

Northeast & North-Central Nebraska

- Conservation & Survey Division
- Groundwater Quantity
- Groundwater Quality
- Groundwater/Surface Water Interaction
- Geologic Framework

Conservation & Survey Division

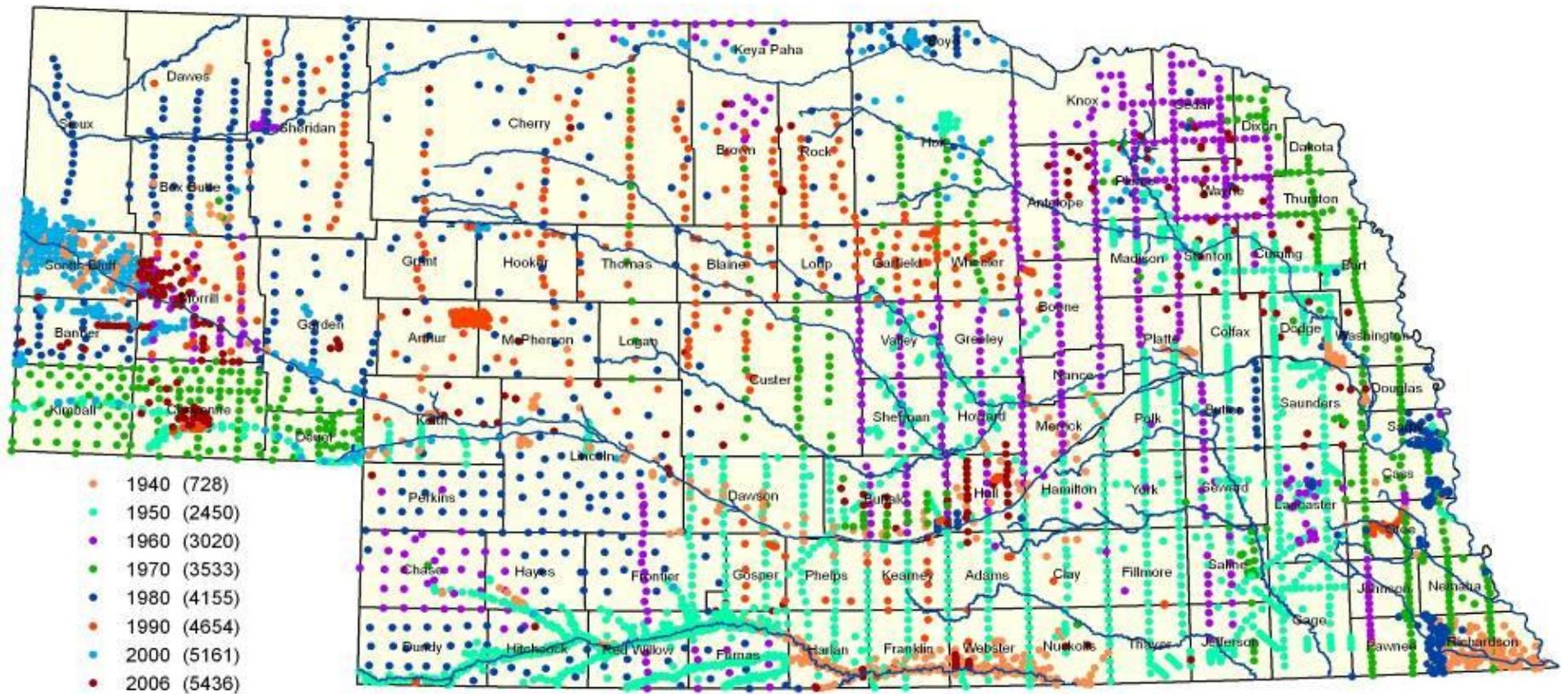
UNL
↓
IANR
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SNR
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CSD

Nebraska Geological Survey

Sue Olafsen Lackey - Hydrogeologist



Conservation and Survey Division/USGS Test Holes 1940 - 2006

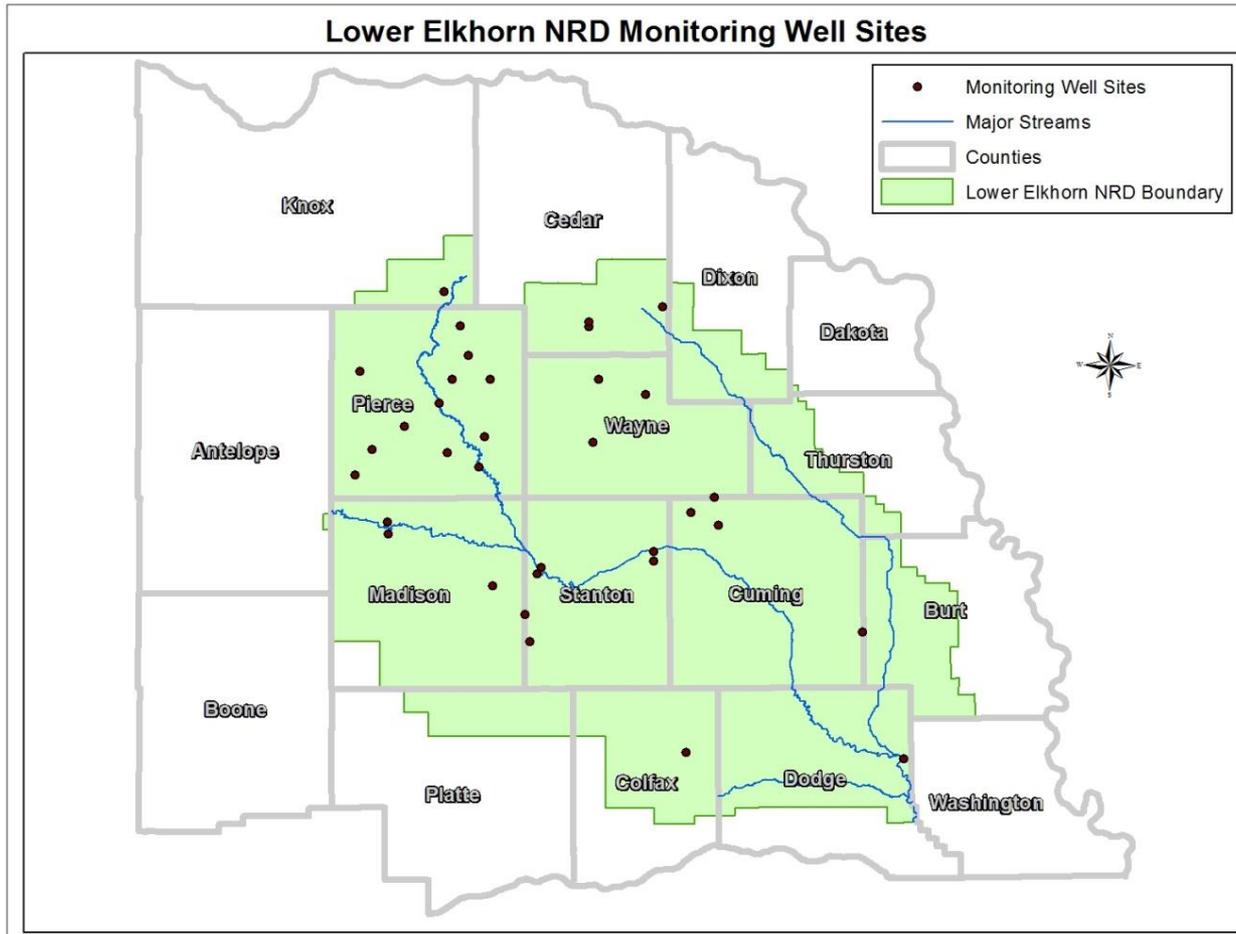


Groundwater Quantity

- Frequency of Monitoring Matters
(Once or twice per year vs every 8 hours)
- Aquifer Depletion verse In-Season Demand
(Groundwater mining vs healthy aquifer)

NRD Monitoring Well Networks
(1998 funding source NRDs)

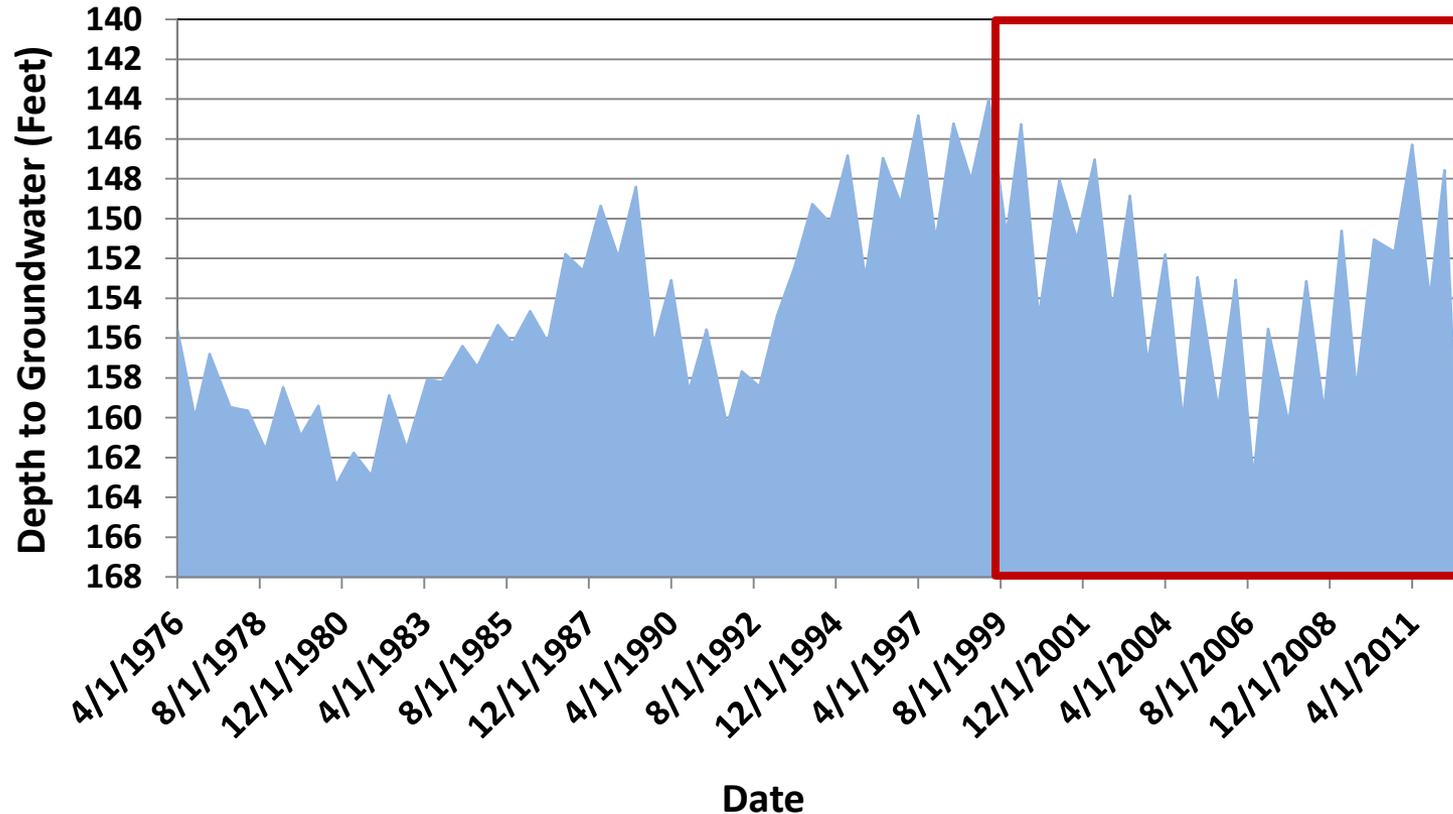
Lower Elkhorn NRD



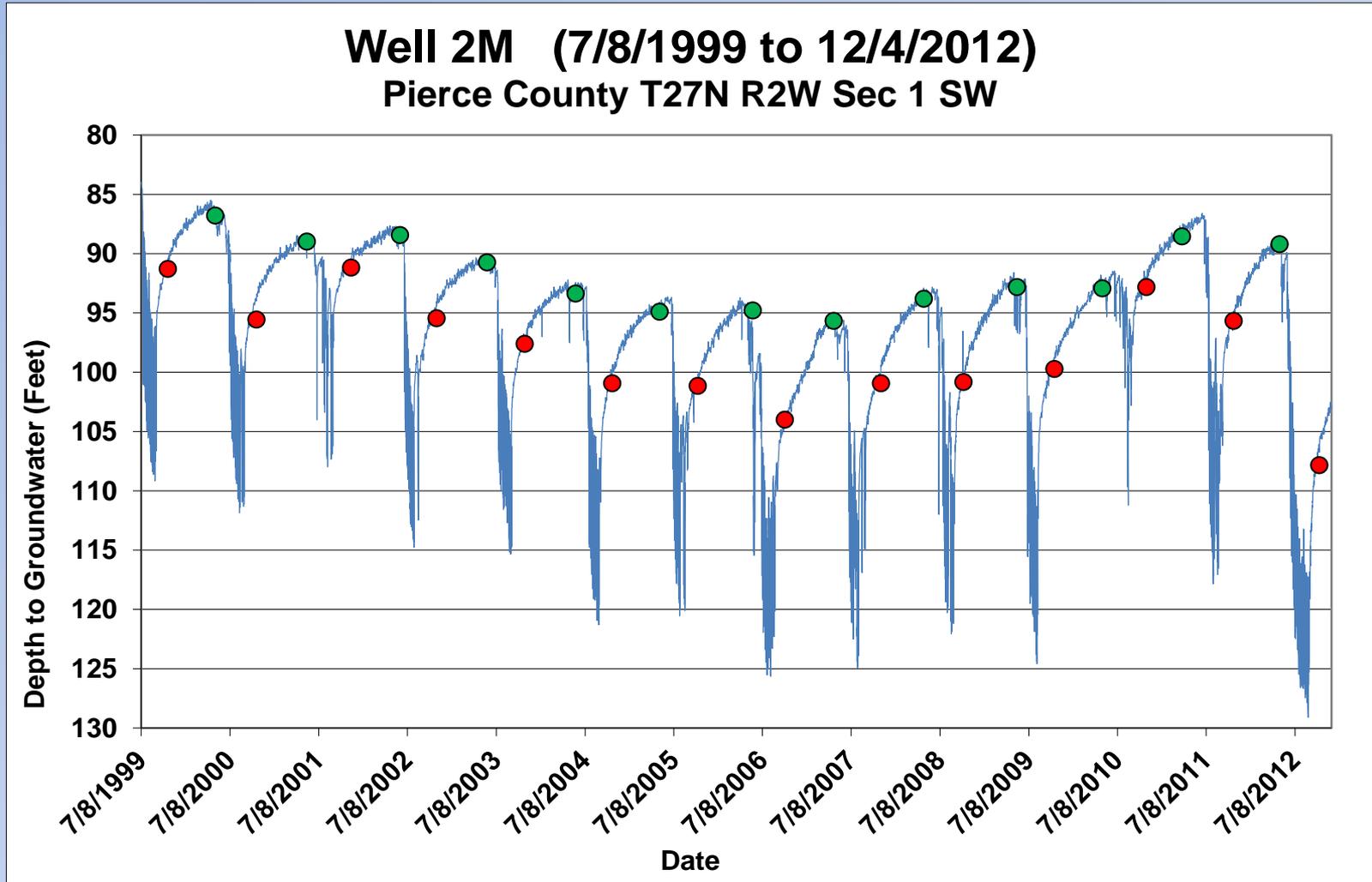
- Started in 1998
- 34 sites
- 63 Wells
- Dedicated Pumps and Transducers
- ~ \$700,000

Spring/Fall Water Level Data verses Transducer Data

Pierce County: T27N R2W Section 1 SW
Depth to Water (1976 - 2012)

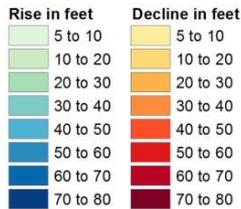
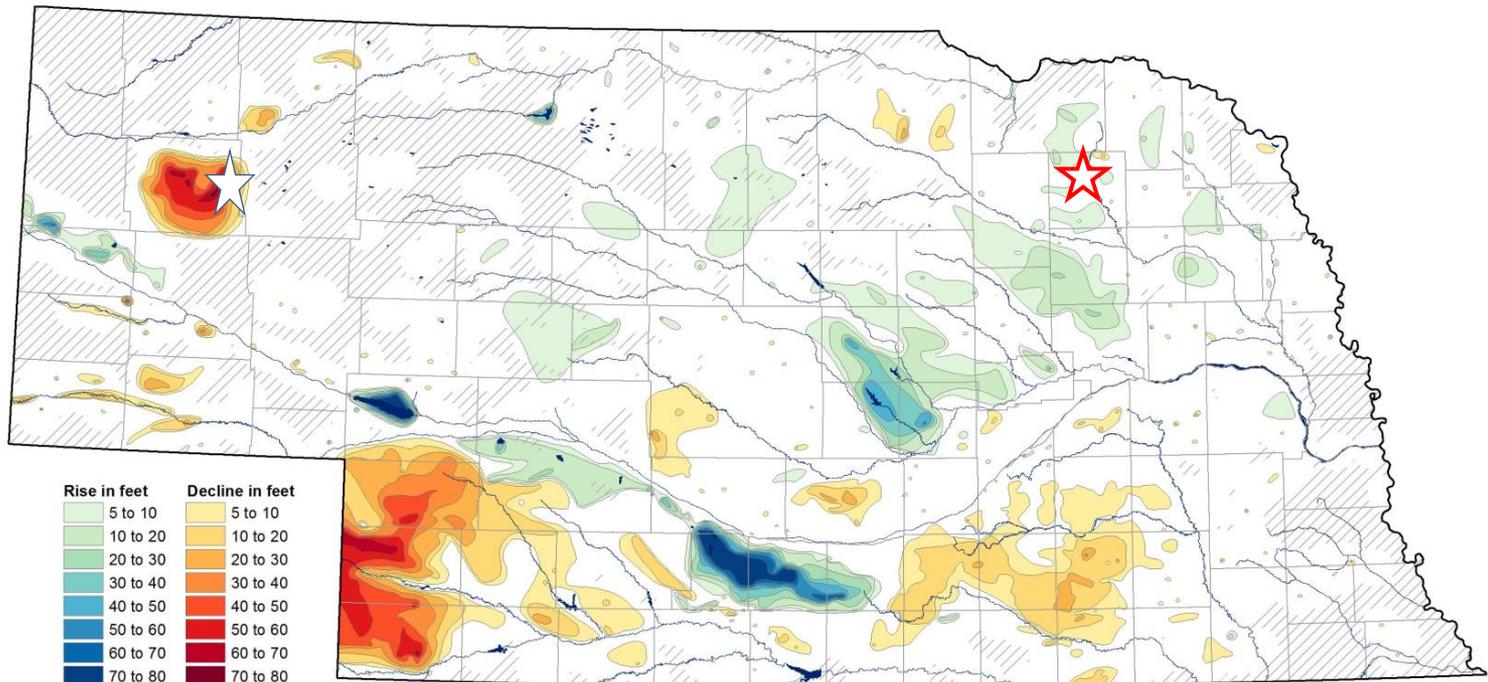


Comparison of Water Level Data



Groundwater Depletion vs In-Season Demand

Groundwater-level Changes in Nebraska - Predevelopment to Spring 2012



□ < +/- 5 feet
 ▨ Sparse data
 ■ Surface water

(1 foot = .3048 meters)

CONSERVATION AND SURVEY DIVISION (<http://snr.unl.edu/csd>)
 School of Natural Resources (<http://snr.unl.edu>)
 Institute of Agriculture and Natural Resources
 University of Nebraska-Lincoln

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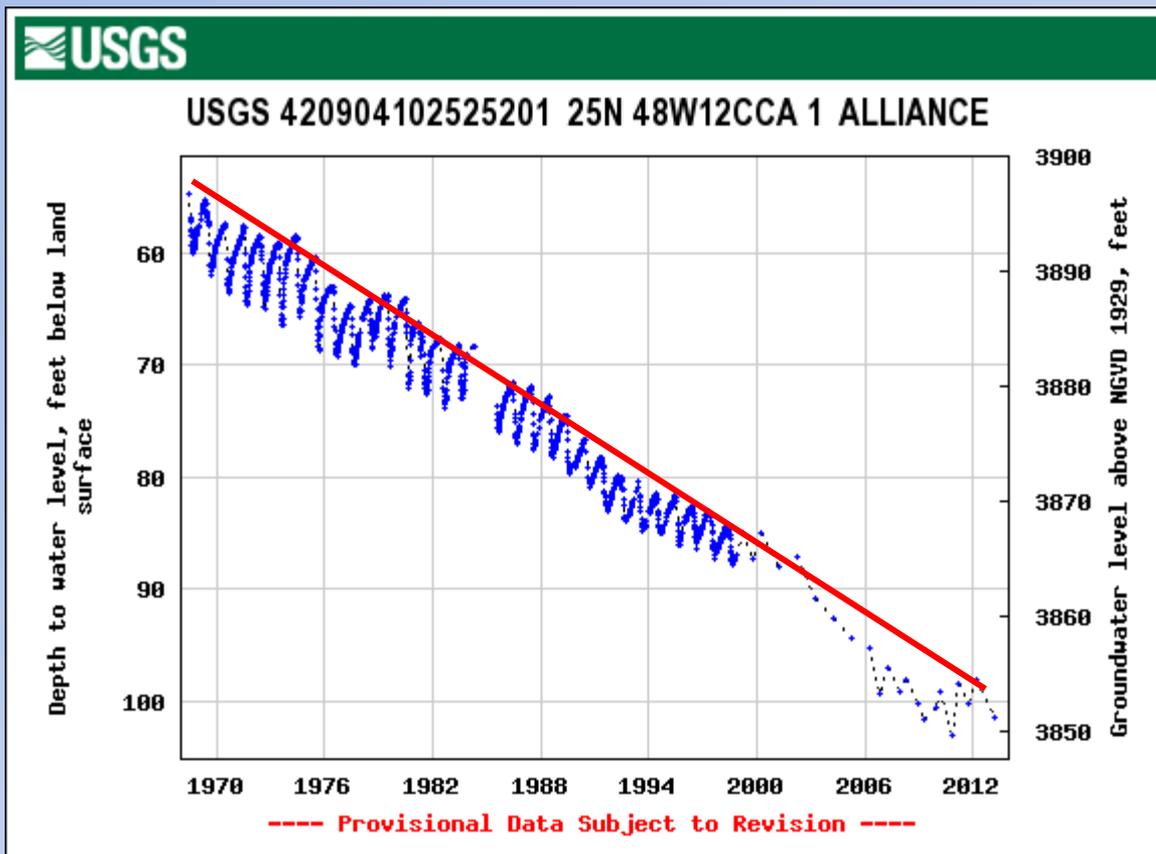
U.S. Geological Survey
 Nebraska Water Science Center

U.S. Bureau of Reclamation
 Kansas-Nebraska Area Office

Nebraska Natural Resources Districts

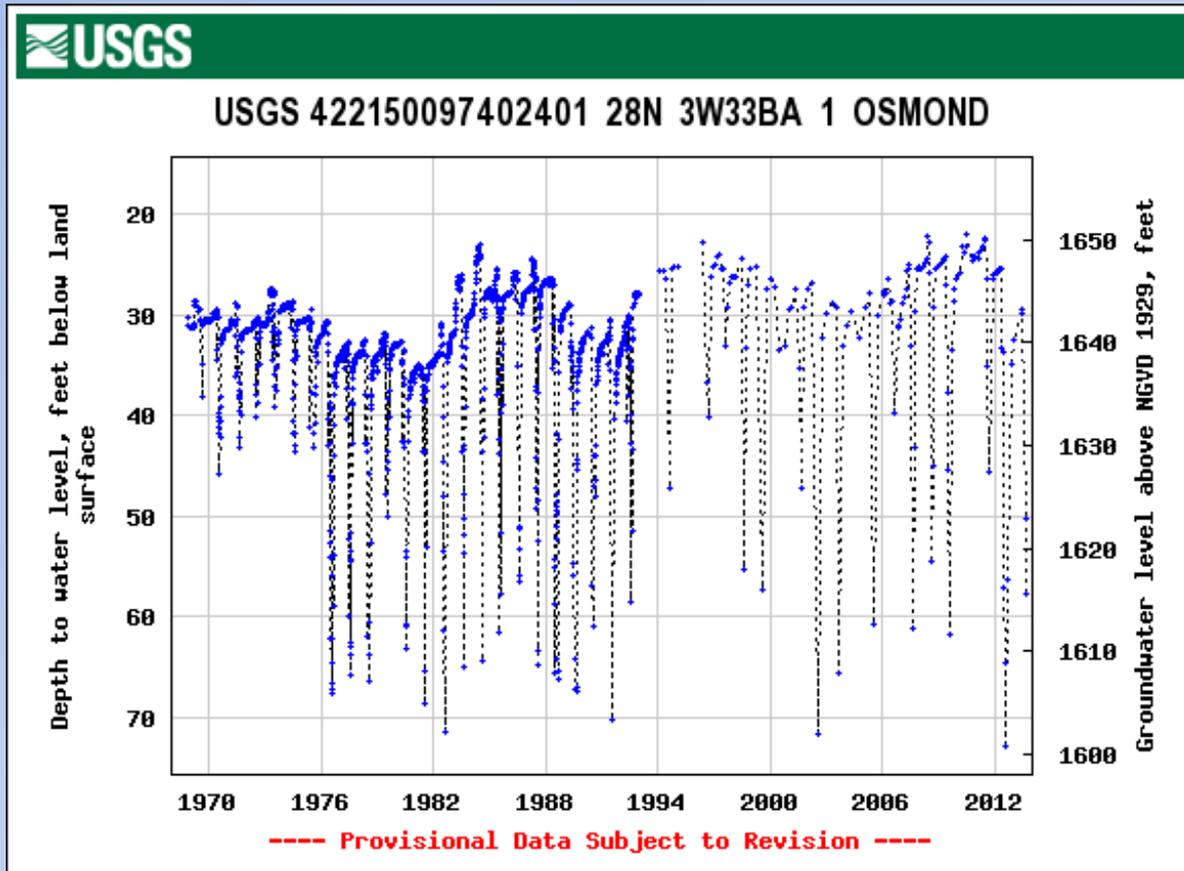
Central Nebraska Public Power and Irrigation District

Groundwater Depletion: Western Nebraska



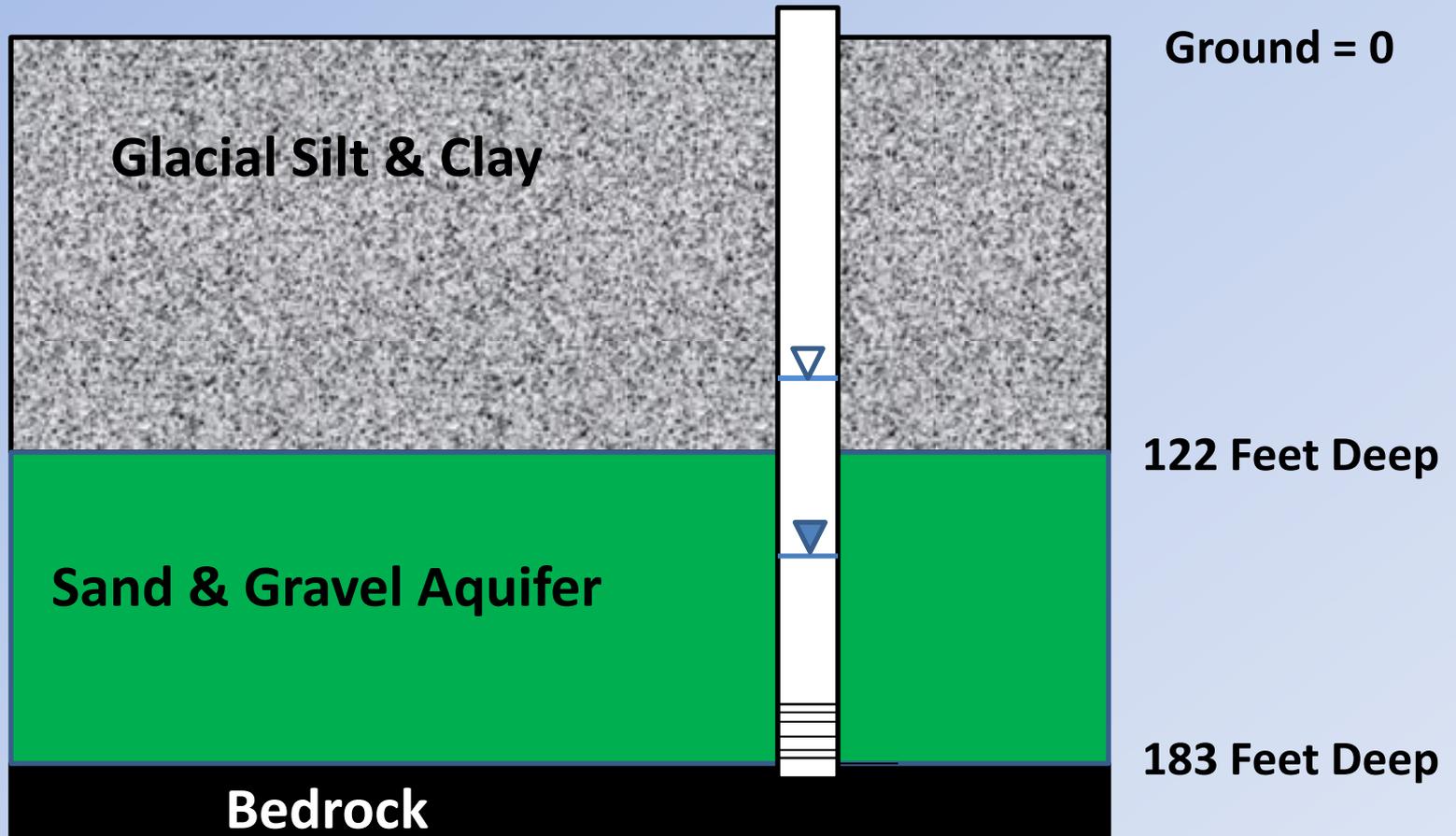
- Water levels recorded for 45 years
- About 45 feet of water level decline
- Groundwater is being depleted an average of about 1 ft/yr
- In-season variation roughly 4-8 feet

In-Season Demand: Eastern Nebraska

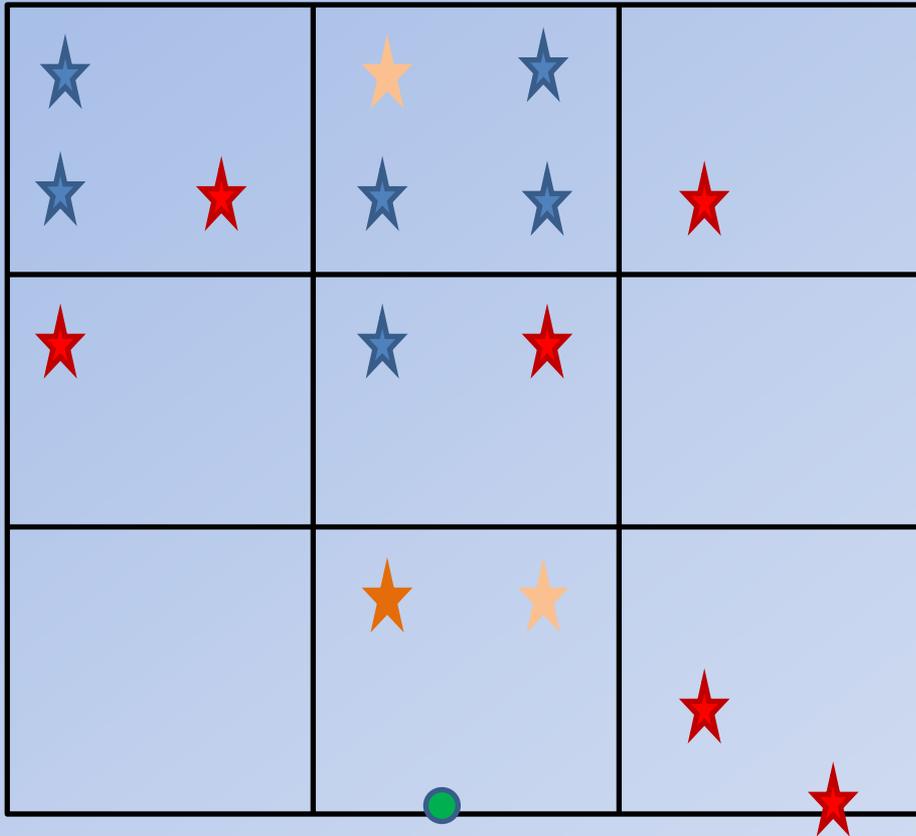


- Water levels recorded for 45 years
- No consistent long-term depletion
- However – Note the in-season variations of up to about 47 feet

Partially Confined Upland Aquifer



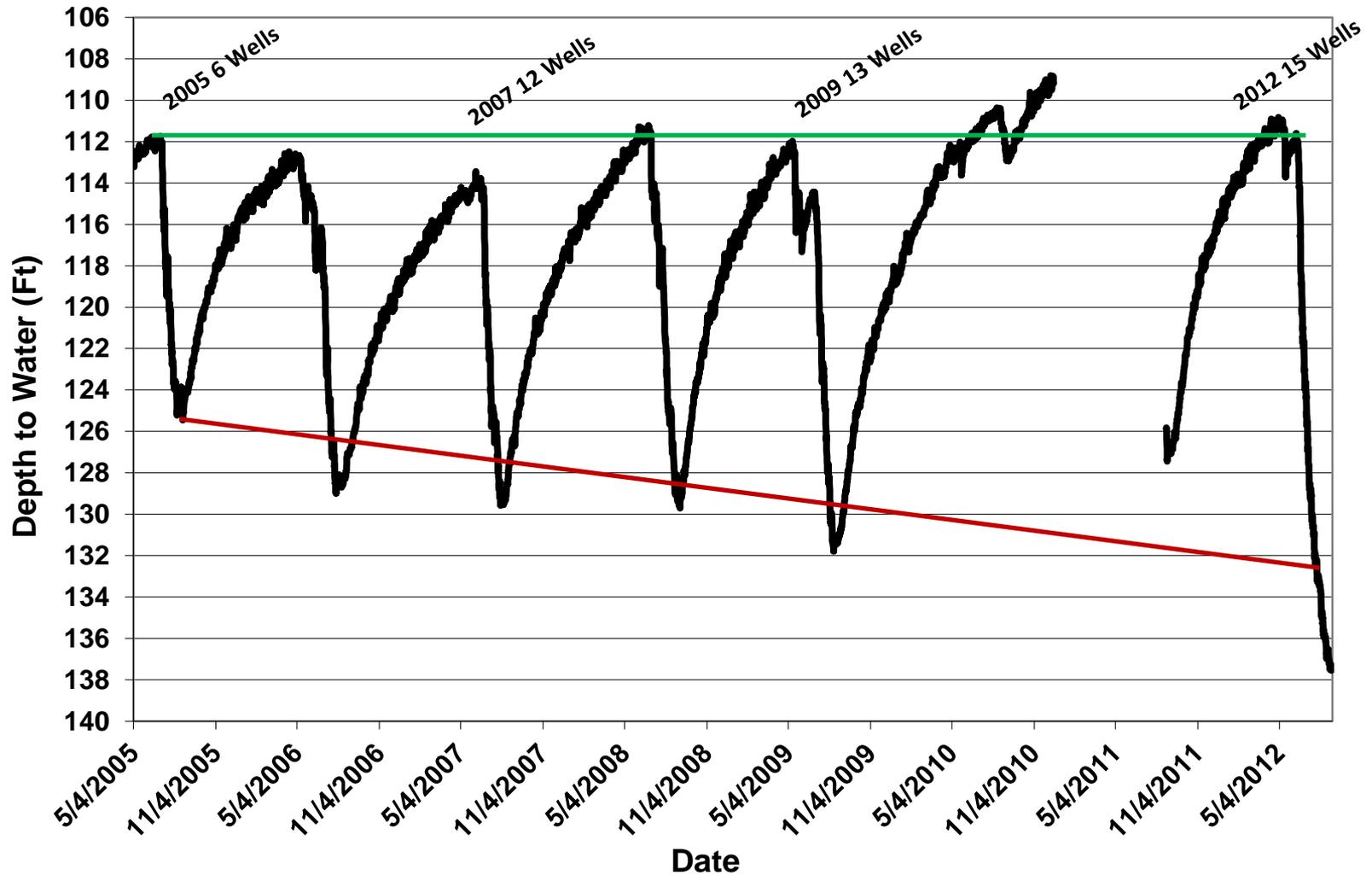
Wayne County: NW of Winside



- ★ Wells installed before 1997 (6)
- Monitoring Well installed in 2005
- ★ Wells installed in 2007 (6)
- ★ Well installed in 2009 (1)
- ★ Wells installed in 2012 (2)

Wayne County: NW of Winside

(5/24/2005 to 8/29/2012) No data (12/17/10 - 8/25/11)



Groundwater Quality

Lost – Integrated Management and Drought

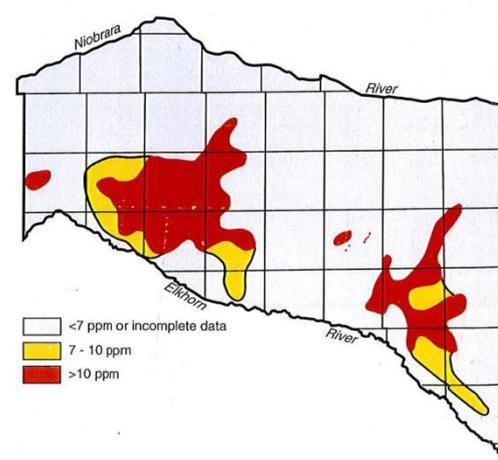
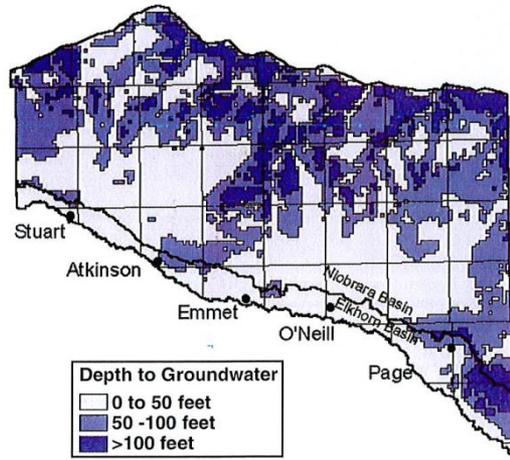
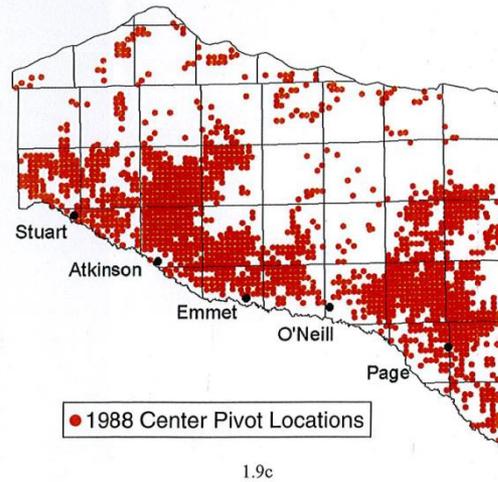
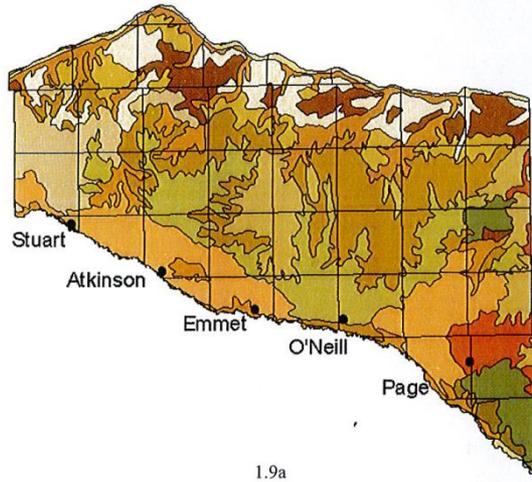
- Areal Variations
- Depth Variations

Holt County Groundwater Education Projects, 1994-2004
(Funding: 319, UENRD & LNNRD)

NRD MW Networks (NRDs and NET – L&C)

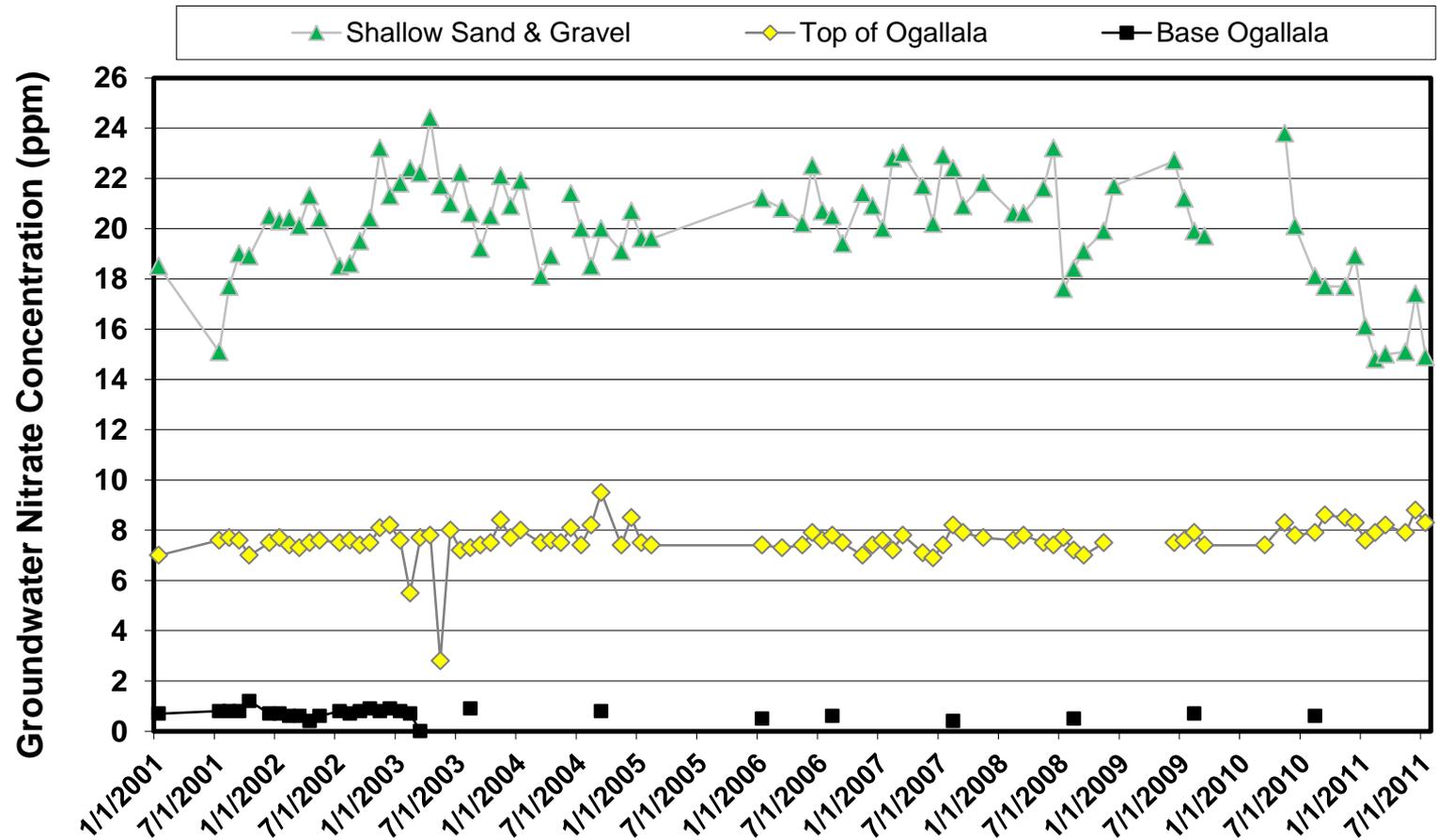
Areal Variations

- Soil Associations
- Center Pivot Locations
- Depth to Groundwater
- Nitrate Concentration



Variation with Depth

Site 12 (Meadow Grove-North) Nitrate Concentrations



Groundwater/Surface Water

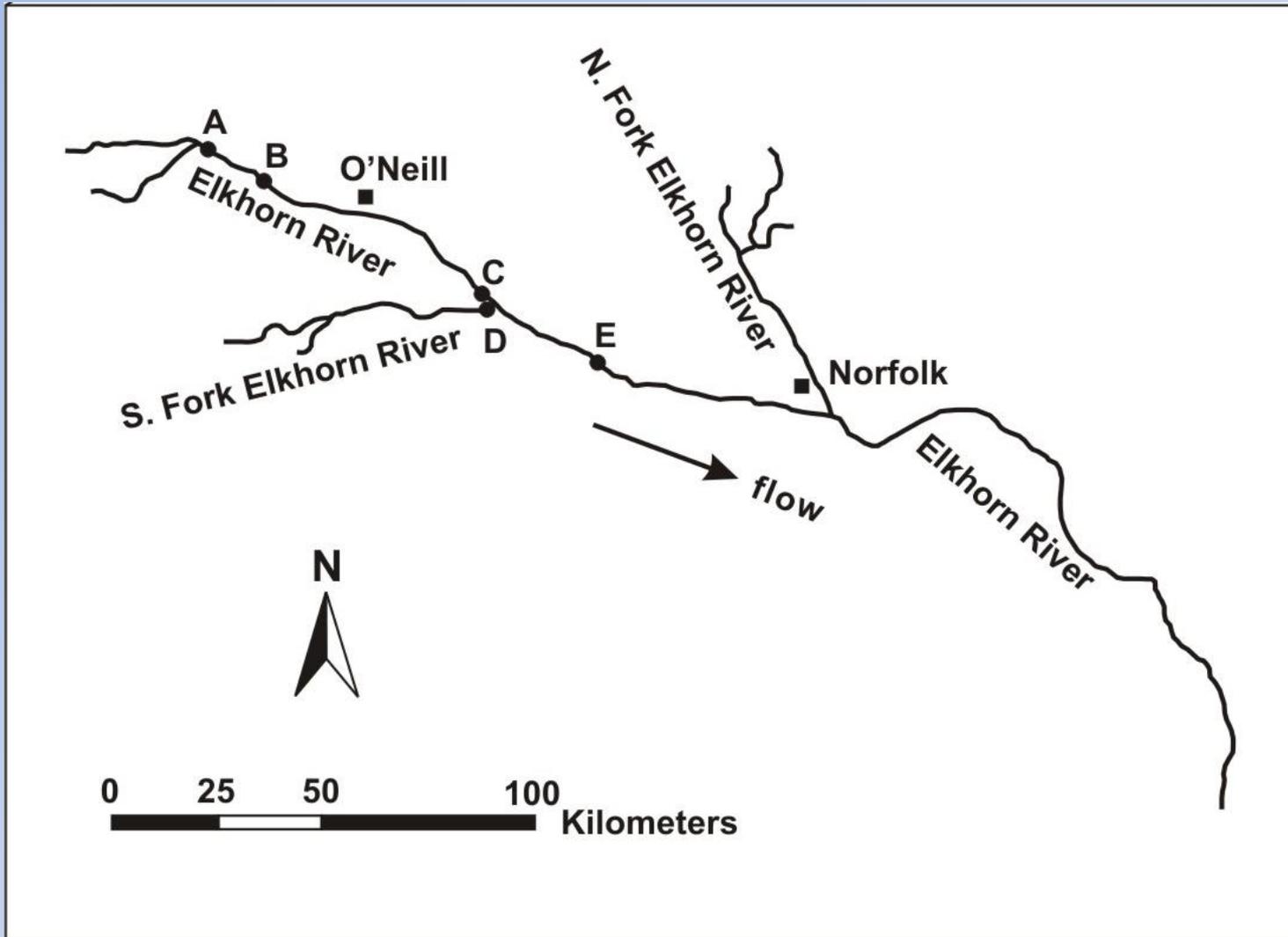
Depth Can Make a Difference

Natural System vs GW Irrigation Impacts

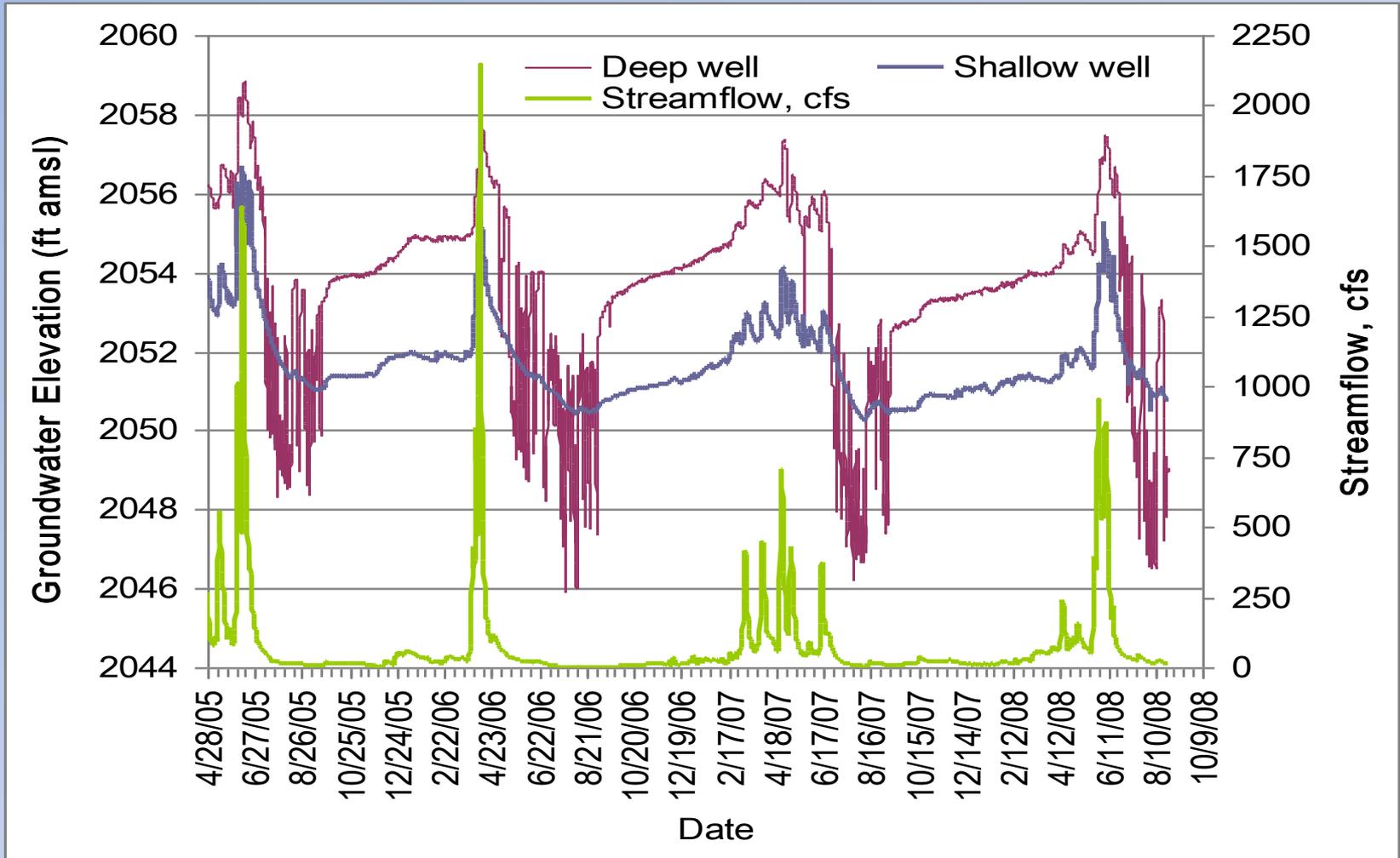
Elkhorn River Basin Studies, 2008-2013

(Funding; LENRD, UENRD, DNR, & NET)

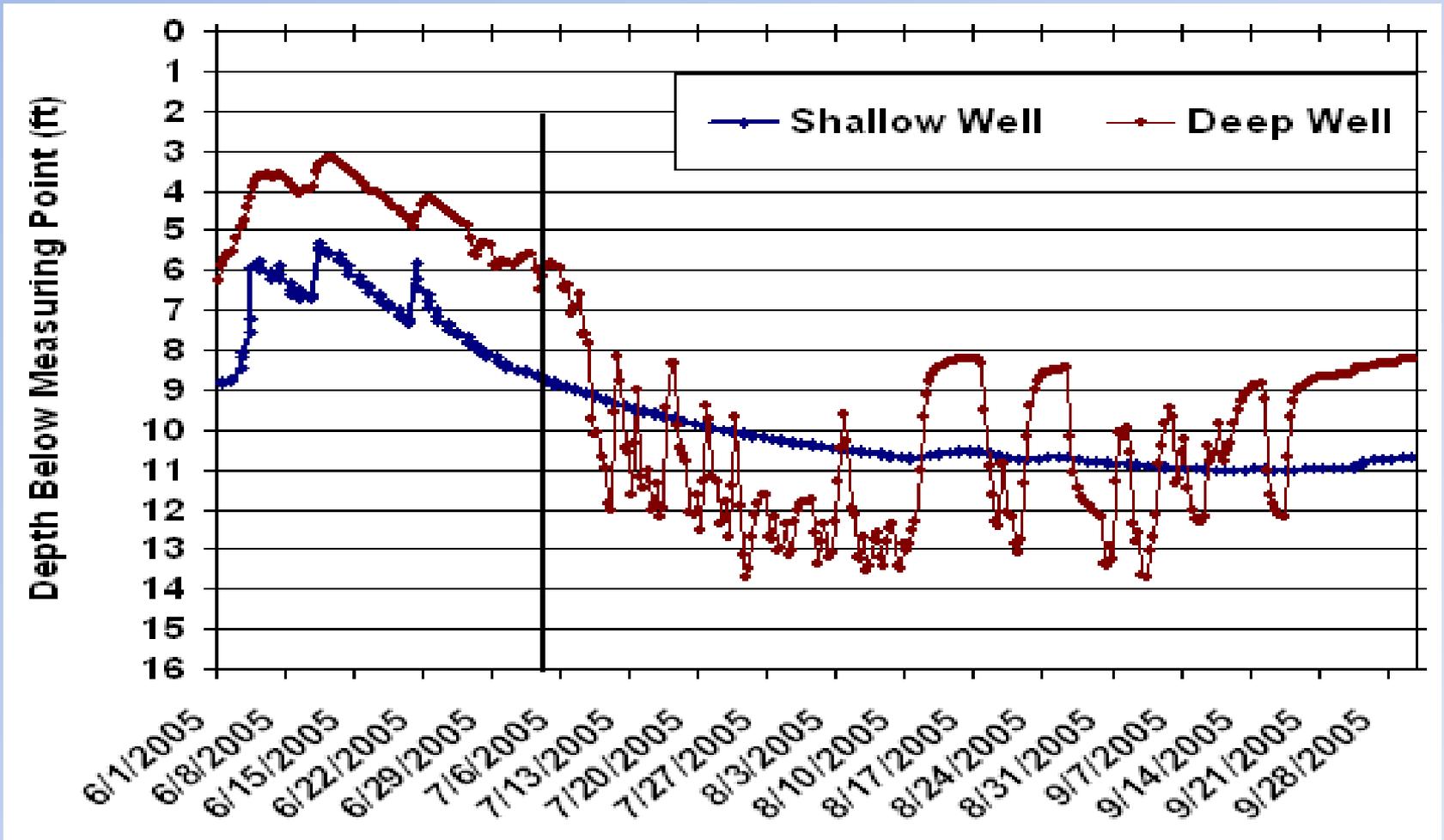
Elkhorn River Basin Study



Irrigation Well Depth



Natural Water Level Variations



Geologic Framework

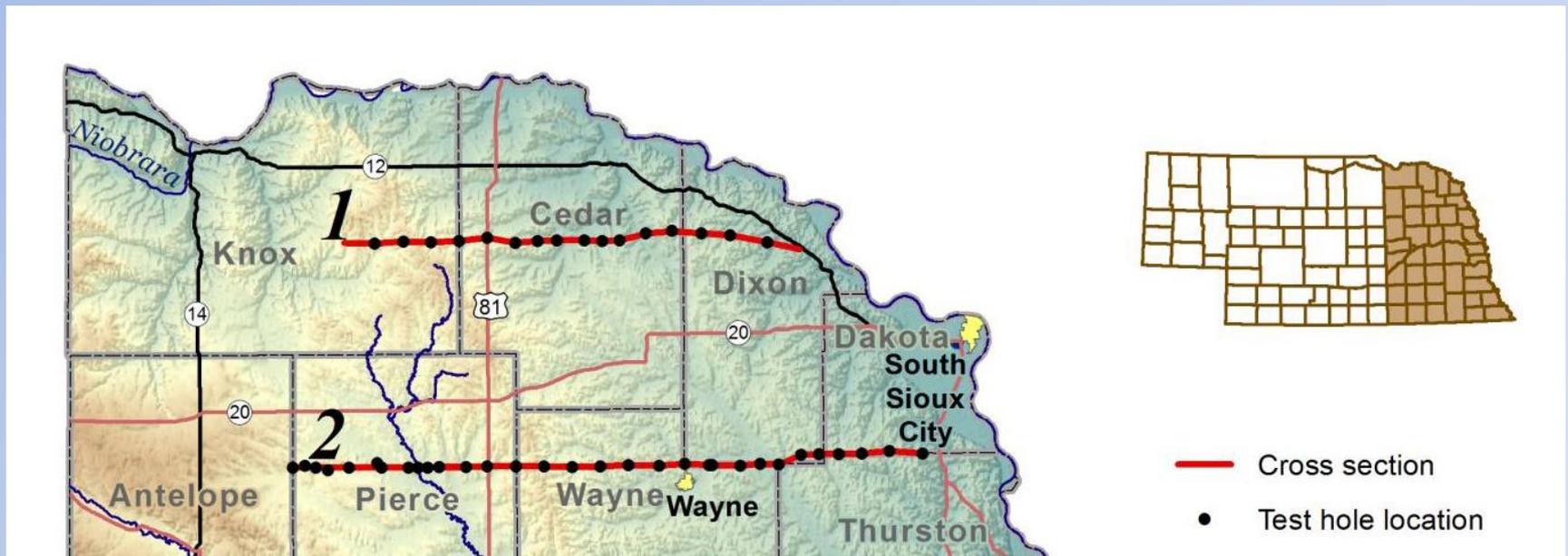
- Defines the Groundwater Flow System
- Level of Detail Required for Assessment
- Key to Effectively Manage Water Resources

Eastern Nebraska Water Resources Assessment – 2005-2013

(Funding; 6 NRDs and Integrated Management Fund)

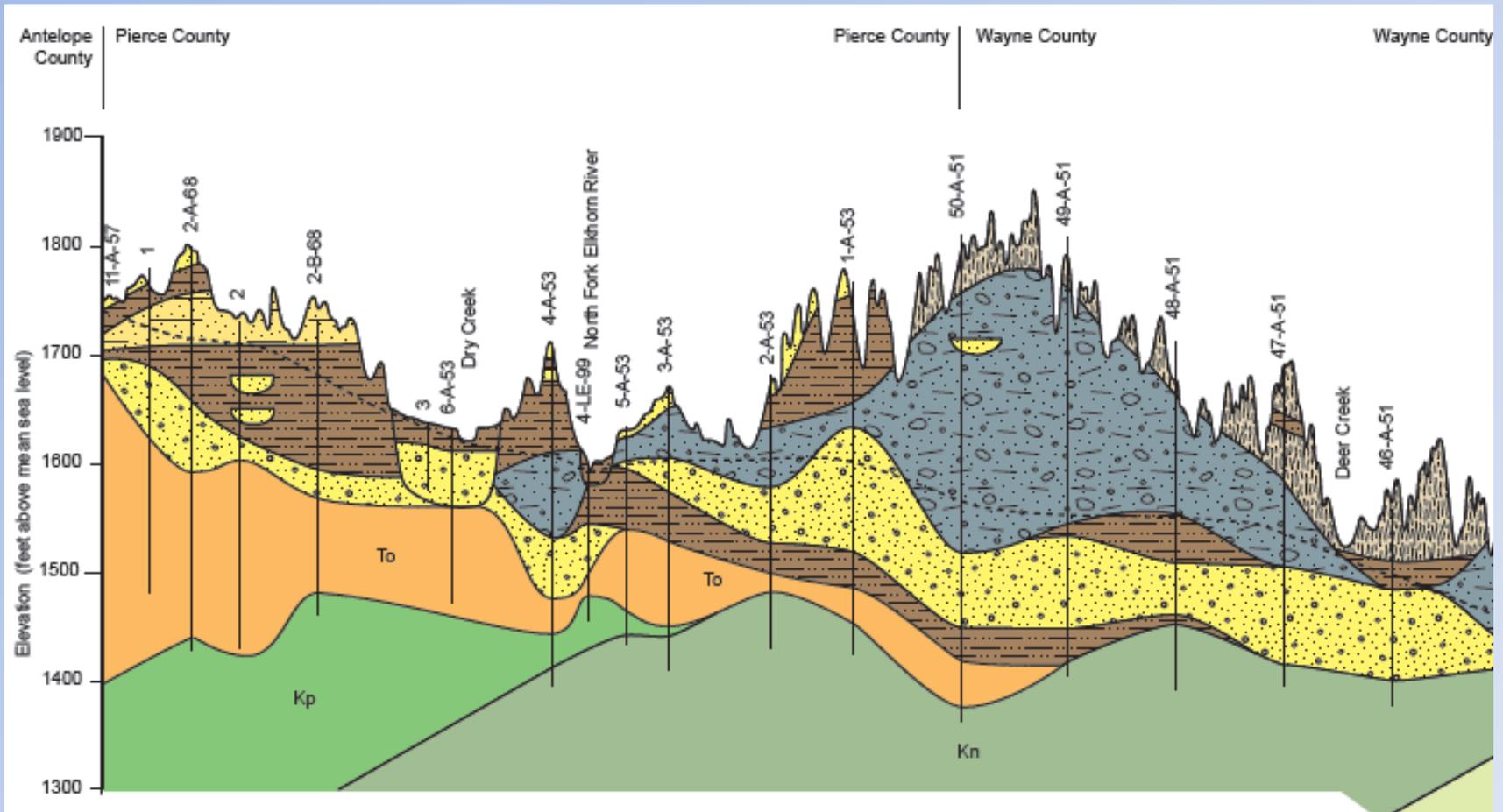
Three Geologic Cross Sections Across Portions of Eastern Nebraska

Jesse T. Korus¹, Dana P. Divine¹, Paul R. Hanson¹, and Jeremy S. Dillon²

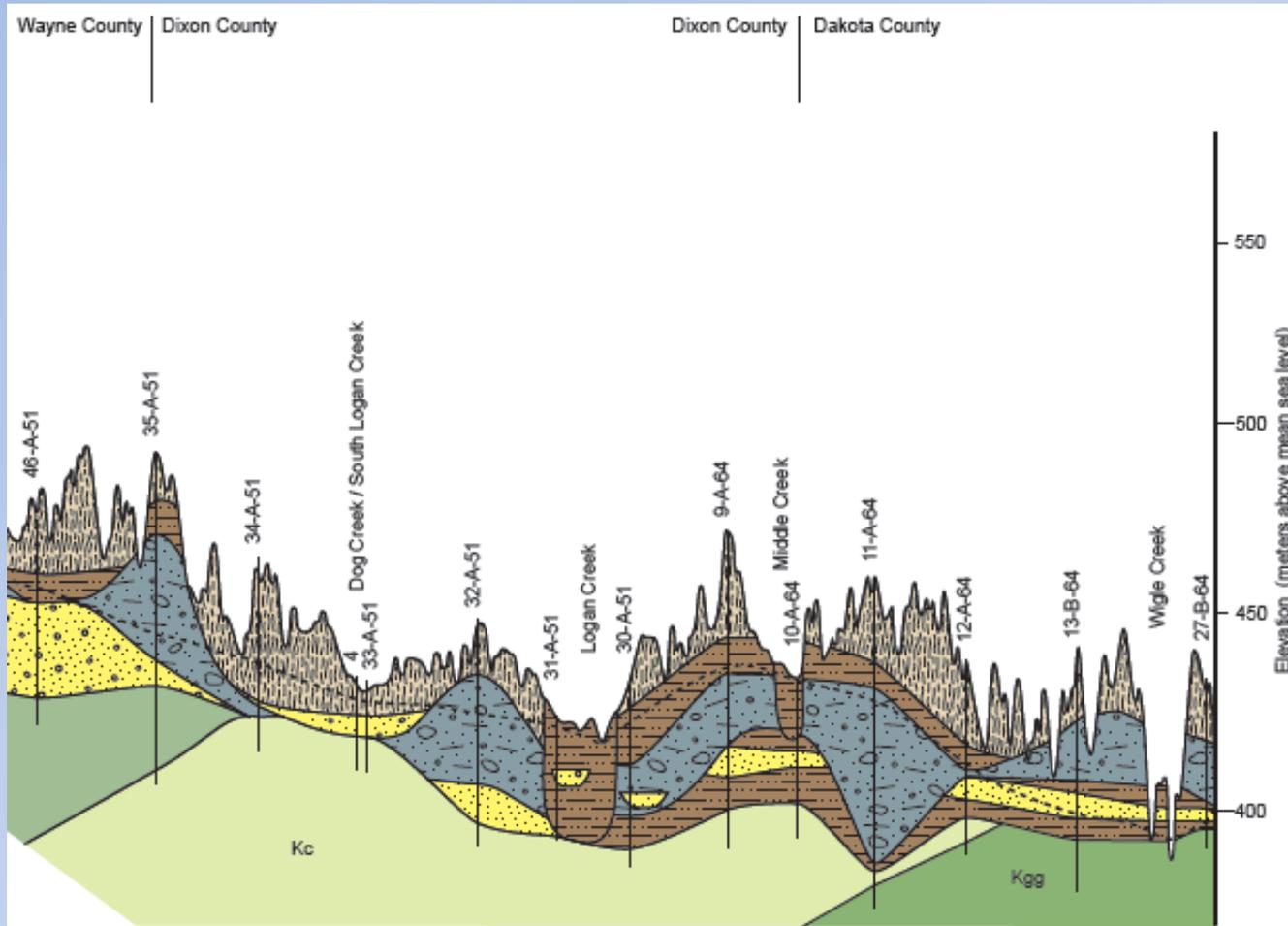


Correlations and Cross Sections (CCS) 18
Conservation and Survey Division
School of Natural Resources
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University of Nebraska-Lincoln

West Portion of Cross-Section

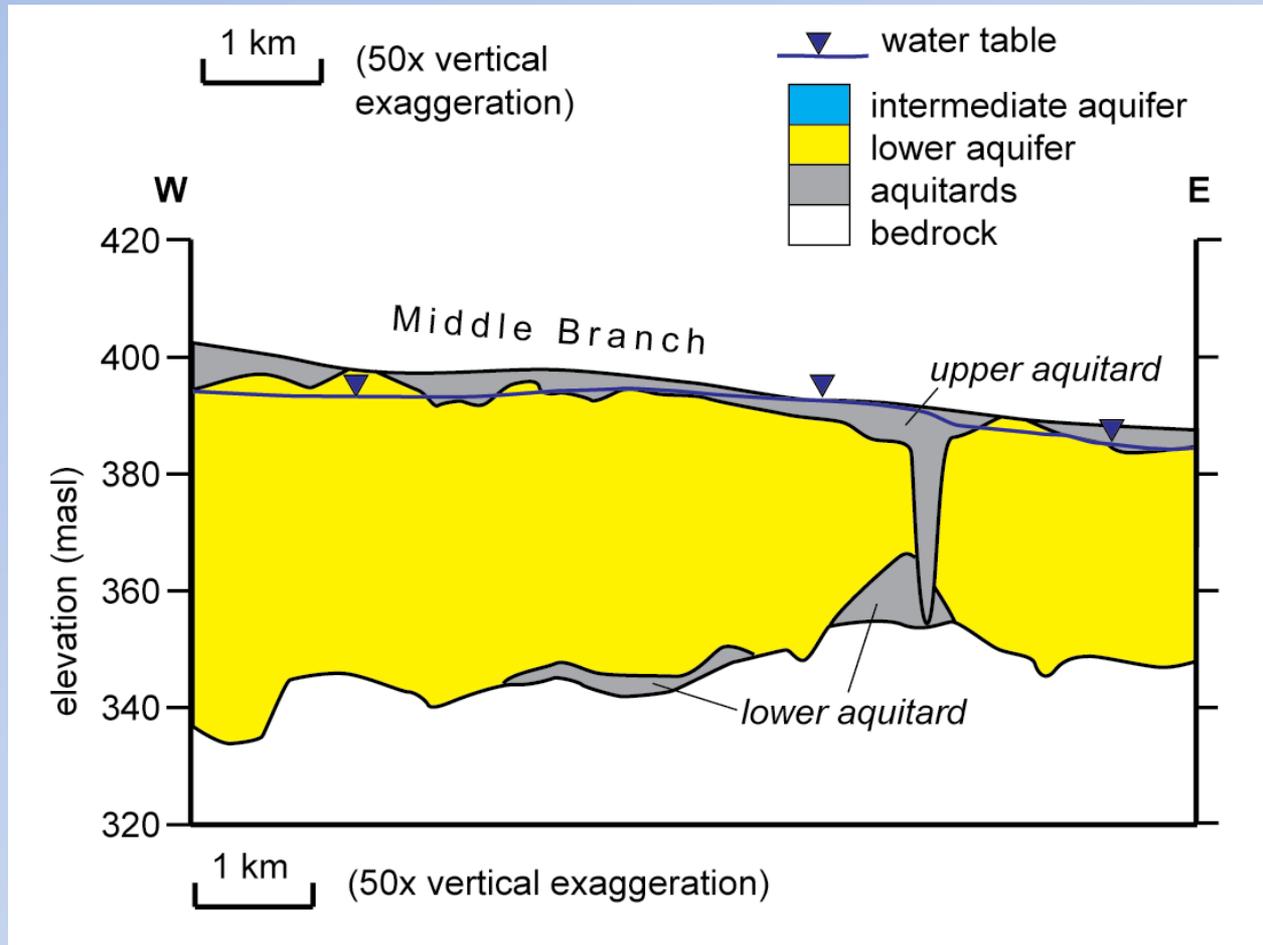


East Portion of Cross-Section



Complex Geology

Cycles of Deposition and Erosion



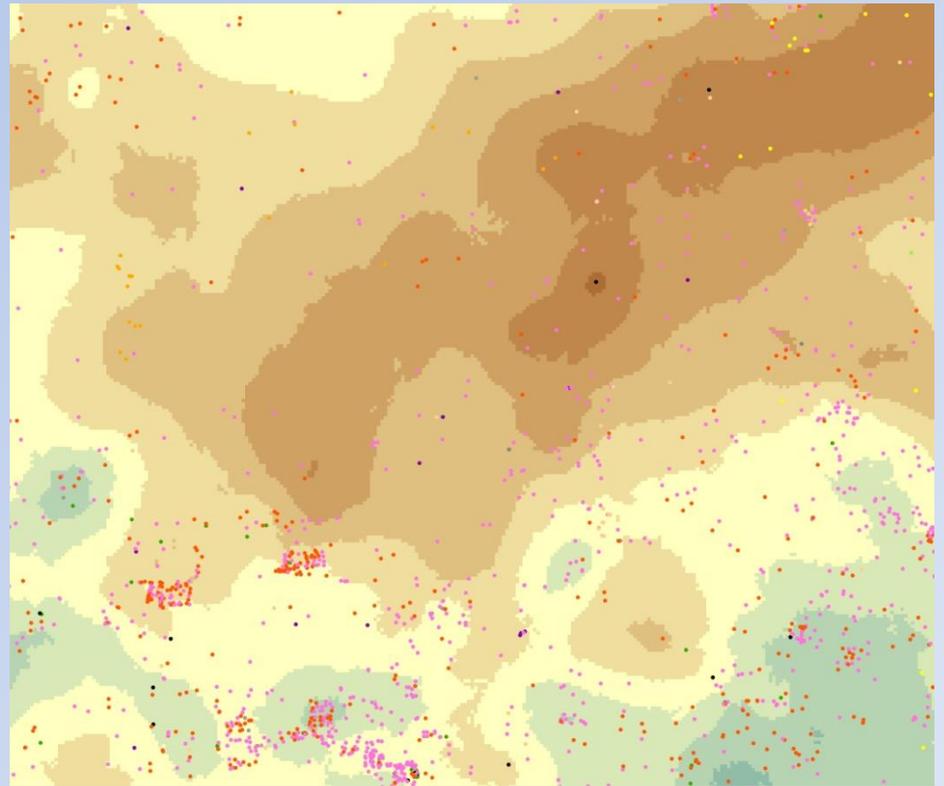
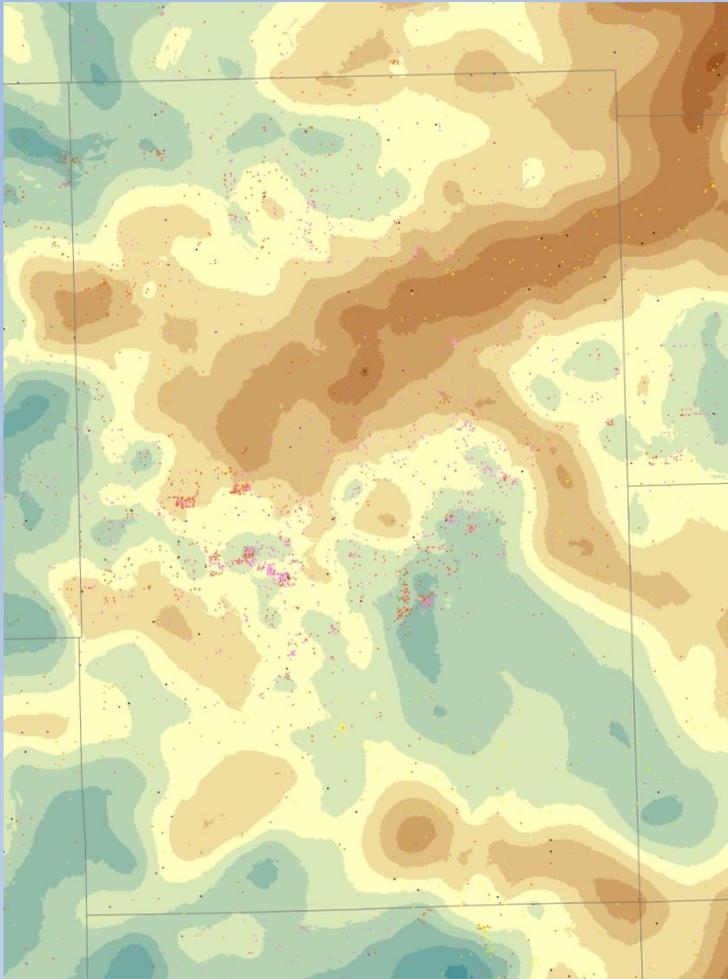
Define the System at a Detailed Scale

Data Needs

- Additional Test-Hole Drilling
- Aerial Electro-Magnetic Surveys (AEM)
- Dedicated Monitoring Wells
- Aquifer Tests

Detailed Analysis of Data

CSD County Atlas Series



Time and Expertise



Questions?