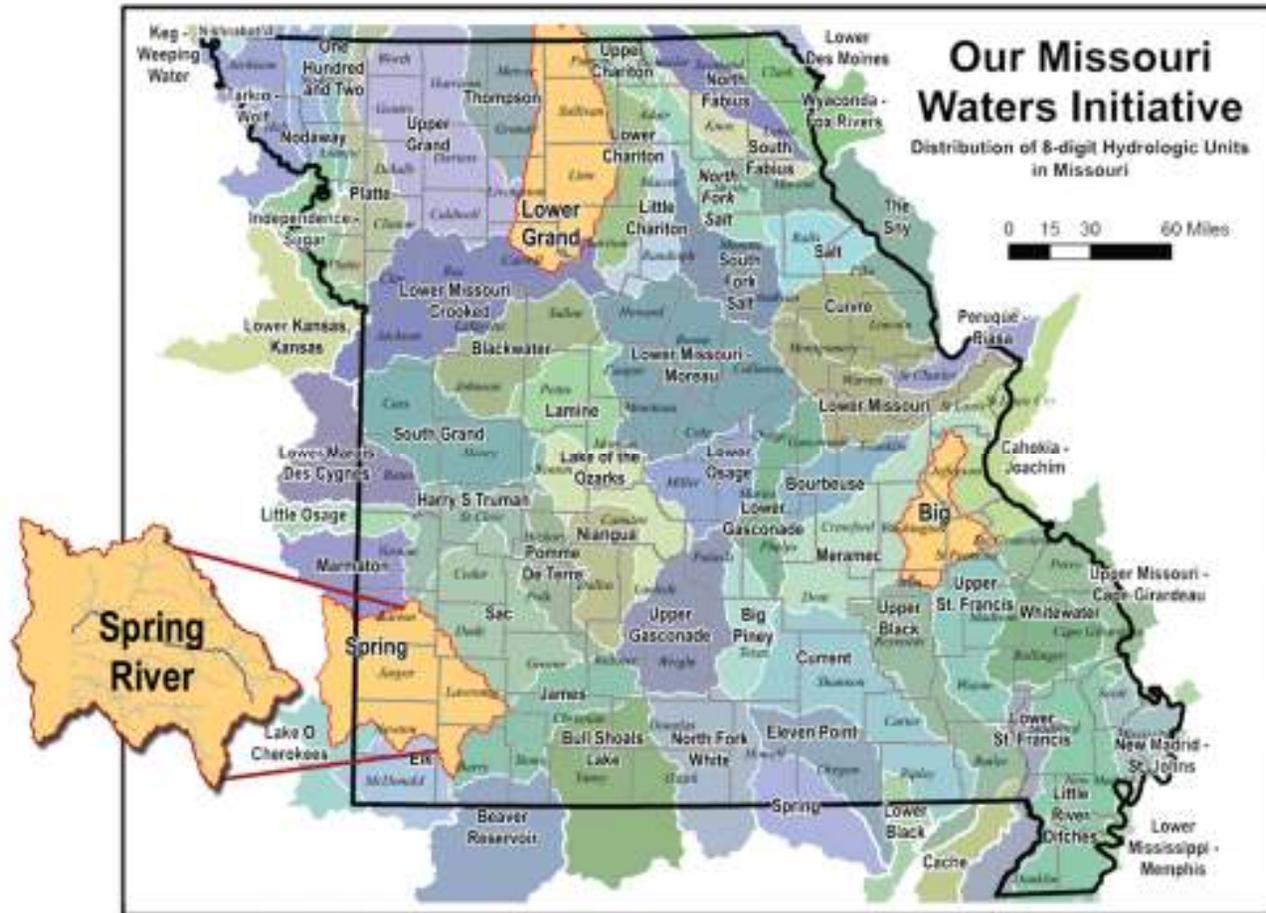


# Water Supply Planning in the Spring River Watershed

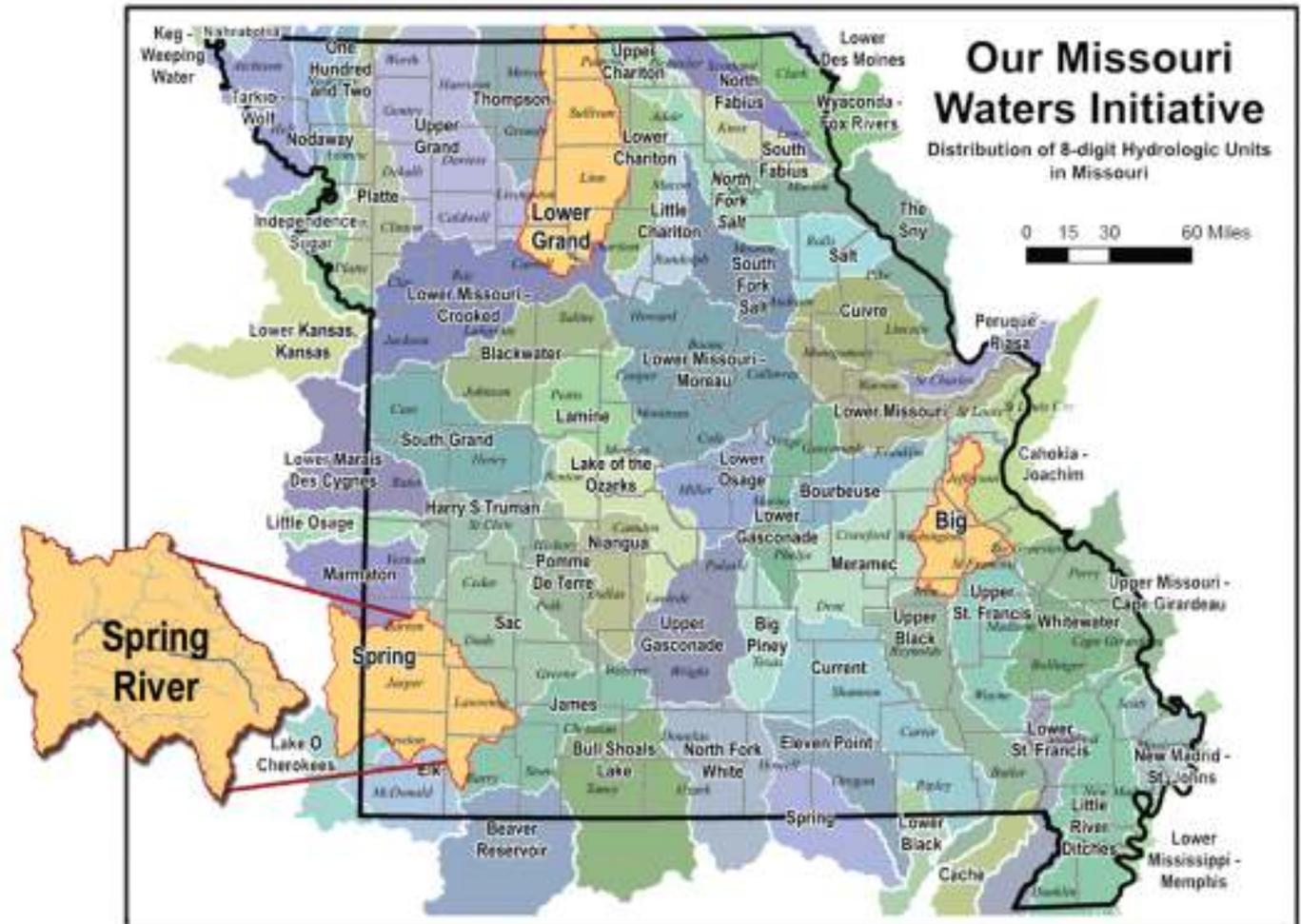


Ryan Mueller, PE

Department of Natural Resources – Water Resources Center

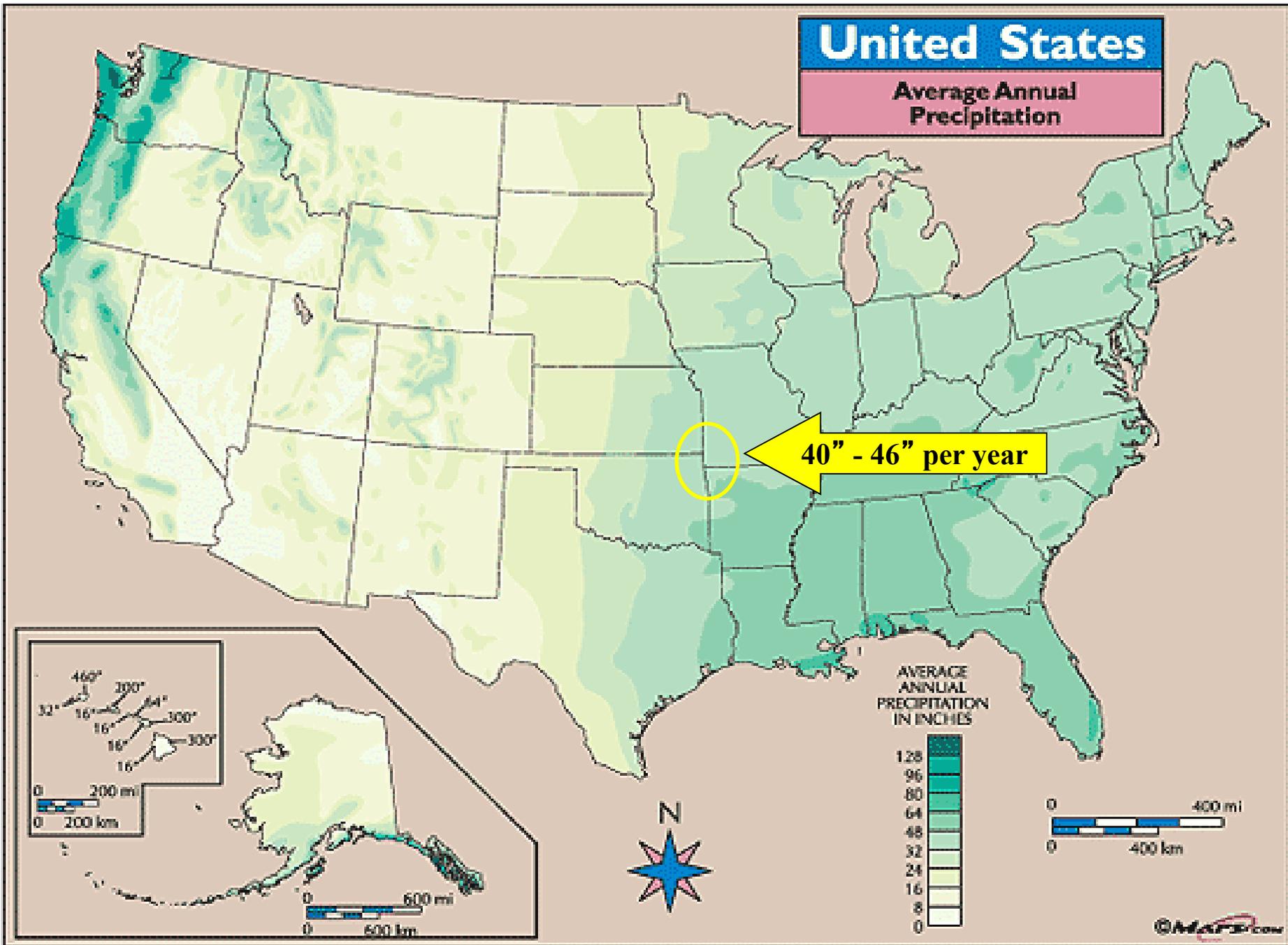
# OVERVIEW

- Climate
- Water Use Trends
- Population Trends
- Aquifer Response
- Planning Activities



# United States

Average Annual Precipitation



In addition to lack of rainfall, drought rapidly evolved due to additional factors ...

## U.S. Drought Monitor, Missouri

May 1, 2012



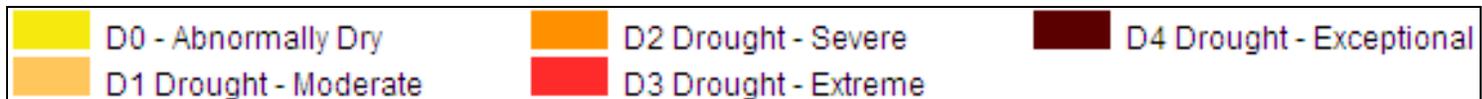
July 31, 2012



Aug 28, 2012



### Drought Severity categories:



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



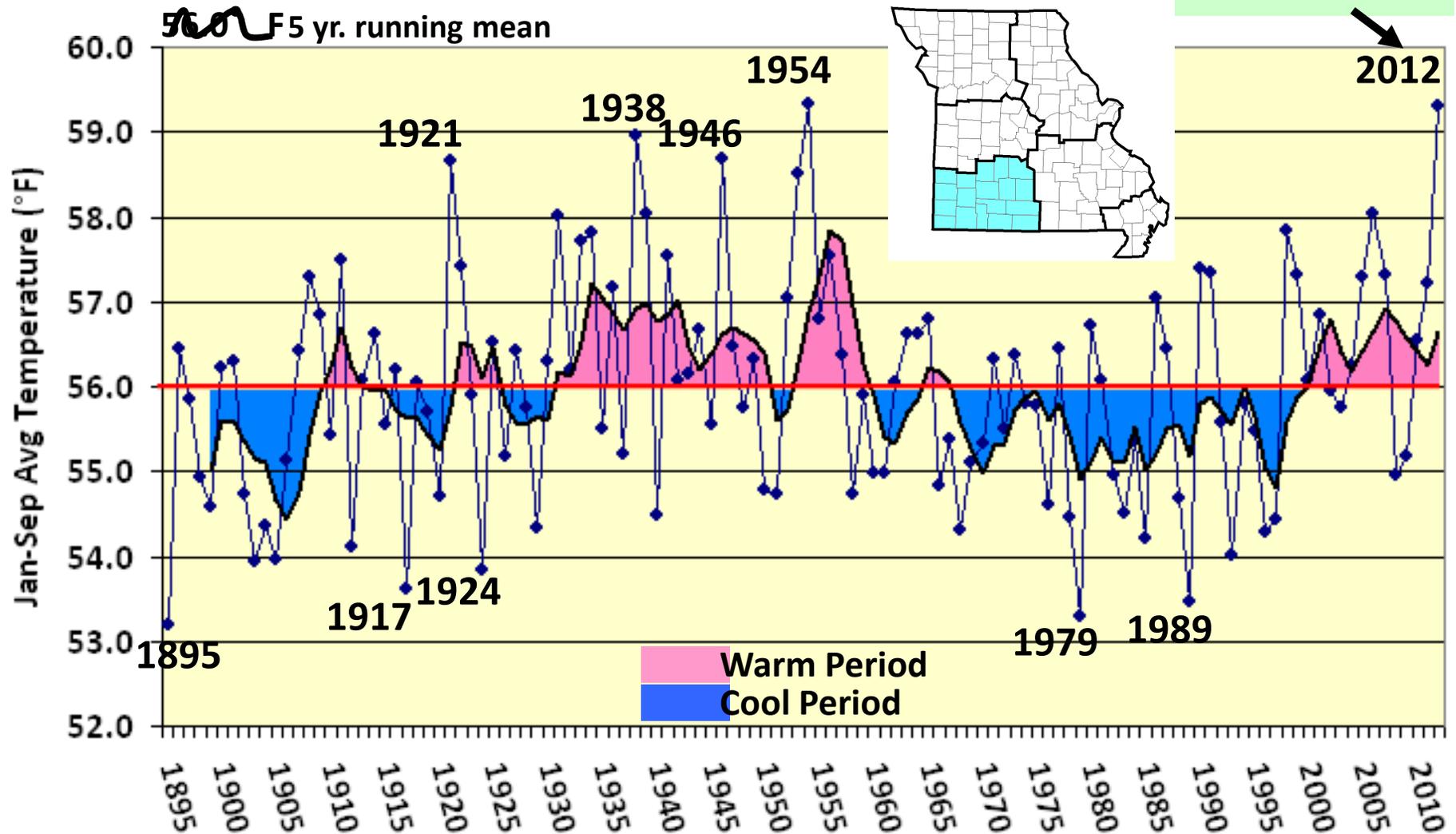
# Warmest year on record...

## Southwest Missouri Annual Average Temperature

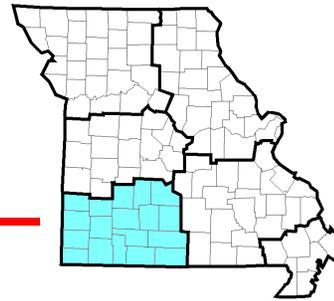
(° F) (1895-2012)

Long-term average: —

5 yr. running mean



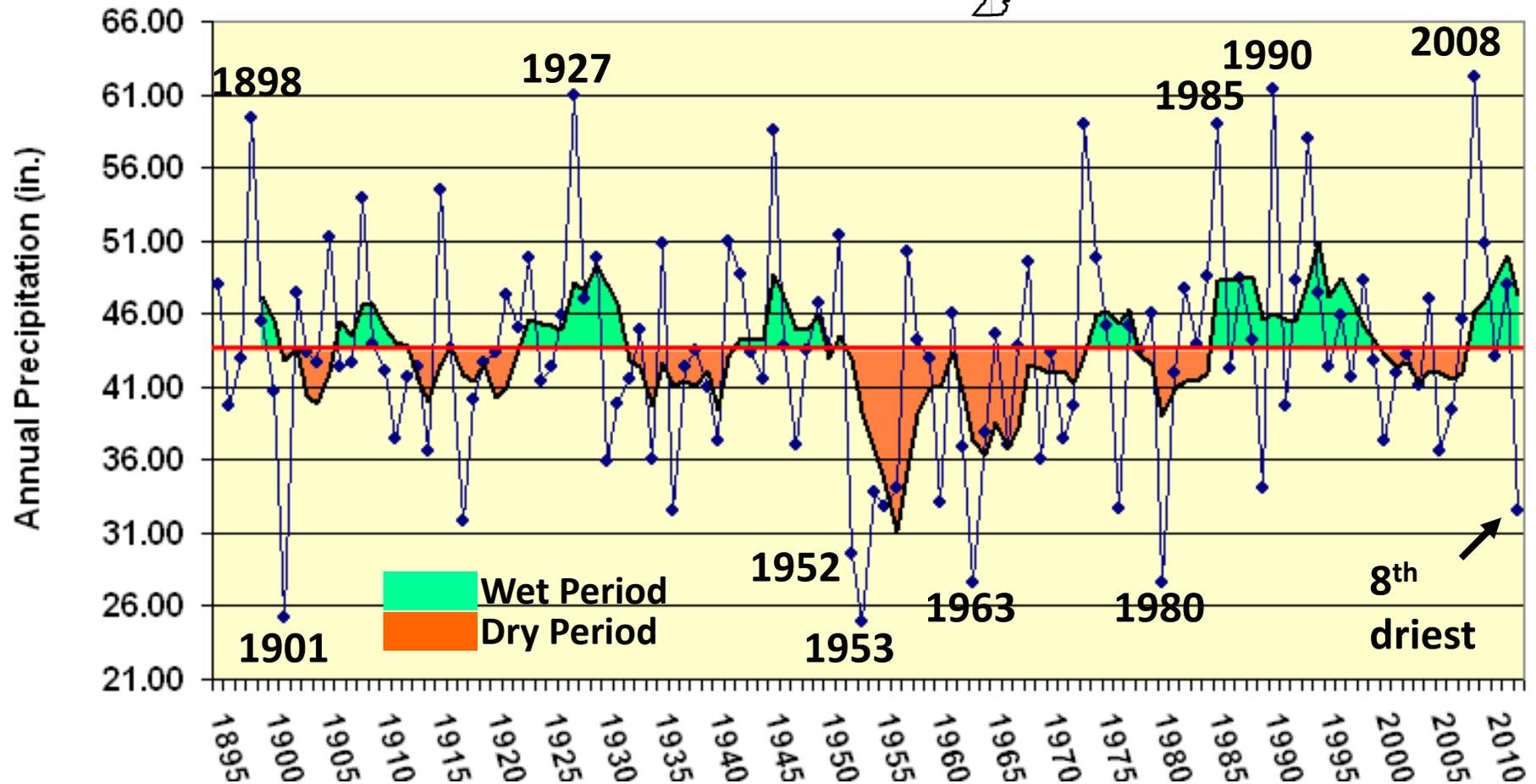
# Southwest Missouri Annual Average Precipitation (1895-2012)



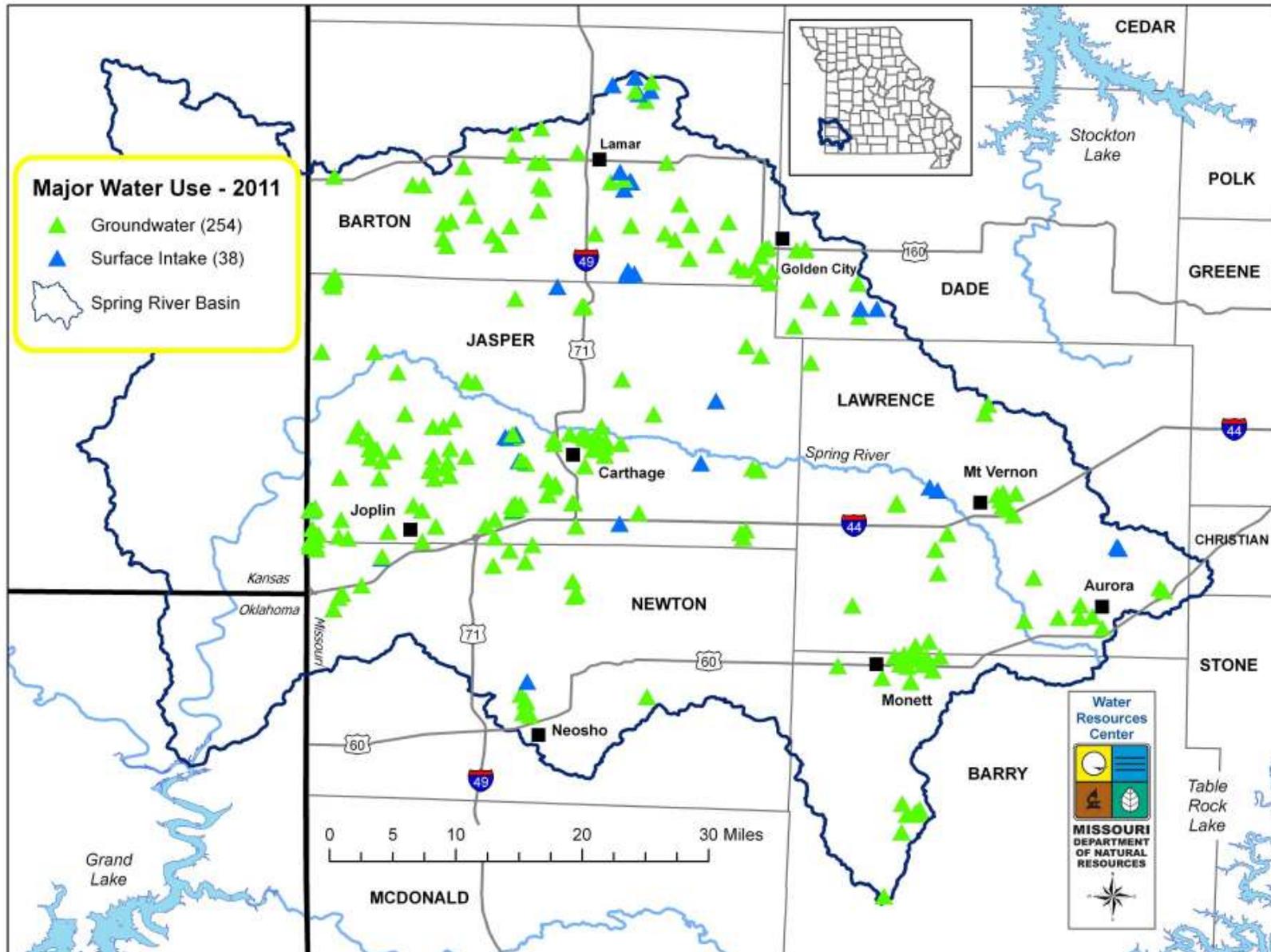
Long-term average: 43.48"



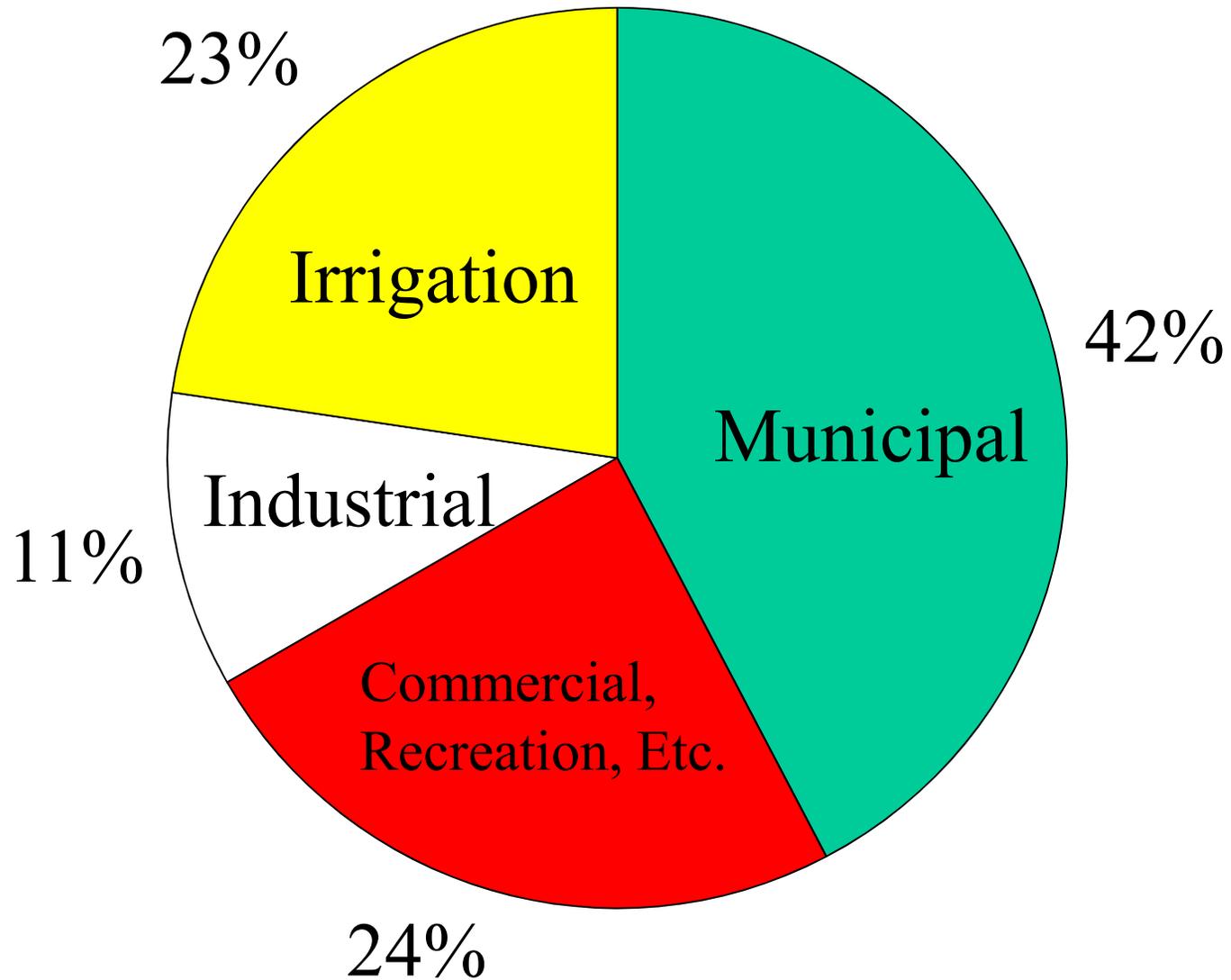
5 yr. running mean



# Water Use



# Water Use by Sector - 2011

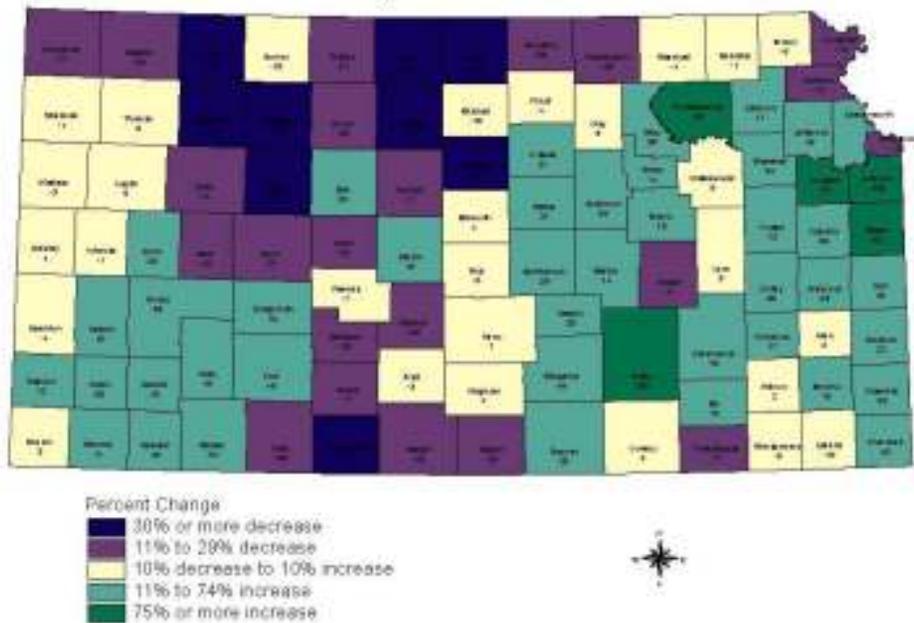


64% Groundwater, 36% Surface Water – Avg. annual use = 13.4 Billion Gal.

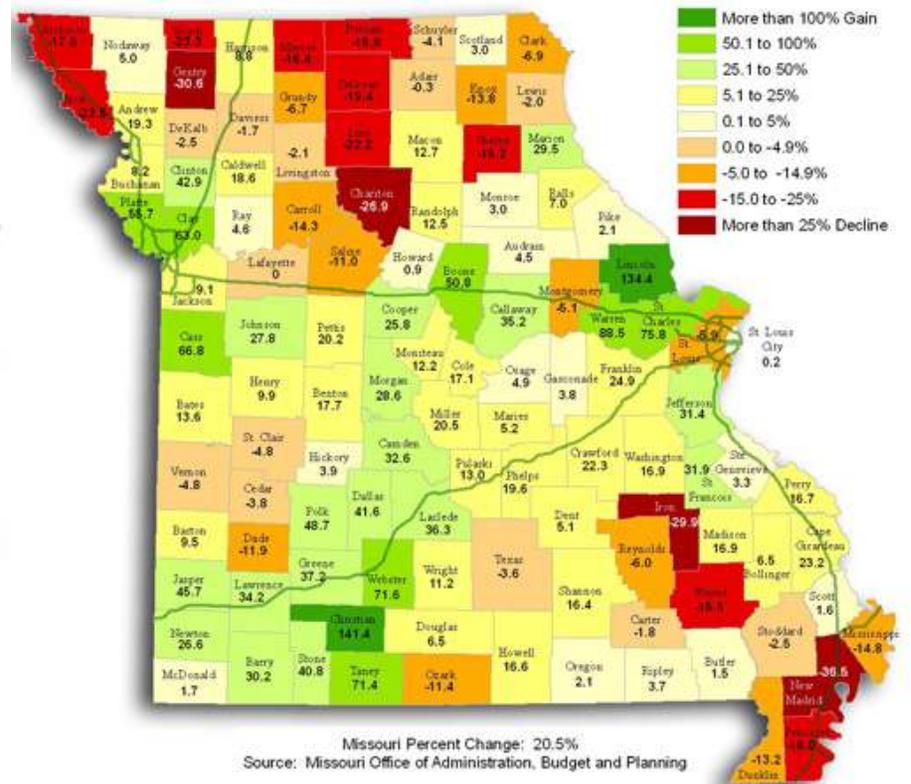
# Population Projections

Figure 5

Percent Change in Population by County  
Kansas, 1990 to 2040



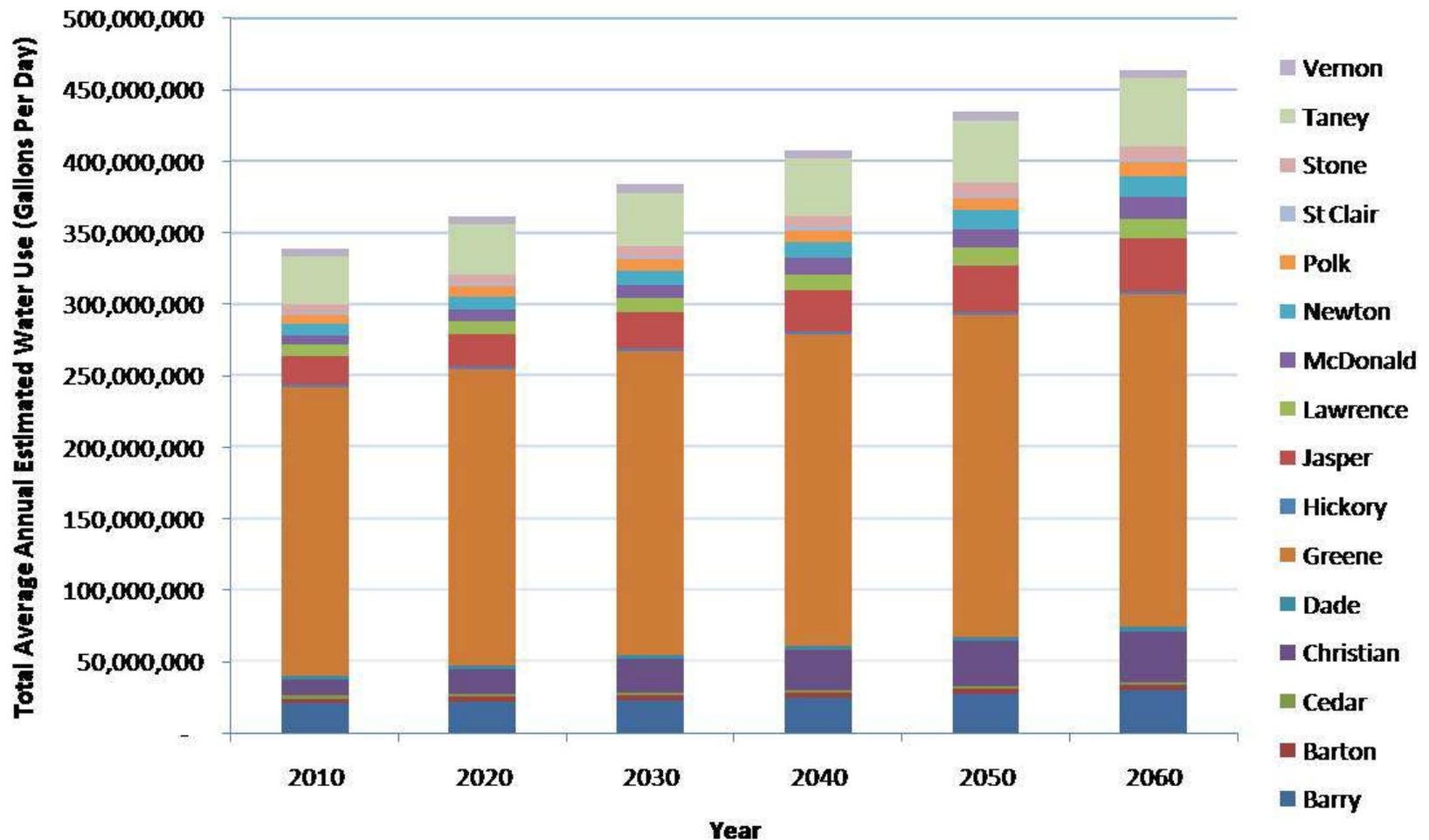
Projected Percent Change in Population, 2000 to 2030



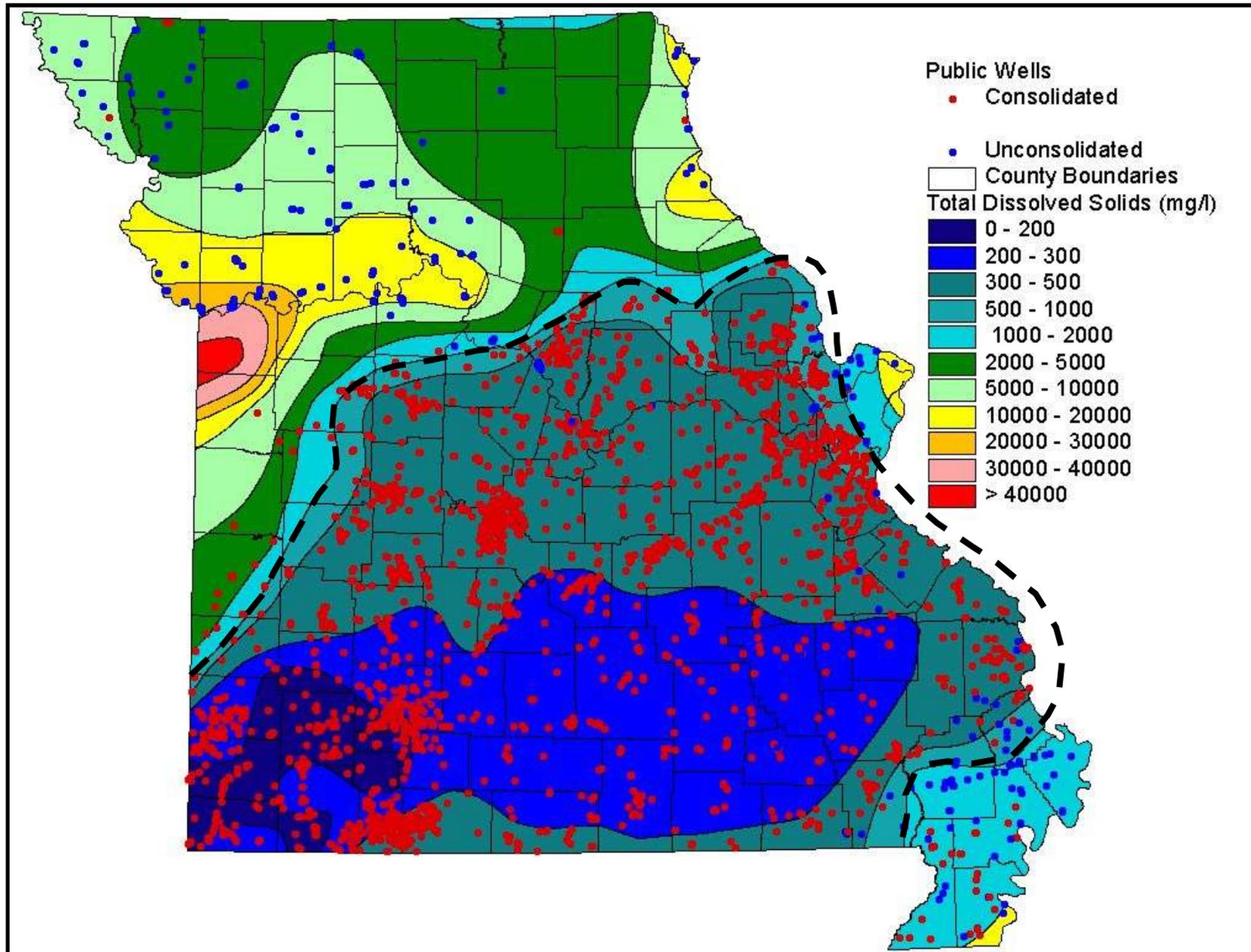
- Approx. 60% increase from 2010 to 2060 for Ottawa, Craig and Delaware counties, OK

# Water Demand Forecast

## Southwest Missouri Total Average Annual Estimated Water Use – Medium Growth Scenario

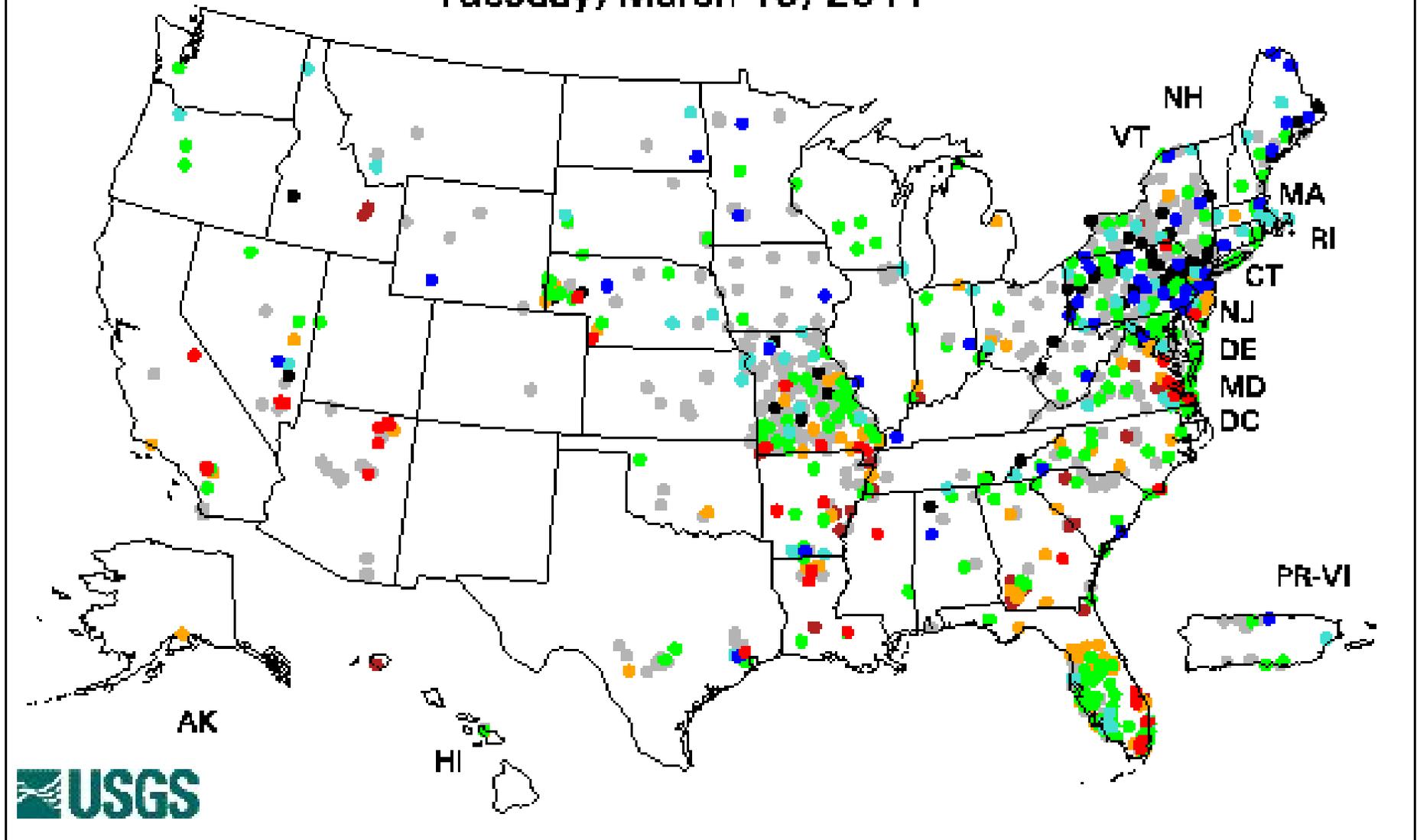


# Public Water Supply Wells

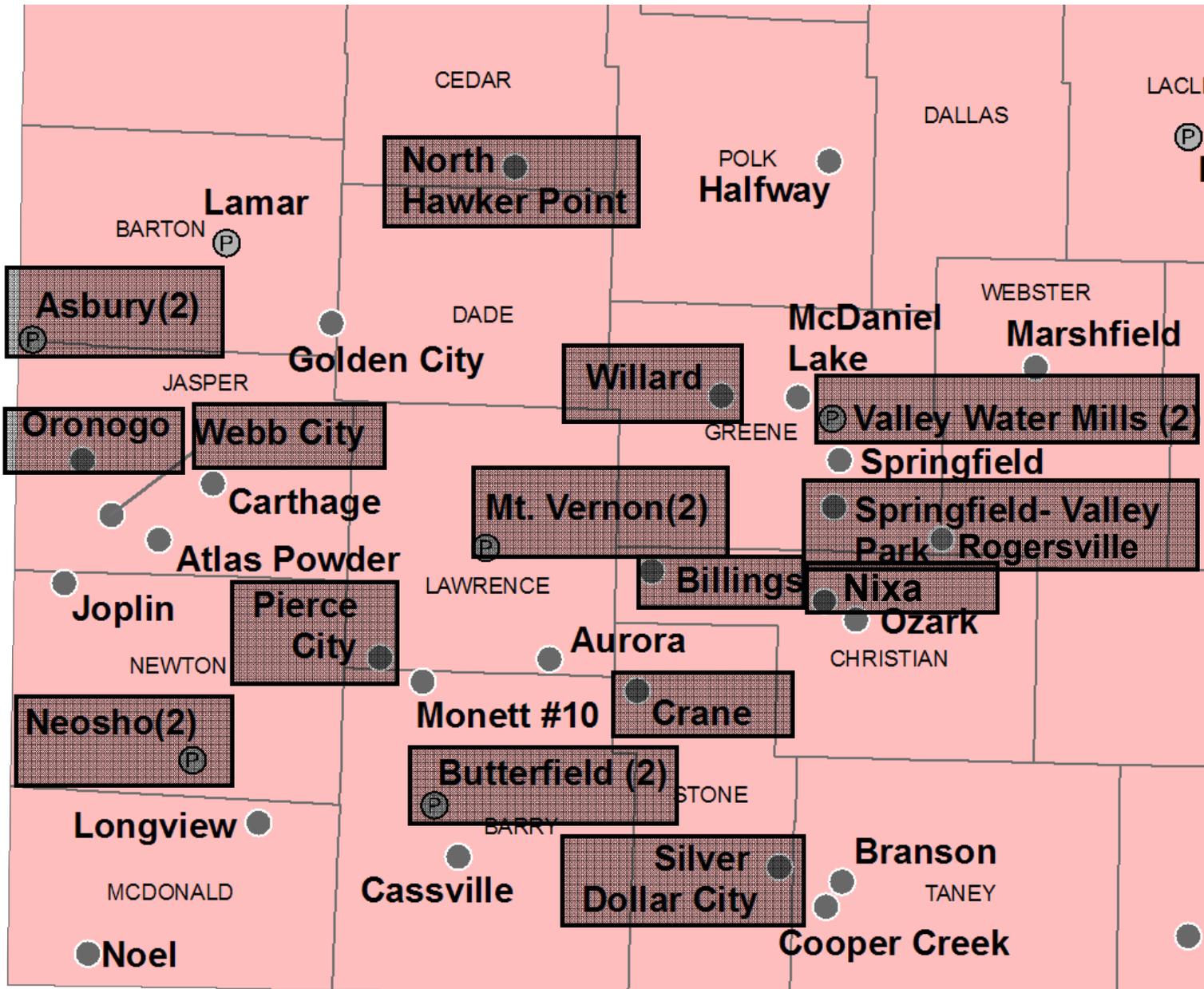


# Real-time Groundwater Monitoring

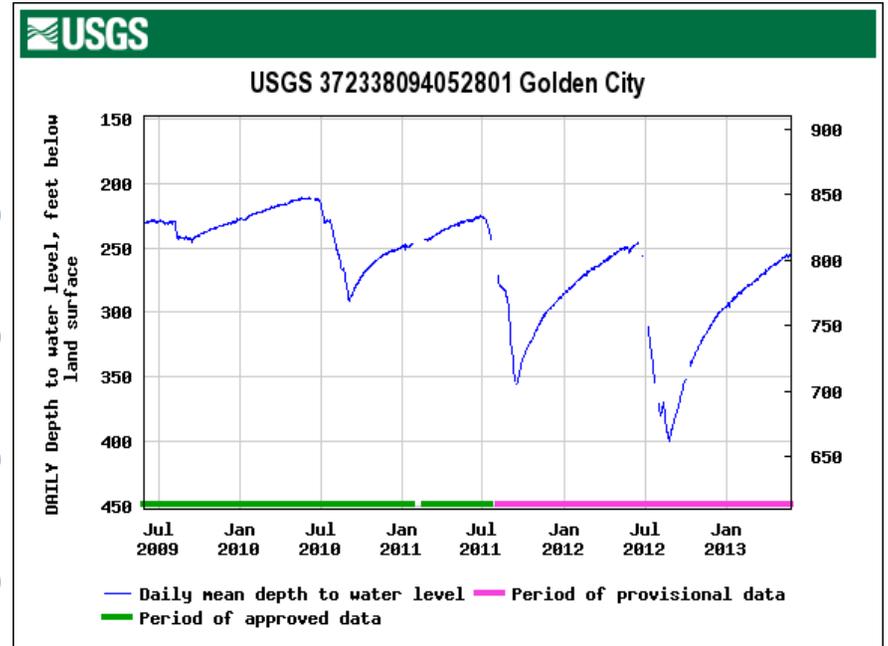
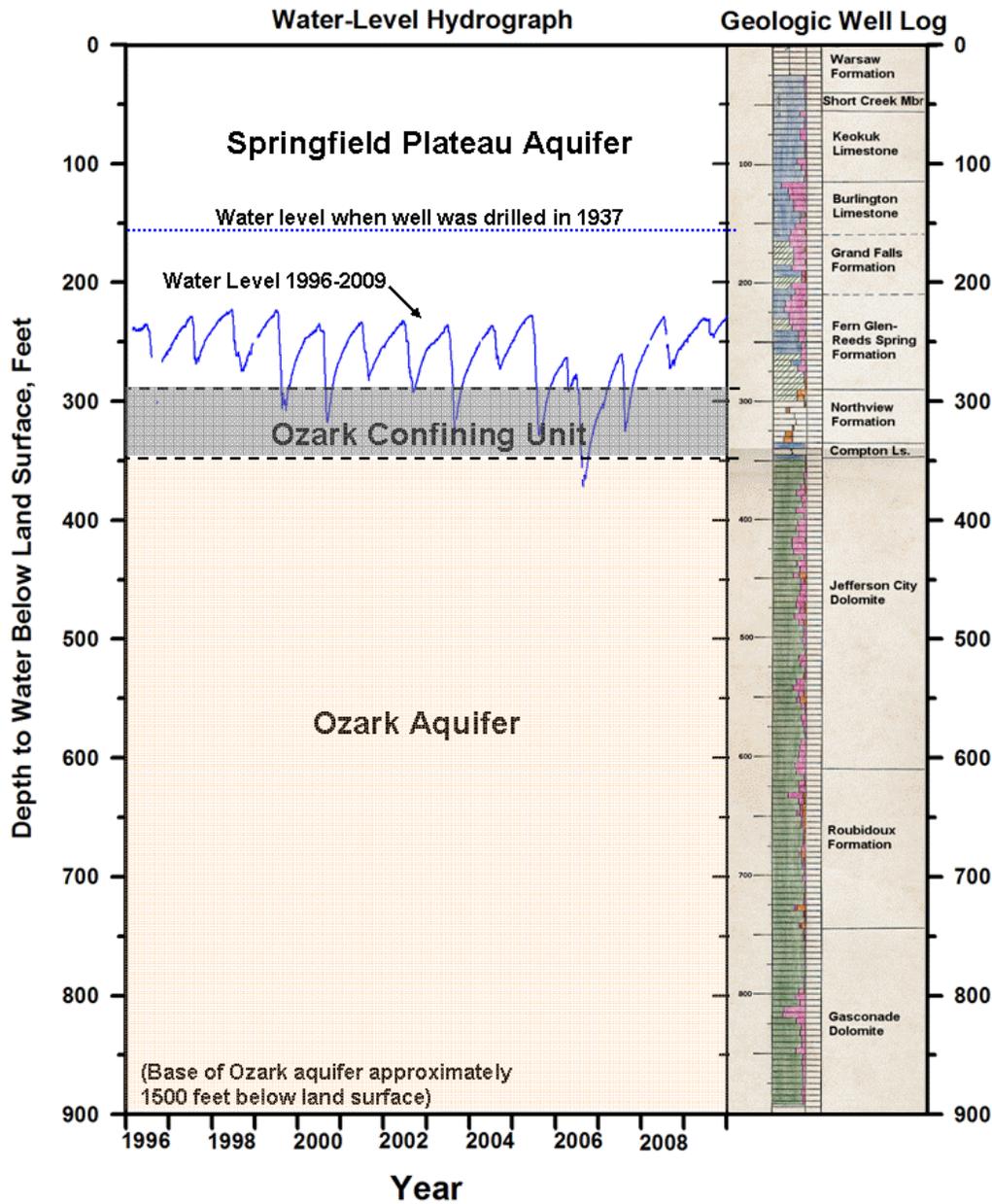
Tuesday, March 15, 2011



# Southwest Missouri Groundwater-Level Observation Wells



# Golden City Observation Well, Barton County





# Recent Tri-State Water Planning Efforts

- Ozark Plateau Aquifer Models
- 2006 Study identified 6 alternatives – existing/new reservoirs
- 2009 Screening study for potential new reservoir locations
- Irrigation water use demonstration project
- Regional water demand forecast and gap analysis

