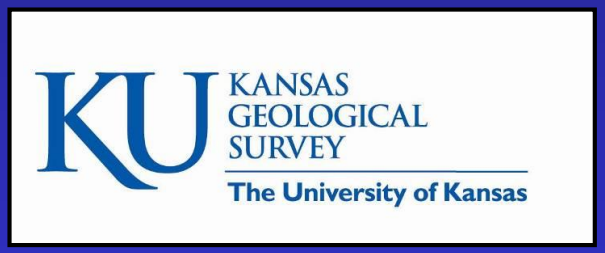
2018 Water Levels Results, Groundwater Flow and Velocities, Index Wells, Water use vs Declines and Saturated Thicknesses in GMD 1

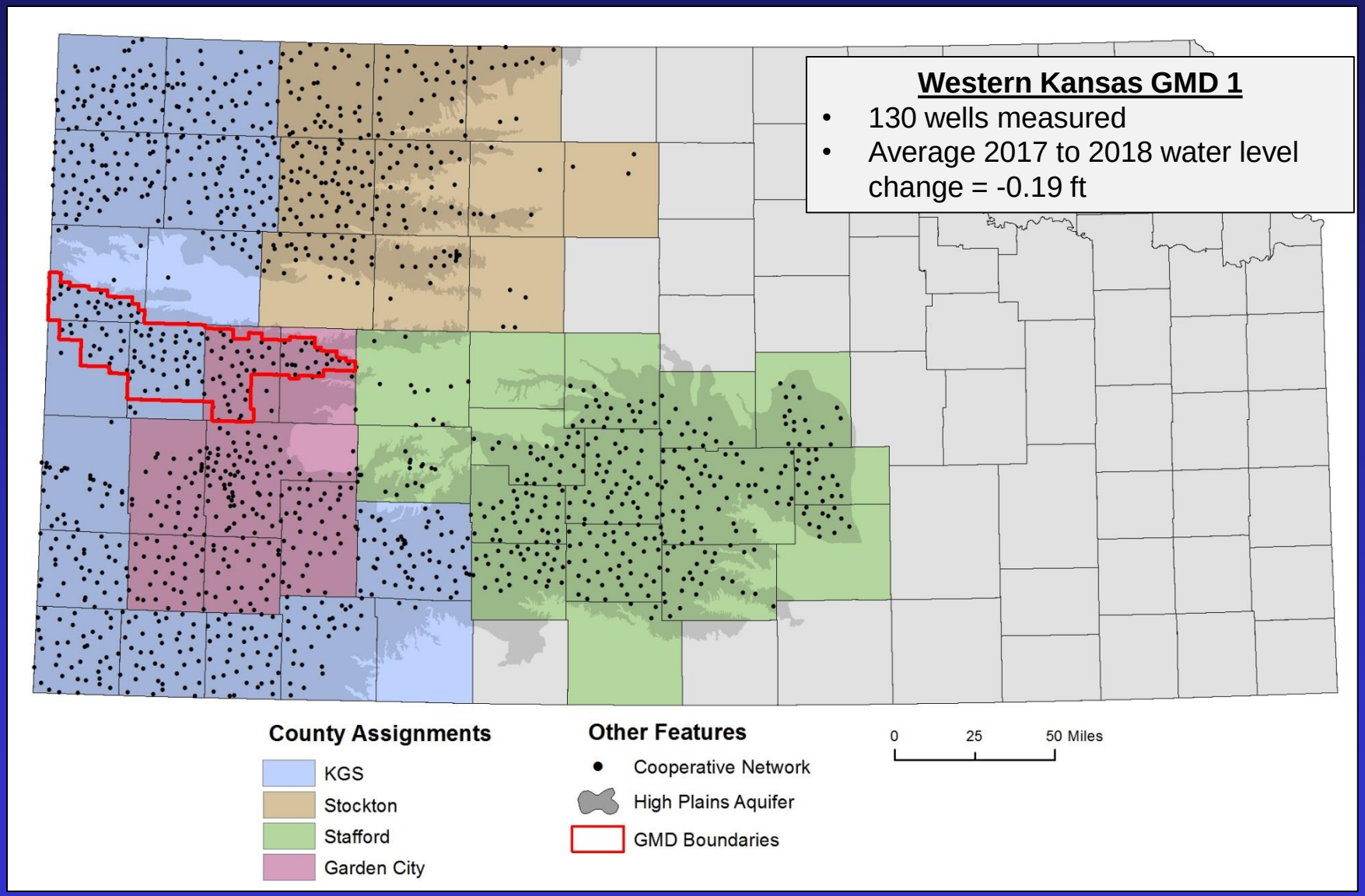
Western Kansas GMD #1
Annual Meeting
February 13, 2018



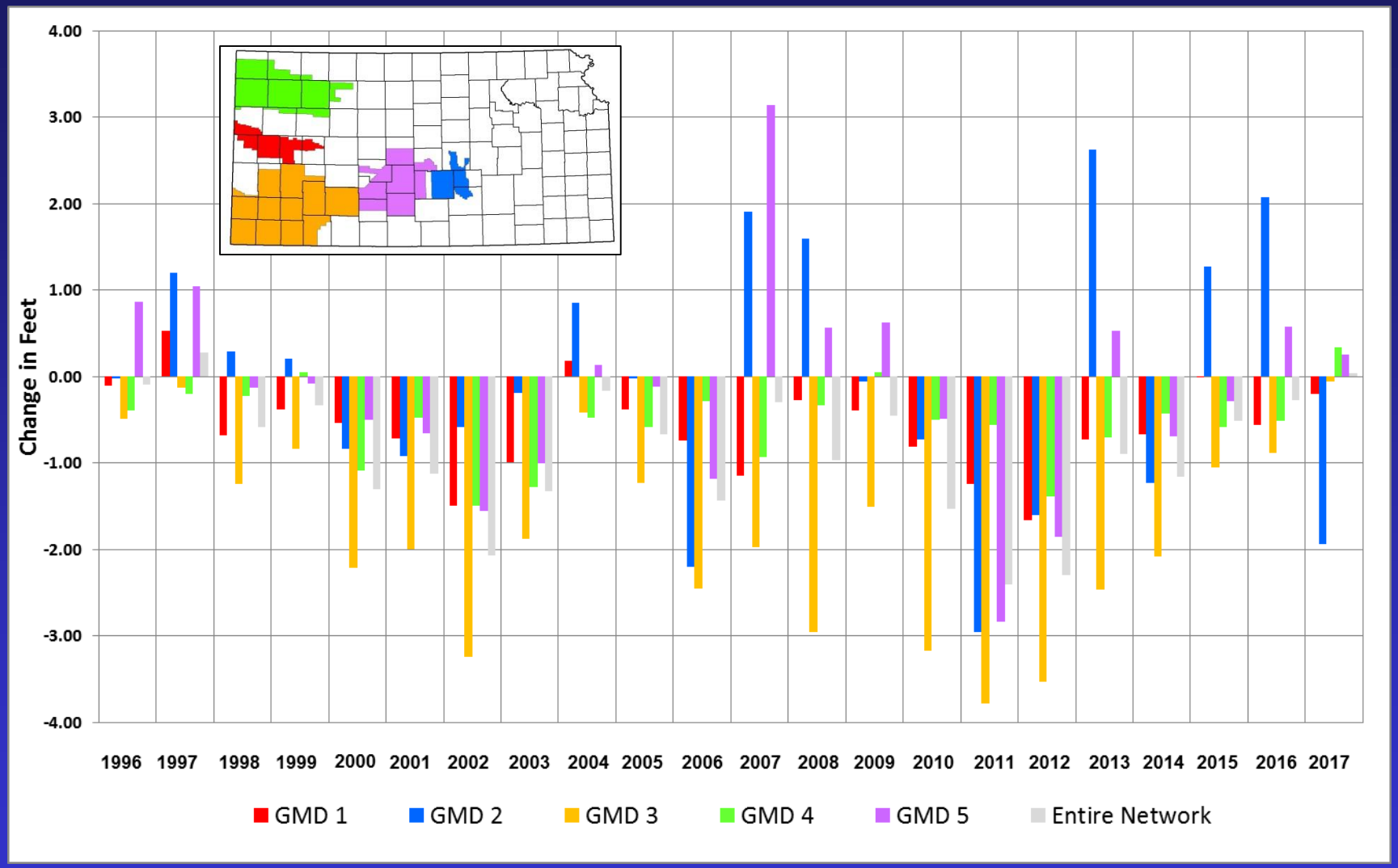
Kansas Geological Survey
University of Kansas

2018 Water Levels Results

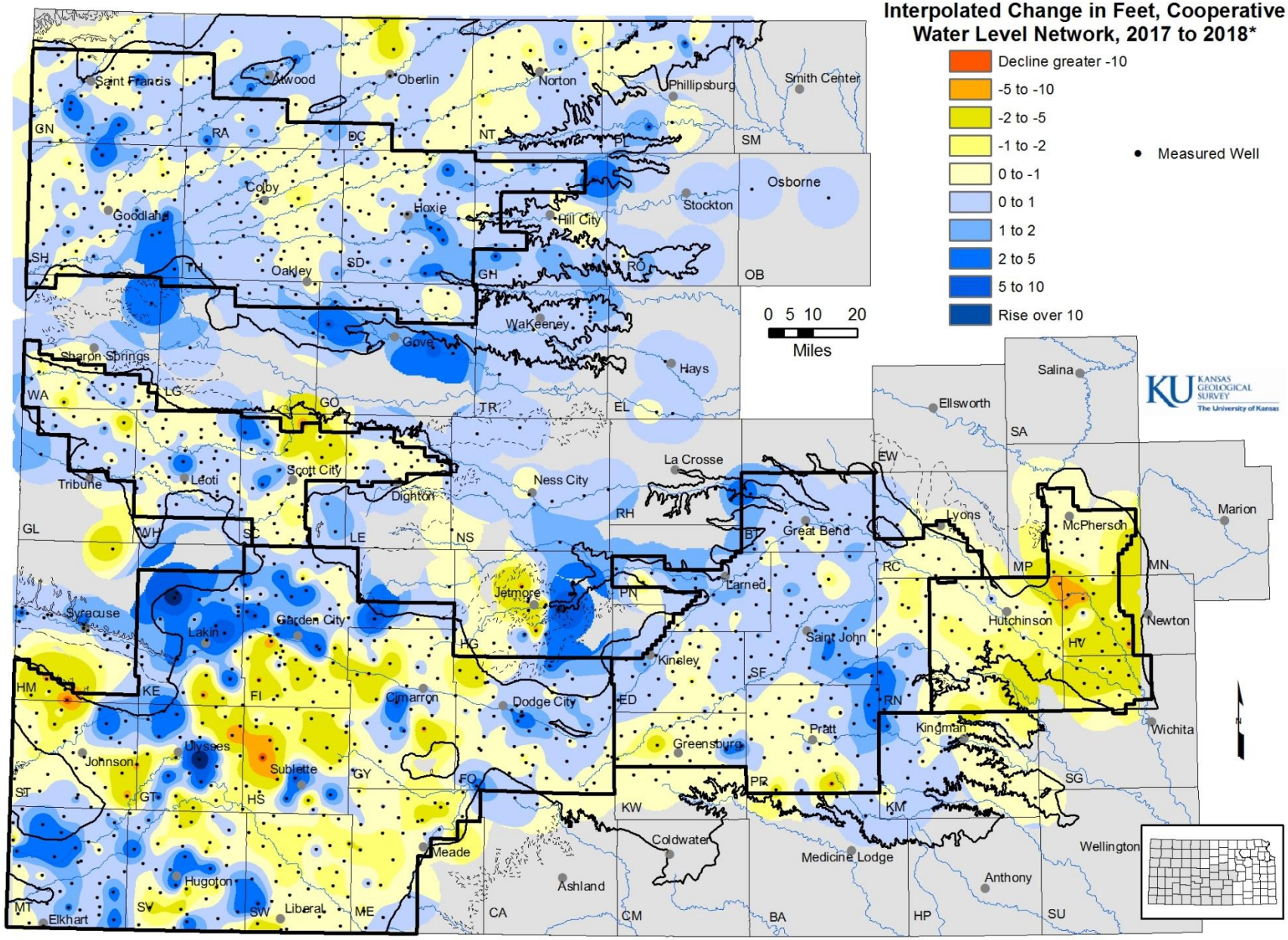
The 2018 Cooperative Water Level Network



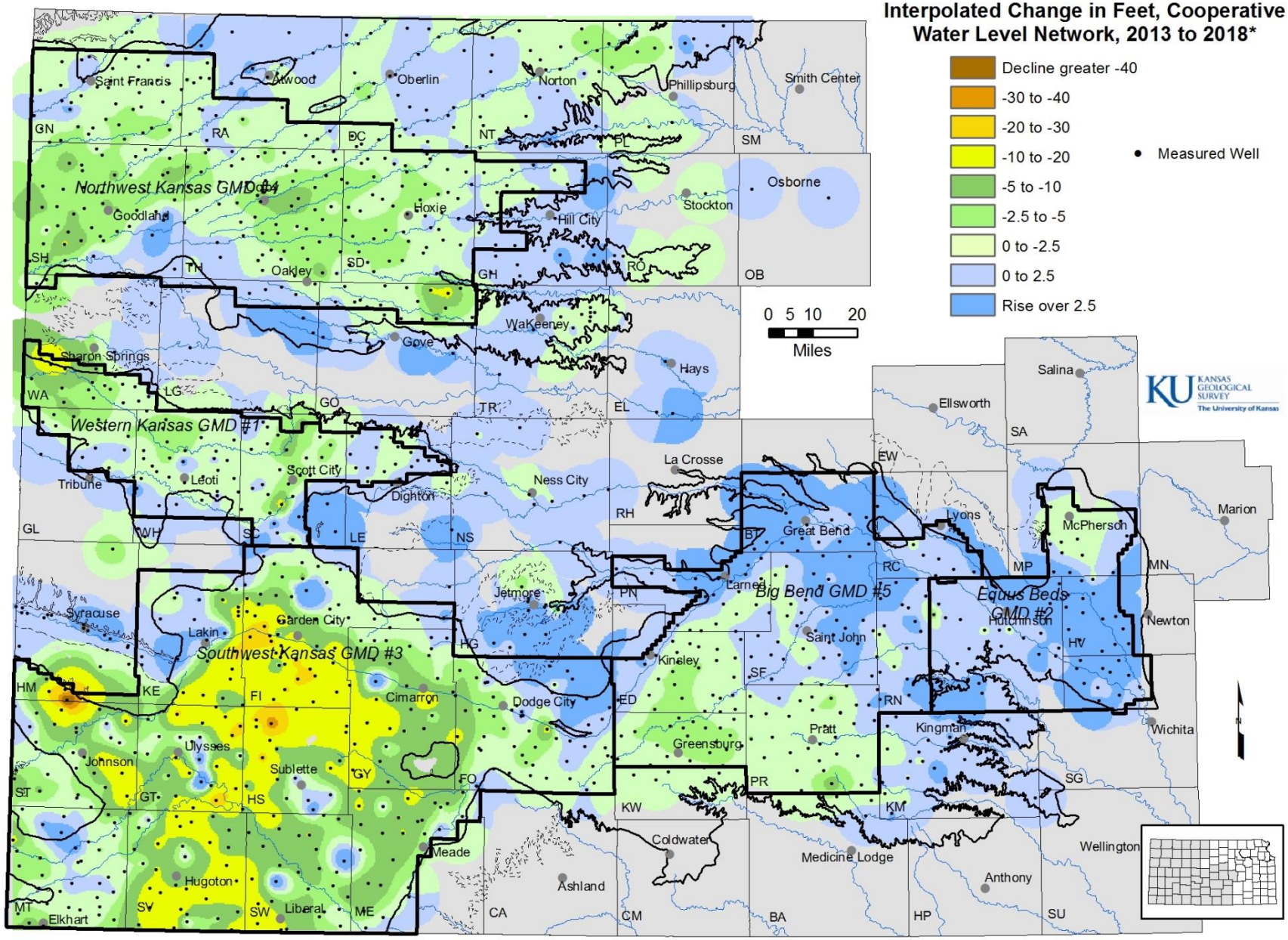
Average Change (by well)



*Results are based only on the cooperative network (KGS and KDA-DWR) and do not include sub-regional networks from the KDA-DWR, KGS, or local GMDs. 2018 water levels are provisional.

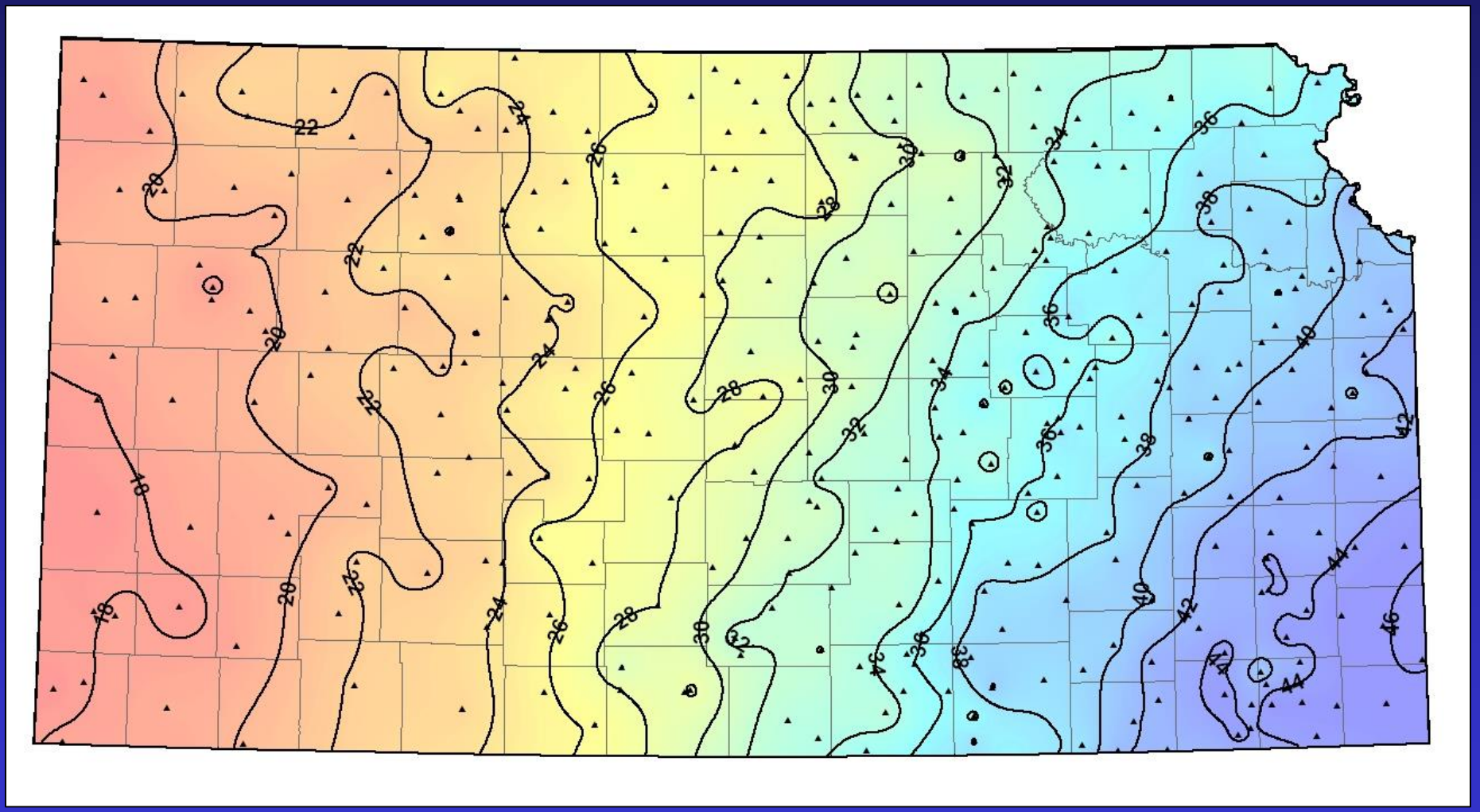


*Results are based only on the cooperative network (KGS and KDA-DWR) and do not include sub-regional networks from the KGS, KDA-DWR or local GMDs.



*Results are based only on the cooperative network (KGS and KDA-DWR) and do not include sub-regional networks from the KGS, KDA-DWR or local GMDs.

1981-2010 Normal Precipitation



Source- National Oceanic and Atmospheric Administration (NOAA)

Percent Departure from Normal Precipitation

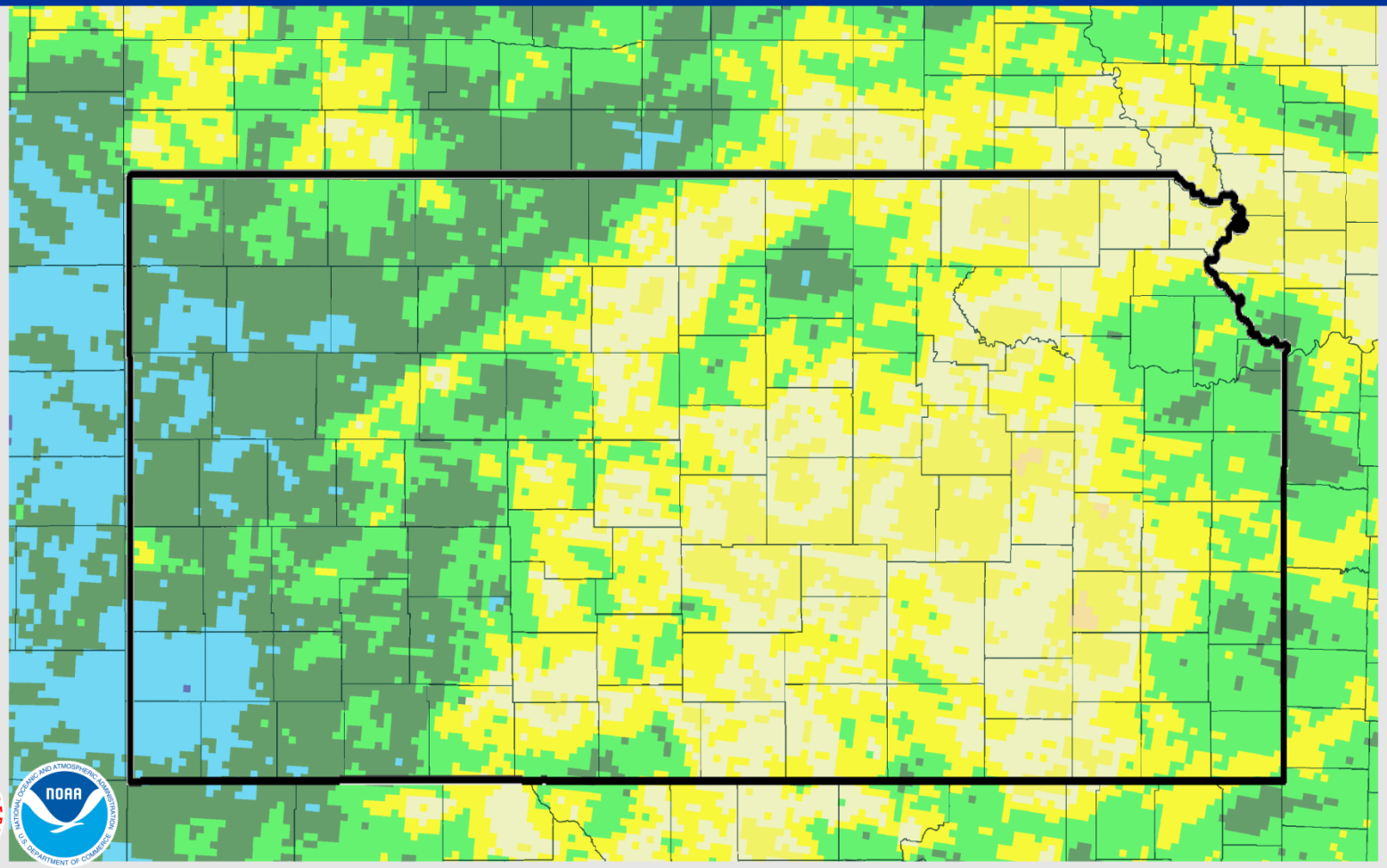
Source- National Oceanic and Atmospheric Administration (NOAA)

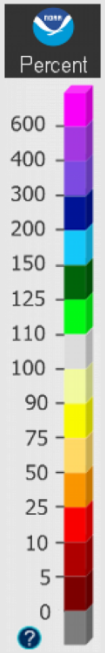
January 01, 2017 Annual Percent Precipitation

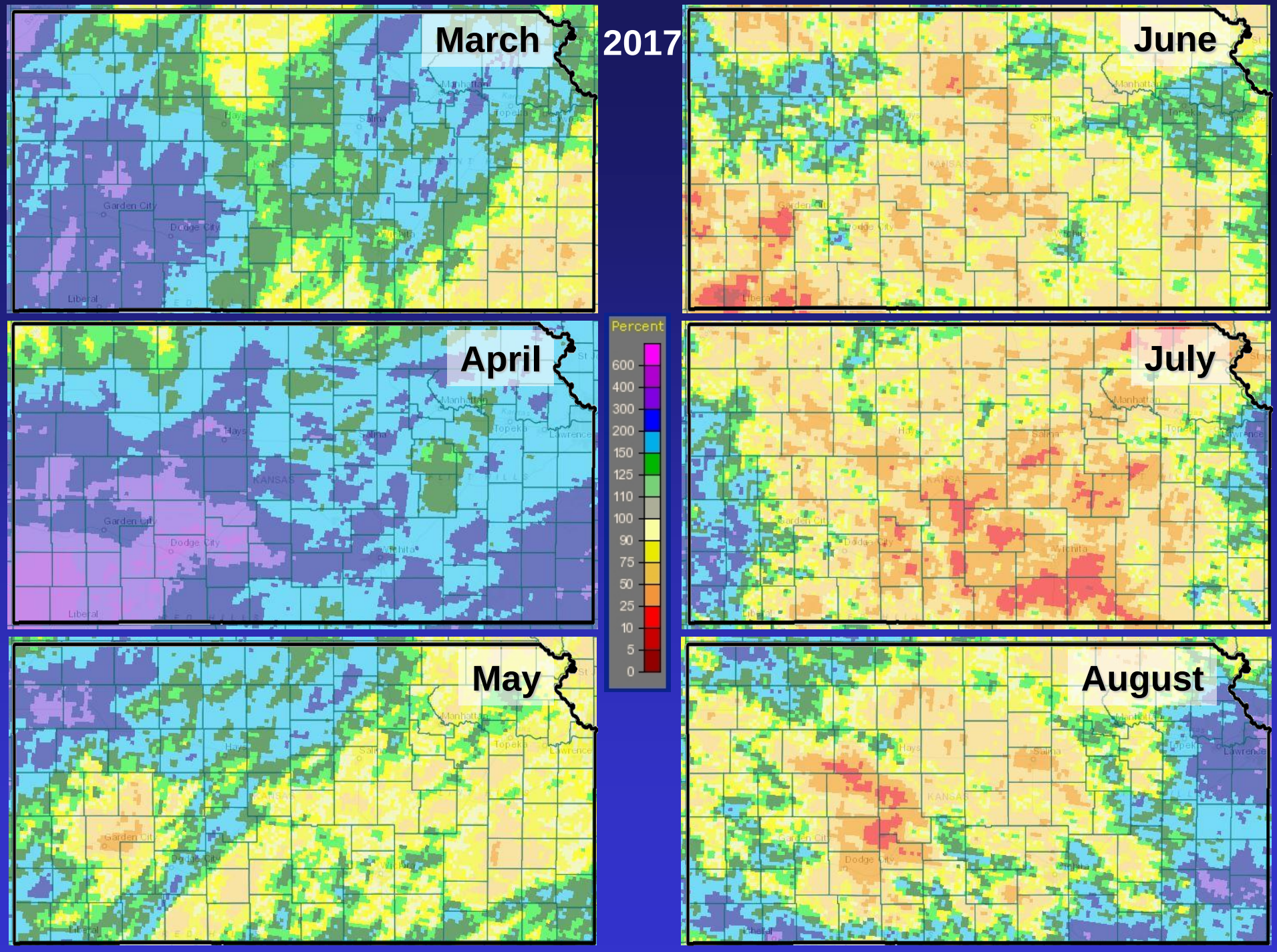
Created on: January 23, 2018 - 17:29 UTC

Valid on: January 01, 2018 12:00 UTC

2017

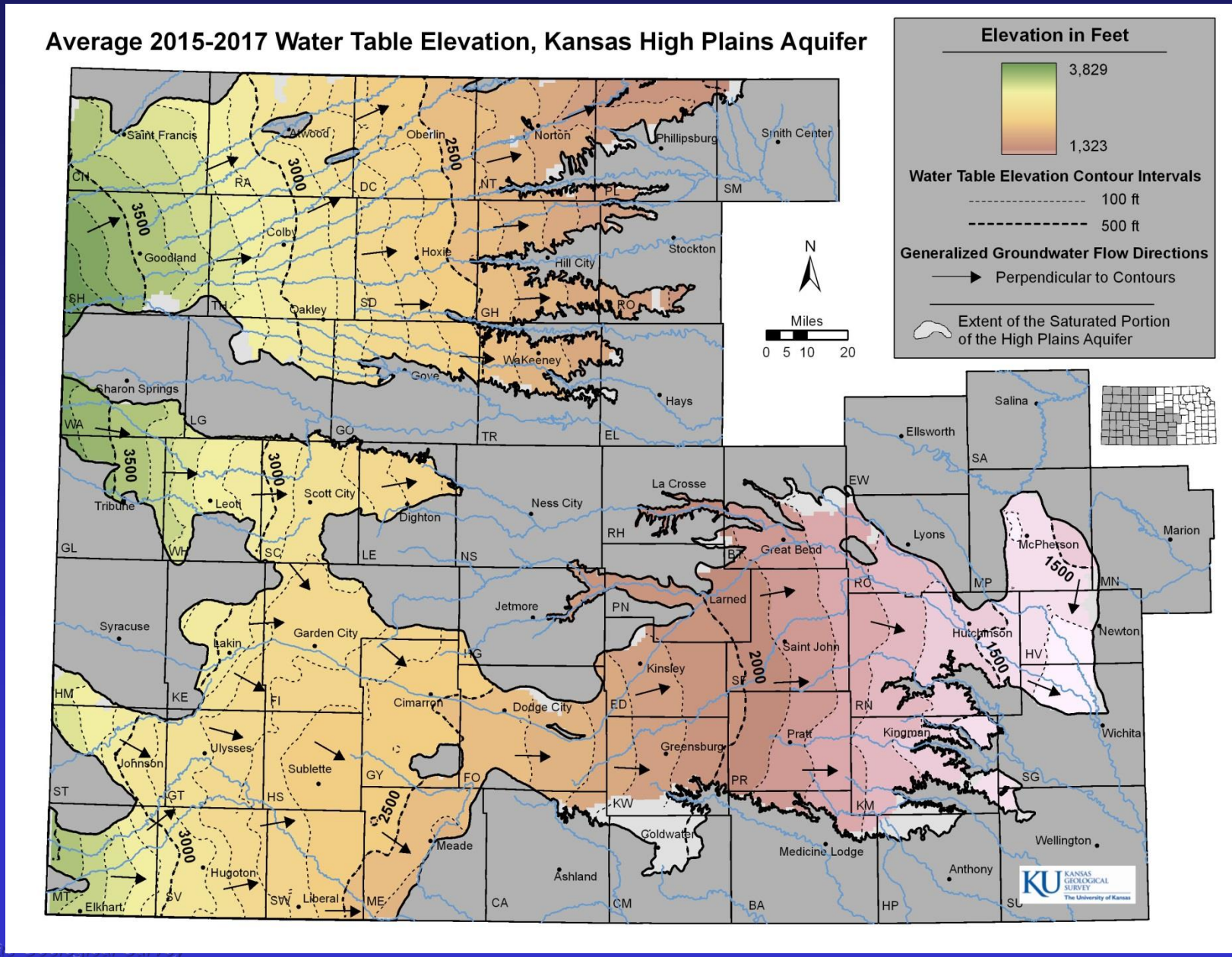




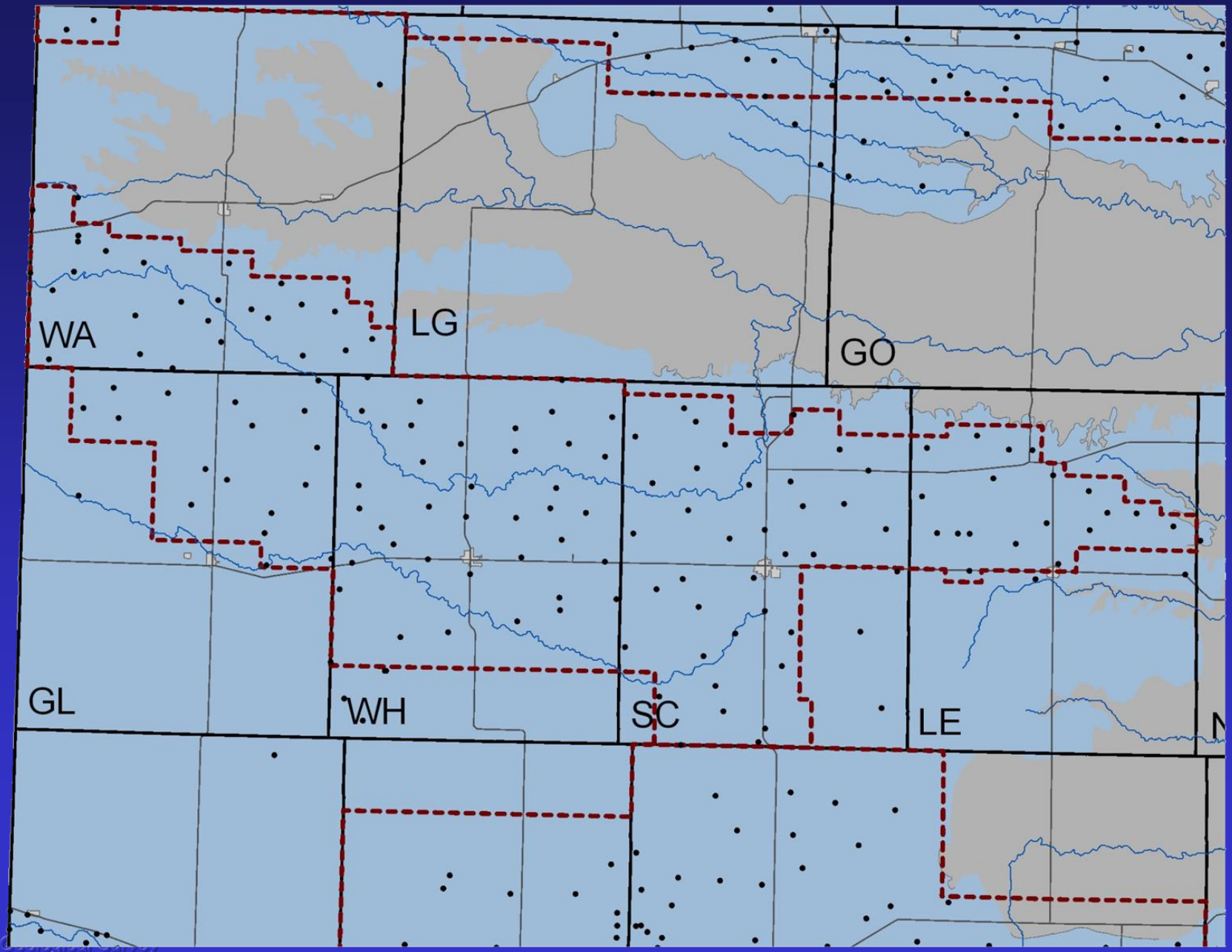

March
2017
June
April
July
May
August
Percent
600
400
300
200
150
125
110
100
90
75
50
25
10
5
0
Garden City
Dodge City
Liberal
Hays
Salina
Topeka
Lawrence
Manhattan
Wichita
KANSAS

Groundwater Flow Directions and Velocities

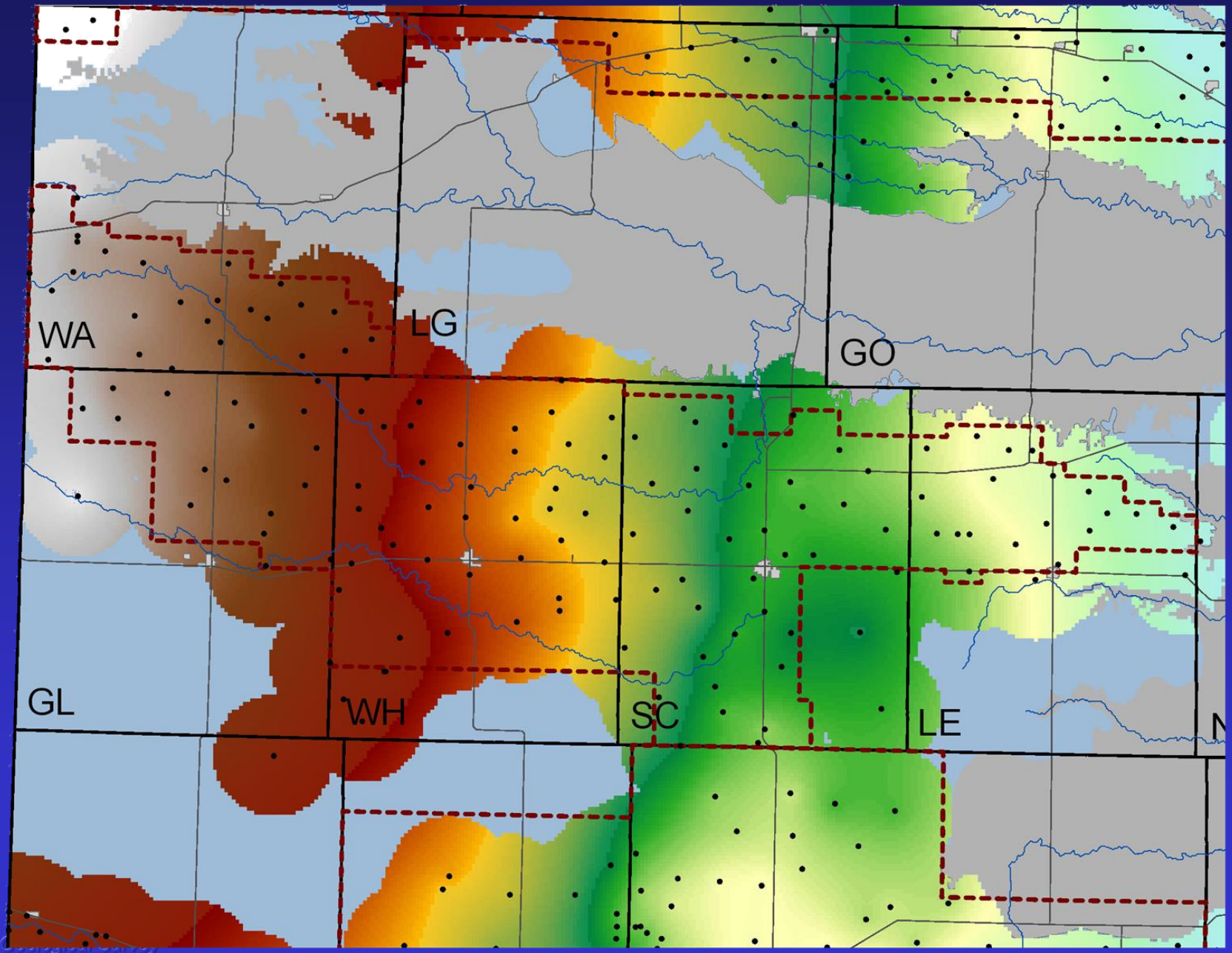
Water Table Elevation and Regional Flow Directions



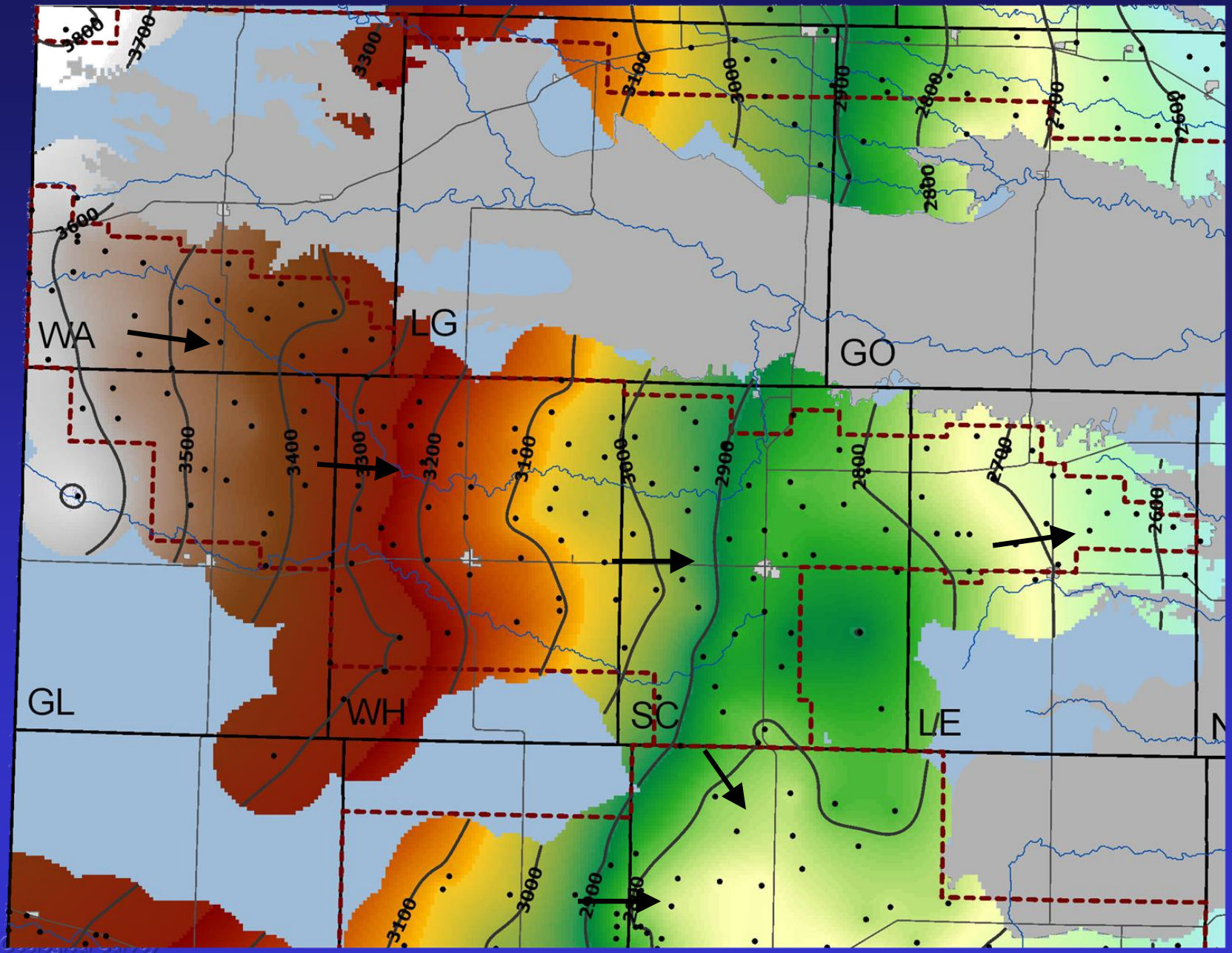
Aquifer Extent and Monitoring Wells



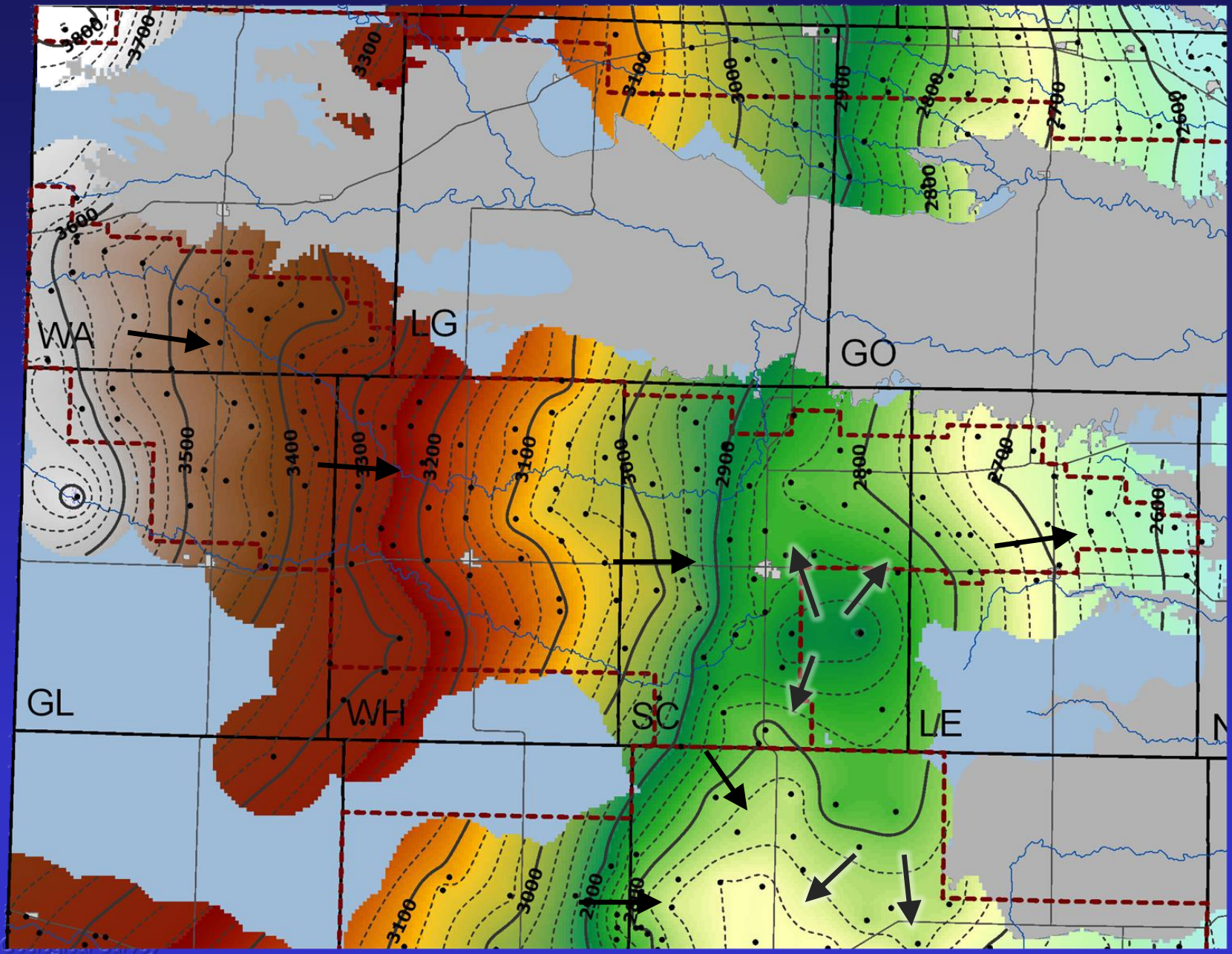
Interpolated 2015-2017 Water Table Elevations



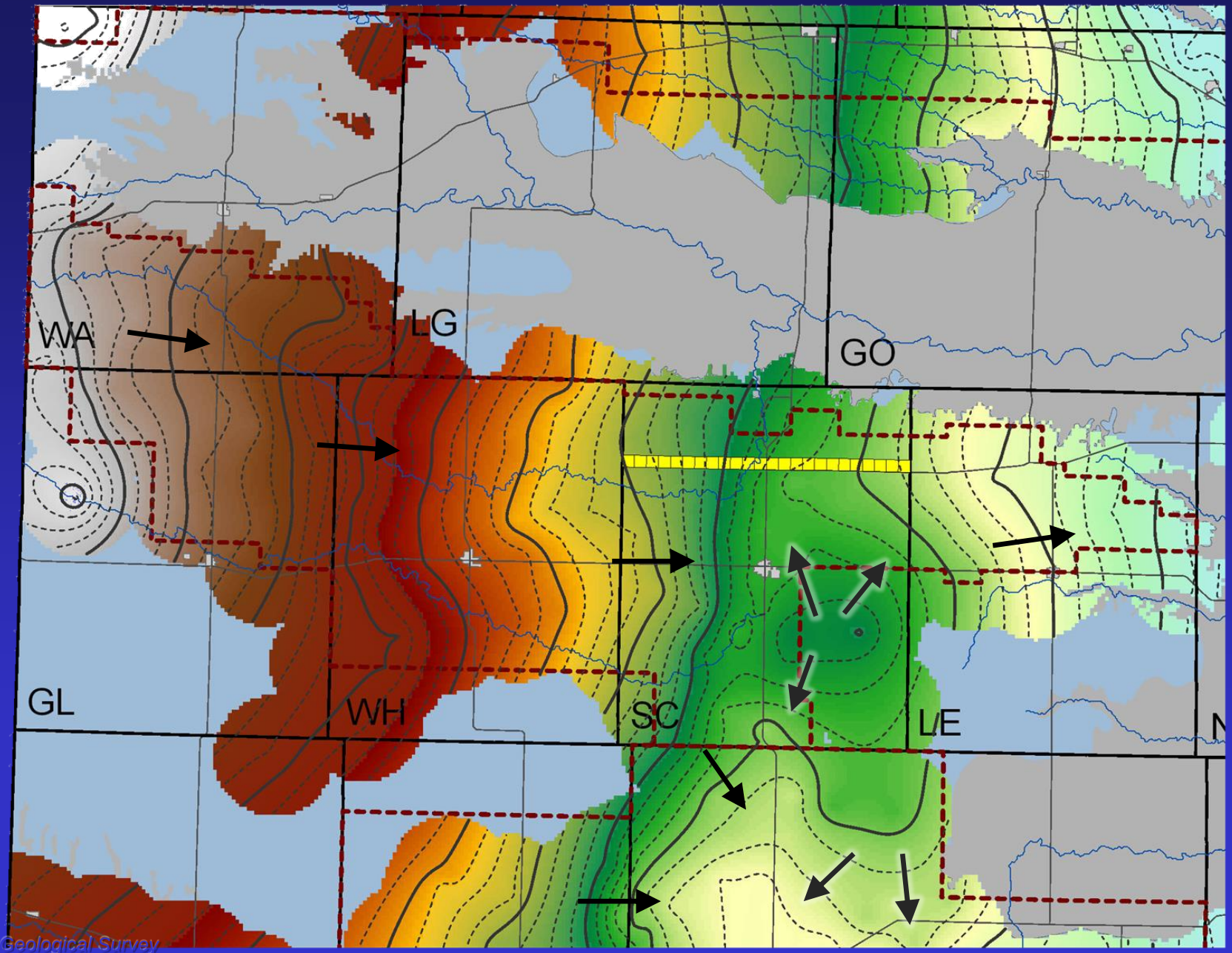
Water Table Elevations, 100 ft Contours



Water Table Elevations, 25 ft Contours

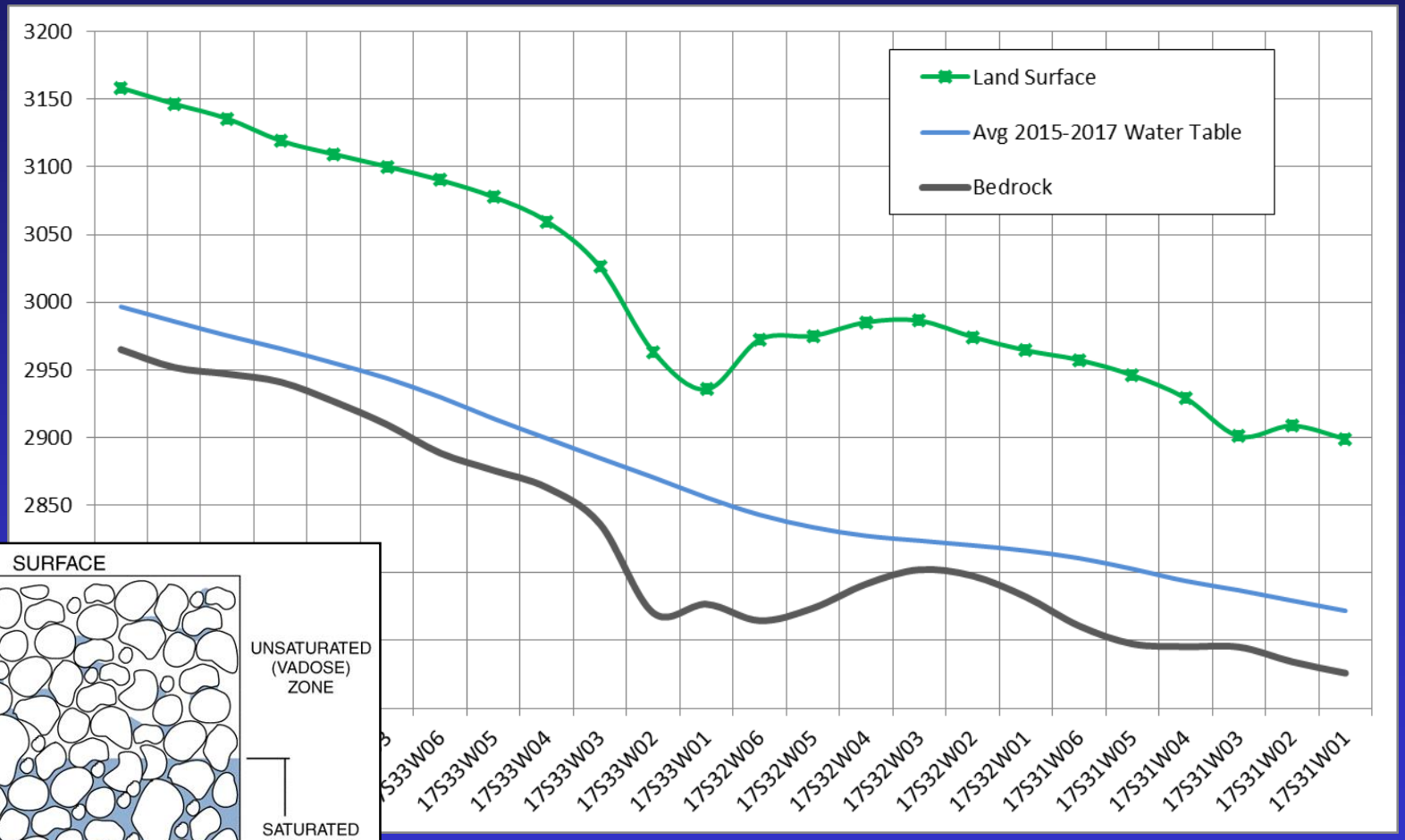


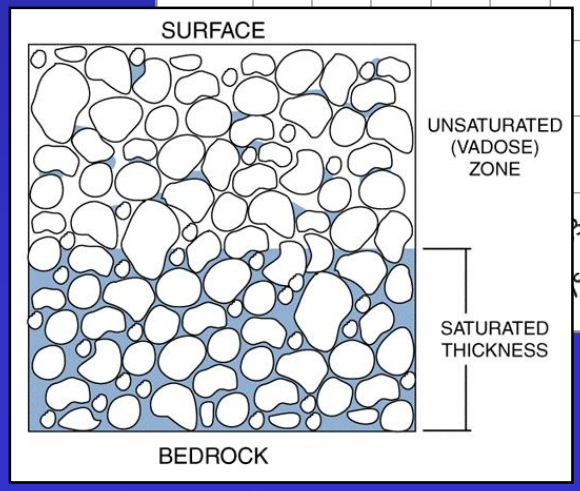
Groundwater Flow Velocity Example



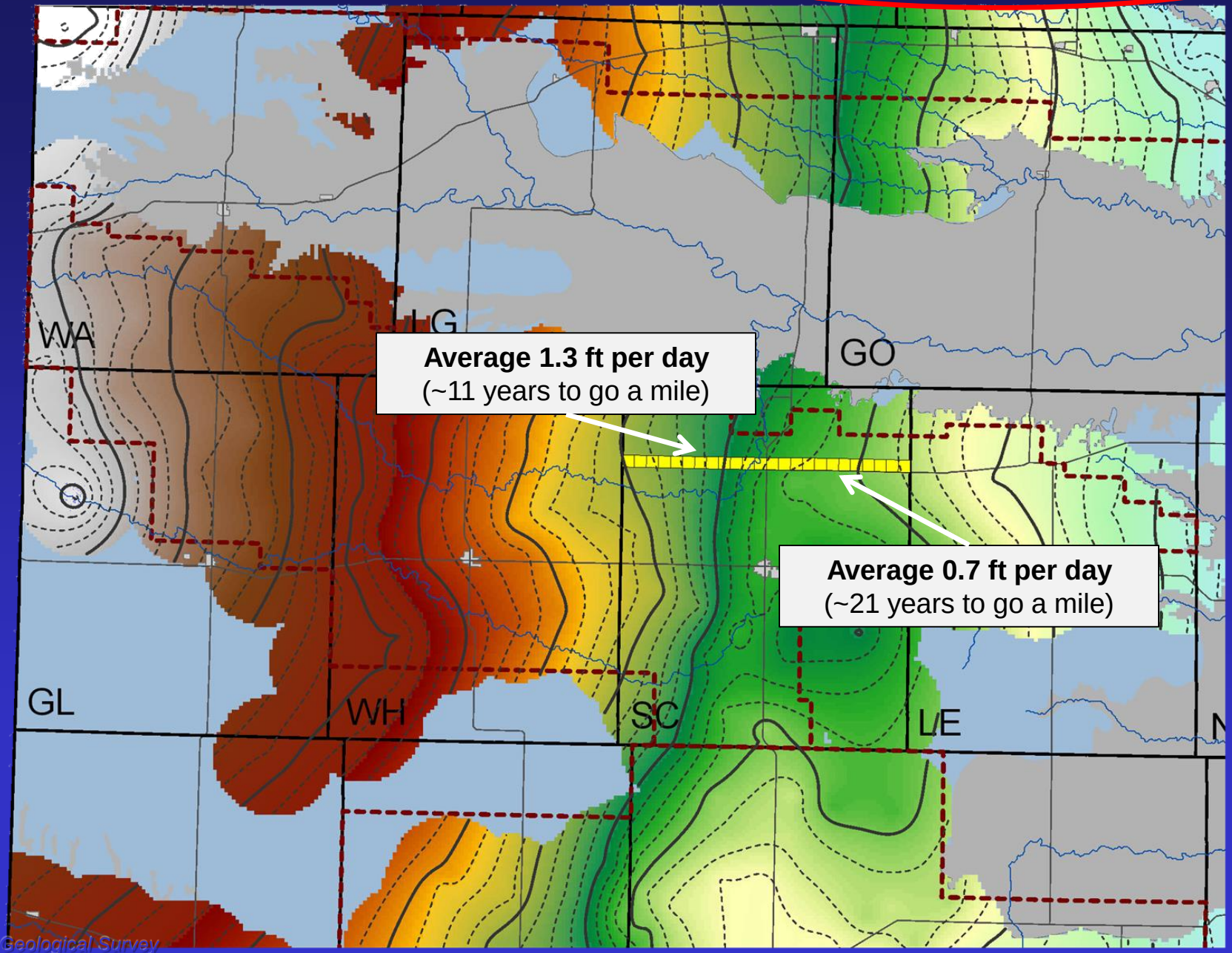
West to East Profile

Velocity (ft/day) = Gradient * Hydraulic Conductivity (ft/day) / Specific Yield



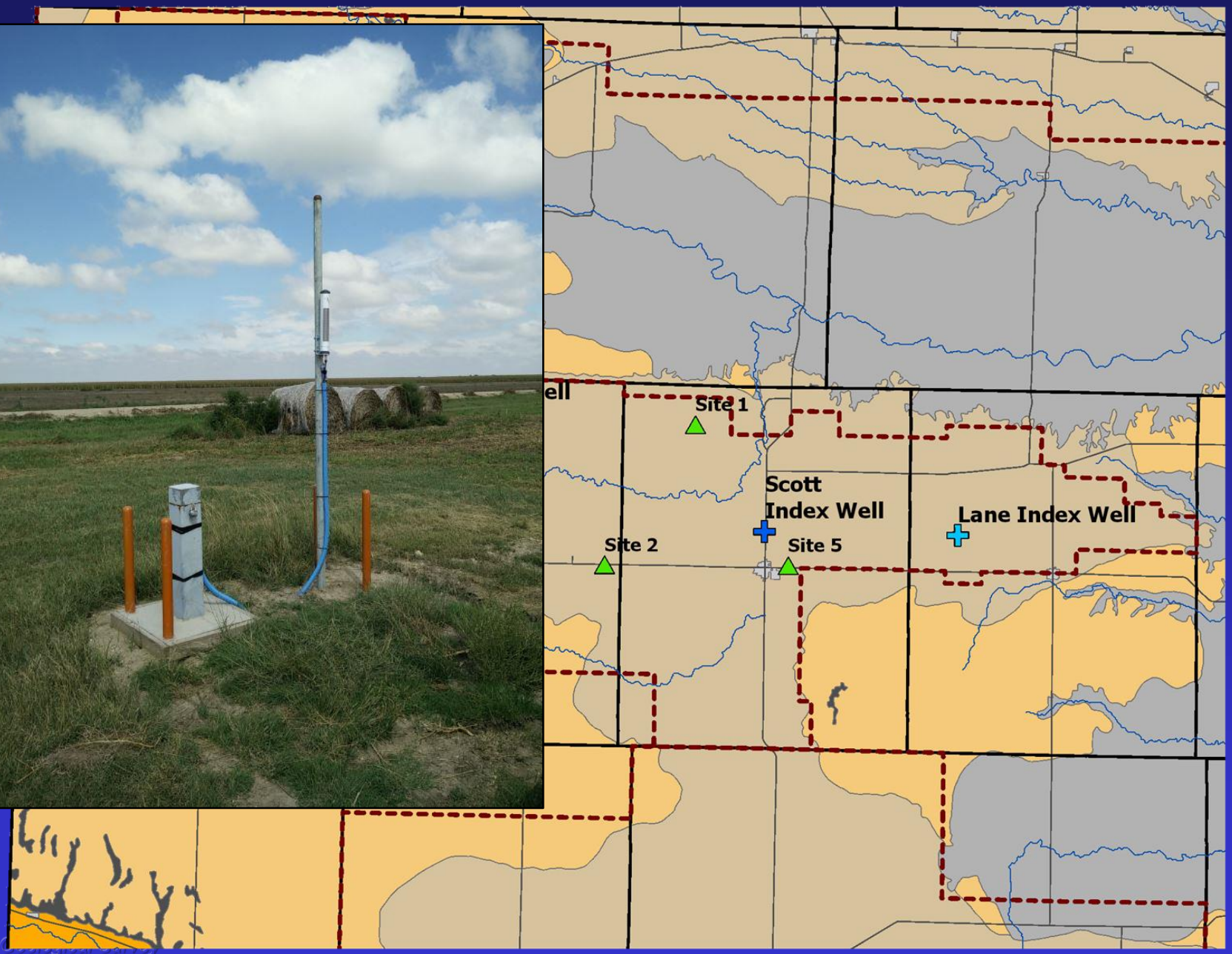


Computed Linear Flow Velocities, Winter/non-Pumping

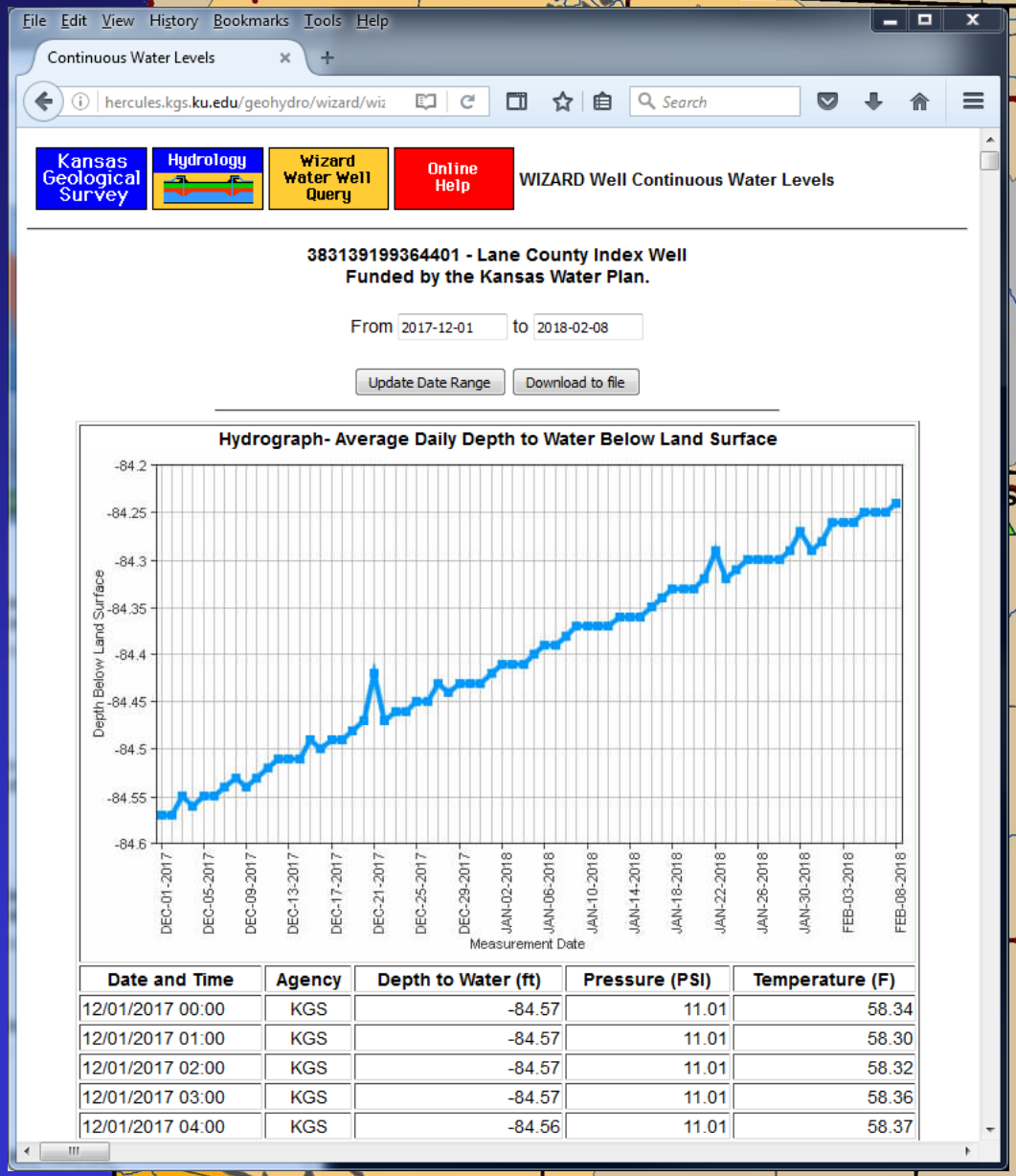


Index Wells

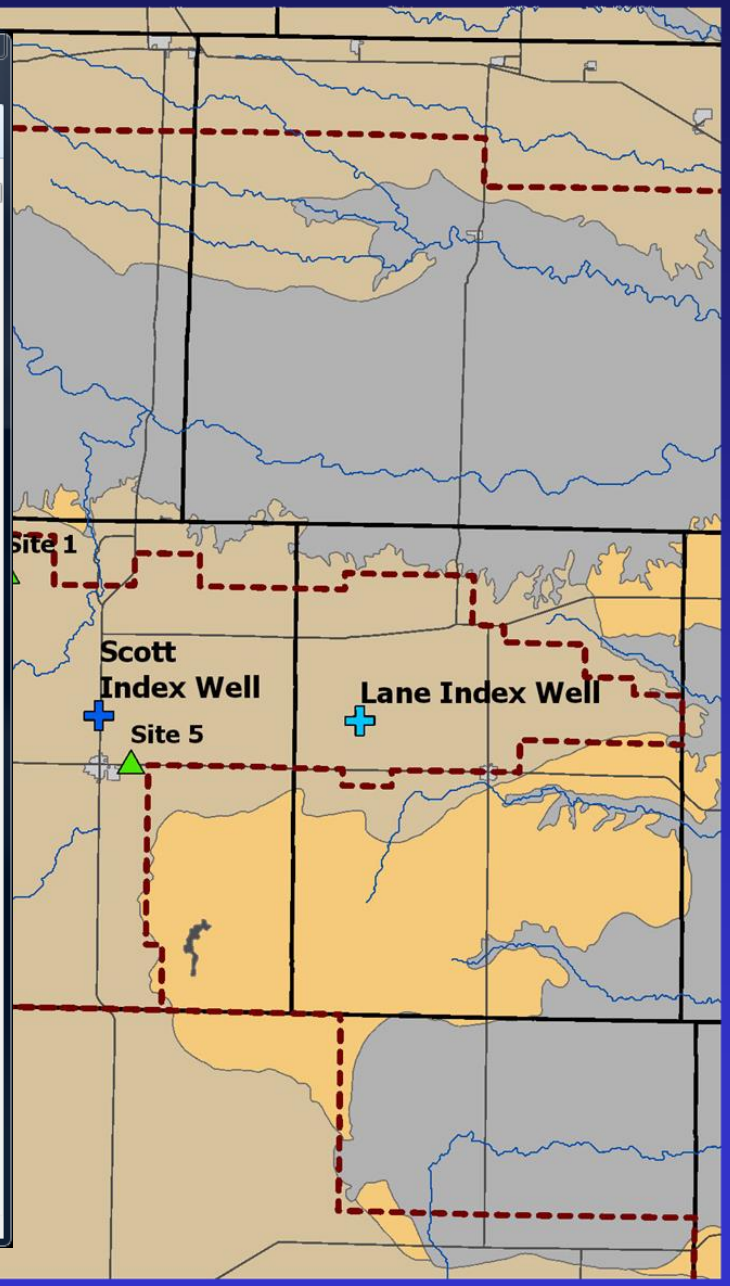
Continuous Water-Level Recording Sites



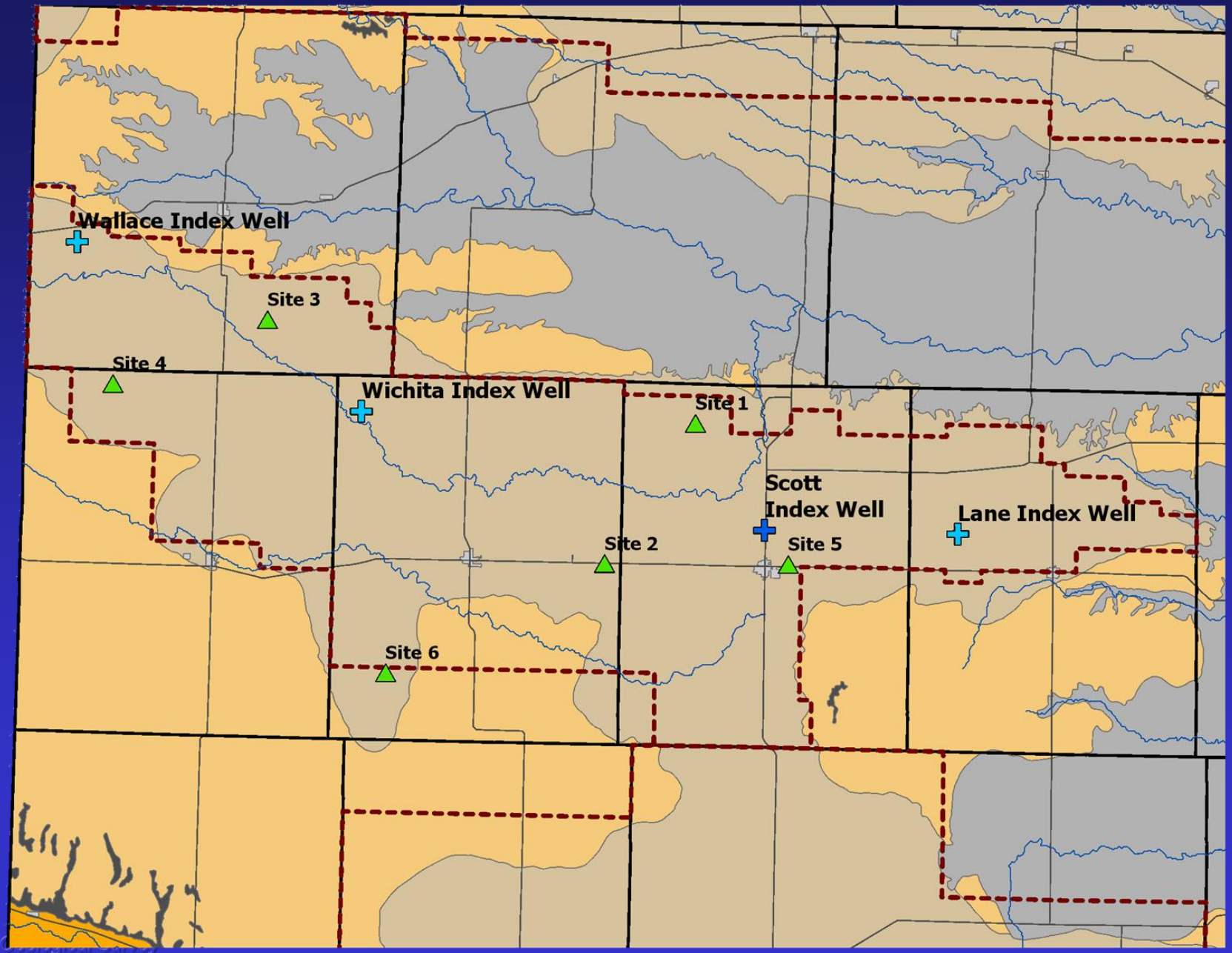
Continuous Water-Level Recording Sites



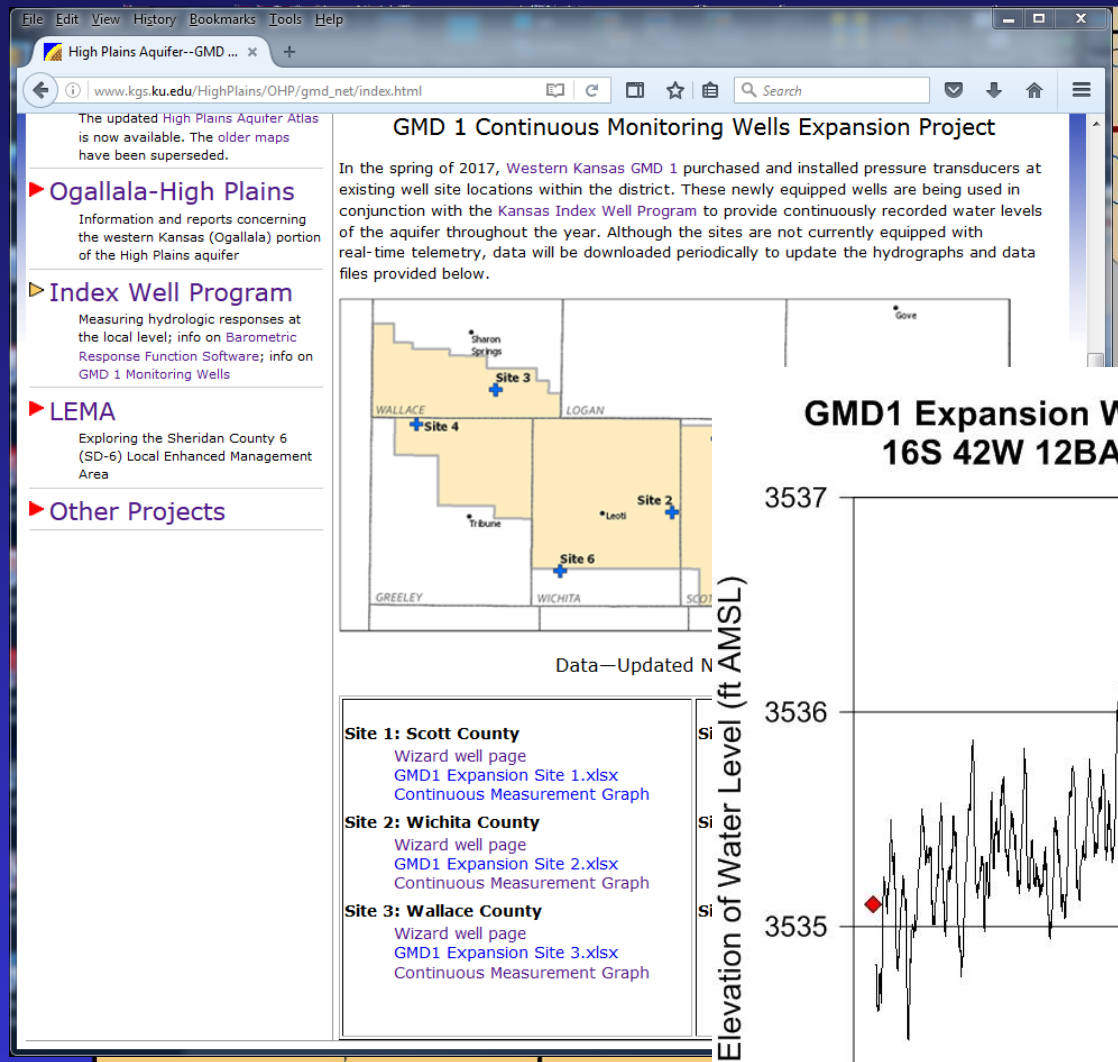
Date and Time	Agency	Depth to Water (ft)	Pressure (PSI)	Temperature (F)
12/01/2017 00:00	KGS	-84.57	11.01	58.34
12/01/2017 01:00	KGS	-84.57	11.01	58.30
12/01/2017 02:00	KGS	-84.57	11.01	58.32
12/01/2017 03:00	KGS	-84.57	11.01	58.36
12/01/2017 04:00	KGS	-84.56	11.01	58.37

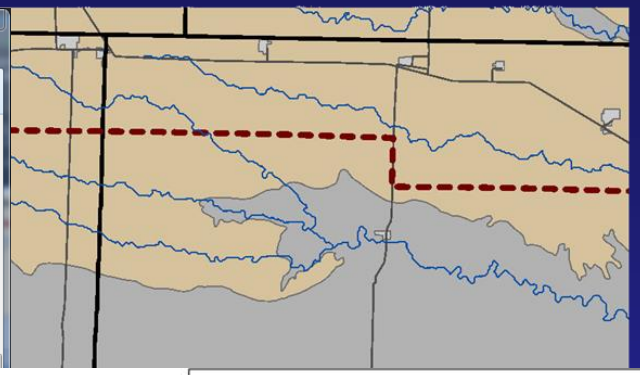


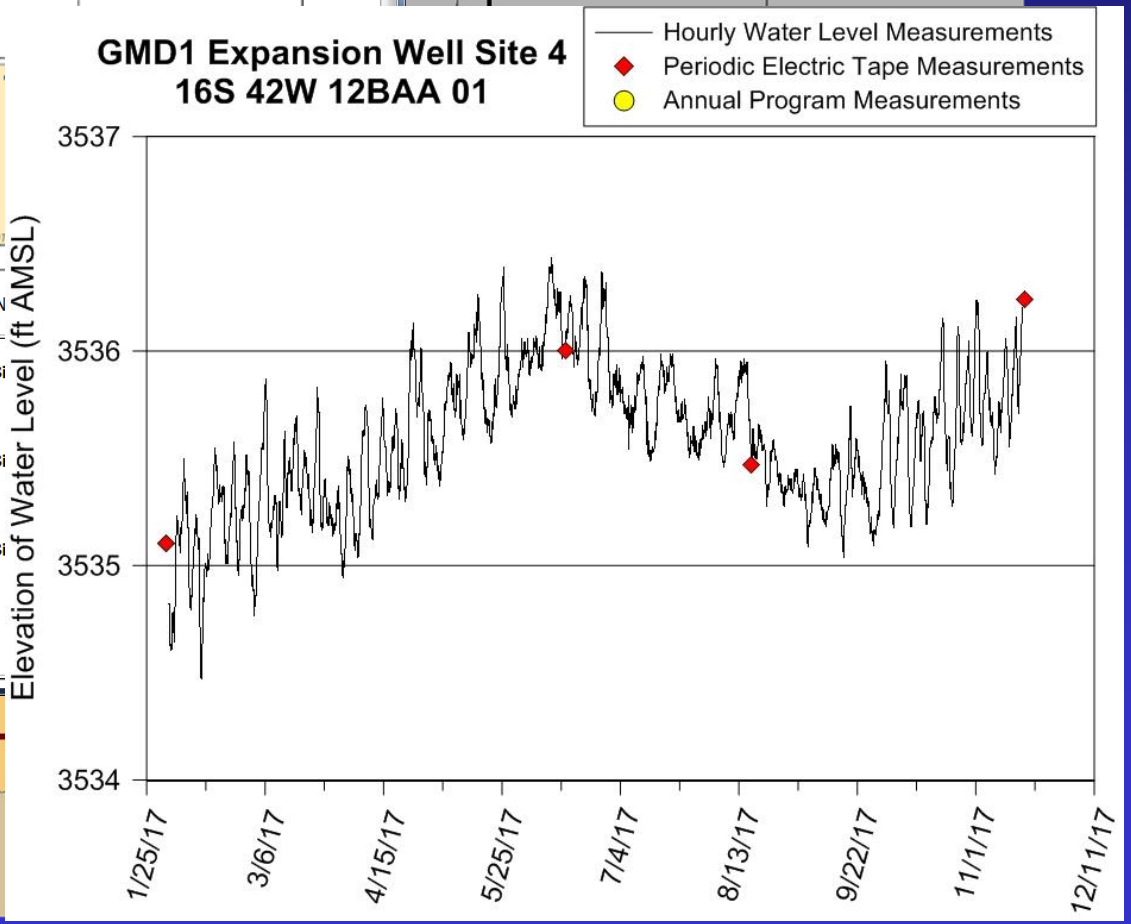
“Poor Man’s” Index Wells



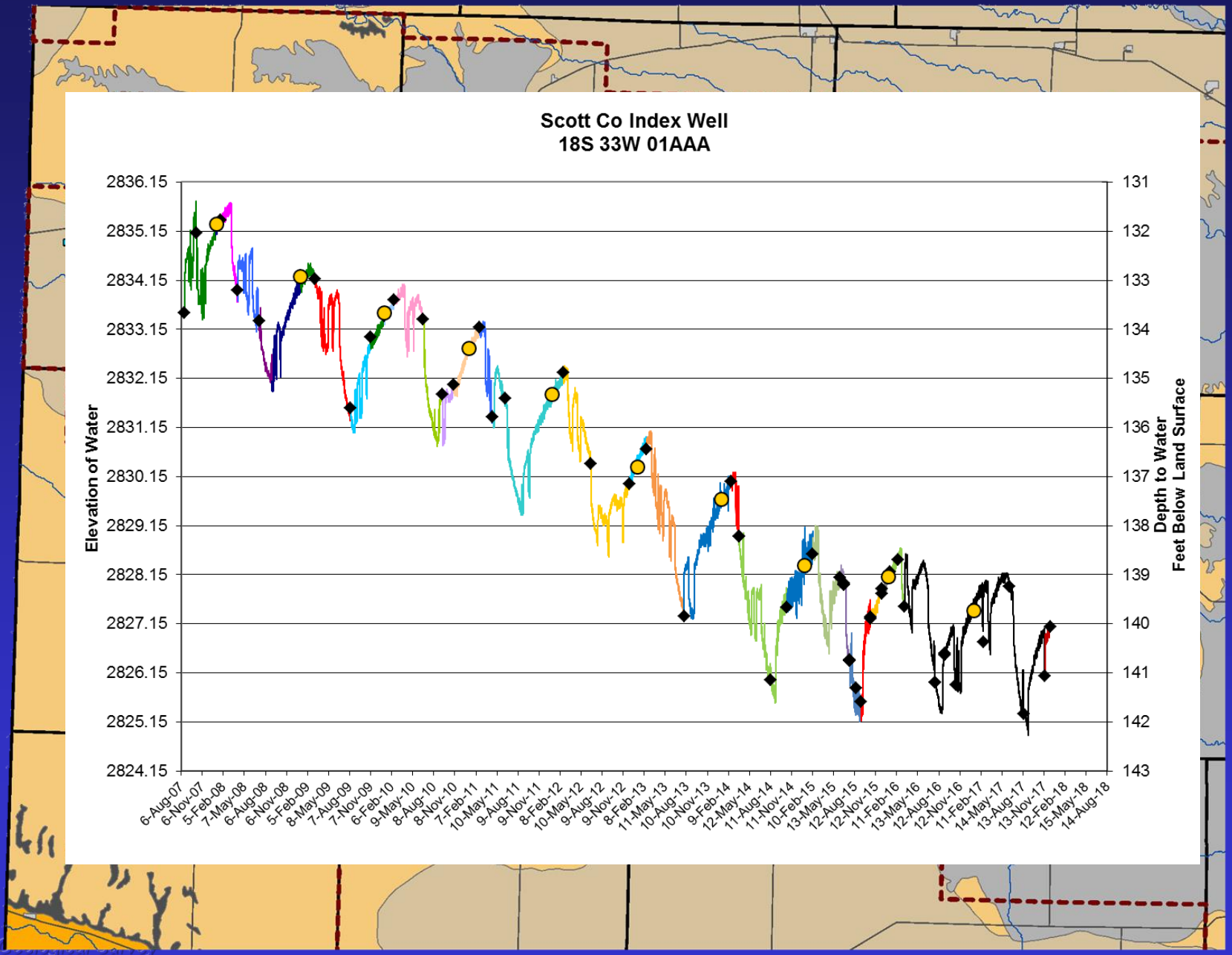
“Poor Man’s” Index Wells



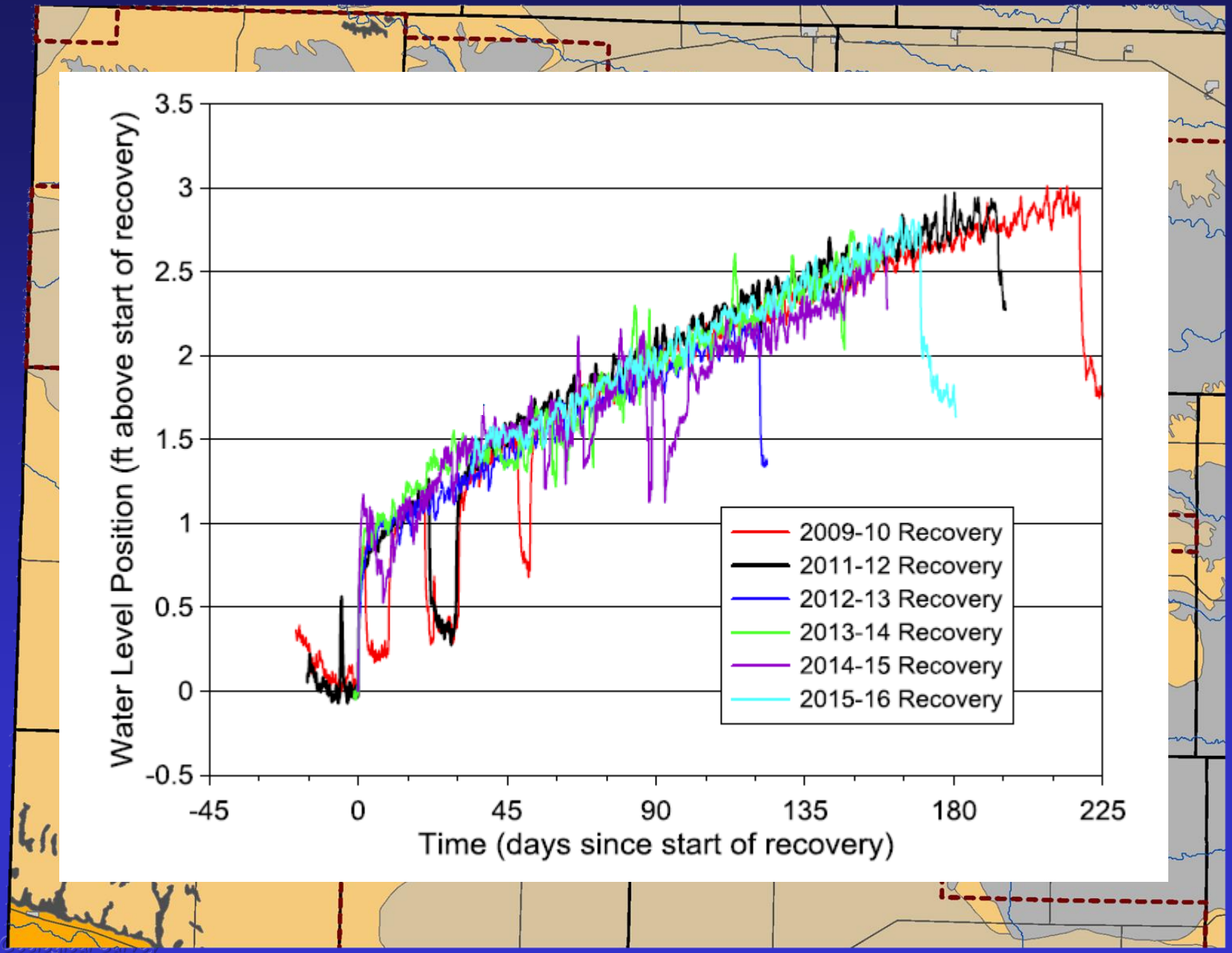




Scott County Index Well



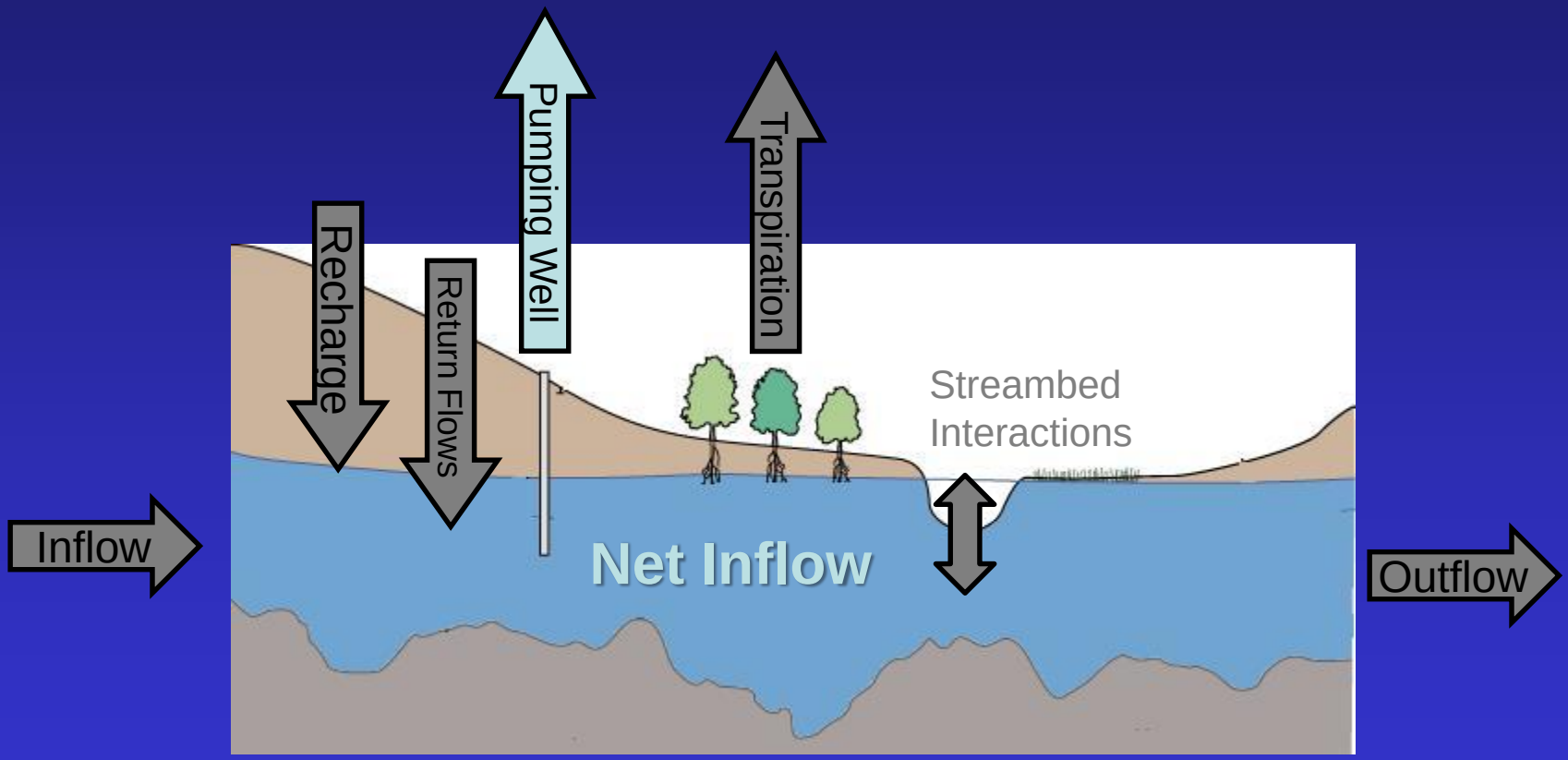
Scott County Index Well- Recovery Curves



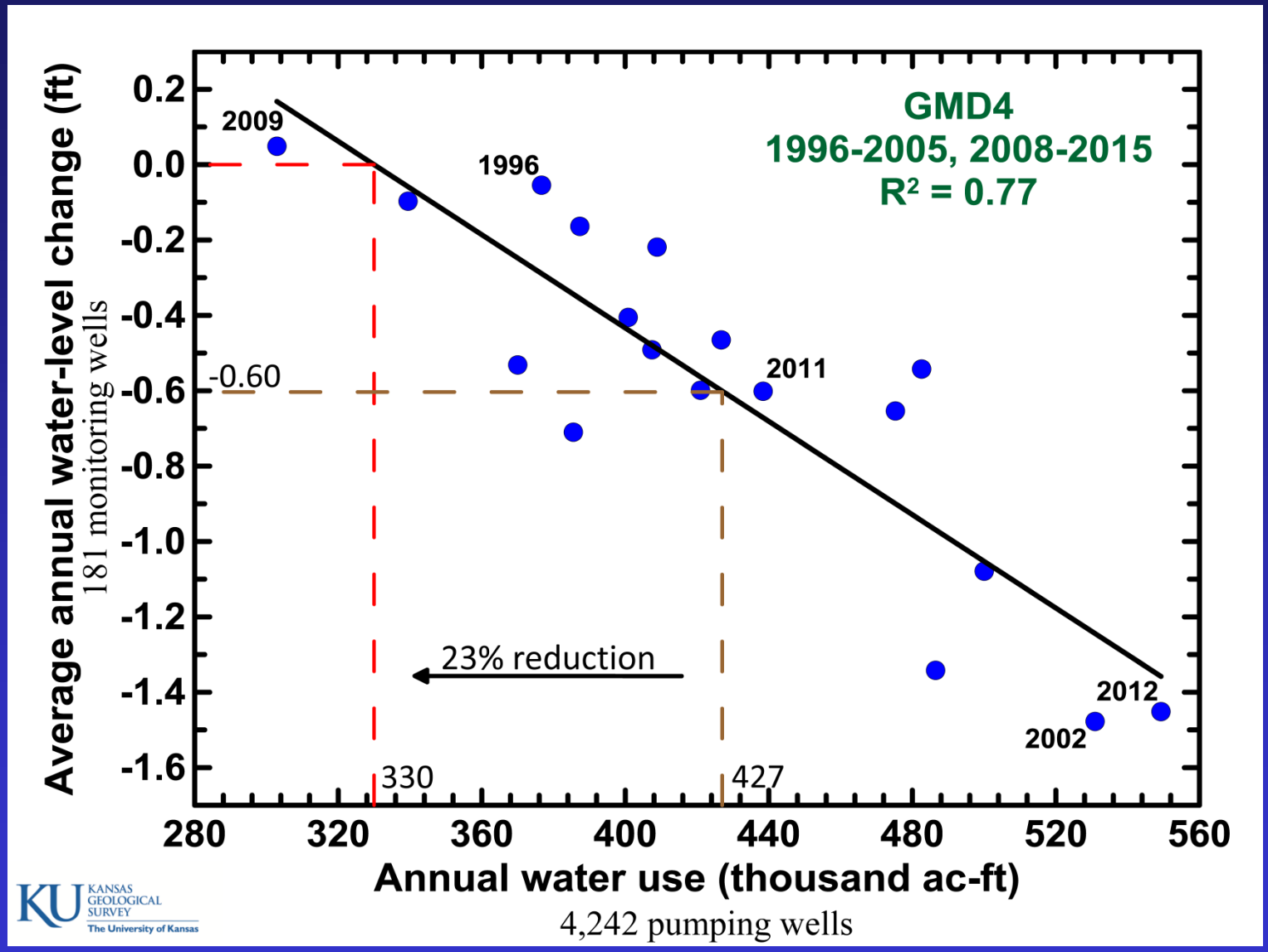
Water Use vs Water Level Decline Data Relationships

Q-Stable Assessment

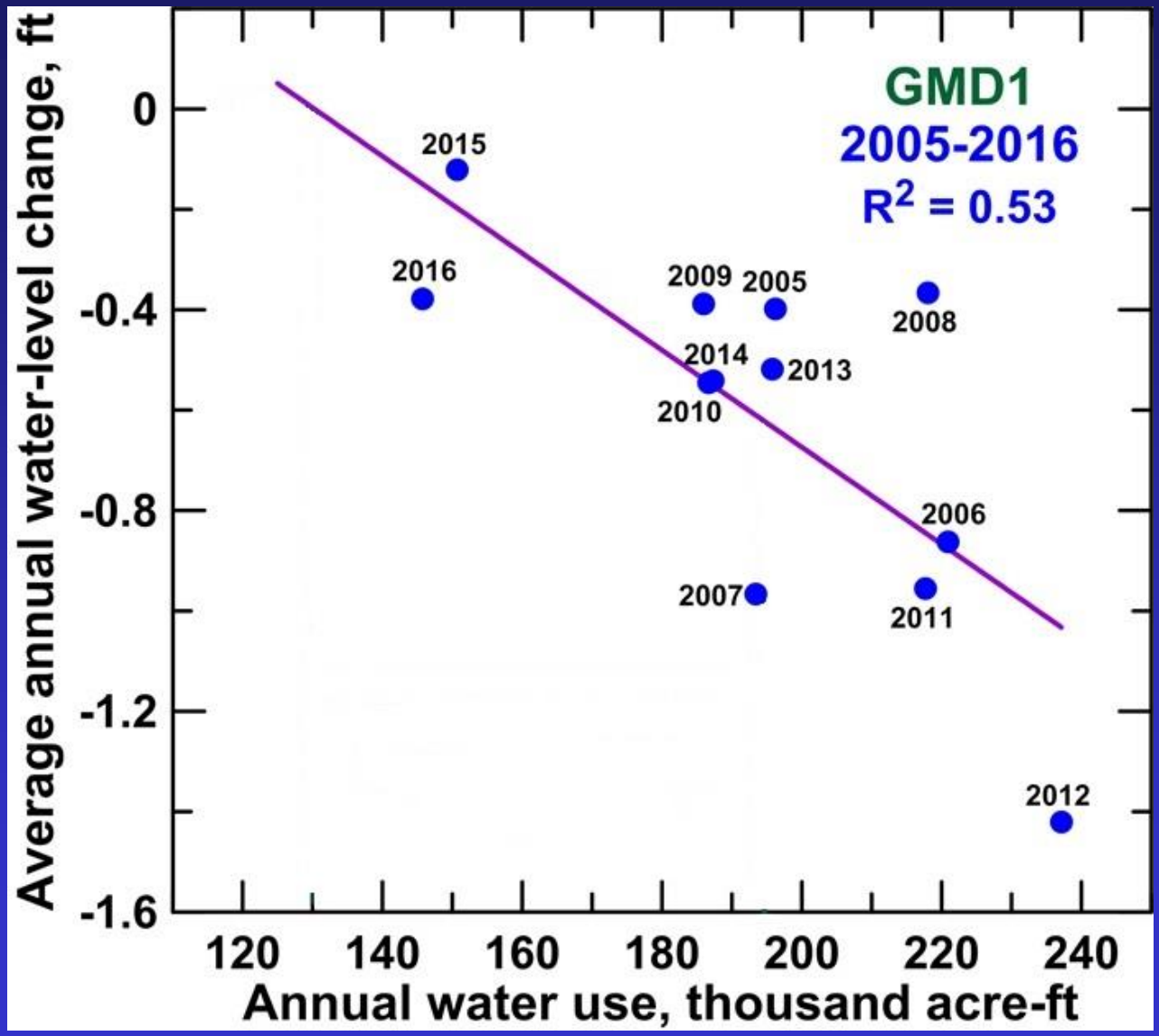
Isolating water-level change vs pumping



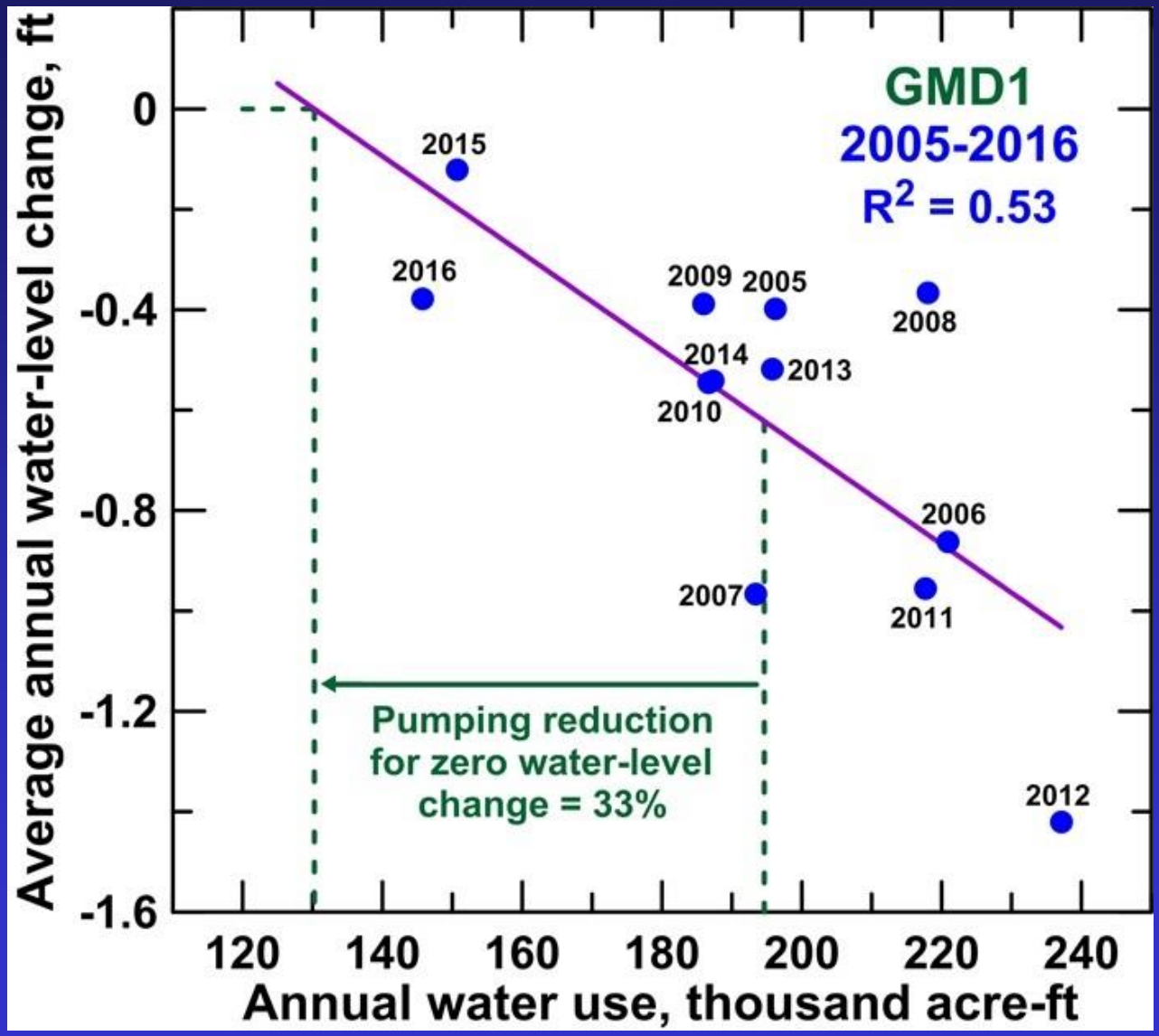
Governor's Press Conference, GMD4 Handout



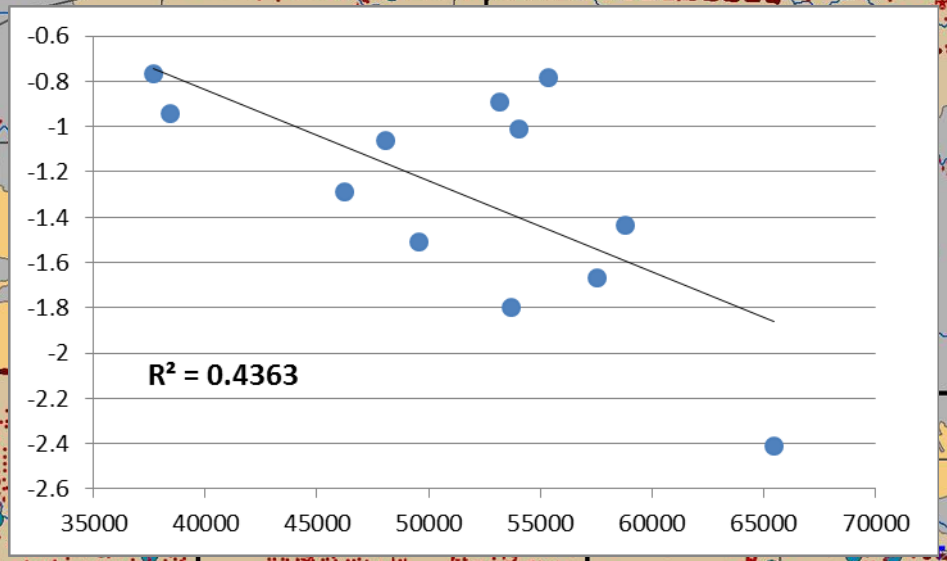
GMD1 Water Use vs Water Level Change



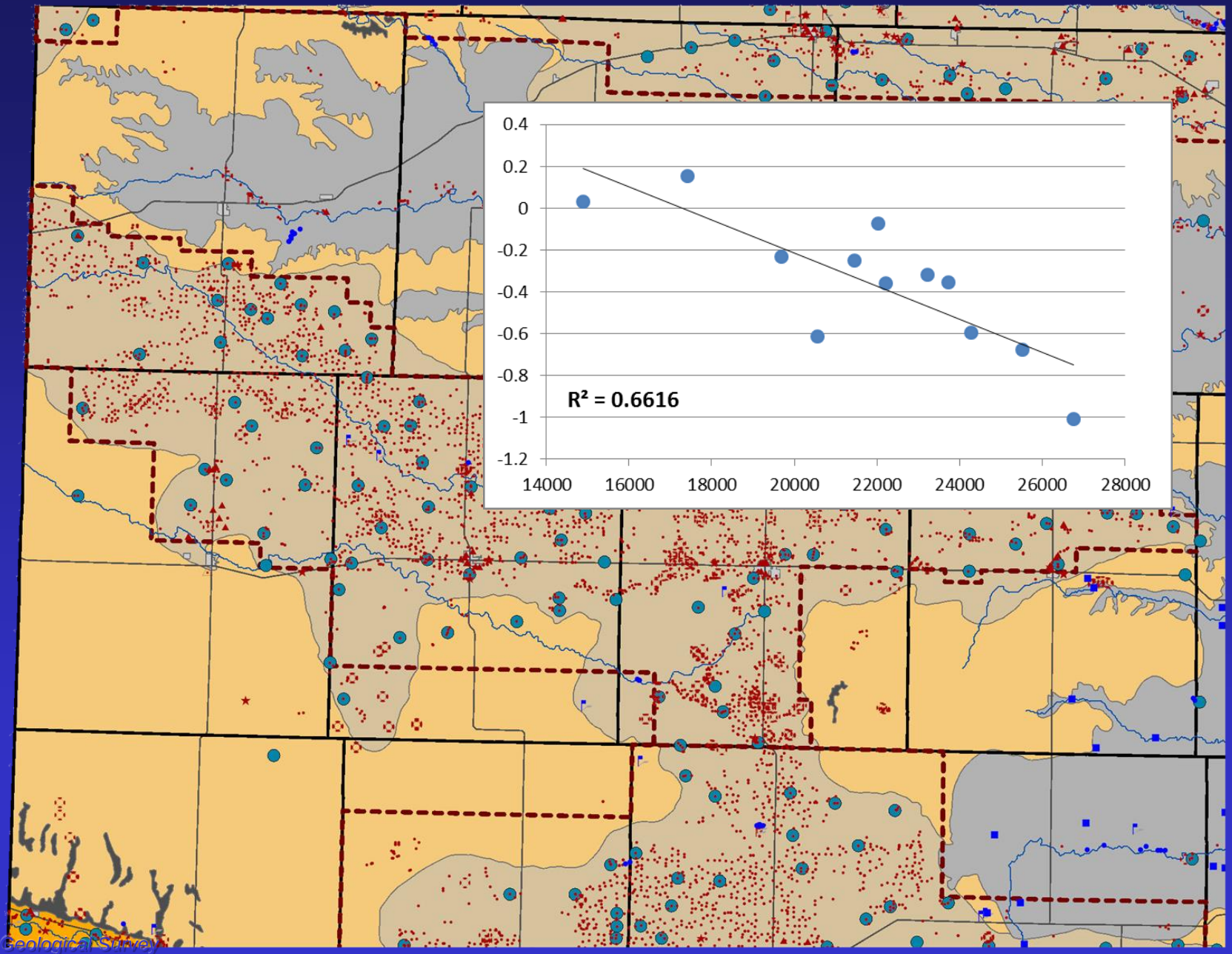
GMD1 Q-Stable Reduction = 33%



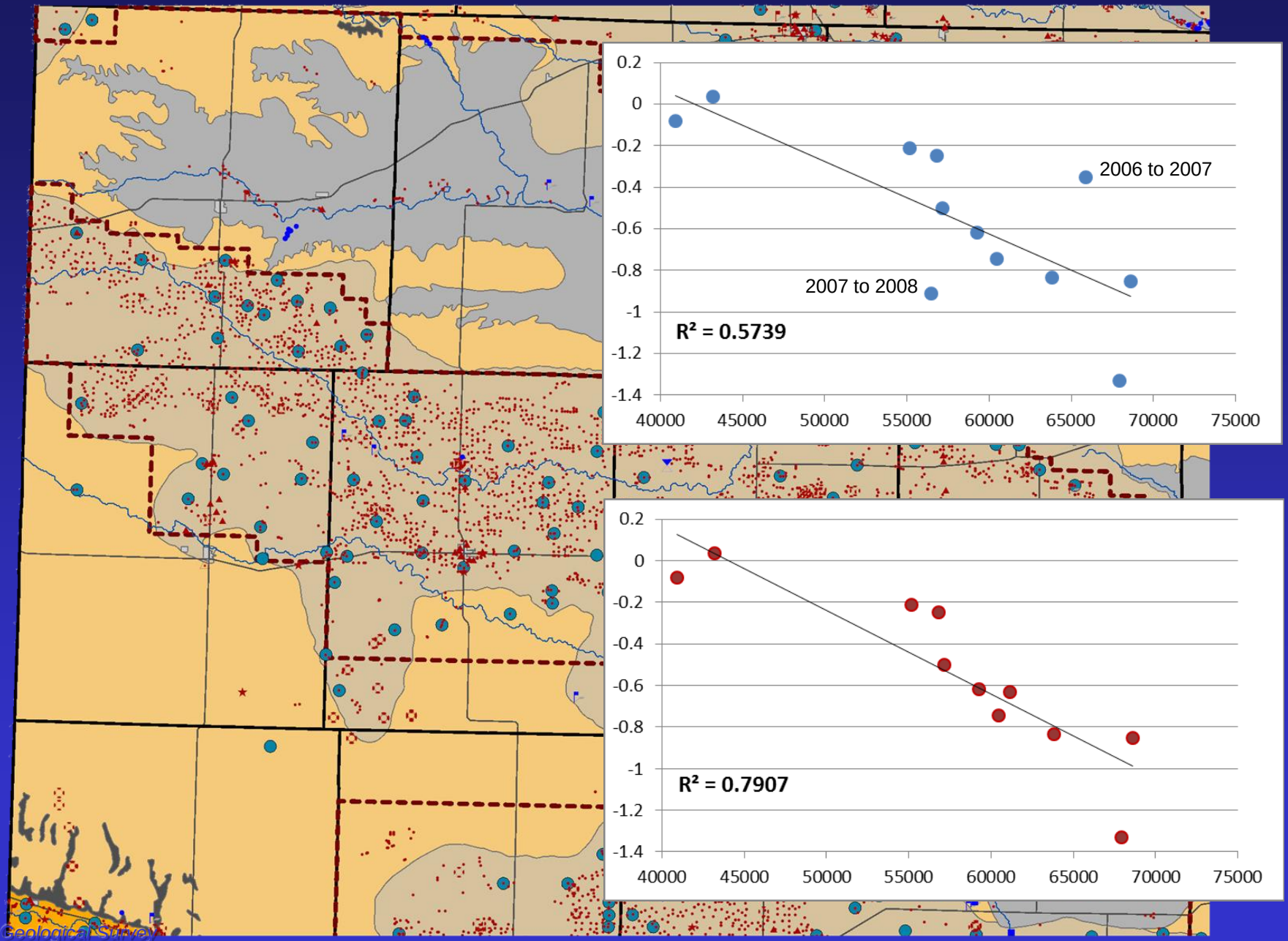
Wallace County (14 Wells), Q-Stable Reduction = 62%



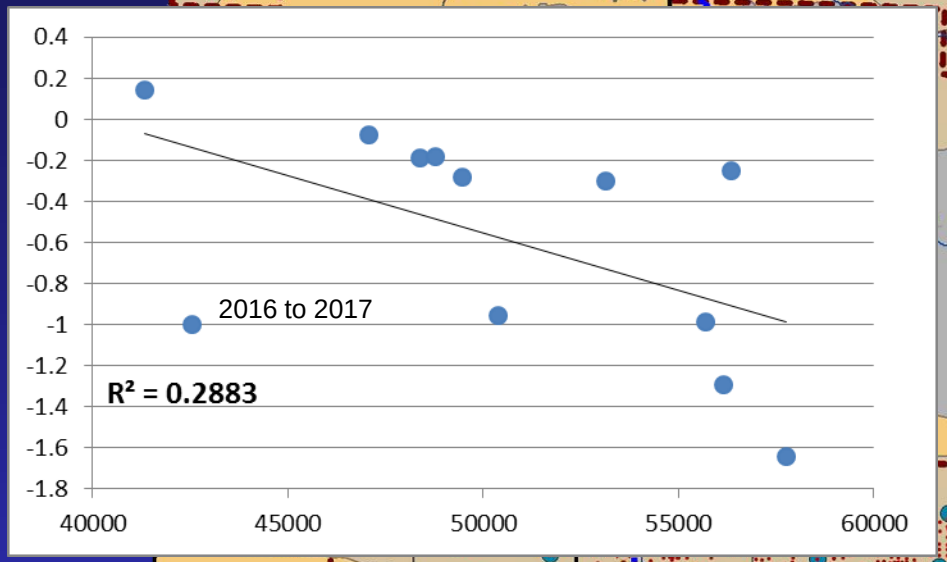
Greeley County (12 Wells),Q-Stable Reduction = 21%

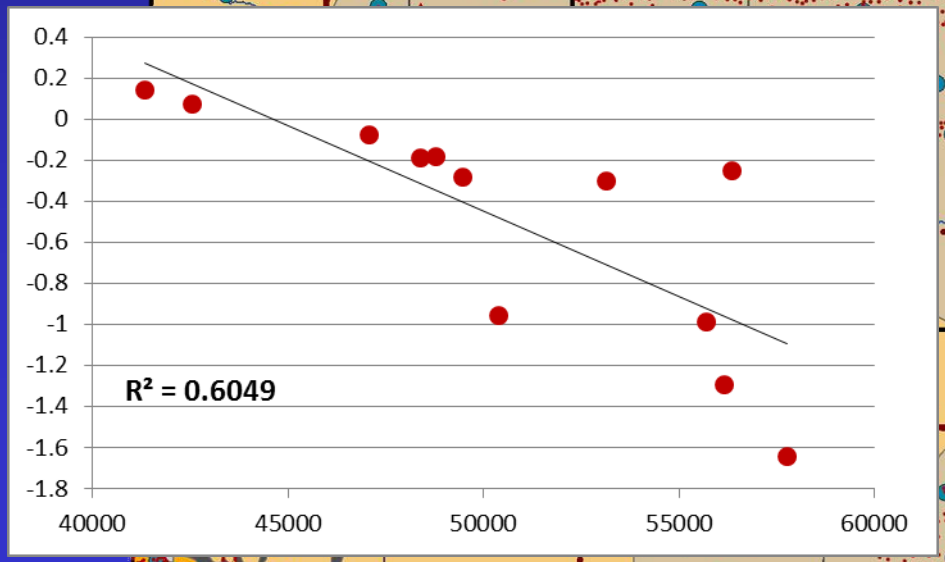


Wichita County (30 Wells), Q-Stable Reduction = 24%

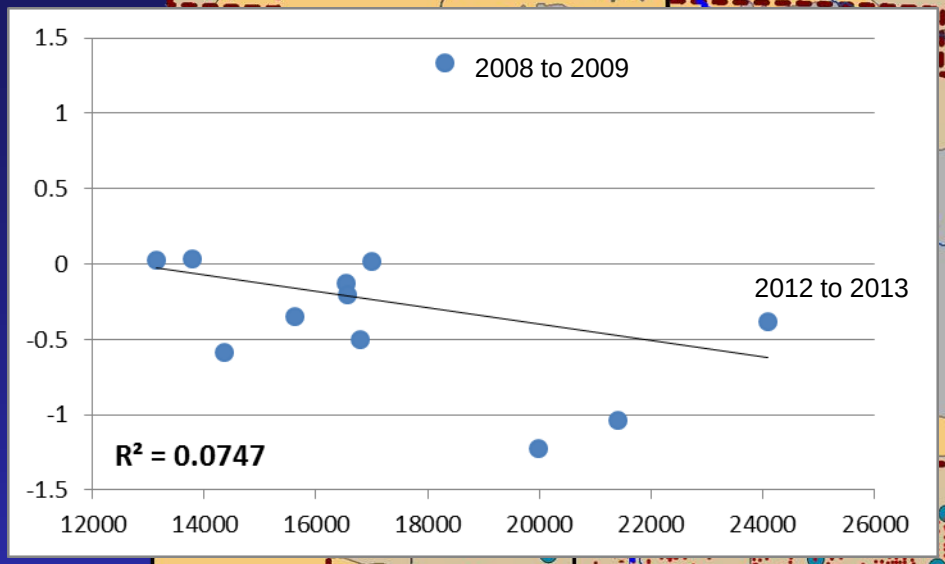


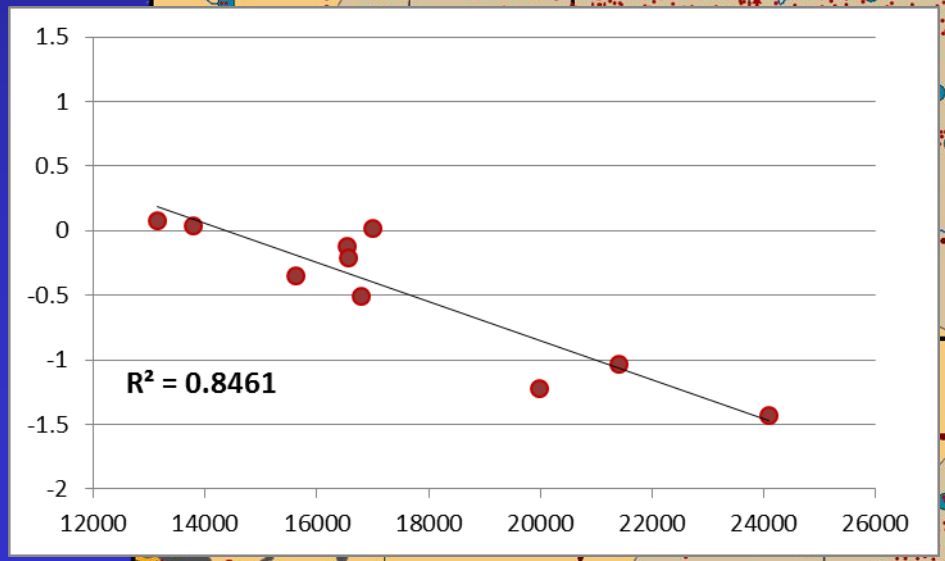
Scott County (19 Wells),Q-Stable Reduction = 12%





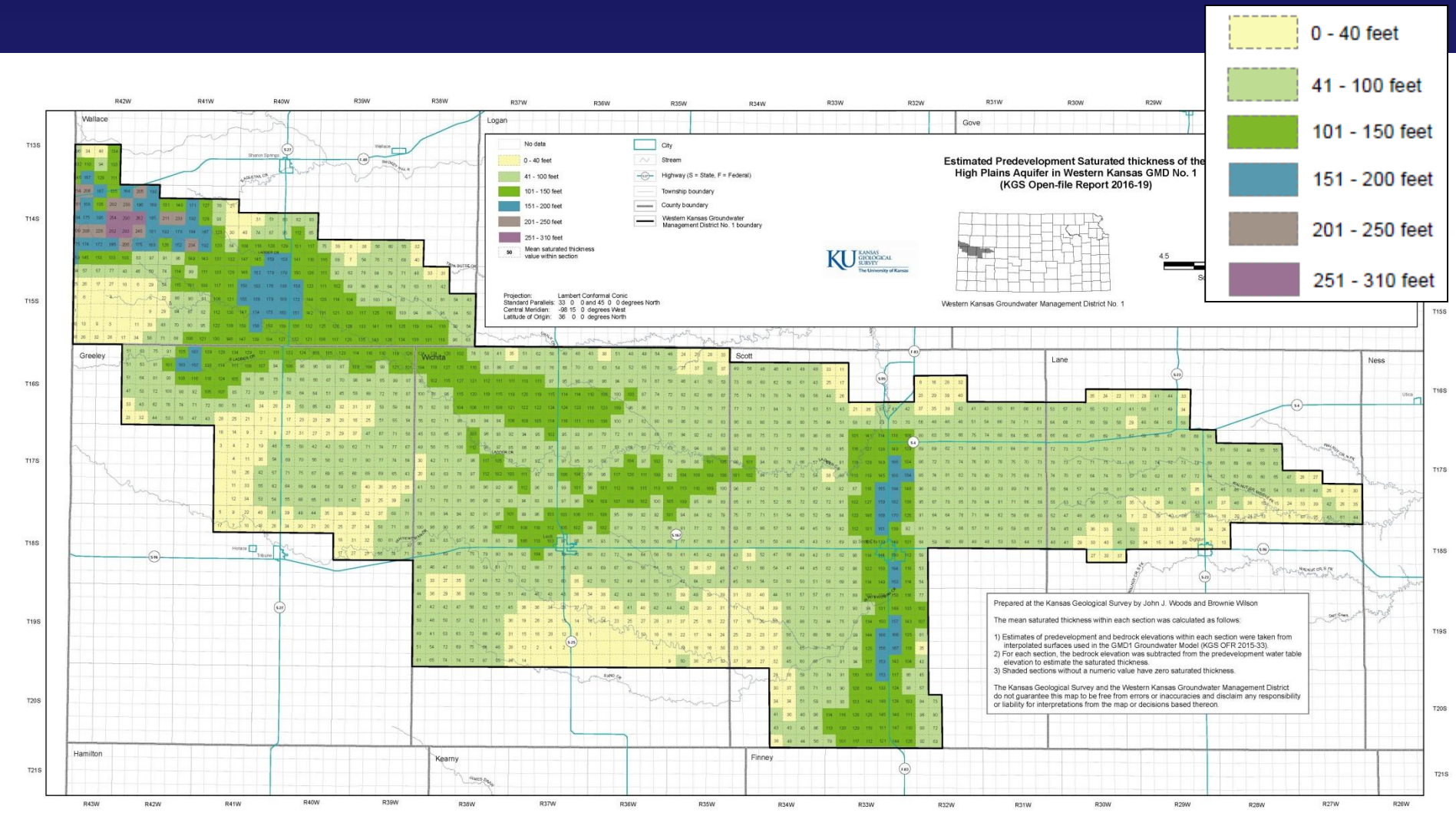
Lane County (15 Wells),Q-Stable Reduction = 18%





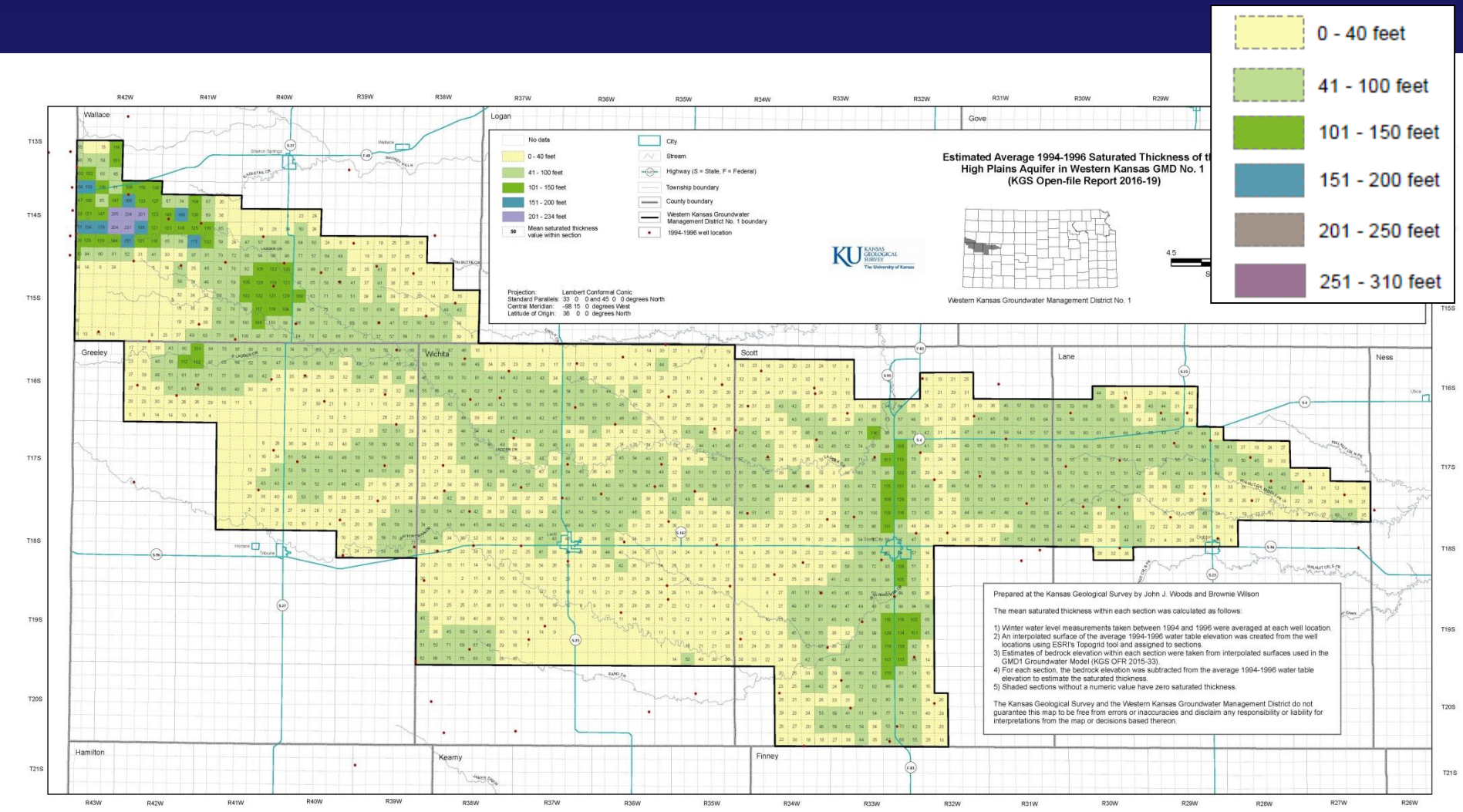
Saturated Thickness

KGS OFR 2016-19, GMD1 Saturated Thickness Maps



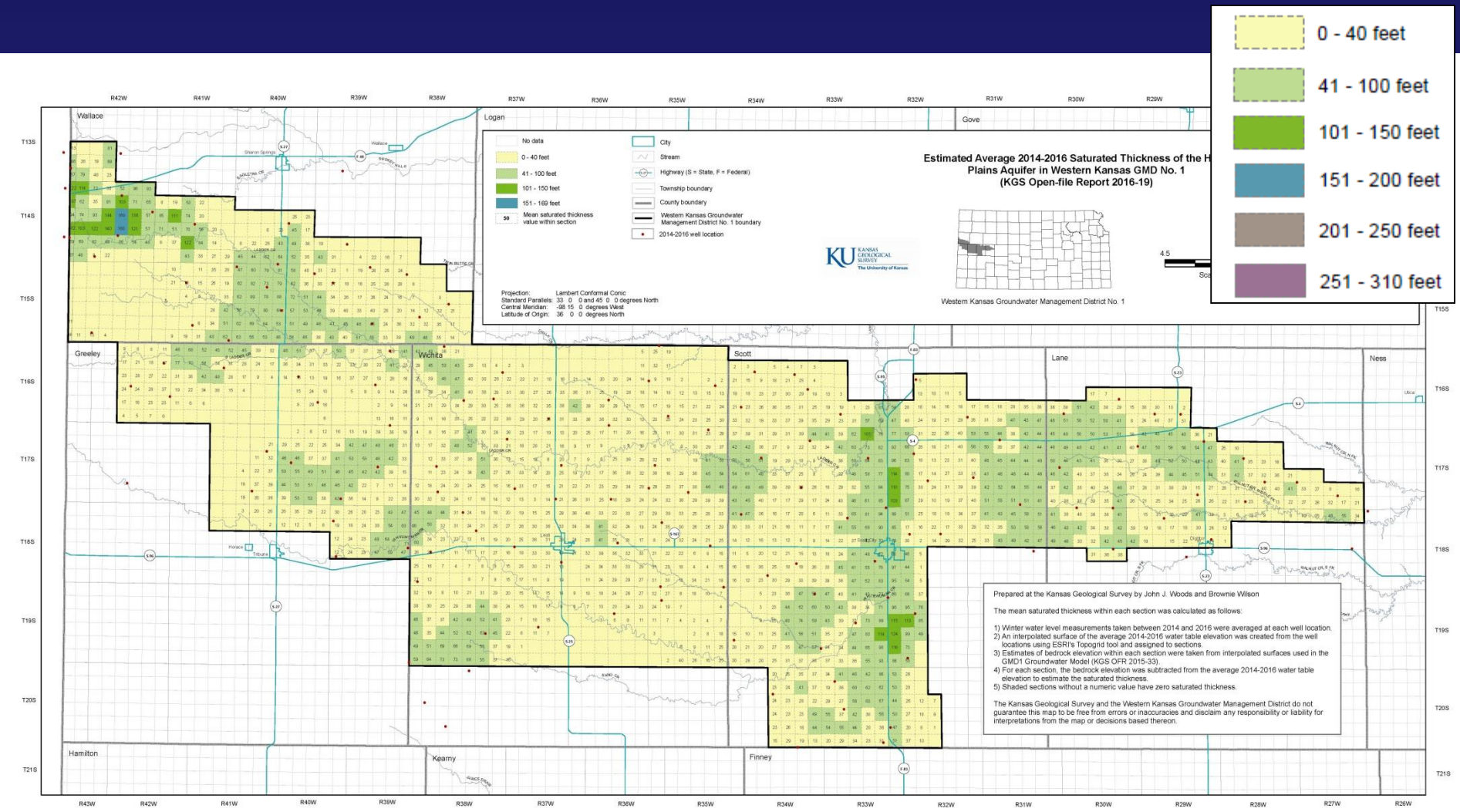
Predevelopment

KGS OFR 2016-19, GMD1 Saturated Thickness Maps



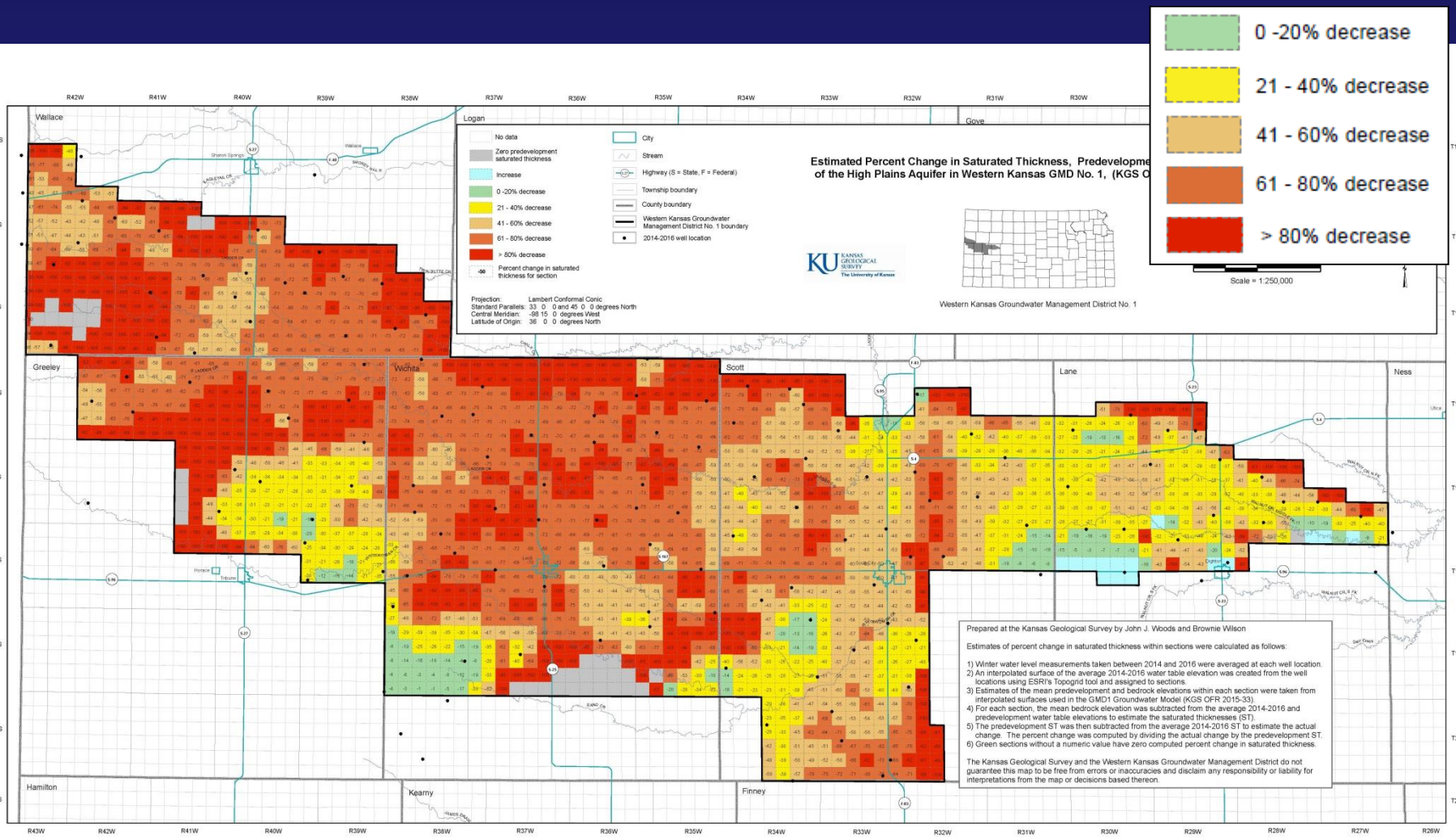
Average 1994-1996

KGS OFR 2016-19, GMD1 Saturated Thickness Maps



Average 2014-2016

KGS OFR 2016-19, GMD1 Saturated Thickness Maps



Percent Change, Predevelopment to Average 2014-2016

Questions????

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

KU KANSAS GEOLOGICAL SURVEY
The University of Kansas

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

Average Change (by well)

GMD	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
1	**-0.11**	**0.53**	**-0.68**	**-0.38**	**-0.54**	**-0.72**	**-1.49**	**-0.99**	**0.18**	**-0.38**	**-0.73**	**-1.15**	**-0.27**	**-0.39**	**-0.81**	**-1.24**	**-1.66**	**-0.72**	**-0.67**	**-0.01**	**-0.55**	**-0.19**
2	-0.02	1.21	0.29	0.21	-0.84	-0.91	-0.58	-0.19	0.85	-0.02	-2.20	1.91	1.59	-0.06	-0.73	-2.96	-1.60	2.62	-1.23	1.28	2.08	**-1.93**
3	-0.49	-0.13	-1.24	-0.84	-2.21	-1.99	-3.24	-1.88	-0.41	-1.23	-2.45	-1.98	-2.95	-1.50	-3.17	-3.78	-3.53	-2.46	-2.08	-1.05	-0.88	**-0.05**
4	-0.39	-0.20	-0.23	0.06	-1.08	-0.47	-1.49	-1.28	-0.48	-0.58	-0.28	-0.93	-0.33	0.05	-0.50	-0.56	-1.38	-0.71	-0.43	-0.58	-0.51	**0.33**
5	0.87	1.04	-0.12	-0.08	-0.50	-0.65	-1.56	-1.01	0.13	-0.11	-1.18	3.15	0.57	0.62	-0.49	-2.84	-1.85	0.53	-0.69	-0.28	0.58	**0.26**
Net-work	-0.09	0.29	-0.58	-0.33	-1.30	-1.12	-2.07	-1.33	-0.17	-0.66	-1.44	-0.30	-0.97	-0.46	-1.52	-2.41	-2.29	-0.90	-1.16	-0.51	-0.28	**0.04**

***Results are based only on the cooperative network (KGS and KDA-DWR) and do not include sub-regional networks from the KDA-DWR, KGS, or local GMDs. 2018 water levels are provisional.**