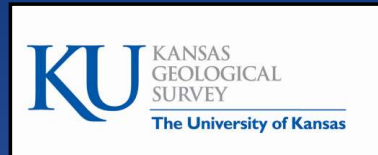


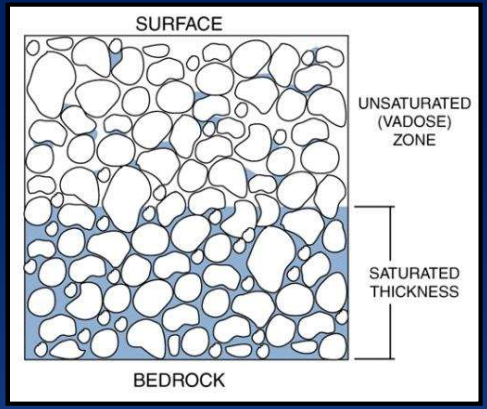
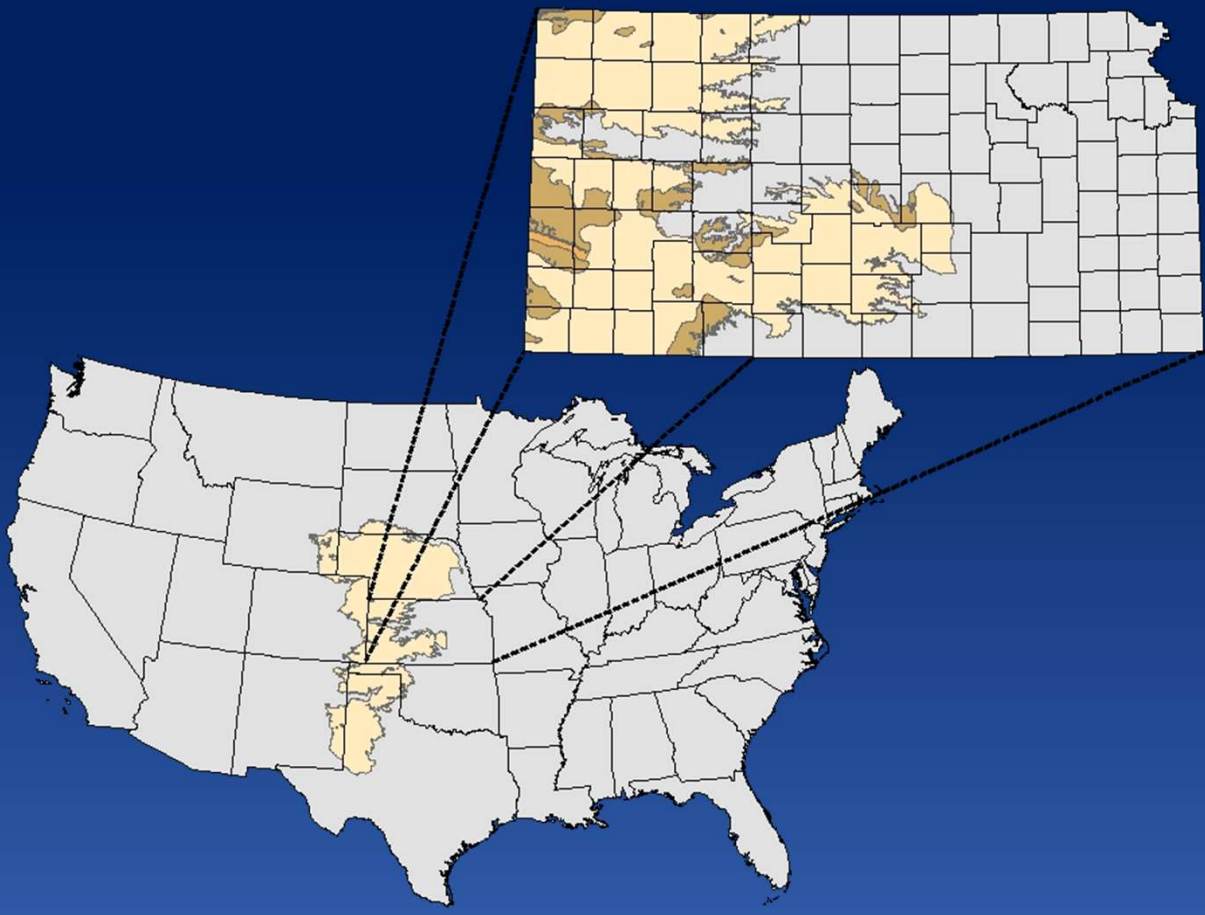
Conditions and Trends in the Kansas High Plains Aquifer

Kansas Water Office Webinar
April 29, 2020

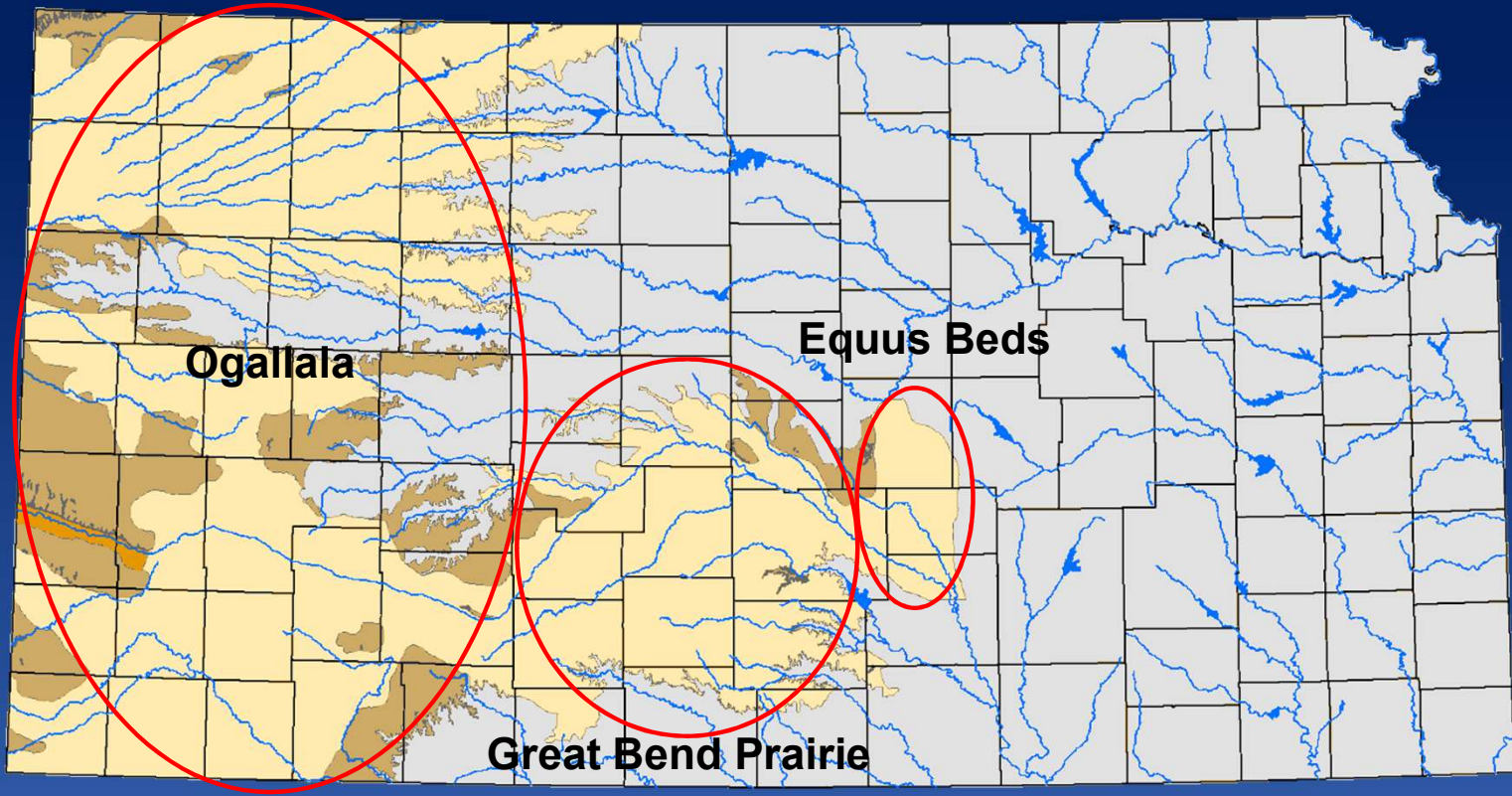


Kansas Geological Survey
University of Kansas

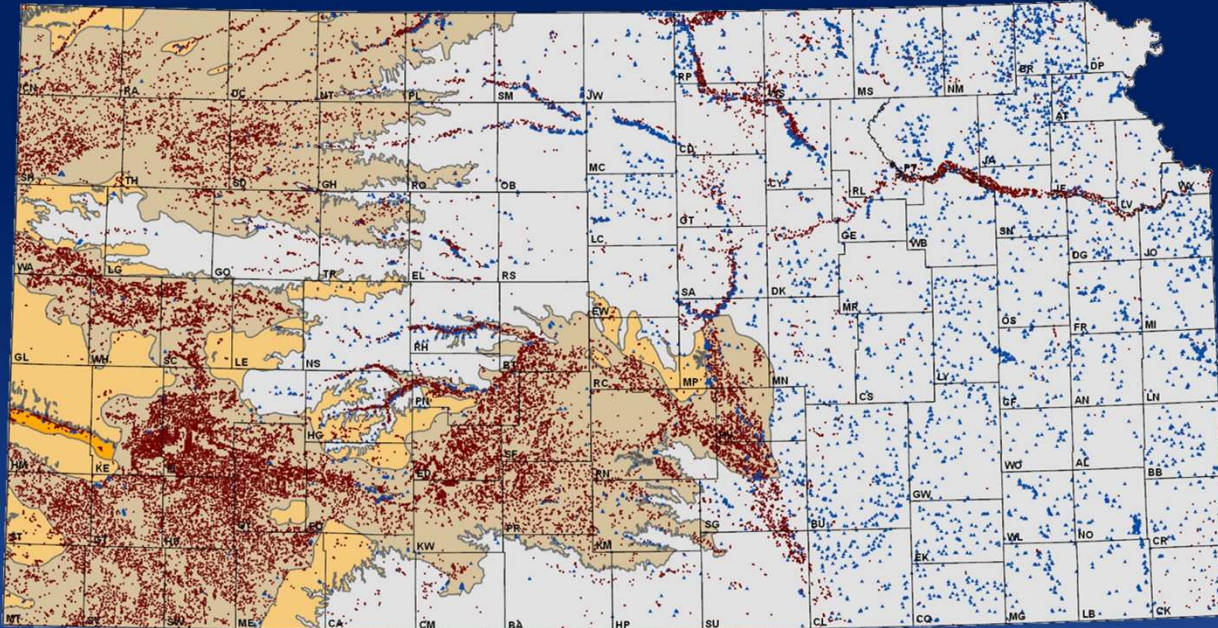
The High Plains Aquifer



The High Plains Aquifer in Kansas



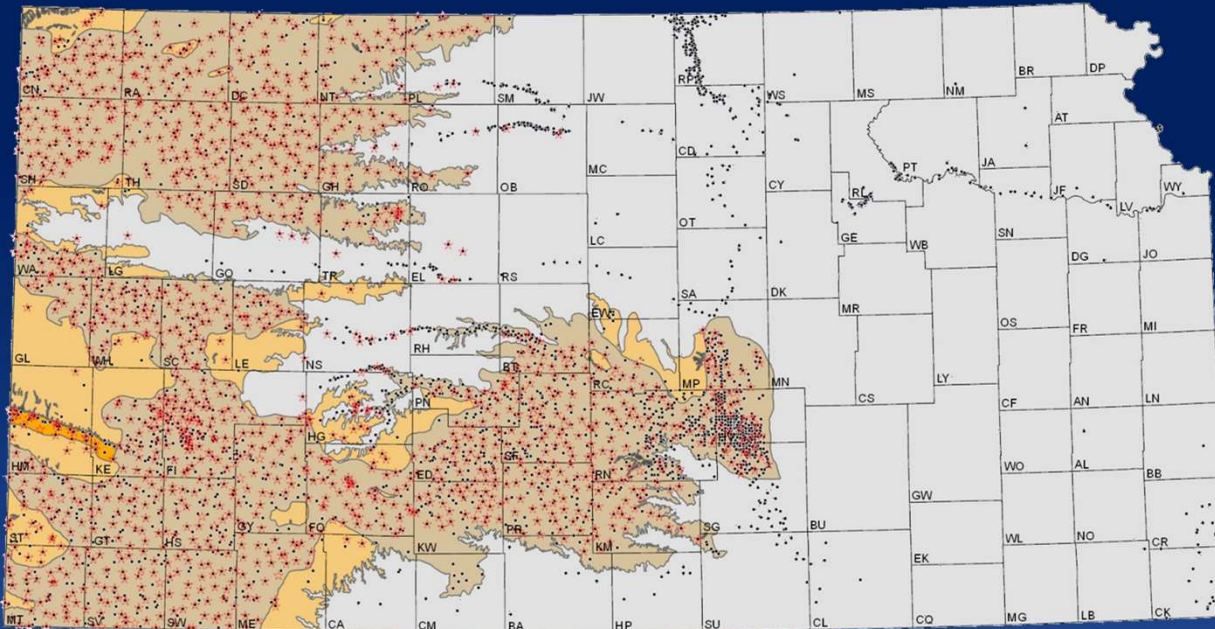
Water Right Development in Kansas



- 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



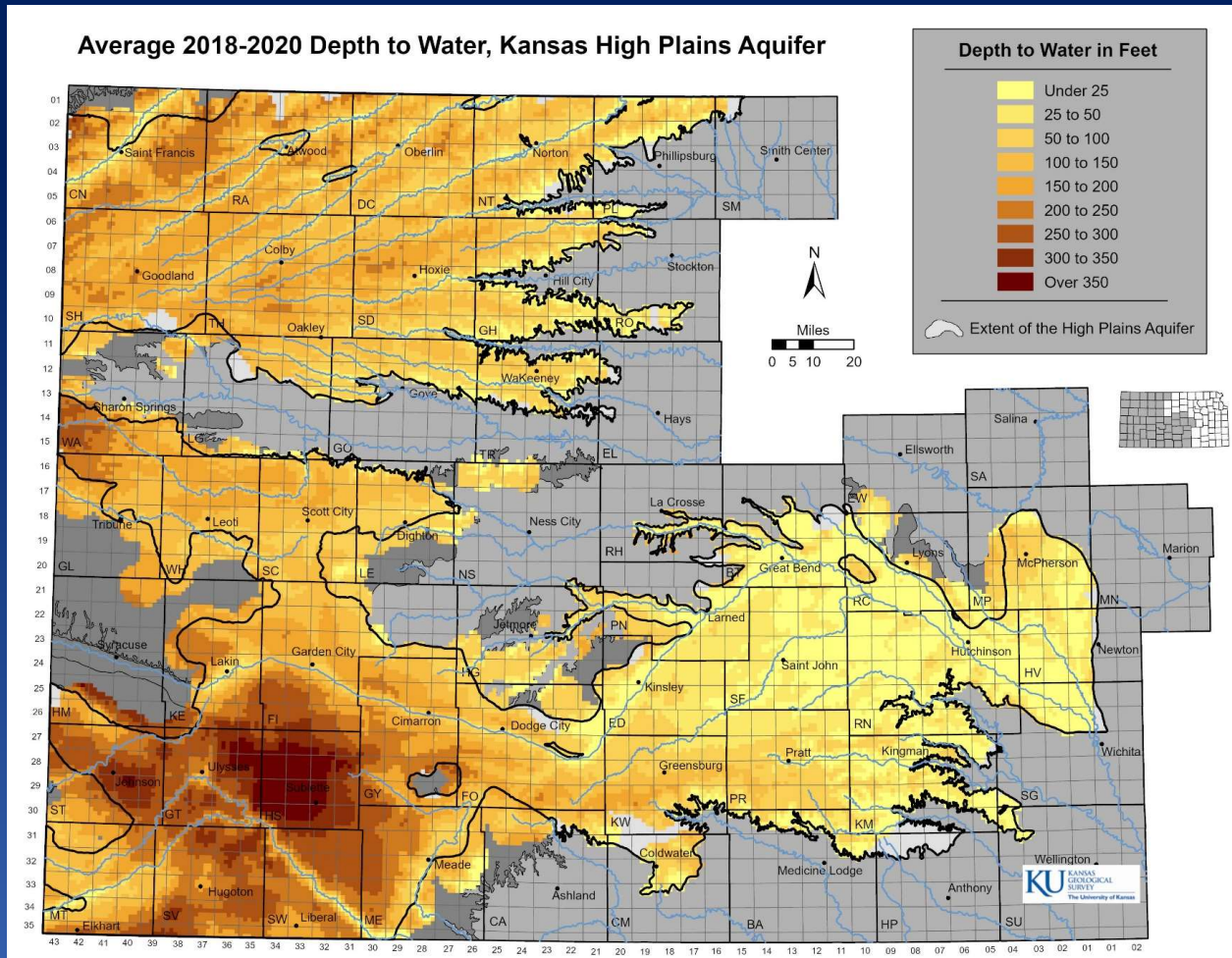
Measuring Wells in Kansas



- 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



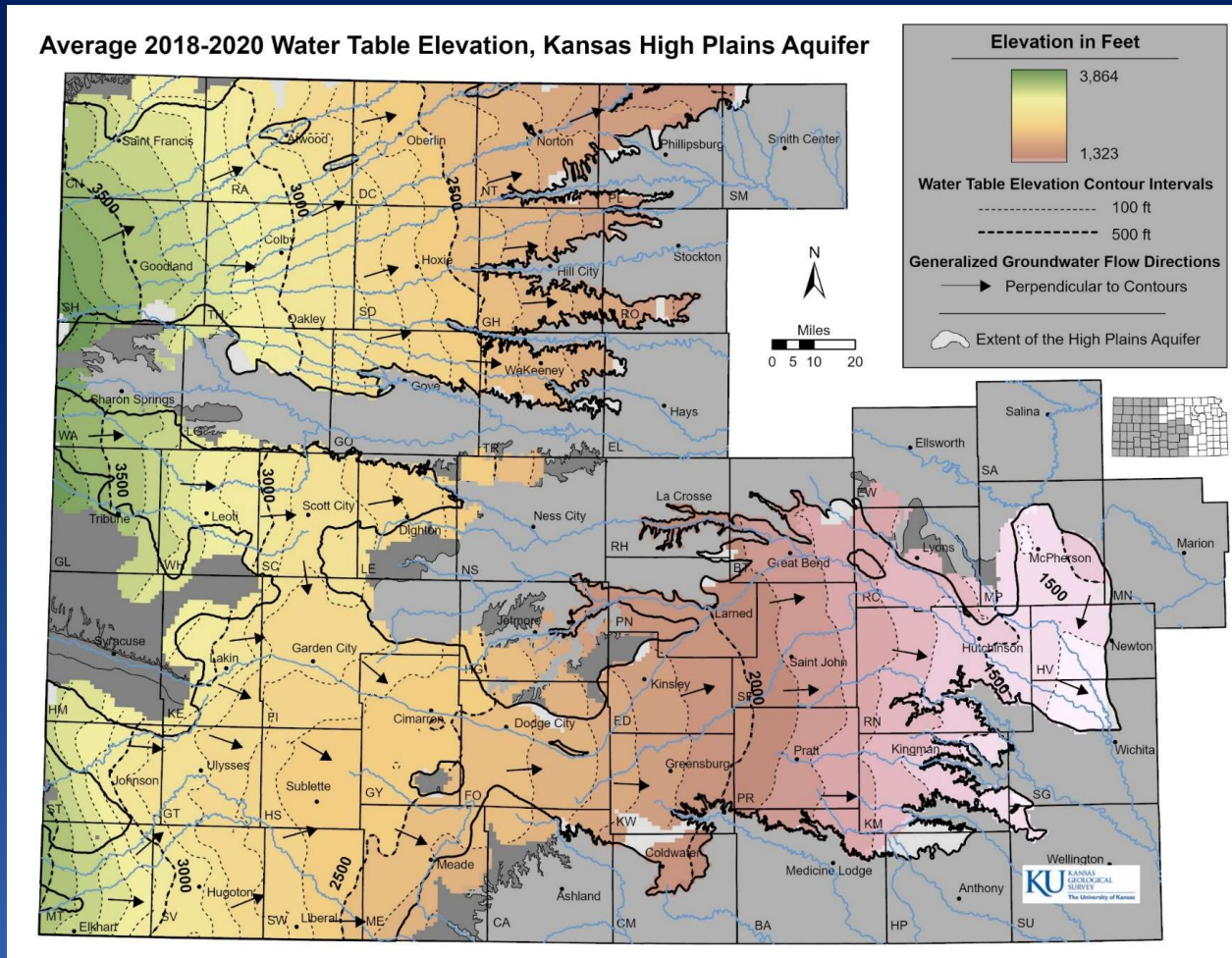
Depth to Water, Kansas High Plains Aquifer



Depth to water ranges:

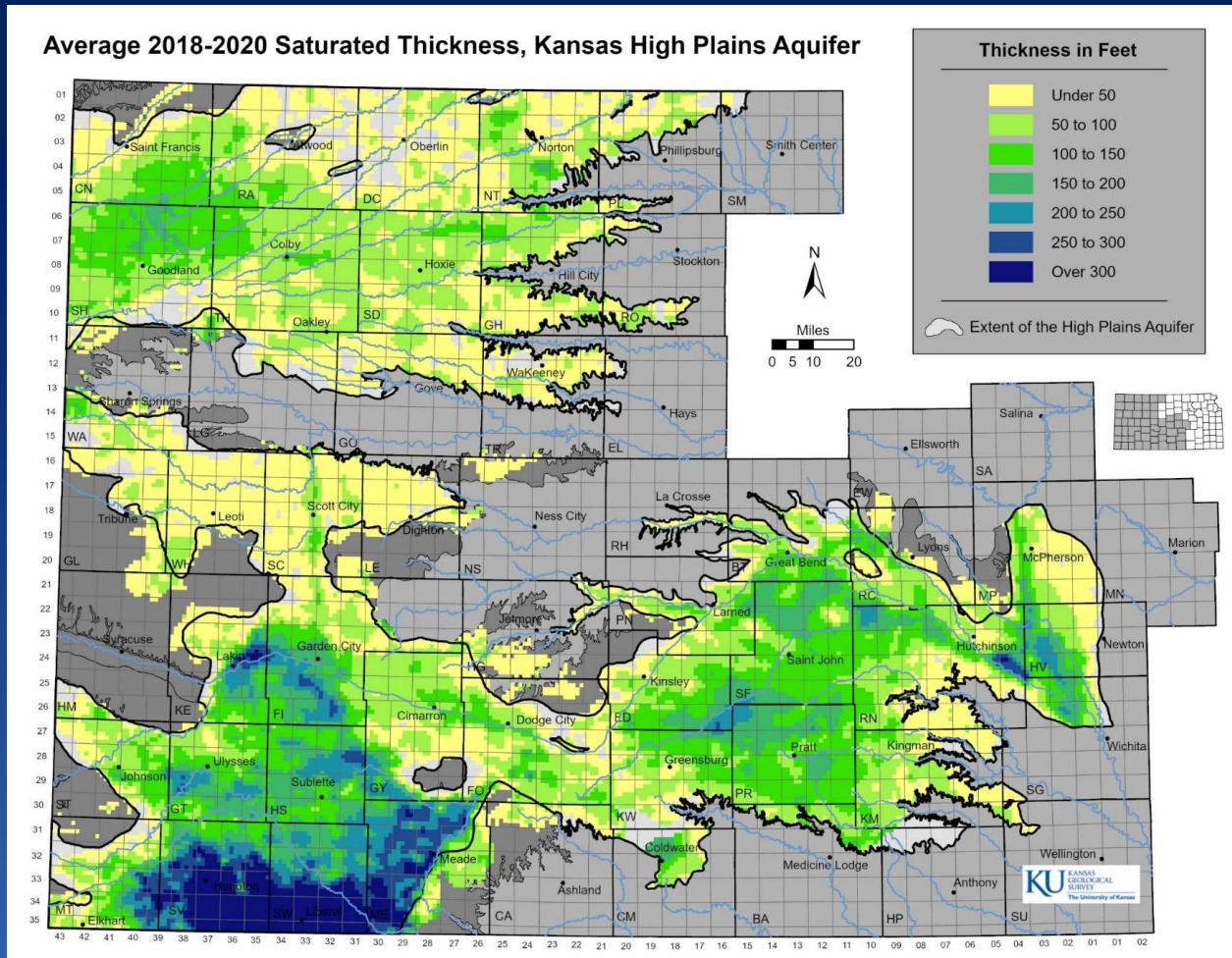
- At or near the land surface
- Over 400 ft (Haskell County)

Water Table Elevation, Kansas High Plains Aquifer

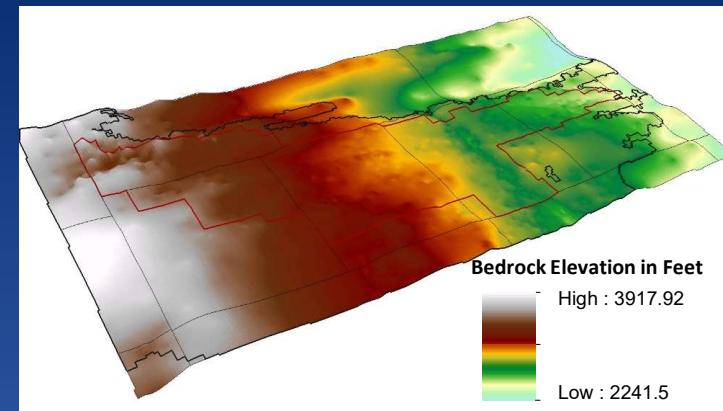


- Follows land surface
- Flow paths are generally west to east with some local variations
- Linear flow velocities
 - Range from 1 ft per 1 to 4 days
 - 10 to 20 years to go a mile

Aquifer Thickness, Kansas High Plains Aquifer

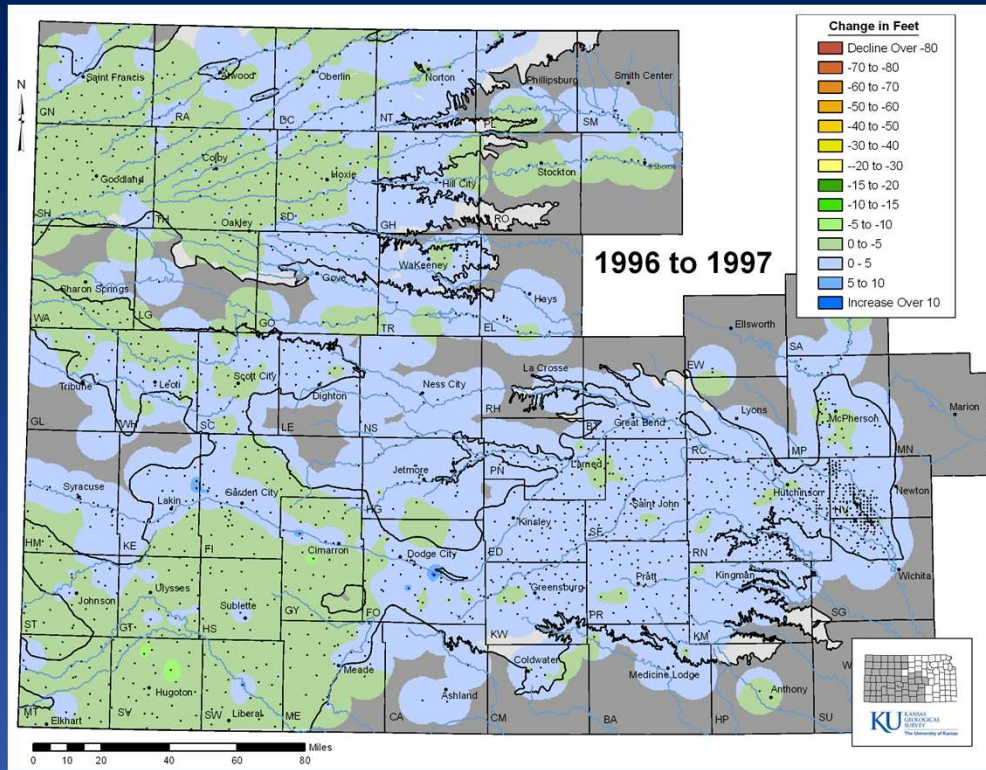


- Ranges from 0 to 500 ft (Seward County)
- Variability driven by underlying bedrock surface.

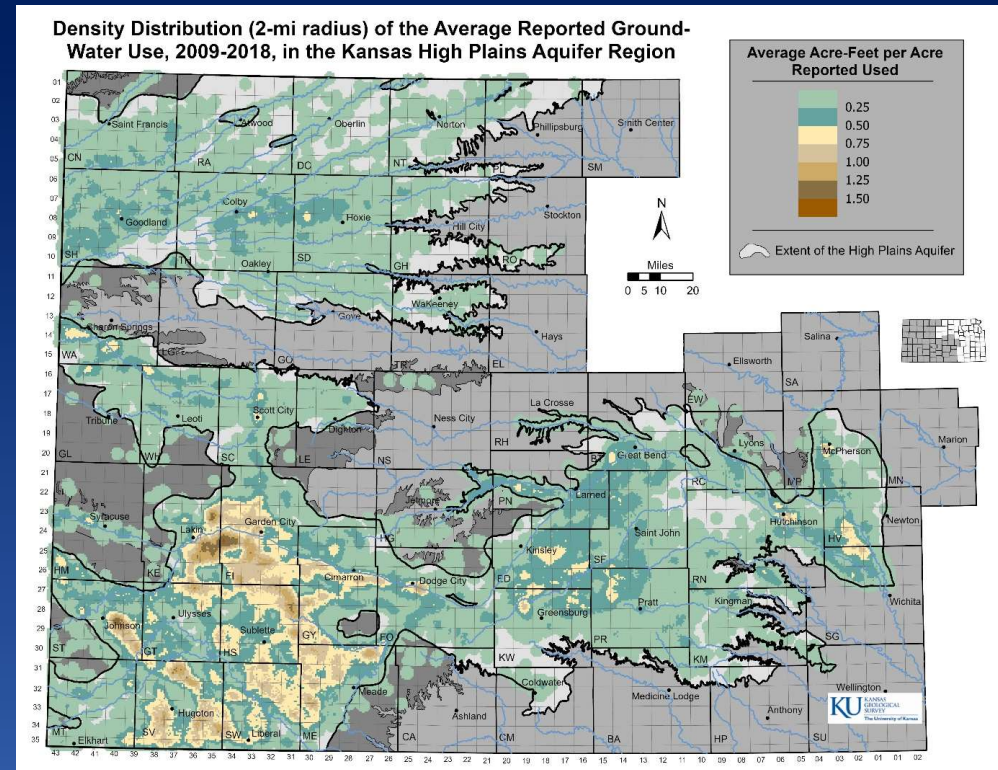


Water-Level Change vs Reported Water Use

Water Level Change

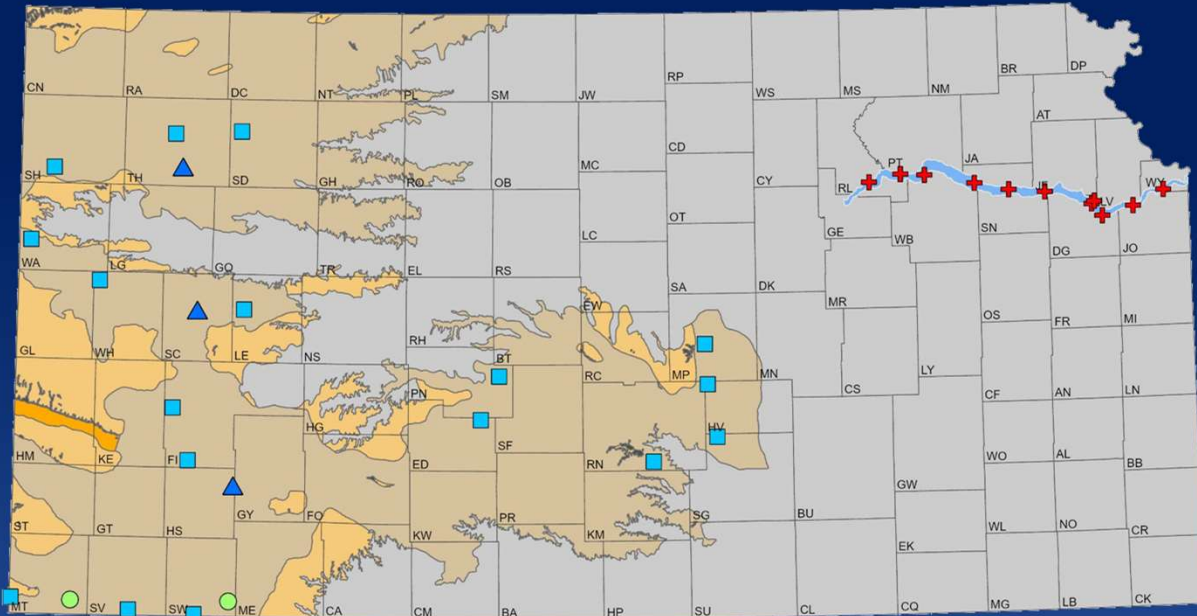


Groundwater Usage

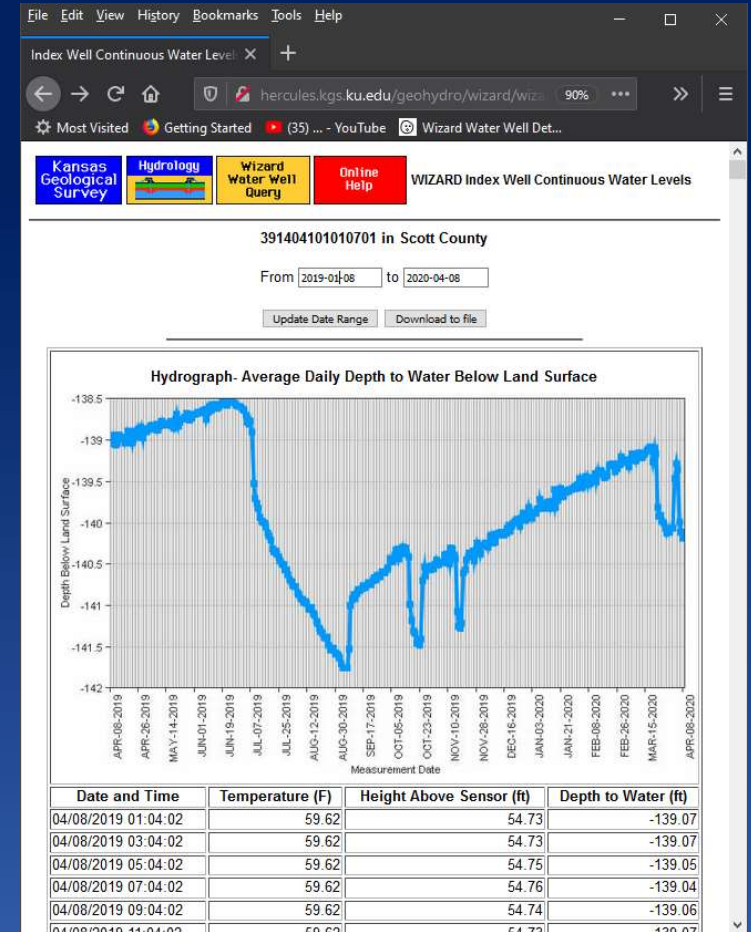


How far out of whack are we?

Kansas Index Well Program

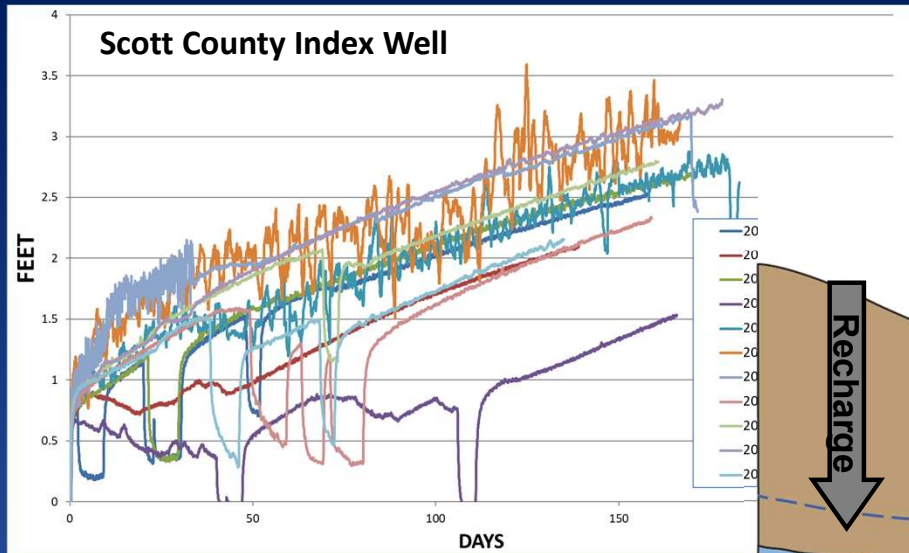


- First wells installed in 2007 through the Kansas Water Plan Fund
- Continuous, real-time water-level recordings
- Characterizations at the local scale

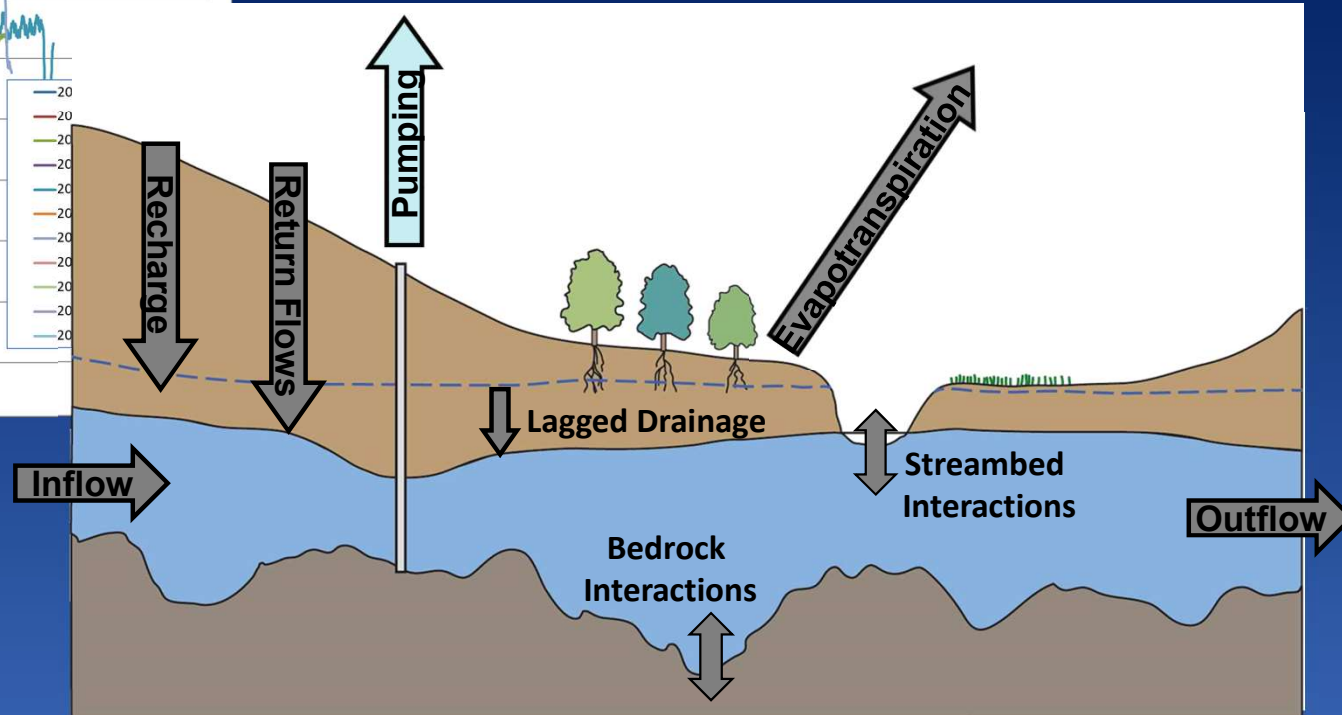


Simple Water Balance- Isolating Water Use and Water-level Change

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

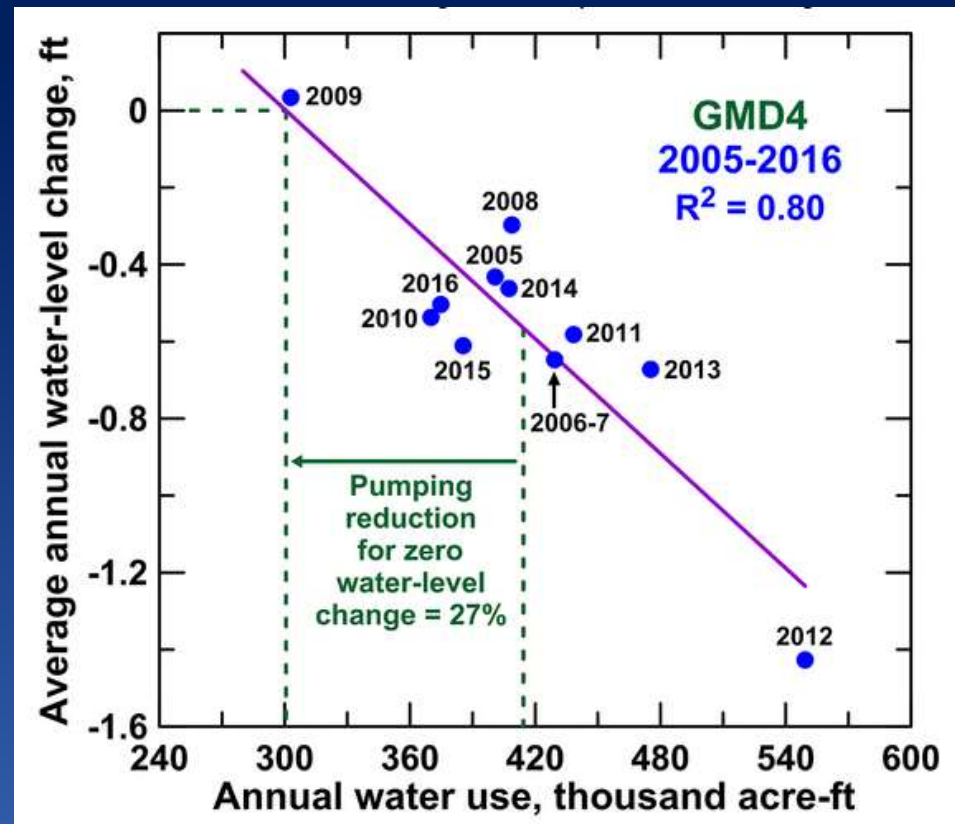
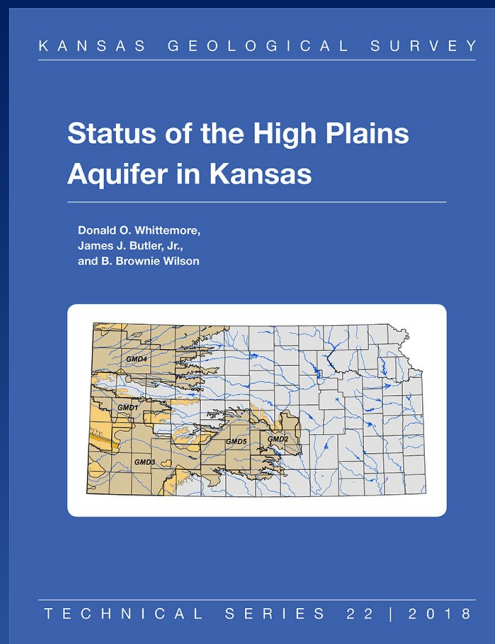


Water Volume Change in Aquifer =
Net Inflow - Pumping

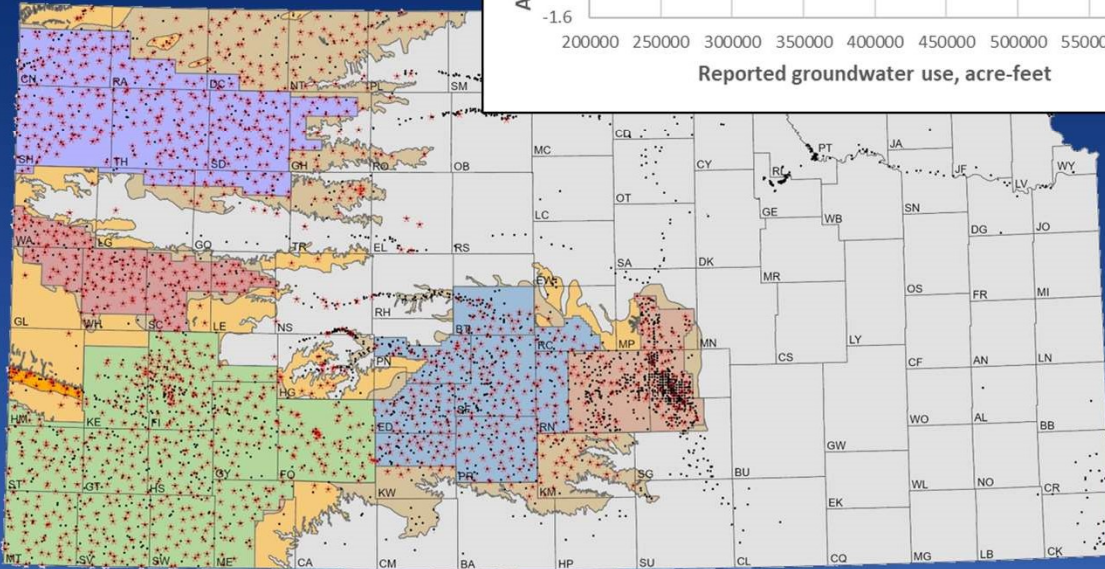
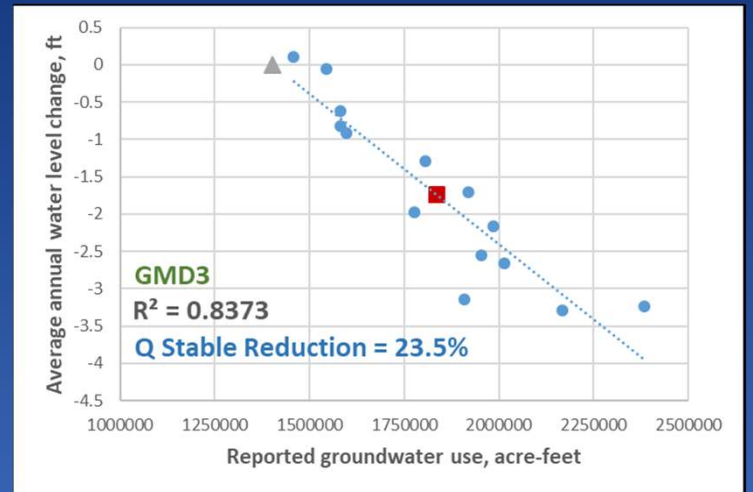
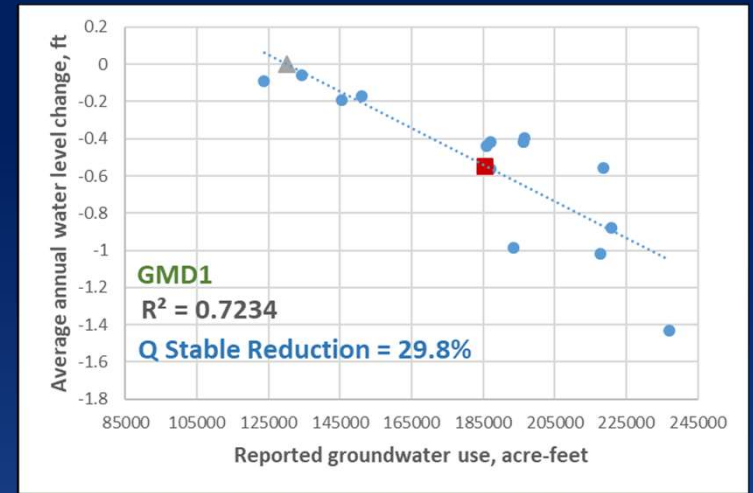
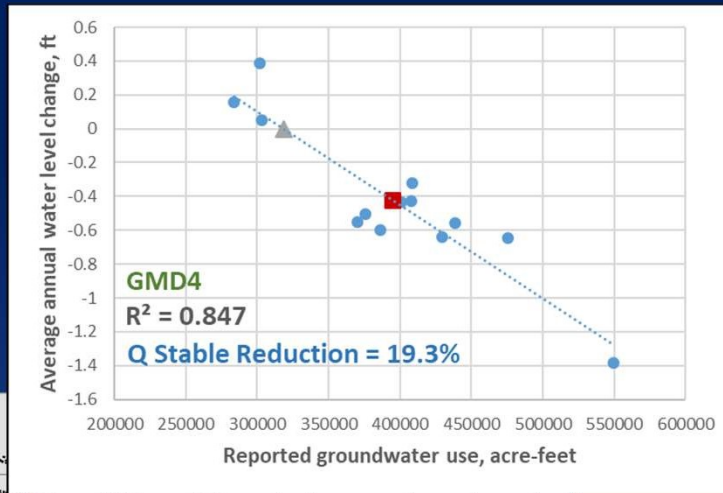


Status of the High Plains Aquifer in Kansas

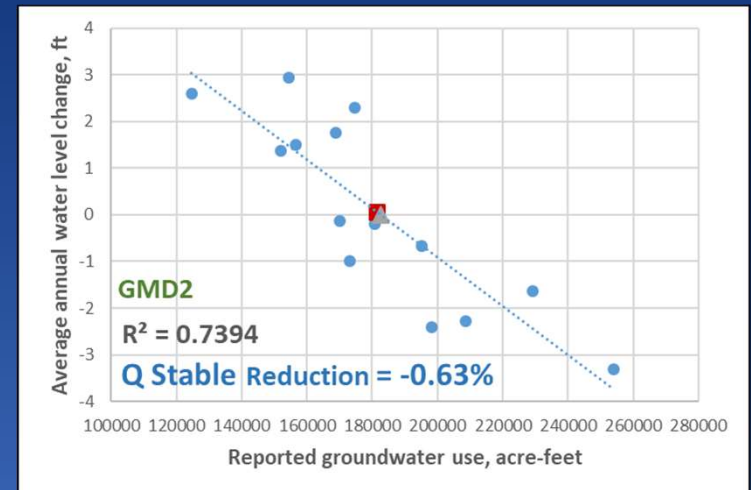
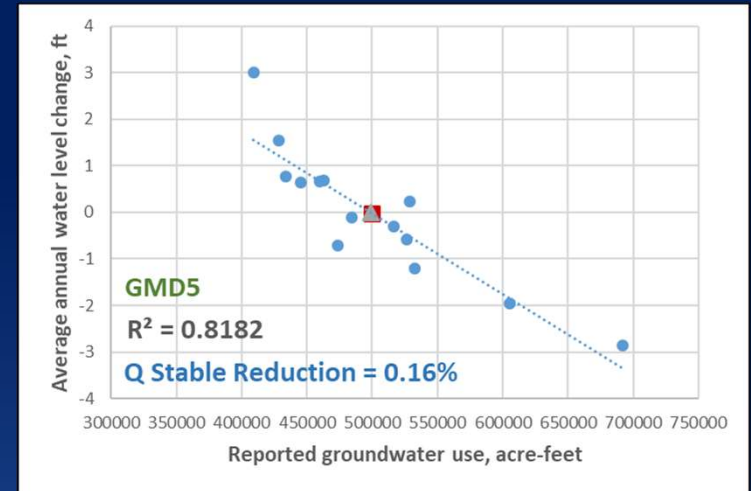
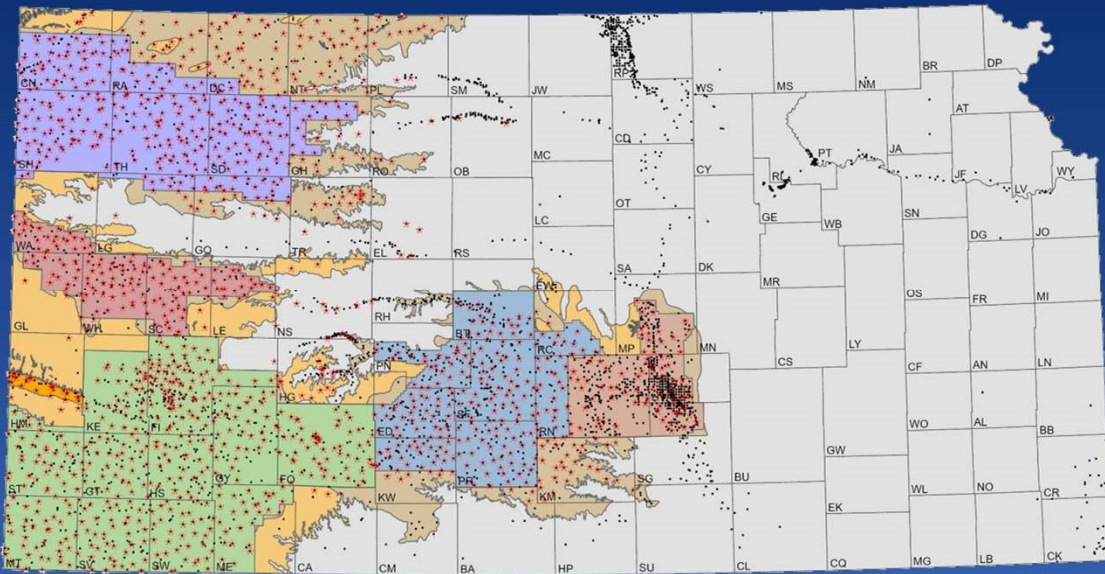
KGS Technical Series 22- <http://www.kgs.ku.edu/Publications/Bulletins/TS22/index.html>



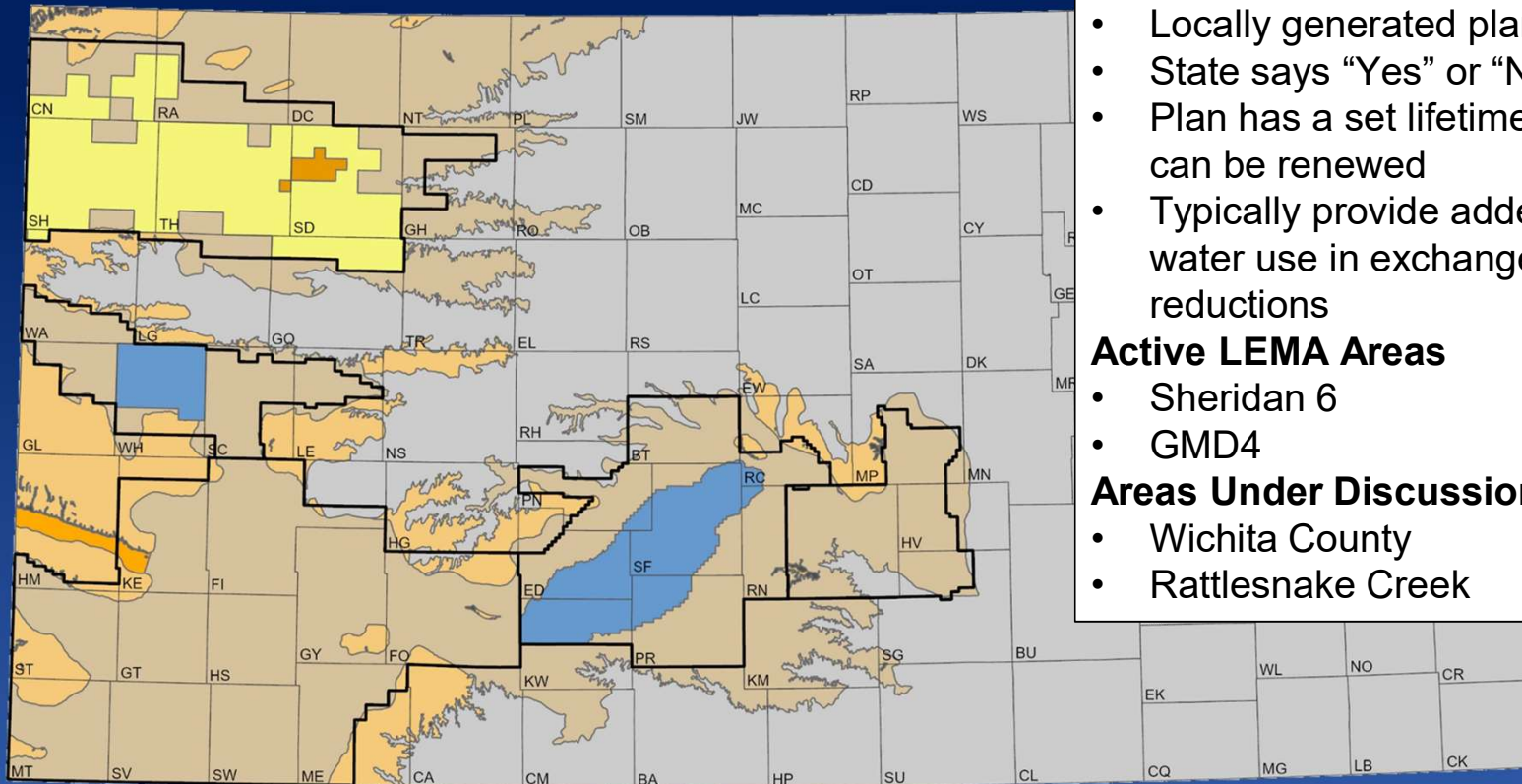
Reductions in Average 2005 to 2018 Reported Water Use, by GMD, Needed to Stabilize Water Levels



Reductions in Average 2005 to 2018 Reported Water Use, by GMD, 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

Active LEMA Areas

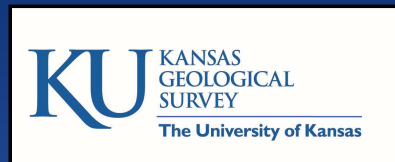
- Sheridan 6
- GMD4

Areas Under Discussion

- Wichita County
- Rattlesnake Creek

Questions????

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



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

WATER CONSERVATION EFFORTS IN NW KANSAS

SD-6 LEMA

GMD 4 LEMA

Soil Moisture Probe/VRI Cost-Share

WCAs

Water Technology Farms

Northwest Kansas Certified Irrigator Program

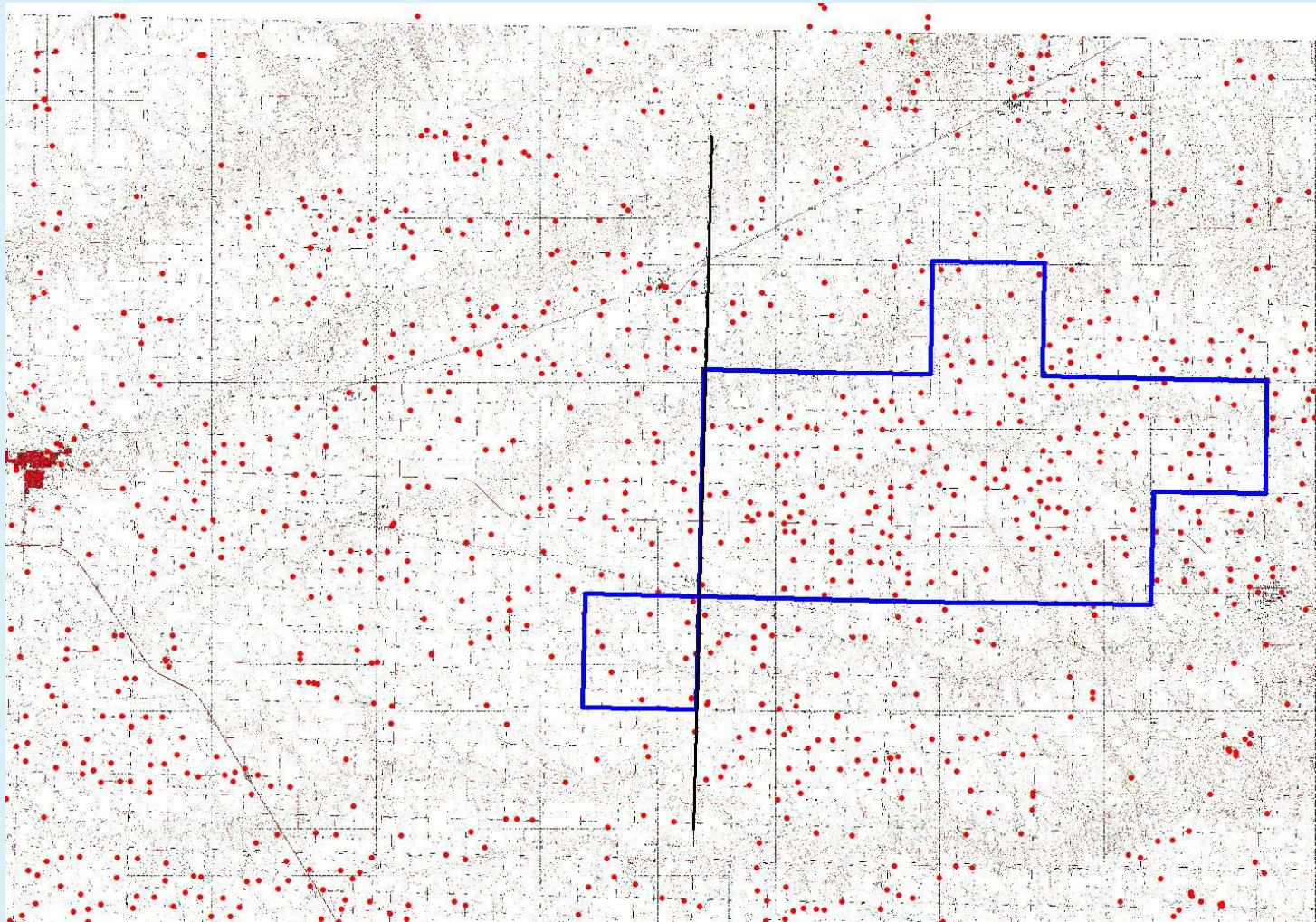
Shannon Kenyon, Manager GMD 4

LEMA: Local Enhanced Management Area

Created in 2012

K.S.A. 82a-1041

SD-6 AREA



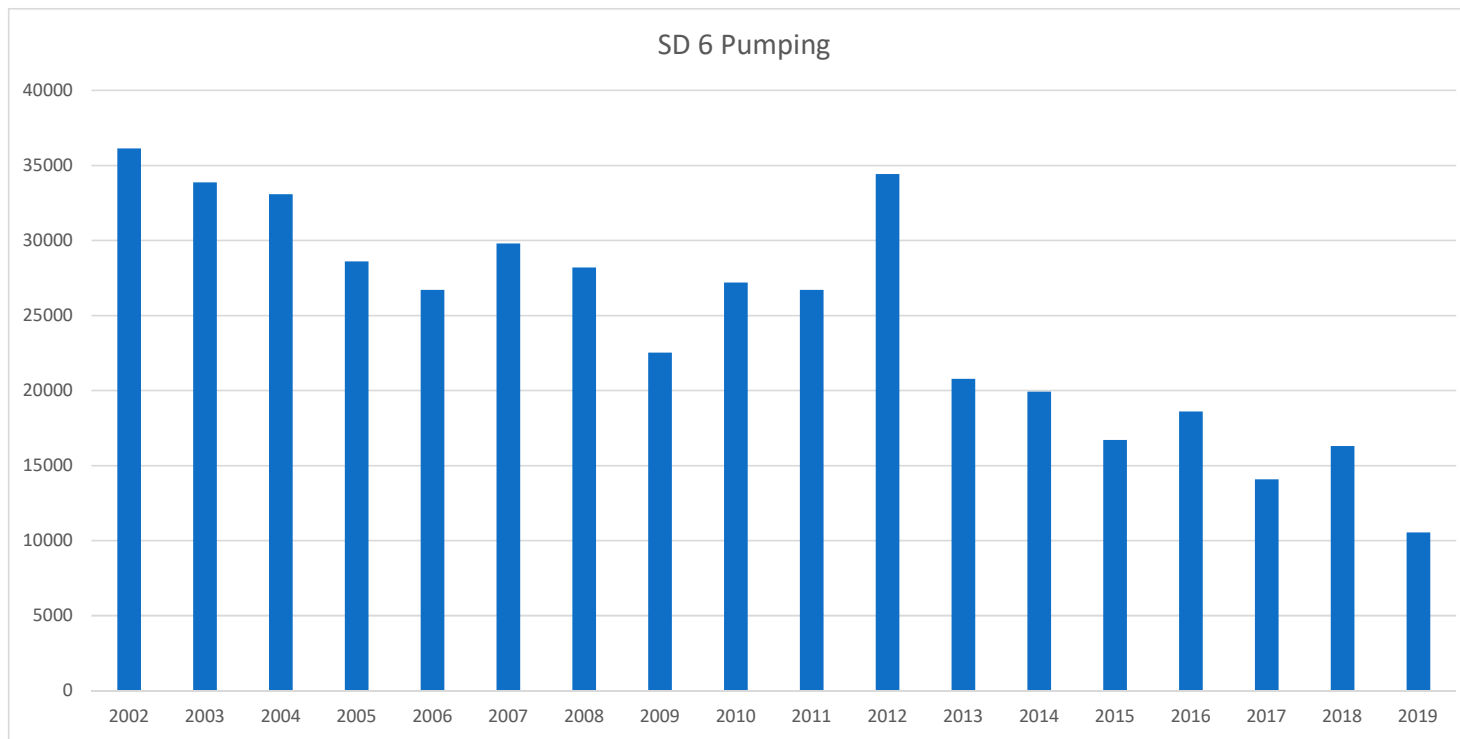
SD-6 LEMA 2013-2017; 2018-2022

- 99 SECTIONS
- 193 WELLS
 - 183 IRR
 - 7 STK
 - 2 MULTI-USE
 - 1 REC
- 56,481 AF APPROPRIATED
- AVERAGED 27,800 AF PUMPED 2008 – 2012 (49.2 % OF APPROPRIATED)
- AVERAGED 18,455 AF PUMPED 2013 – 2017 (32.7 % OF APPROPRIATED)
- 16,300 AF pumped in 2018 & only 11,438 AF in 2019 (20%)!!!!

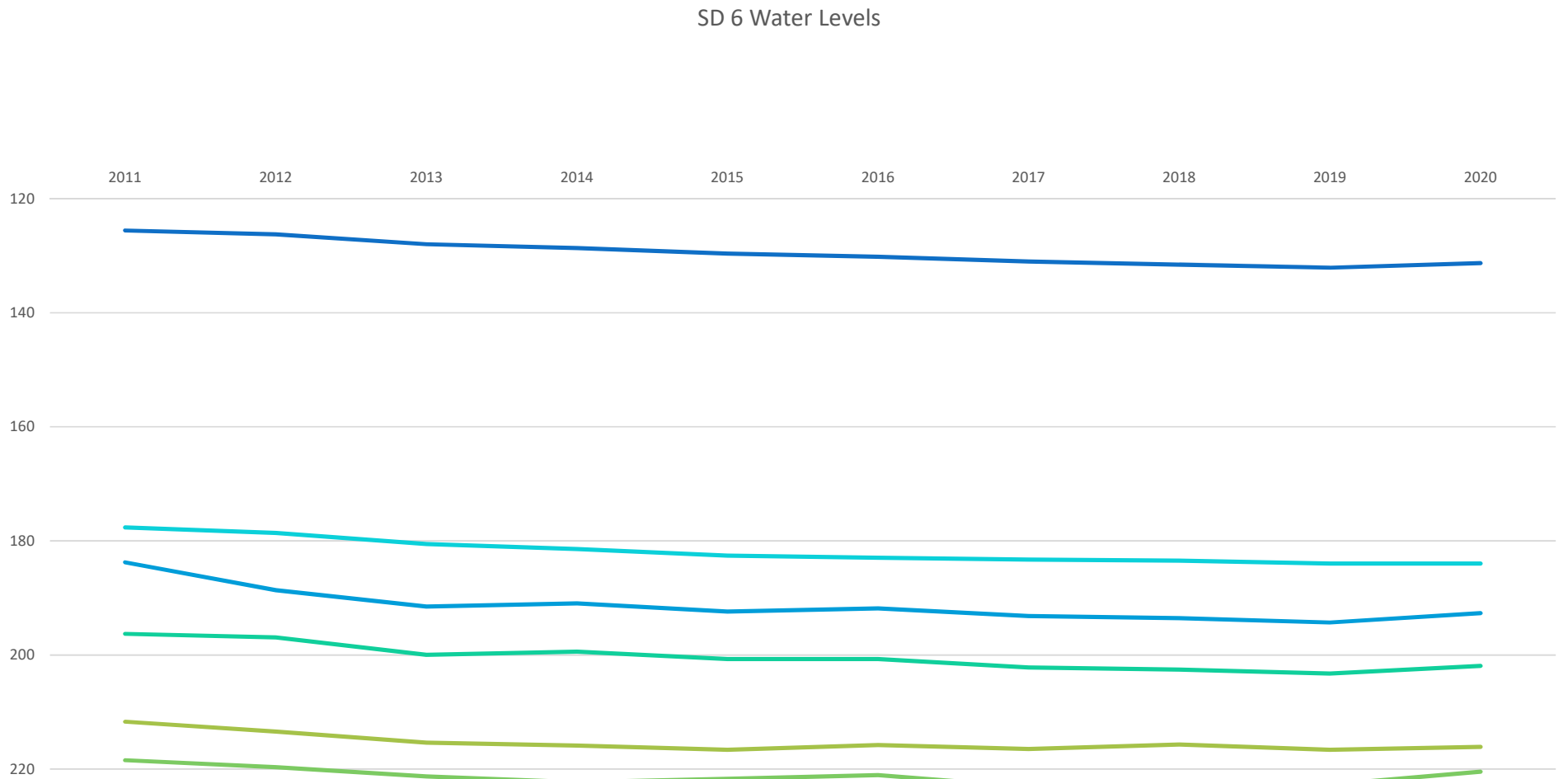
SD6 LEMA Components

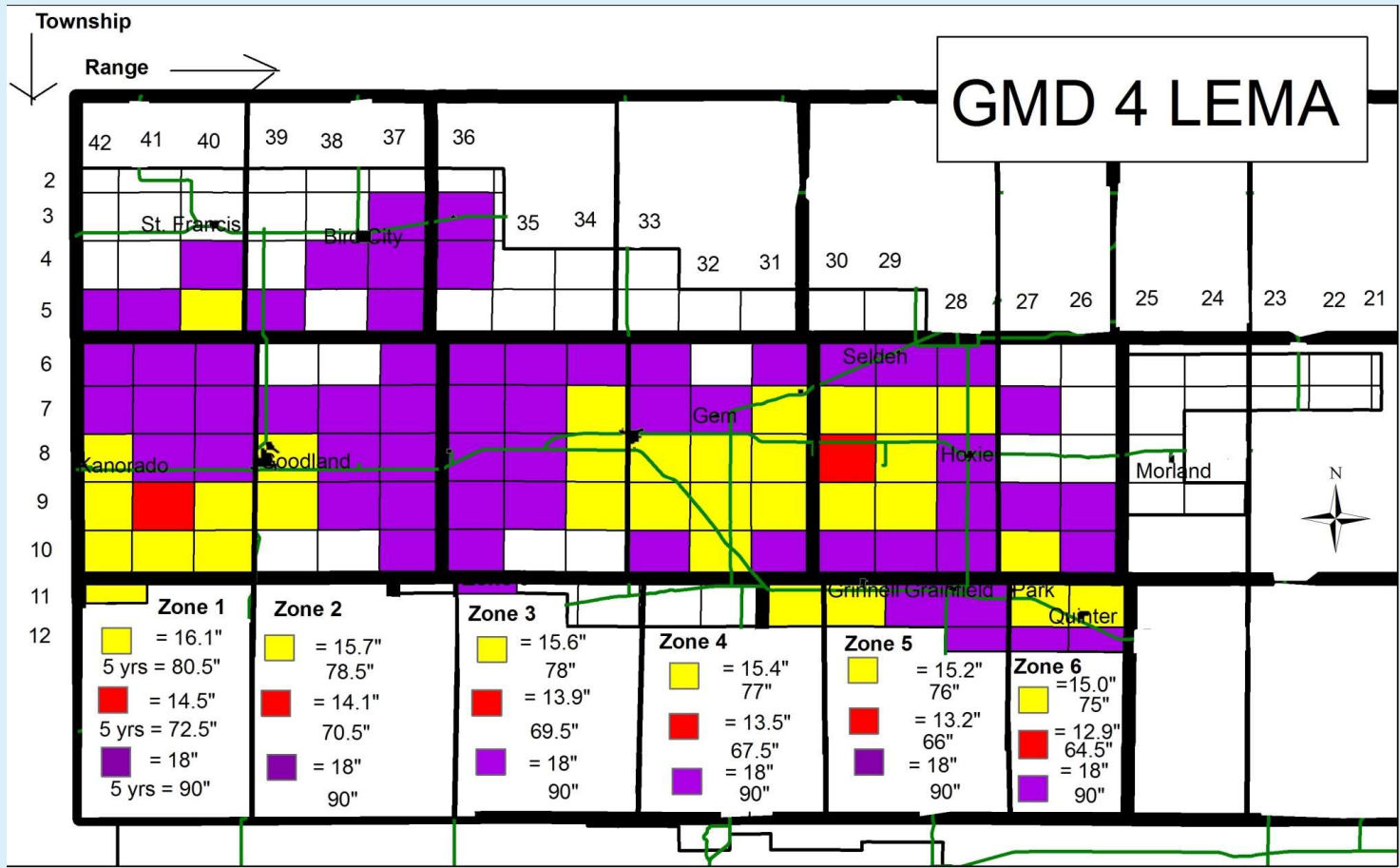
- 55" over 5 years per eligible acre for IRR
- 12 gallons/head/day for STK
- Cannot exceed annual authorized quantity
- 0 – 35% individual water right reduction
- Goal of approximate 20% regional reduction compared to previous 5 years
- Goal of 114,000 AF 2013 – 2017
- Approximately 89,200 AF pumped (32% less than goal)
- Umbrella accounts
- Transfers

SD-6 IRRIGATION USAGE 2013 - 2017



SD-6 WATER TABLE DEPTHS





- Townships with 2%+ Average Annual Decline in 2004-2015
- Townships with 1-2% Average Annual Decline in 2004-2015
- Townships with 0.5 - 1% Average Annual Decline in 2004-2015 (18 inch allocation; 5 years = 90 inches)

Prepared by Shannon Kenyon GMD 4

GMD 4 LEMA

- 2018 First year of implementation
- Action driven by GMD 4 Board of Directors
- Legal Challenges
 - District Court found it constitutional
 - May continue

Soil Moisture Probe/VRI Cost-Share

- Northwest Kansas Groundwater Conservation Foundation
- 2015 – Current
- \$50,000/year
- \$1000/probe & \$500/VRI
- Two each per producer
- ~20% water savings per probe



Water Conservation Areas (WCA's)

- Franklin Family in SH County was first in Kansas (2016-2030)
- Townsend (2018-2022)
- Pillango Investments (2018-2022)
- Hayden Family Farms (2018-2027)
- McCarty (2018-2022)
- <https://agriculture.ks.gov/divisions-programs/dwr/managing-kansas-water-resources/wca>

Water Technology Farms

Northwest Kansas Technical College – Precision Ag



Northwest Kansas Certified Irrigator Program

- Certified Program
- Curriculum currently being developed
- Online Modules
- Local, in-person discussions among irrigators
- Question and answer sessions with experts via video conference
- Incentives-based

Questions??

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<http://www.gmd4.org/>