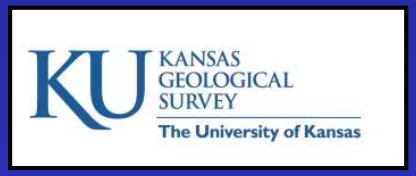
Sustainability Assessment
Lake McKinney Water Group

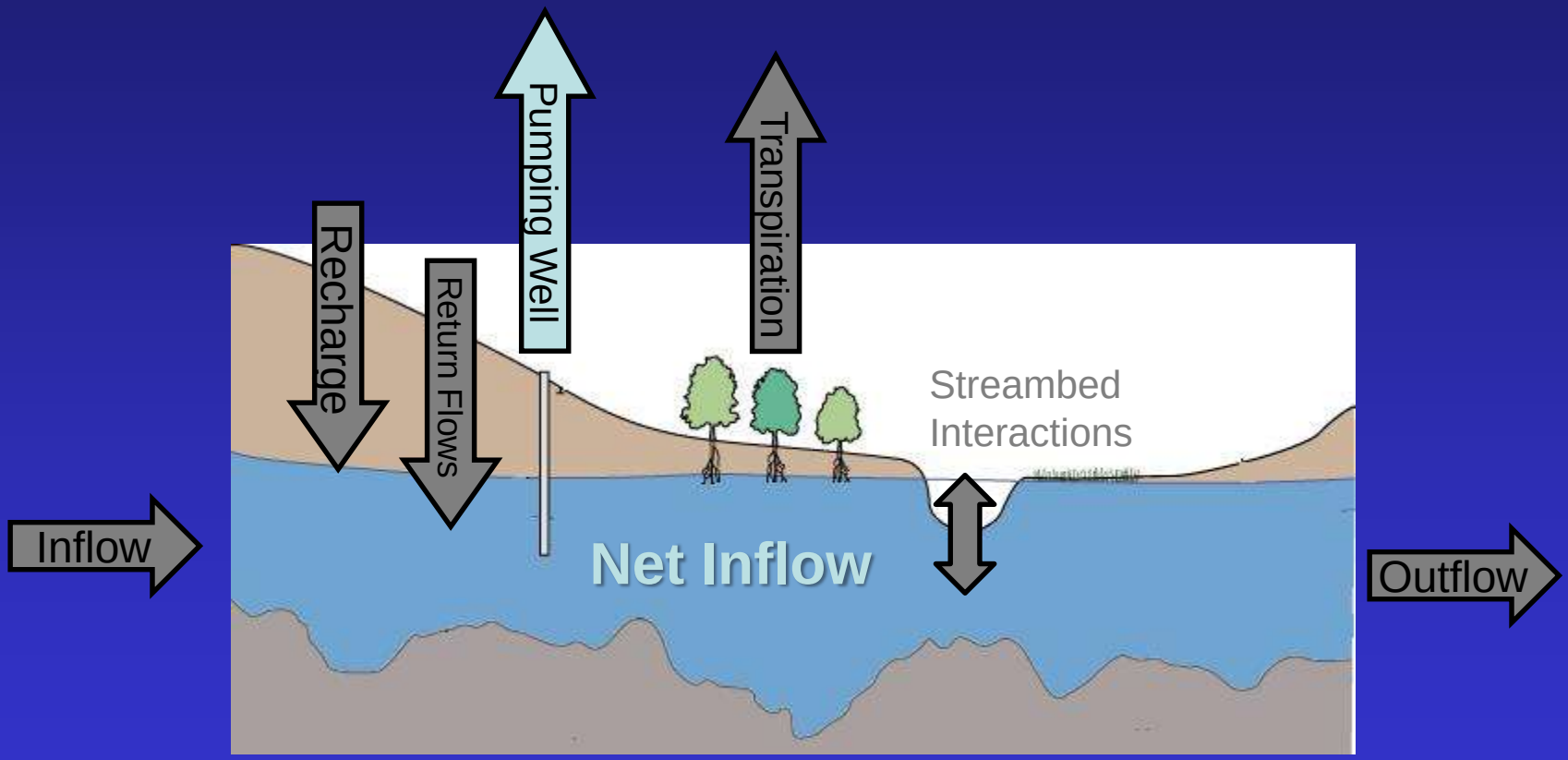
March 7th, 2017



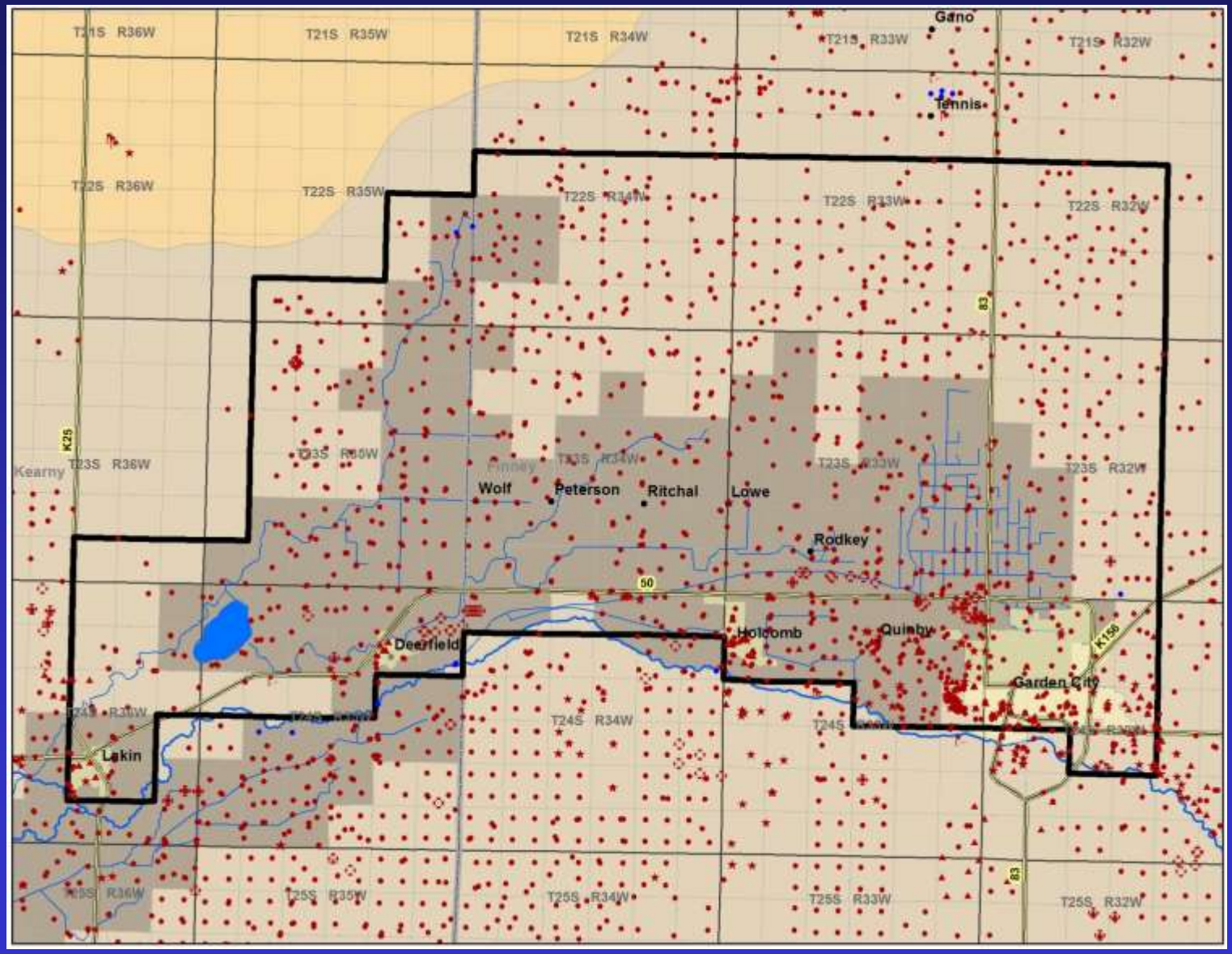
Geohydrology Section
Kansas Geological Survey
University of Kansas

Q-Stable Assessment

Isolating water-level change vs pumping



Study Area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Finney
Wolf
Peterson
Ritchal
Lowe
Rodkey
50
83
Deerfield
Holcomb
Quinby
K156
Garden City
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T24S R33W
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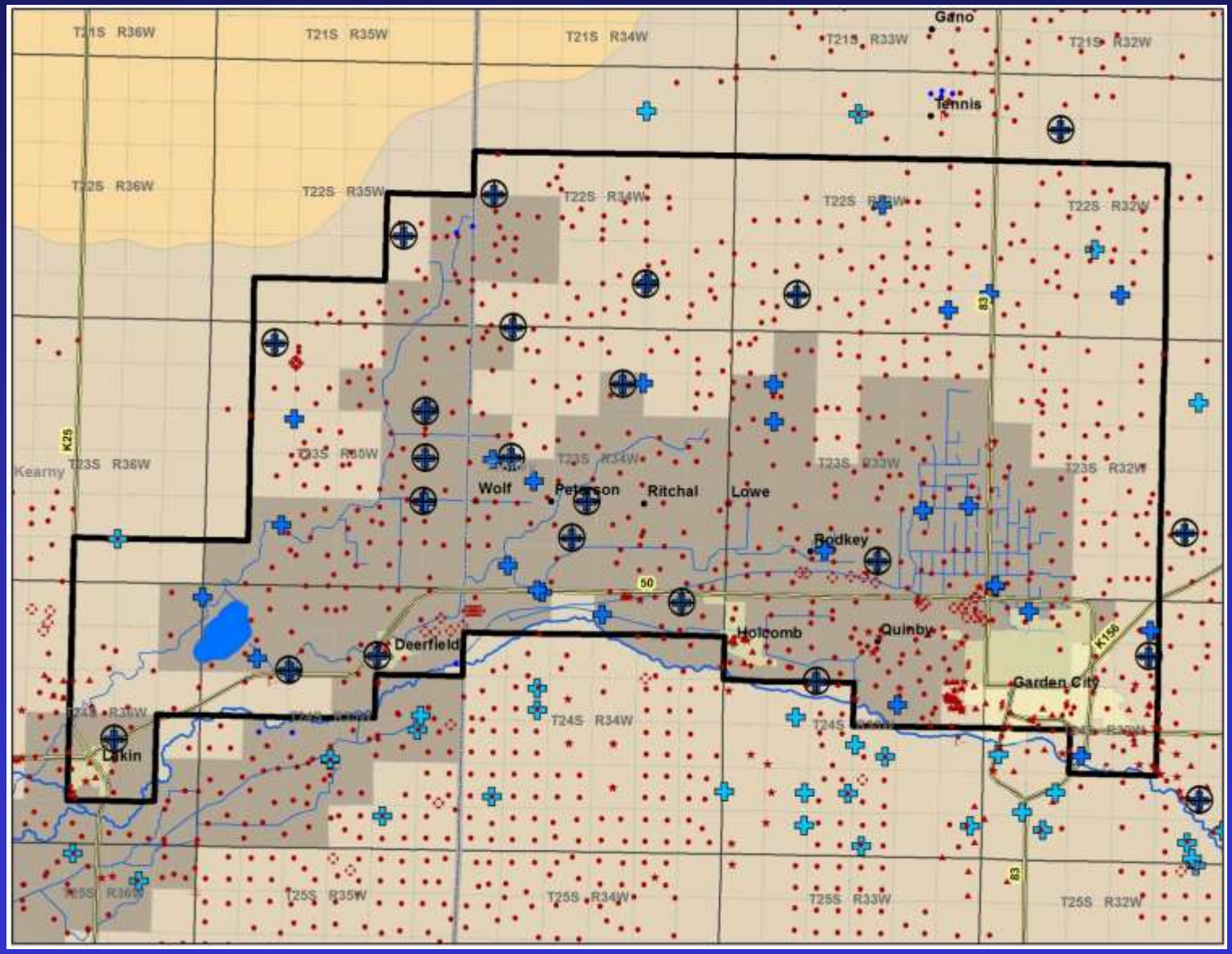
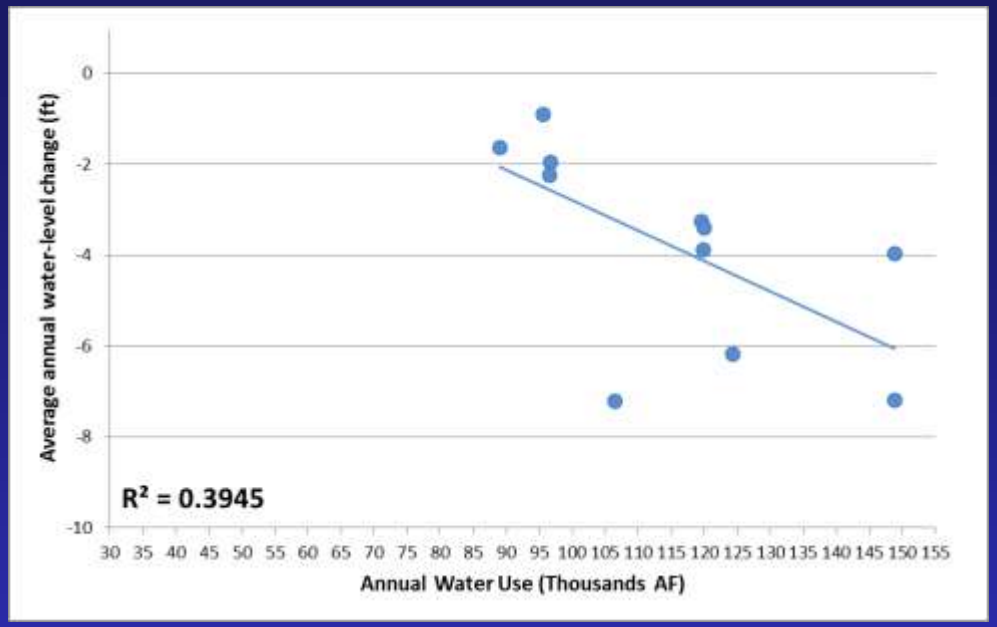
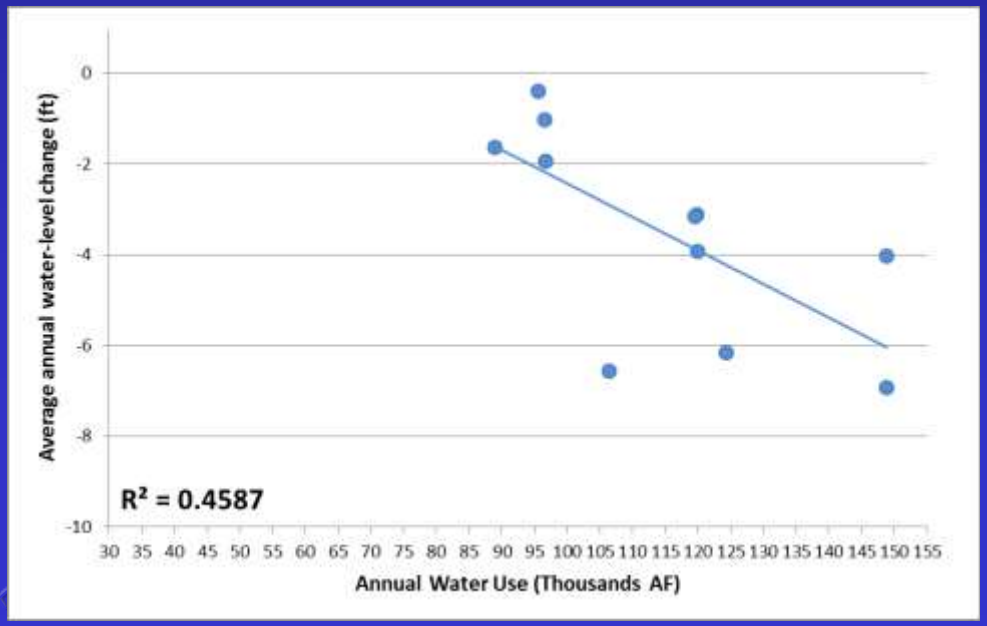
Measured Water Levels, 2005-2016



Water Use vs Water-level Change- All Wells

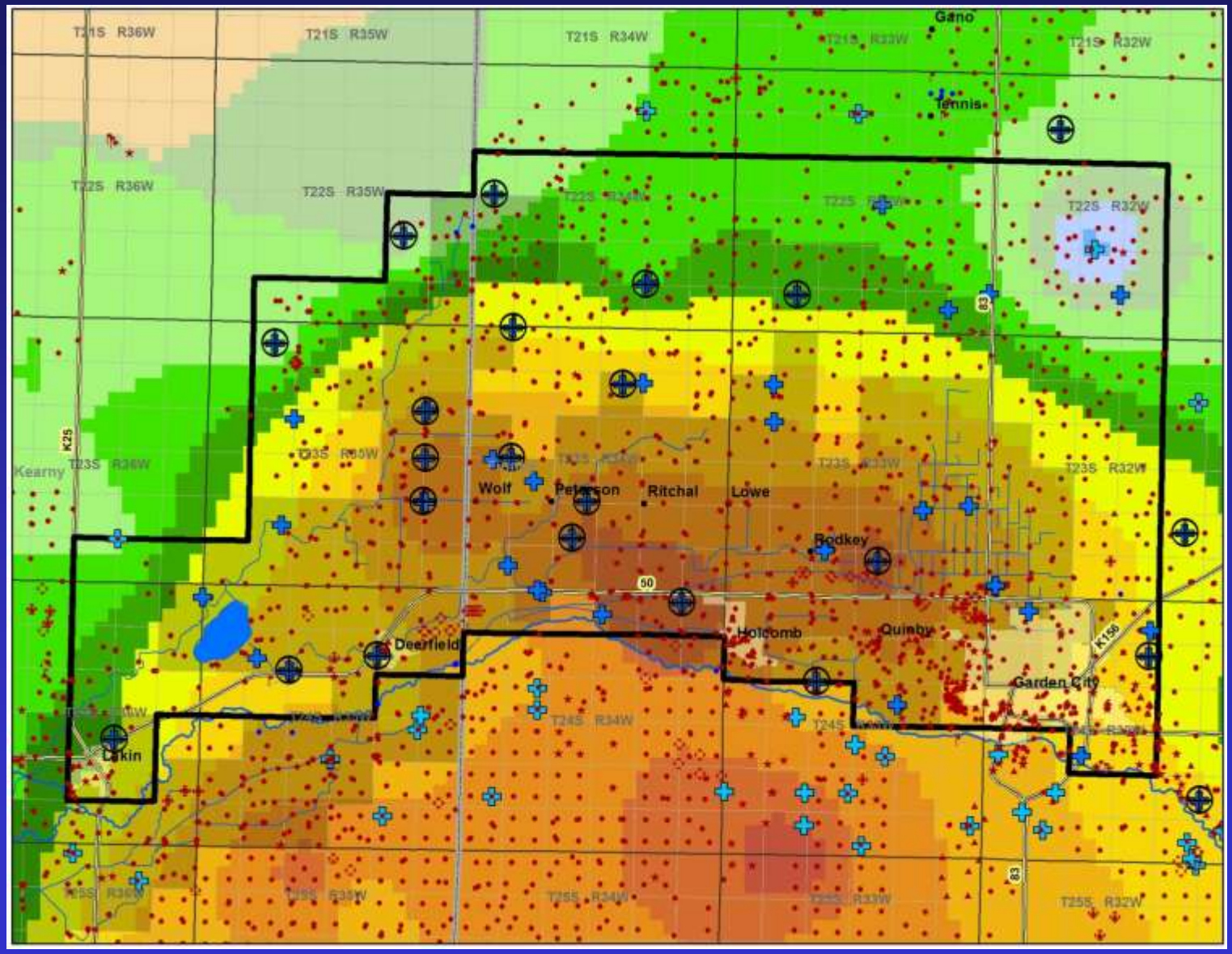


Maximum Wells

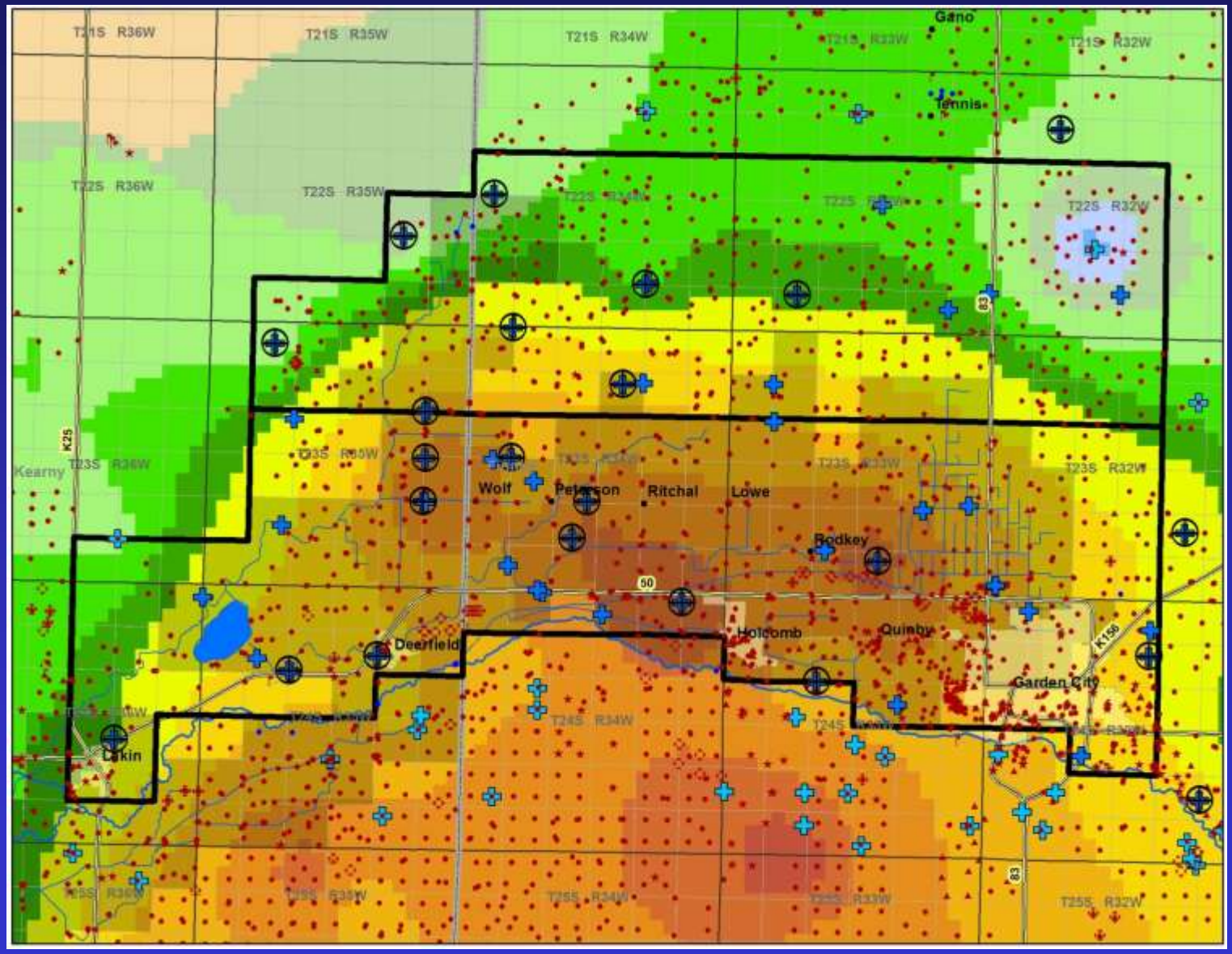


Continuous Wells

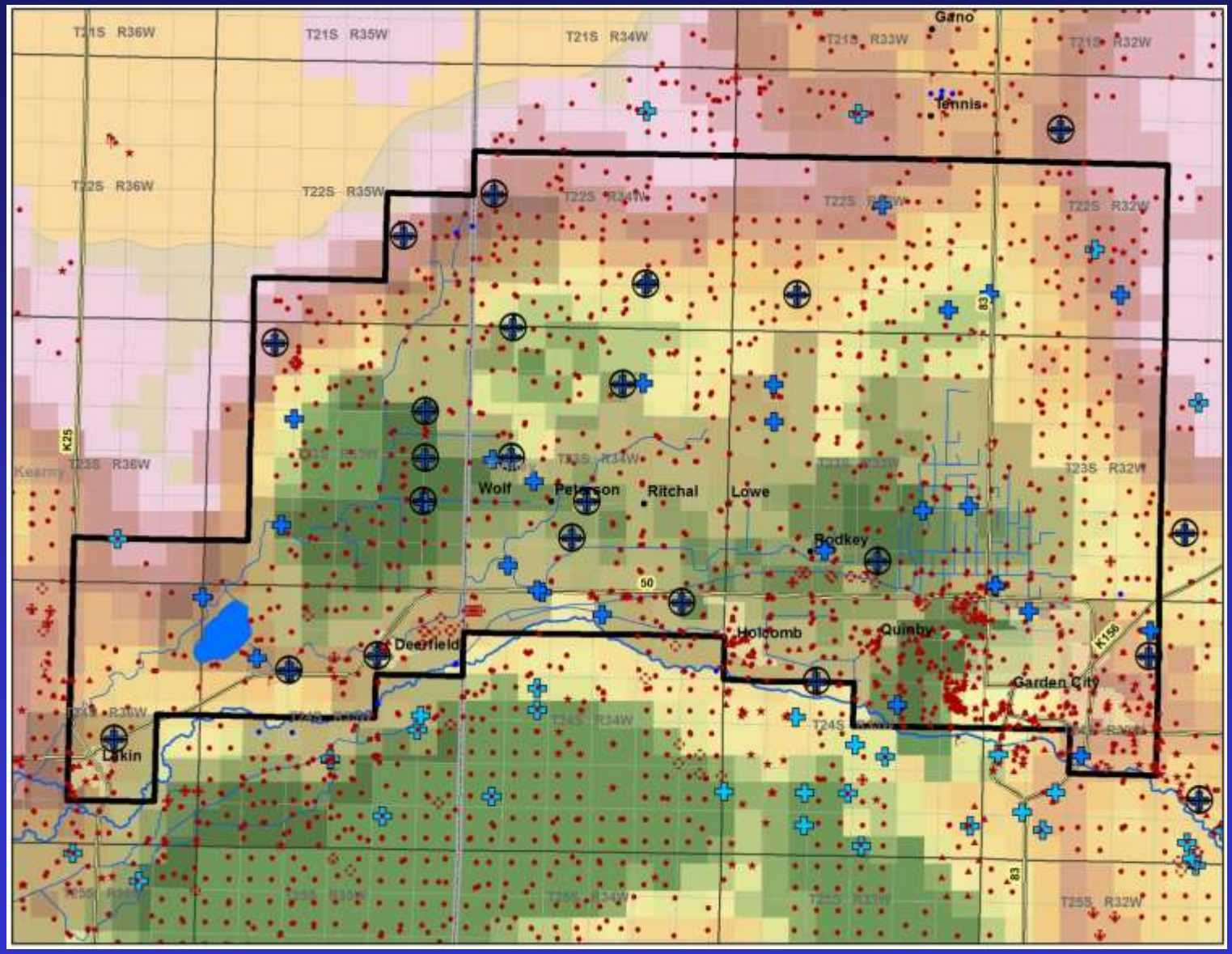
Water Level Change, 2005-2016



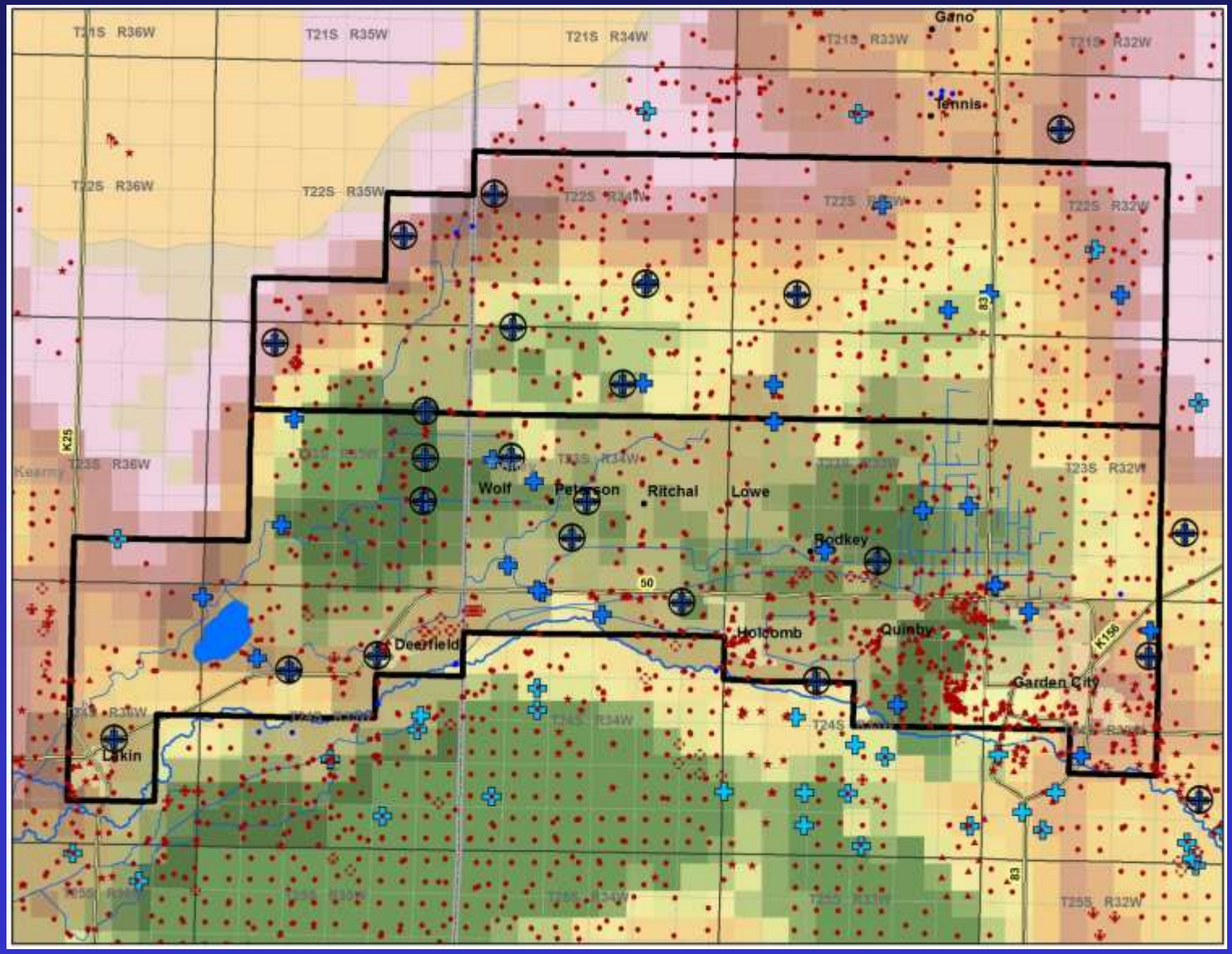
Water Level Change, 2005-2016



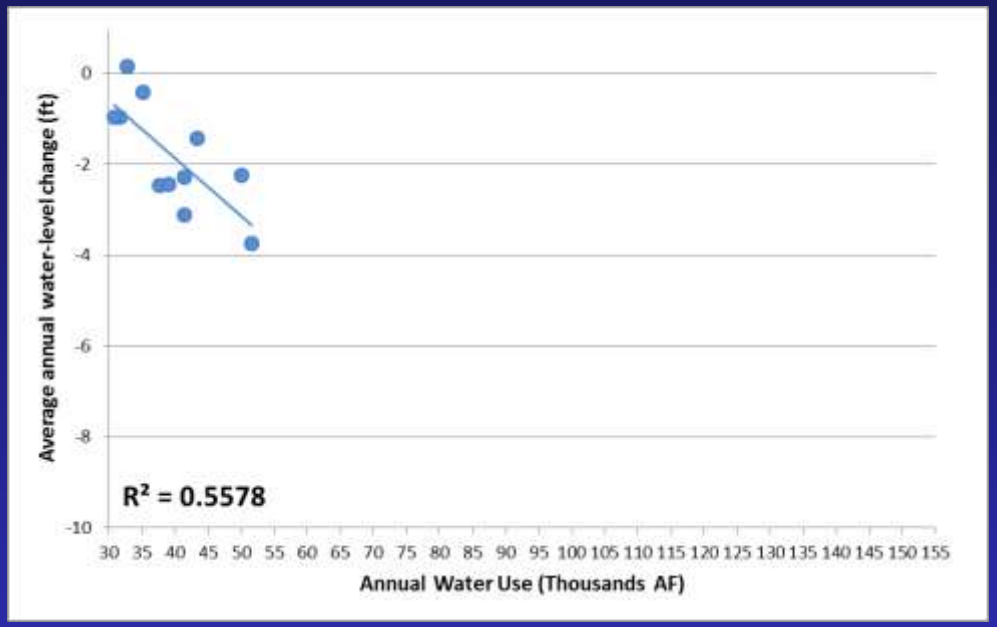
2-Mile Water Use Density, Average 2005-2015



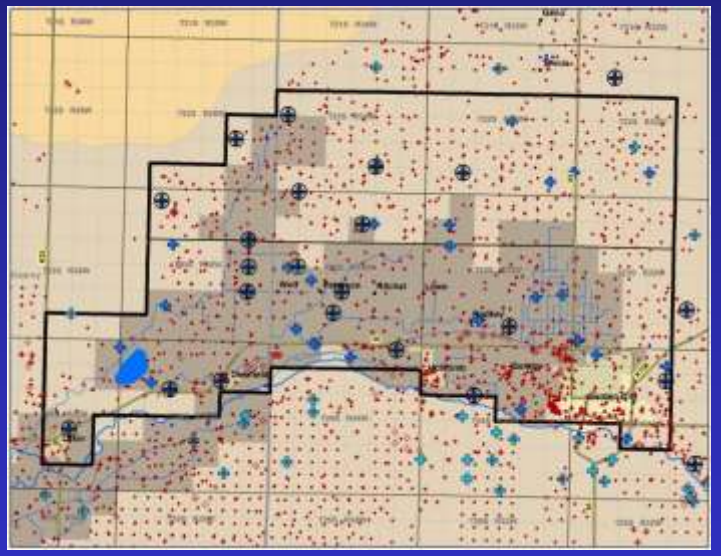
2-Mile Water Use Density, Average 2005-2015

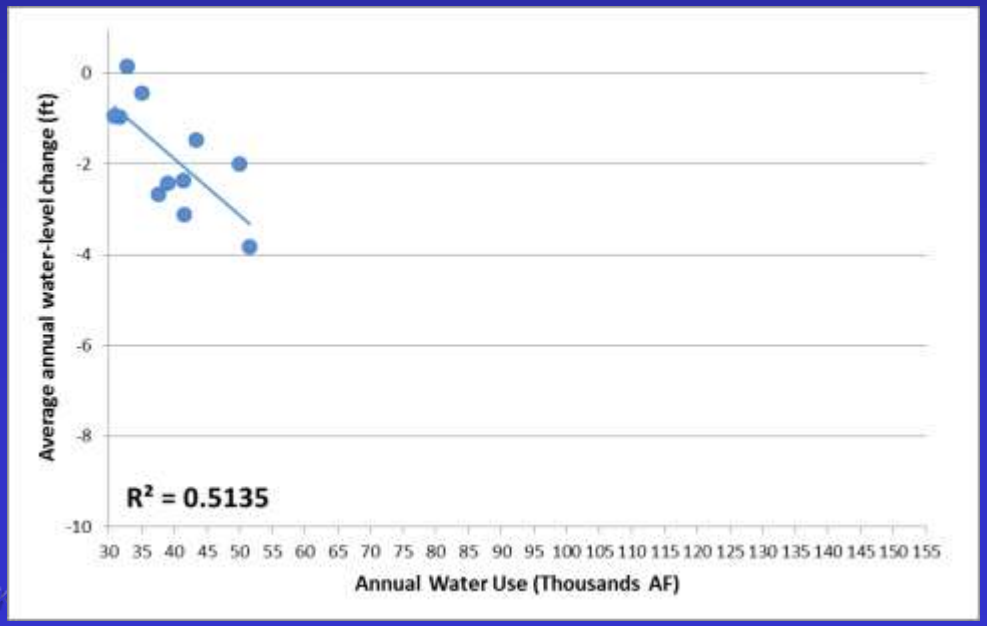


Water Use vs Water-level Change- Northern Area



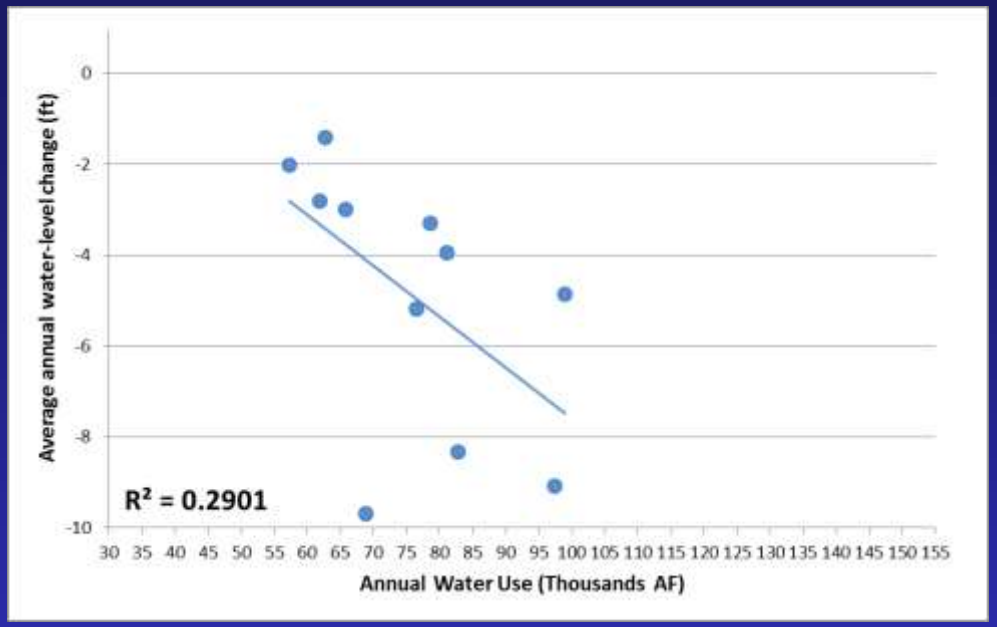
Maximum Wells



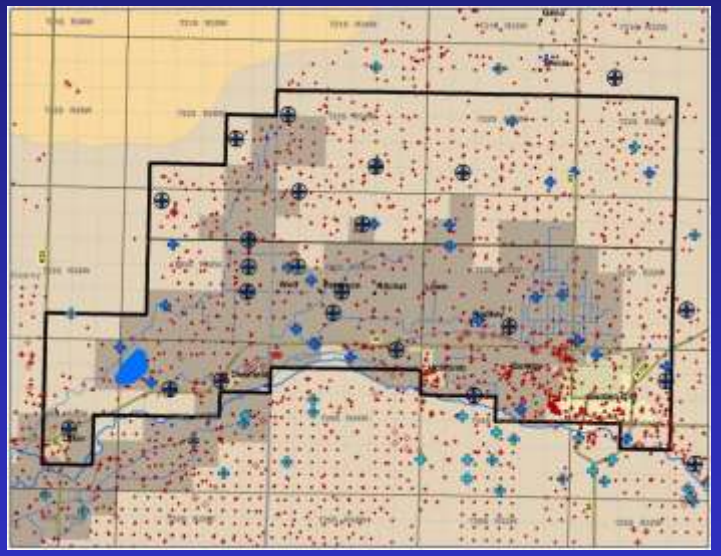


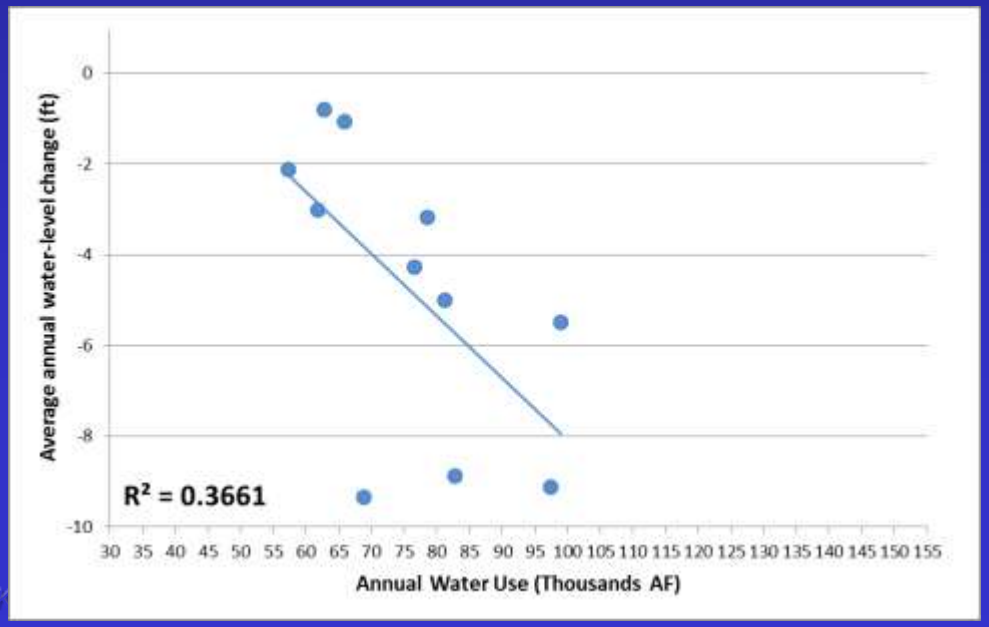
Continuous Wells

Water Use vs Water-level Change- Southern Area



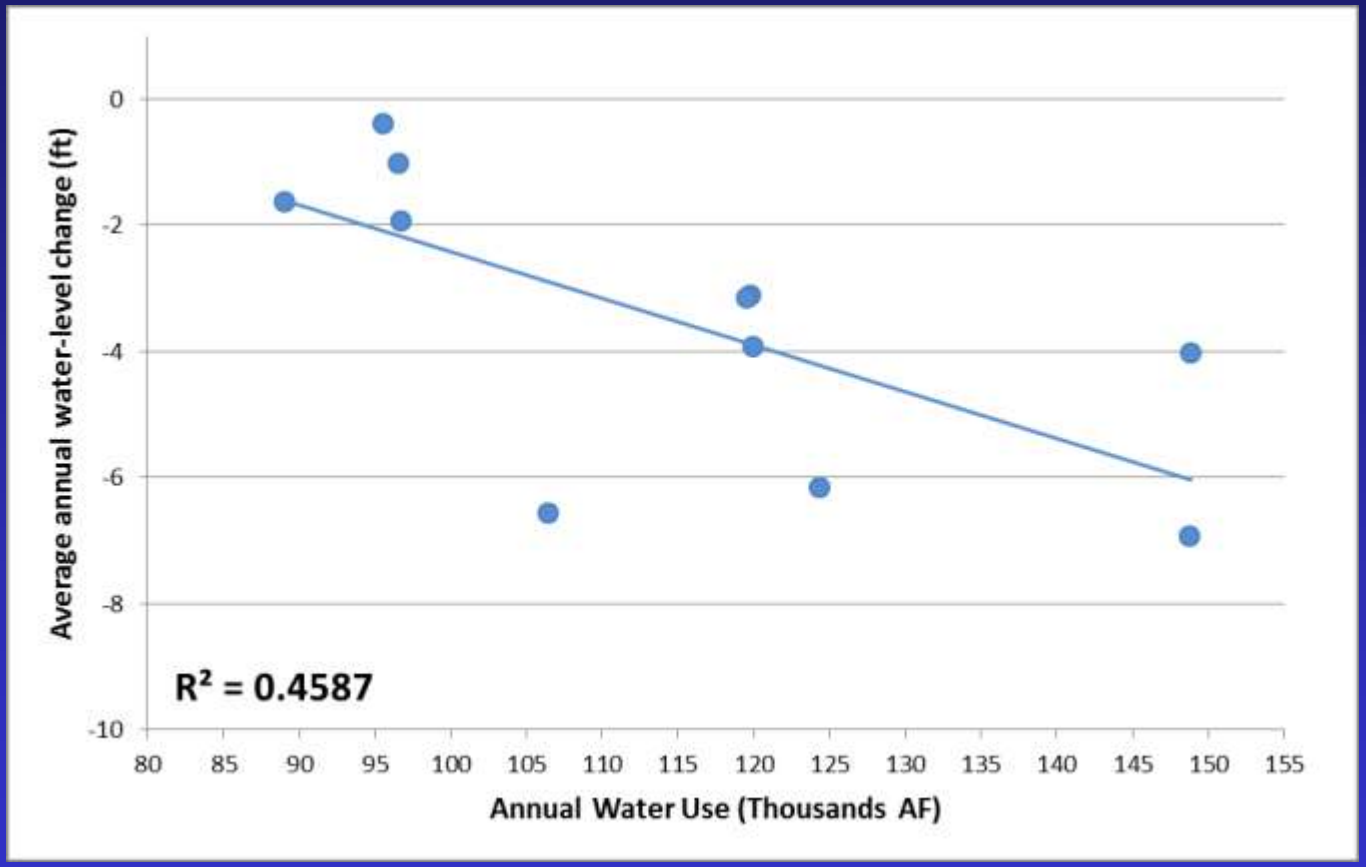
Maximum Wells



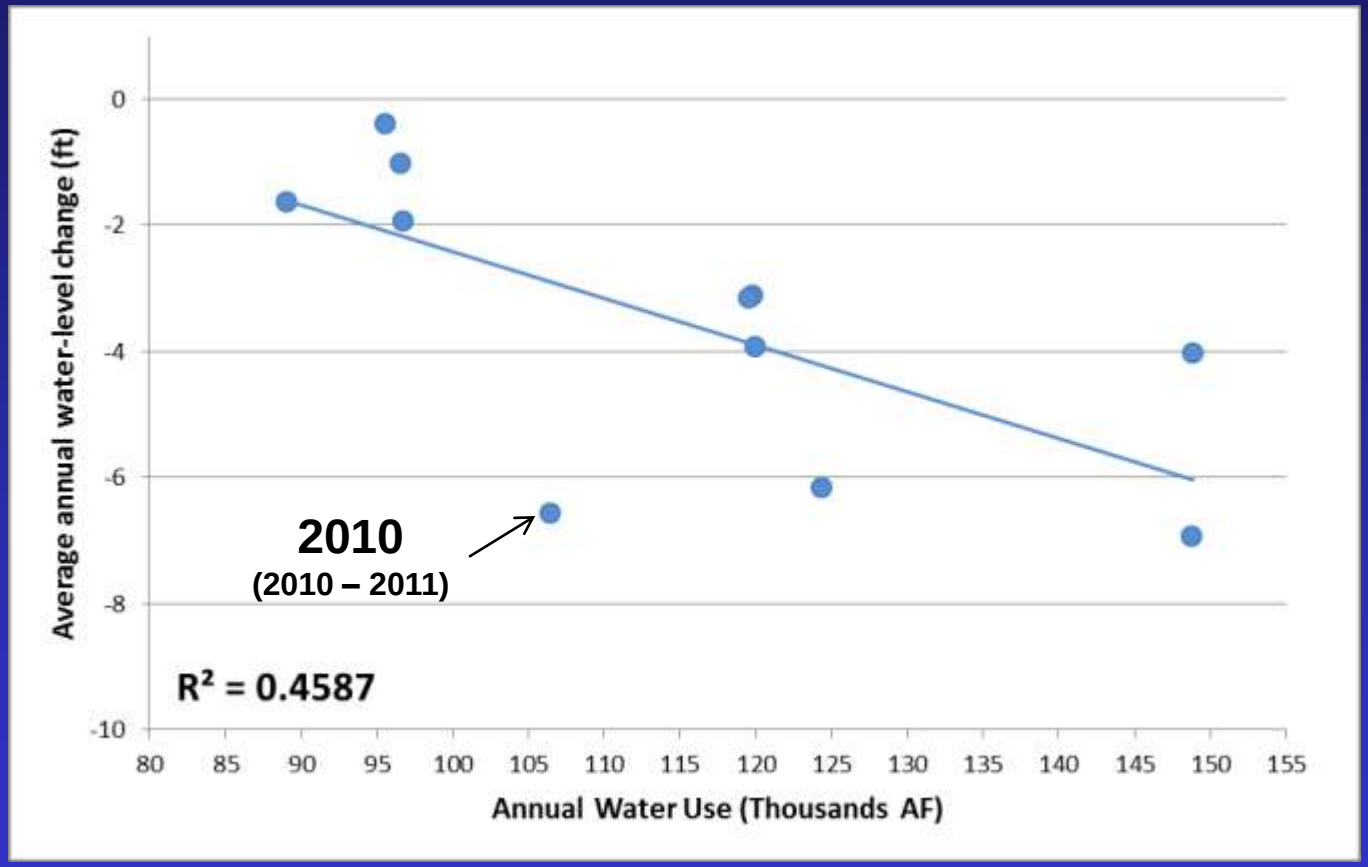


Continuous Wells

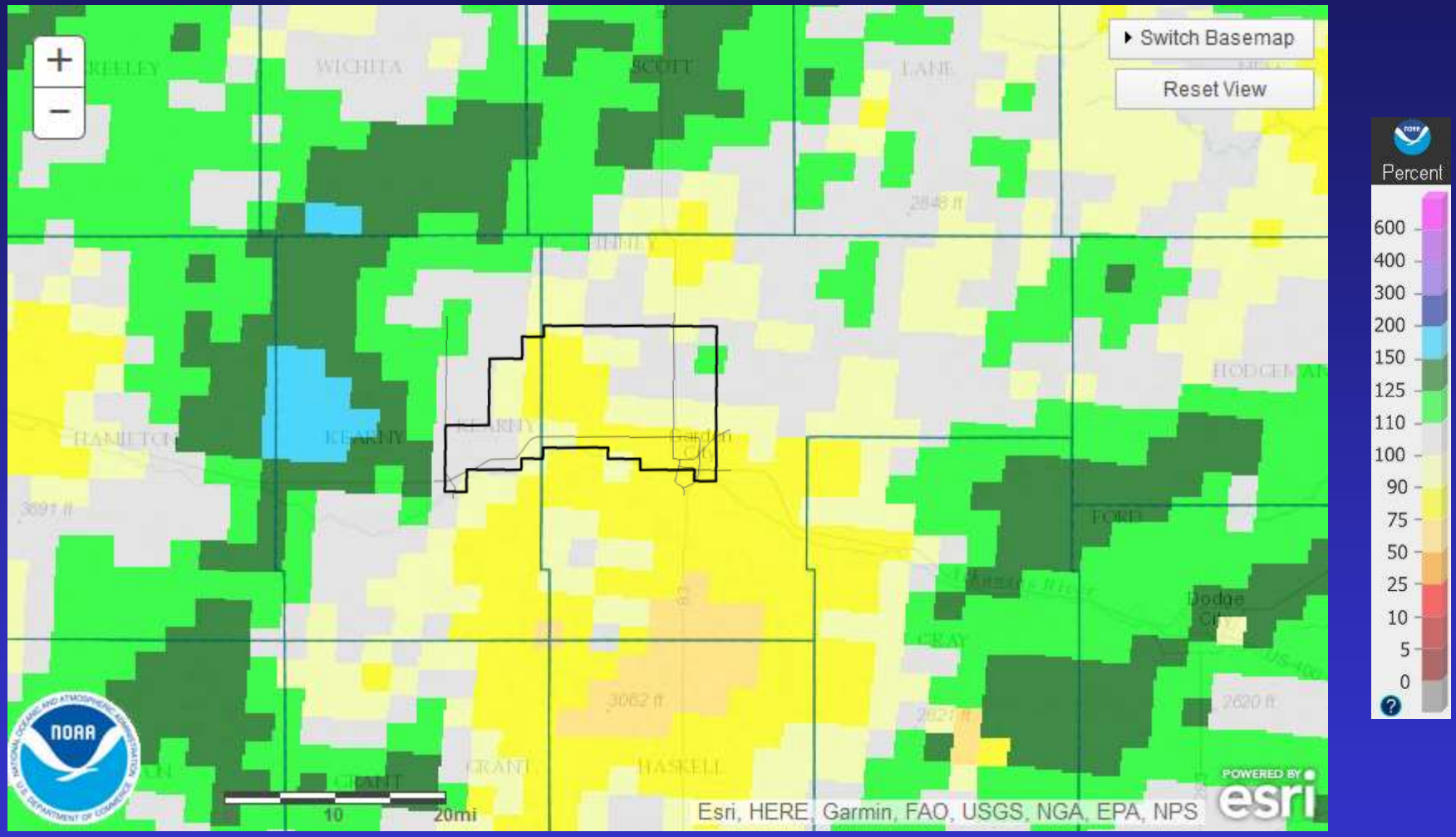
Water Use vs Water-level Change- All Continuous Wells



Water Use vs Water-level Change- All Continuous Wells

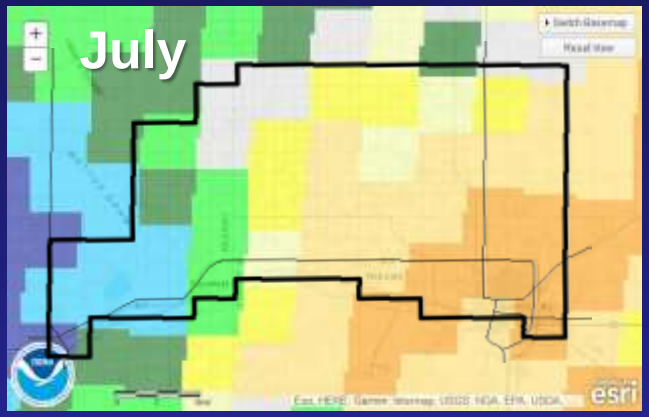


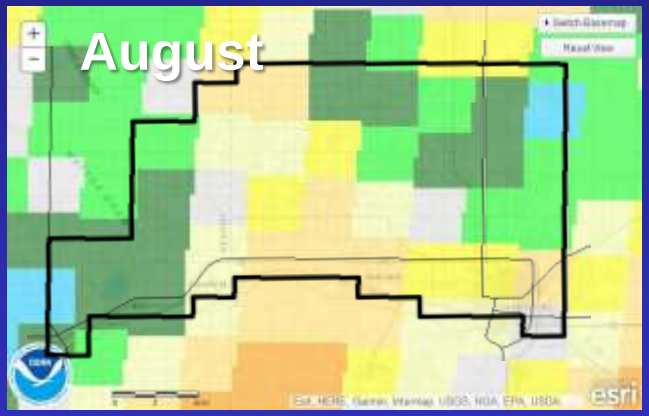
Percent Departure from Normal Precipitation, 2010

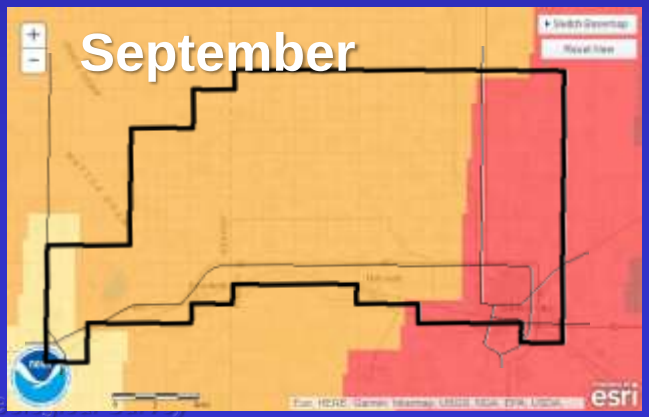


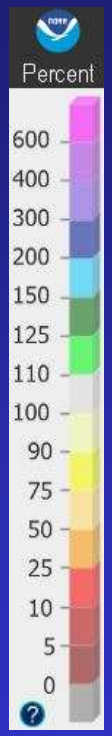
Water Year (October 1)

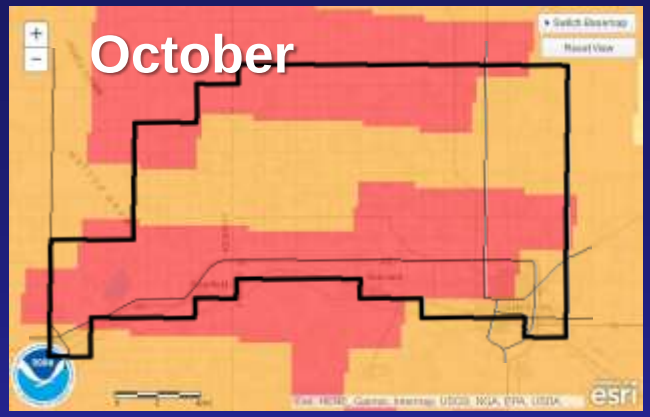
Monthly Percent Departure from Normal Precipitation, 2010

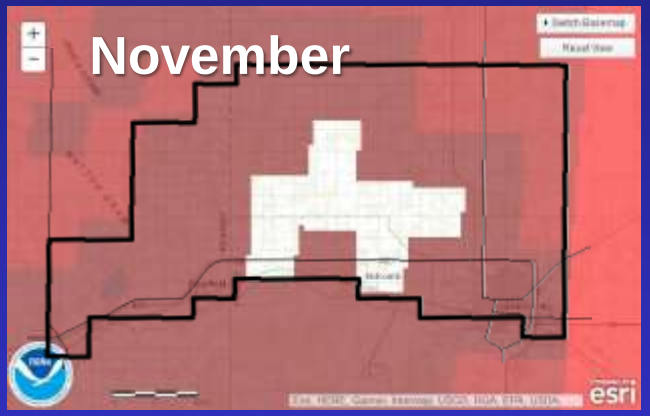


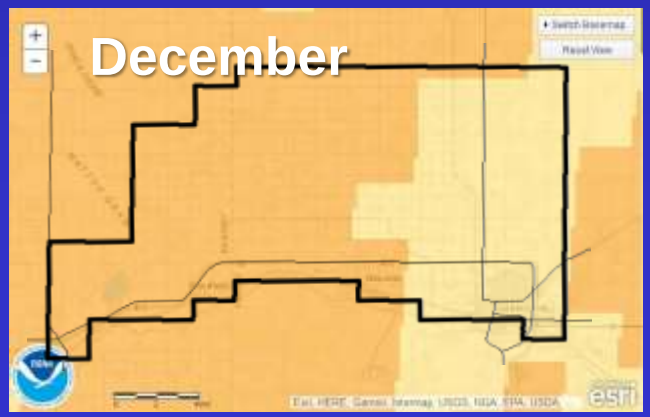




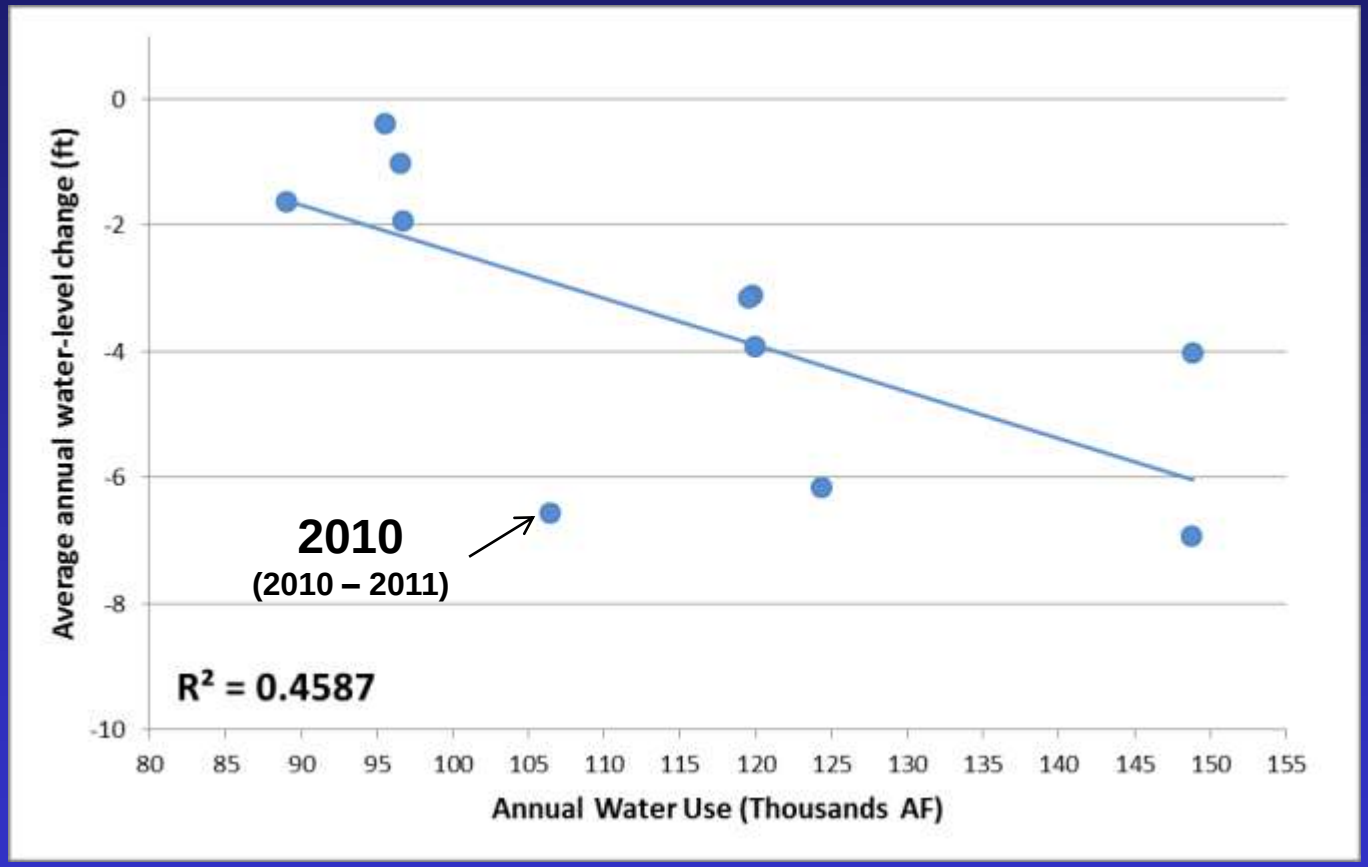








Water Use vs Water-level Change- All Continuous Wells



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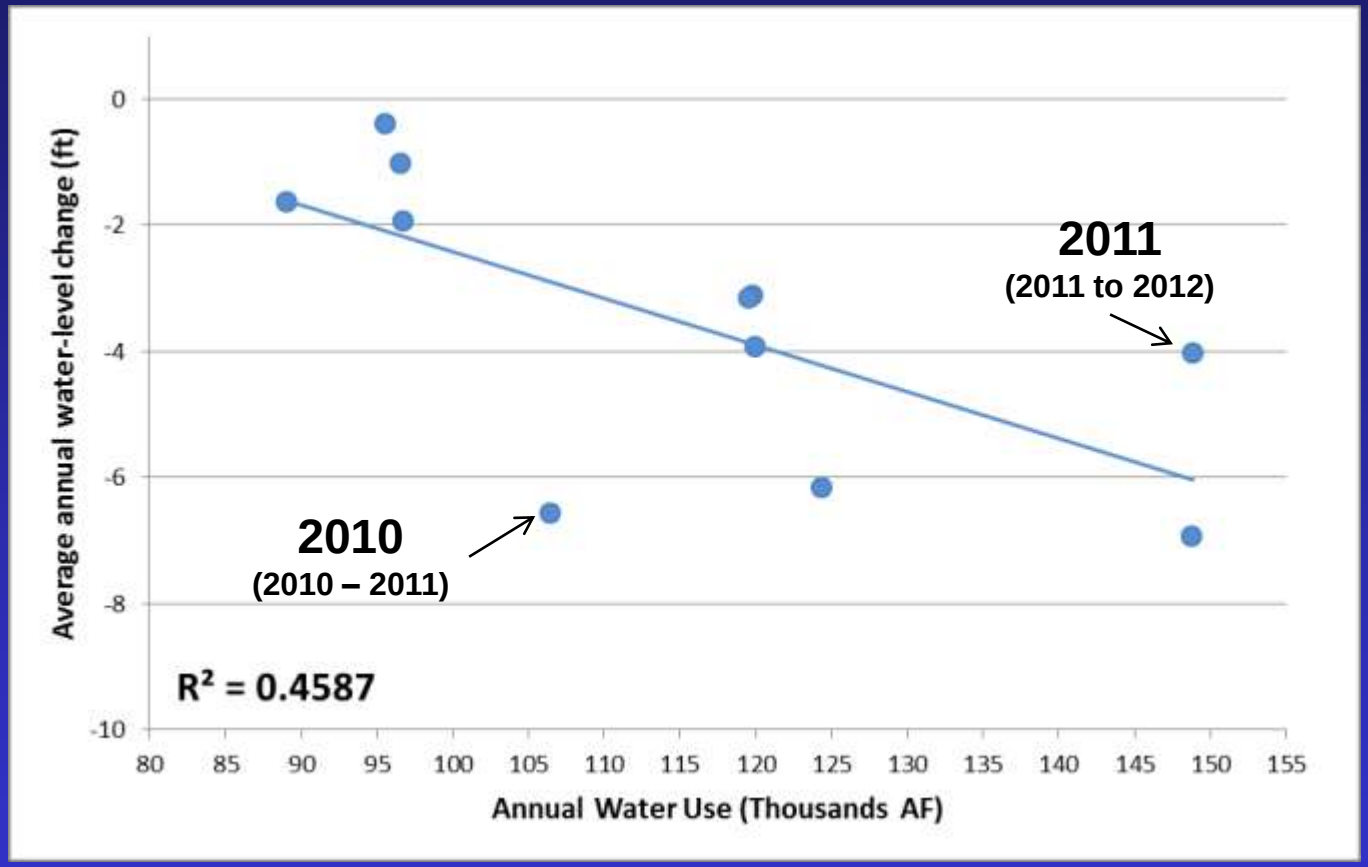
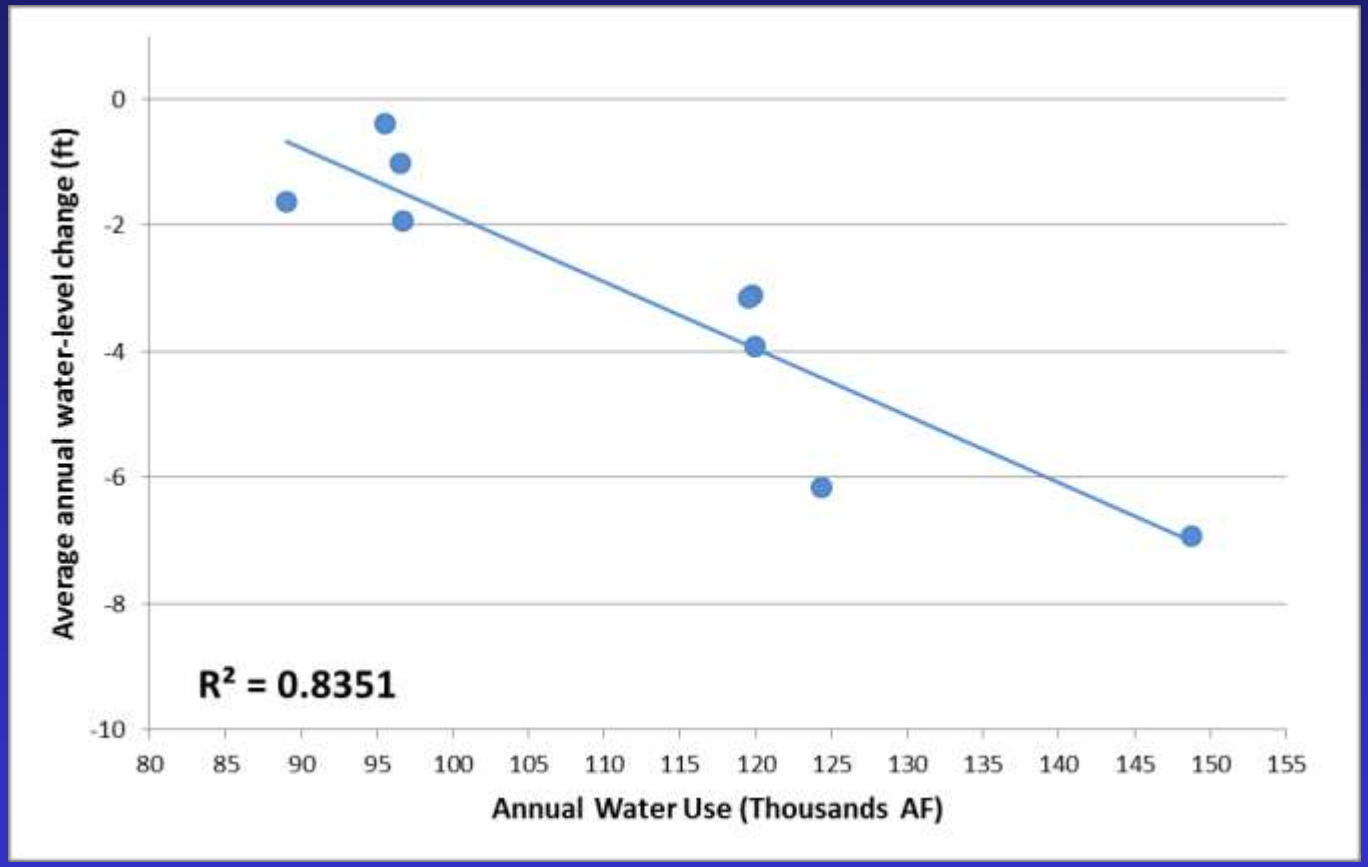
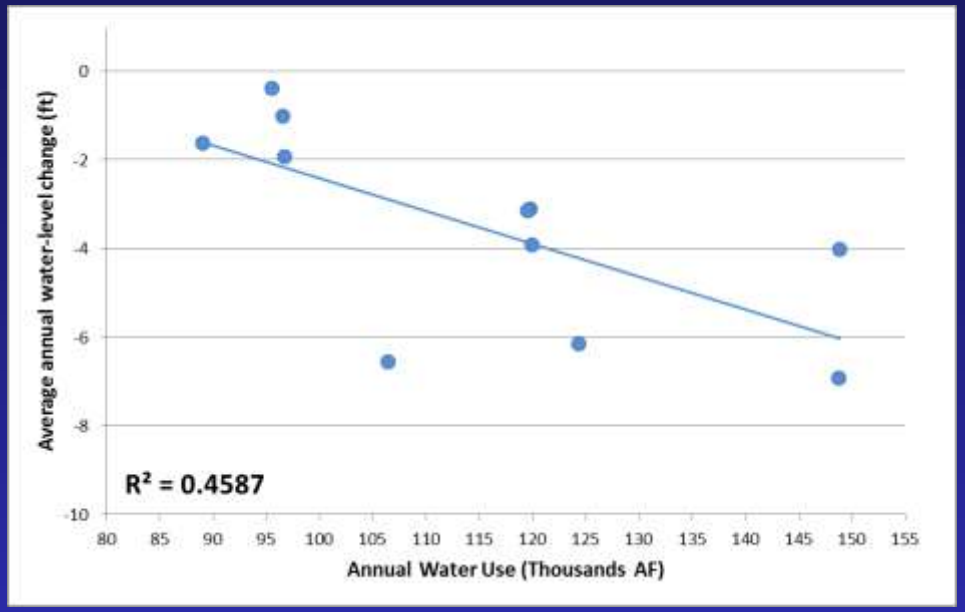


Water Use vs Water-level Change- All Continuous Wells



2010 and 2011 Excluded or Averaged

Q Stable- Lake McKinney Area



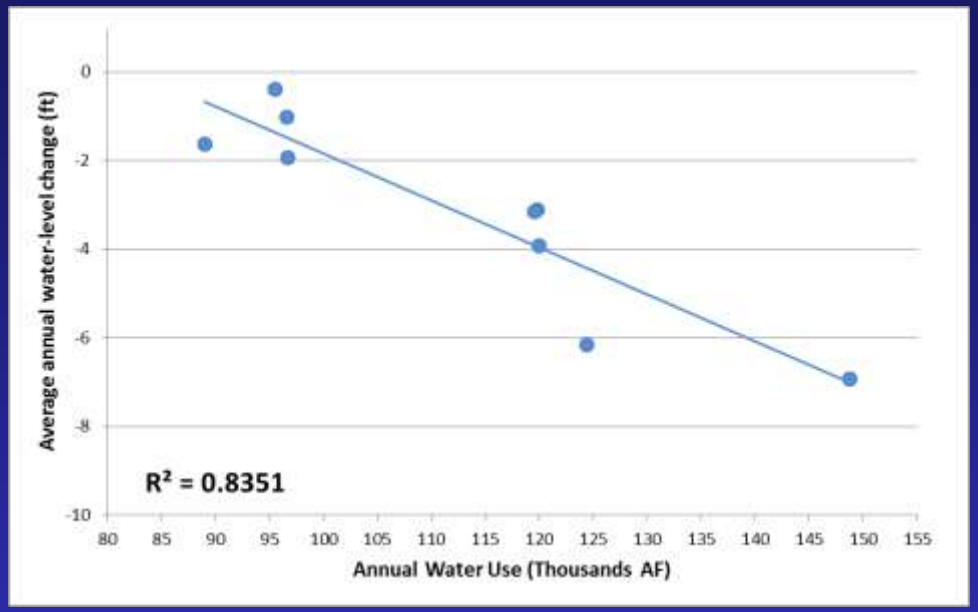
Average Groundwater Use = 115,046 AF

Average Water Level Decline = 3.53 ft

Based on this relationship, using averages, on the short term:

- **41.4% reduction in average use = Stable water levels = Sustainable**
- **30% reduction in average use = 0.97 ft annual decline = decline reduced by over 72%**
- **20% reduction in average use = 1.82 ft annual decline = decline reduced by over 48%**
- **10% reduction in average use = 2.68 ft annual decline = decline reduced by over 24%**

Q Stable- Lake McKinney Area, excluding 2010-2011



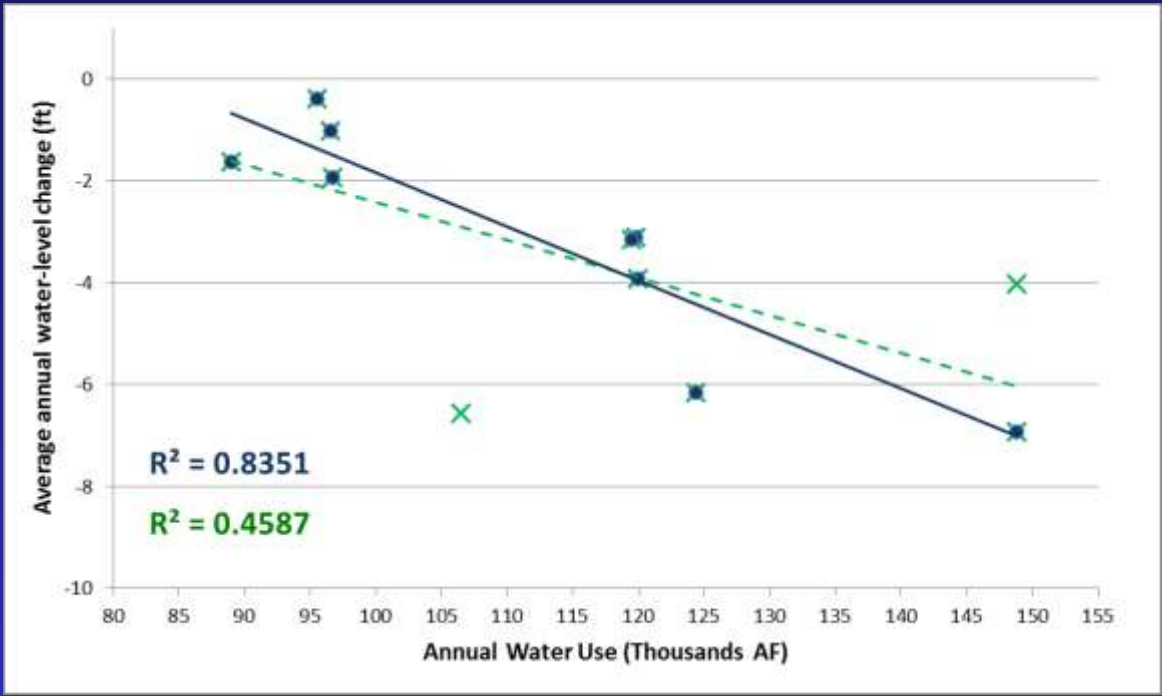
Average Groundwater Use = 112,249 AF

Average Water Level Decline = 3.13 ft

Based on this relationship, using averages, on the short term:

- **26.3% reduction in average use = Stable water levels = Sustainable**
- **20% reduction in average use = 0.76 ft annual decline = decline reduced by 76%**
- **10% reduction in average use = 1.95 annual decline = decline reduced by 38%**

Q Stable- Lake McKinney Area



Average Groundwater Use = ~115,000 AF

Average Water Level Decline = ~ 3.3 ft

- **26 to 40% reduction in average use = Stable water levels = Sustainable**
- **20% reduction in average use = 0.75 to 1.8 ft declines = decline reduced 50 to 76%**
- **10% reduction in average use = 1.9 to 2.7 declines = decline reduced 24 to 38%**

Questions????

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

KU KANSAS GEOLOGICAL SURVEY
The University of Kansas

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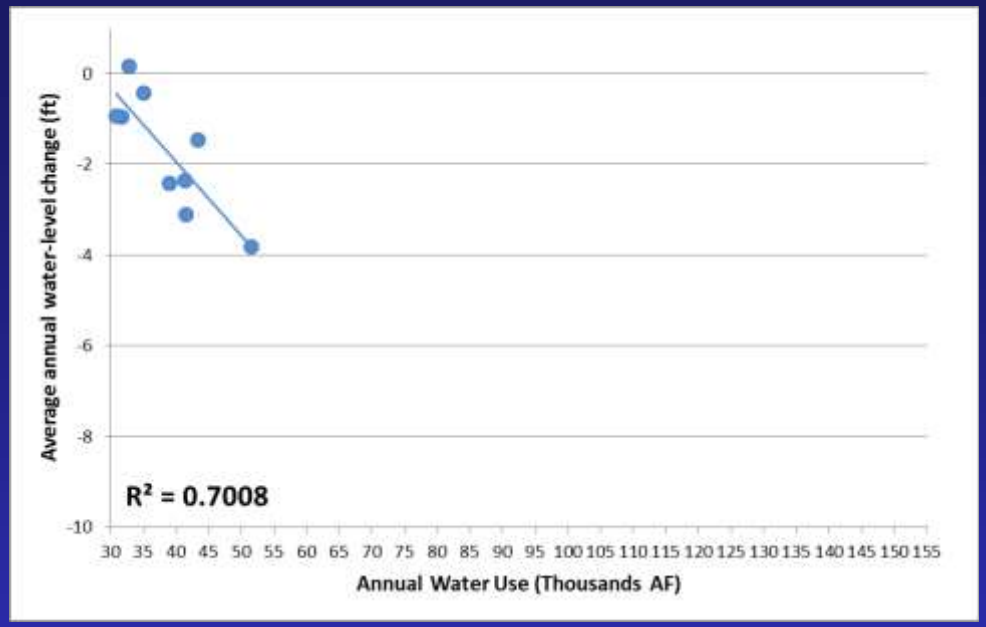
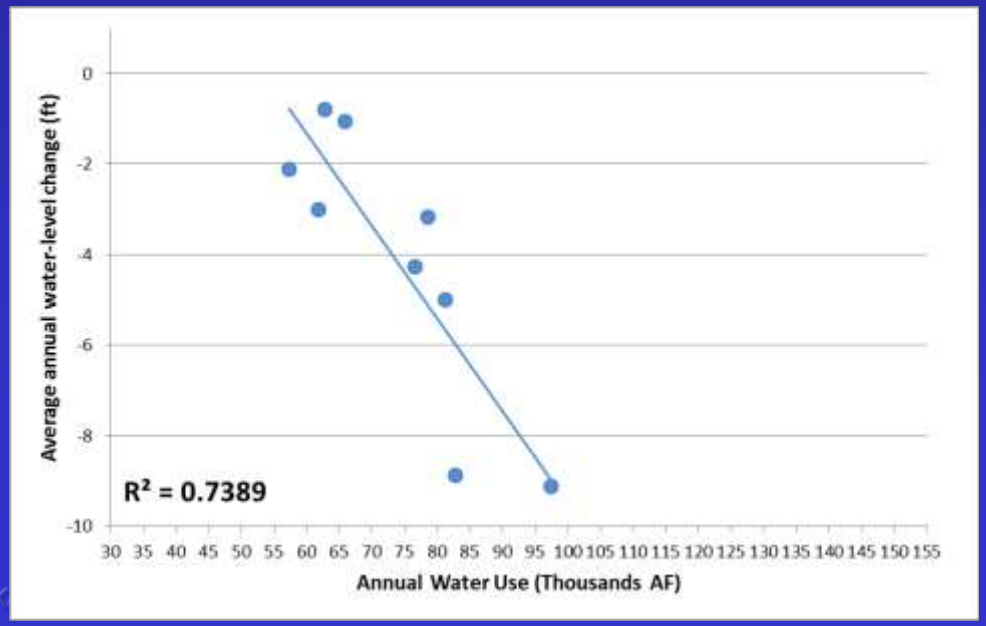
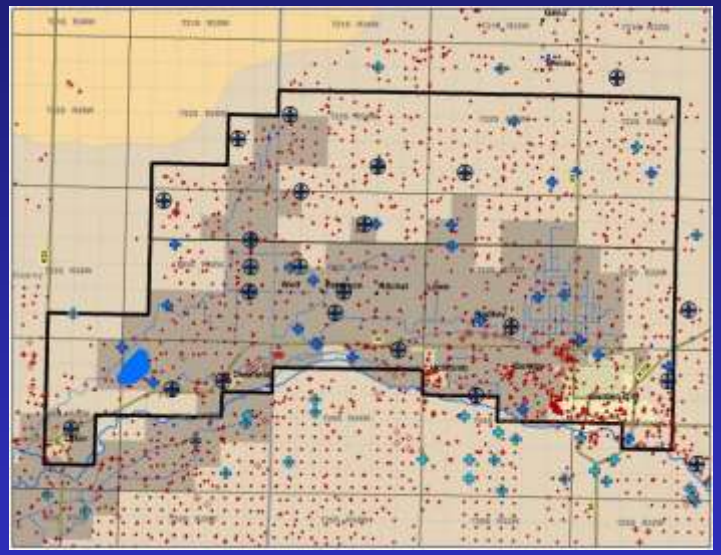
http://www.kgs.ku.edu

Water Use vs Water-level Change North/South Areas







2010 and 2011 Excluded