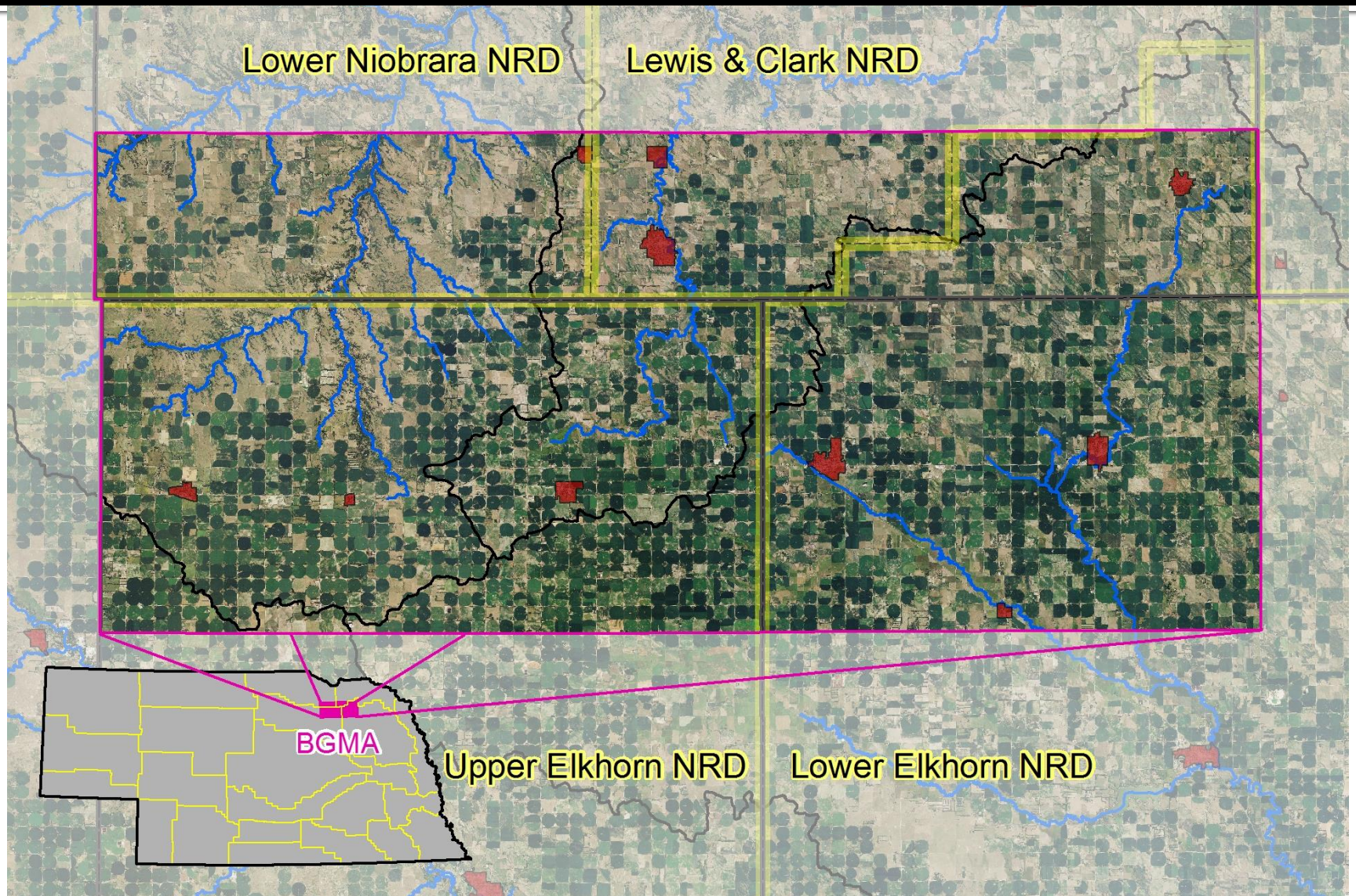
Community Based Watershed Planning

Bazile Groundwater Management Area Plan

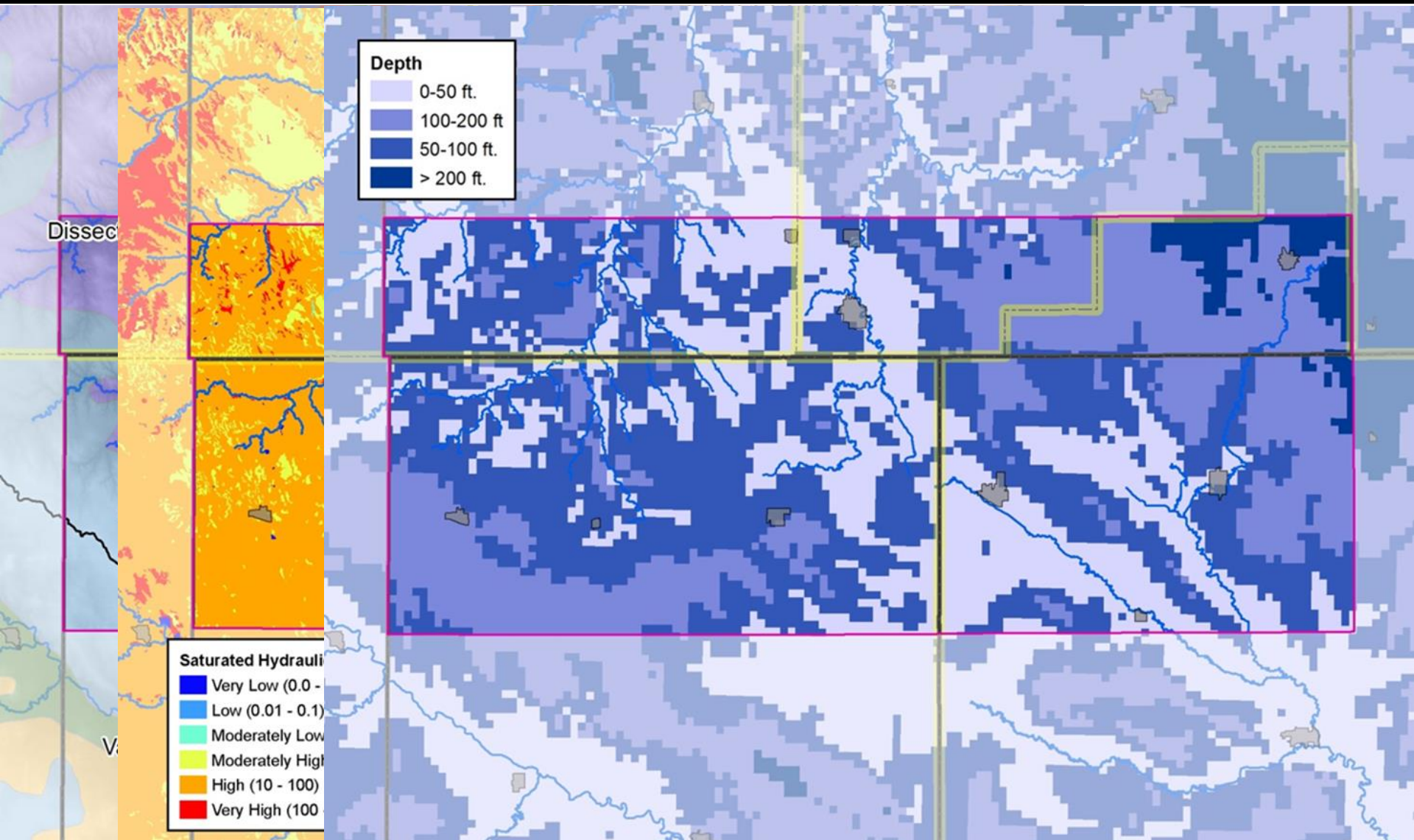
Laura Johnson

Nebraska Department of Environmental Quality

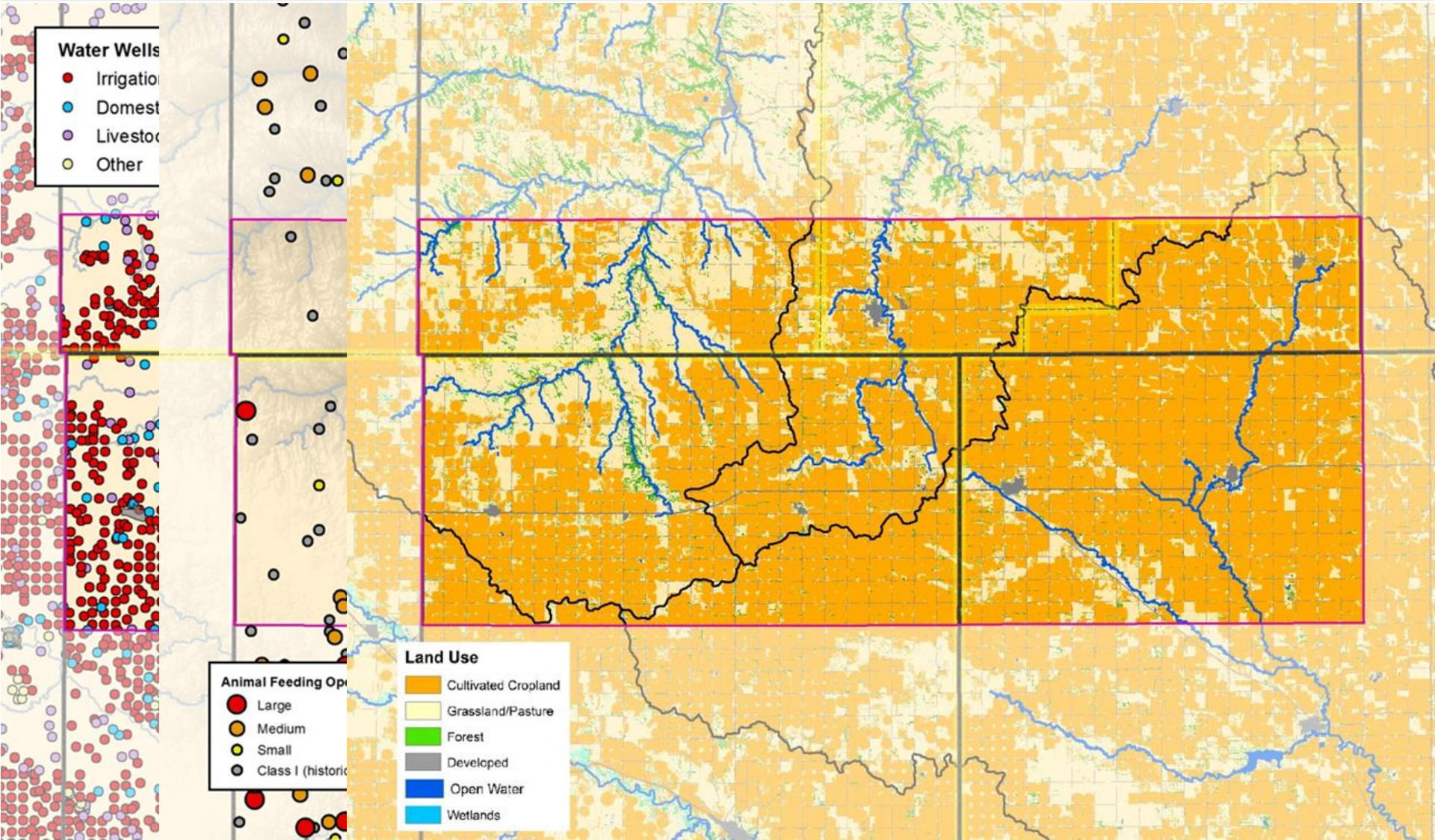
BGMA Location



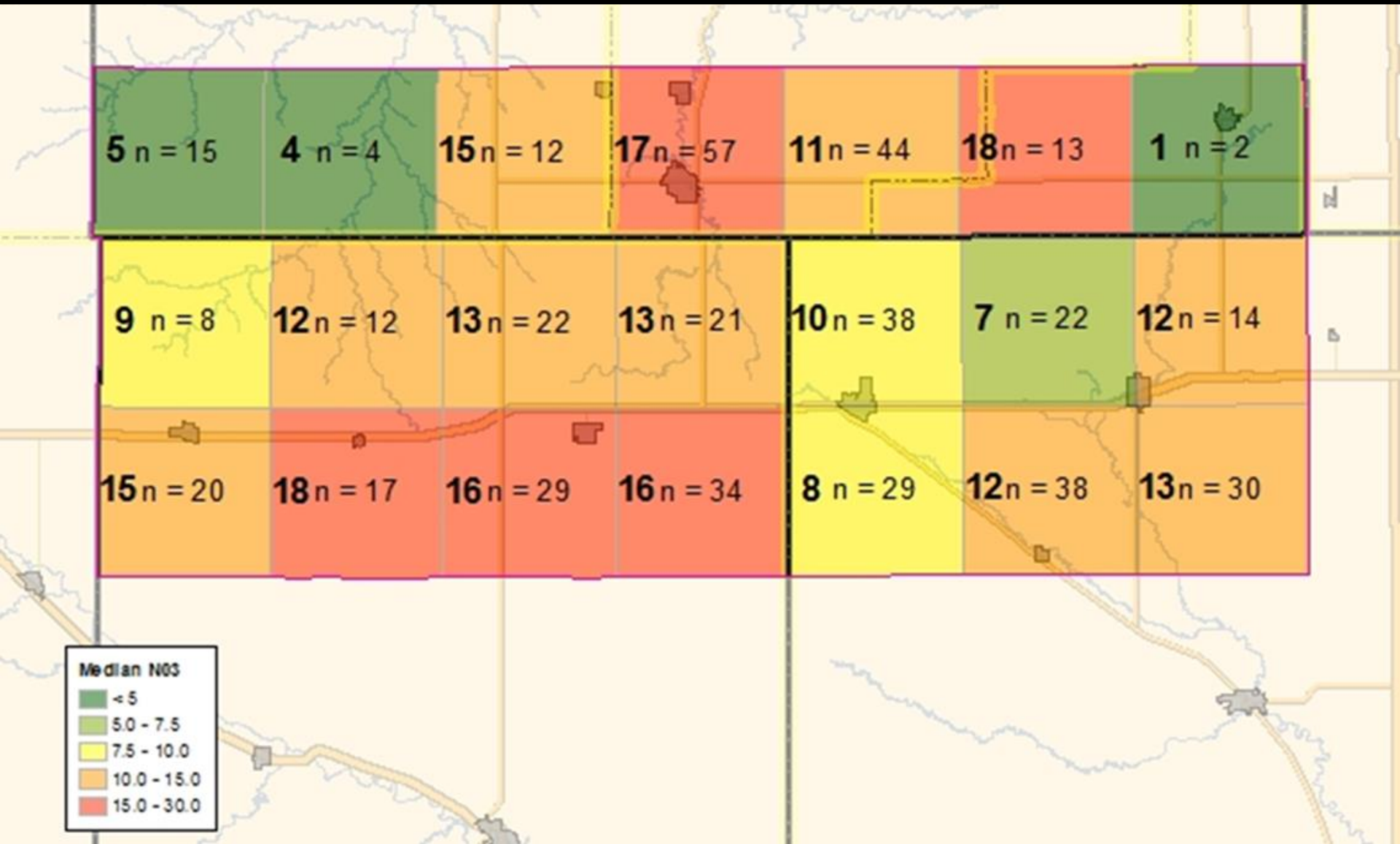
BGMA Geology



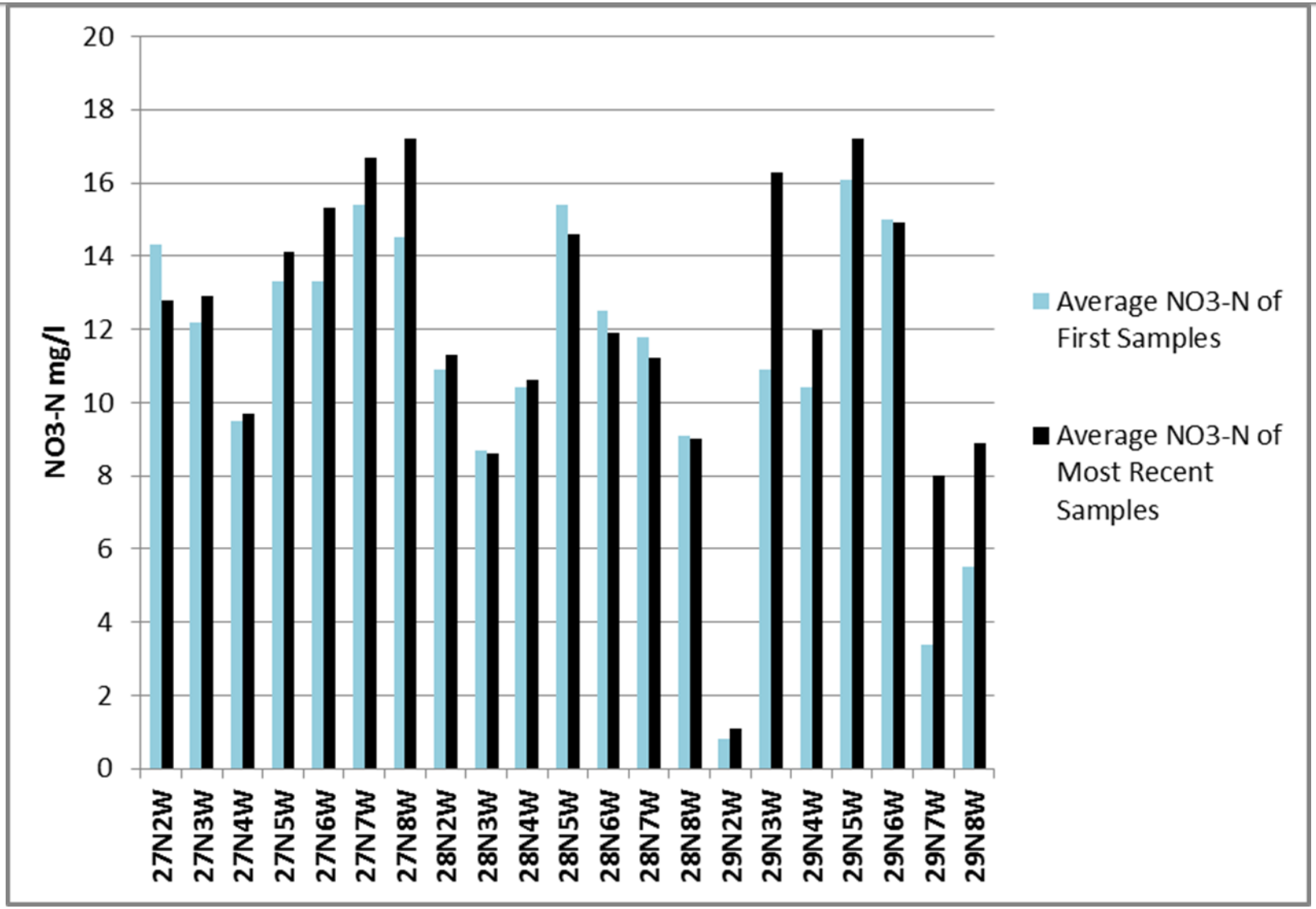
BGMA Land and Water Use



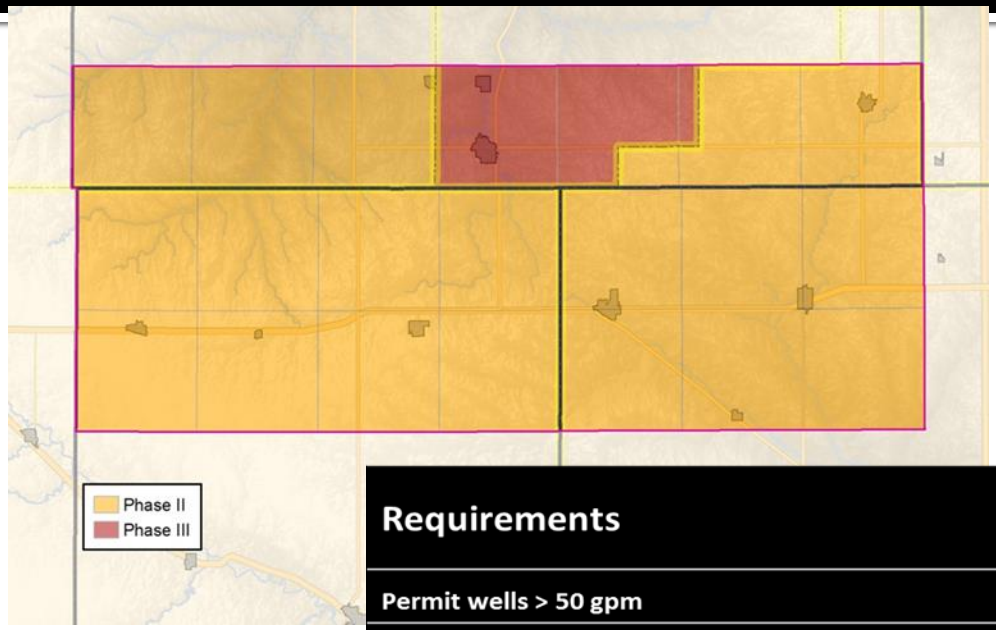
Groundwater Nitrate Contamination



Nitrate Contamination Over Time



NRDs GWMP Phase Areas



NRDs have agreed to manage this area together under one set of rules!

Requirements	Lower Niobrara	Upper Elkhorn	Lower Elkhorn	Lewis & Clark
Permit wells > 50 gpm	X	X	X	X
Nitrogen Certification every 4 years	X	X	X	X
Water Analysis every 4 years	X	X	X	X
Water Analysis increases to every 2 years				X
Encourage BMPs and Education	X	X	X	X
Fall and/or Winter applications discouraged	X	X		
No Fall and/or Winter application	X	X		X
Spring application > 100 lbs./acre encouraged to split	X	X		X
Deep Soil Sampling encouraged	X	X	X	X
Deep Soil Sampling Required	X	X	X	X
Annual Crop Report	X	X	X	X

Each NRDs Board must separately approve rule changes and allow 30 day public comment periods.

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**
Bazile GWMA 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

Gosselin, D. C. – UNL Conservation & Survey Div

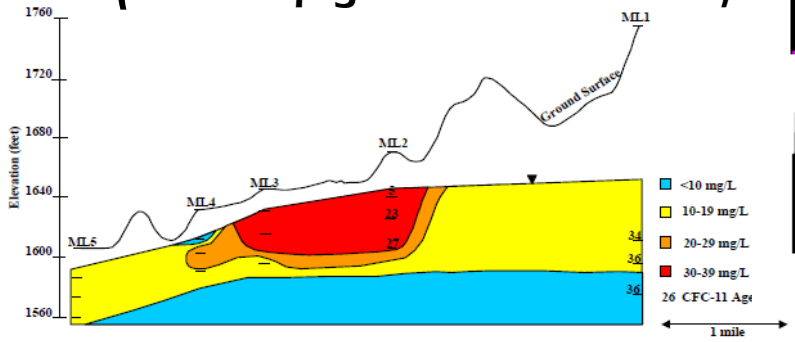
- 125 wells sampled
- Nitrate contamination in the Ogallala due to direct hydraulic connection w/ the contaminated overlying unconfined aquifer
- "… source of GW contamination is most likely related to fertilizer application practices."

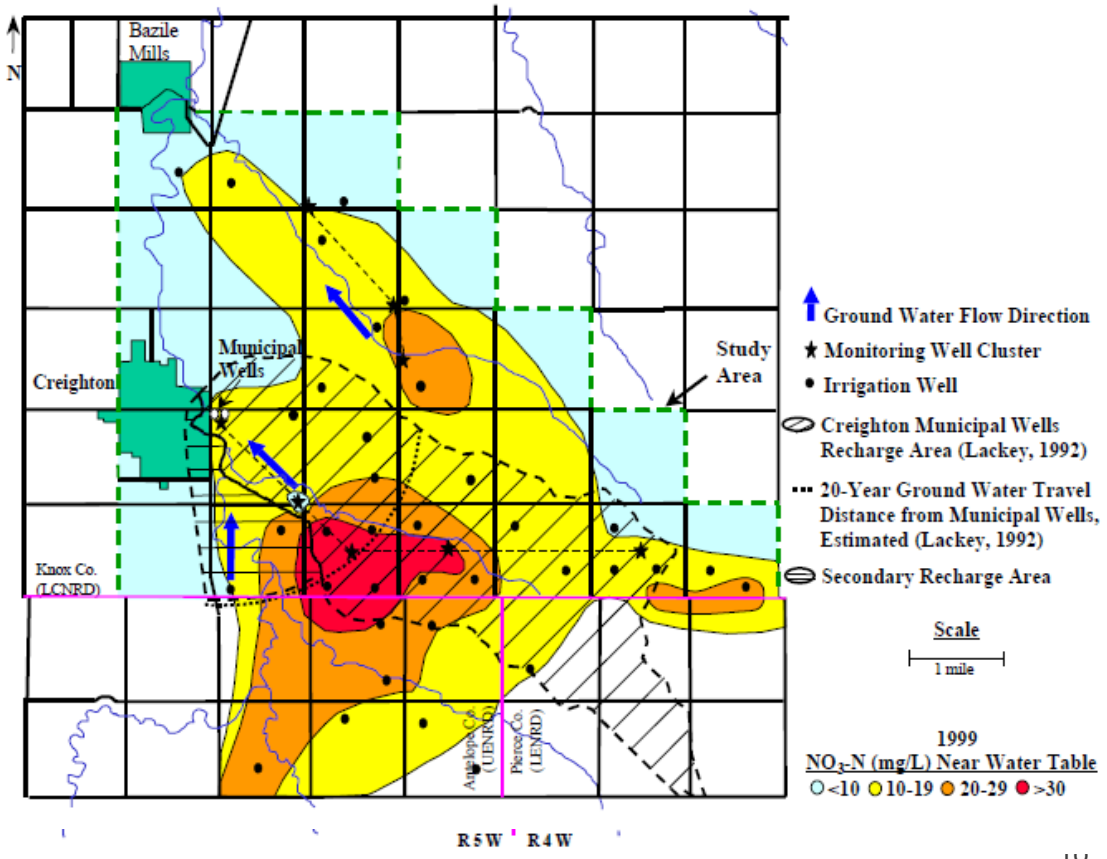
History (10 years later)

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

Mark Burbach and Roy Spalding - UNL Water Center

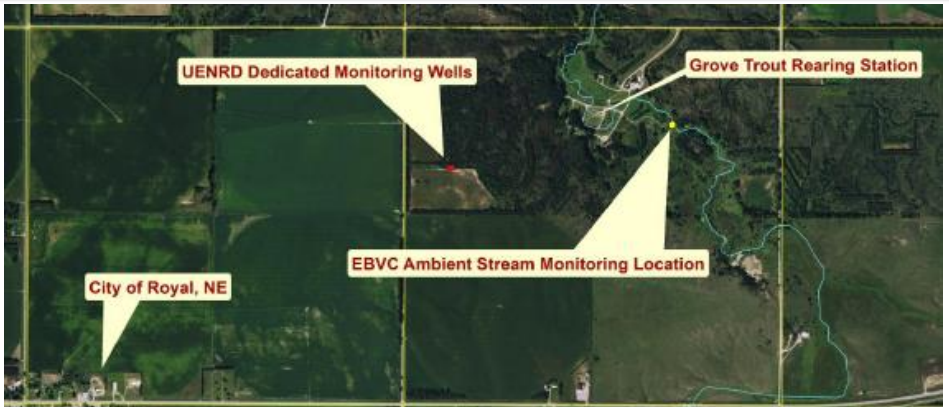
- 8 clusters of nested monitoring wells
  (water table, middle, deep)
- 12 vadose zone cores
  (6 sites up gradient of clusters)

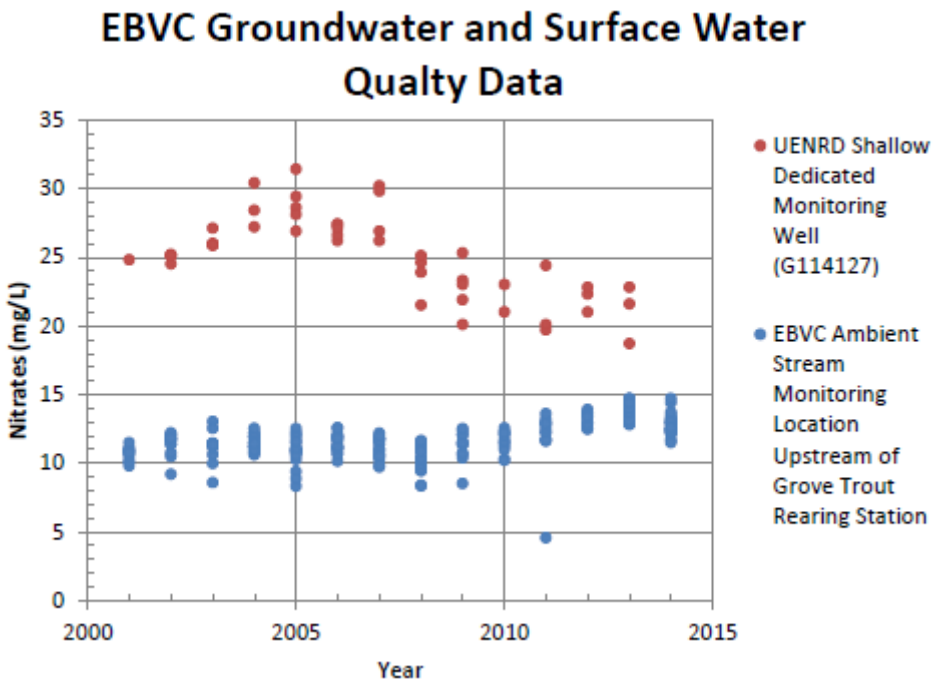




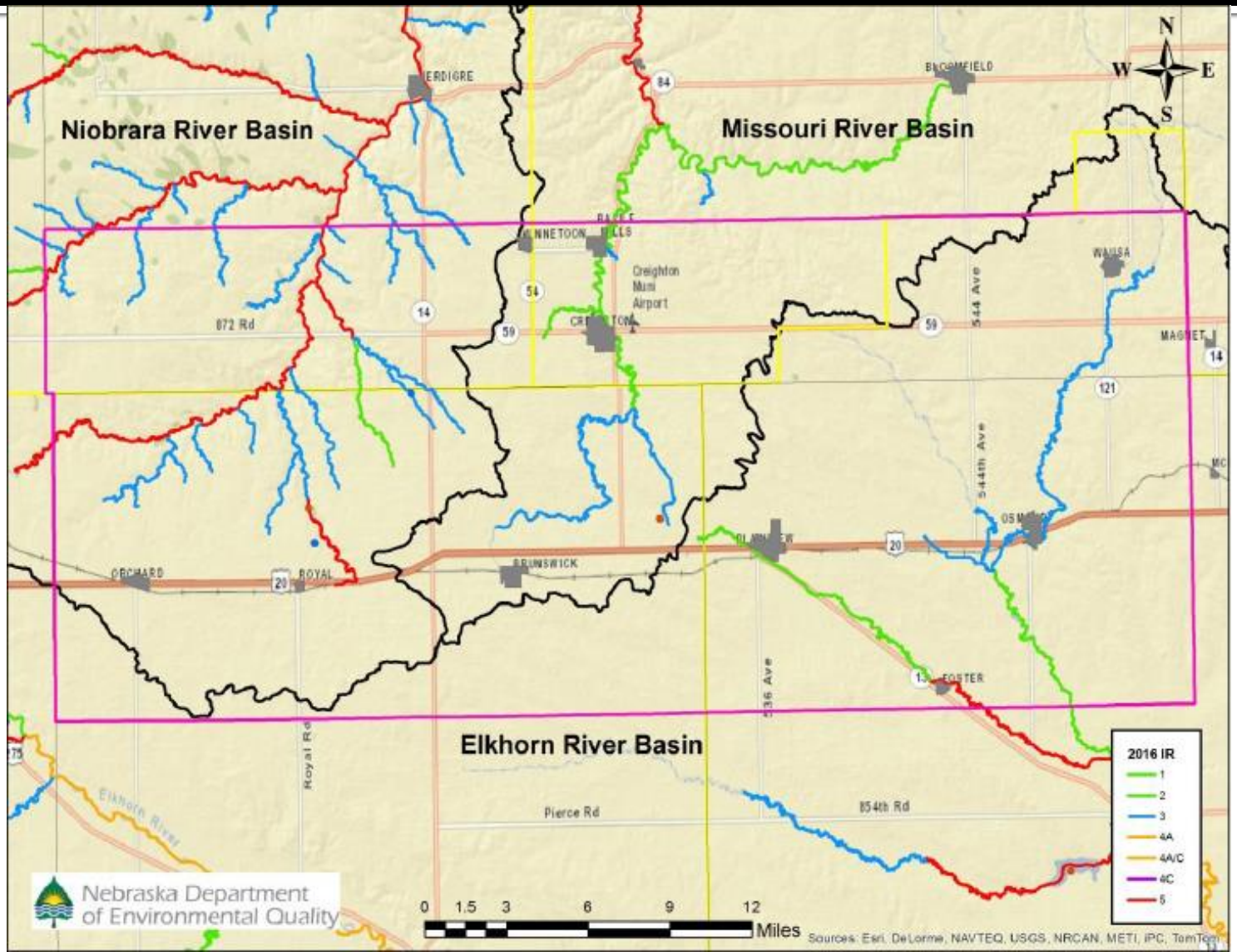
History (5 years later)

- 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
    - Nitrates ⇩ 1.59 mg/L/year
    - Shallow well < 19mg/L
    - Deep well < 1 mg/L

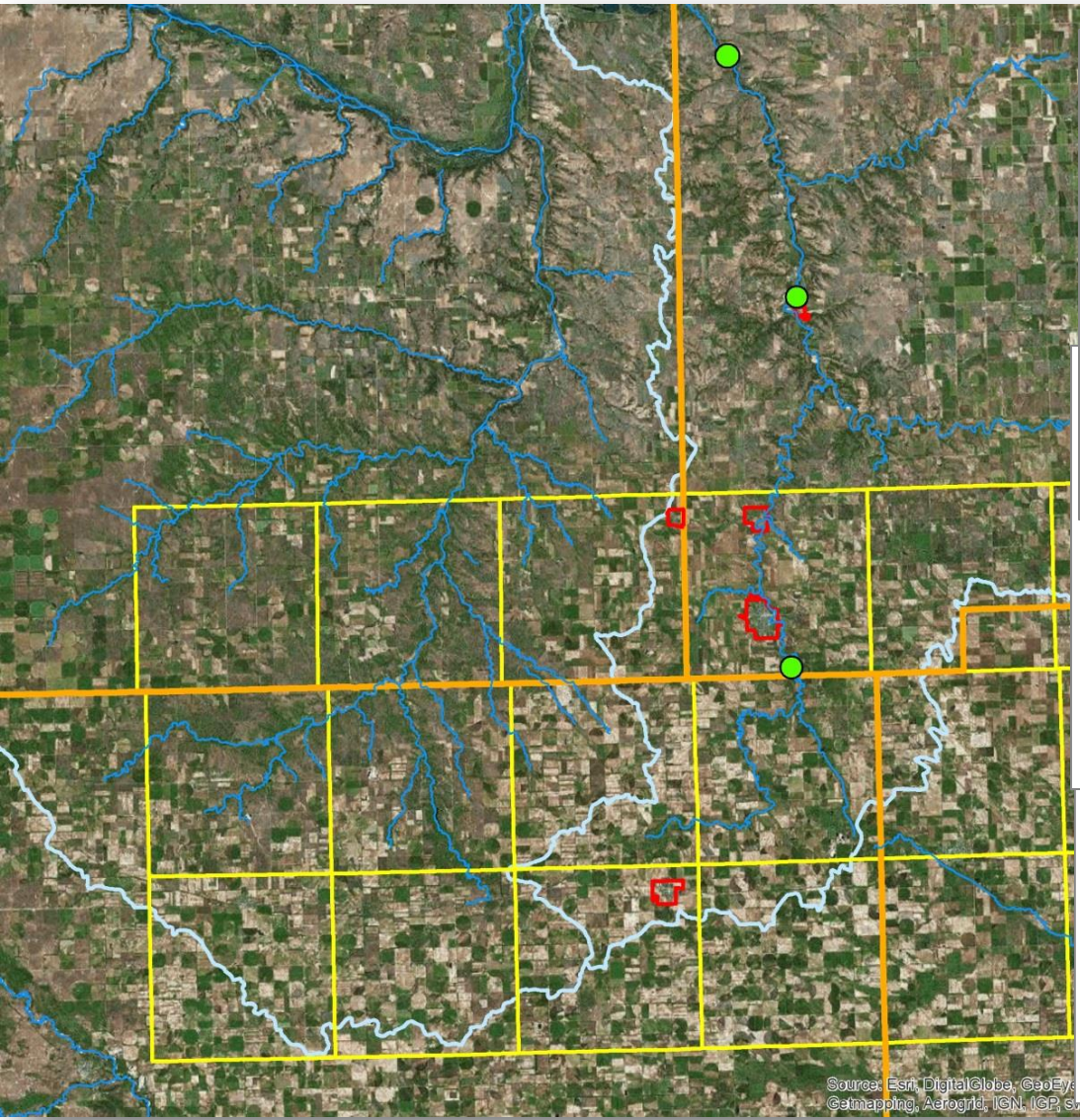


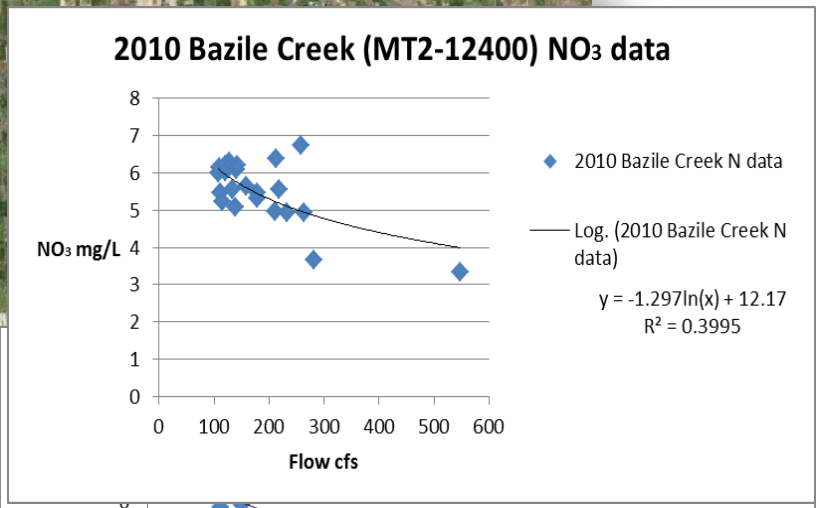


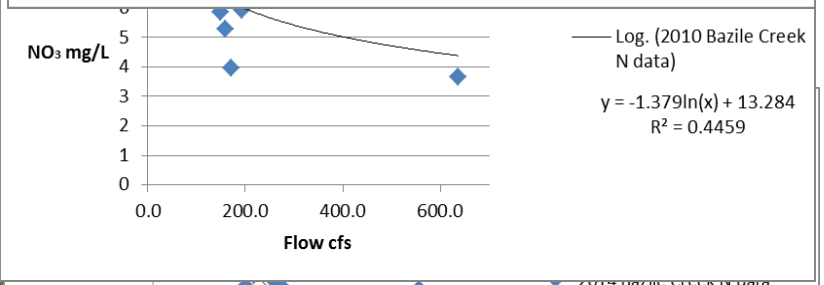
Surface Water Conditions

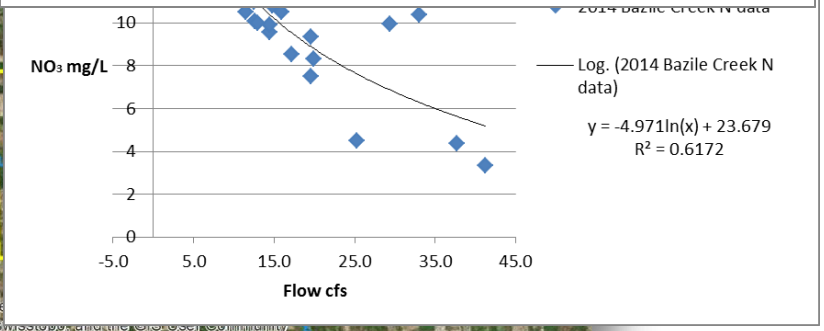


Surface Water Nitrate Data

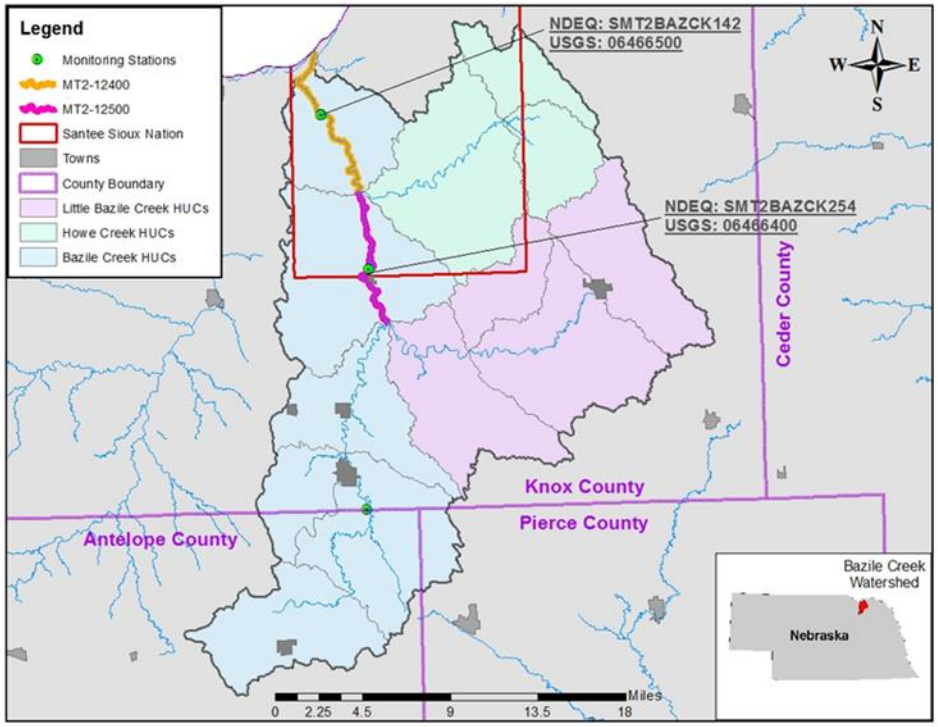


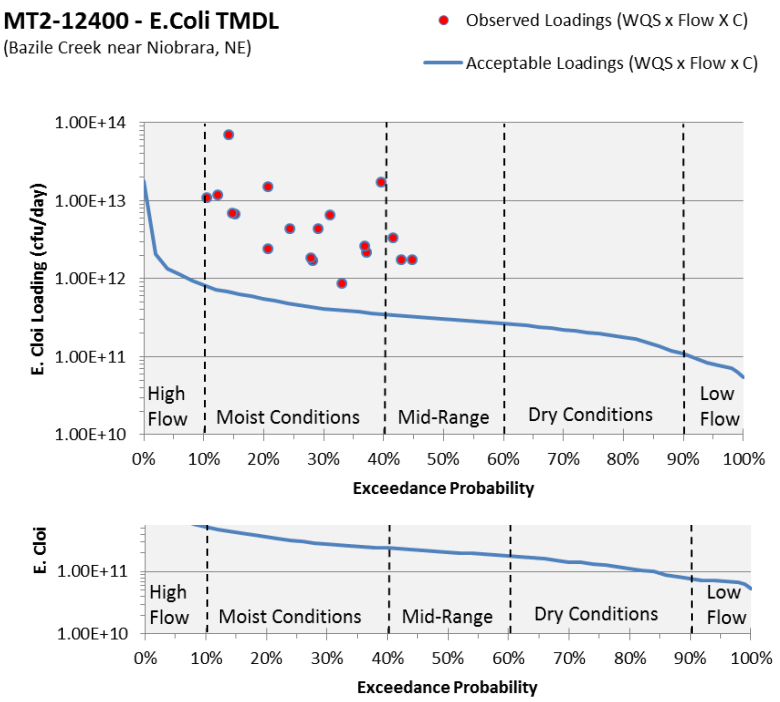






Surface Water E.coli data





- CFRA 319 grant to assist the NICC in raising awareness about water quality issues and monitoring in Santee and Macy, NE.

Community Based Planning Process

- **2011 – NRDs hosted meeting with residents of BGMA and formally requested assistance from NDEQ to take collective action!**

Form a Technical Advisory Group

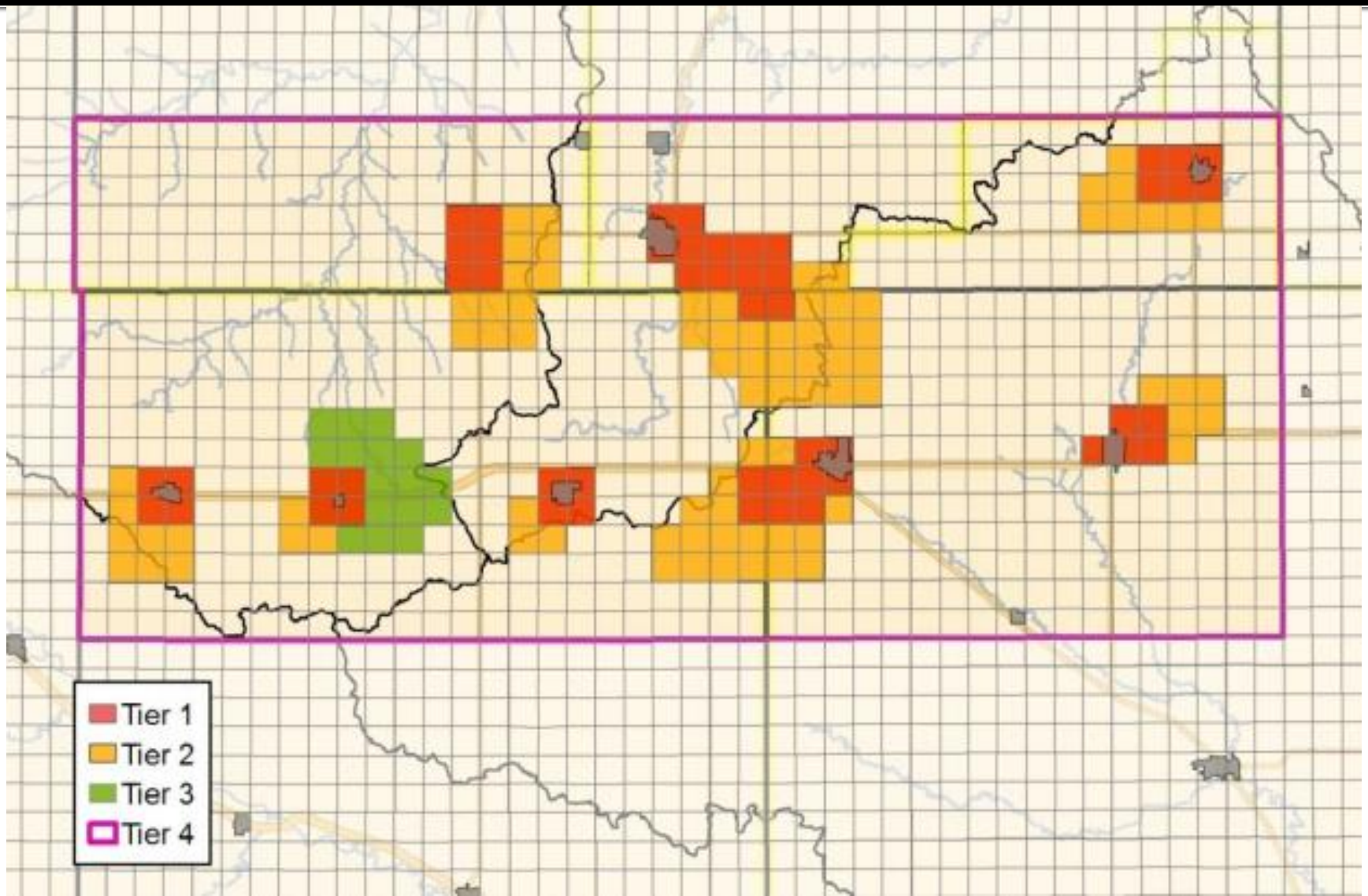
Identify Stakeholders

Conduct Public Meetings

Formulate Acceptable Alternatives

Develop the Implementation Plan

BGMA Priority Areas



Bazile GWMA Plan Goals

SHORT TERM – 5 YEARS

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

Priority Areas	Acres	Average NO3-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

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

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, crop tissue analysis, split applications, fertigation, nitrification inhibitors, variable application and precision farming, cover crops and no-till/reduced tillage
  - Well rehabilitation/decommissioning, and septic system upgrades
- **Monitoring**
  - Analyze water, soil, crop tissue and residue, install flow meters, soil moisture sensors, vadose zone sampling

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
  - Identify screened intervals for all baseline wells and newly identified wells to fill data gaps.
  - Identify potential locations to install nested monitoring wells
  - Adopt well construction standards to protect confined aquifers and identify poorly constructed well candidates for well rehabilitation demonstrations.

Where we are today

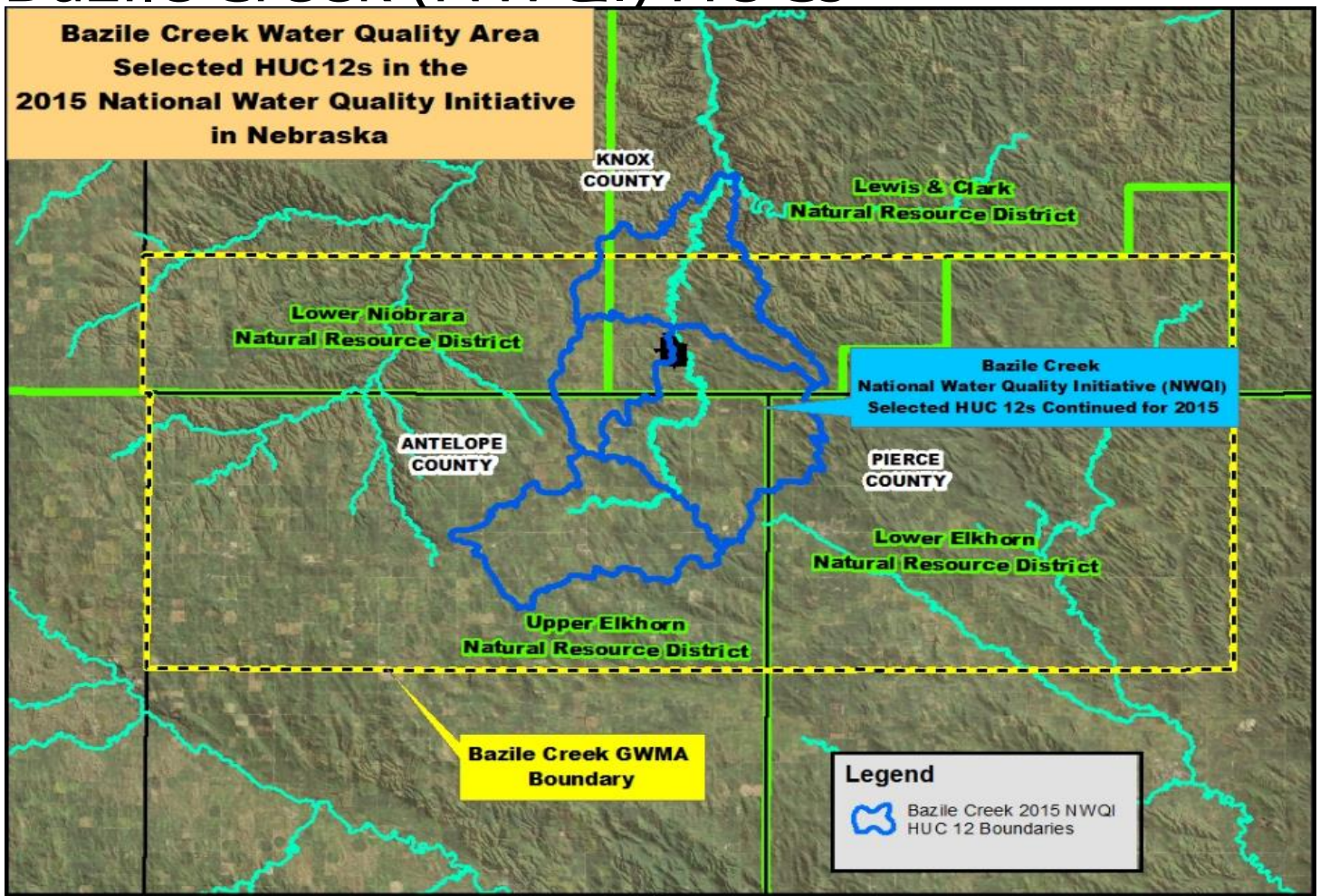
- Bazile GWMA Plan has been adopted by all four NRD Boards and has been approved by NDEQ and EPA Region 7 as well as EPA Headquarters!
- BGMA coordinator was hired to help complete and begin implementing the BGMA plan in March 2014.
- NRDs are committed to fund a coordinator for an additional 5 years.

Where we are today cont…

- 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)
- 7 Chemigation conversions (878 acres)
- 42 flow meters (5,200 acres)
- 58 tissue analysis (7,164 acres)
- Deep vadose zone (24 ft) NO_3 Study (2014 & 2015)

Where we are today cont…

- Bazile Creek (NWQI) HUCs



Where we are today cont…

- Installed a weather station to provide real time ET data for irrigation scheduling
- The NRDs received an NET grant to conduct an airborne electromagnetic geophysical survey


Lower
Niobrara
Natural Resources District


Lewis & Clark
NRD
Natural
Resources
District


Nebraska
DEQ


UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY


Upper Elkhorn
Natural Resources District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Questions?