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# **Water Scarcity: Who's the Gorilla in the Room?**

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**James W. Richardson**  
**Regents Professor**  
**AgriLife Senior Faculty Fellow**  
**Co-Director of Agricultural & Food Policy Center**

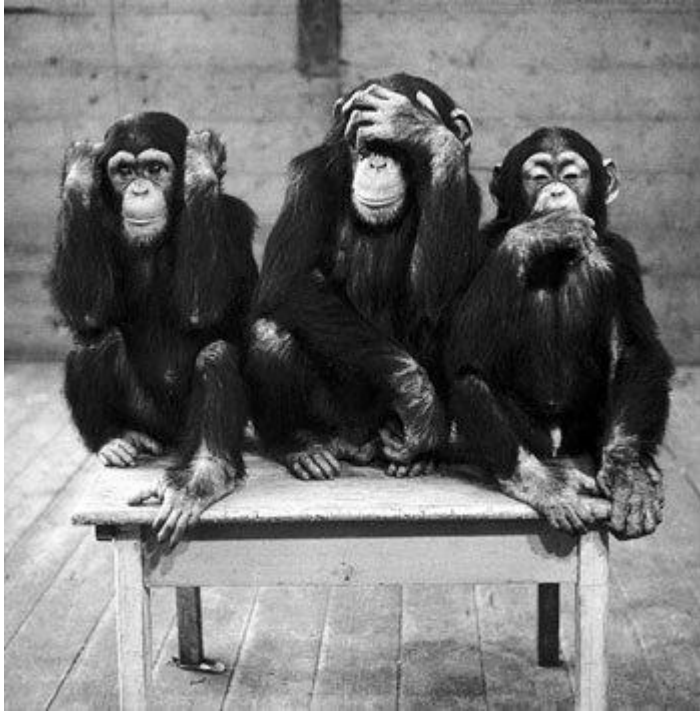
**USDA Outlook**  
**February 19, 2015**

**TEXAS A&M**  
UNIVERSITY

**AFPC**

# A Gorilla or Three Big Monkeys?

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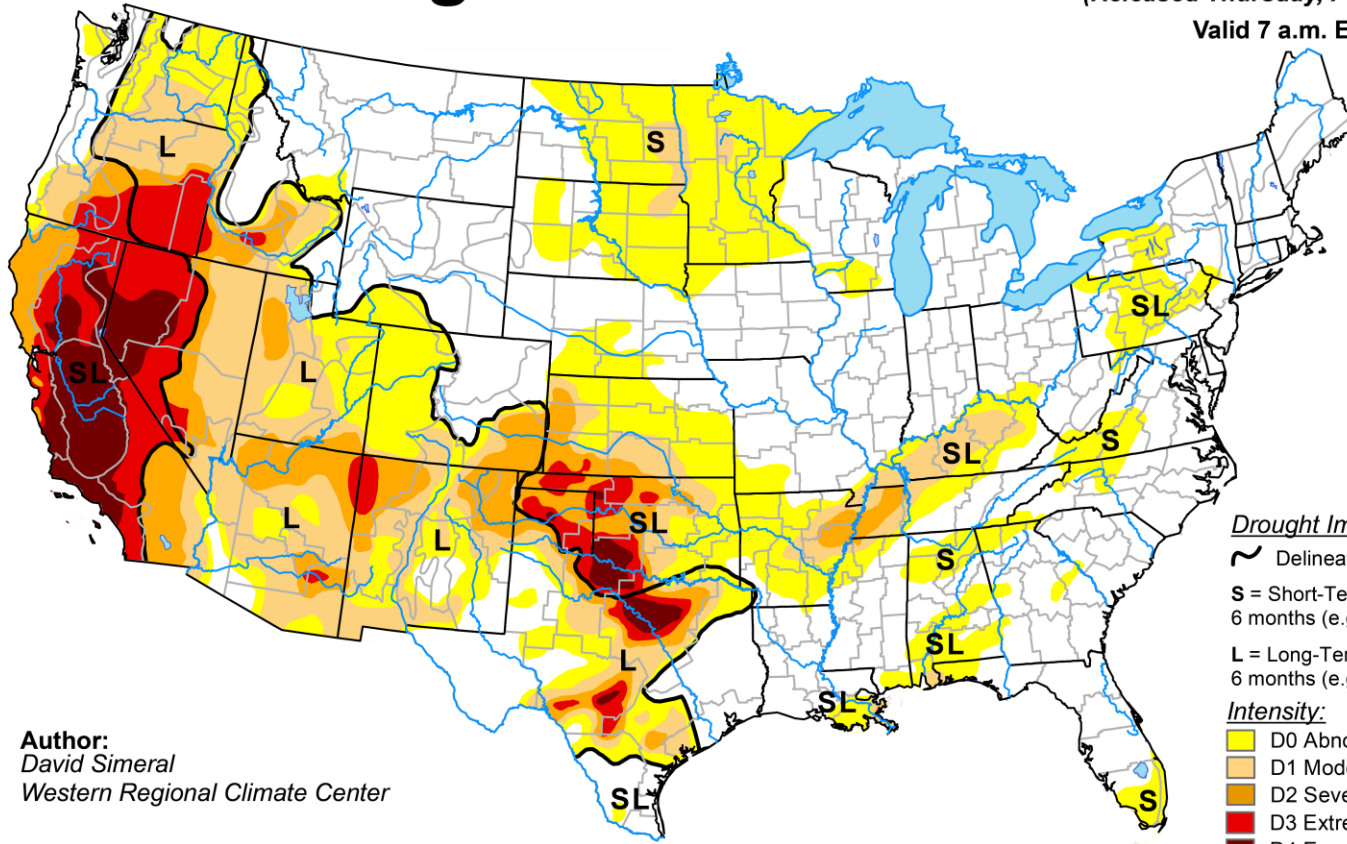
- Drought
- Population Growth
- Agricultural and Industrial Uses

# US Drought: Current Conditions

## U.S. Drought Monitor


February 10, 2015  
(Released Thursday, Feb. 12, 2015)

Valid 7 a.m. EST








**Author:**  
David Simeral  
Western Regional Climate Center

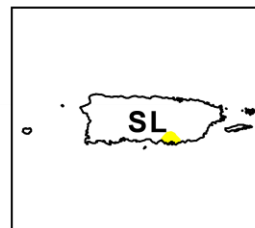
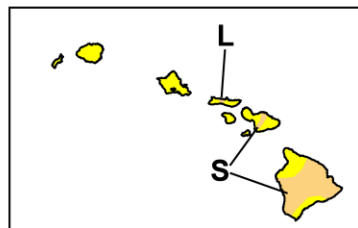
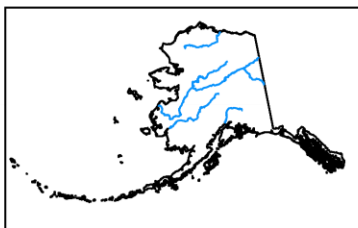
Drought Impact Types:

-  Delineates dominant impacts
- S** = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L** = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

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.



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

# Texas is actually looking pretty good relative to 2011 ...

September 13, 2011

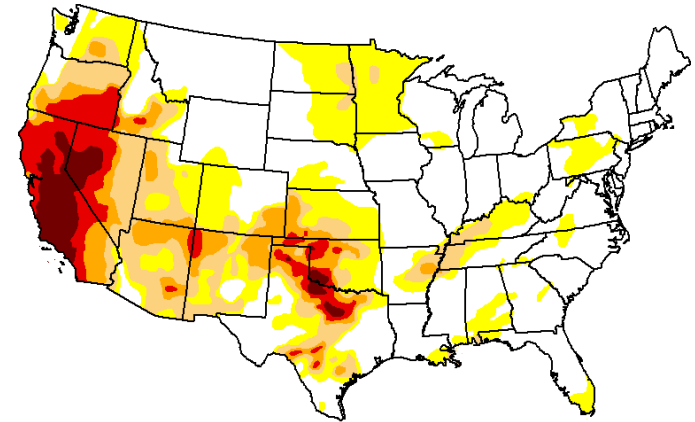
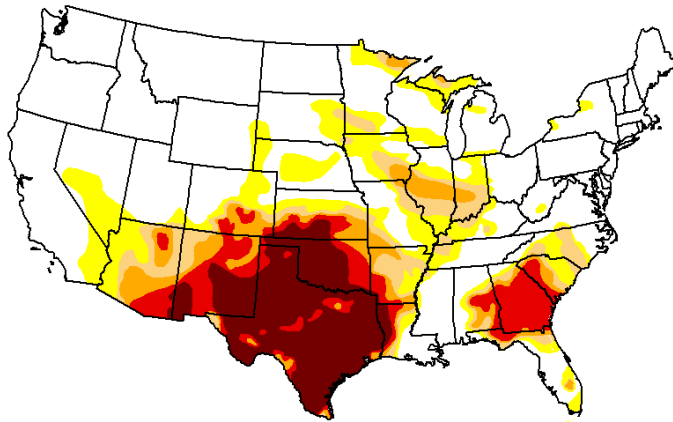
February 3, 2015

U.S. Drought Monitor  
CONUS

September 13, 2011  
(Released Thursday, Sep. 15, 2011)  
Valid 7 a.m. EST

U.S. Drought Monitor  
CONUS

February 3, 2015  
(Released Thursday, Feb. 5, 2015)  
Valid 7 a.m. EST



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:  
Mark Svoboda  
National Drought Mitigation Center



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



# ... but parts of Texas are still in an exceptional, multi-year drought ...

# Will Drought Be More Commonplace?

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**A ‘megadrought’ will grip U.S. in the coming decades, NASA researchers say**

Fading El Niño could extend Texas drought

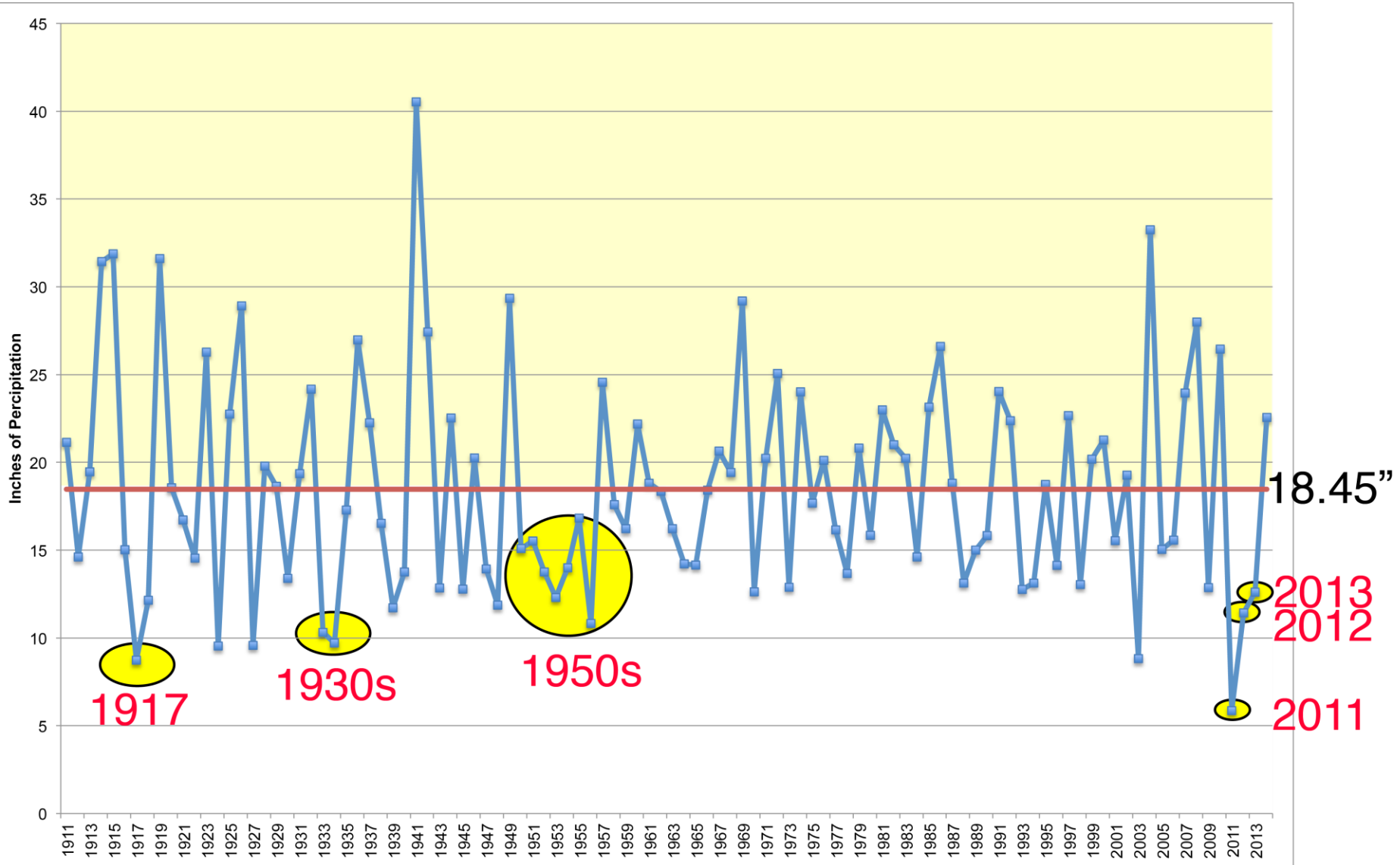
**Southwest, Central Plains Face ‘Unprecedented’ Drought**

**Climate Forecast: More Southwest Droughts and Australian Floods**

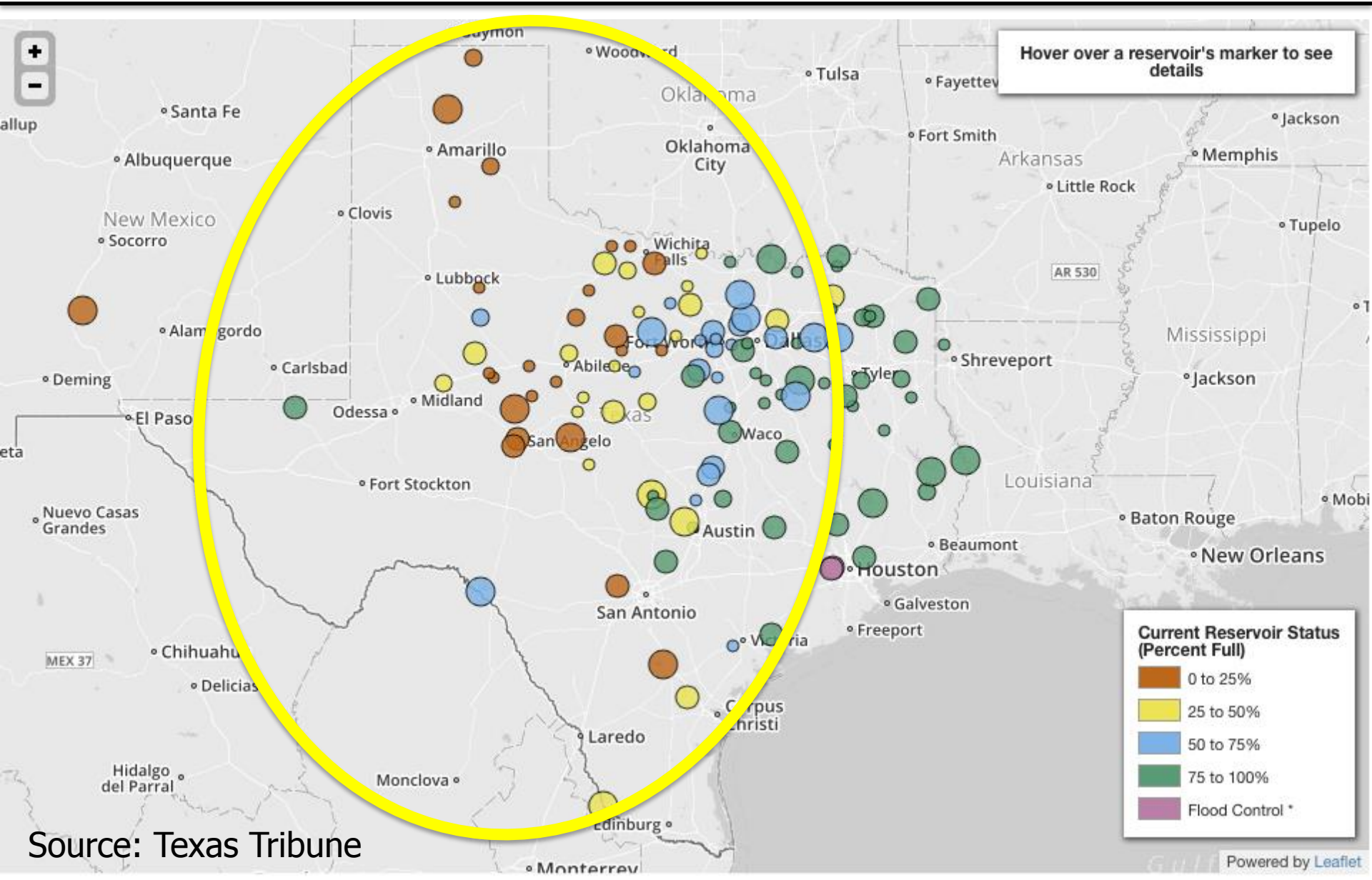
*Global warming will drive La Niña to greater extremes, a new study says—and El Niño too.*

**Drought among the worst in Texas  
in past 500 years**

# Lubbock, TX, Rainfall (1911 – 2014)



# Texas Reservoir Levels (2015)

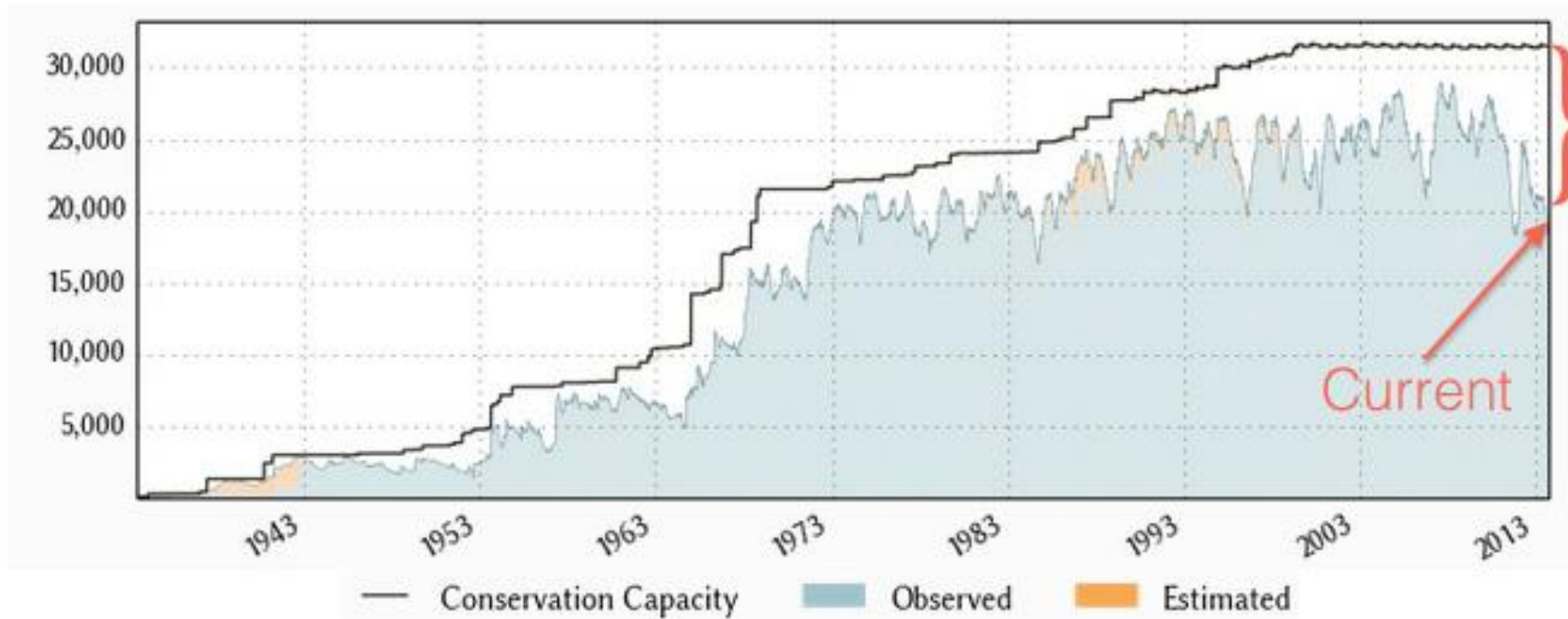


Source: Texas Tribune



# Reservoir Levels vs. Capacity

Texas water supply reservoirs are at 64.9%

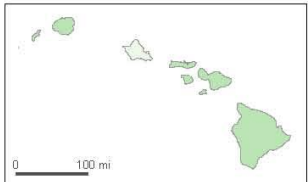
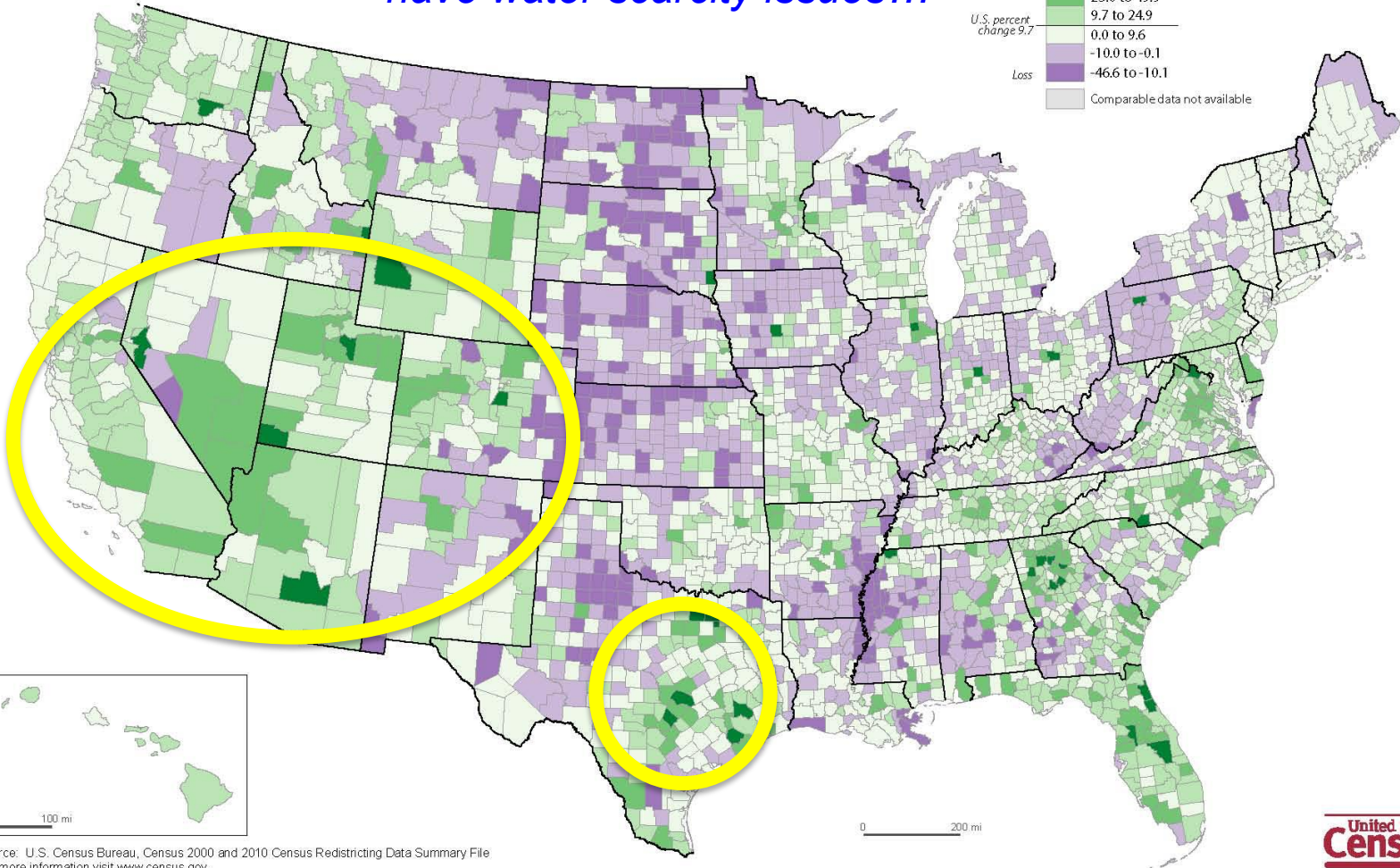
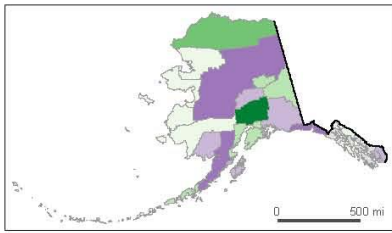
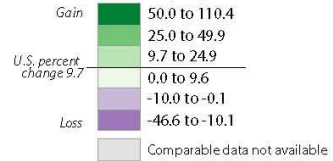


# 2010 Census Results - United States

Percent Change in Population: 2000 to 2010

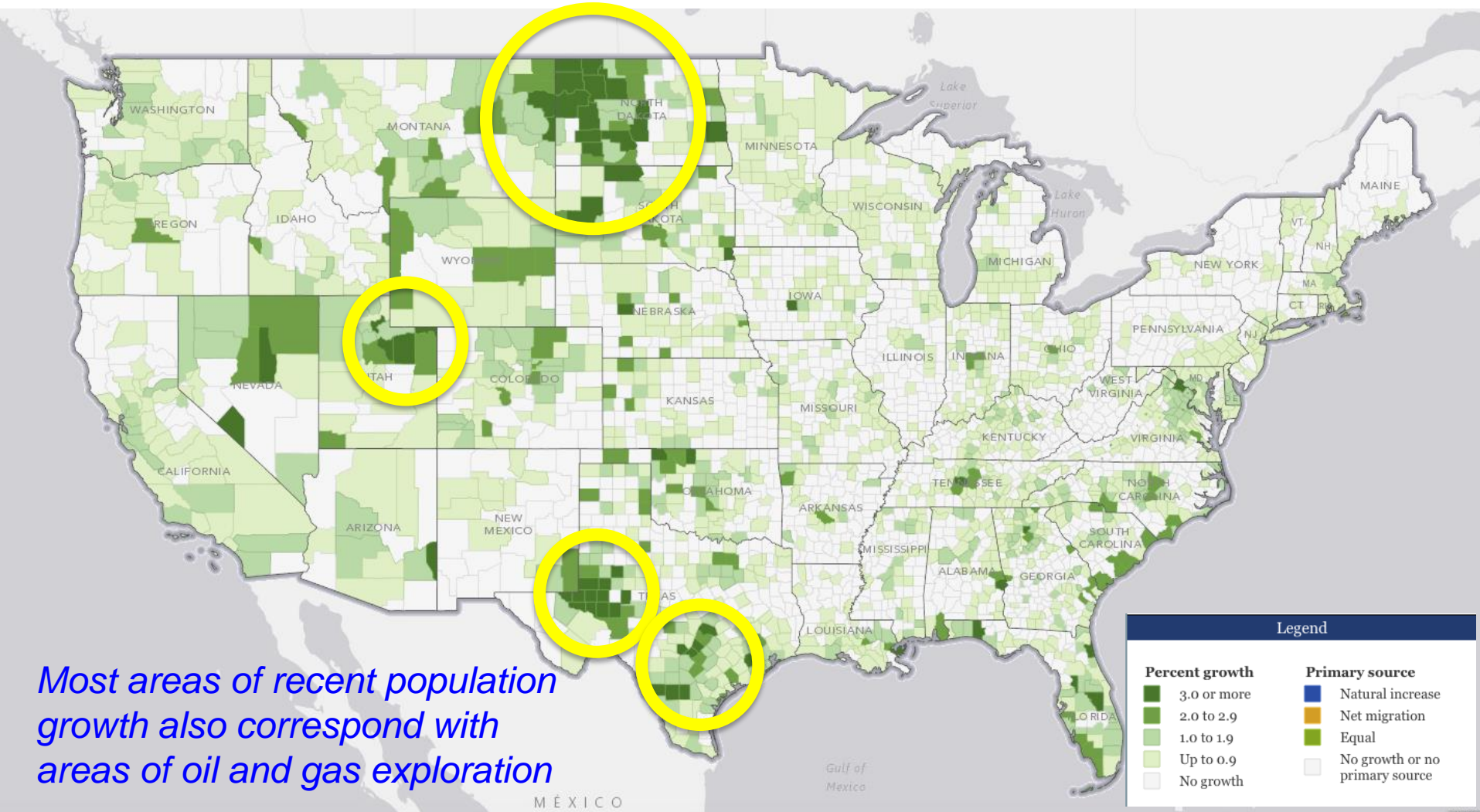
*US population growth areas  
have water scarcity issues...*

### Percent Change by County or County Equivalent



Source: U.S. Census Bureau, Census 2000 and 2010 Census Redistricting Data Summary File  
For more information visit [www.census.gov](http://www.census.gov).

# County Population Growth (2012 – 2013)



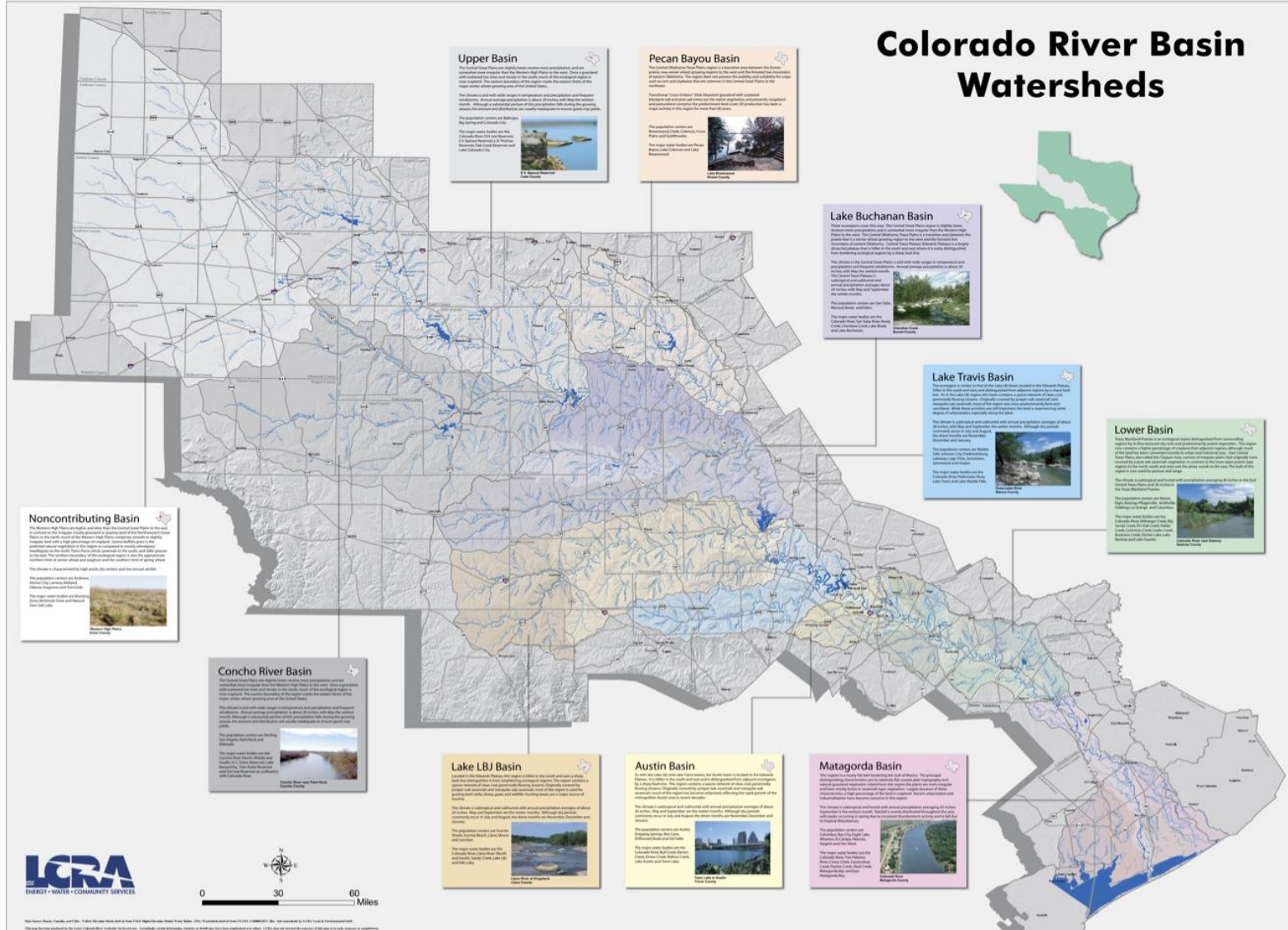
*Most areas of recent population growth also correspond with areas of oil and gas exploration*

# Situation

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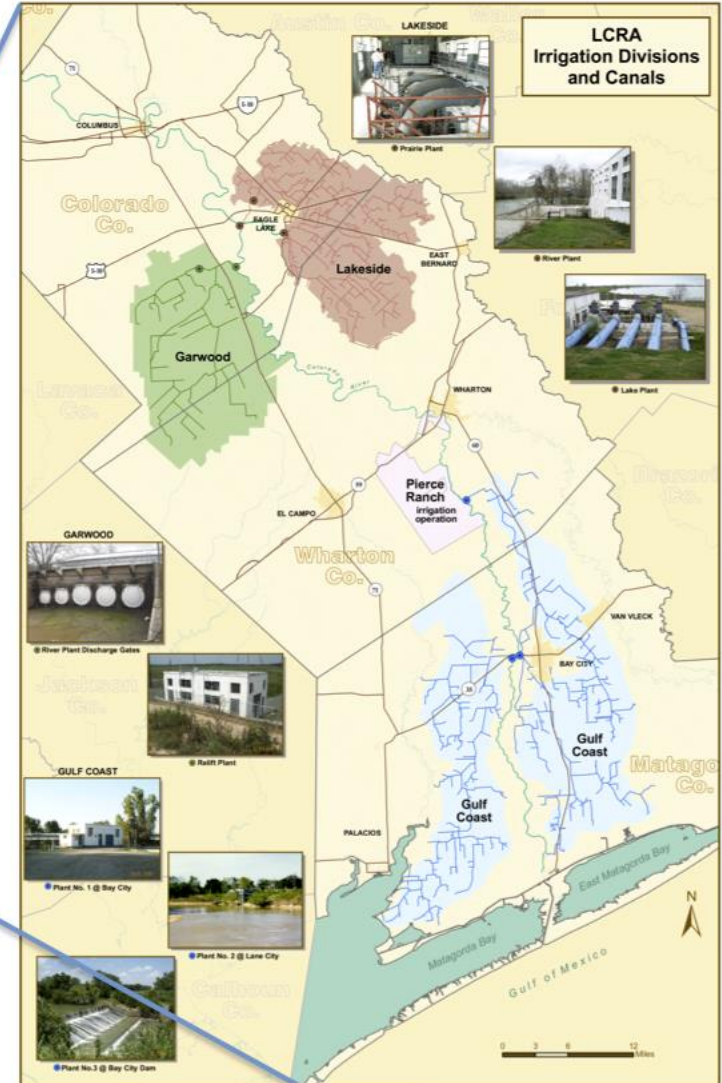
- Gorilla 1: A big drought in the Southwest
- Gorilla 2: Increased rate of population growth in the aid regions
- What does this mean for water consumers other than people?
  - Gorilla 3: Agriculture and Industry

# Agriculture Example Will Focus on One River Basin in Texas



Map data provided by Esri, DeLorme, GeoEye, Google Earth, IGN, Intermap, Inc., Swire, GEBCO, United States Geological Survey, AeroGRID, IGN, Esri, and Swire. © 2010 Esri. All rights reserved. This is a technical drawing and not a map. It is not intended to be used as a map. It is not intended to be used as a map. It is not intended to be used as a map.

# LCRA Rice Irrigation Areas in Texas



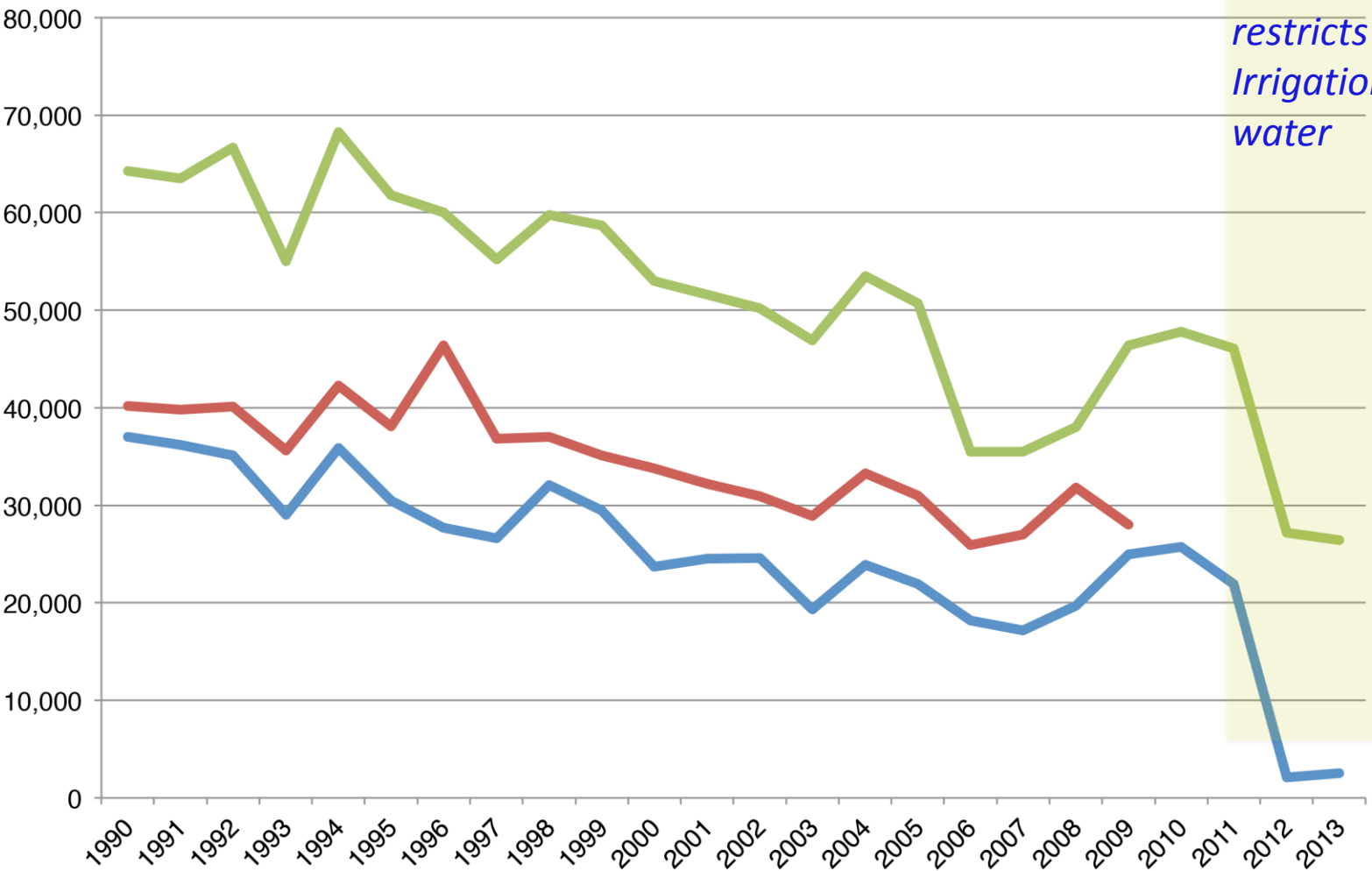
# People vs. Agriculture?

## Texas Rice Farmers Take the Hit; No Water in 2011-15; Likely Cause a Loss of Infrastructure & Community

### Texas Rice County Planted Acres

*State restricts Irrigation water*

- Colorado
- Matagorda
- Wharton



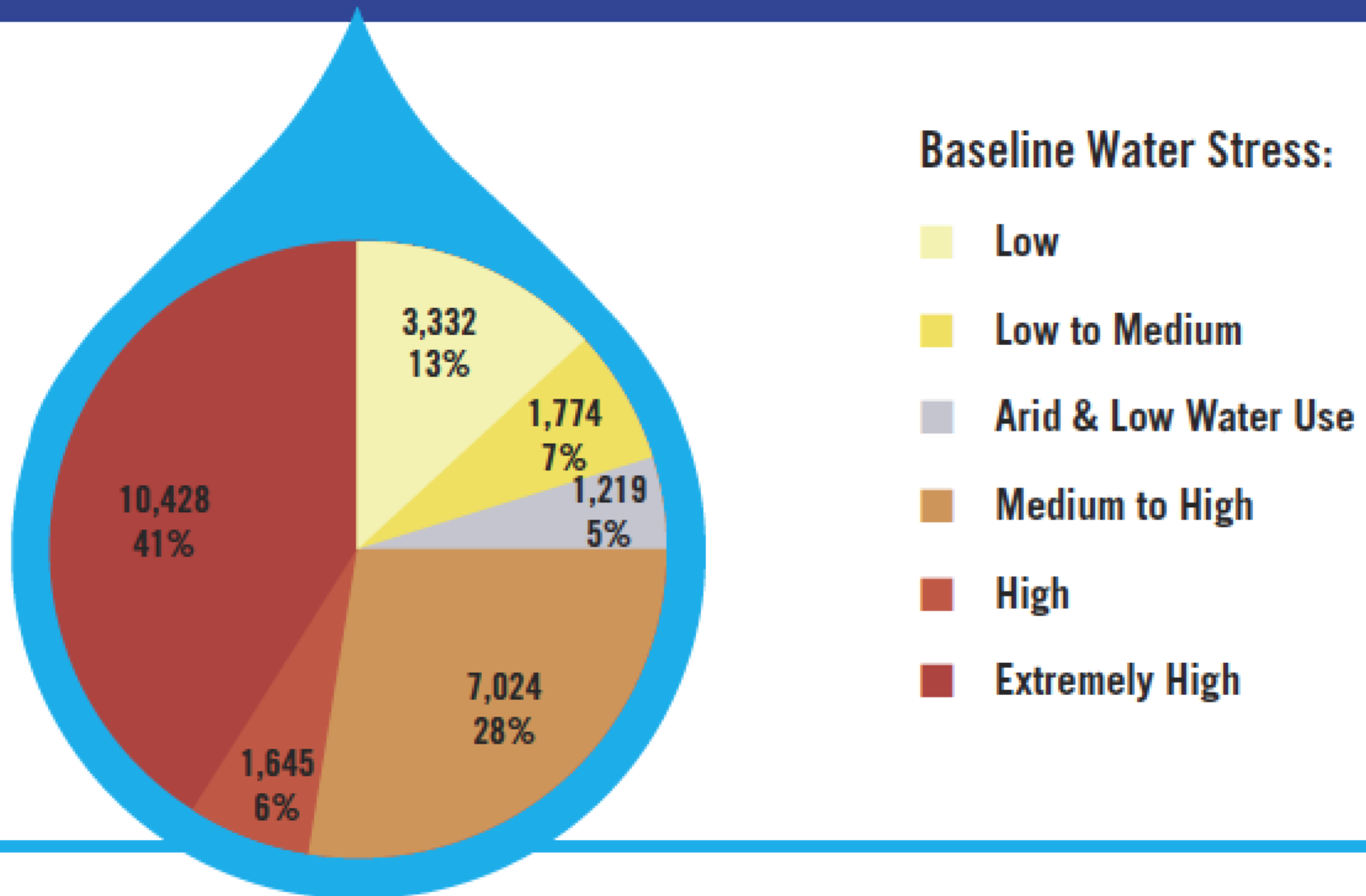
# Energy Industry is a Growing Water User

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- Water used for fracking is small, usually about 1% of the state's water usage
- But, locally water usage could be quite large
  - 2 to 10 million gallons per well
  - Globally 38% of shale oil & gas in water stressed regions
  - In the Texas Eagle Ford Shale water use could amount to 89% of total water use in peak production
  - In the Texas Barnett Shale about 50% of water usage in 2006 was for fracking
- Jan 2001-Sept 2012, 25,450 wells reported using 65.8 billion gallons; the annual water needs for 2.5 million Americans

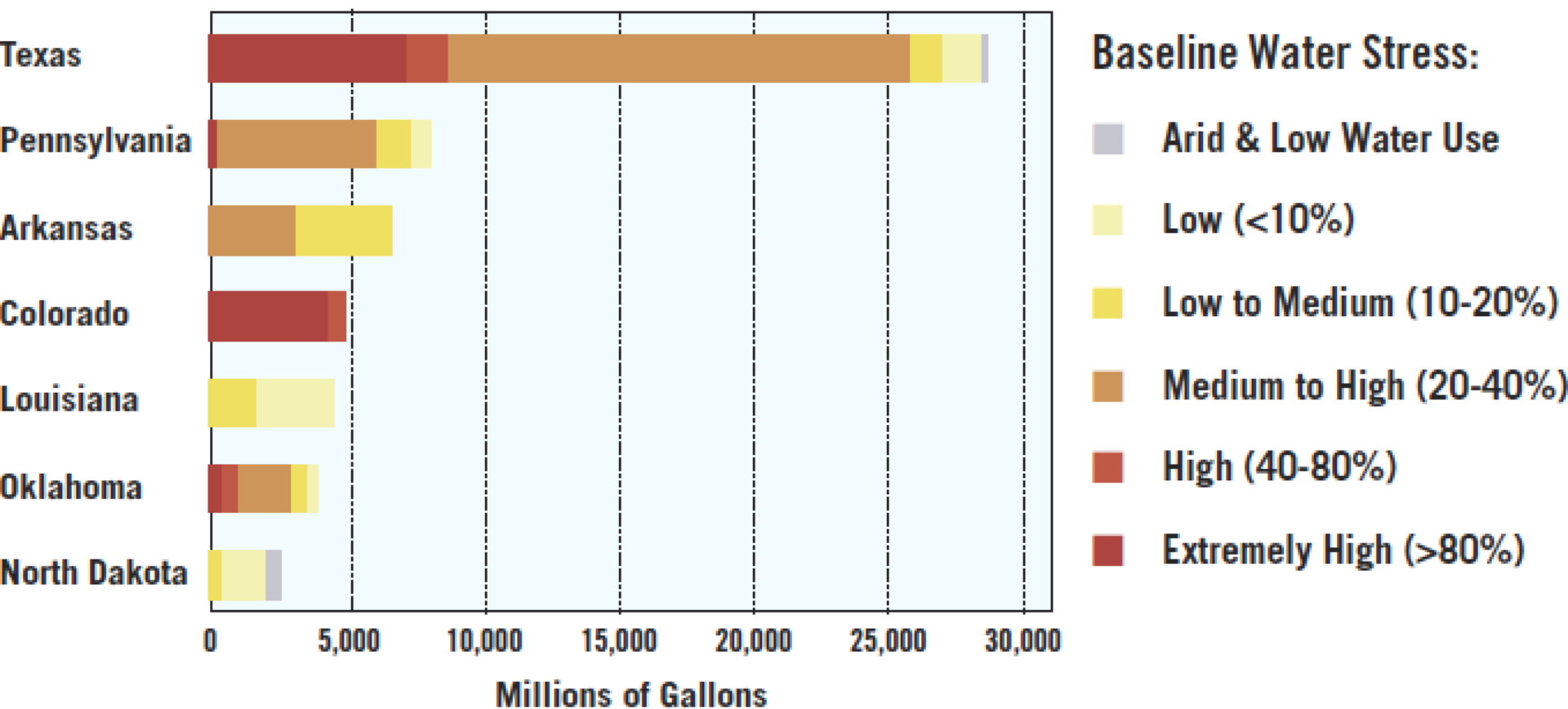


**FIGURE 1: NUMBER & PERCENTAGE OF HYDRAULICALLY FRACTURED WELLS BY WATER STRESS**



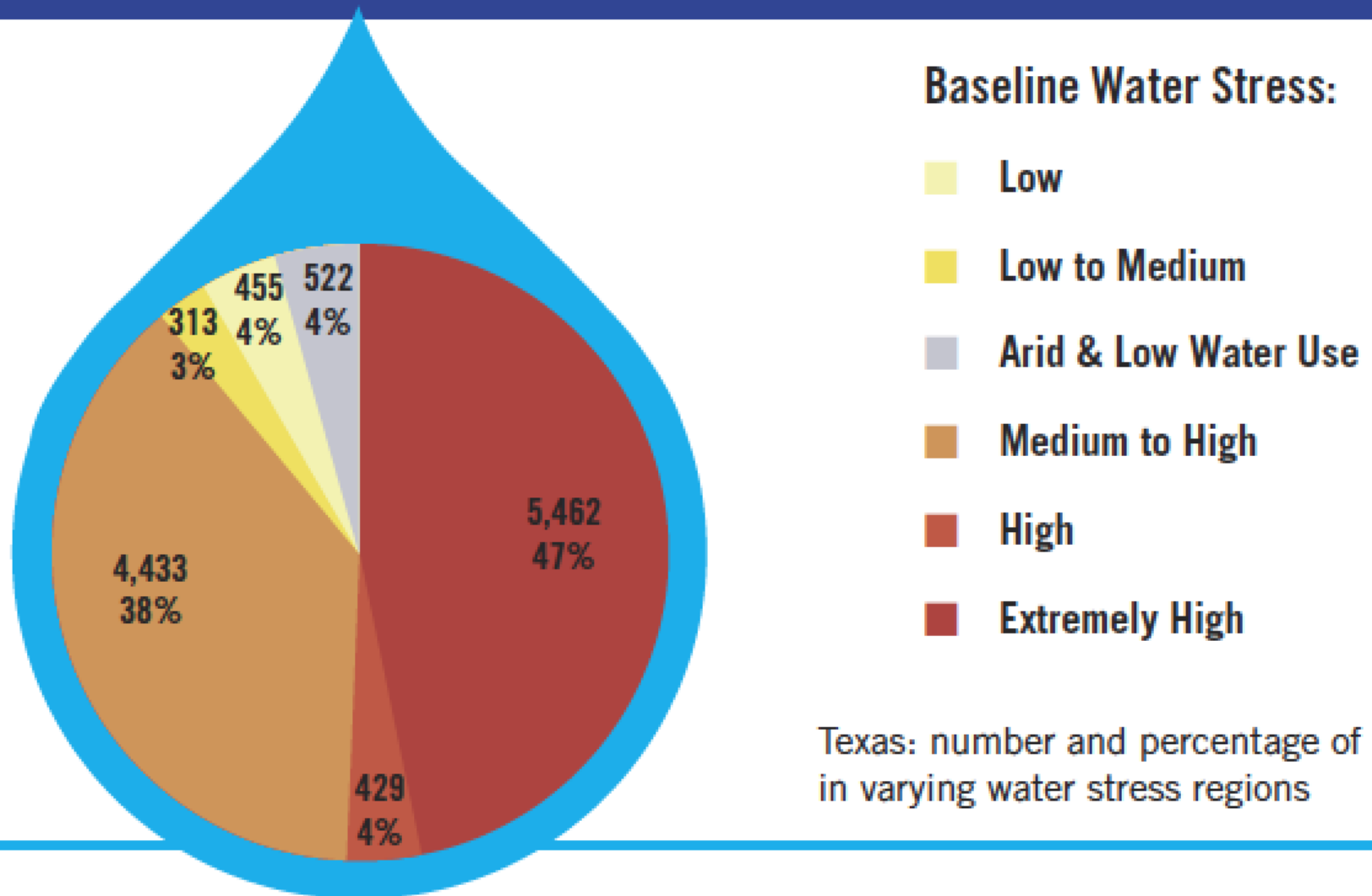
Source: CERES, Hydraulic Fracturing & Water Stress, May 2013

**FIGURE 6: VOLUME OF WATER INJECTED FOR HYDRAULIC FRACTURING BY STATE & WATER STRESS REGIONS**



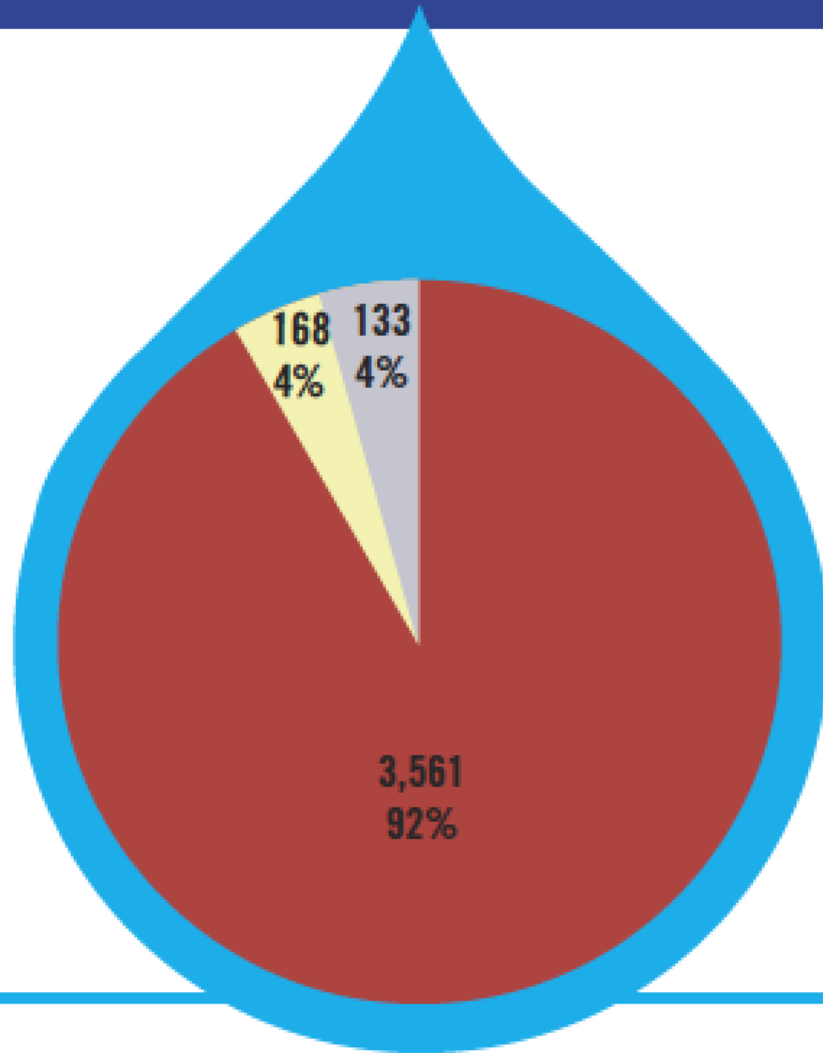
Source: CERES, Hydraulic Fracturing & Water Stress, May 2013

**FIGURE 3: TEXAS—NUMBER OF WELLS BY WATER STRESS**



Source: CERES, Hydraulic Fracturing & Water Stress, May 2013

**FIGURE 4: COLORADO—NUMBER OF WELLS BY WATER STRESS**



**Baseline Water Stress:**

- Low
- Low to Medium
- Arid & Low Water Use
- Medium to High
- High
- Extremely High

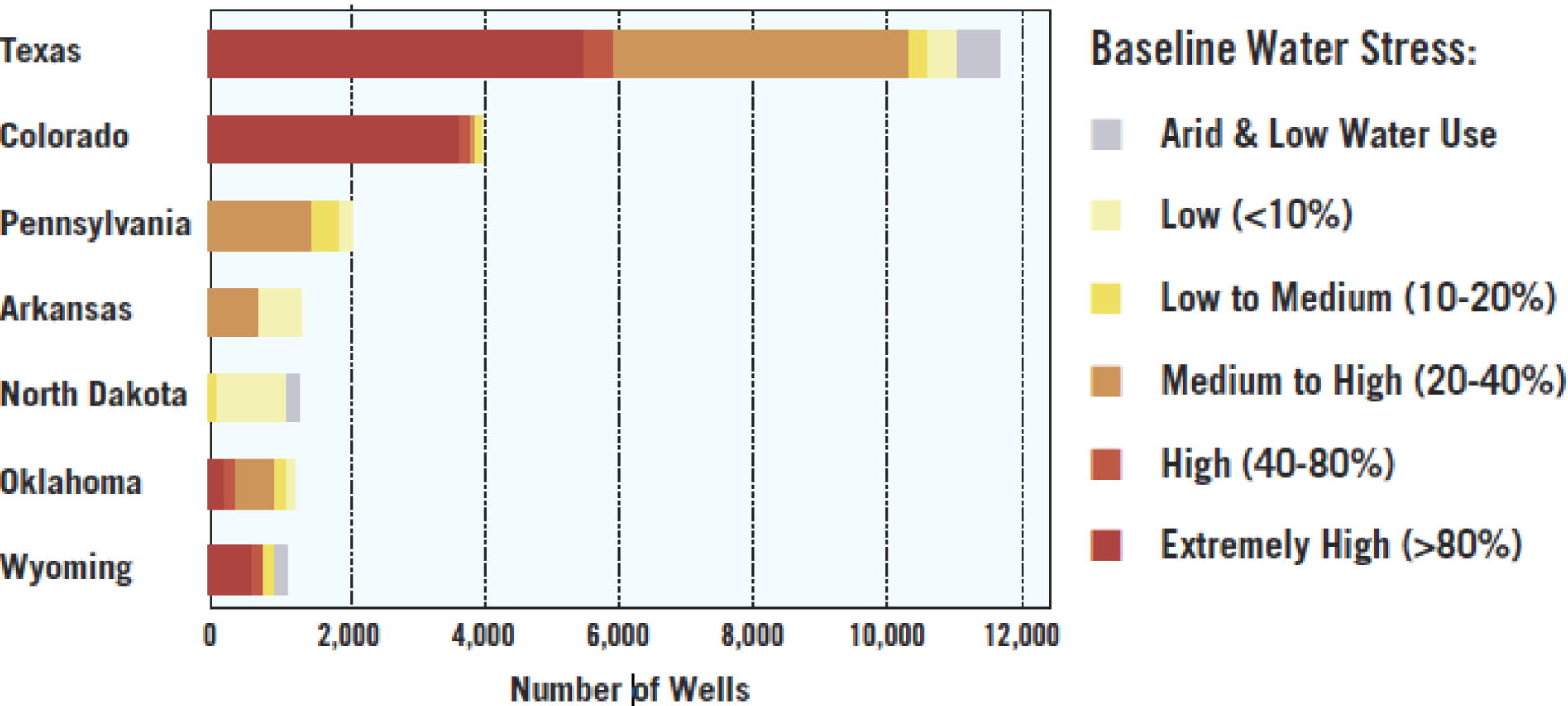
Colorado: number and percentage of wells in varying water stress regions

# Summary

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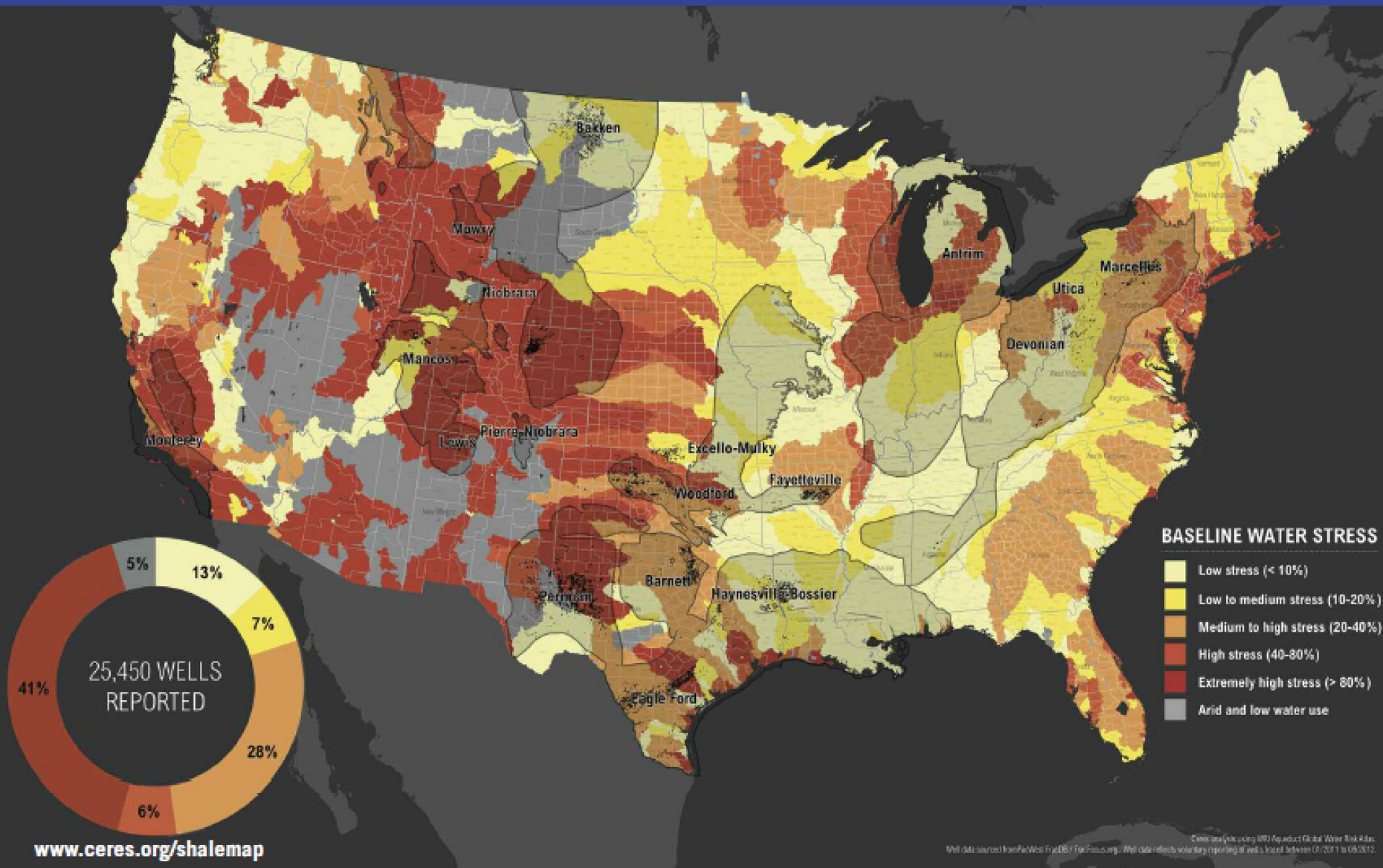
- Drought appears to be with us for many years
  - Continued water scarcity in Southwest and West
- Population continues to grow in water scarce regions
  - Added stress on diminished water supplies
- Agriculture is the first to lose access to water
  - Even if the industry has long standing water rights
  - Puts severe economic pressure on agricultural infrastructure and rural communities
- Energy industry water needs are expanding
  - Water stress regions are using water at increasing rates
  - Majority of water is for energy
  - Where will the trade-off end?

**FIGURE 2: NUMBER OF HYDRAULICALLY FRACTURED WELLS BY STATE & WATER STRESS**



Source: CERES, Hydraulic Fracturing & Water Stress, May 2013

# COMPETITION FOR WATER IN U.S. SHALE ENERGY DEVELOPMENT



Source: CERES, Hydraulic Fracturing & Water Stress, May 2013