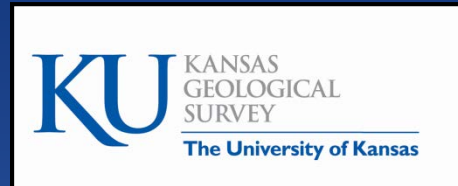


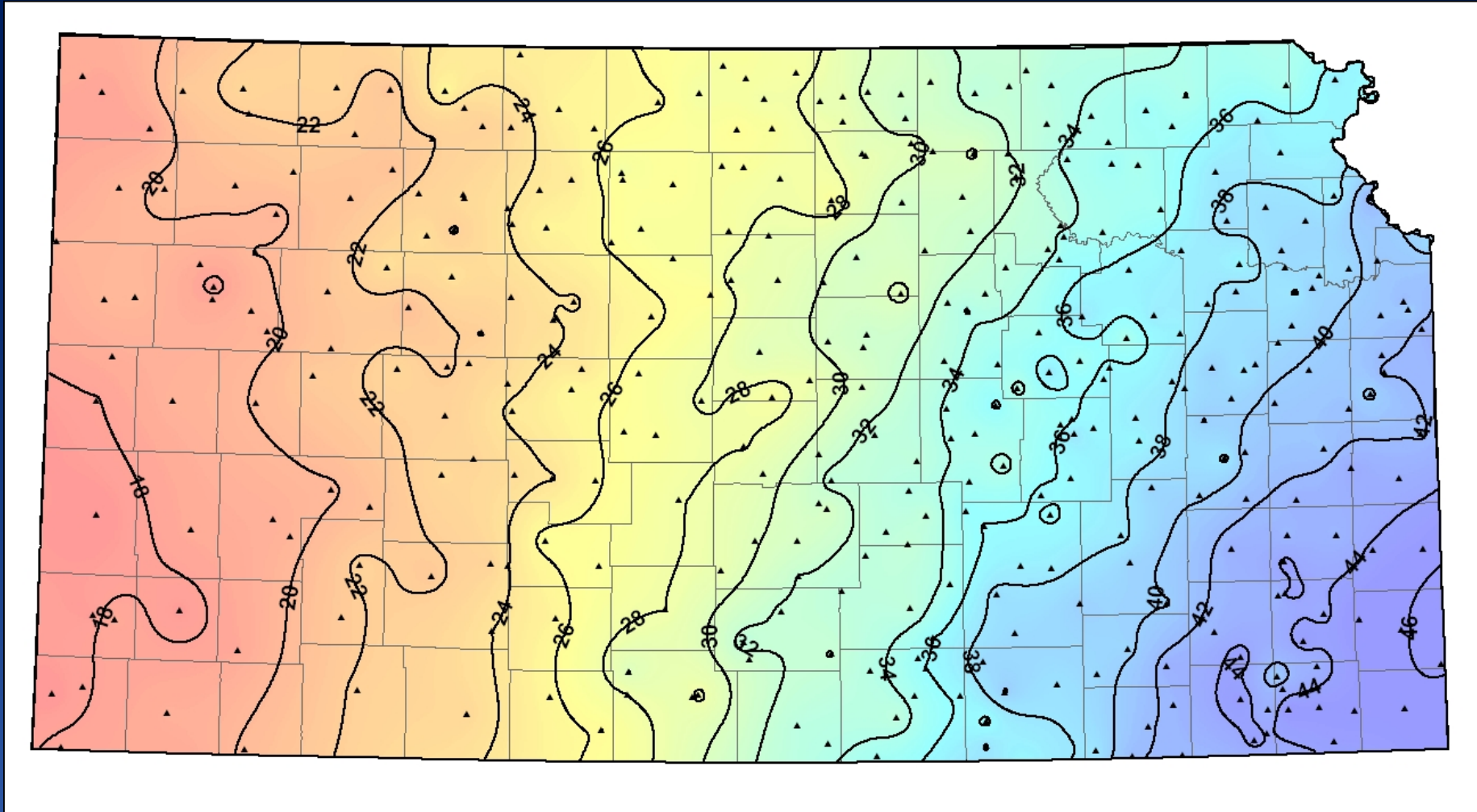
Conditions and Trends in the Kansas High Plains Aquifer

Upper Smoky Hill RAC Meeting
May 5, 2020



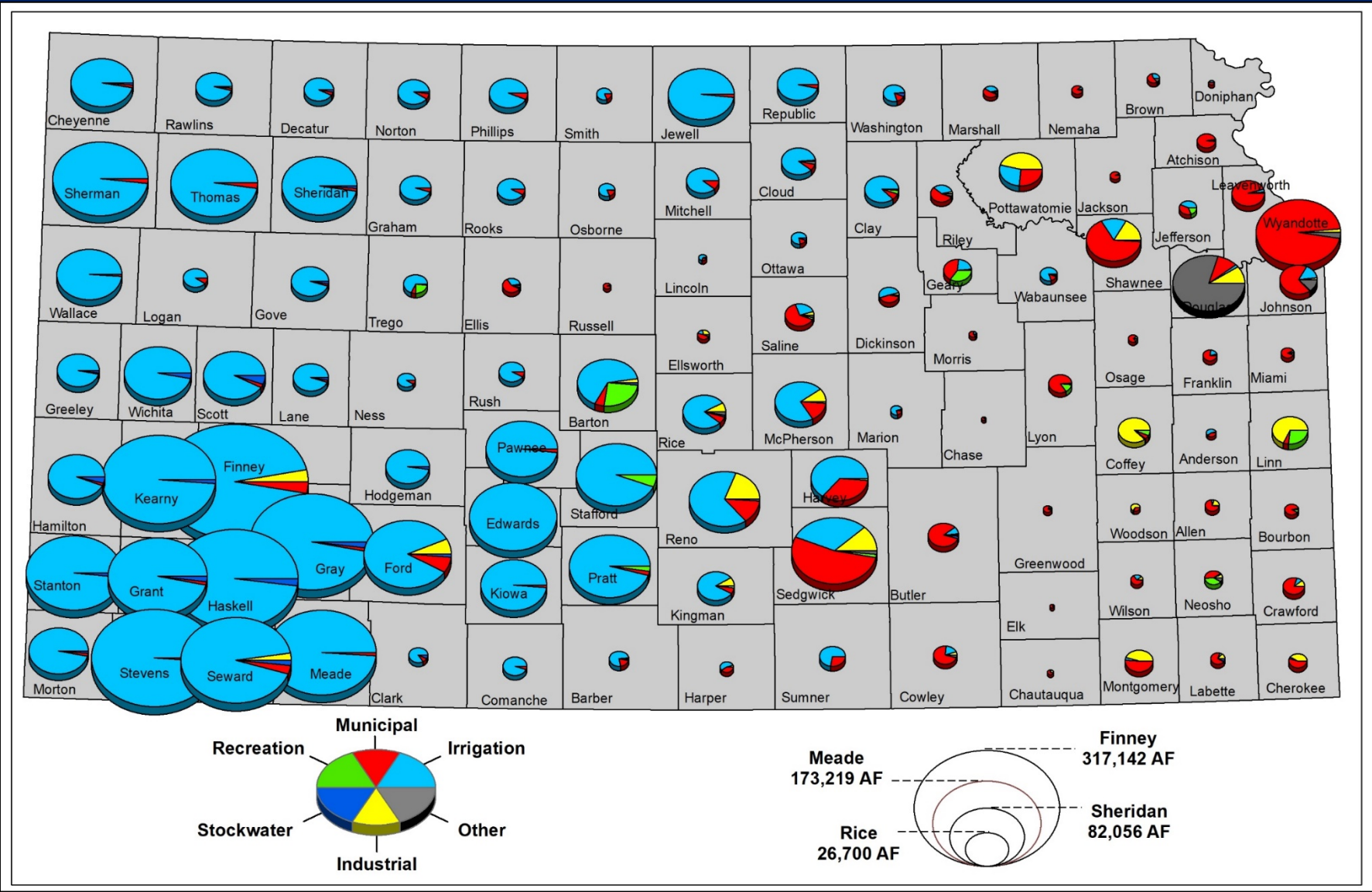
Kansas Geological Survey
University of Kansas

1981-2010 Normal Precipitation

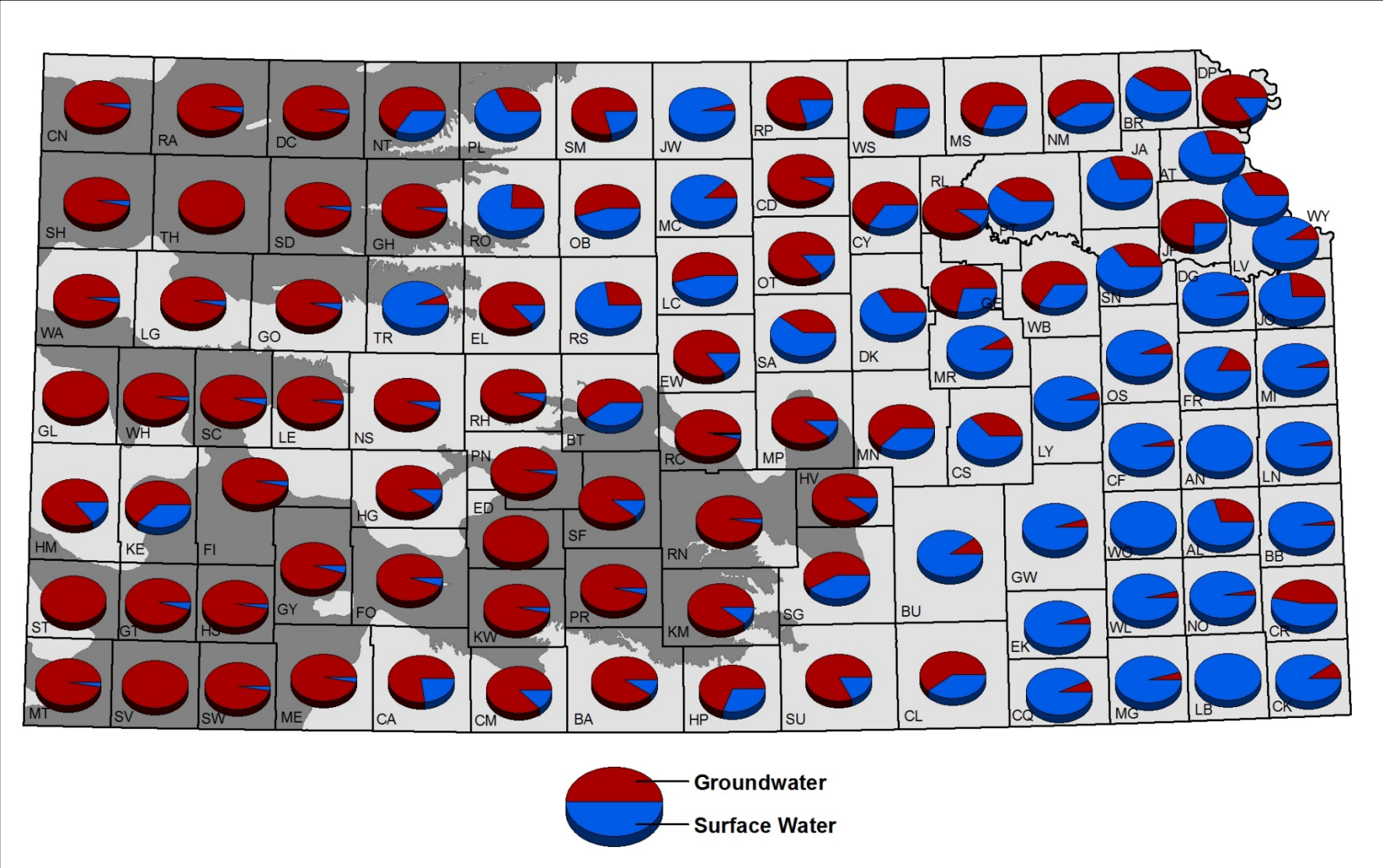


Source- National Oceanic and Atmospheric Administration (NOAA)

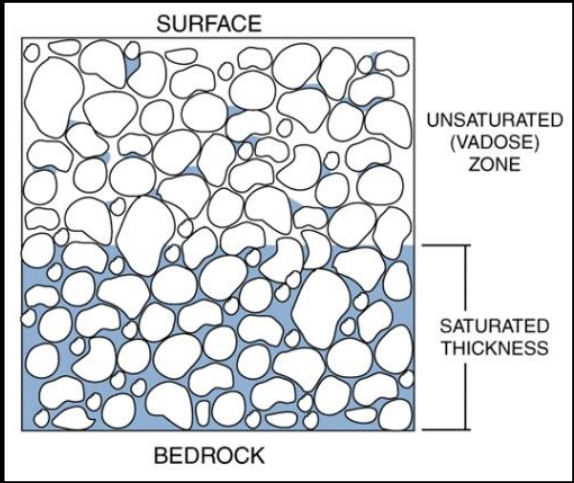
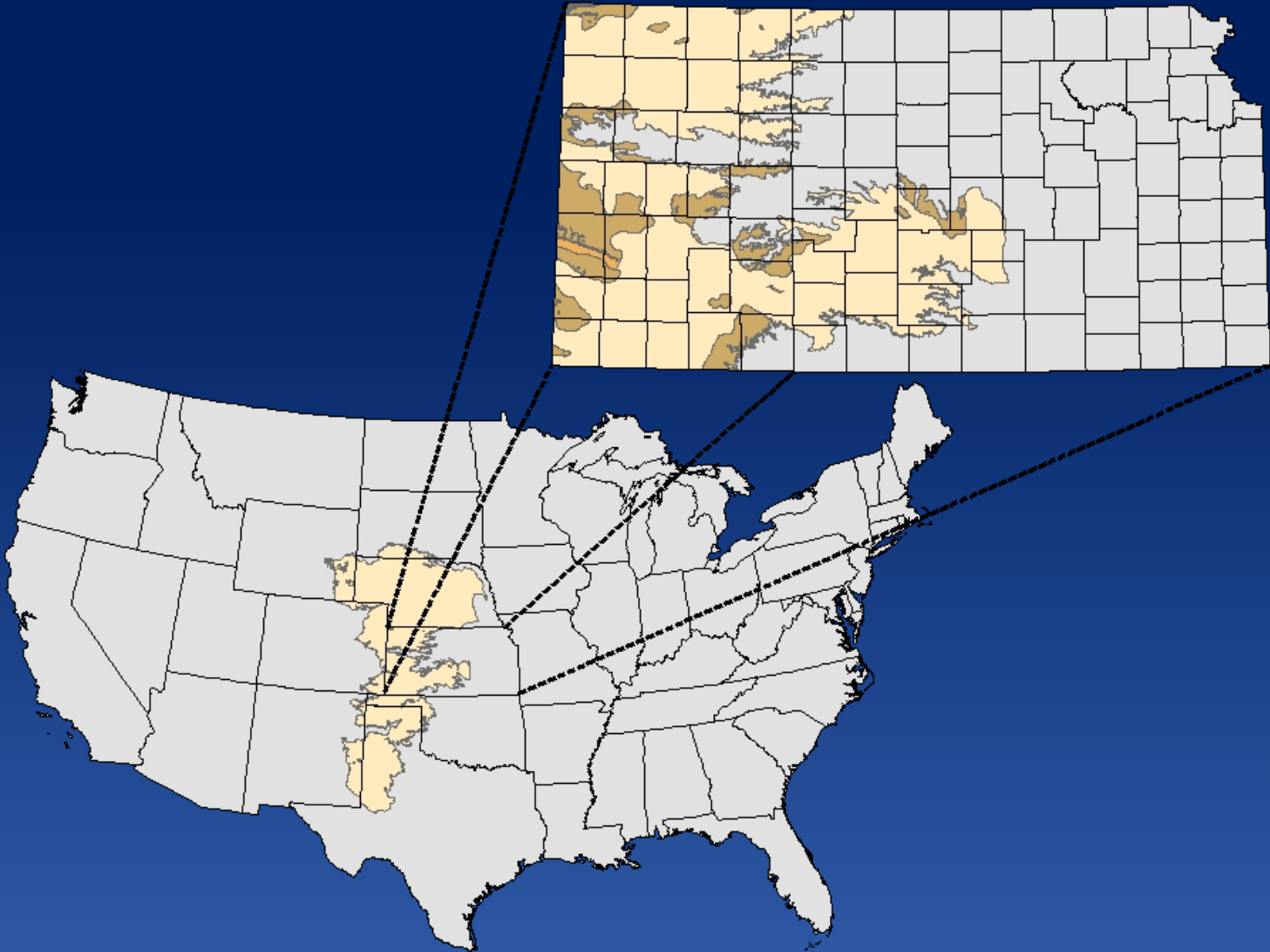
Average Reported Use Made of Water



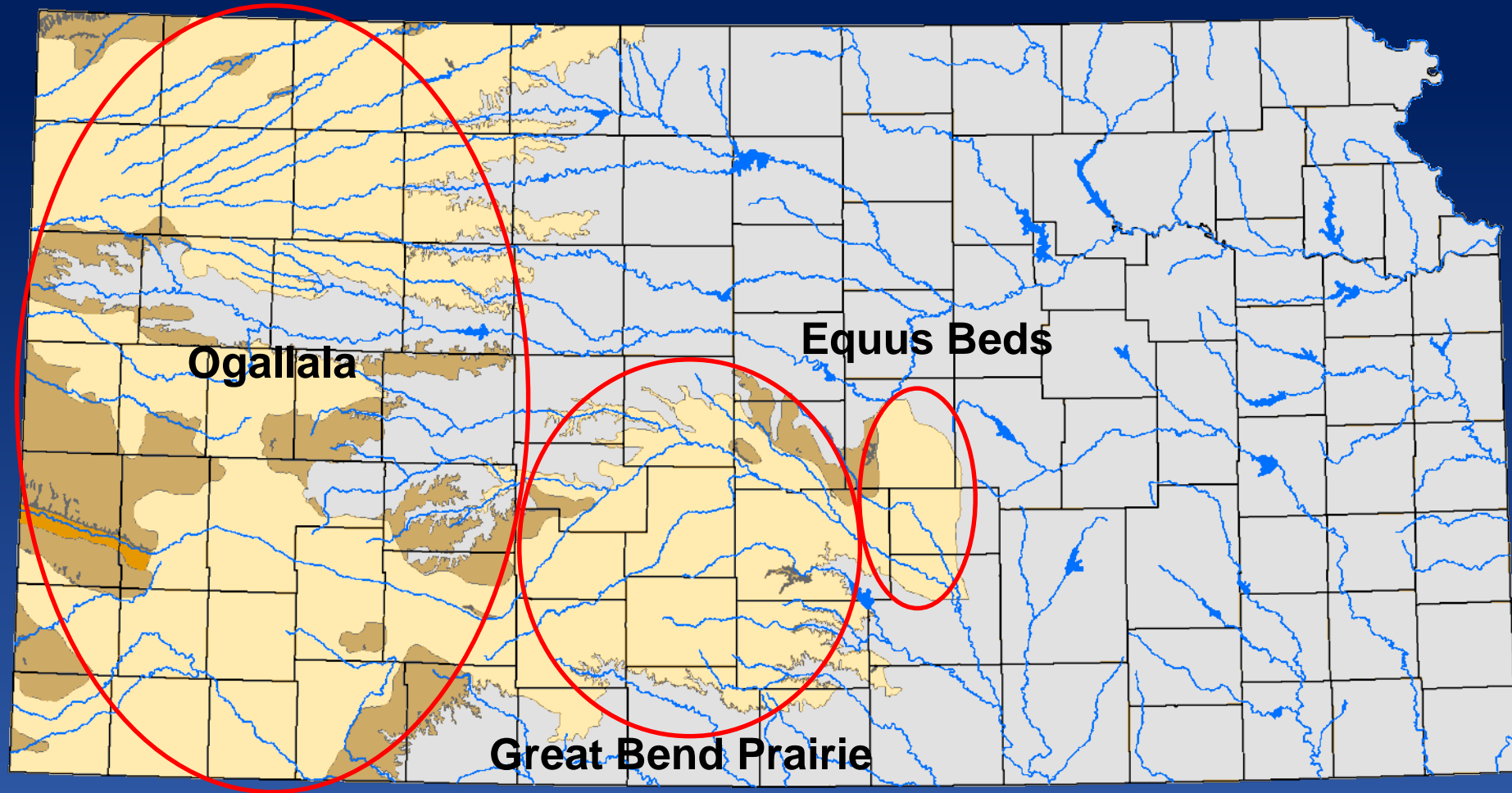
Source of Water Supply



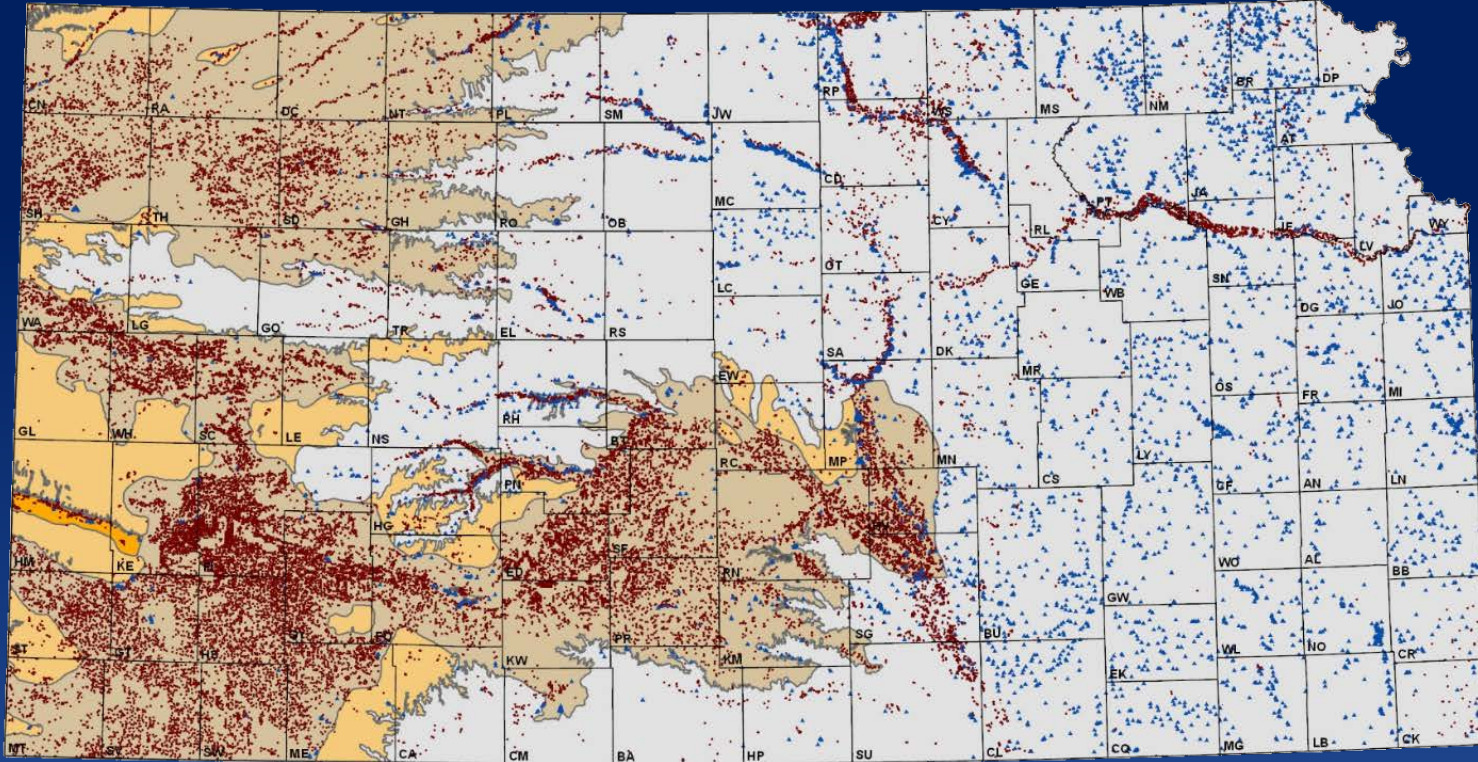
The High Plains Aquifer



The High Plains Aquifer in Kansas



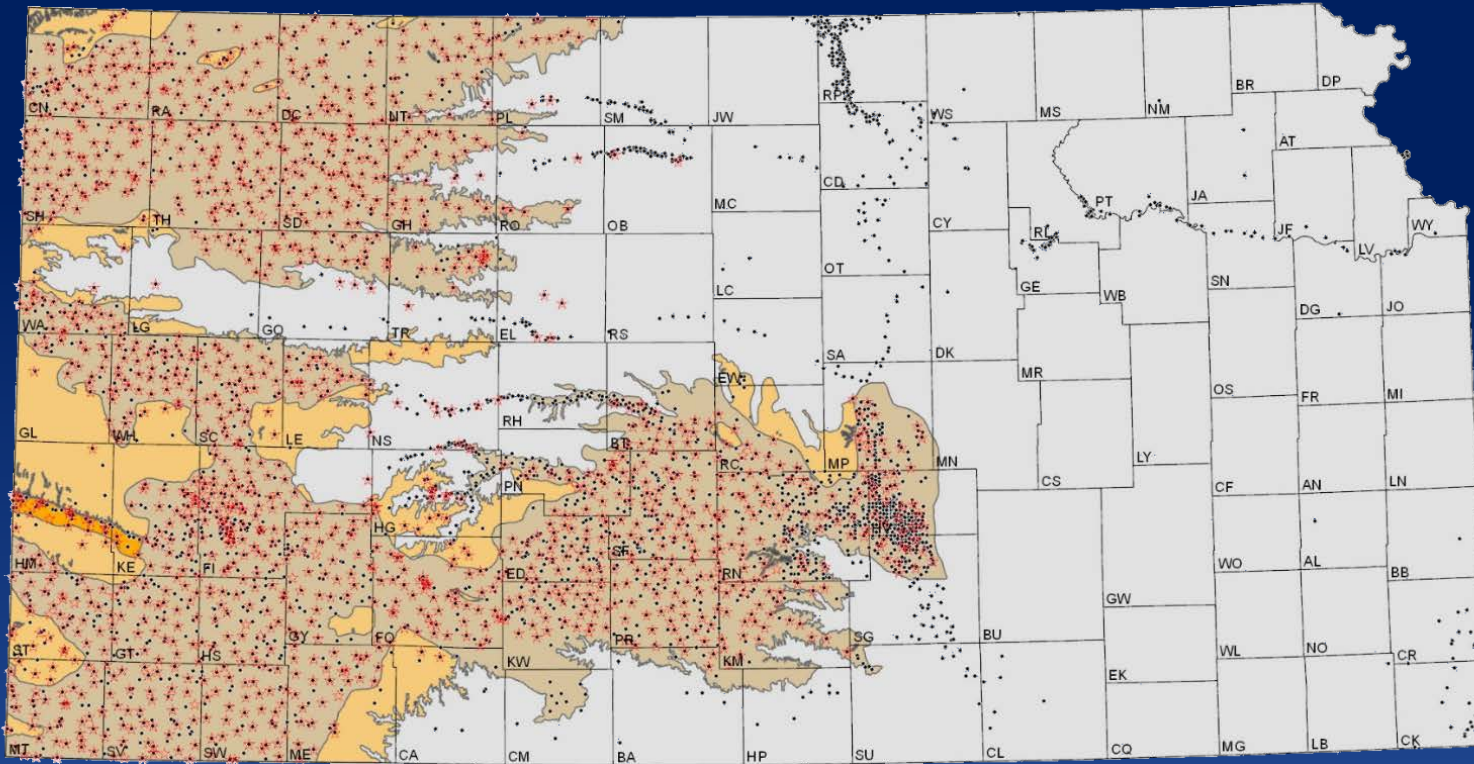
Water Right Development in Kansas



- Water Information Management and Analysis System (WIMAS)
- Kansas Department of Agriculture, Division of Water Resources
- Water Rights
 - Authorized Annual Permits/Certificates
 - Historic Reported Water Usage



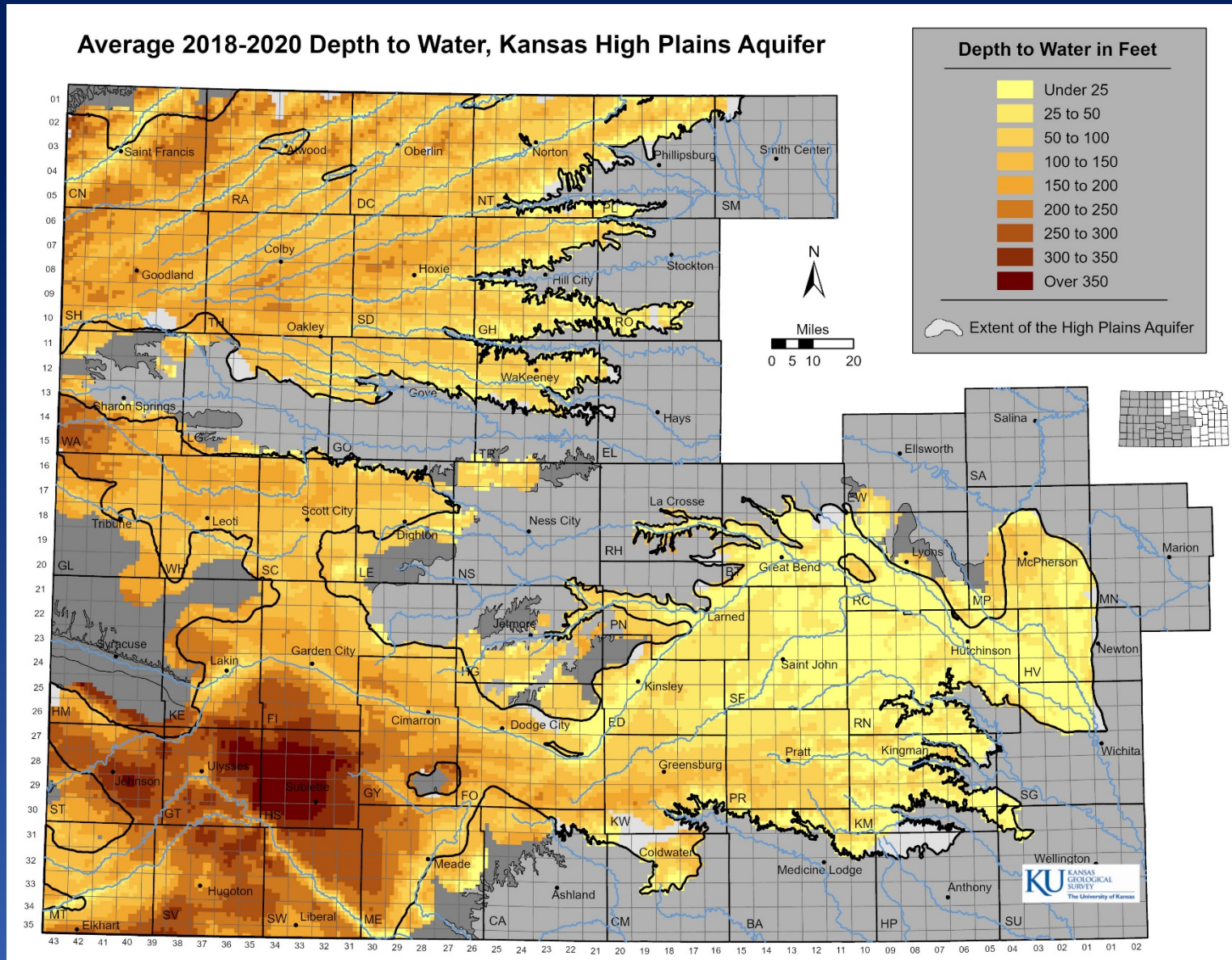
Measuring Wells in Kansas



- Water Information Storage and Retrieval database (WIZARD)
- Kansas Geological Survey
- Wells measured by GMDs 2 and 5, KDA-DWR, USGS, and the KGS
- Cooperative Water Level Network
 - Focused on High Plains aquifer
 - Annual measurements by the KGS and KDA-DWR
 - Regional aquifer characterizations



Depth to Water, Kansas High Plains Aquifer

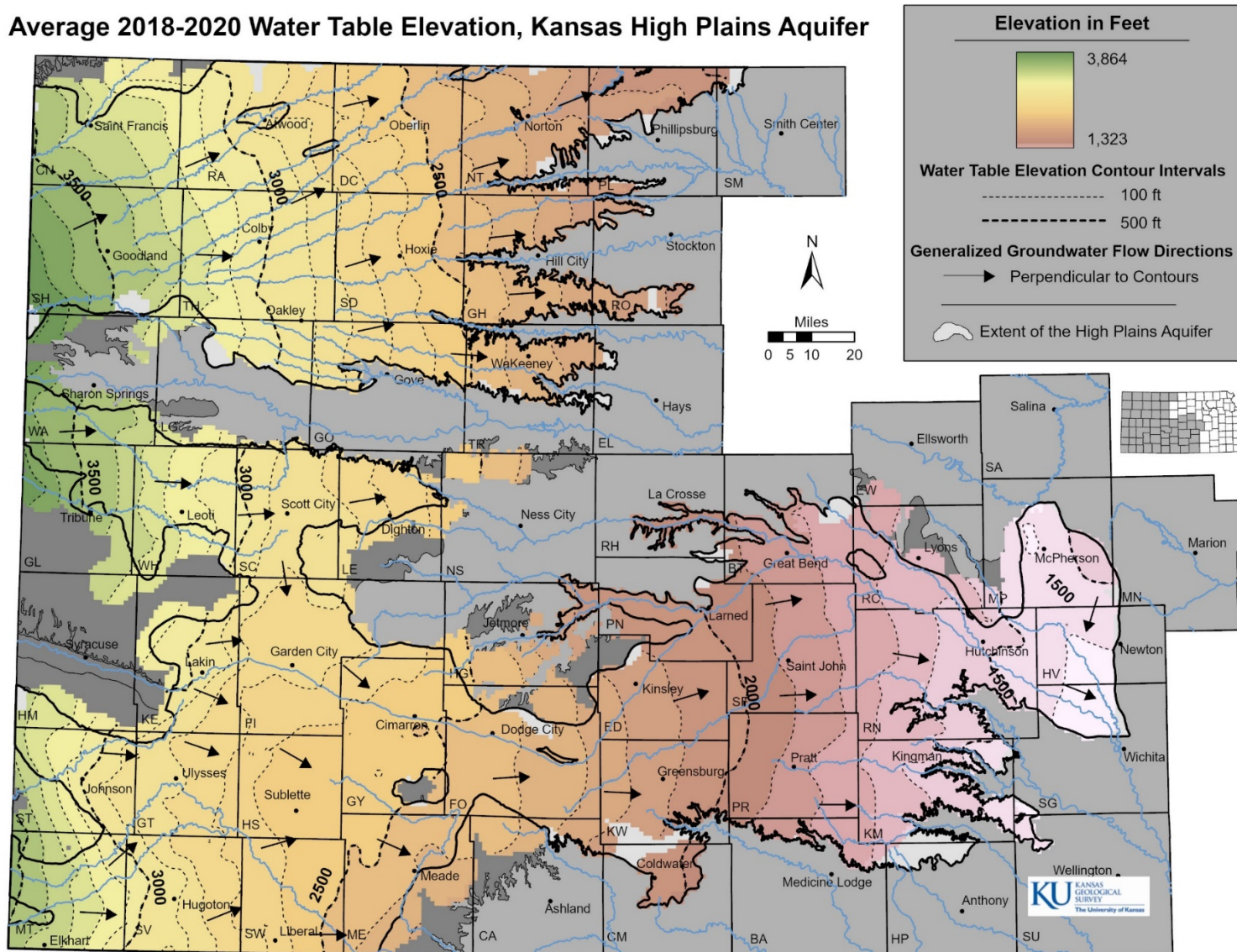


Depth to water ranges:

- At or near the land surface
- Over 400 ft (Haskell County)
- GMD1
 - Averages 141 ft
 - Ranges from 50 to 270+ ft

Water Table Elevation, Kansas High Plains Aquifer

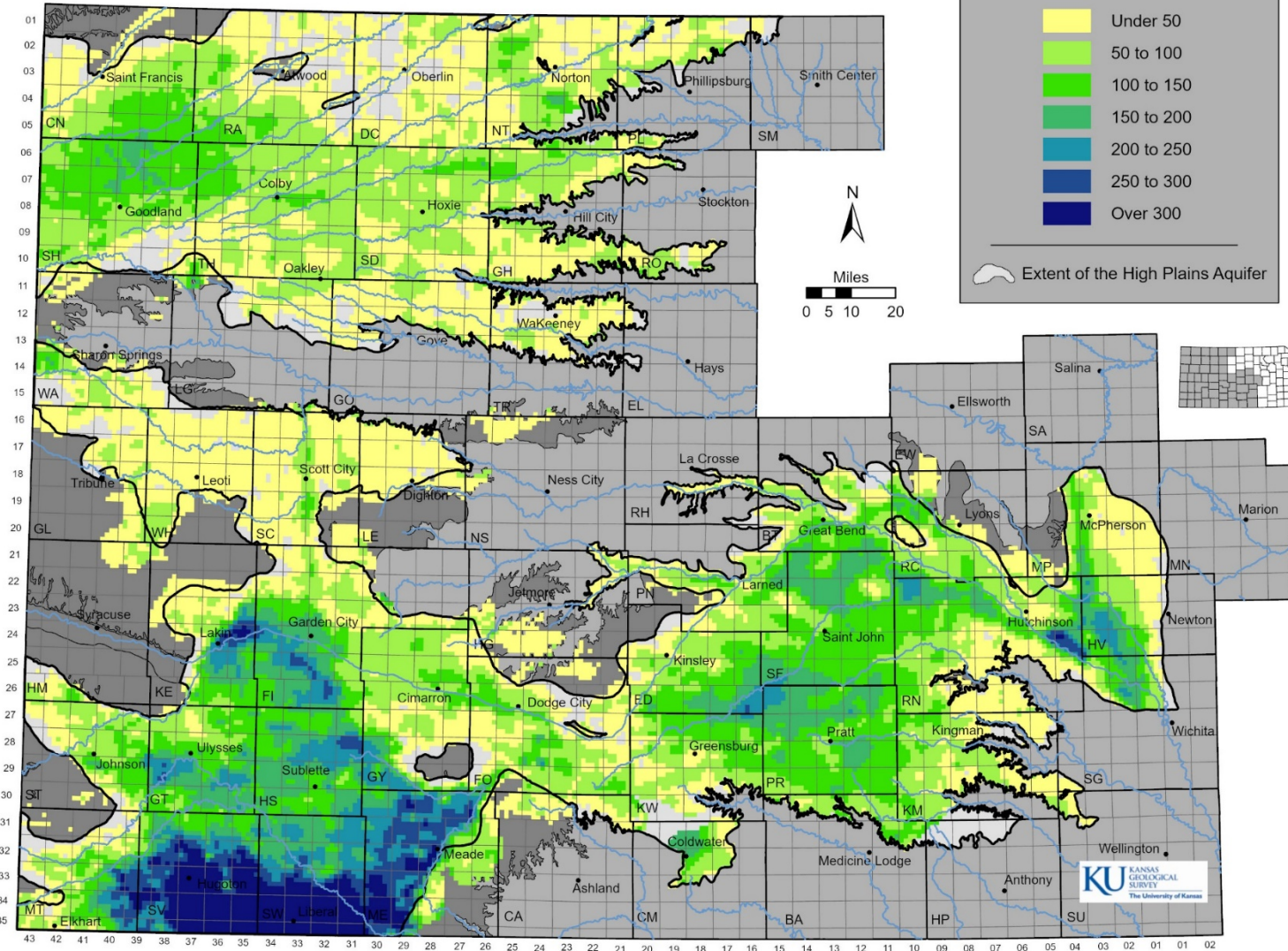
Average 2018-2020 Water Table Elevation, Kansas High Plains Aquifer



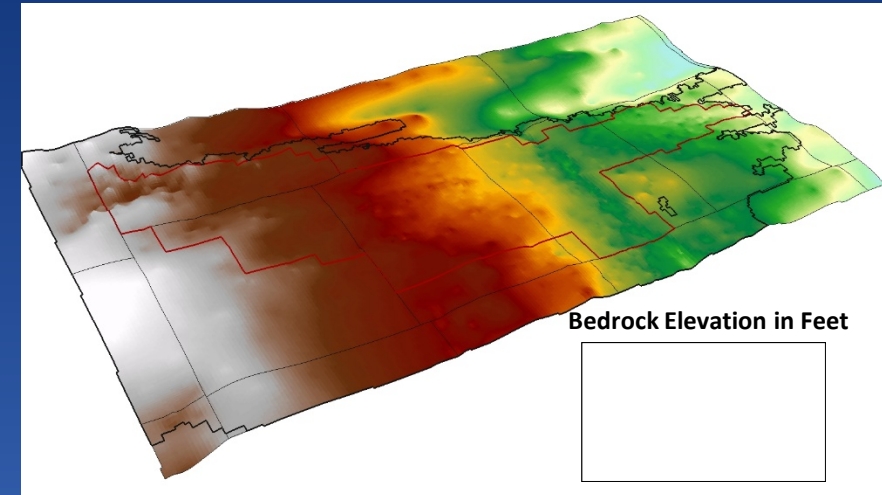
- Follows land surface
- Flow paths are generally west to east with some local variations
- Linear flow velocities
 - Range from 1 ft per 1 to 4 days
 - 10 to 20 years to go a mile

Aquifer Thickness, Kansas High Plains Aquifer

Average 2018-2020 Saturated Thickness, Kansas High Plains Aquifer

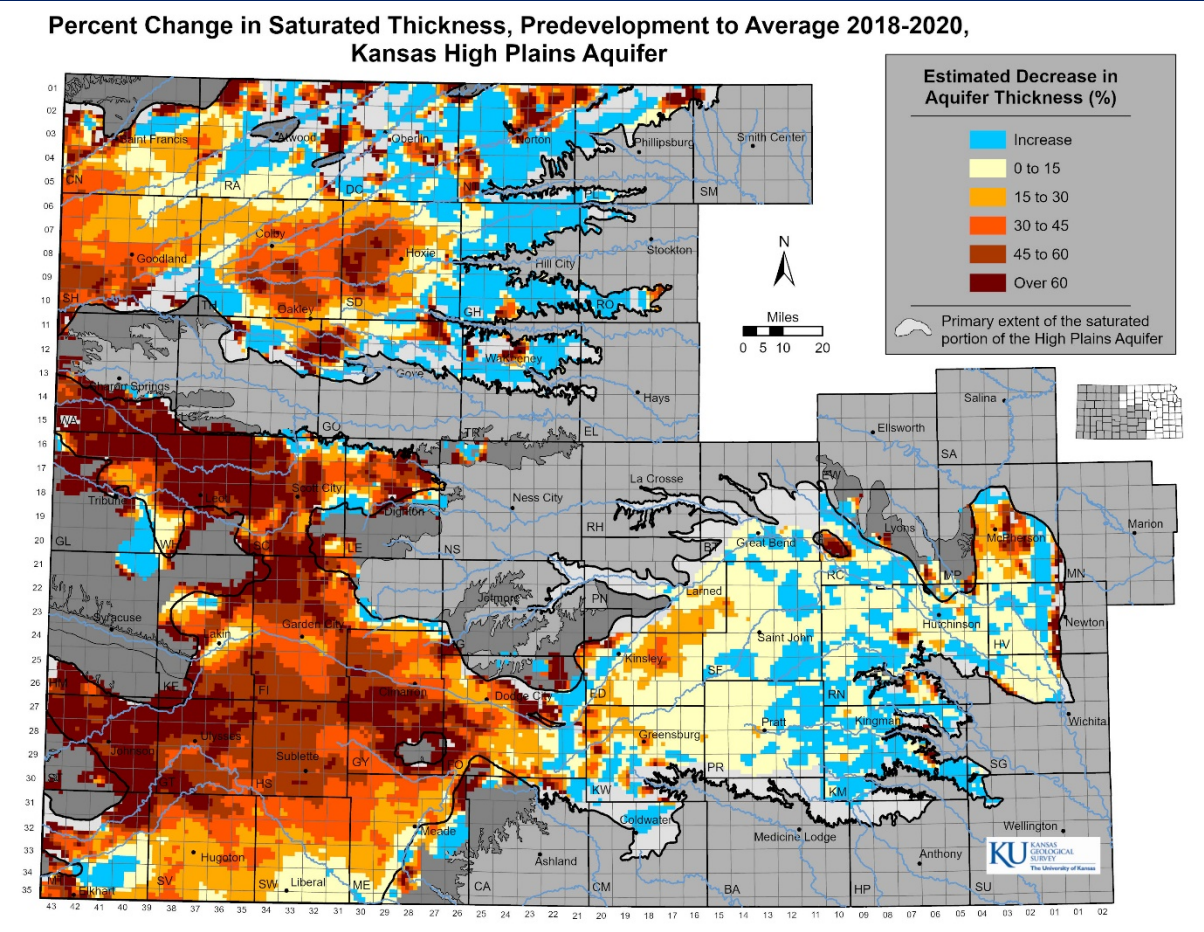


- Ranges from 0 to 500 ft (Seward County)
- GMD1
 - Averages 30 ft
 - Ranges from near 0 to 170 ft
- Variability driven by underlying bedrock surface

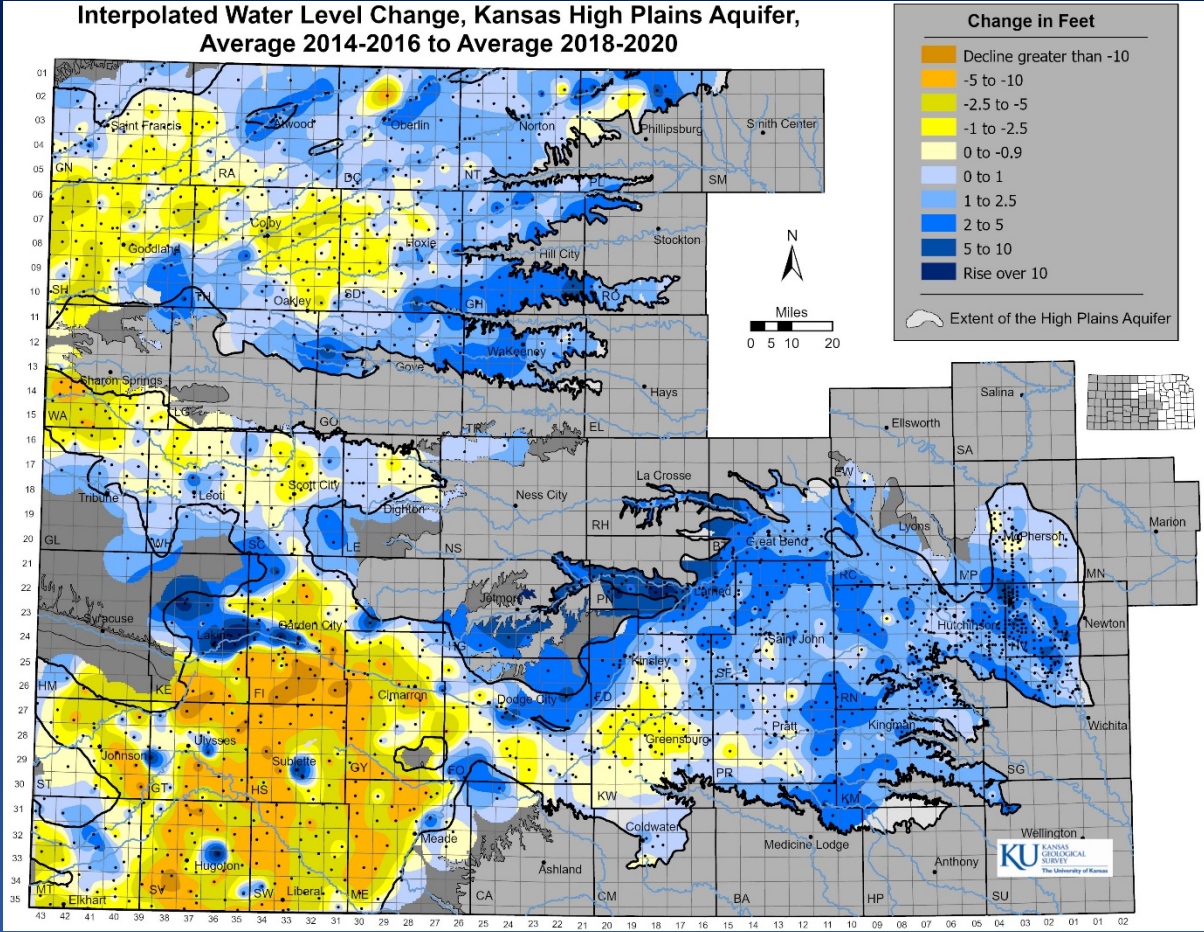


Water-Level Change

Since Predevelopment

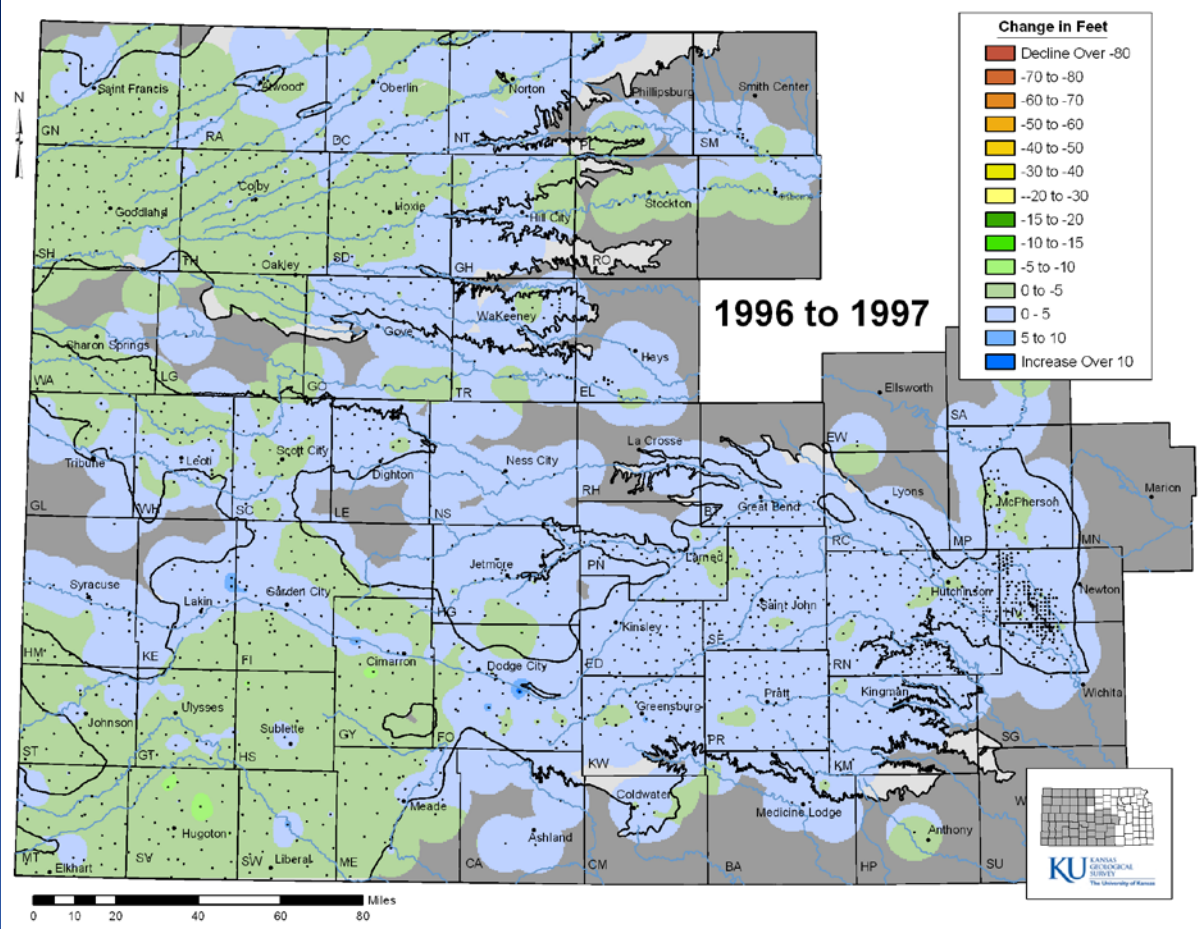


Last 5 Years

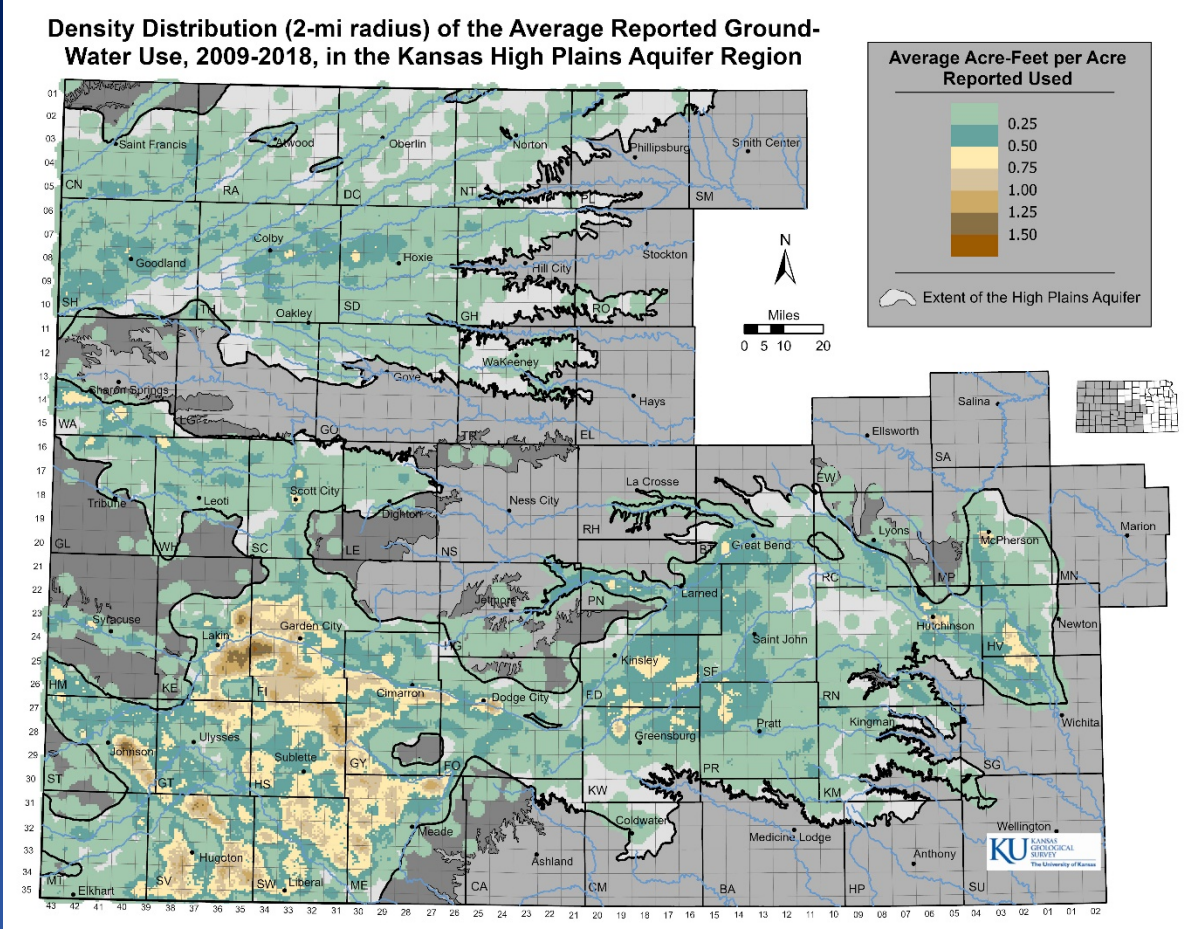


Water-Level Change vs Reported Water Use

Water Level Change

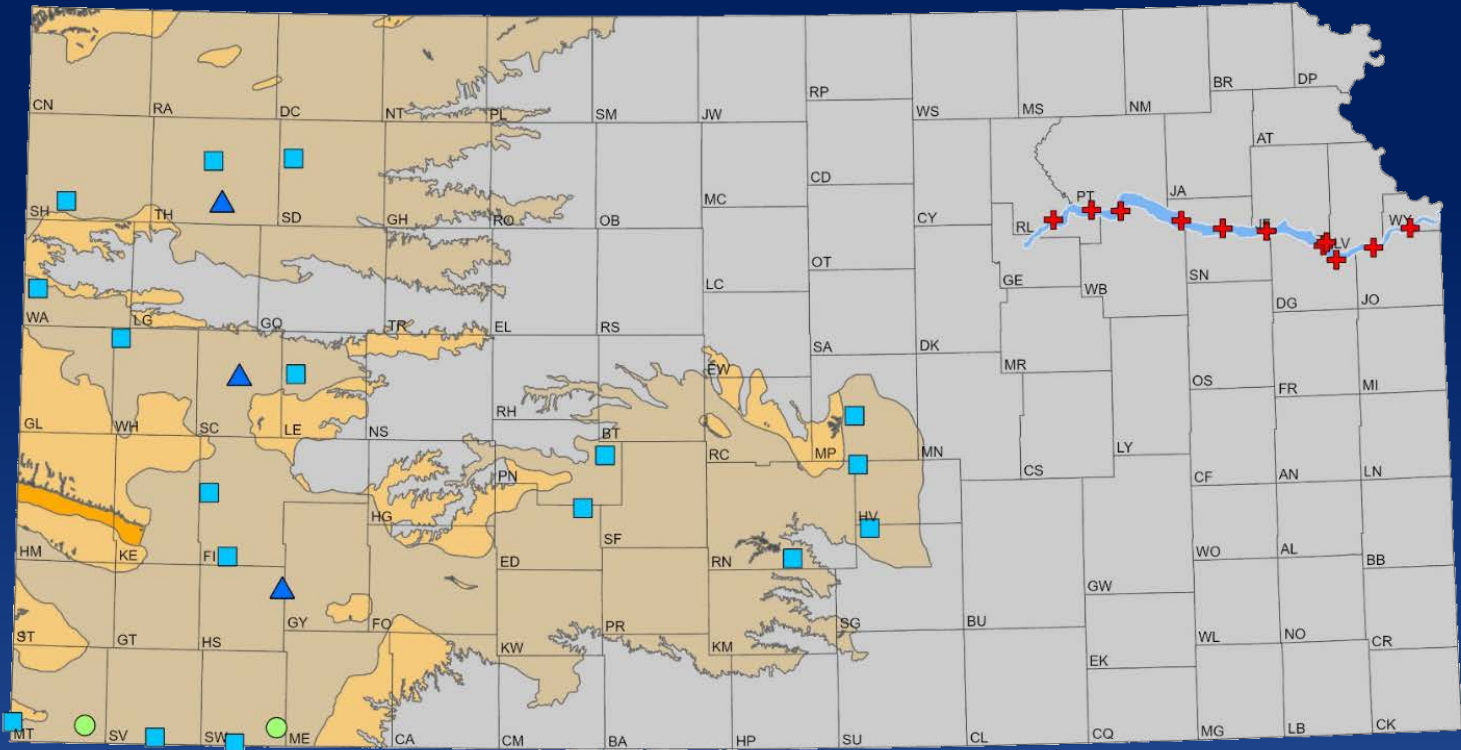


Groundwater Usage

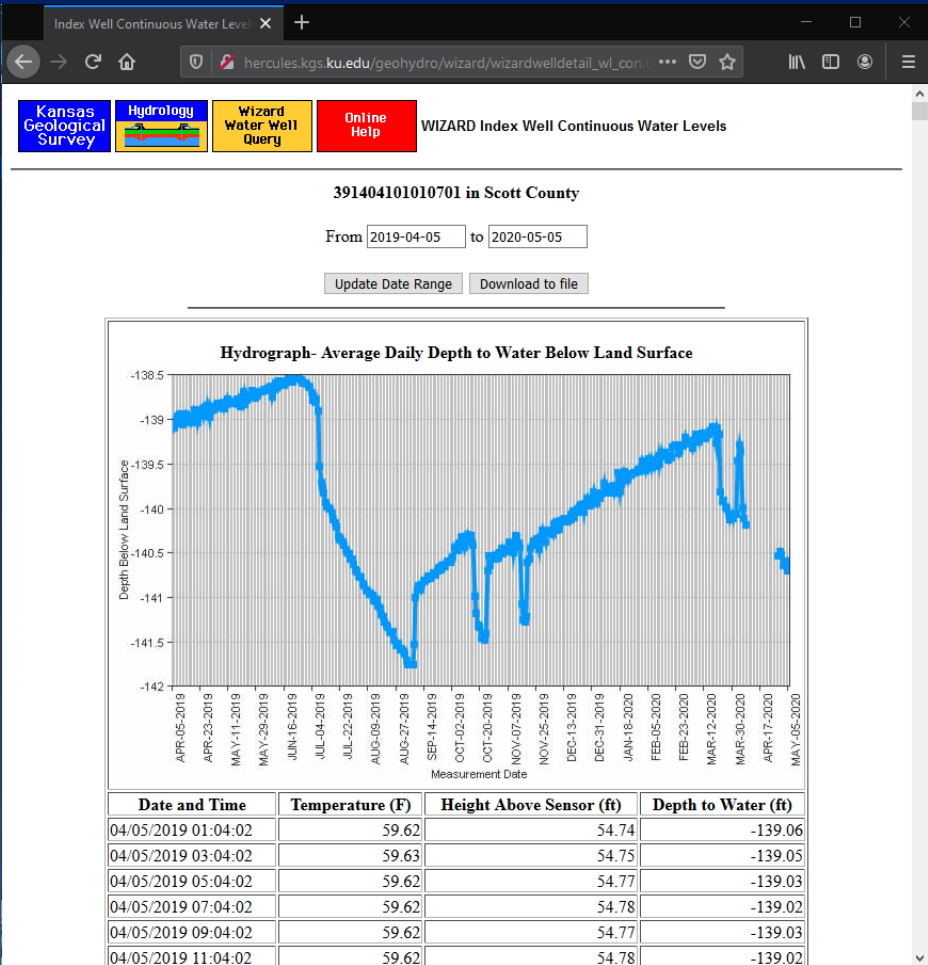


How far out of whack are we?

Kansas Index Well Program

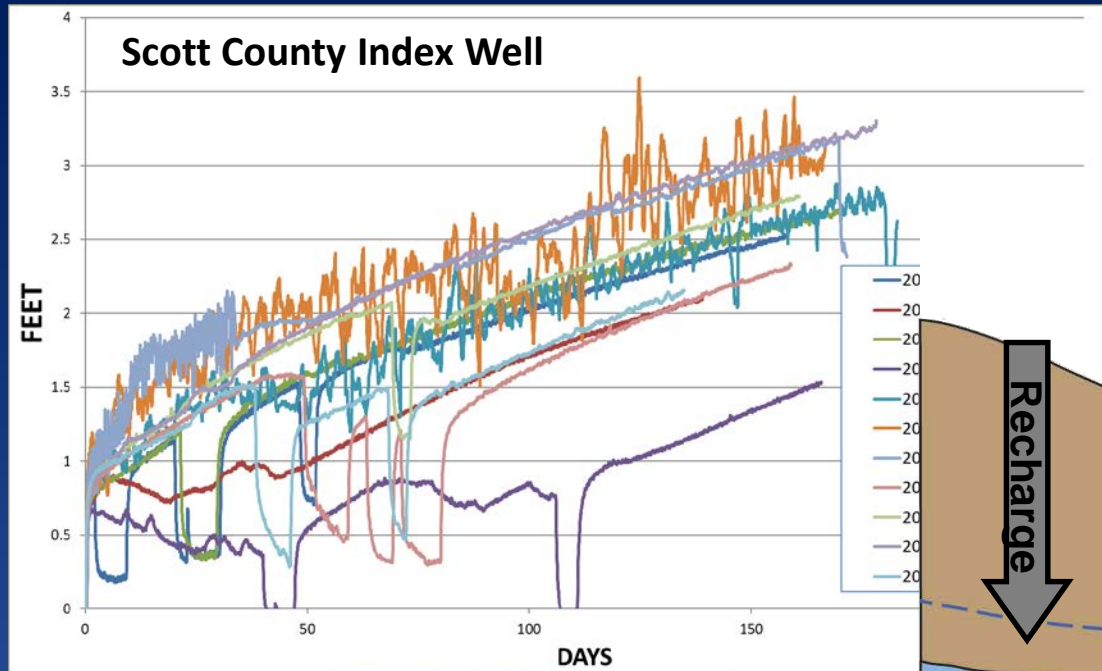


- First wells installed in 2007 through the Kansas Water Plan Fund
- Continuous, real-time water-level recordings
- Characterizations at the local scale

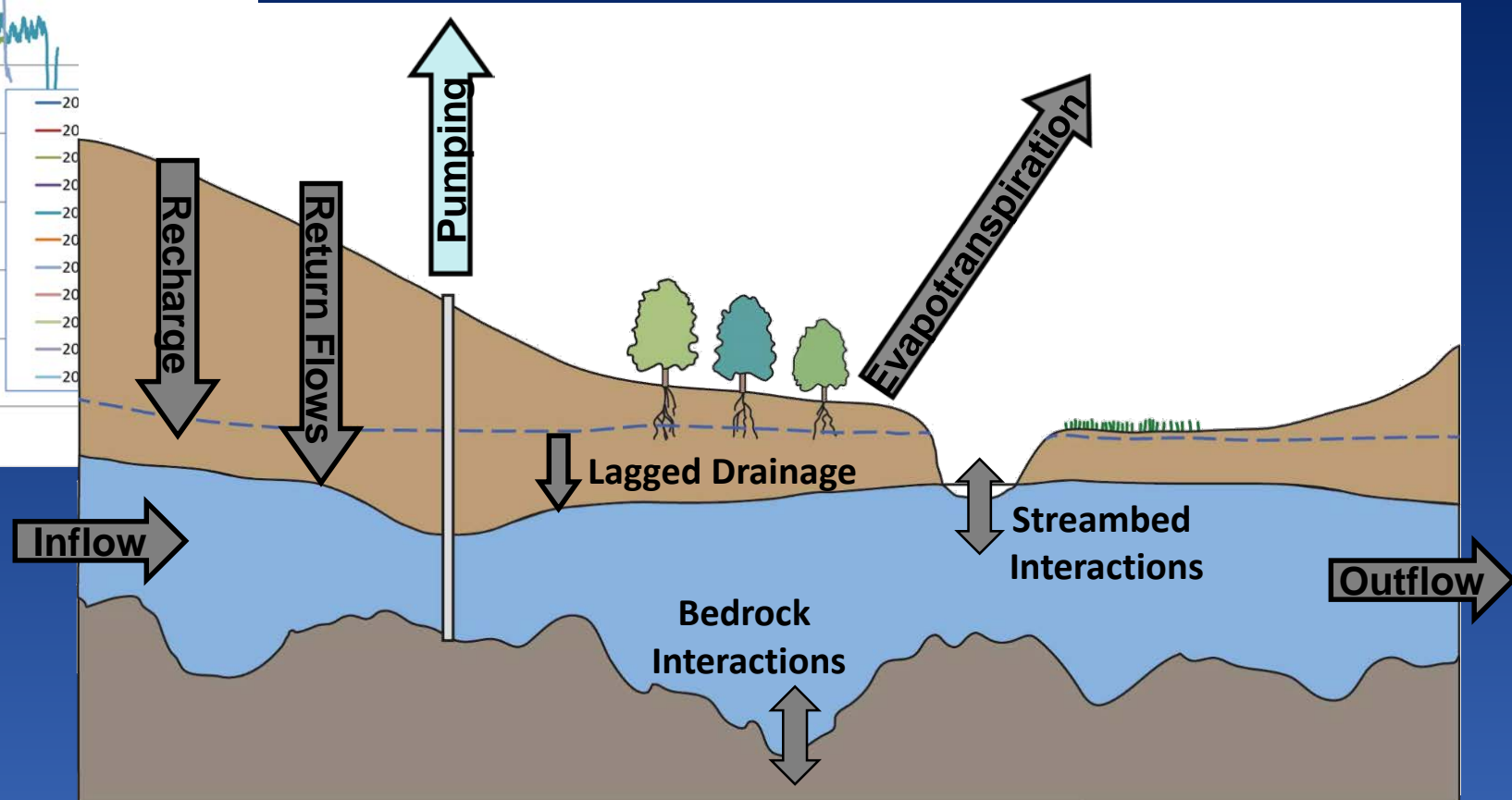


Simple Water Balance- Isolating Water Use and Water-level Change

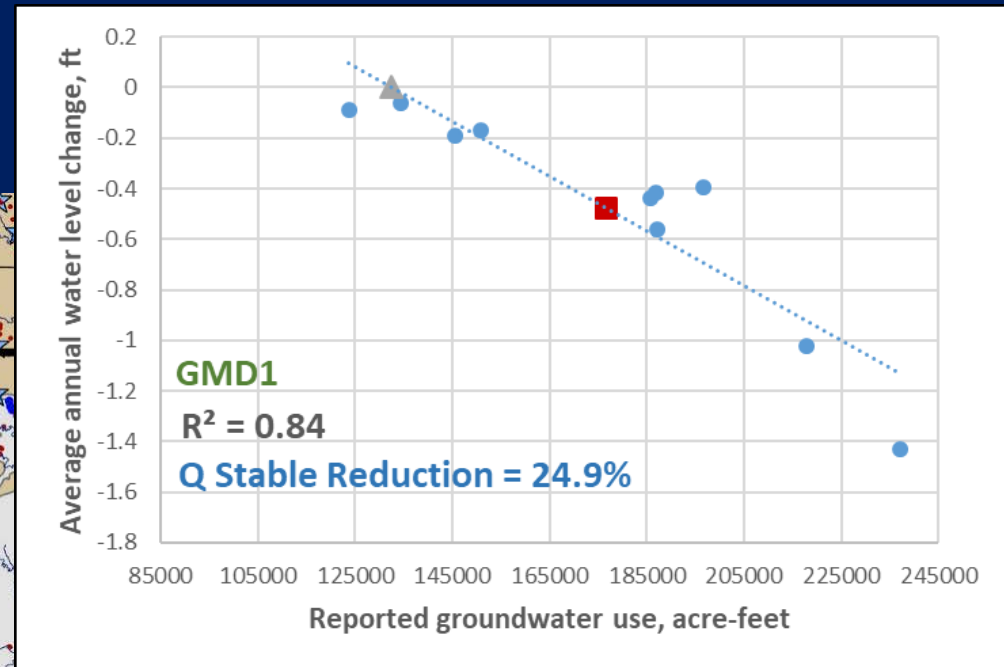
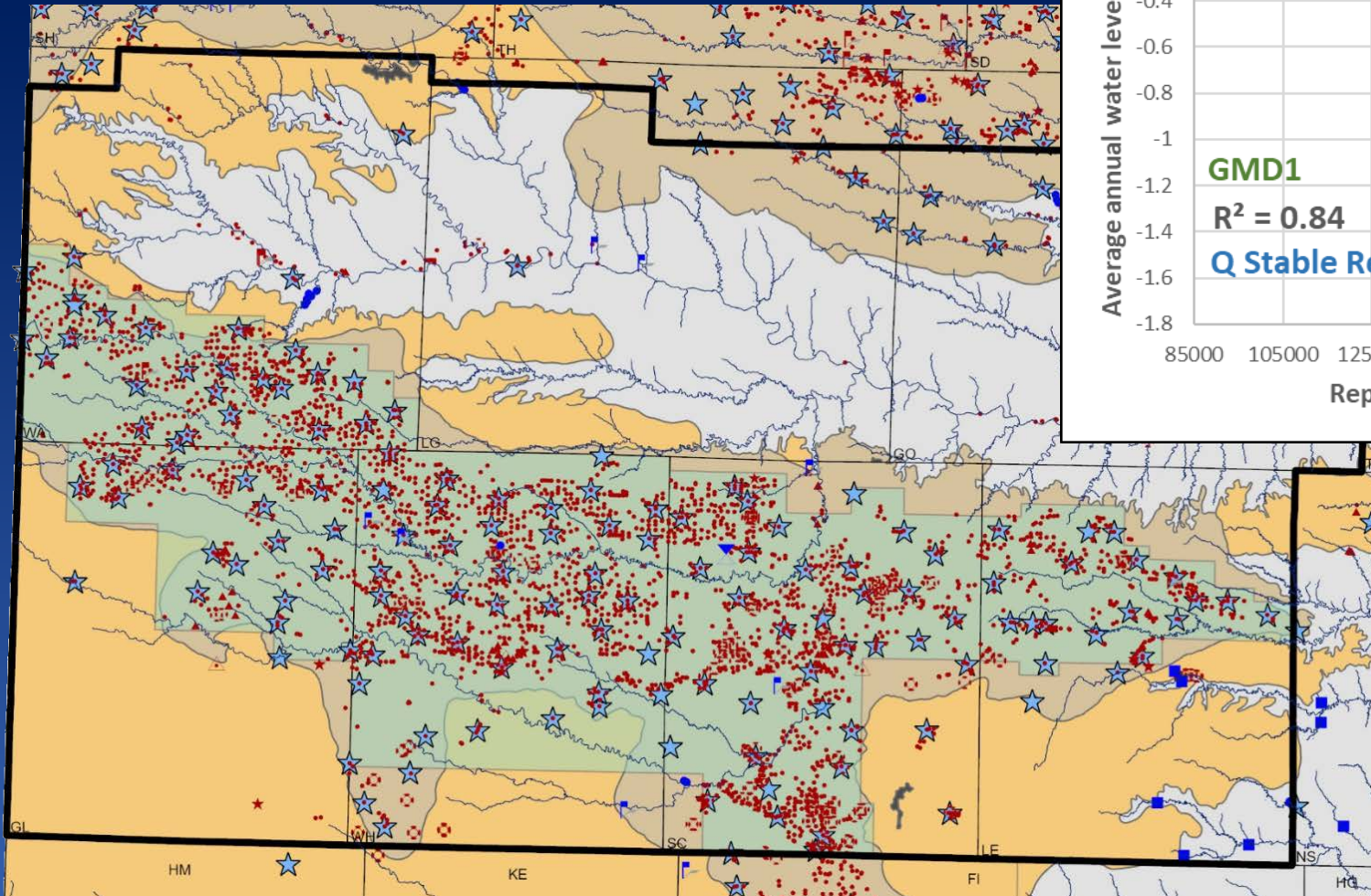
End-of-season recovery is similar regardless of past pumping or climatic conditions



Water Volume Change in Aquifer =
Net Inflow - Pumping



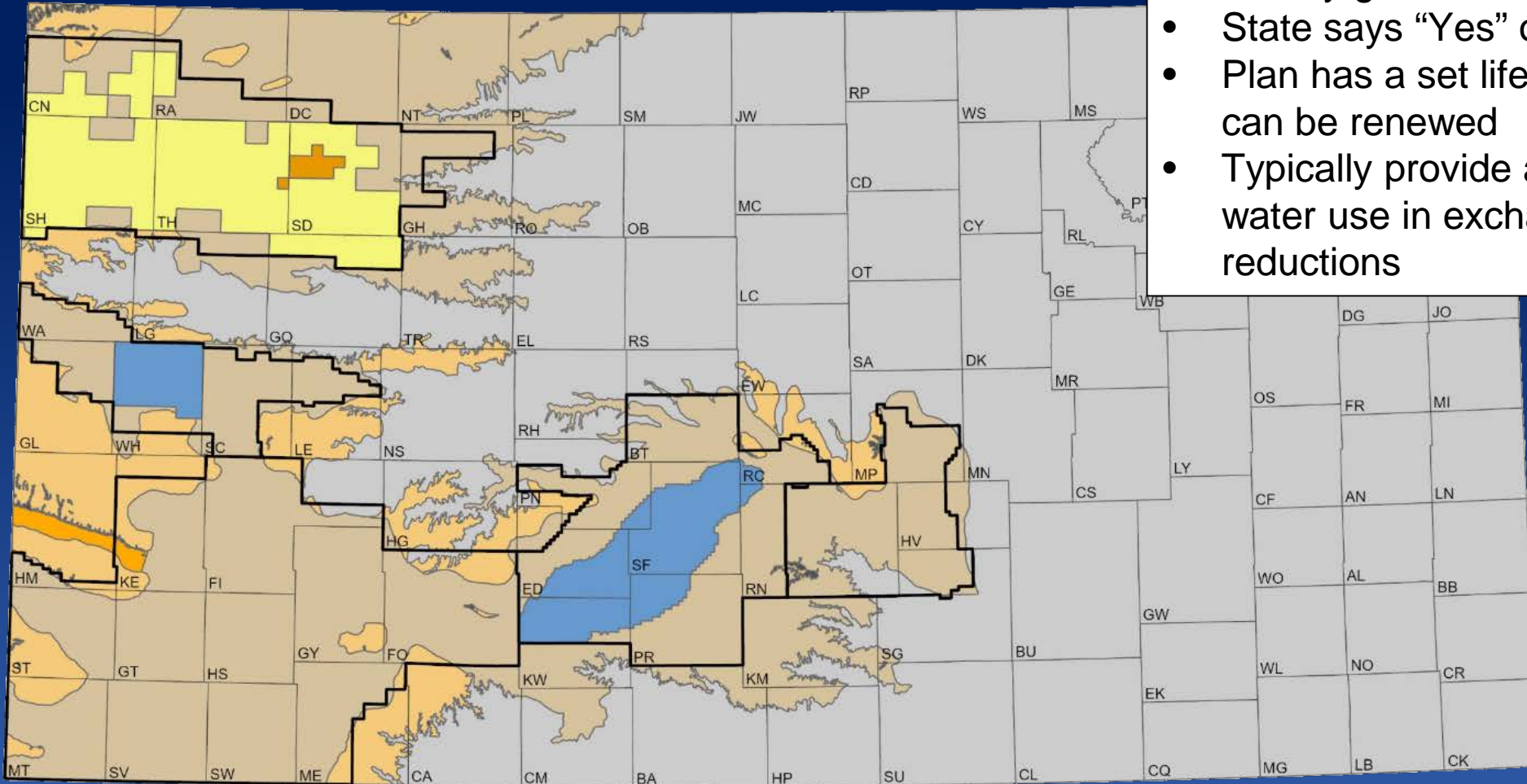
Reductions in Average 2009 to 2018 Reported Water Use Needed to Stabilize Water Levels



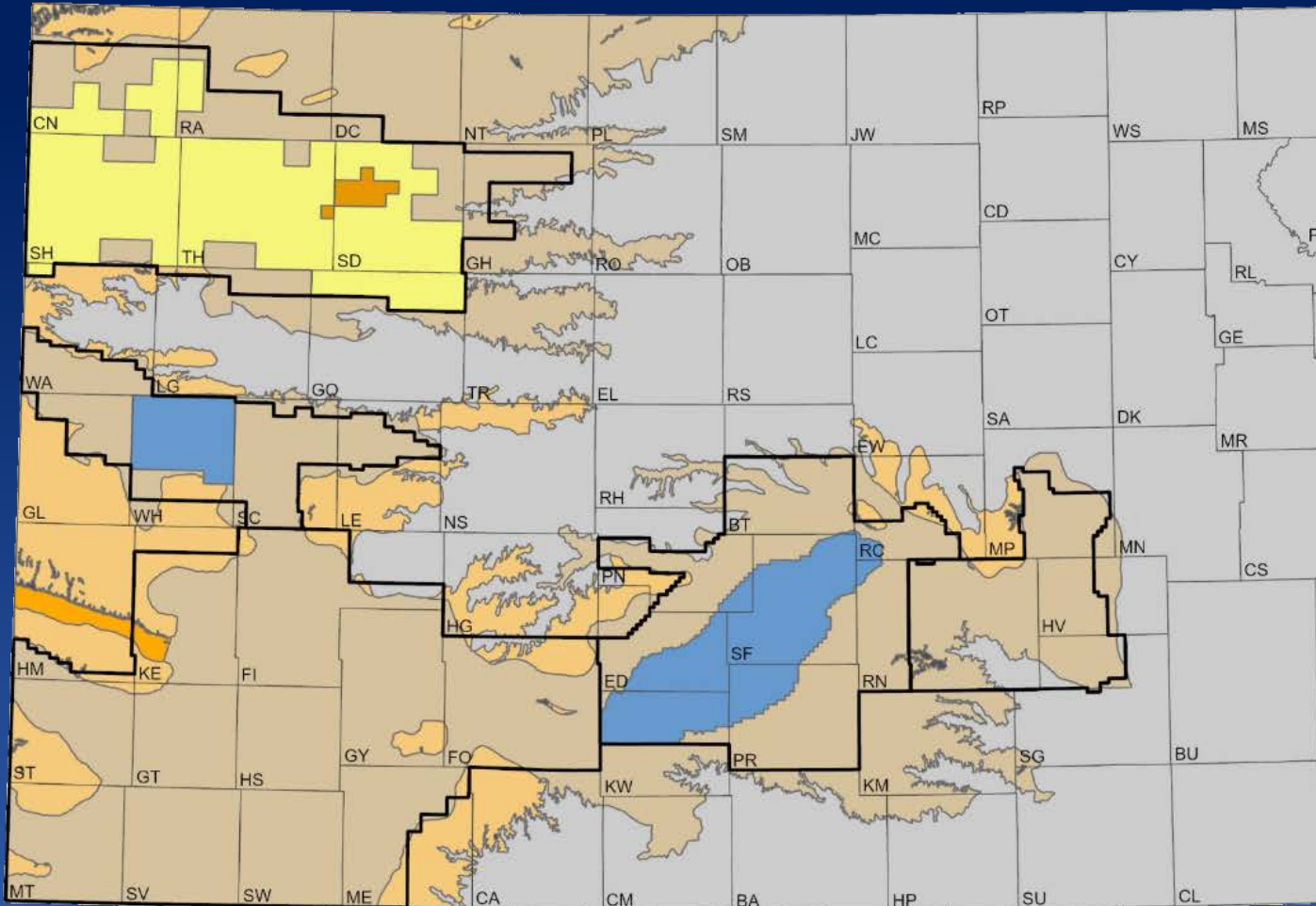
Local Enhanced Management Areas (LEMA)

Provisions of a LEMA

- Locally generated plan within a GMD
- State says “Yes” or “No”
- Plan has a set lifetime (~ 5 years) but can be renewed
- Typically provide added flexibilities in water use in exchange for use reductions



Local Enhanced Management Areas (LEMA)

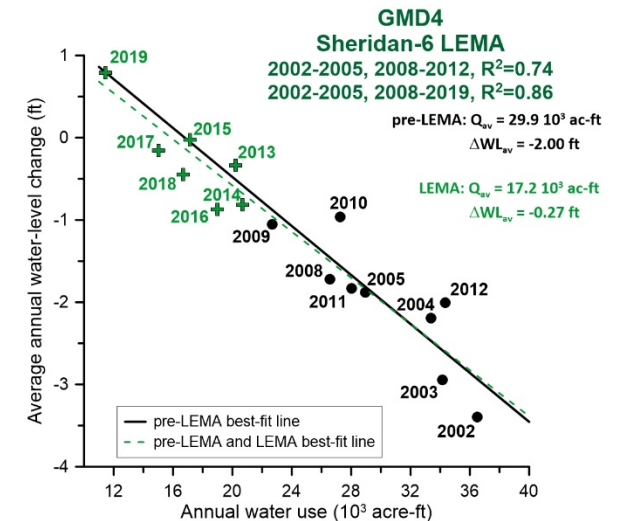


Provisions of a LEMA

- Locally generated plan within a GMD
- State says “Yes” or “No”
- Plan has a set lifetime (~ 5 years) but can be renewed
- Typically provide added flexibilities in water use in exchange for use reductions

Active LEMA Areas

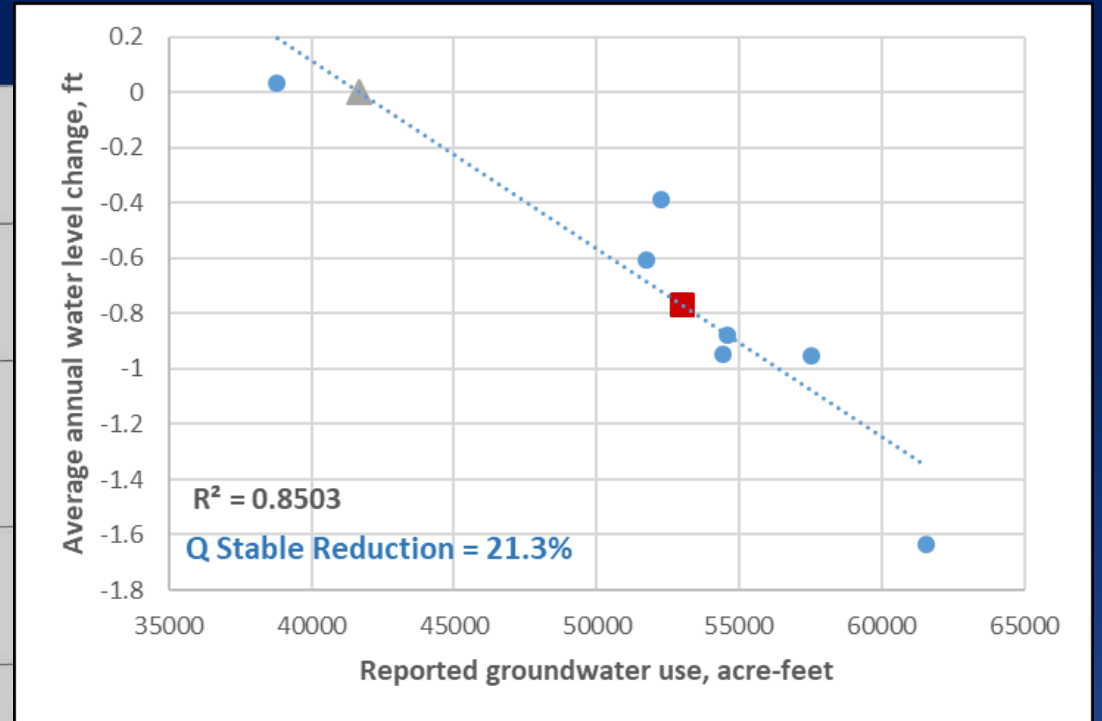
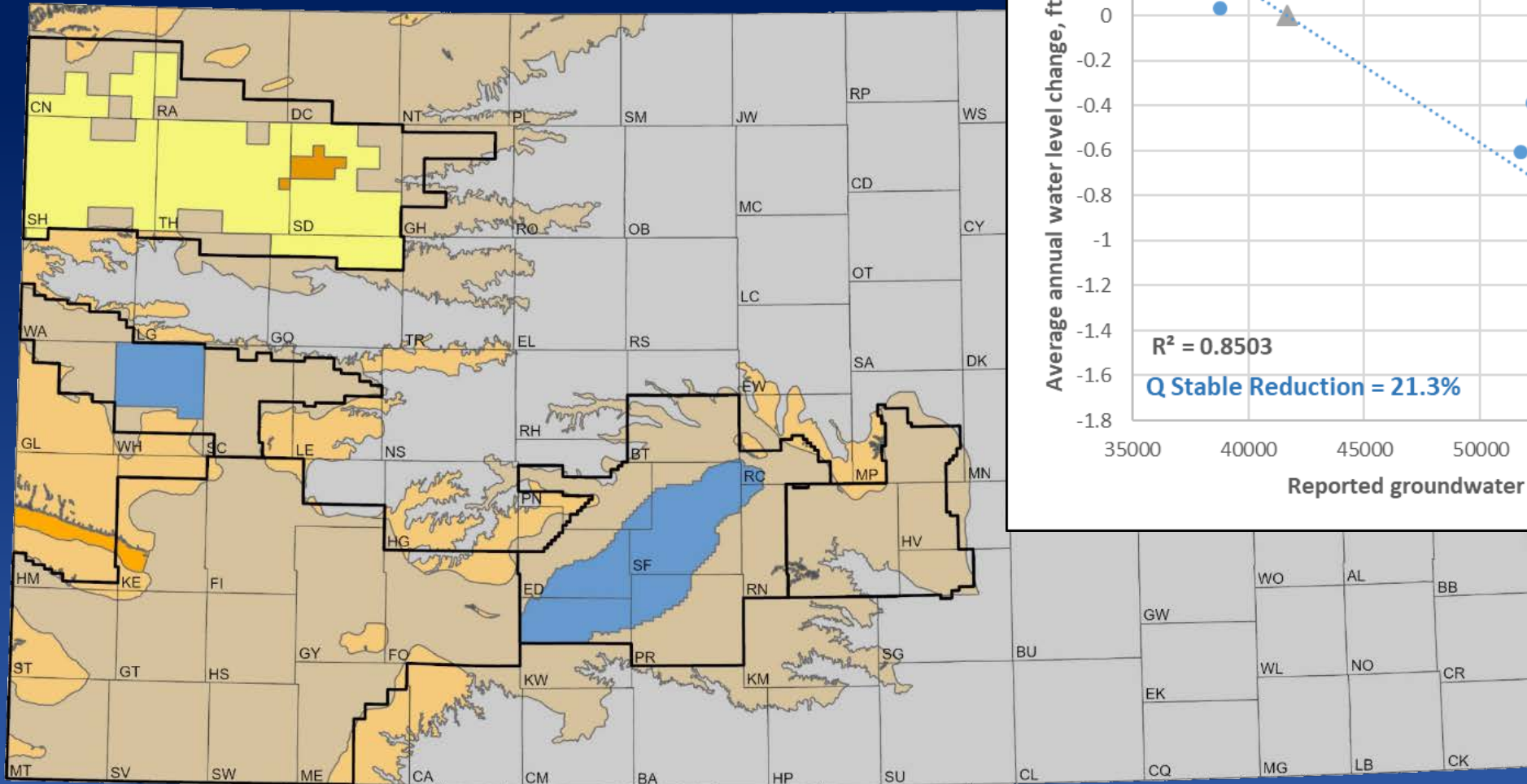
- Sheridan 6
- GMD4



Areas Under Discussion

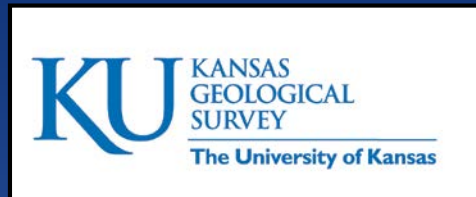
- Wichita County
- Rattlesnake Creek

Proposed Wichita County LEMA, 2009 to 2015

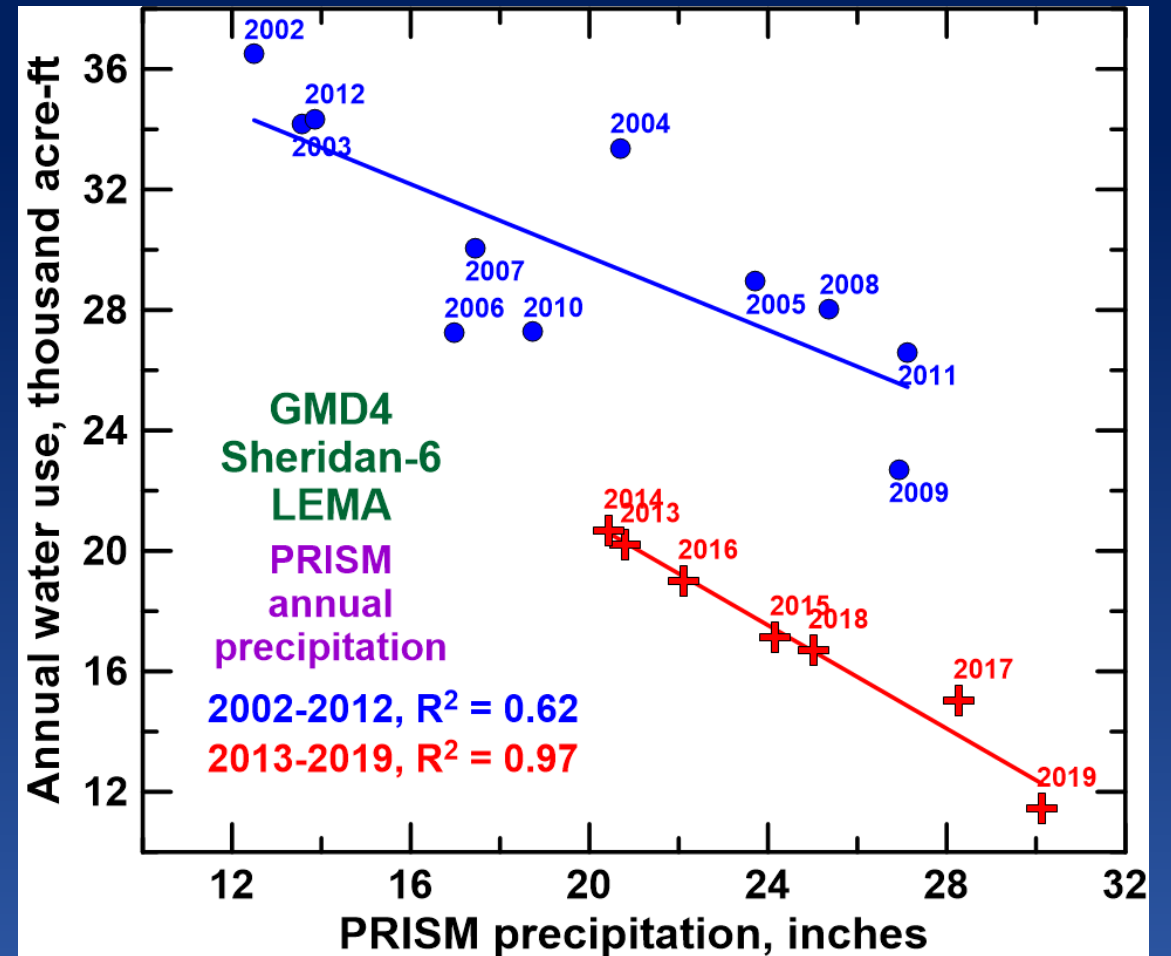
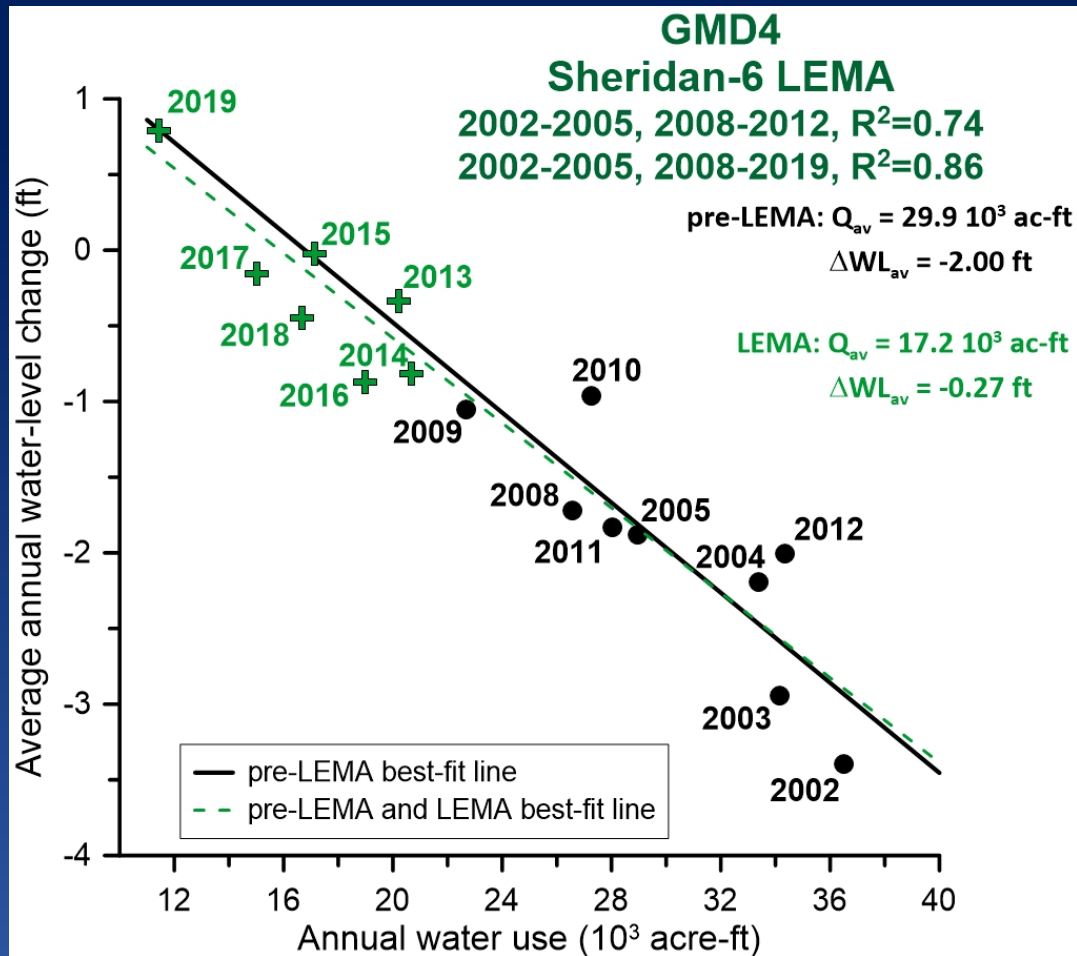


Questions????

**Kansas Geological Survey
1930 Constant Ave
Lawrence, KS 66047
785-864-2118**



Visit our site at
<http://www.kgs.ku.edu>



Kansas Index Wells

