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

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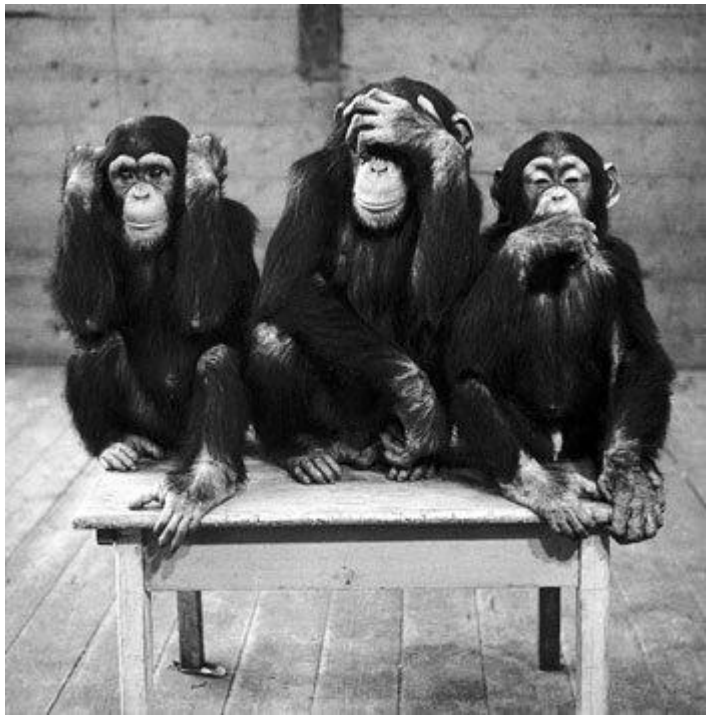
USDA Outlook
February 19, 2015

TEXAS A&M UNIVERSITY

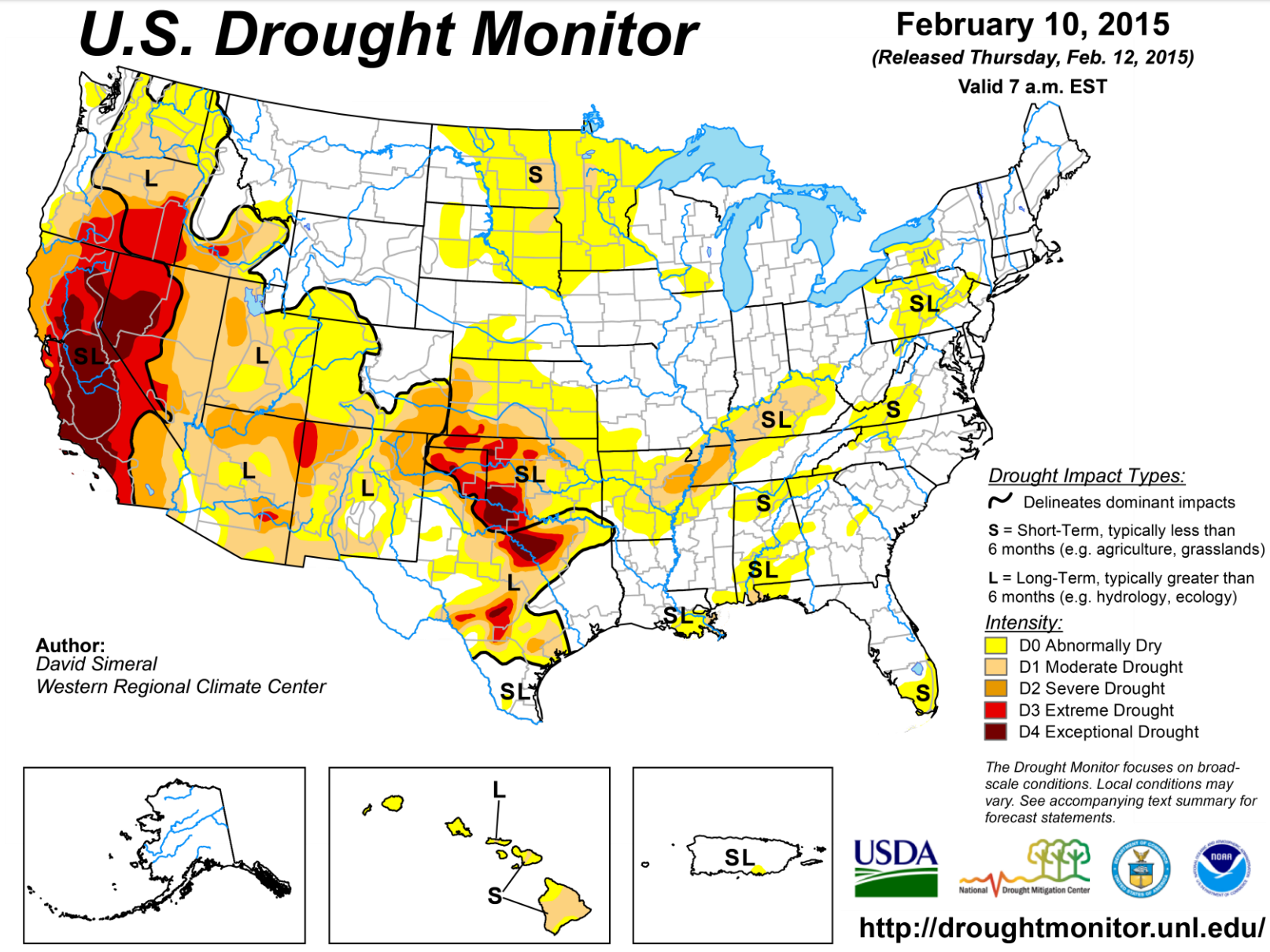
AFPC

A Gorilla or Three Big Monkeys?



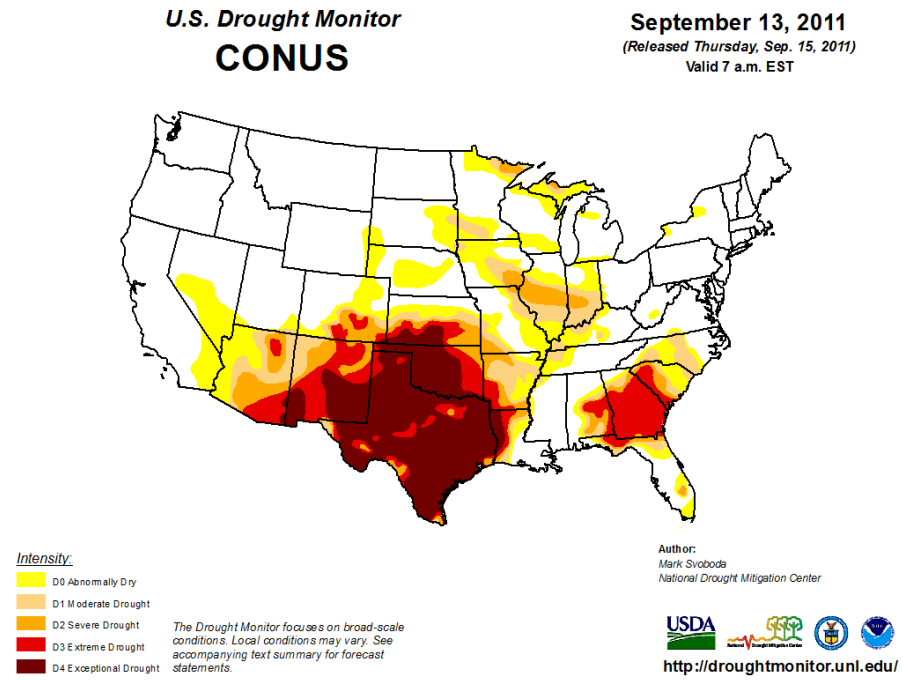
- Drought
- Population Growth
- Agricultural and Industrial Uses

US Drought: Current Conditions

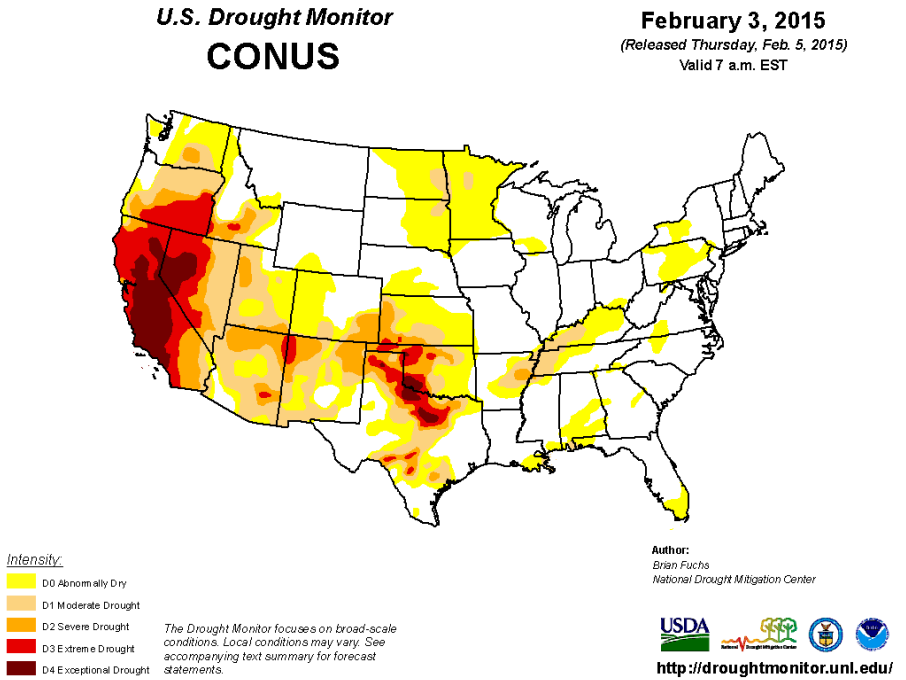


Texas is actually looking pretty good relative to 2011 …

September 13, 2011



February 3, 2015



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

Will Drought Be More Commonplace?

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

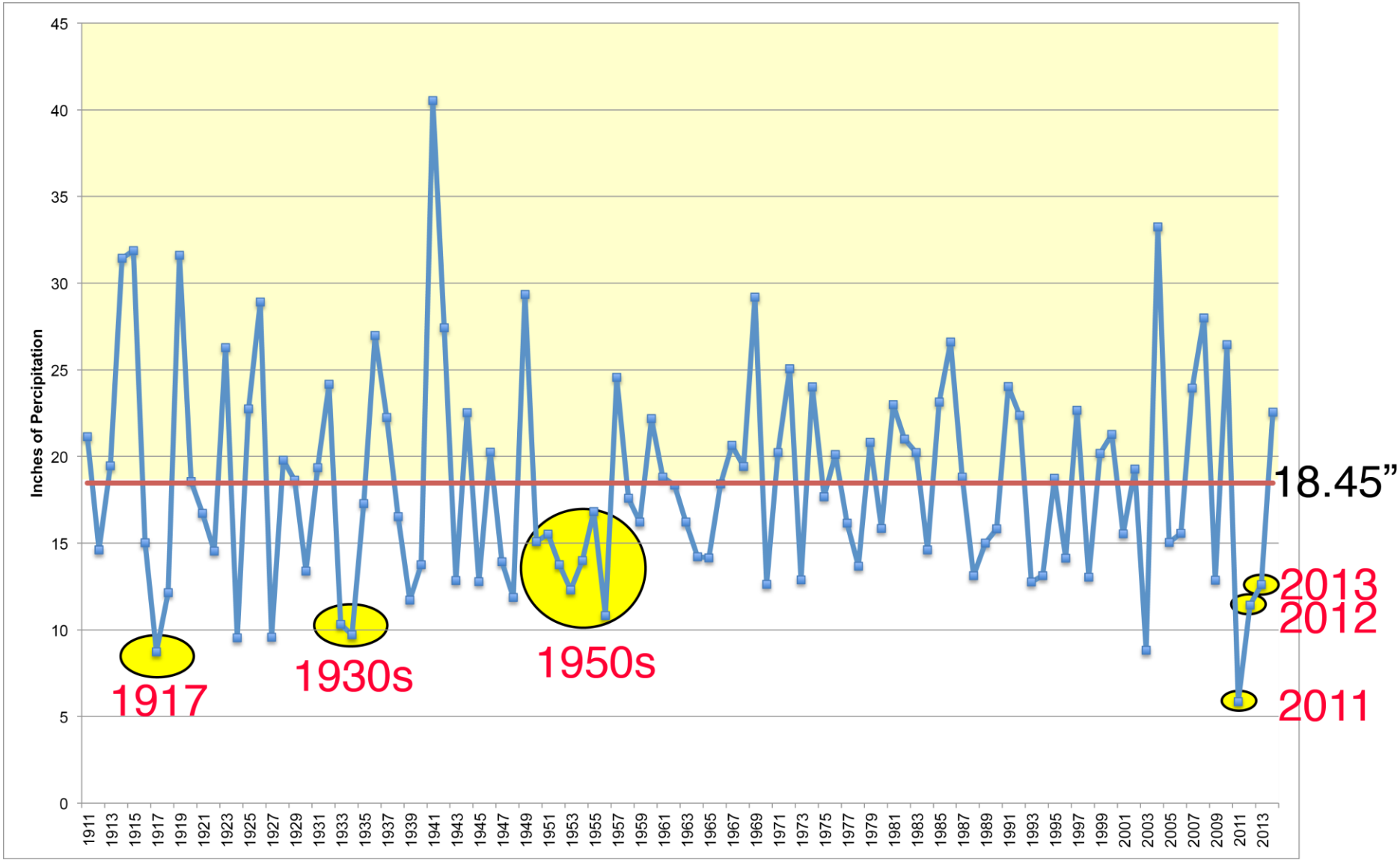
Fading El Niño could extend Texas drought

Southwest, Central Plains Face ‘Unprecedented’ Drought

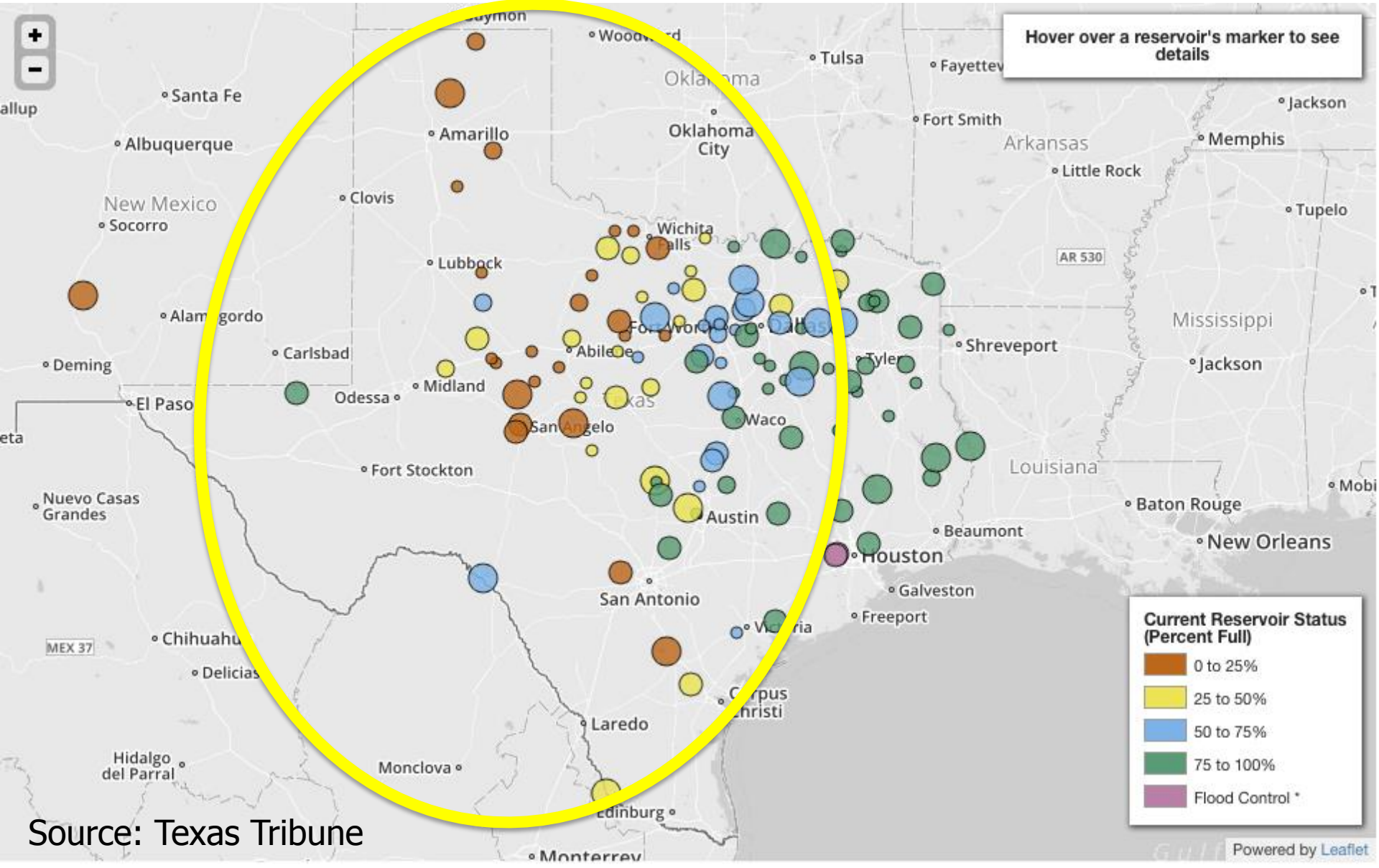
Climate Forecast: More Southwest Droughts and Australian Floods
Global warming will drive La Niña to greater extremes, a new study says—and El Niño too.

Drought among the worst in Texas in past 500 years

Lubbock, TX, Rainfall (1911 – 2014)



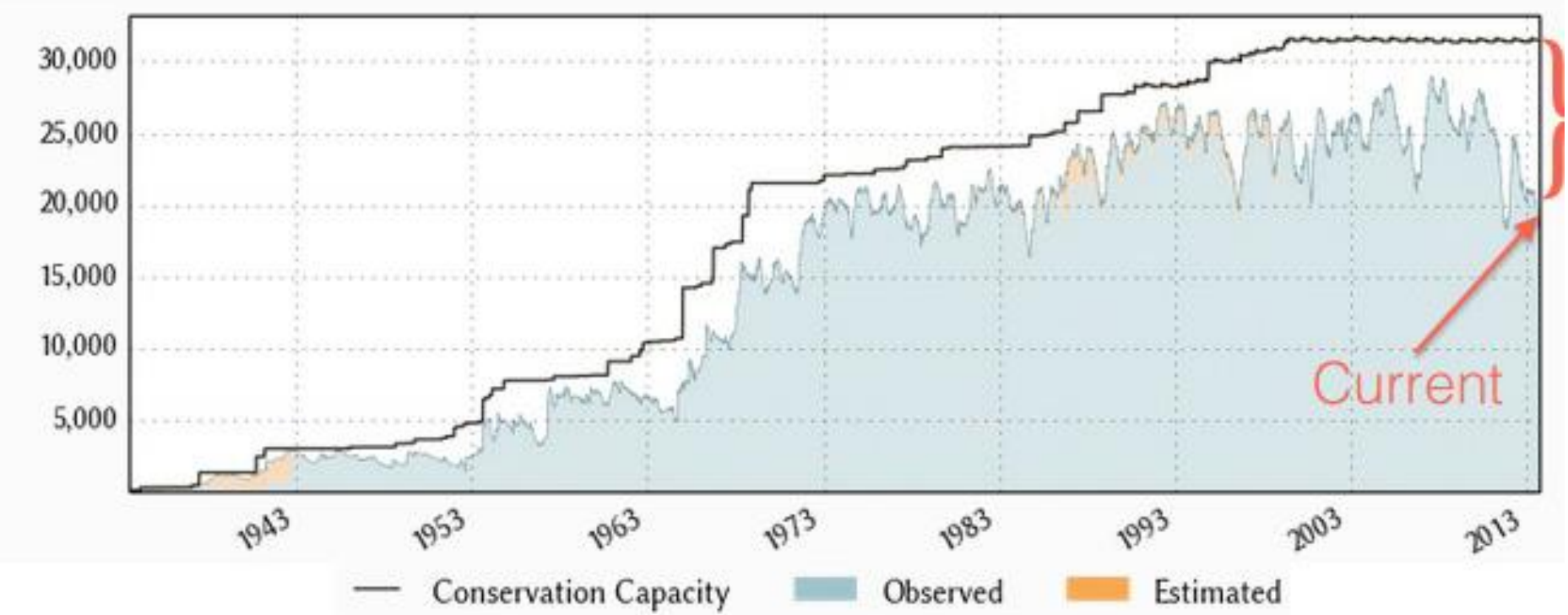
Texas Reservoir Levels (2015)

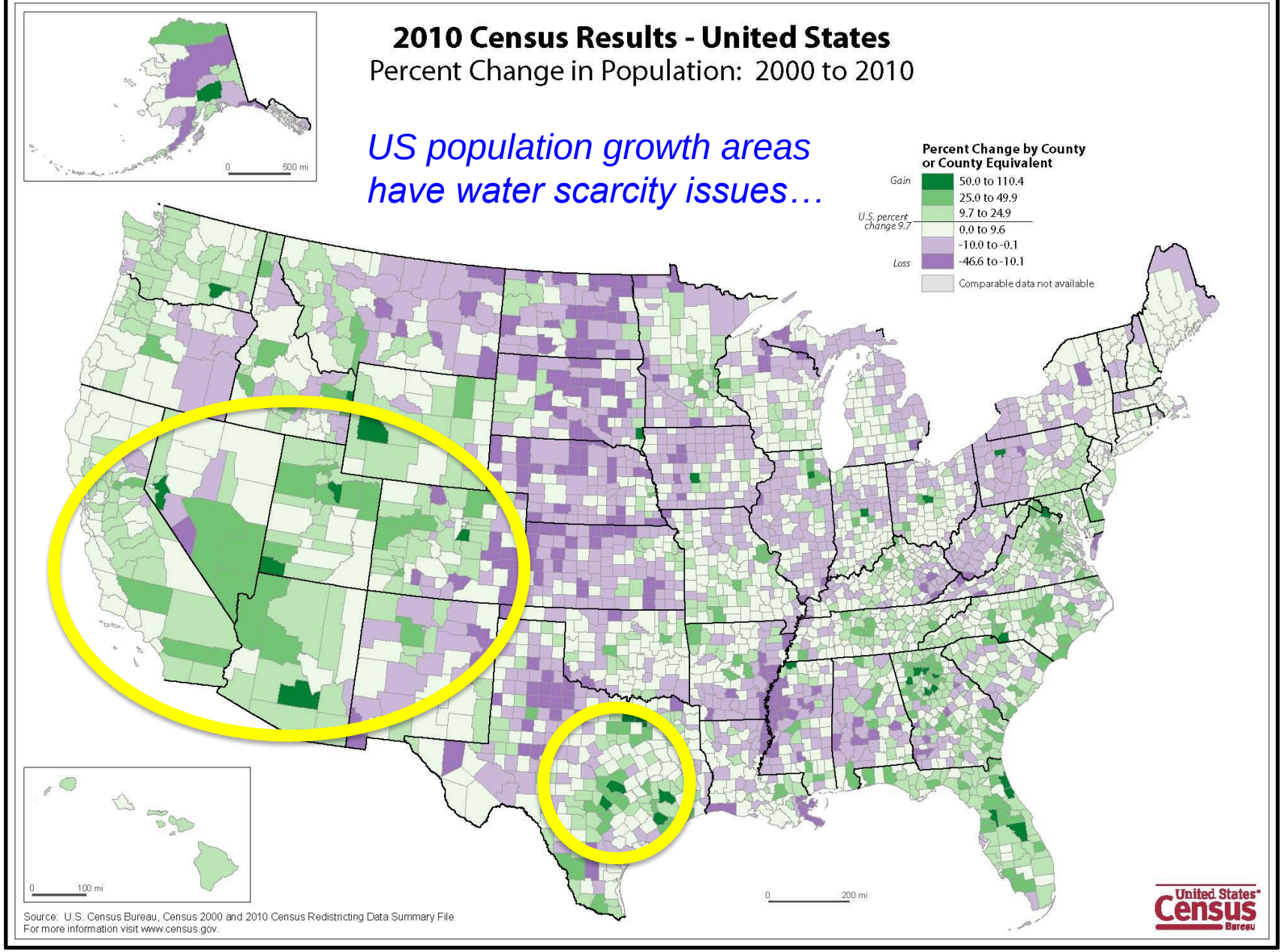


Source: Texas Tribune

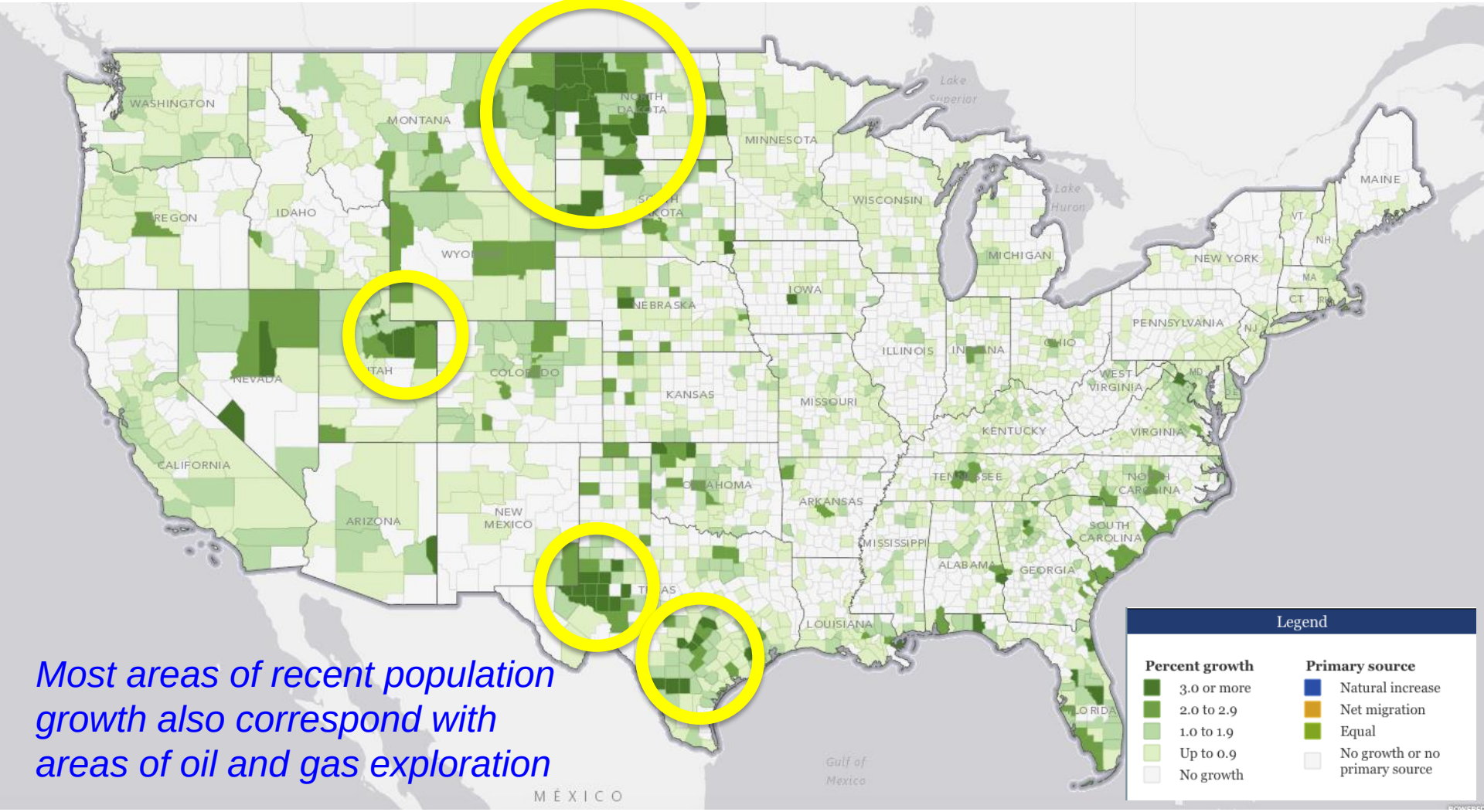
Reservoir Levels vs. Capacity

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
Gain
50.0 to 110.4
25.0 to 49.9
9.7 to 24.9
U.S. percent change 9.7
0.0 to 9.6
-10.0 to -0.1
Loss
-46.6 to -10.1
Comparable data not available
0 500 mi
0 100 mi
0 200 mi
Source: U.S. Census Bureau, Census 2000 and 2010 Census Redistricting Data Summary File
For more information visit www.census.gov.
United States Census Bureau

County Population Growth (2012 – 2013)



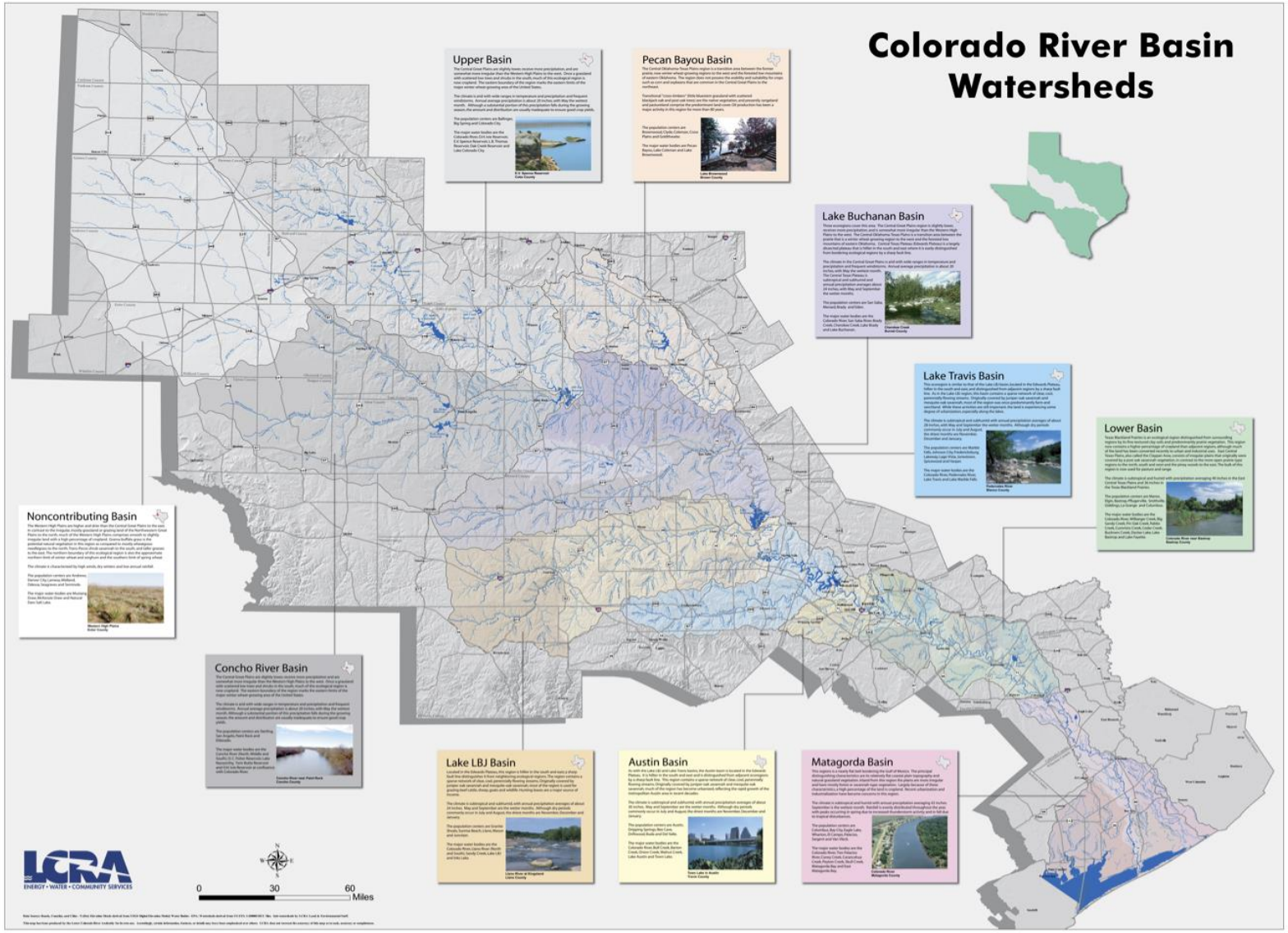
Most areas of recent population growth also correspond with areas of oil and gas exploration

Source: US Census Bureau

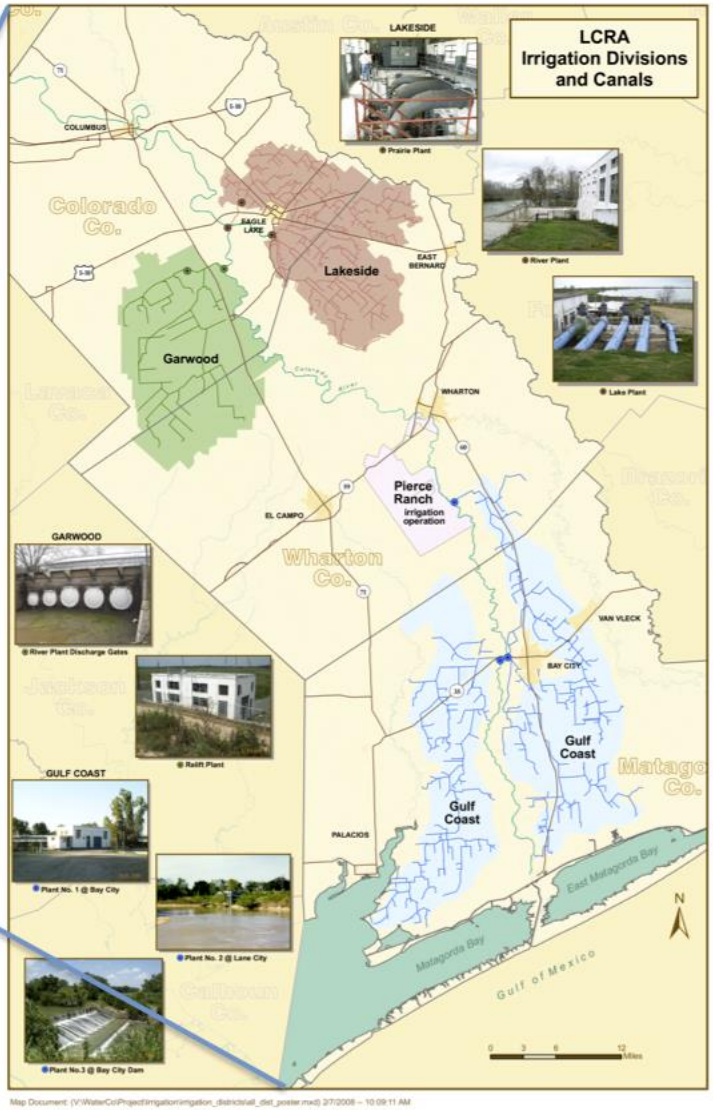
Situation

- 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

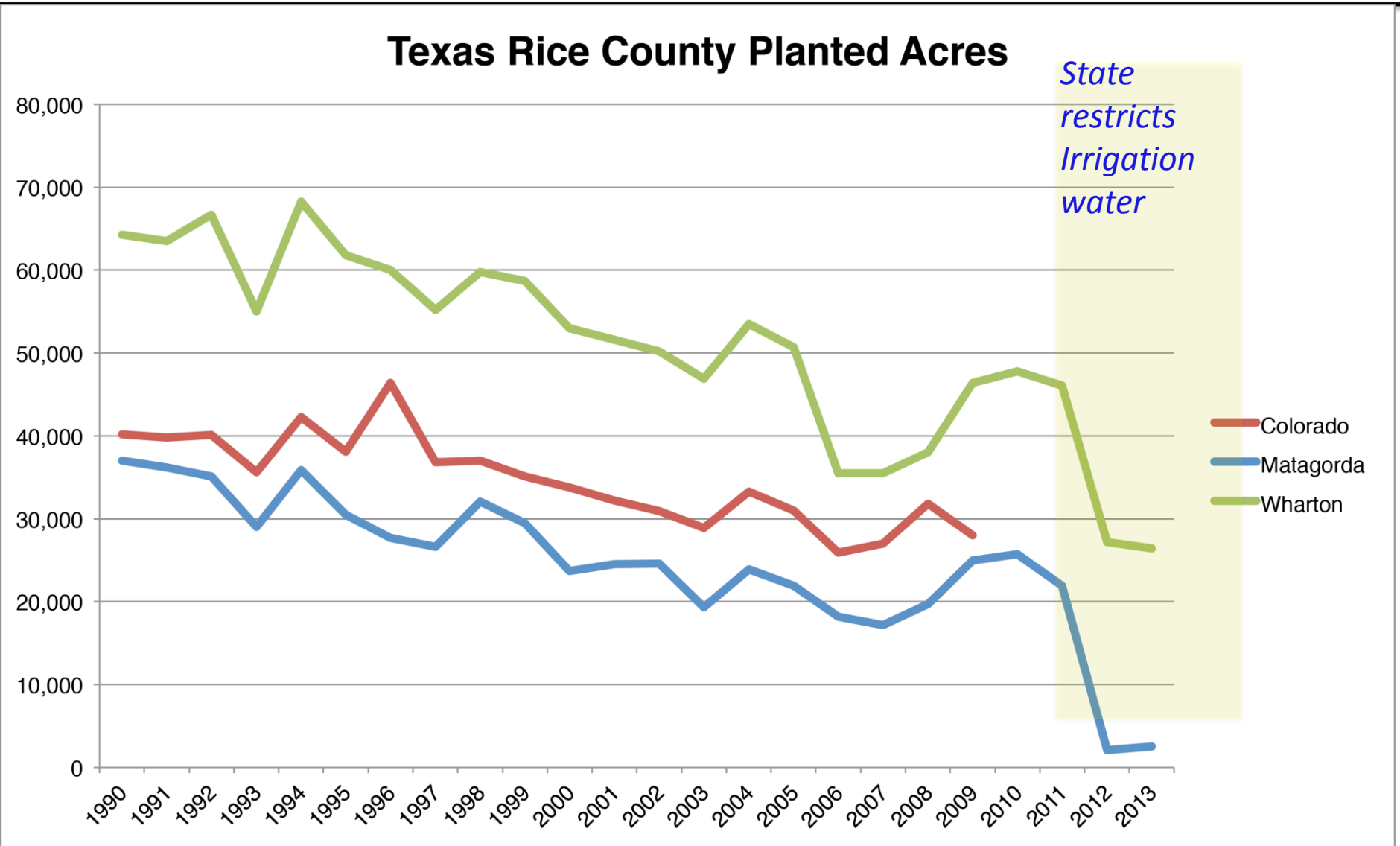


LCRA Rice Irrigation Areas in Texas



People vs. Agriculture?

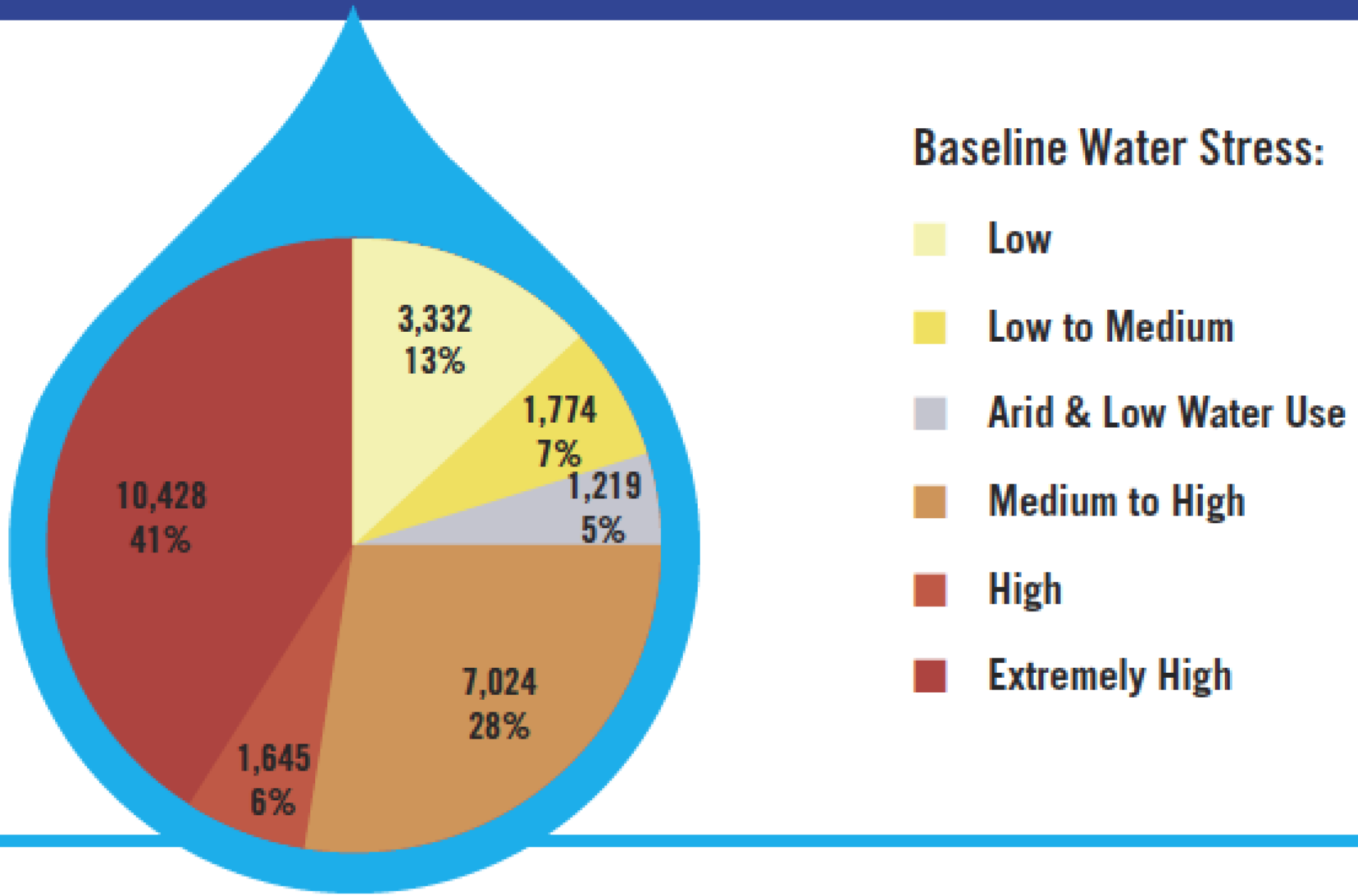
Texas Rice Farmers Take the Hit; No Water in 2011-15; Likely Cause a Loss of Infrastructure & Community



Energy Industry is a Growing Water User

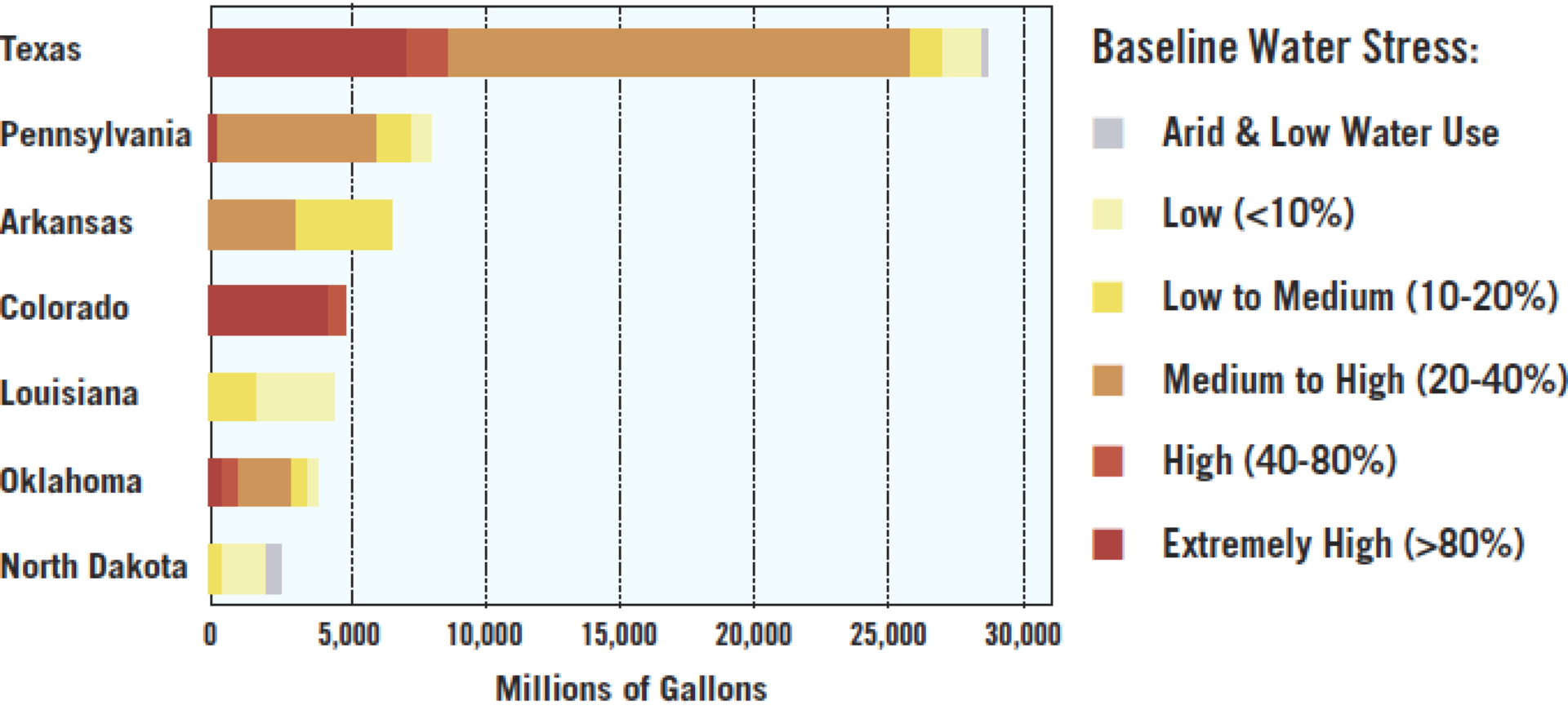
- Water used for fracking is small, usually about 1% of the state's water usage
- But, locally water usage could be quite large
  - 2 to 10 million gallons per well
  - Globally 38% of shale oil & gas in water stressed regions
  - In the Texas Eagle Ford Shale water use could amount to 89% of total water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

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



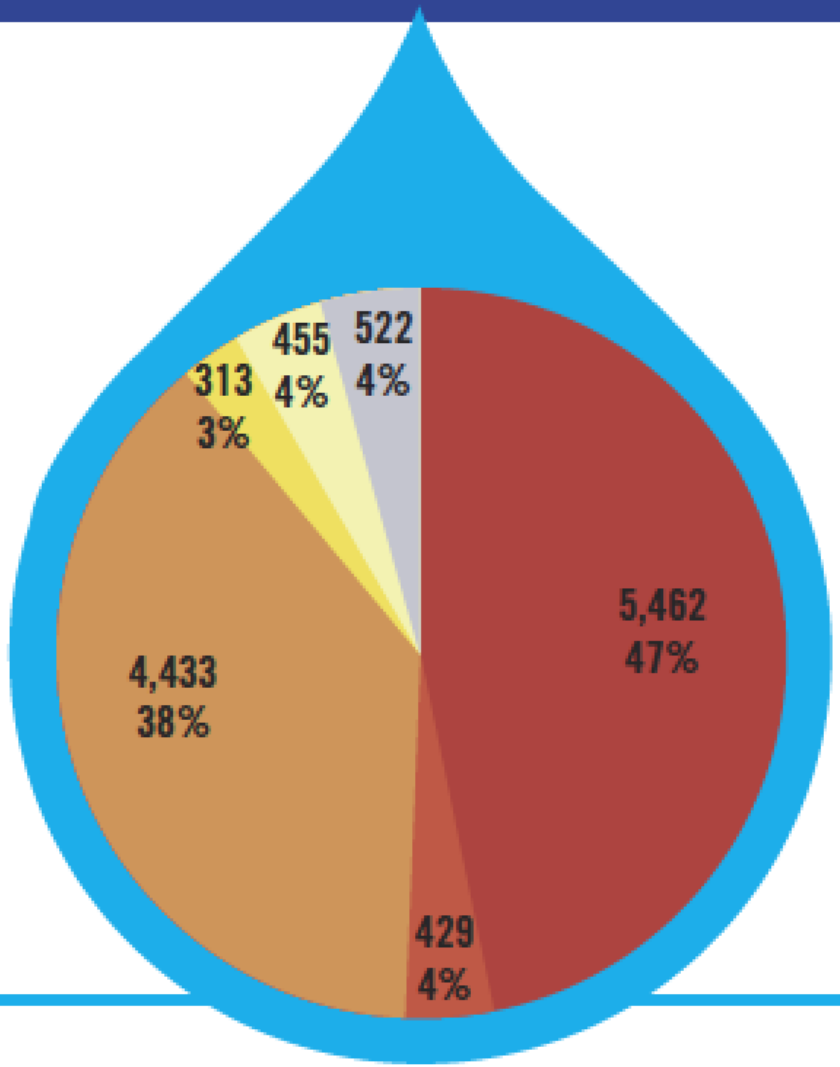
Source: CERES, Hydraulic Fracturing & Water Stress, May 2013

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



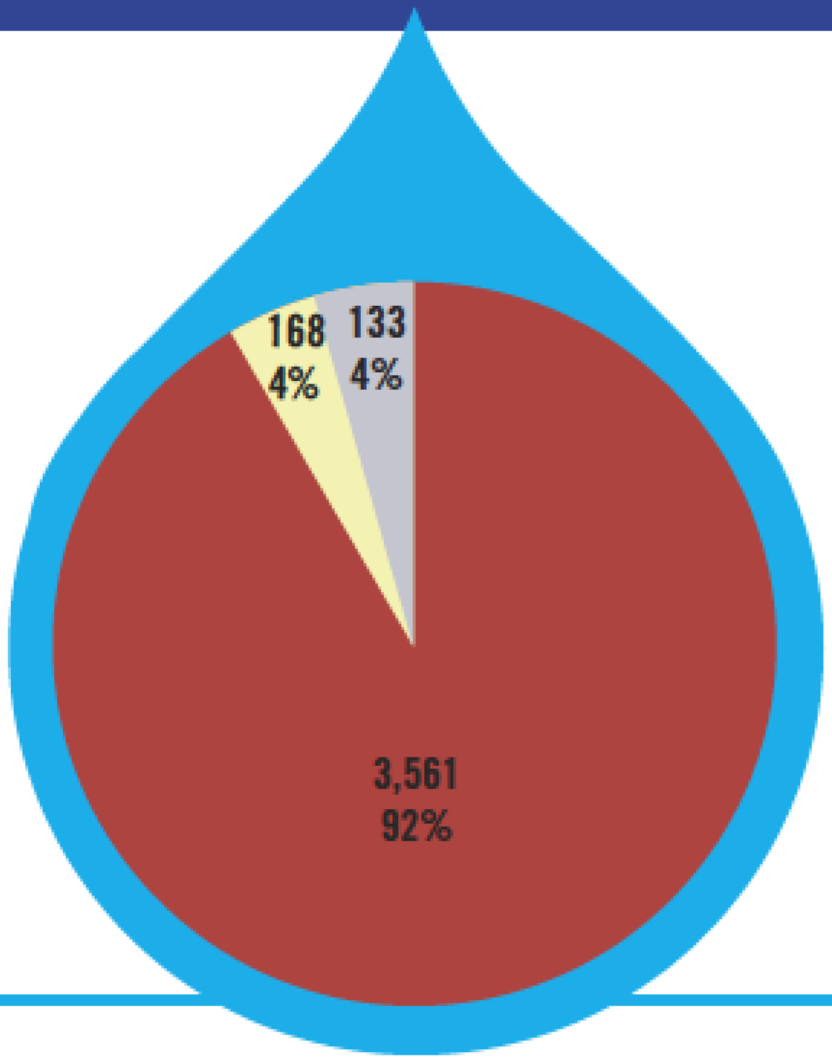
Baseline Water Stress:

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

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

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

FIGURE 4: COLORADO—NUMBER OF WELLS BY WATER STRESS



Baseline Water Stress:

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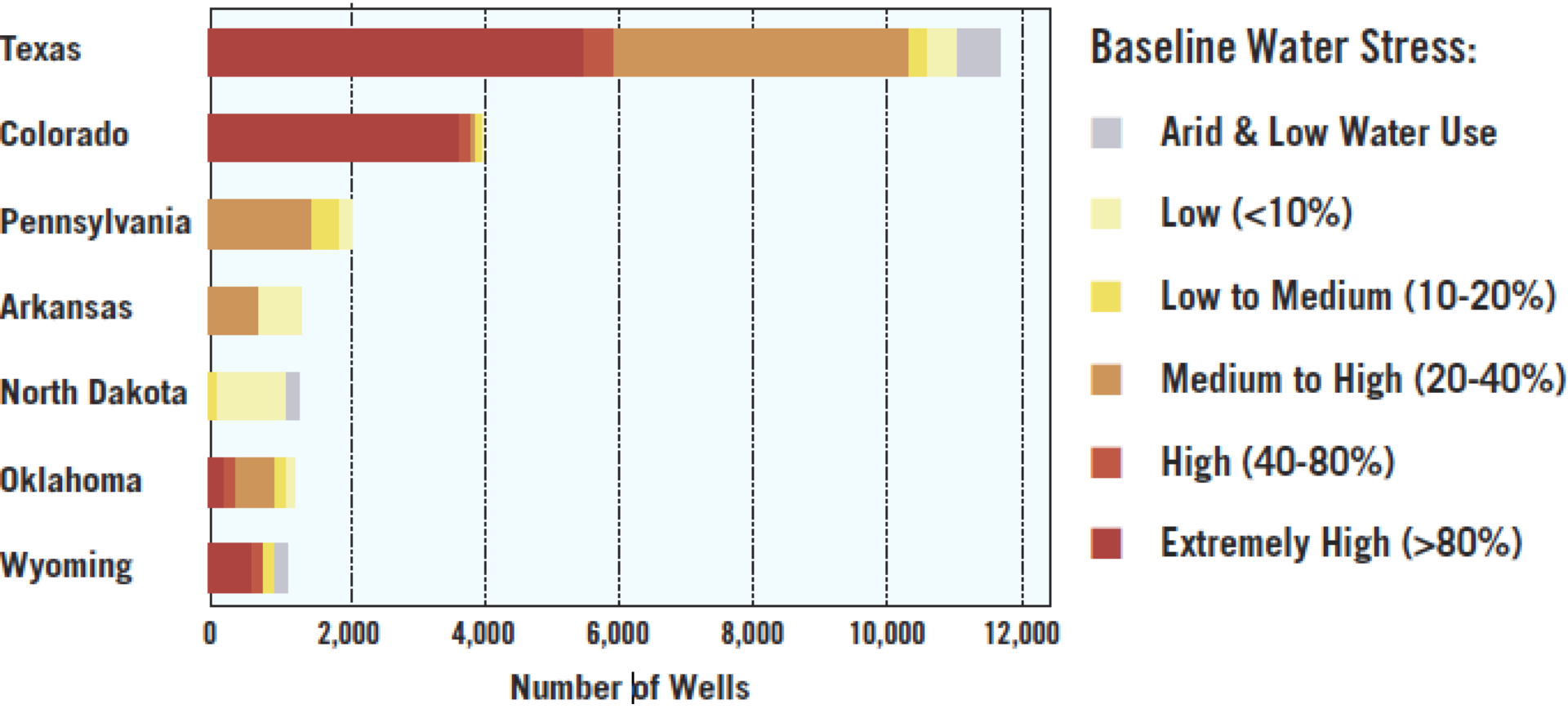
Colorado: number and percentage of wells in varying water stress regions

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

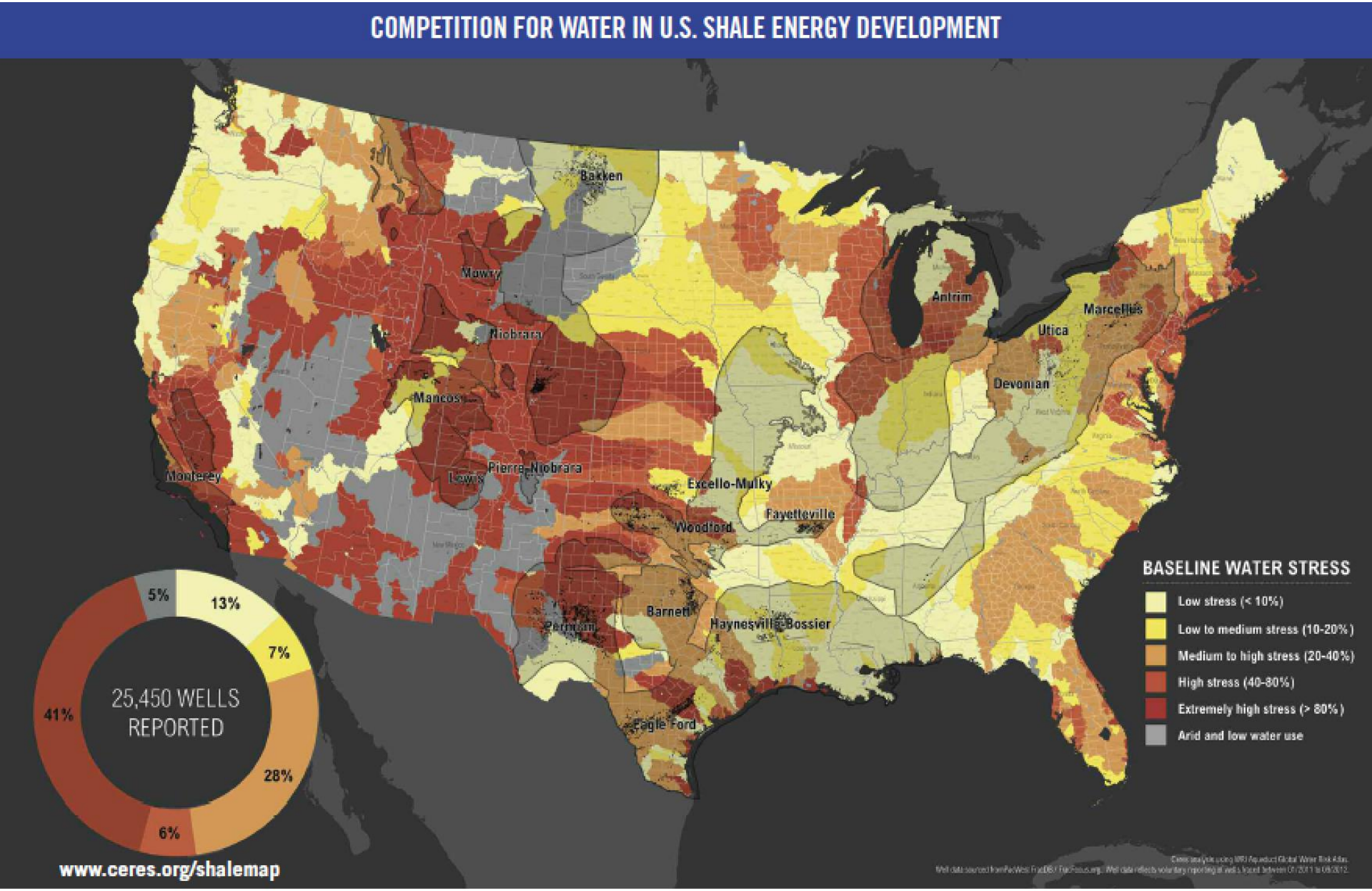
Summary

- 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



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