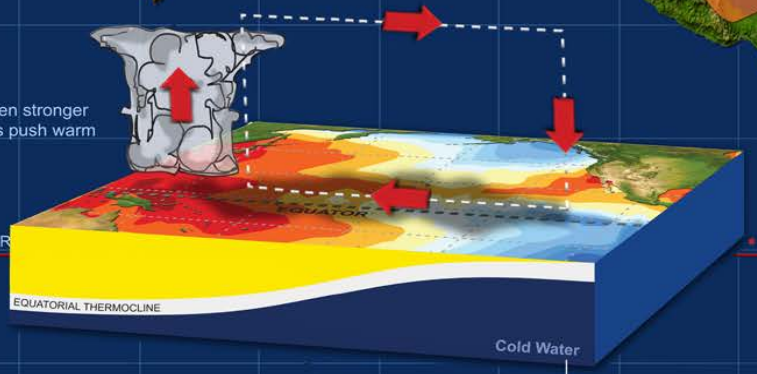
Pacific Jet Stream

Dry

Wet

Warm

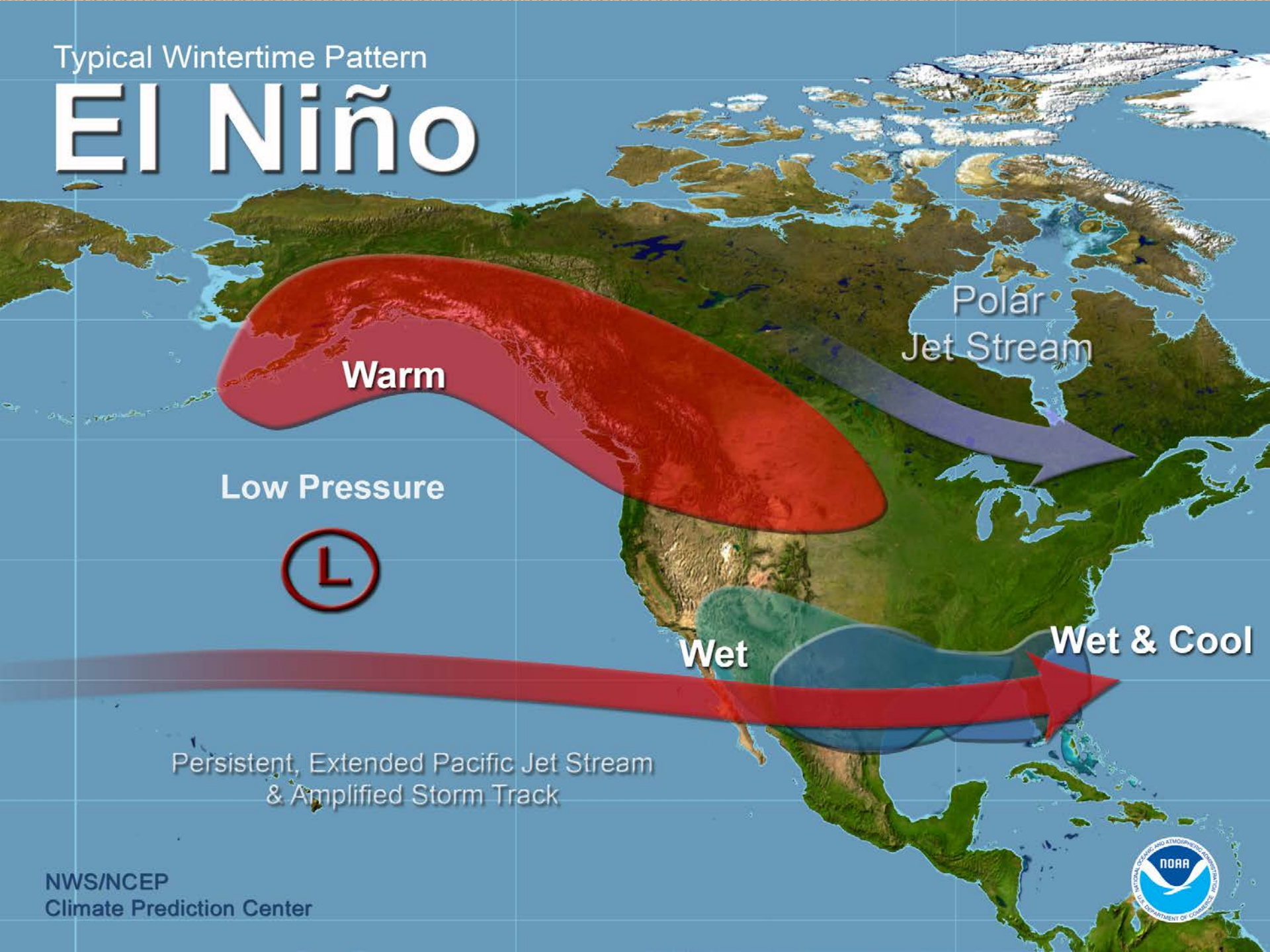
**La Niña** develops when stronger than normal trade winds push warm water farther west.




Enhanced upwelling makes surface waters in the eastern Pacific cooler than normal.

EQUATOR • EQUATOR • EQUATOR • EQUATOR • EQUATOR • EQUATOR • EQUATOR • EQUATOR • EQUATOR • EQUATOR • EQU

www.weather.gov


Typical Wintertime Pattern
El Niño
Warm
Polar
Jet Stream
Low Pressure
L
Wet
Wet & Cool
Persistent, Extended Pacific Jet Stream
& Amplified Storm Track
NWS/NCEP
Climate Prediction Center
NOAA

# Oceanic influences on our weather

(red denotes current oceanic conditions)

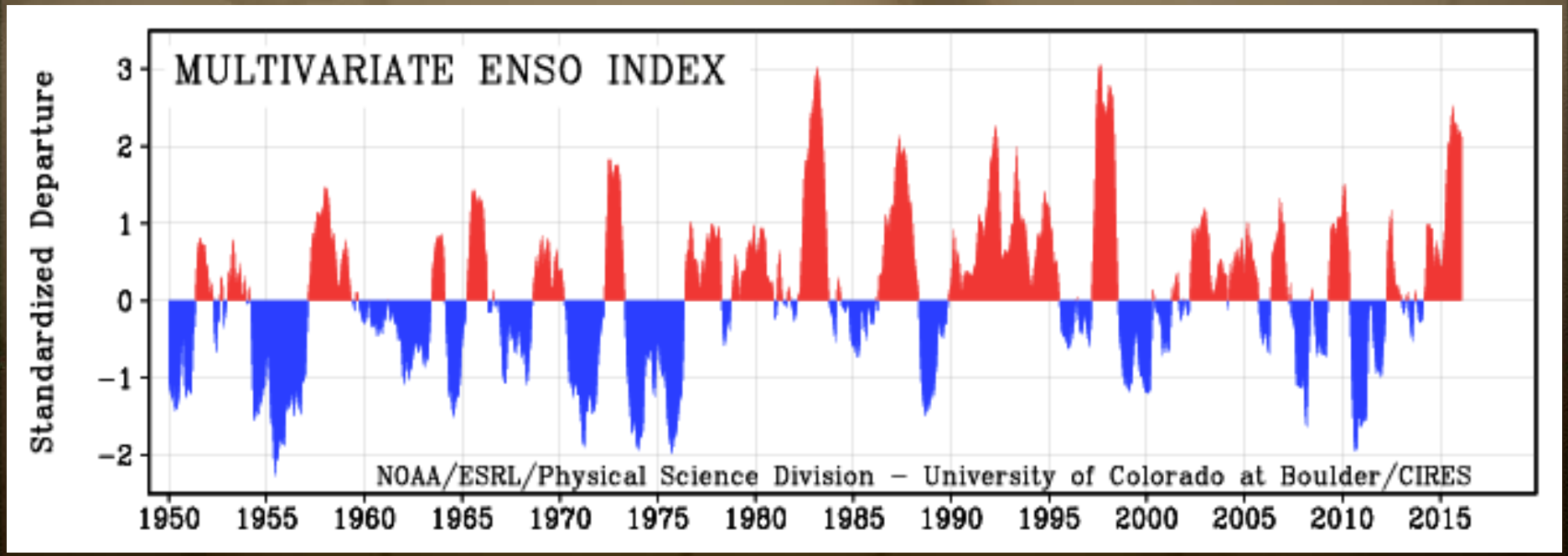
- ENSO (El Nino-Southern Oscillation)
  - Varies every 1-3 years
  - El Nino (wetter than normal)
  - La Nina (warm and dry)
- Pacific Decadal Oscillation (PDO)
  - Varies every 20-30 years
  - Cool phase (more La Ninas, drier)
  - Warm phase (more El Ninos, wetter)
- Atlantic Decadal Oscillation (AMO)
  - Varies every 20-40 years
  - Warm phase (dry)
  - Cool phase (wet)

# The science works

**1950-1976**
**Lots of La Nina's**
**Cool PDO**
**DRY!**

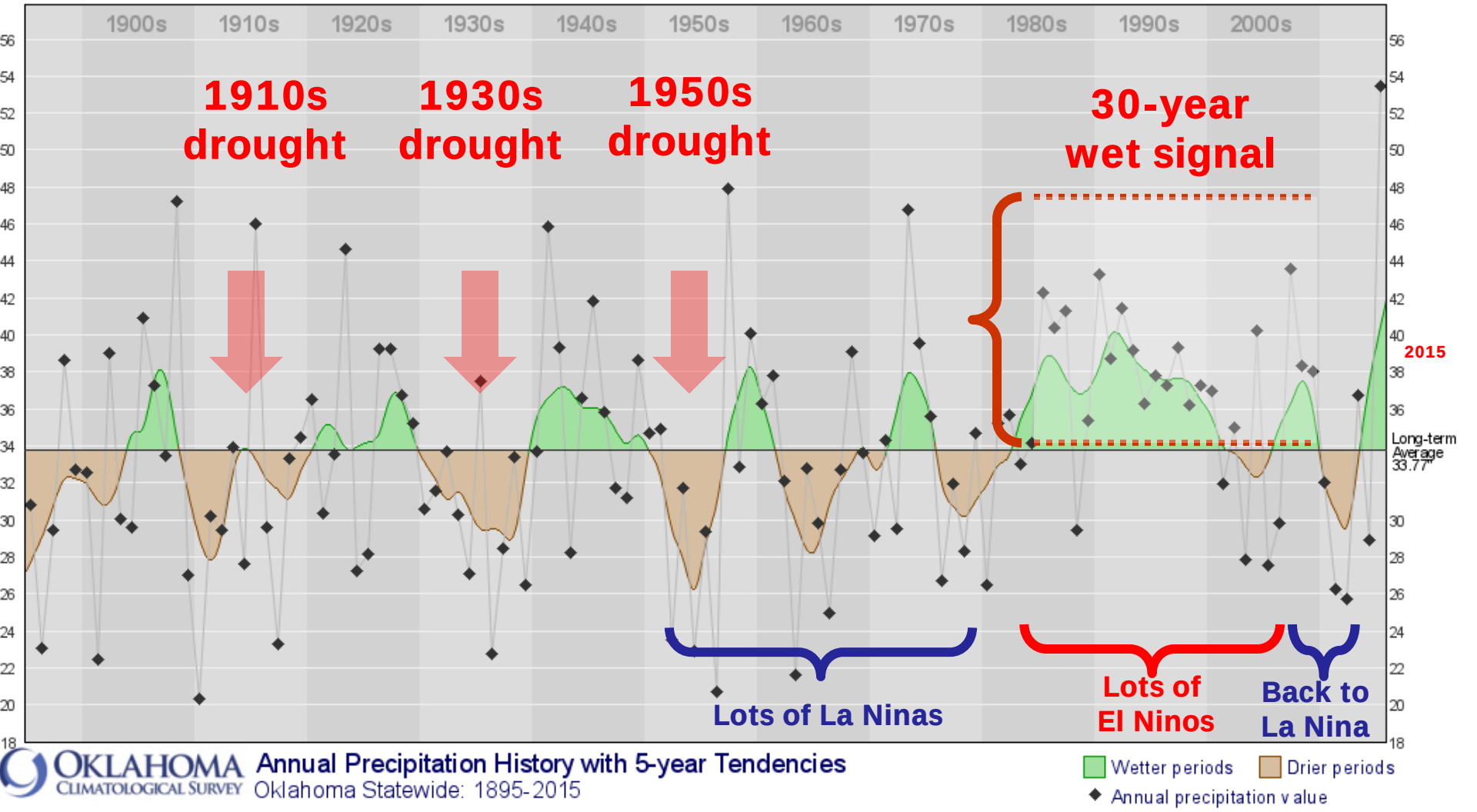
**1976-2005**
**Mostly El Nino**
**Warm PDO**
**Unusually and consistently wet!**

**??**

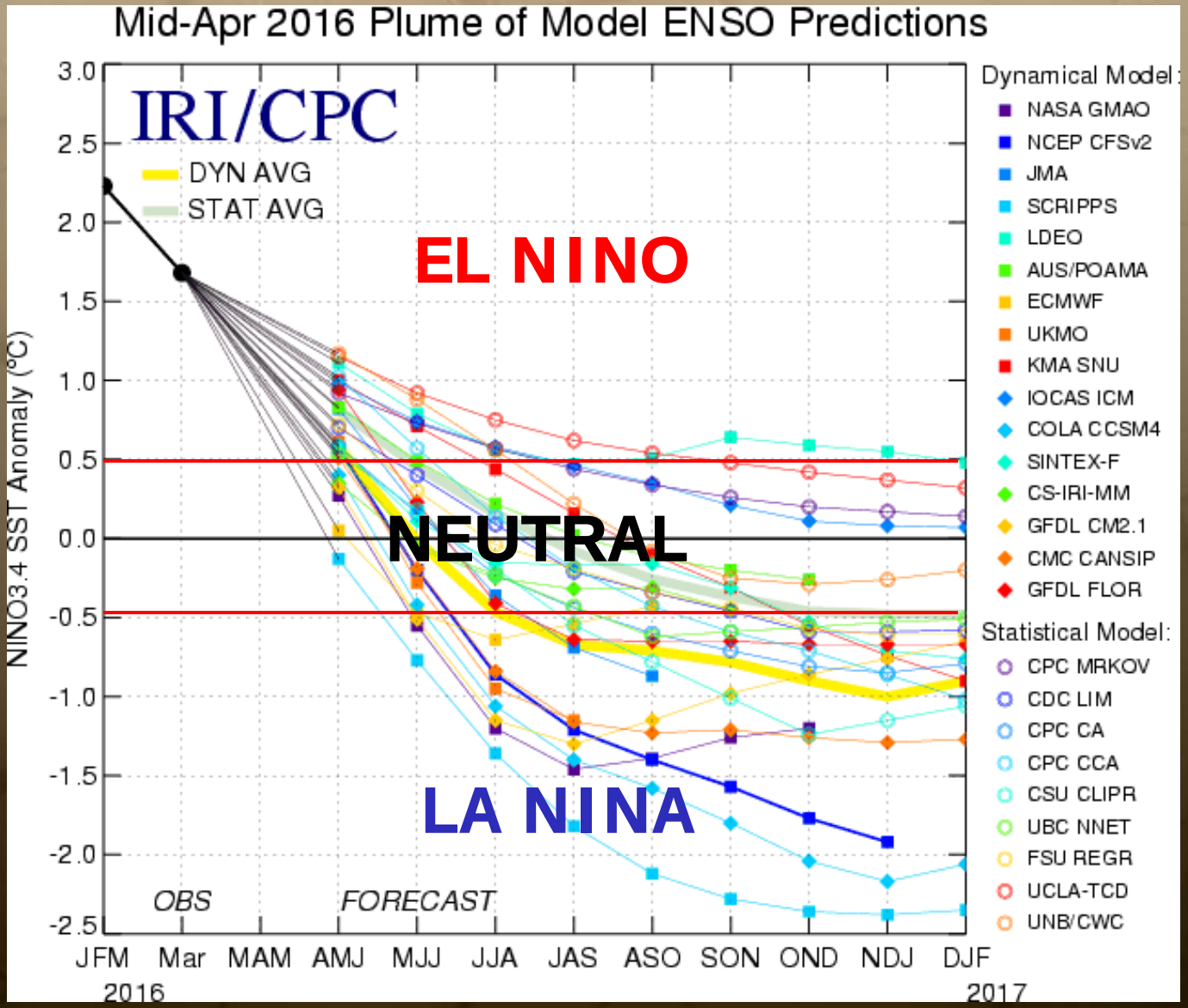


# The Oceans at Work

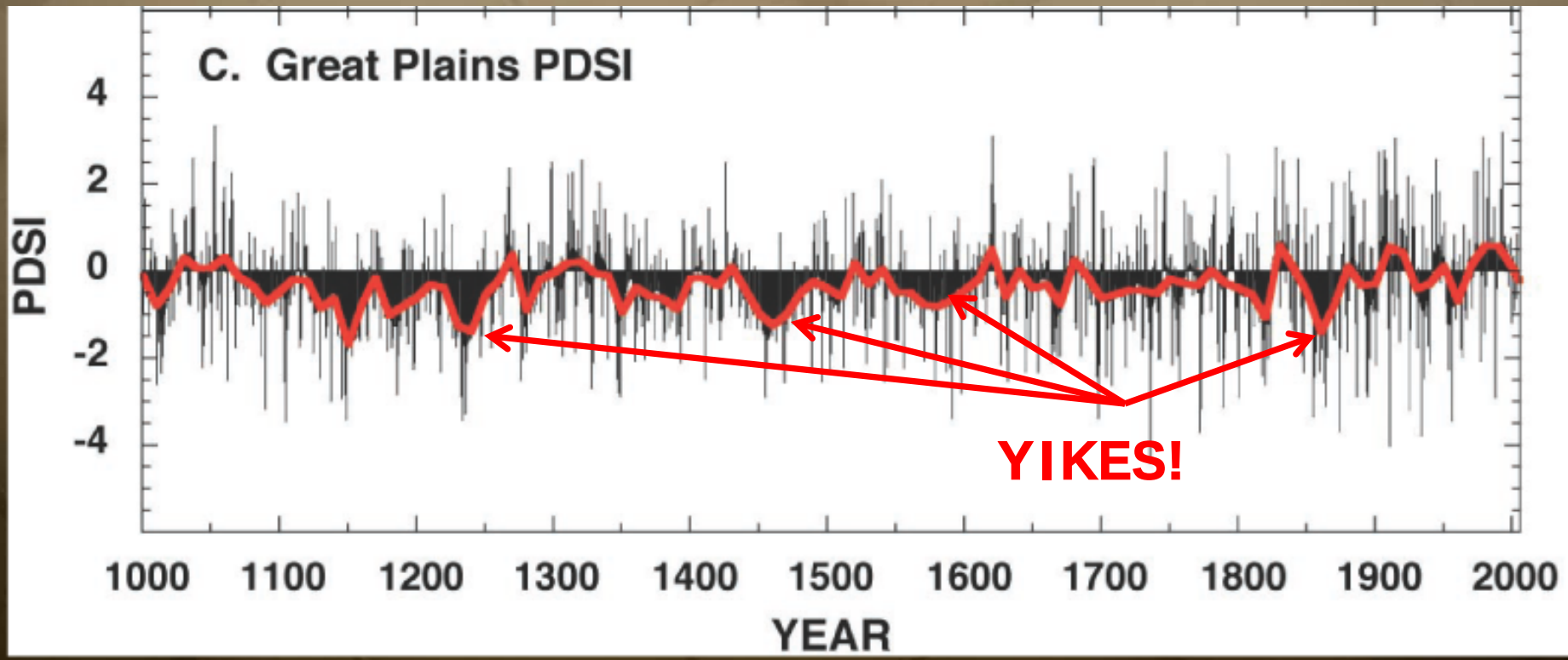
## Statewide avg. rainfall (1895-2015)



# This STRONG EL NINO is fading and will *possibly* transition to La Nina by this summer

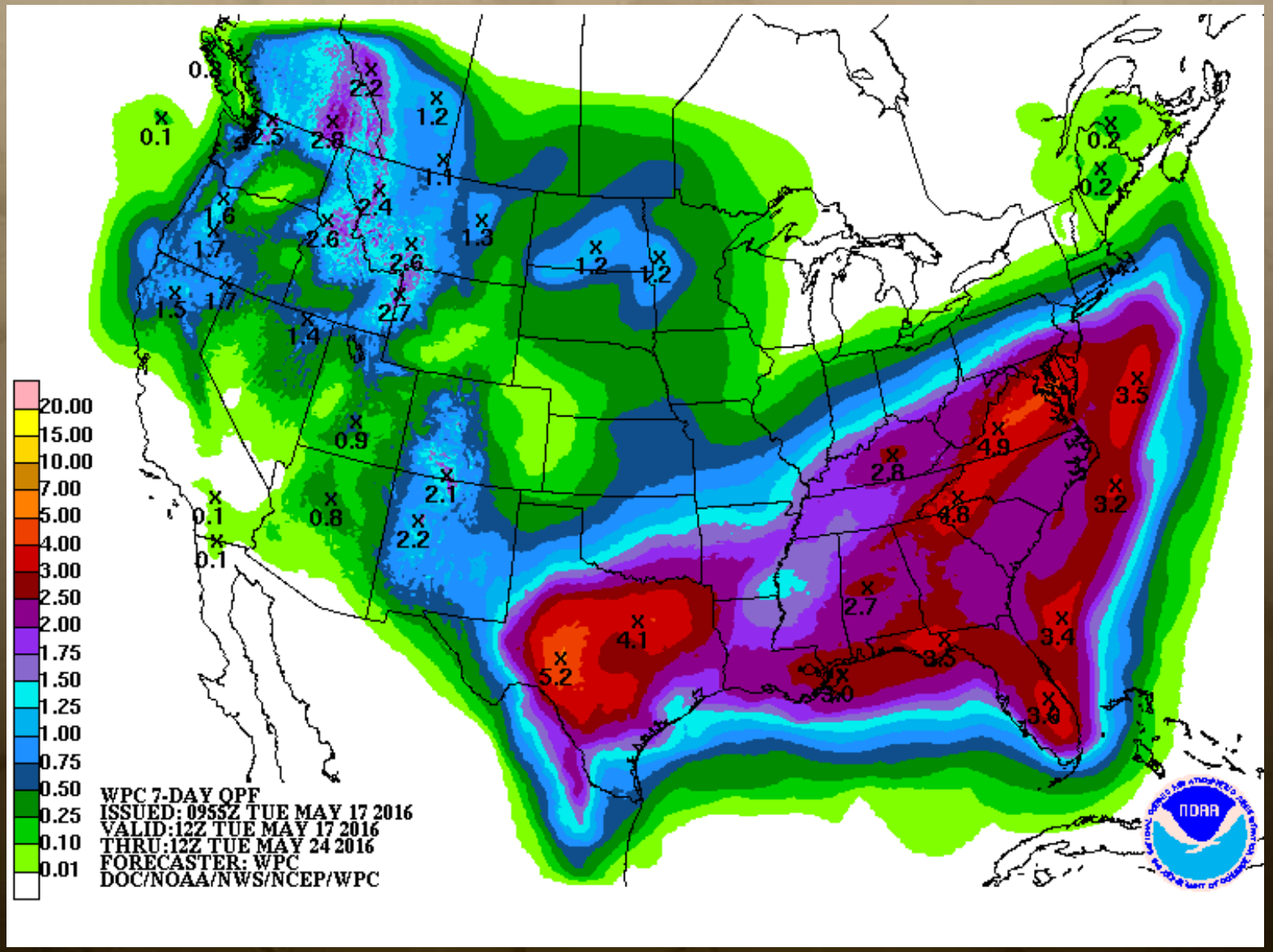


# Recent droughts are infants!



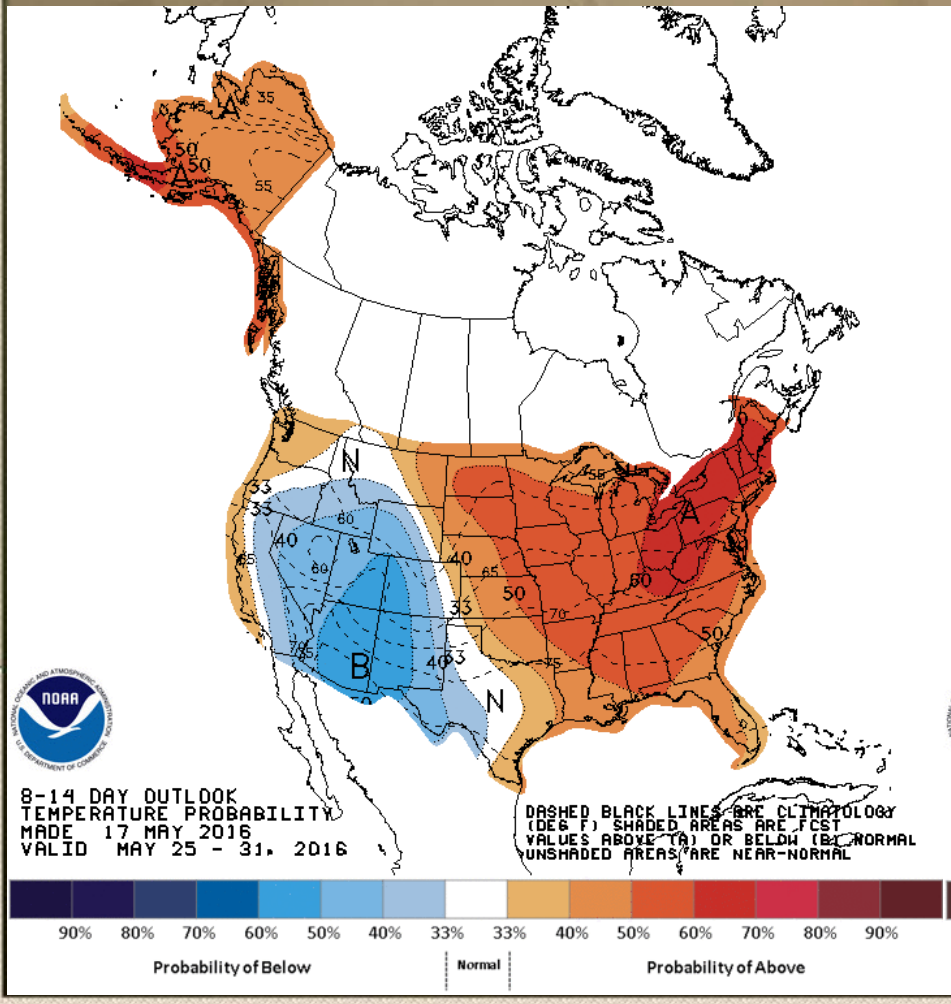
# Forecasts and Outlooks

# Next 7 days: WET?

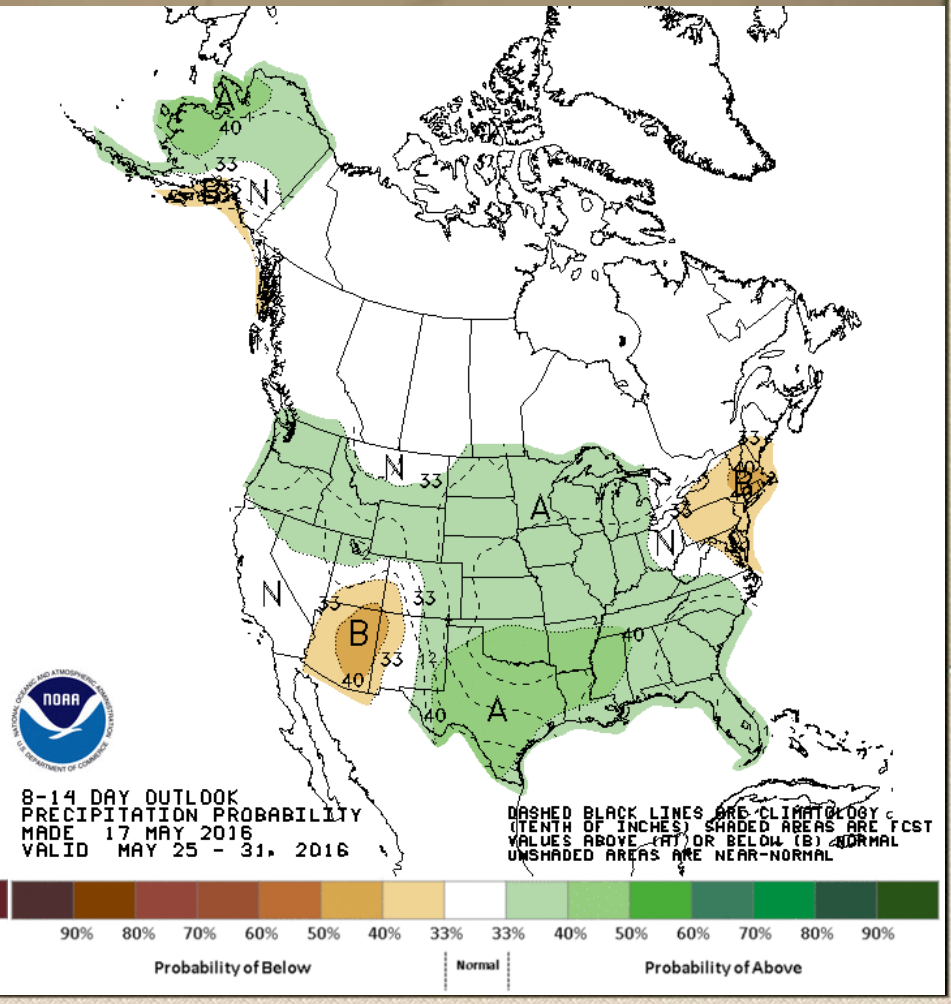


# Medium-term Outlooks: May 25-31

## Temperature




## Precipitation

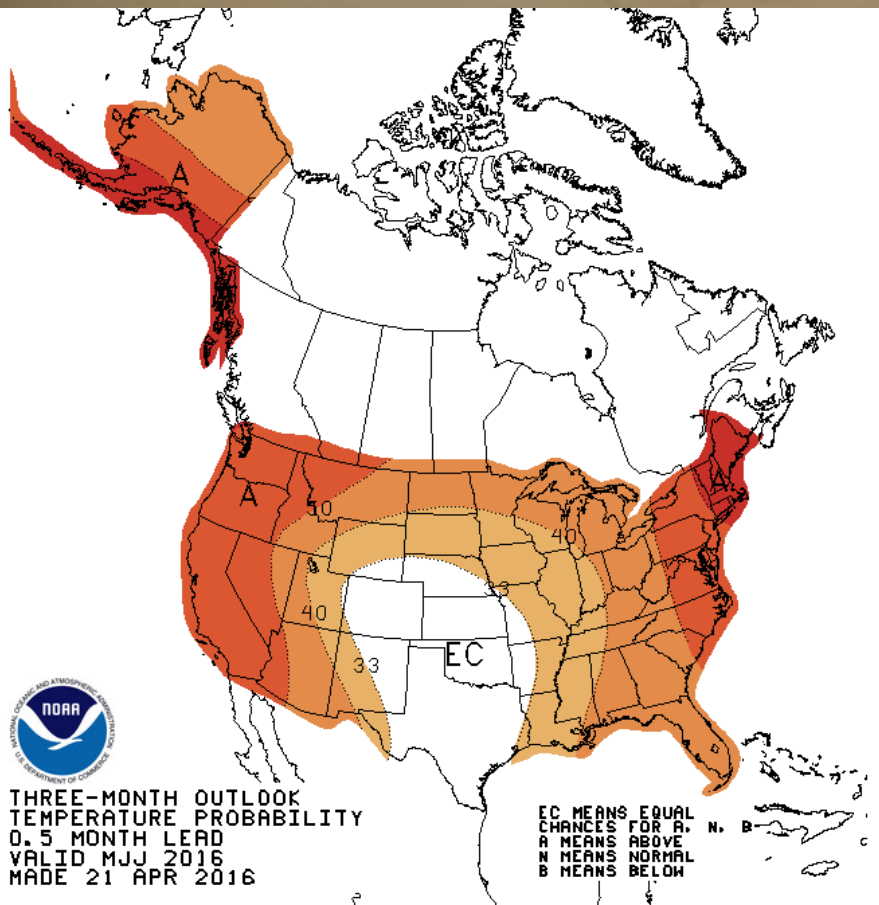


# Late spring/early summer Outlooks

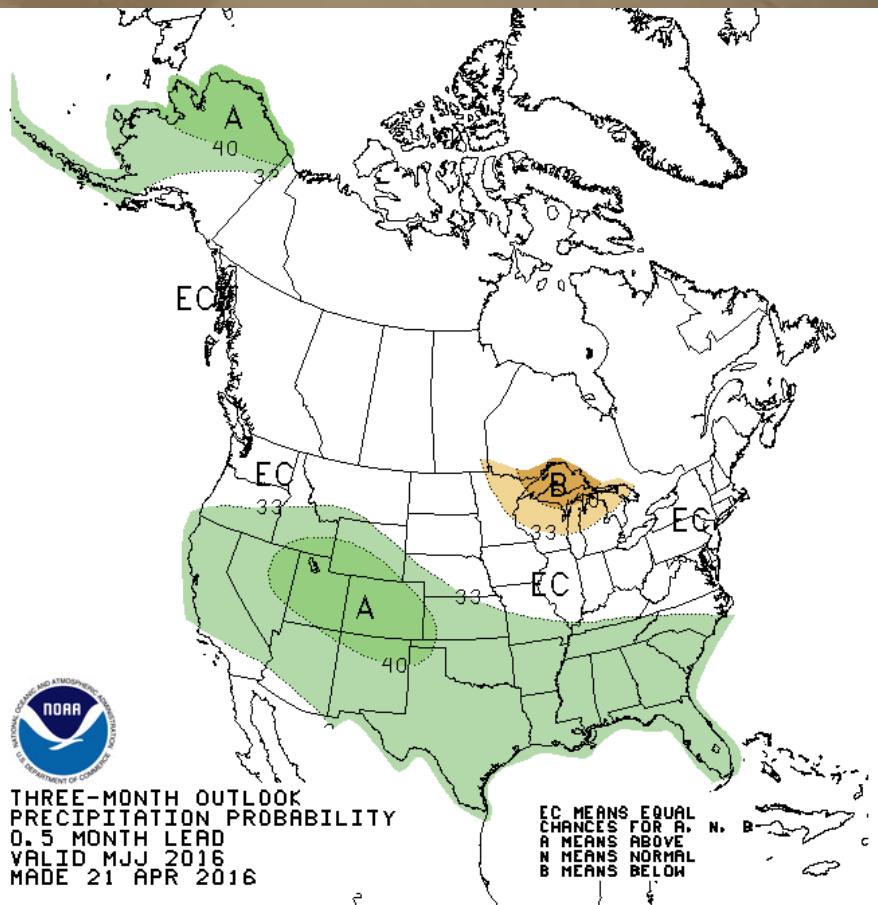
## May-July

## El Nino's influence hangs around

**Temperature**



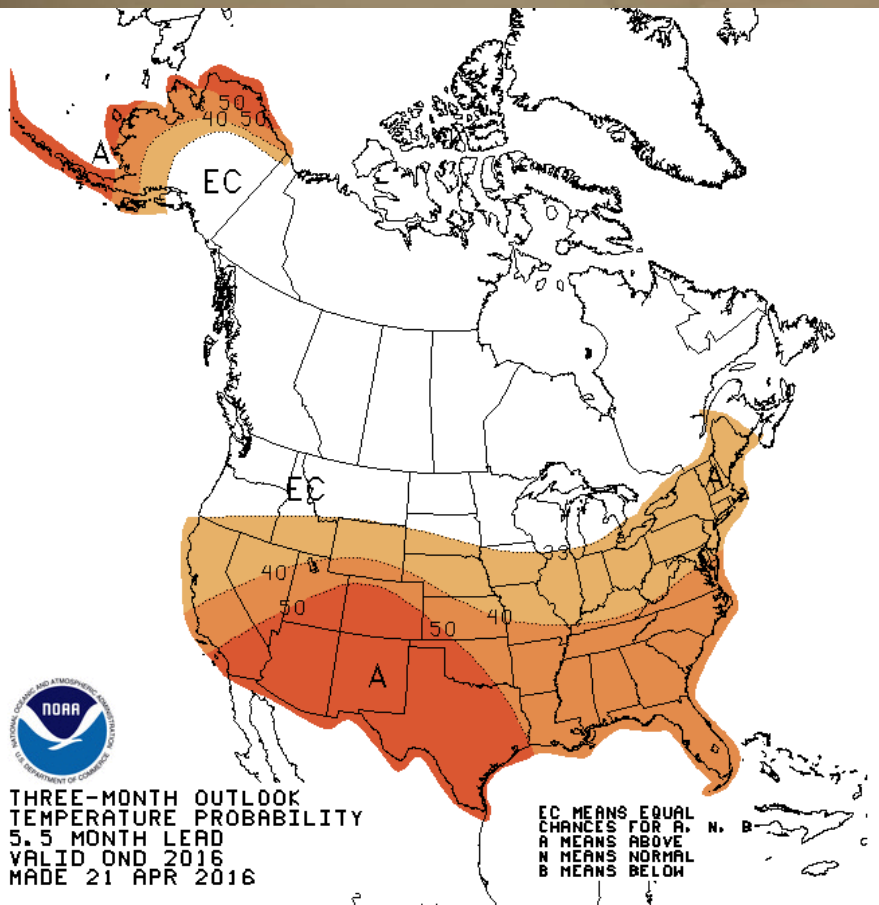

**Precipitation**



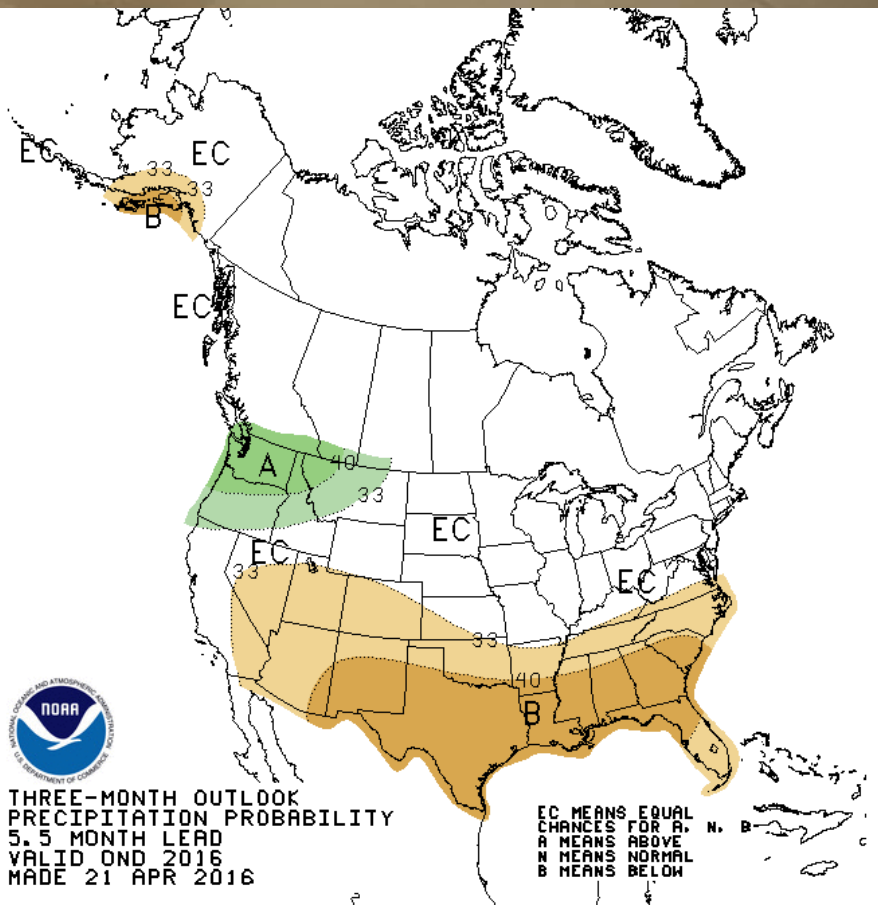
# Fall Outlooks: October-December

## La Nina's influence

**Temperature**



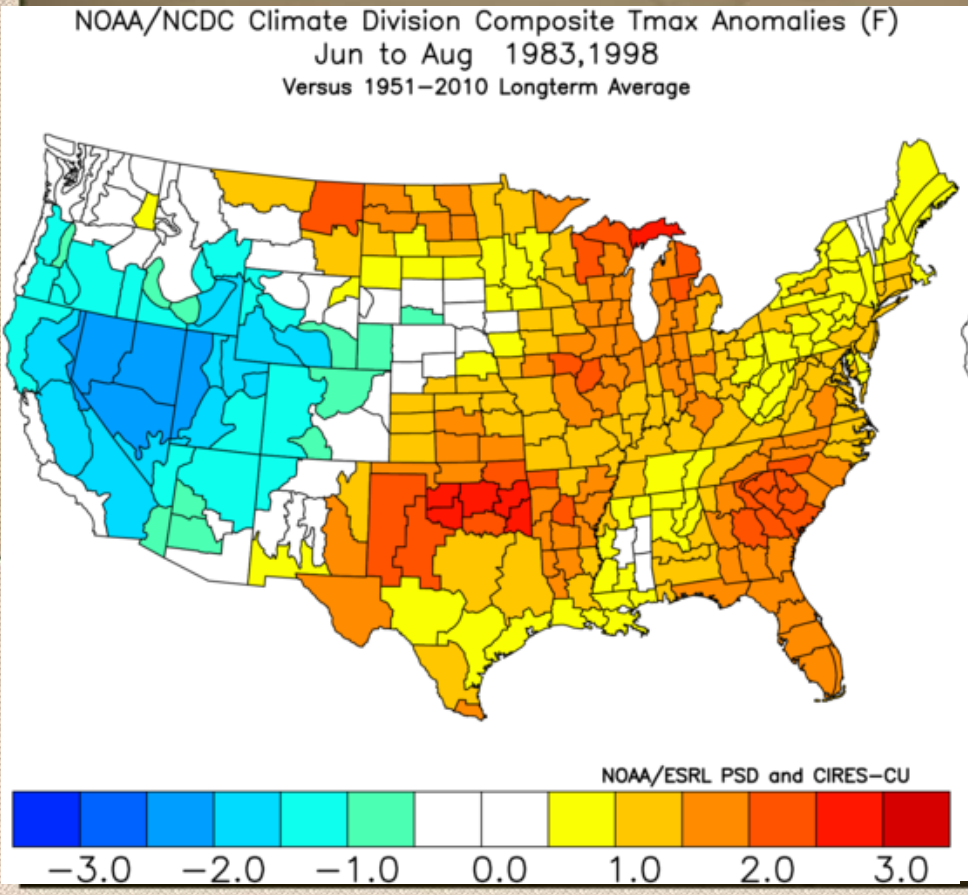

**Precipitation**



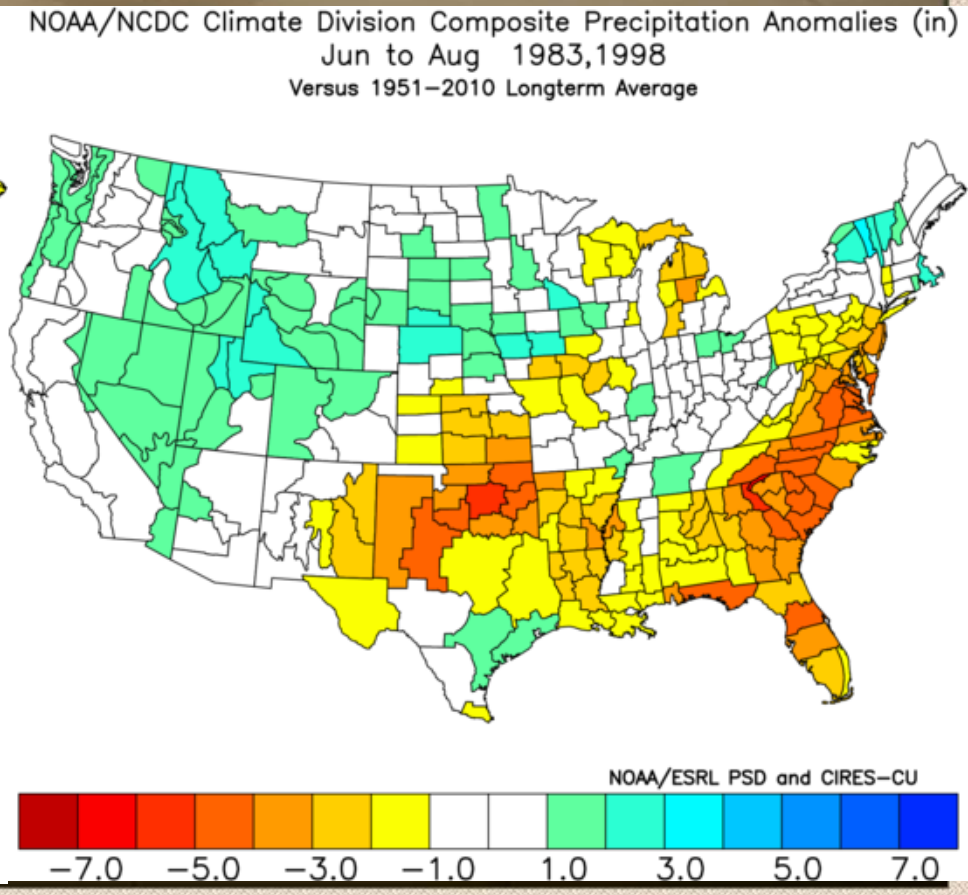
# Summers following last two “super” El Ninos?

## HOT AND DRY?

**Temperature**




**Precipitation**



# Final Thoughts

- 5 years of drought (worst since 1950s?) ended in floods
- El Nino fading fast
- Drought on the way out again
- Watch out for summer!
- Drought can come back in a hurry
- La Nina looming for fall and winter
- Ocean patterns are favorable for now, but uncertain in long term

# Thank You!

Visit us at: http://climate.ok.gov/