

Bazile Groundwater Management Area Plan

Community Based Planning

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NDEQ **LENRD**

NARD Legislative Conference – January 24th 2017

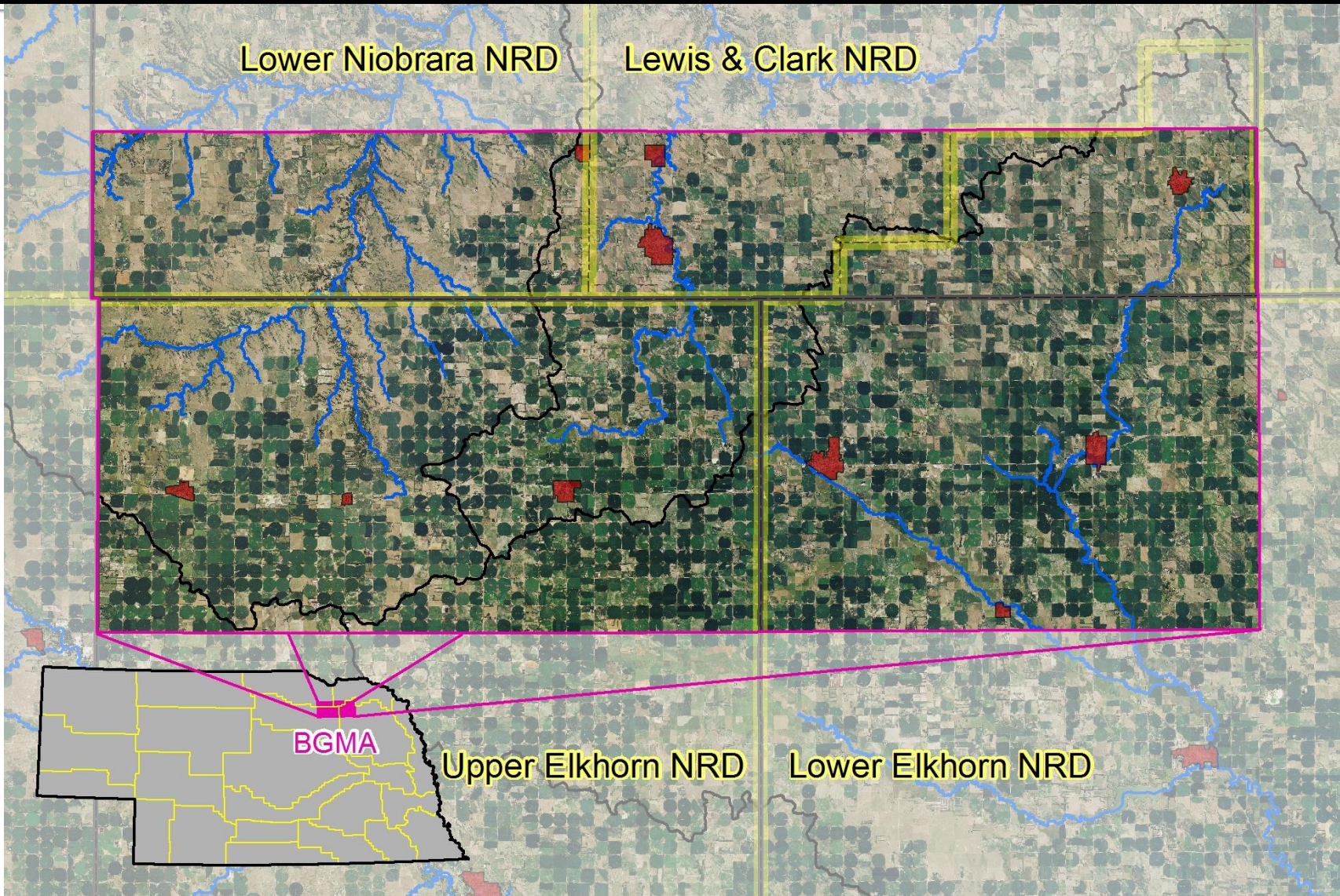
Why is this Plan Important?

Clean Water Act 1972

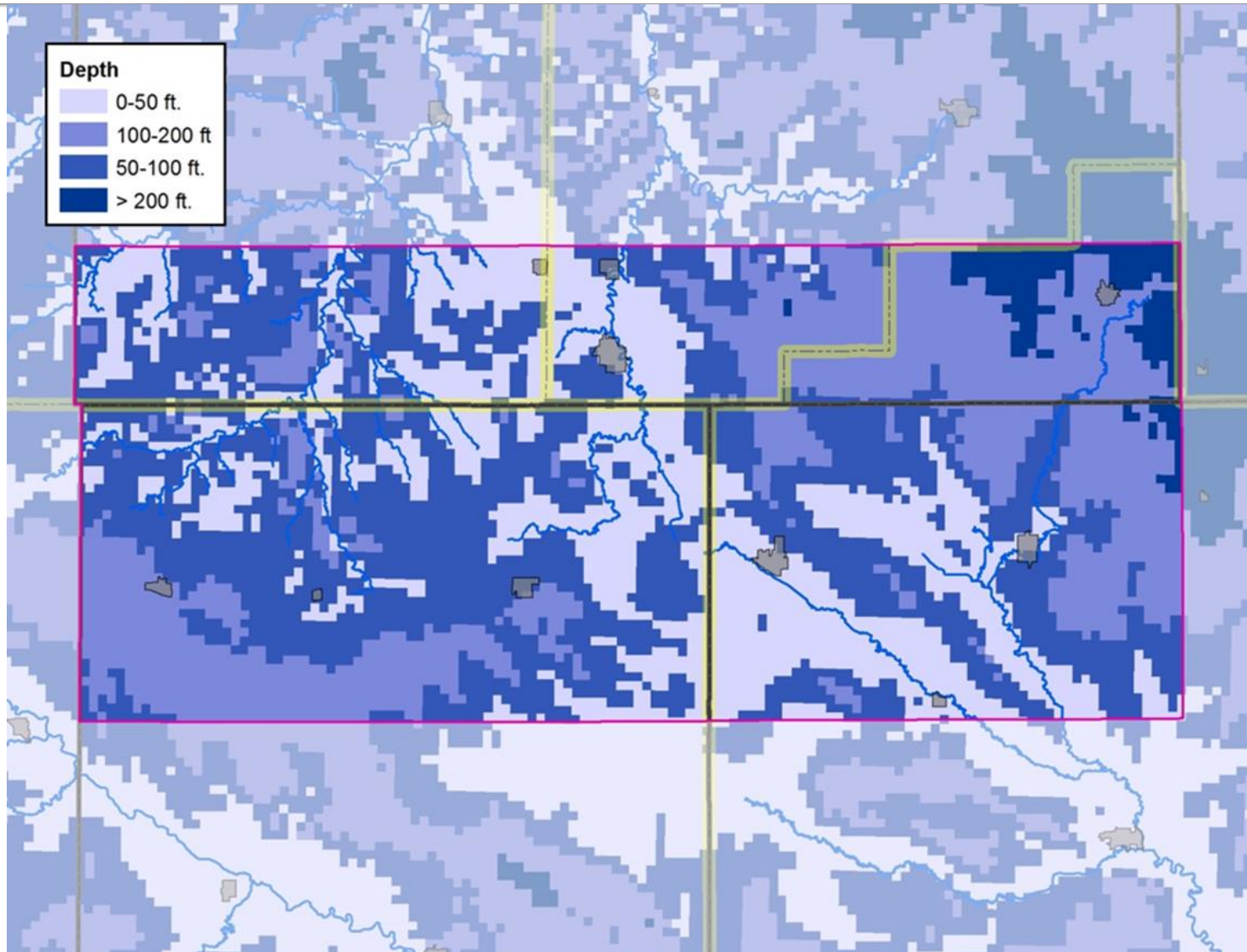
- **Surface water focused**
 - Regulate Point Sources
 - **Incentivize Non-Point (CWA Section 319 funds)**
- **Groundwater is now**
 - Eligible for 50% of NDEQ's 319 grant funds/year (\$1.25 million)
 - **NPS public health risk!**



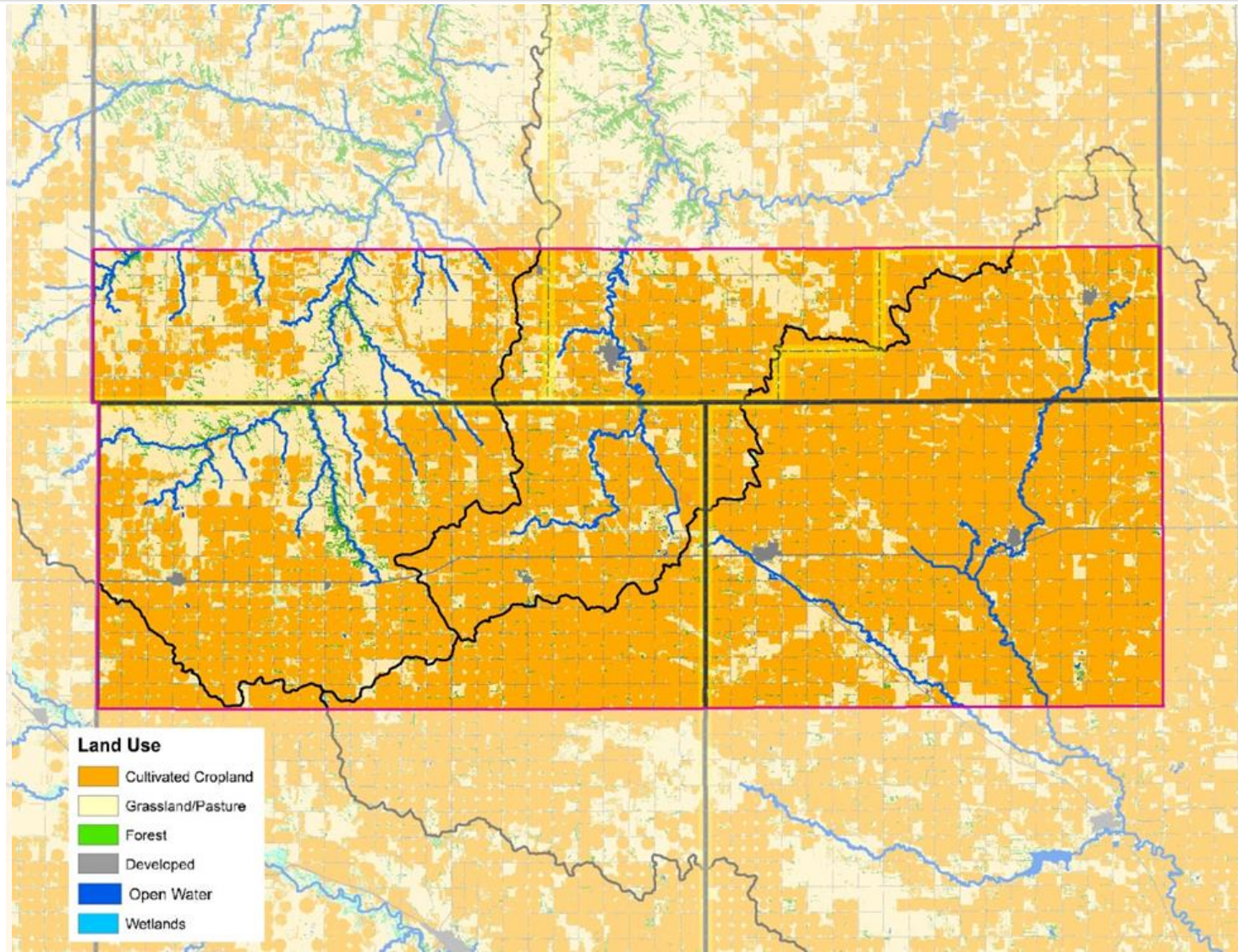
BGMA Location



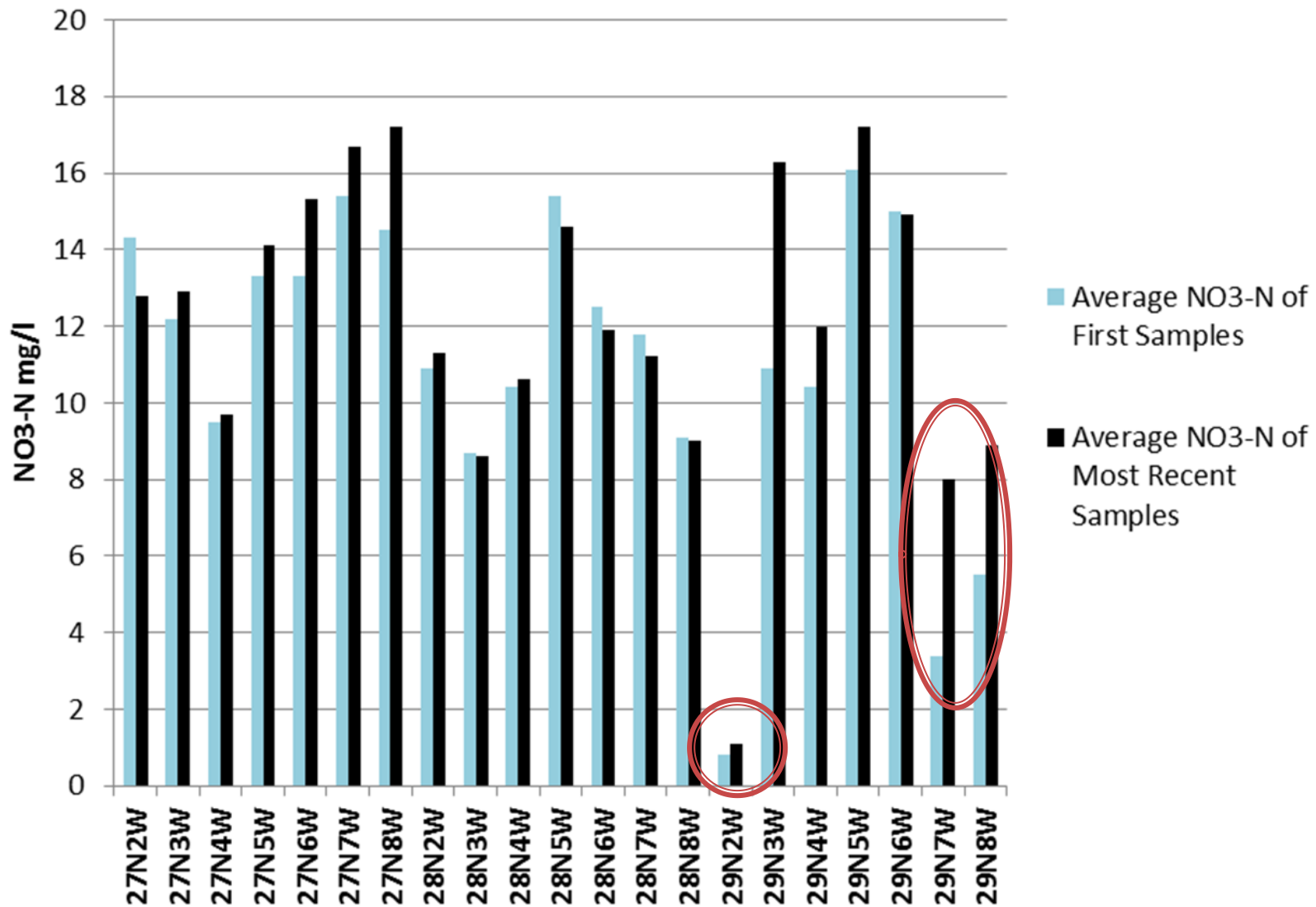
BGMA Geology & Hydrology



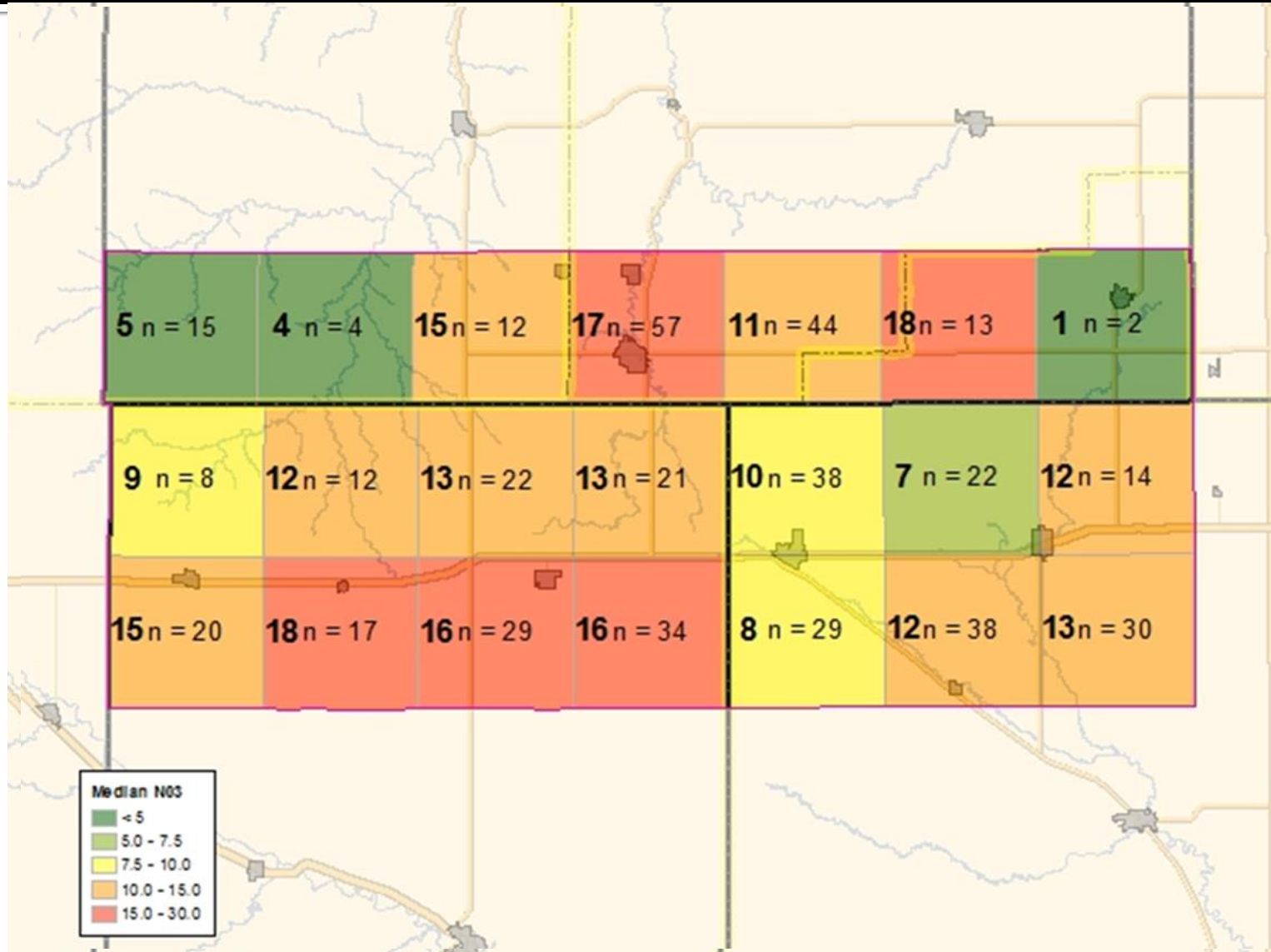
BGMA Land and Water Use



Nitrate Contamination Over Time



Groundwater Nitrate Contamination



Nitrates in Drinking Water Treatment Cost

Municipalities	Population	AO	Treatment	Cost to Society
Creighton	1250		Original RO Plant (excludes engineering and equipment)	1993 USDA Loan \$606,507
" "			RO Plant rehab	Current SRF Loan \$1,173,790
" "			O&M including annual depreciation over 20 years	Estimated Cost \$3,492,820
Brunswick	179	AO	Replace wells, mains, and meters	SRF 2014 Request \$ 594,839
Orchard	391	AO	Place "Bad well" (9.83 ppm) on emergency use	
Osmond	796	AO	Replace wells, mains, tower, and meters	SRF 2014 Request \$1,682,309
Plainview	1157		Replace wells and mains	SRF 2014 Request \$,1269,667
Domestic Wells	248		POU Treatment Systems (\$1,187.25 each)	Estimated Costs \$294,438
	Total = 4021			Total Cost \$9,114,370
BGMA Plan	7,159		2 –year Bazile GWMA Coordinator to carry out plan objectives and implement BMPs	319, NET, & NRD Funding = \$286,550

History

■ 1990 – Bazile Triangle GW Study Began

**David C. Gosselin – UNL
Conservation & Survey Div**

- 125 wells sampled
- **Nitrate** contamination in the Ogallala due to direct hydraulic connection w/ the contaminated overlying unconfined aquifer
- “... source of GW contamination is most likely related to fertilizer application practices.”

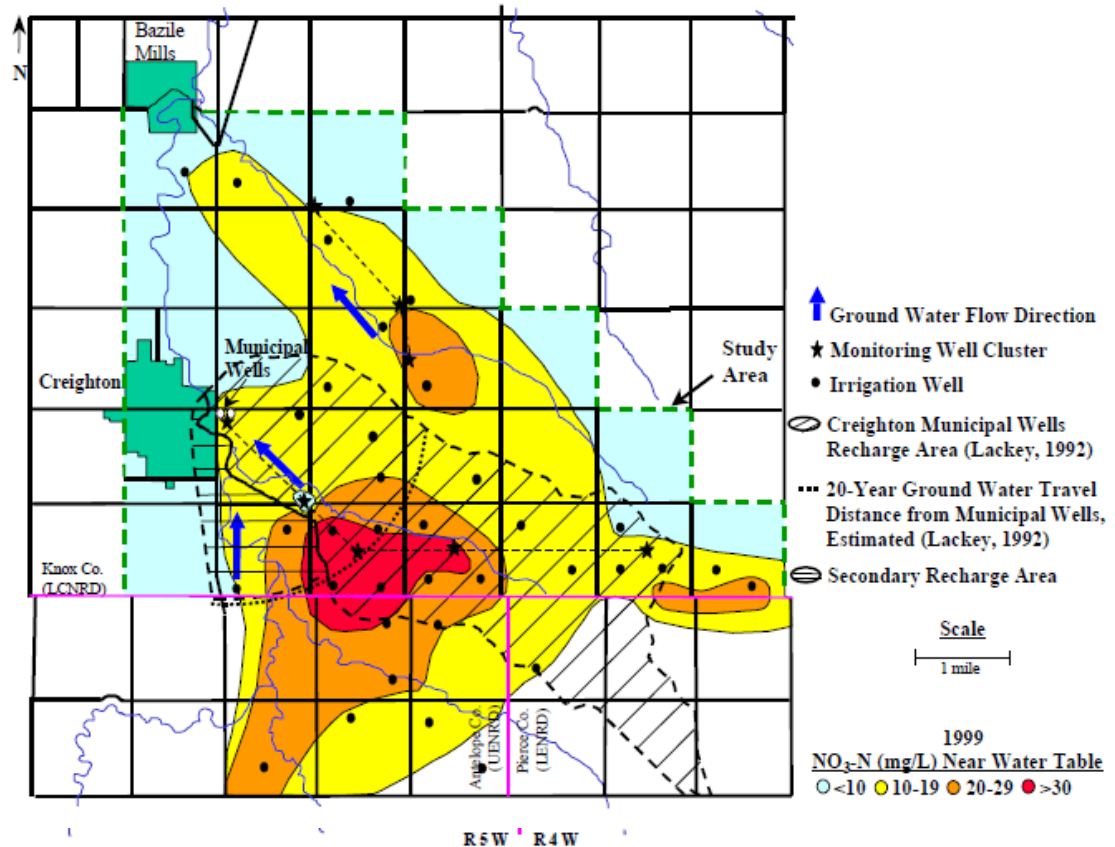
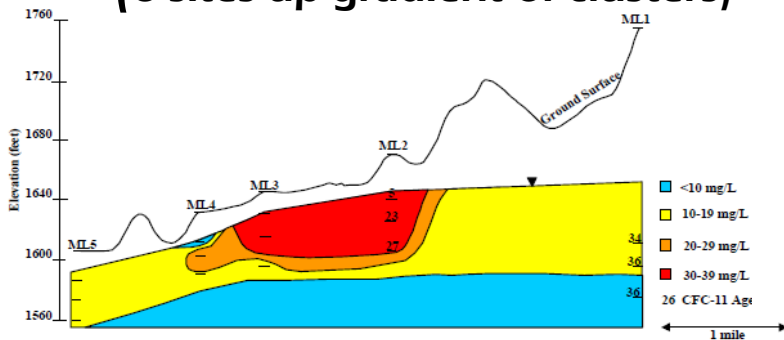


History (10 years later)

2000 – Evaluation & Assessment of Ag Contaminants in Creighton, NE (319 Project)

Mark Burbach and Roy Spalding - UNL Water Center

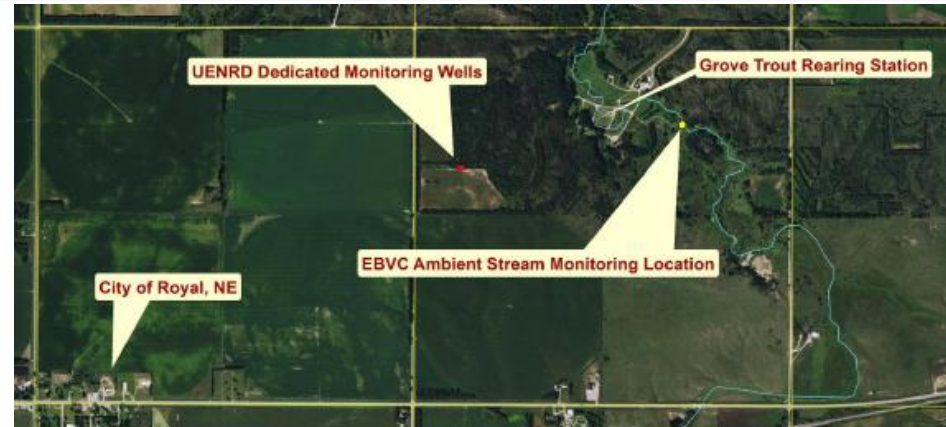
- 8 clusters of nested monitoring wells (water table, middle, deep)
- 12 vadose zone cores (6 sites up gradient of clusters)



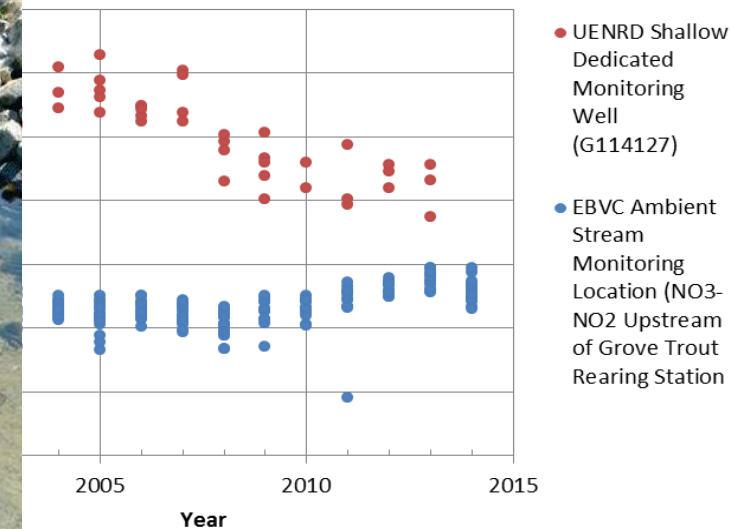
History (5 years later)

■ 2005 East Branch Verdigris Creek Project

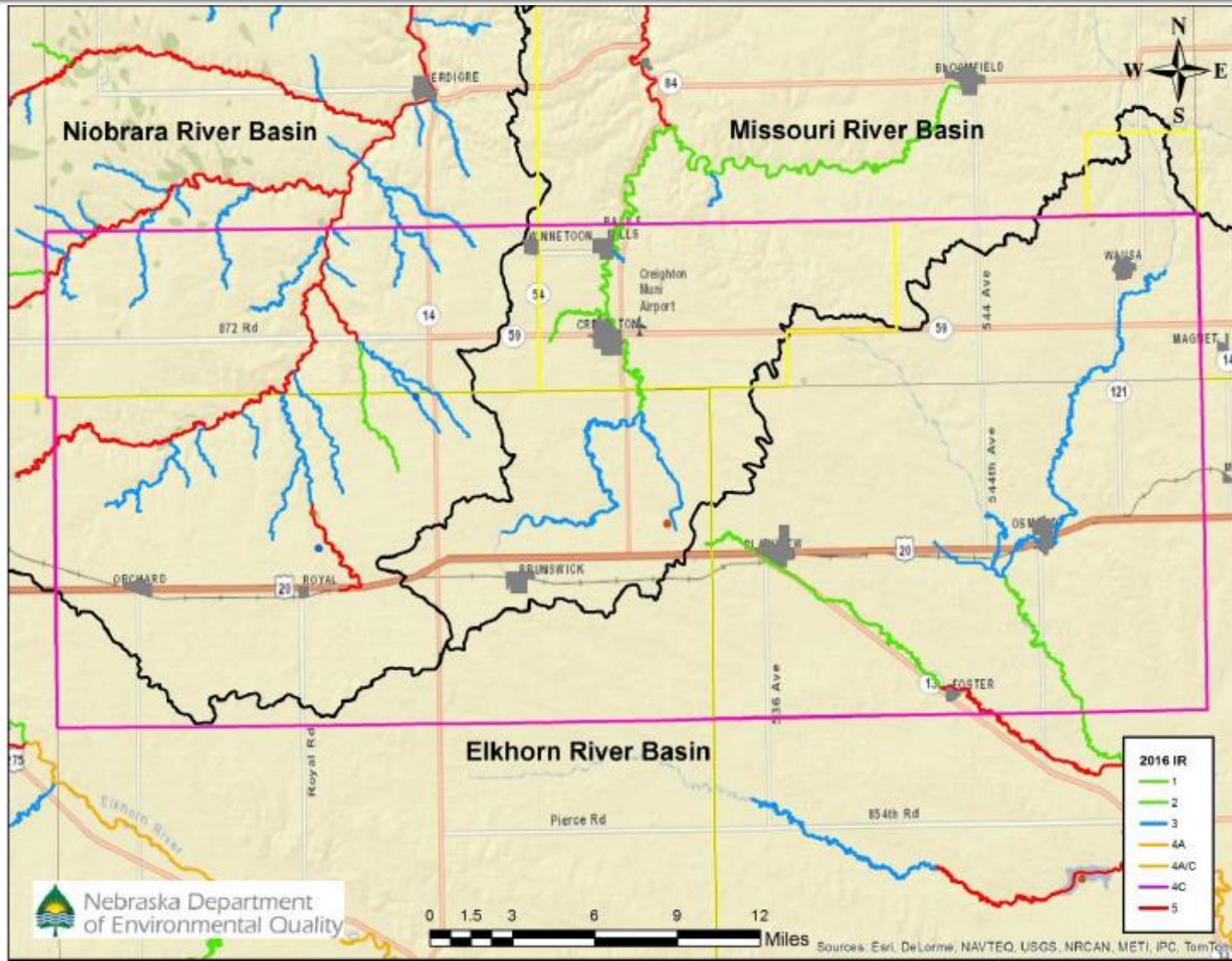
- Pre- project 1987 -2005
 - Nitrates ⬆️ .49 mg/L/year
 - Shallow well >30 mg/L
 - Deep well < 1 mg/L
- Post – project <2005-2013



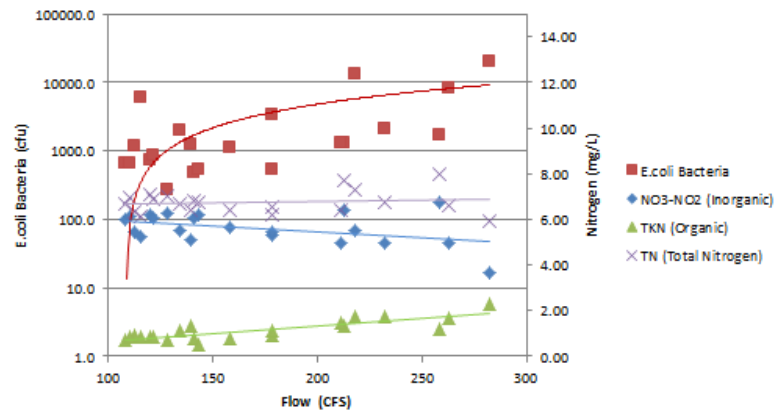
Groundwater and Surface Water Quality Data



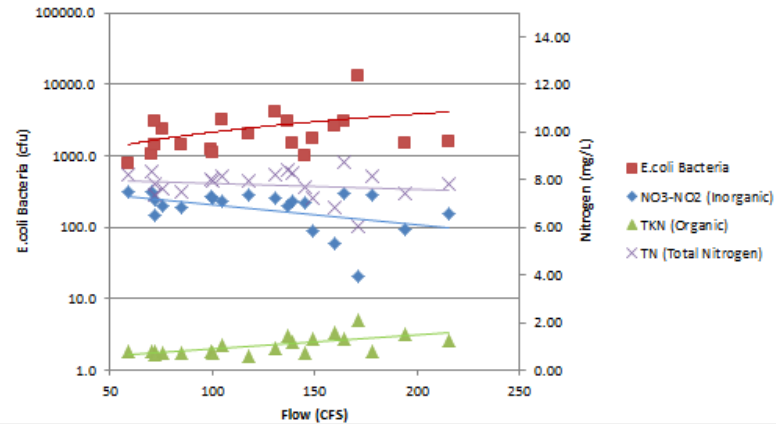
Surface Water Conditions



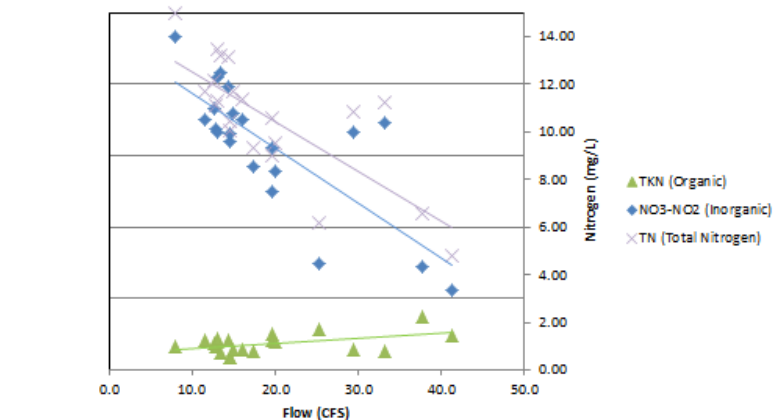
2010 Bazile Creek Water Quality Trends (MT2-12400)



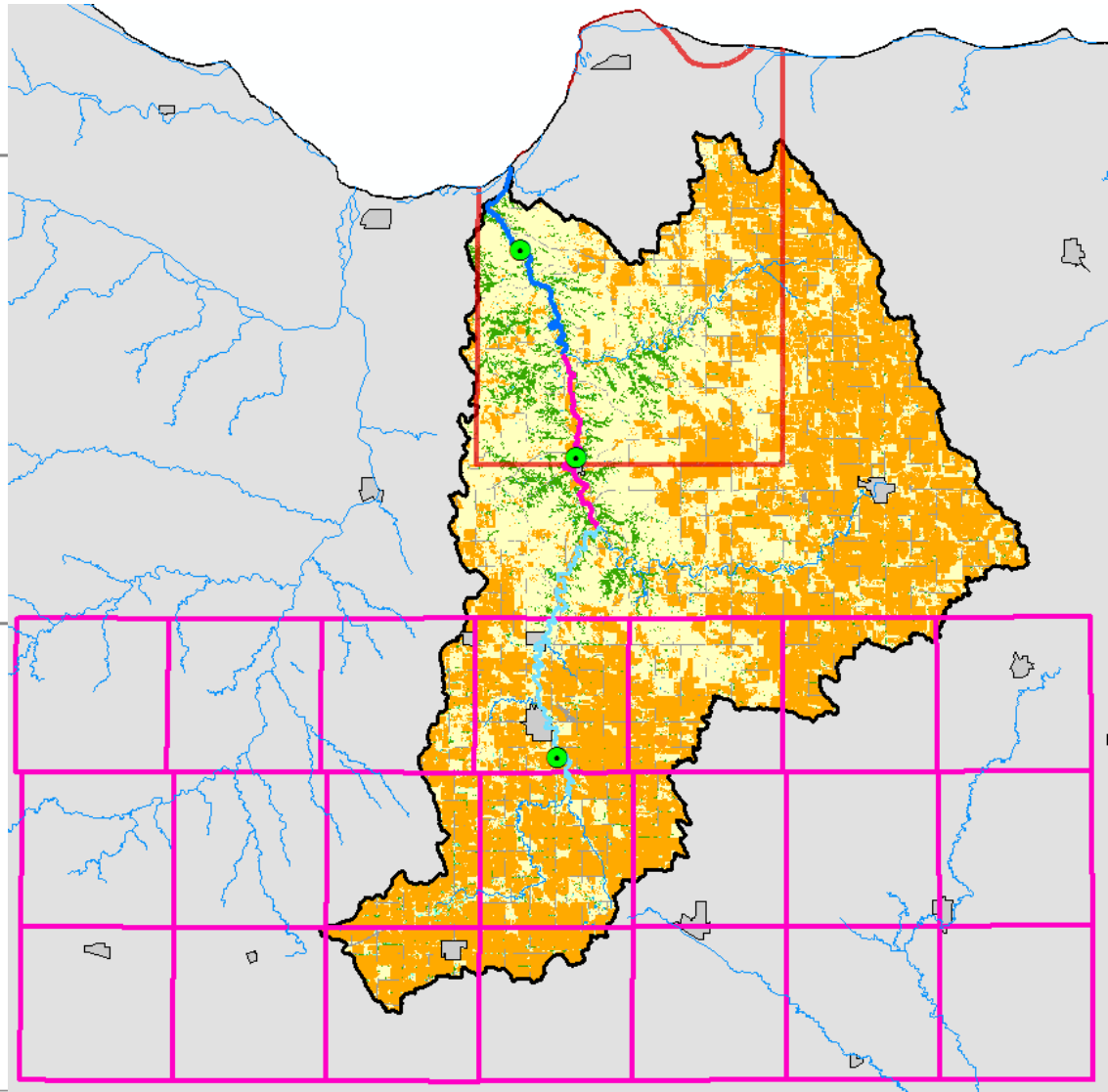
2010 Bazile Creek Water Quality Trends (MT2-12500)



2014 Bazile Creek Water Quality Trends (MT2-12600)

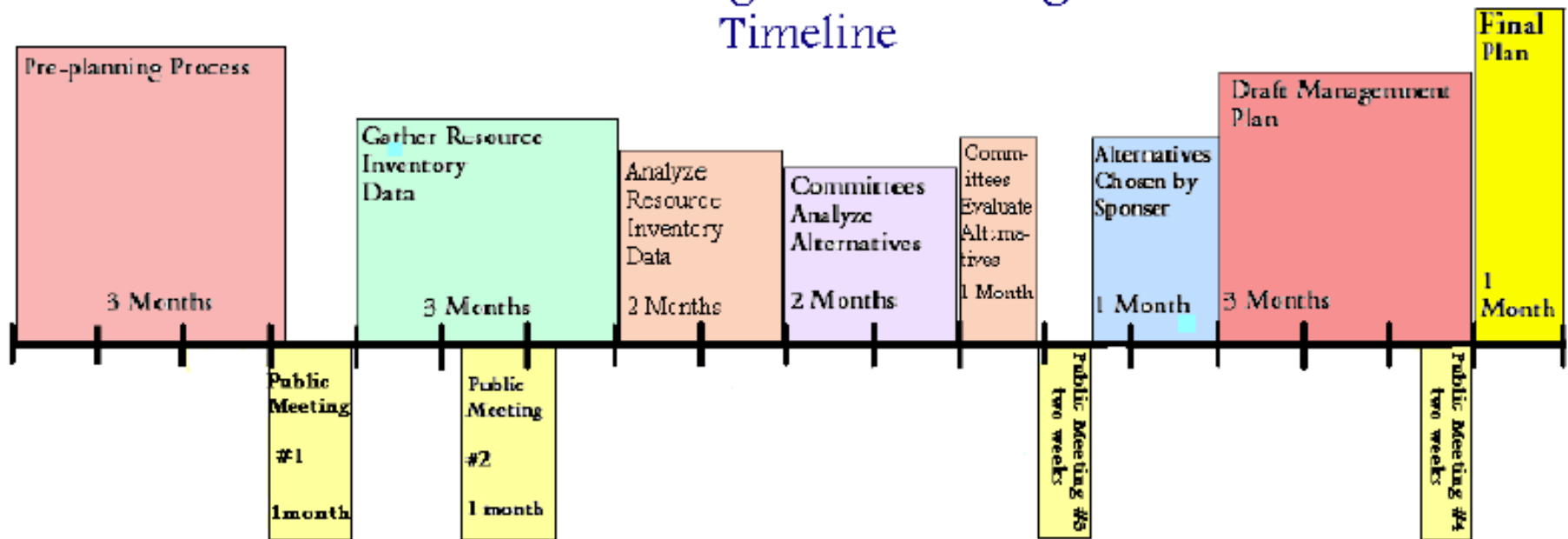


Bazile Creek Surface Water Quality



Community Based Planning Process

Community Based Approach to the Watershed Management Planning Process Timeline



Bazile GWMA Plan Goals

SHORT TERM – 5 YEARS

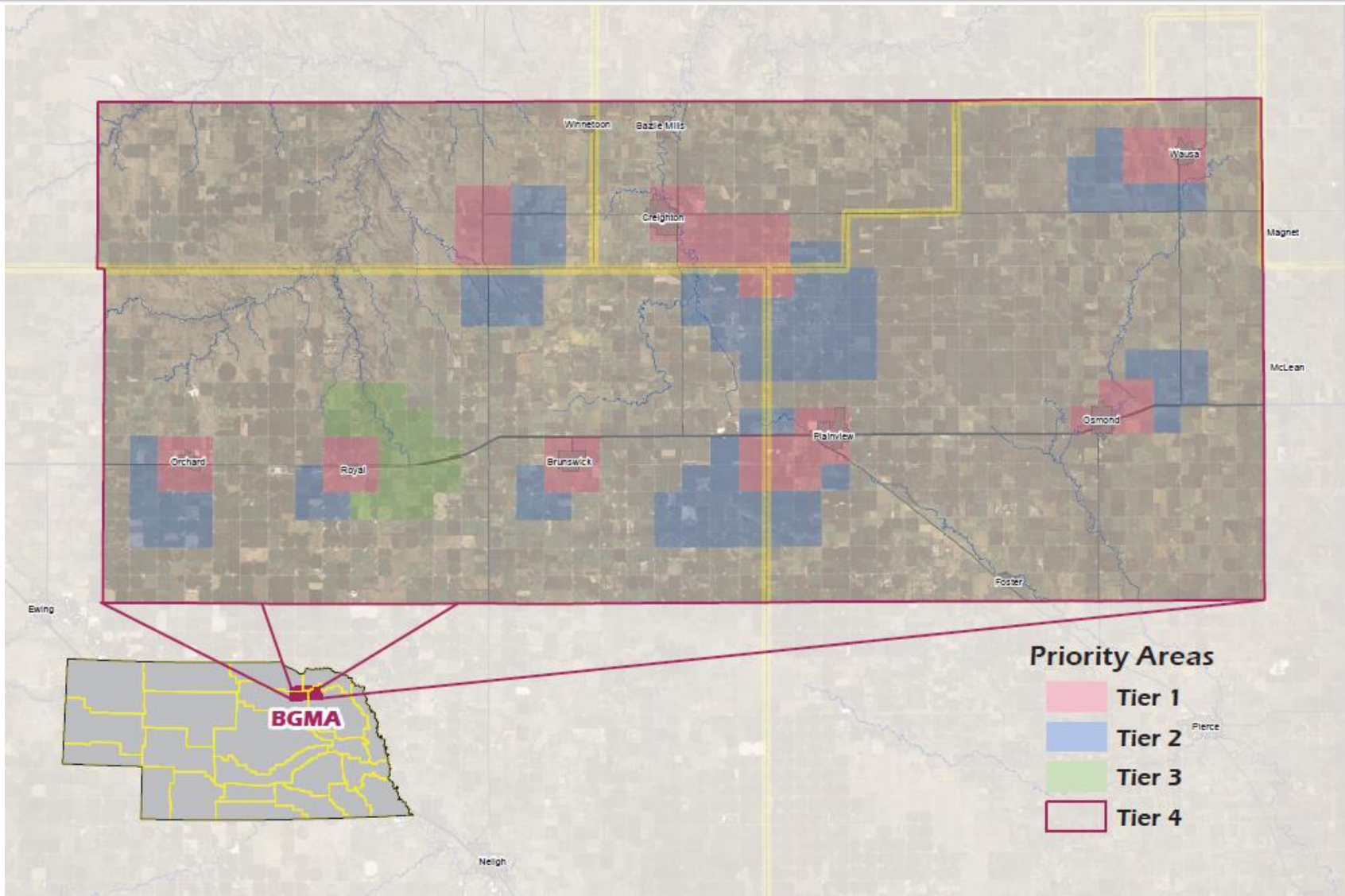
- Halt the trend of increasing Nitrate concentrations in Tiers 1-3

LONG TERM – 20 YEARS

- Reduce nitrate concentrations below 10 mg/l in Tiers 1 and 2 and remove all PWS from Administrative Orders for Nitrates
- GW contamination and other NPS pollution will not impair SW beneficial uses in the Tier 3 area

Priority Areas	Acres	Average NO ₃ -N of most recent samples	Reduction % needed	Acres Needing BMPs
Tier 1	31,224	17.6	45%	14,051
Tier 2	53,112	14.2	30%	15,934
Tier 3	10,167	14.9	46%	4,677
Tier 4	389,337	12.6	21%	81,761
Total	483,840			116,422

BGMA Priority Areas



Actions and Tasks

■ Education

- Status quo projections, current efforts and trends of both Quality & Quantity, available and efficient BMPs, demonstration plots, WHPA plans, SW/GW interactions, etc.

■ Nitrogen Management (above and beyond GWMP requirements)

- Restrict manure application, encourage split applications, fertigation, nitrification inhibitors, cover crops and no-till/reduced tillage, variable application and precision farming (irrigation management), well rehabilitation/decommissioning, and septic system upgrades

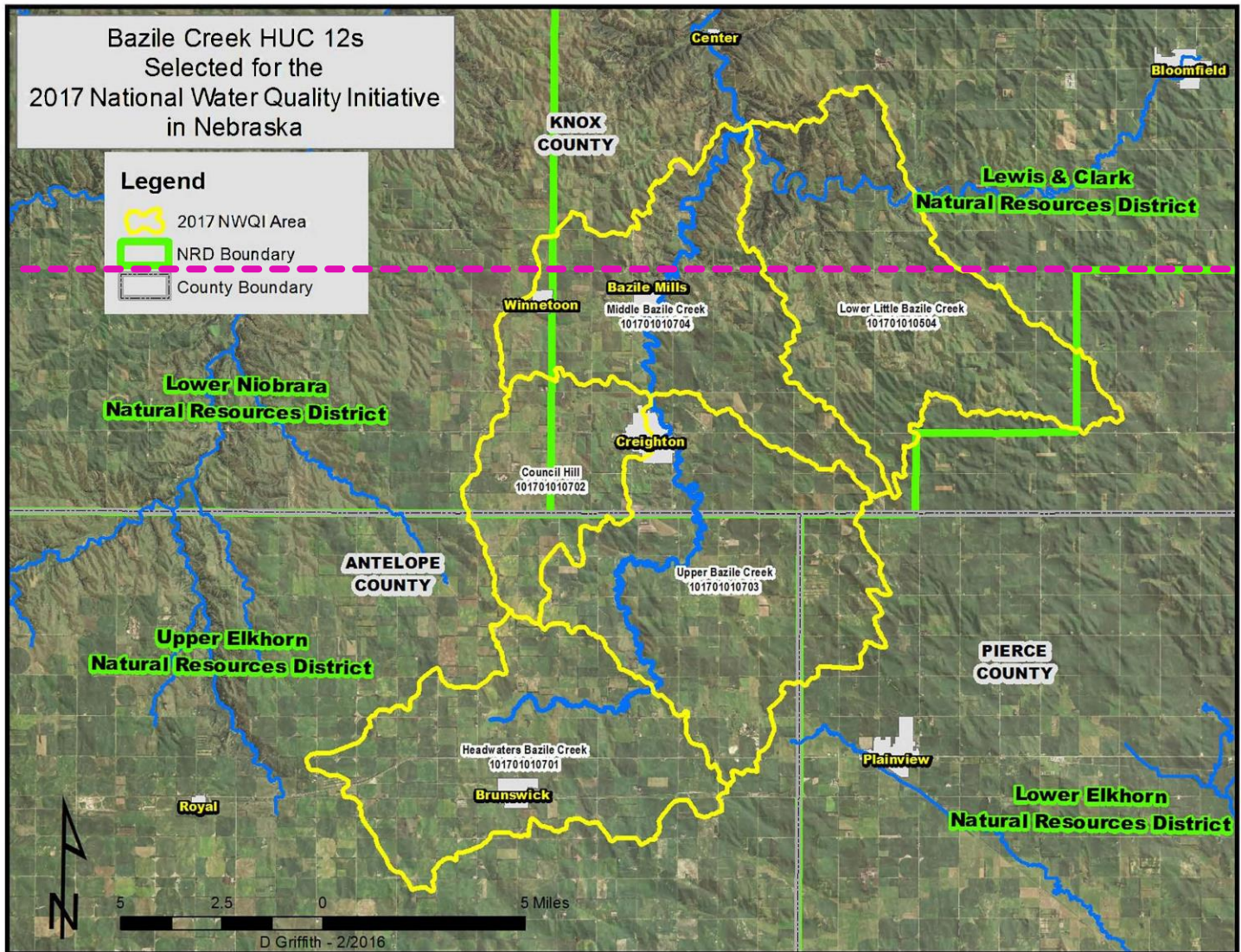
■ Monitoring

- Analyze water, soil (vadose zone), crop tissue and residue, and crop reporting forms for nitrogen. Analyze flow meters, soil moisture sensors, static water levels and stream flow for irrigation management.

Additional NRD Actions

- **Short term (5-years) NRD Actions**
 - Adopt uniform Groundwater Management Triggers and Phases across the BGMA
 - ✓ Conduct baseline Vadose Zone Sampling for each Wellhead Protection Area (2014 – 2016...cont)
 - Identify screened intervals for all baseline wells and newly identified wells to fill data gaps
 - ✓ Identify potential locations to install nested monitoring wells (2016)
 - Adopt well construction standards to protect confined aquifers and identify poorly constructed well candidates for well rehabilitation demonstrations.

USDA's NWQI Partners



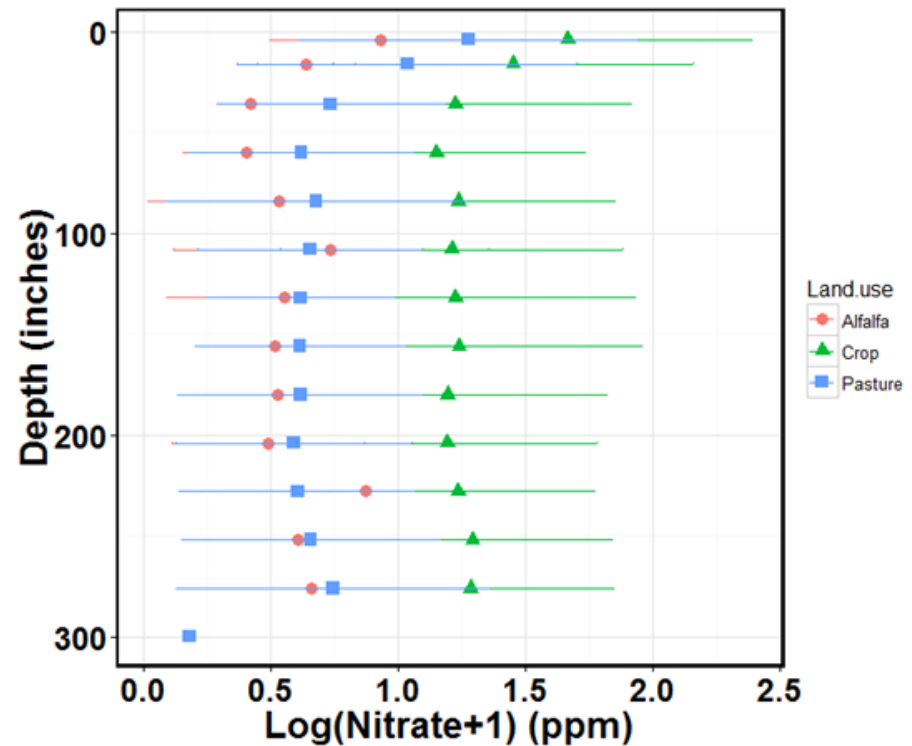
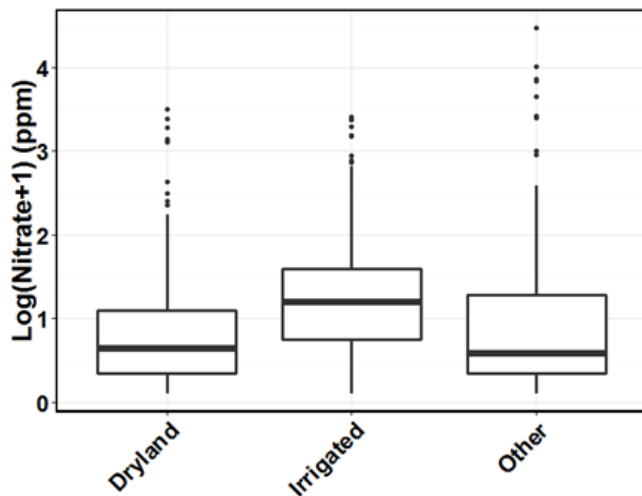
Where we are today

- Urban demo sites: rain garden, turf demo, pet waste dispenser station, and signs in 5 communities
- Ag demo sites: irrigation and fertilizer BMPs
- 2 SNIP (150 acres)
- 4 Moisture Probes (520 acres)
- 7 Chemigation conversions (878 acres)
- 47 flow meters (5,785 acres)
- 58 tissue analysis (7,164 acres)

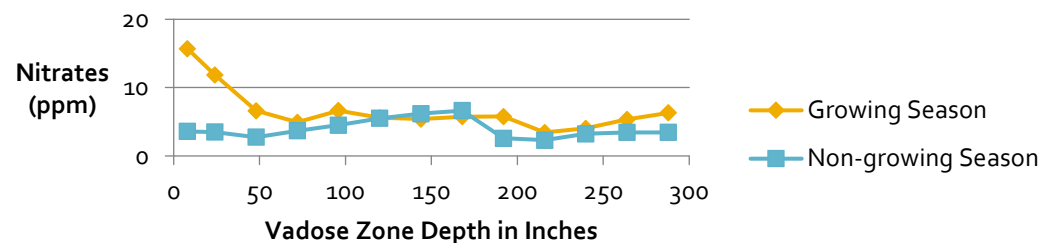


Where we are today cont...

- Deep vadose zone (2014 - 2016) results
- What matters:
 - Landuse
 - Depth
 - Time of year

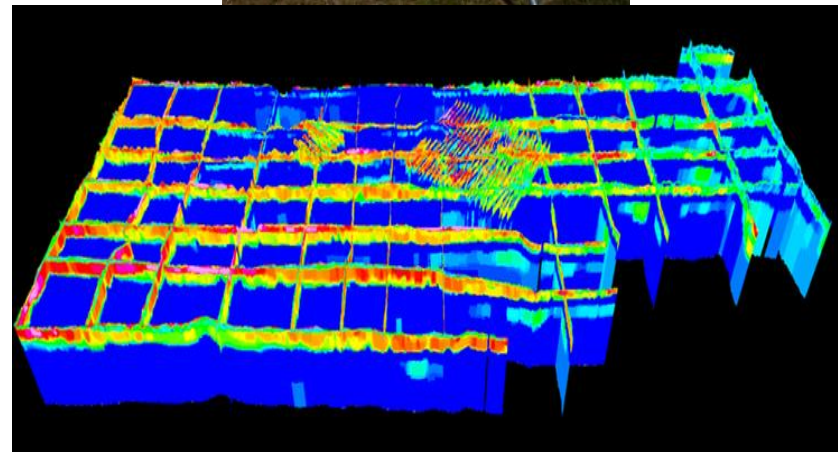


Vadose Zone Nitrates



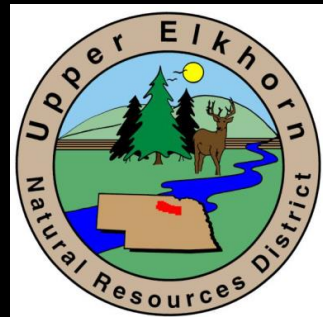
Where we are today cont...

- Working with UNL's Dr. Snow on an Isotope Recharge Study
- Installed a weather station to provide real time ET data for irrigation scheduling
- NRDs received an NET grant to conduct an airborne electromagnetic geophysical survey



Where we are today cont...

- BGMA Plan adopted by all four NRD Boards, accepted by NDEQ, EPA Region 7, and EPA Headquarters Oct 2016!
- BGMA coordinator has been hired (Tanner Jenkins)
- NRDs secured \$300,000 319 grant for plan implementation
- NRD boards committed funds for the next 5 years
- Risk Communication for BGMA stakeholders



Questions?