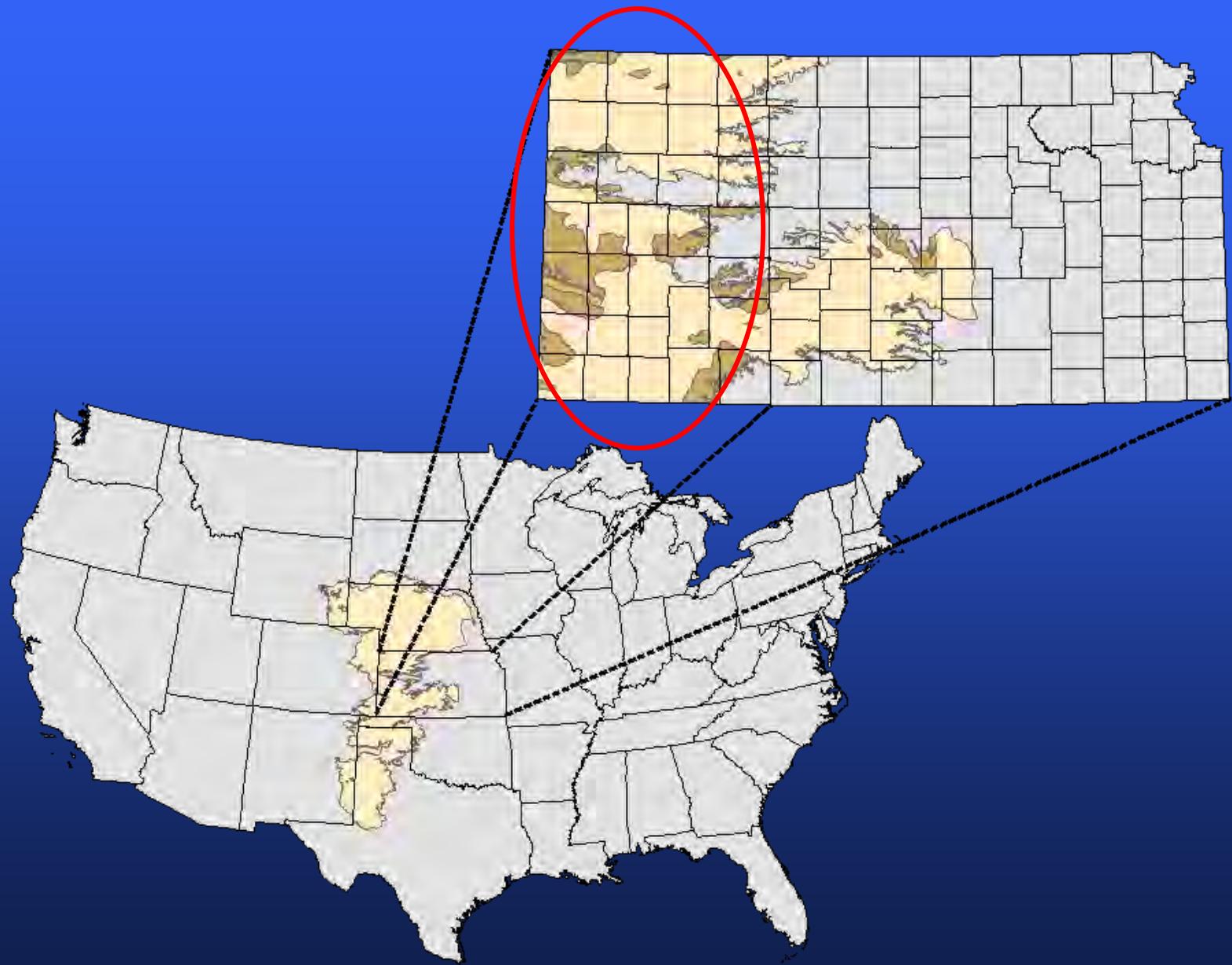


Understanding Kansas Groundwater Declines

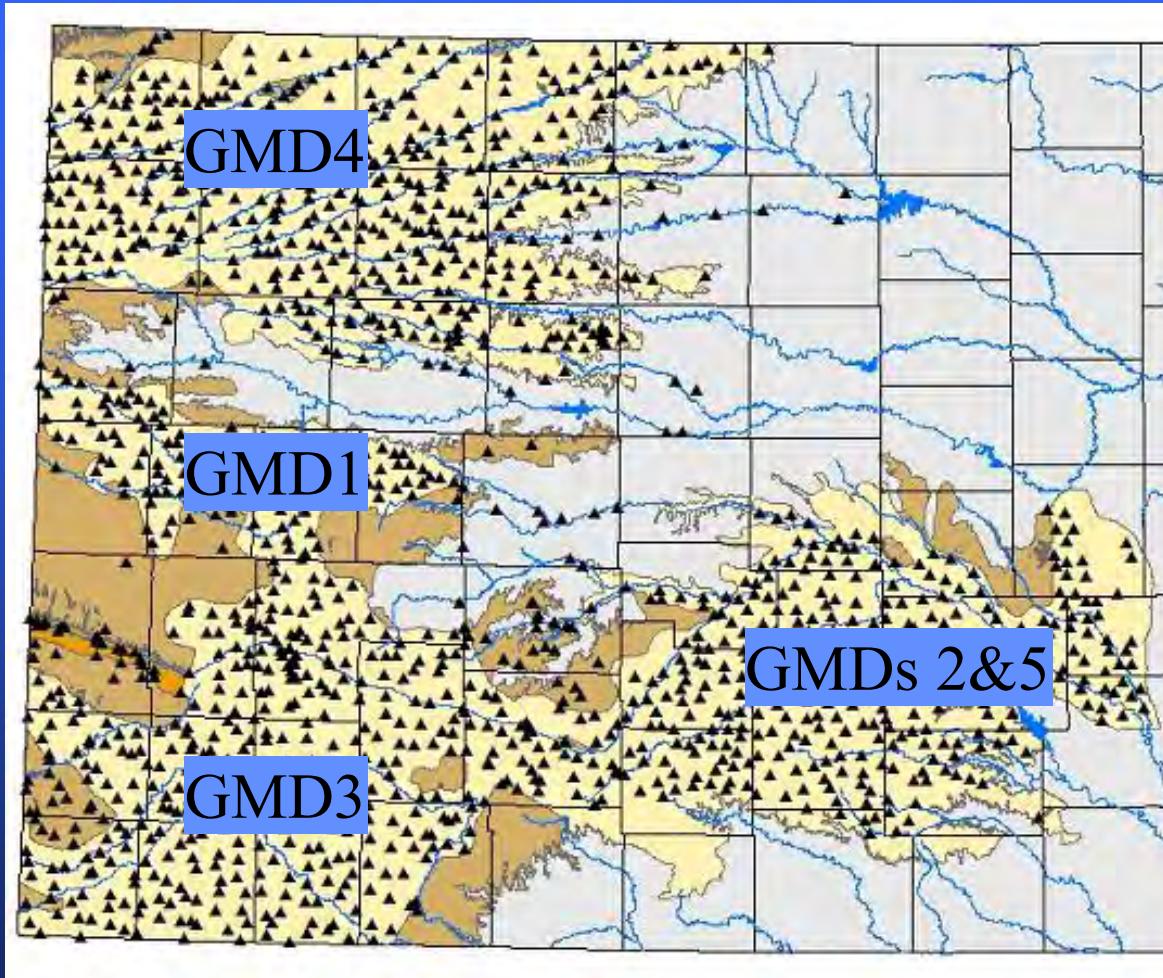
Jim Butler, Don Whittemore,
and Brownie Wilson
Kansas Geological Survey
University of Kansas

2015 Ogallala Aquifer Program
Annual Workshop
Manhattan, Kansas
March 12, 2015

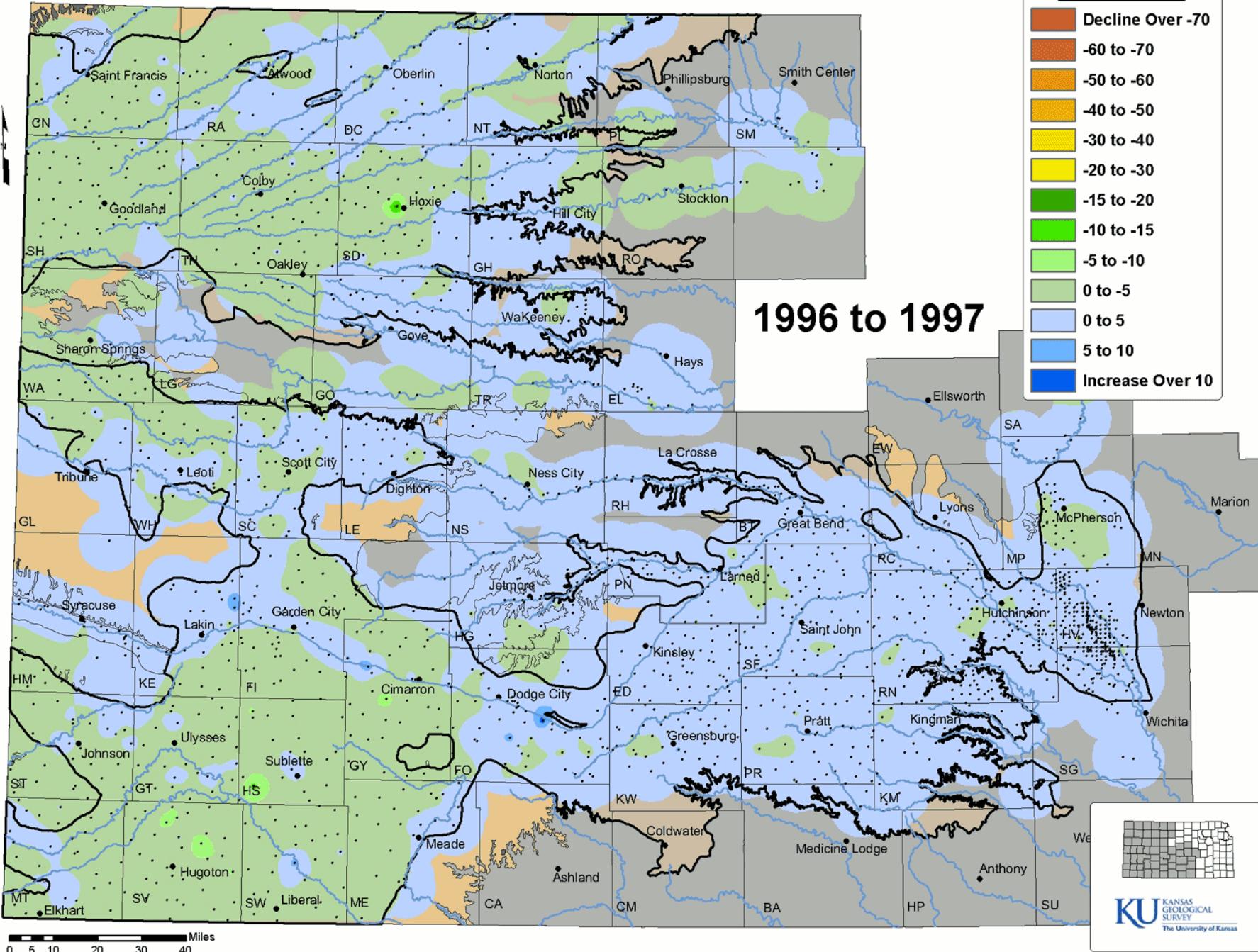
The High Plains Aquifer



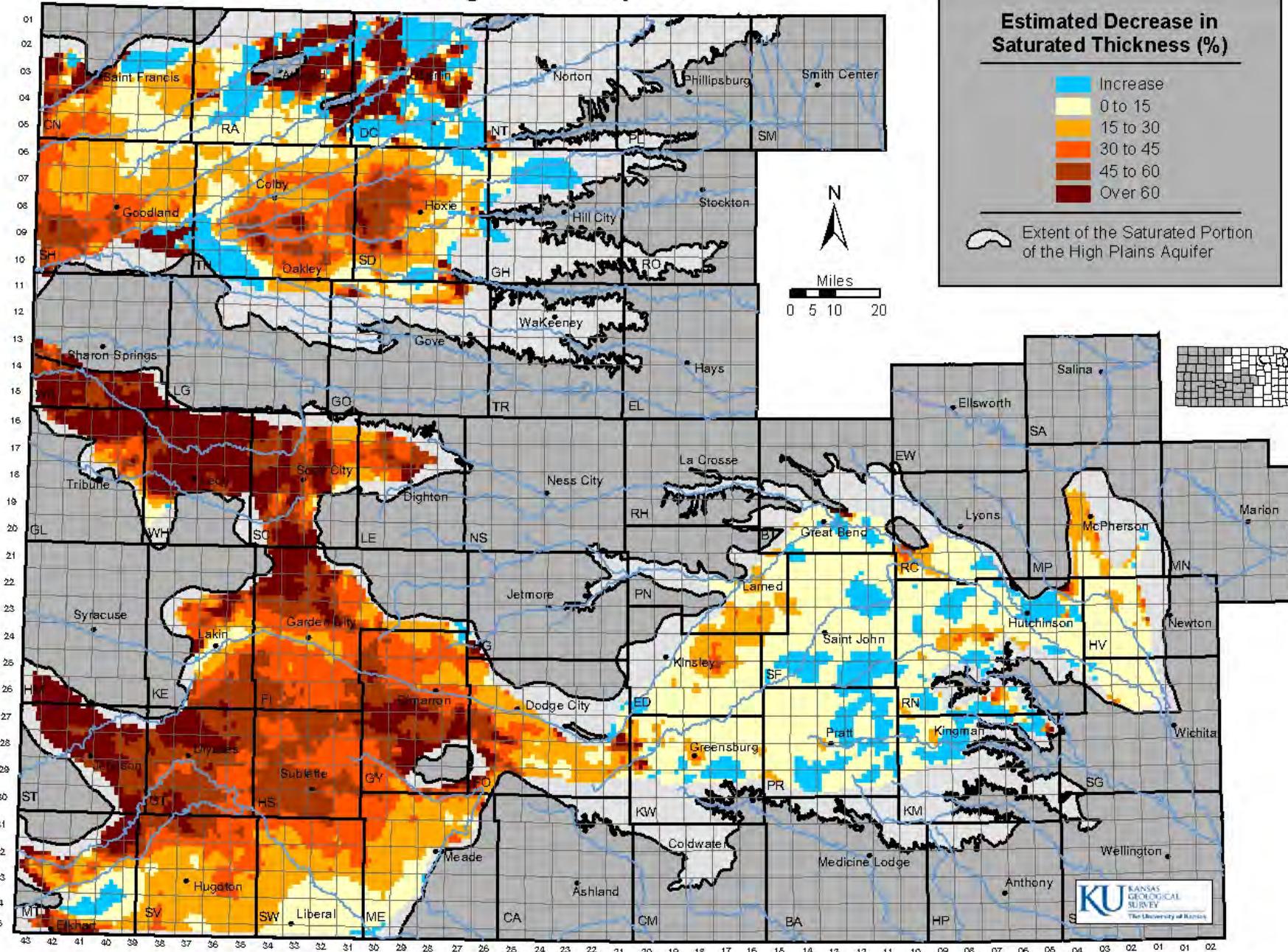
Annual Water Level Measurement Program



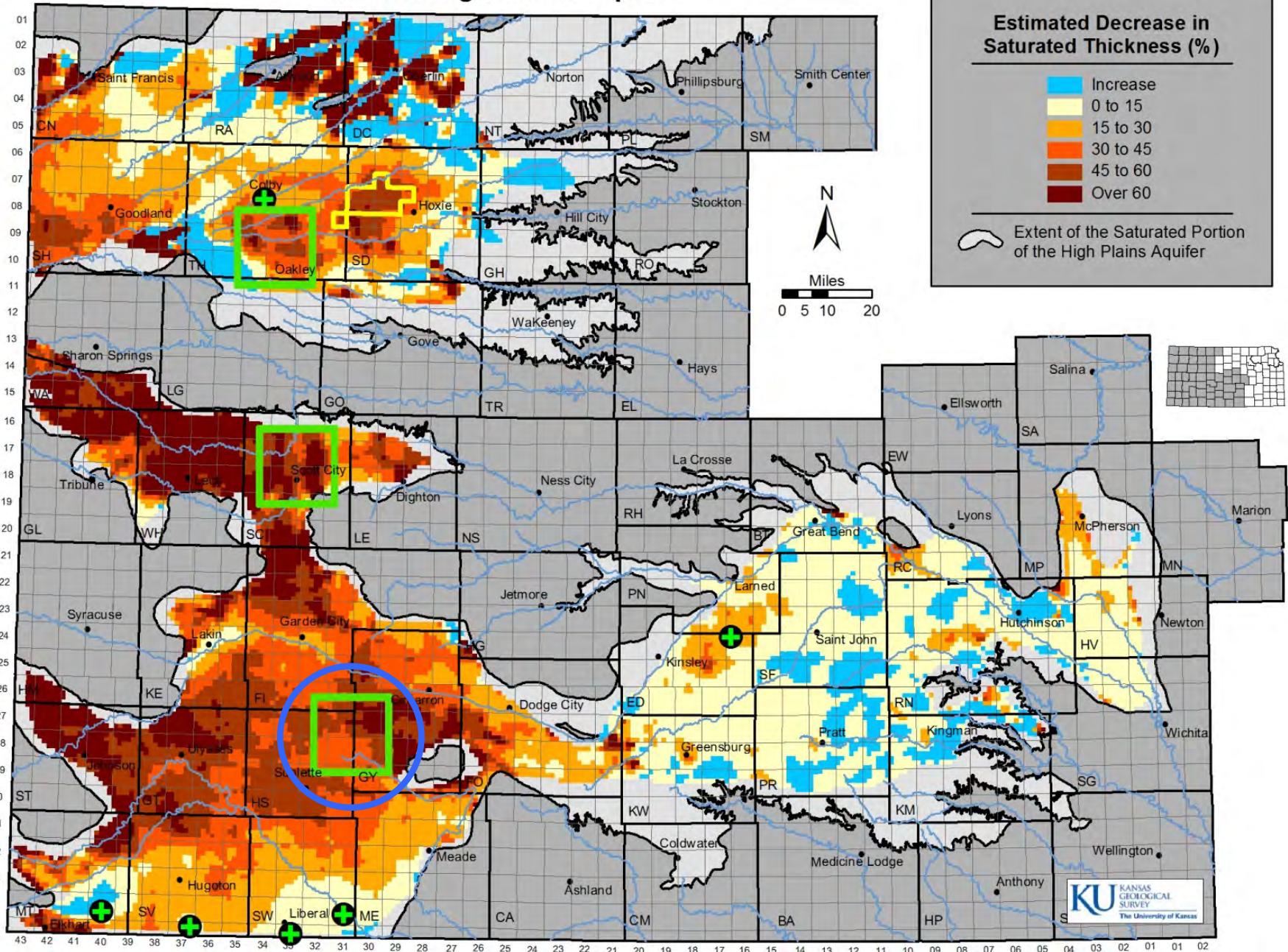
- ≈ 1400 wells measured in High Plains aquifer in 2015
 - http://www.kgs.ku.edu/HighPlains/HPA_Atlas/index.html



Percent Change in Saturated Thickness, Predevelopment to Average 2012 - 2014, Kansas High Plains Aquifer



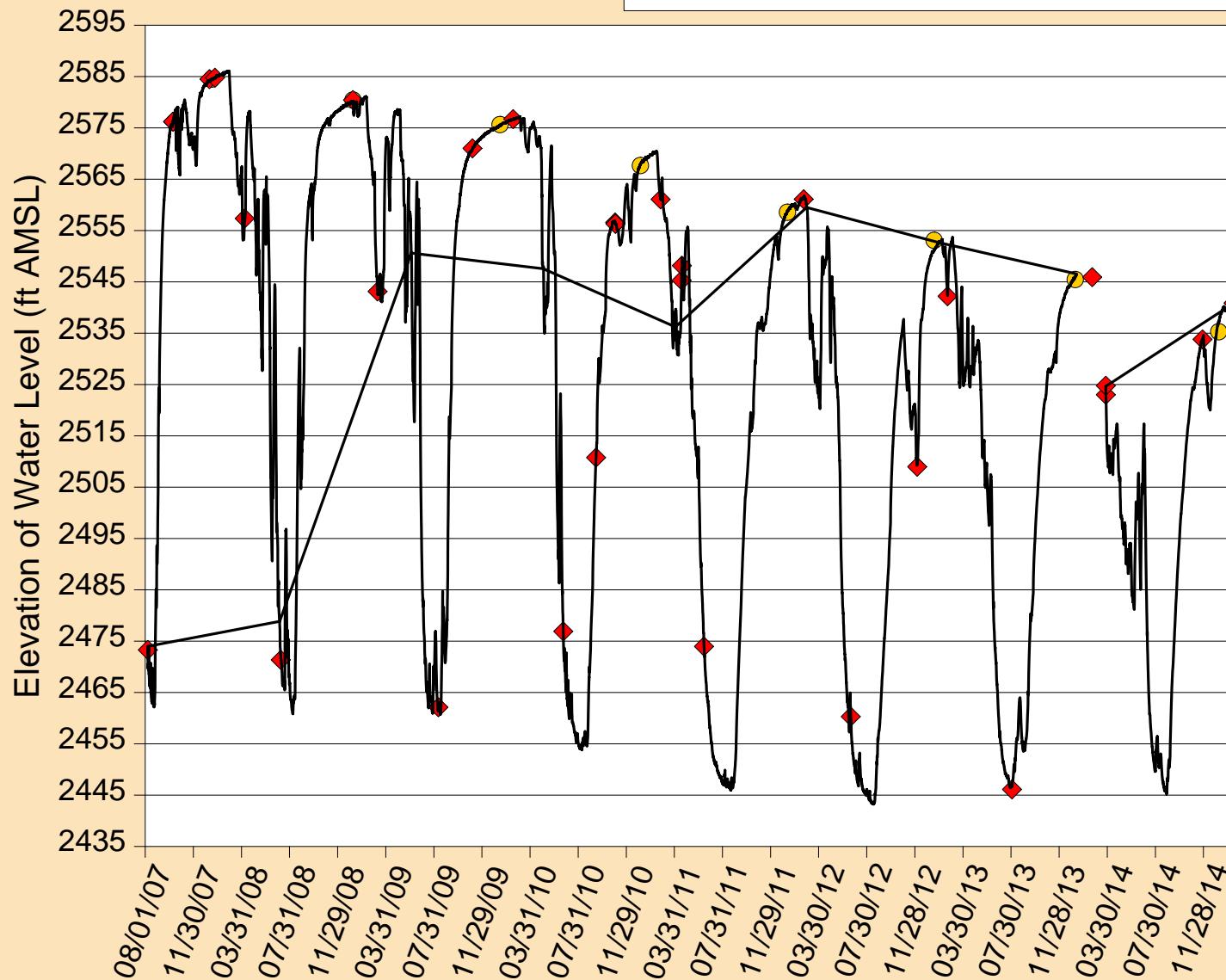
Percent Change in Saturated Thickness, Predevelopment to Average 2012 - 2014, Kansas High Plains Aquifer



Haskell Co Index Well

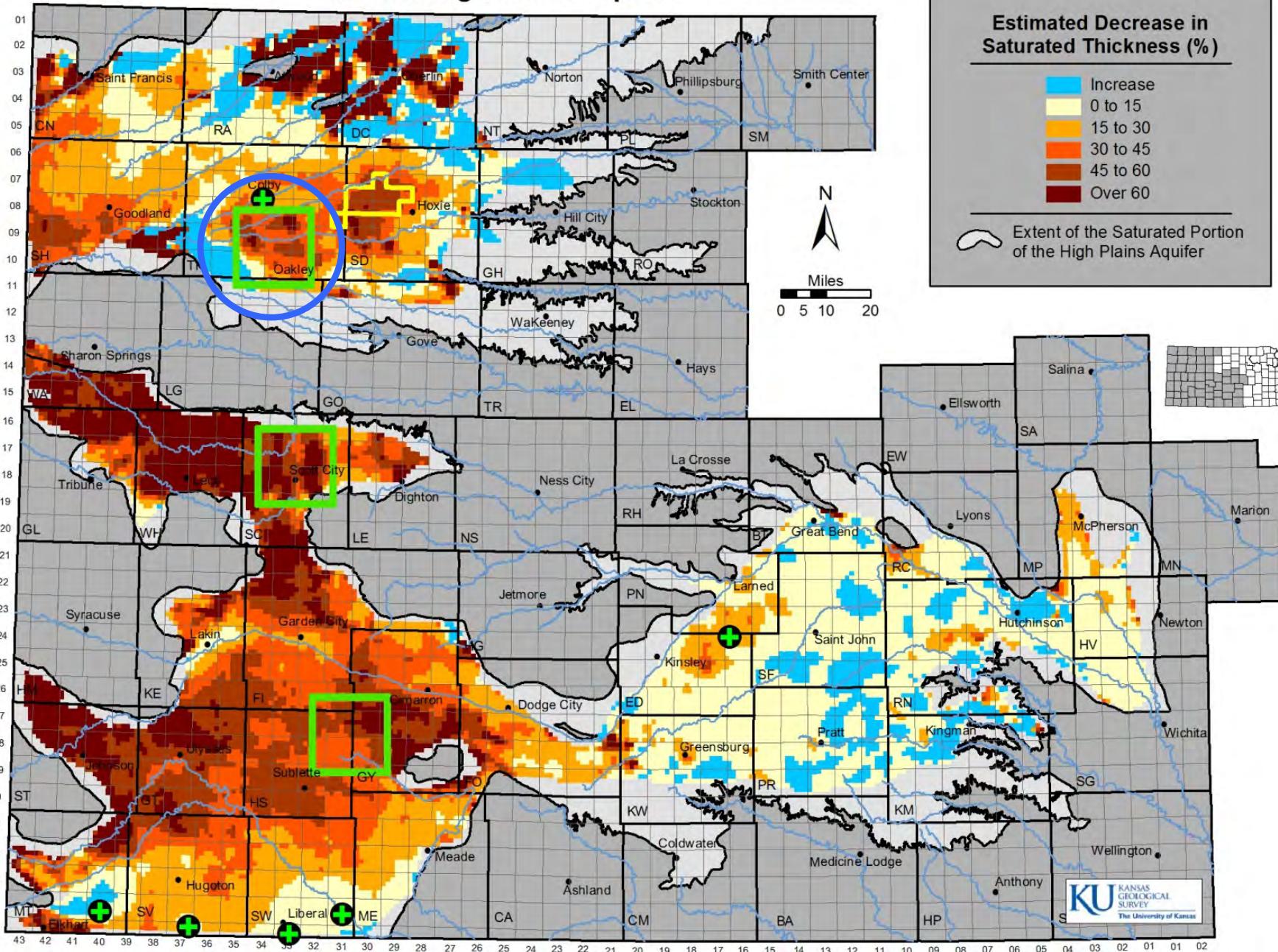
27S 31W 36BDC

- Hourly Water Level Measurements
- Periodic Electric Tape Measurements
- Annual Program Measurements



Aquifer bottom – 2405 ft

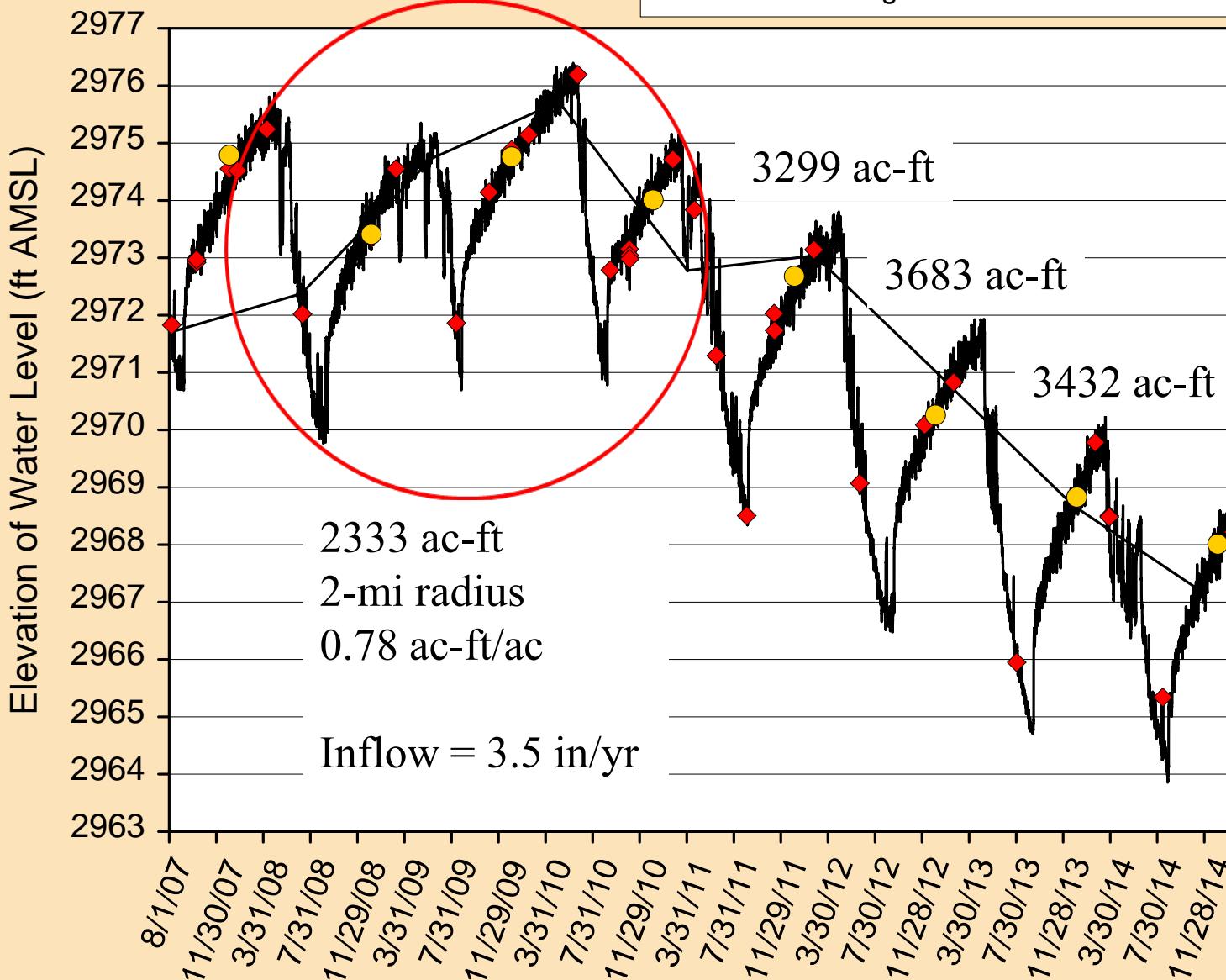
Percent Change in Saturated Thickness, Predevelopment to Average 2012 - 2014, Kansas High Plains Aquifer



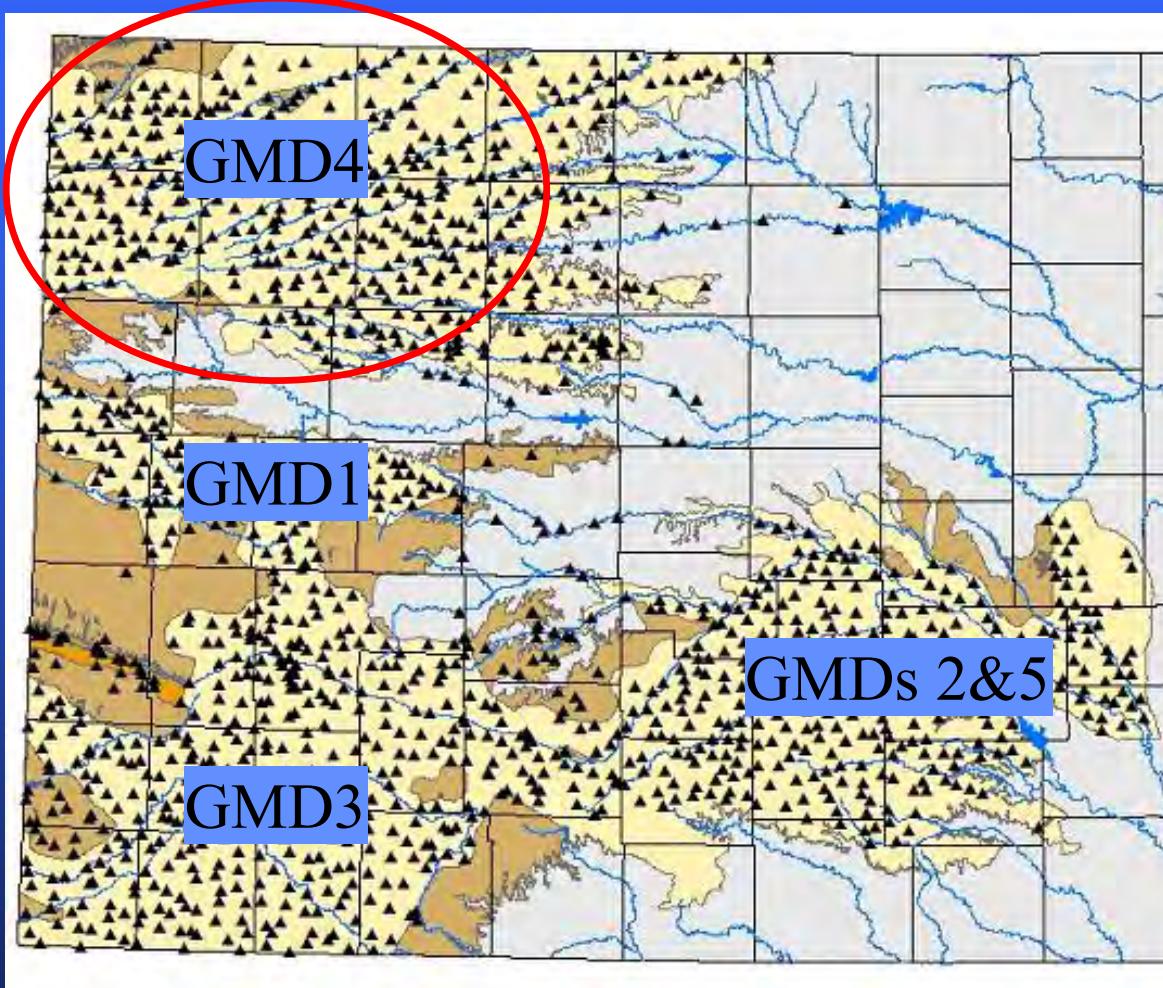
Thomas Co Index Well 1

09S 33W 33BBB

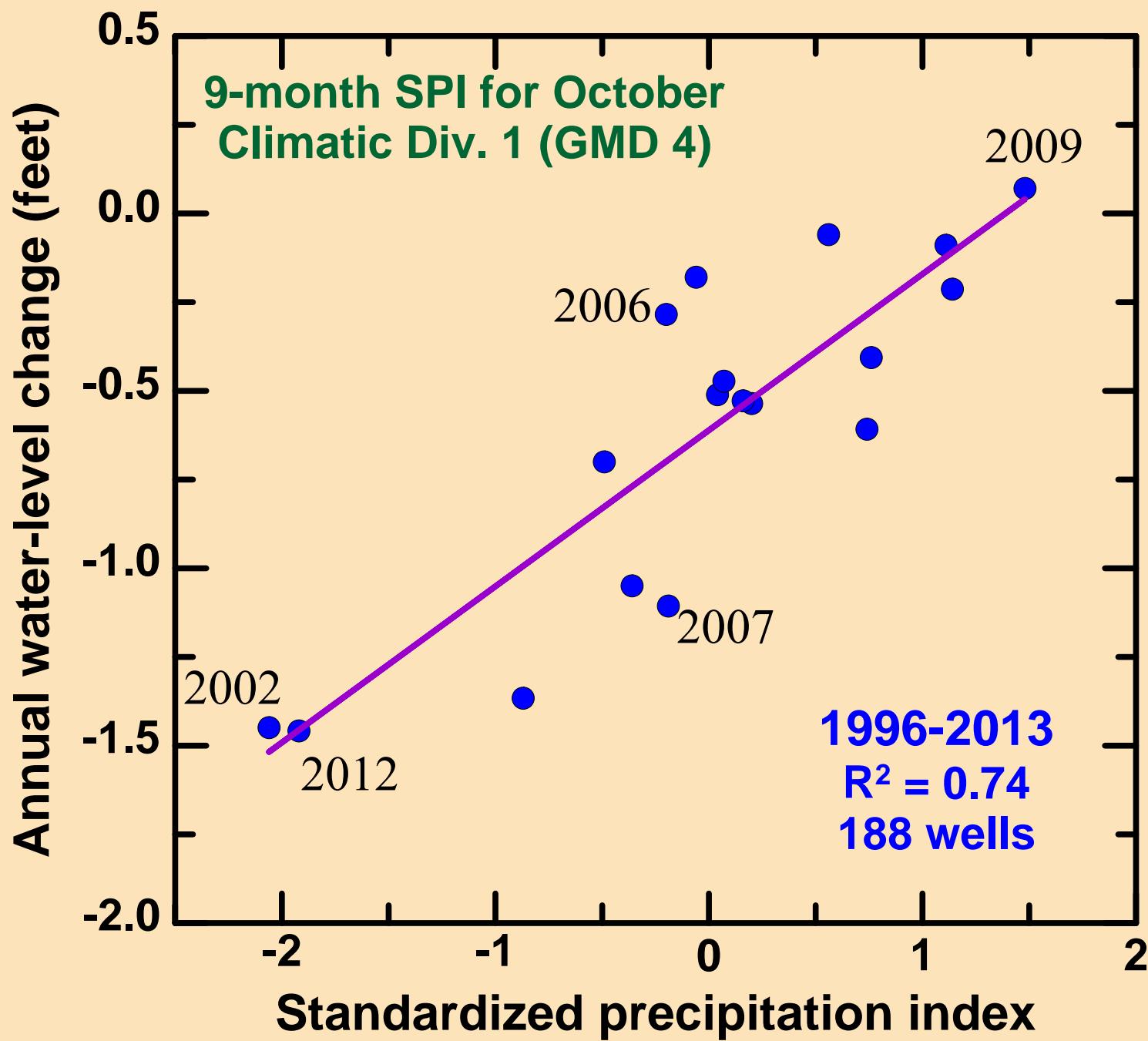
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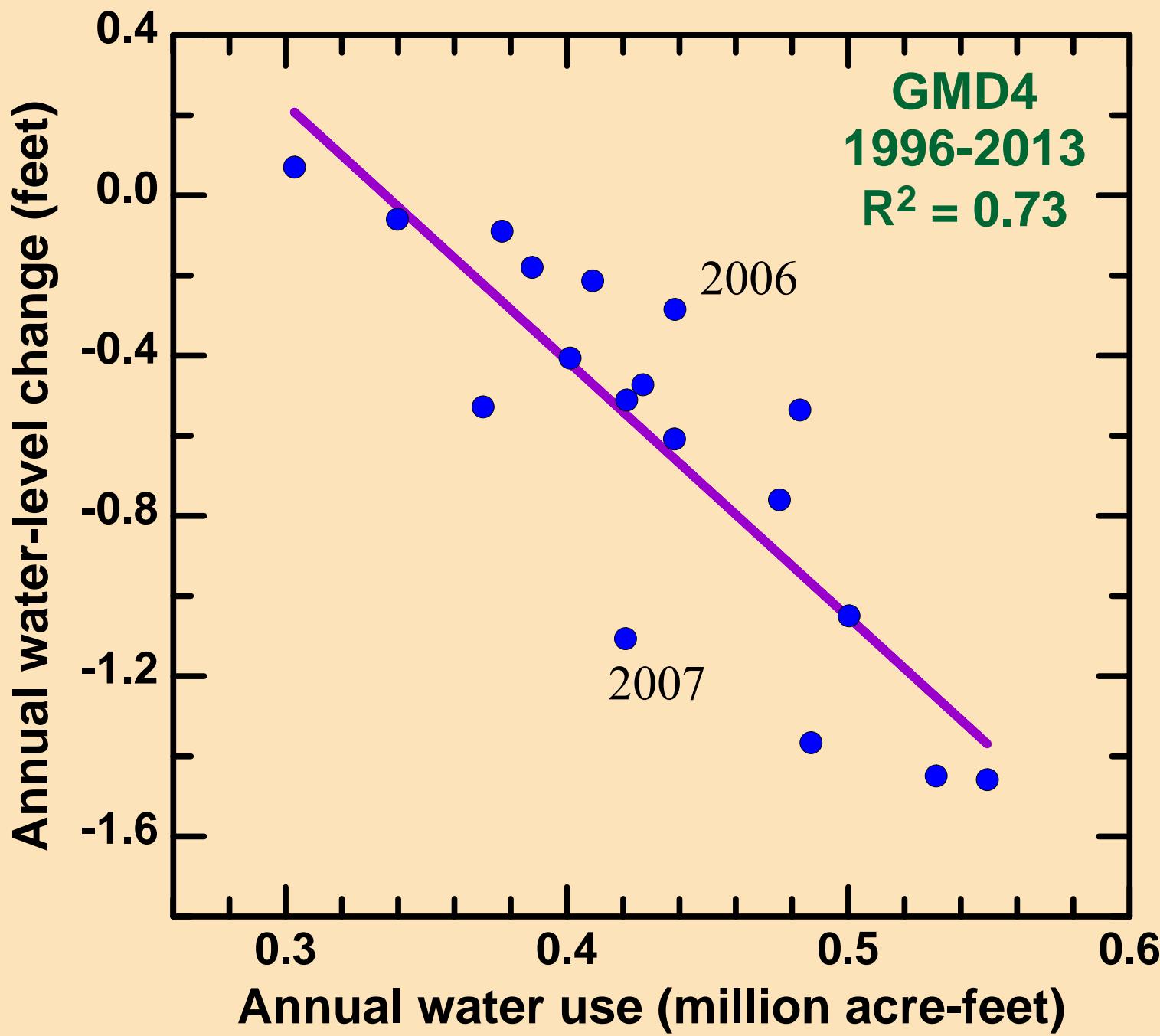
Annual Water Level Measurement Program

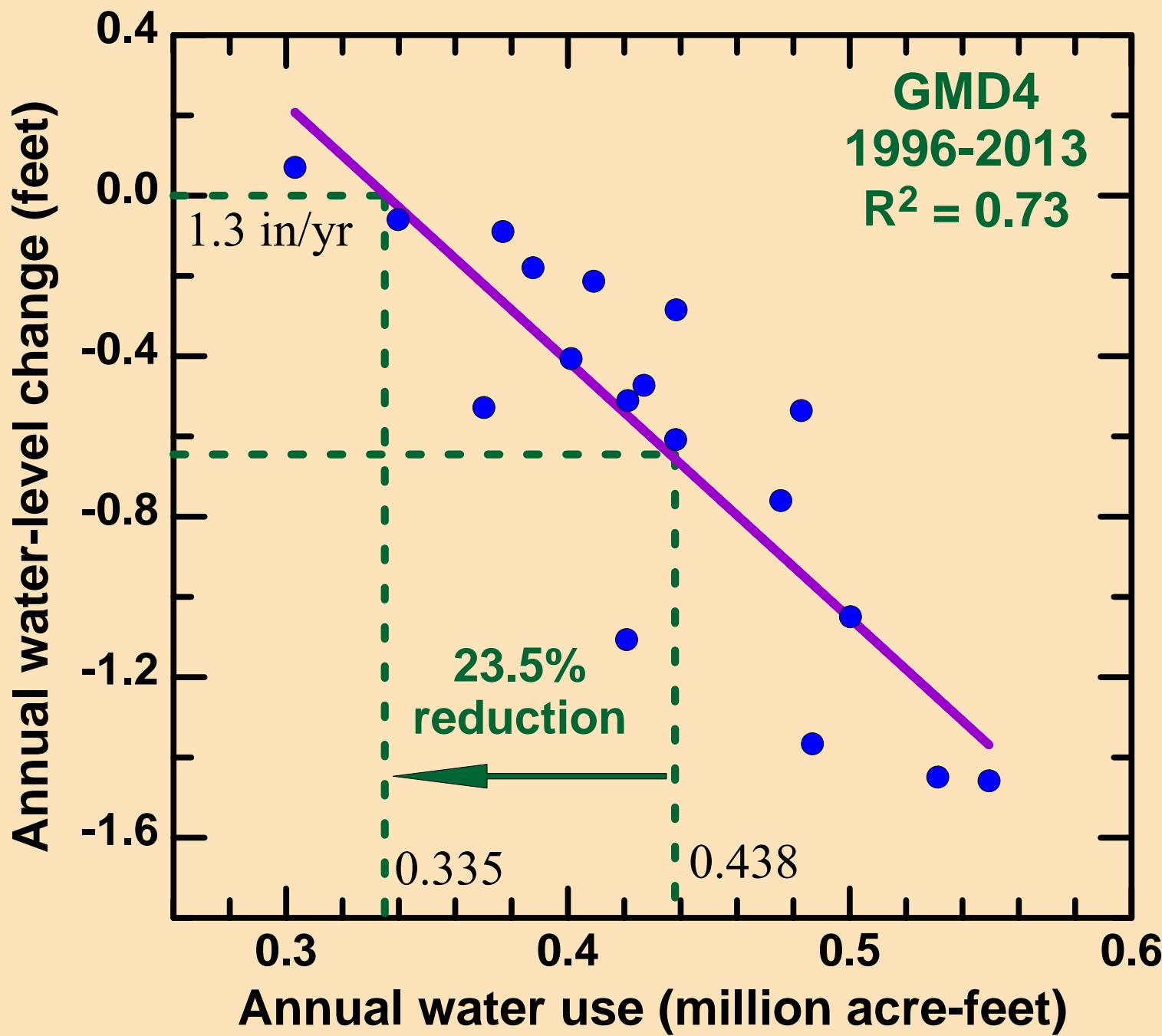


- ≈ 1400 wells measured in High Plains aquifer in 2015
 - http://www.kgs.ku.edu/HighPlains/HPA_Atlas/index.html



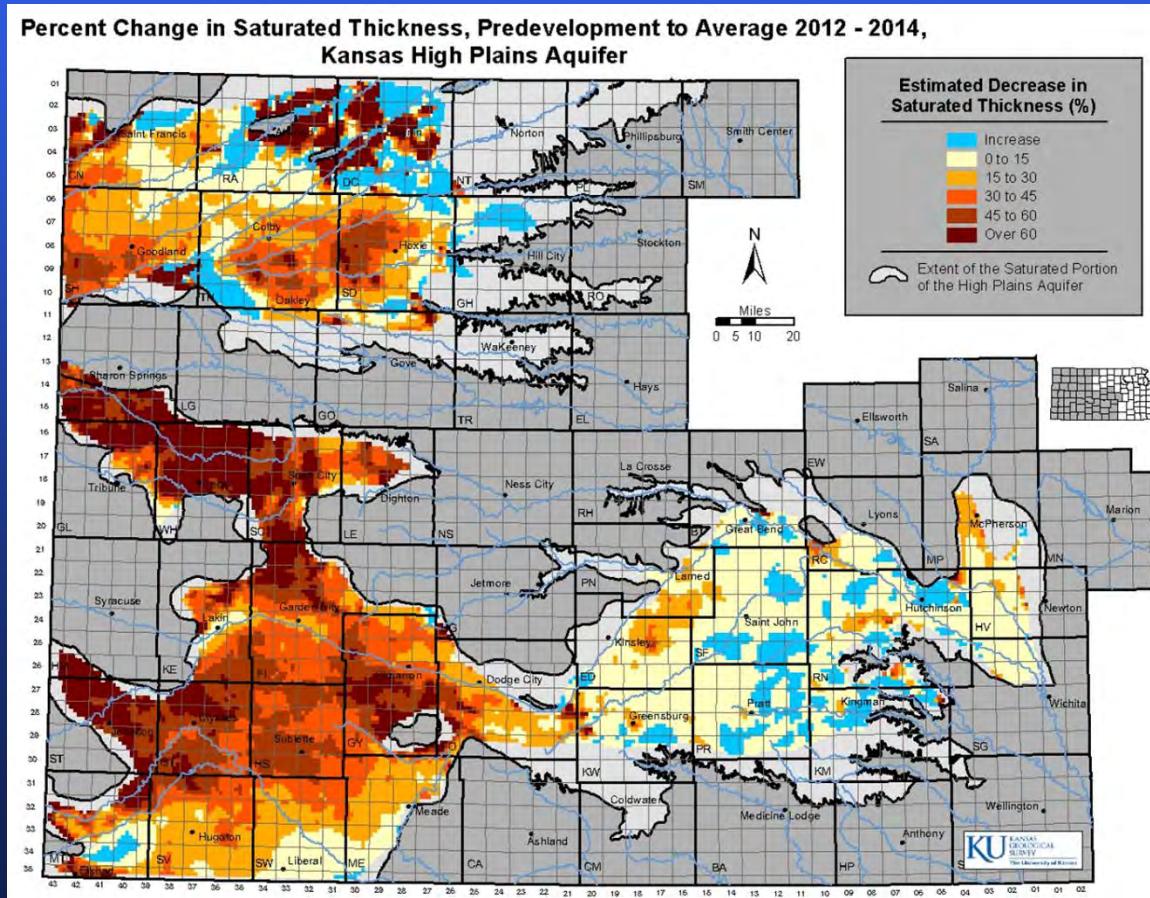






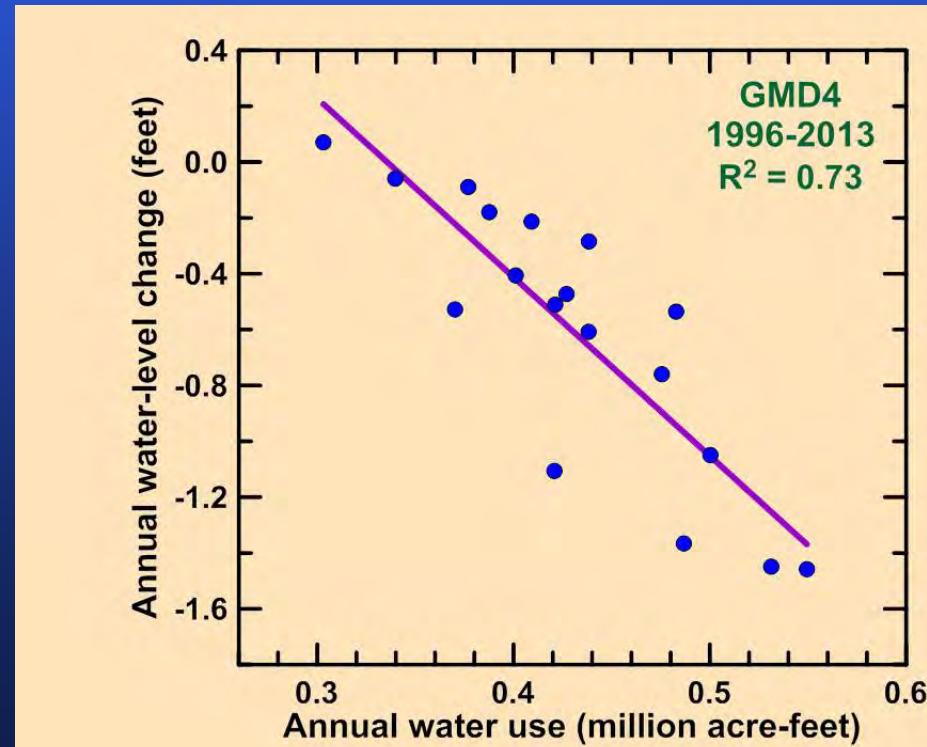
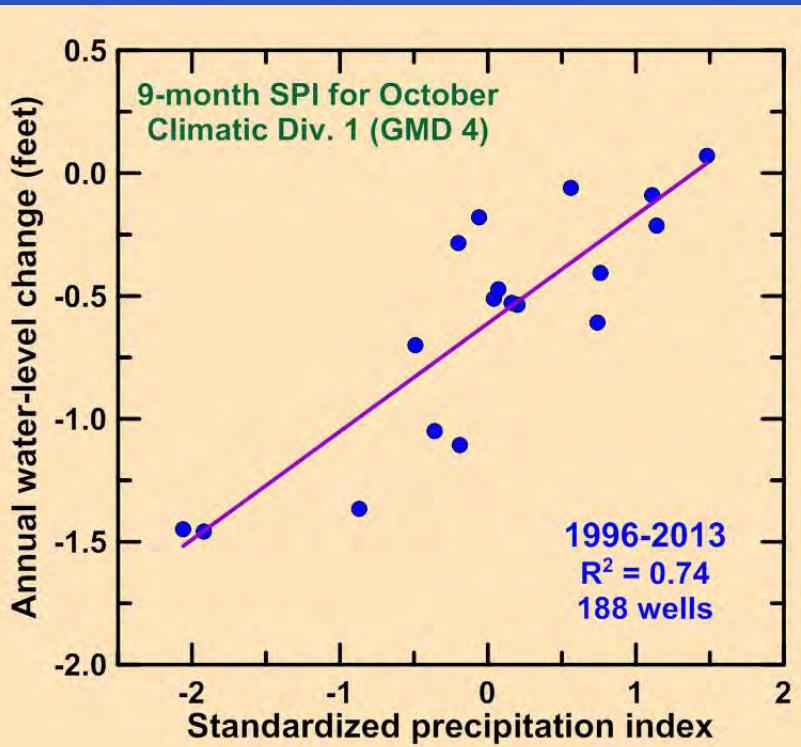
Major Findings and Conclusions

- Ogallala portion of High Plains aquifer in Kansas
 - Significant reductions in saturated thickness
 - High groundwater use
 - Low natural recharge



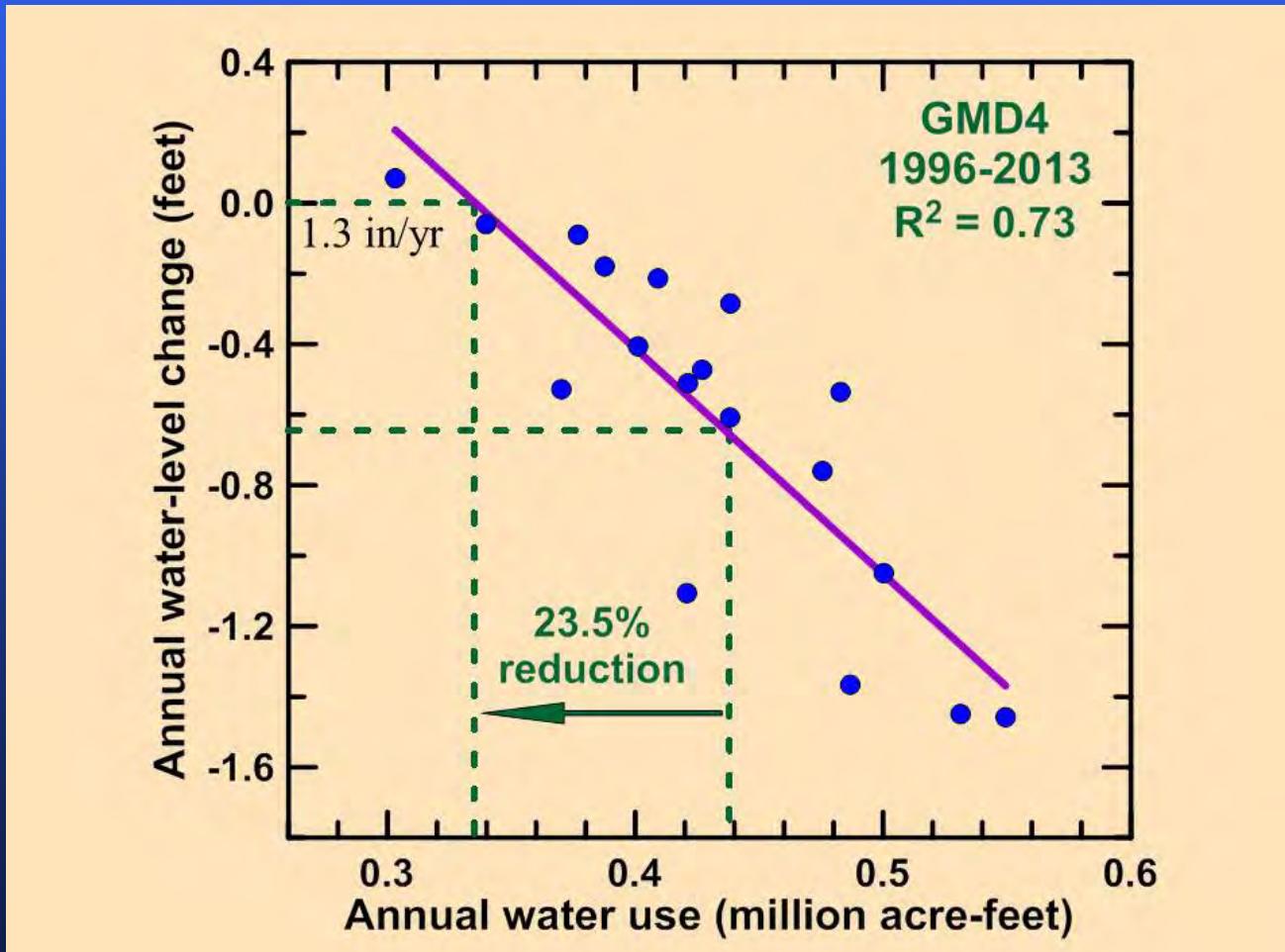
Major Findings and Conclusions

- Value of simple approaches
 - Tools for managers and for insight development
 - Whittemore, Butler, and Wilson, Assessing the major drivers of water-level declines: New insights into the future of heavily stressed aquifers, *Hydro Sci Jour*, in press, 2015.



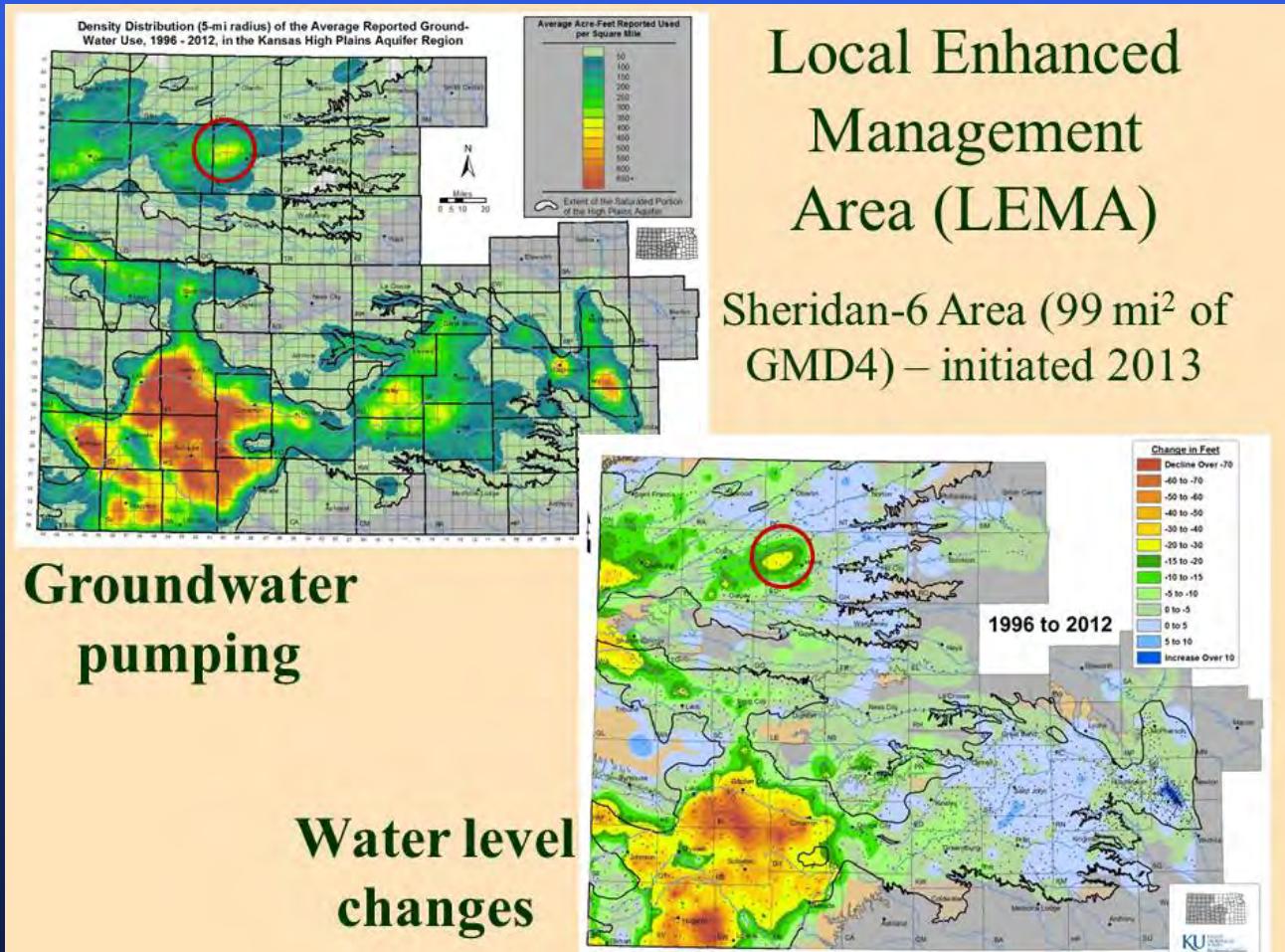
Major Findings and Conclusions

- Short-term stabilization of water levels
 - Practically feasible cutbacks
 - “Short-term”?
 - Source?



Major Findings and Conclusions

- Short-term stabilization of water levels
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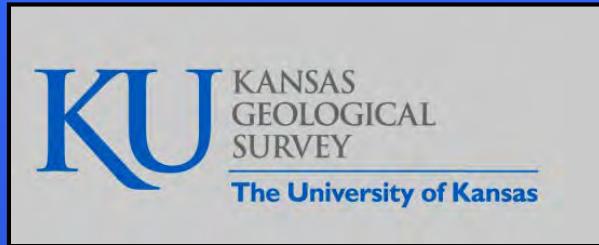
ACKNOWLEDGMENTS

This work was supported, in part, by funding from the Kansas Water Office, the National Science Foundation, and the Ogallala Technical Support Program of the Kansas Geological Survey.

The screenshot shows the homepage of the Kansas High Plains Aquifer Atlas. The header features the title "Kansas High Plains Aquifer Atlas" with a sunburst graphic and a like button. Below the header is a photograph of a rural landscape with a tall utility pole. The main content area is organized into a grid of nine cards:

- Introduction and Navigation**: Click here to view instructions for navigating this atlas. 3 images.
- Aquifer Basics**: Basic information about the geology and hydrology of the High Plains aquifer. 18 images.
- Water Levels**: View water levels from predevelopment to current. 9 images.
- Water Rights and Water Use**: 12 images.
- Climate and Climate Trends**: 18 images.
- Land Cover and Irrigation**: 5 images.
- Index Well Program**: The Kansas Geological Survey has installed index wells, one in each of the three western Kansas Groundwater Management Districts, to continuously monitor water levels in the Ogallala-High Plains aquifer.
- Interactive Atlas**: Use our interactive atlas to view water levels, saturated thickness, and more.

Questions ?



Kansas High Plains Aquifer Atlas

This atlas has been created to serve as the primary gateway to the most recent graphical data available for the High Plains aquifer in Kansas. As newer/updated data become available, this atlas will be updated.

The screenshot shows a grid of nine cards, each with a thumbnail image, title, and a brief description:

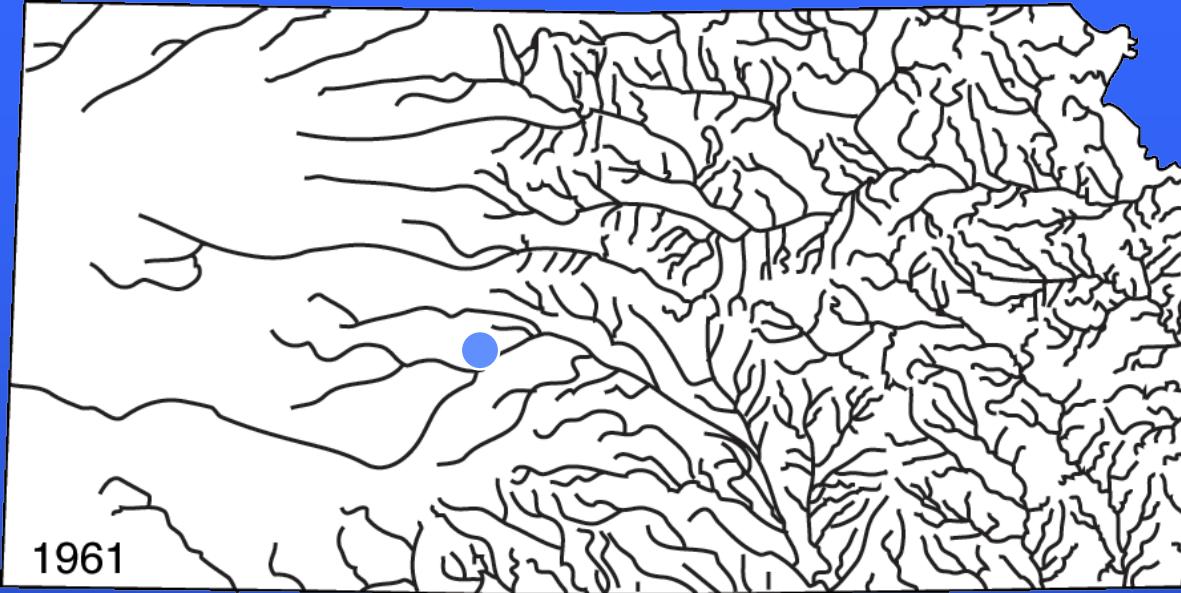
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**Paper: Assessing the Major Drivers of Water-level Declines:
New Insights into the Future of Heavily Stressed Aquifers**

Available online in Hydrological Sciences Journal

Go to <http://www.tandfonline.com>, search for Donald Whittemore



Major Perennial Streams in Kansas



Adapted from Angelo (1994)

