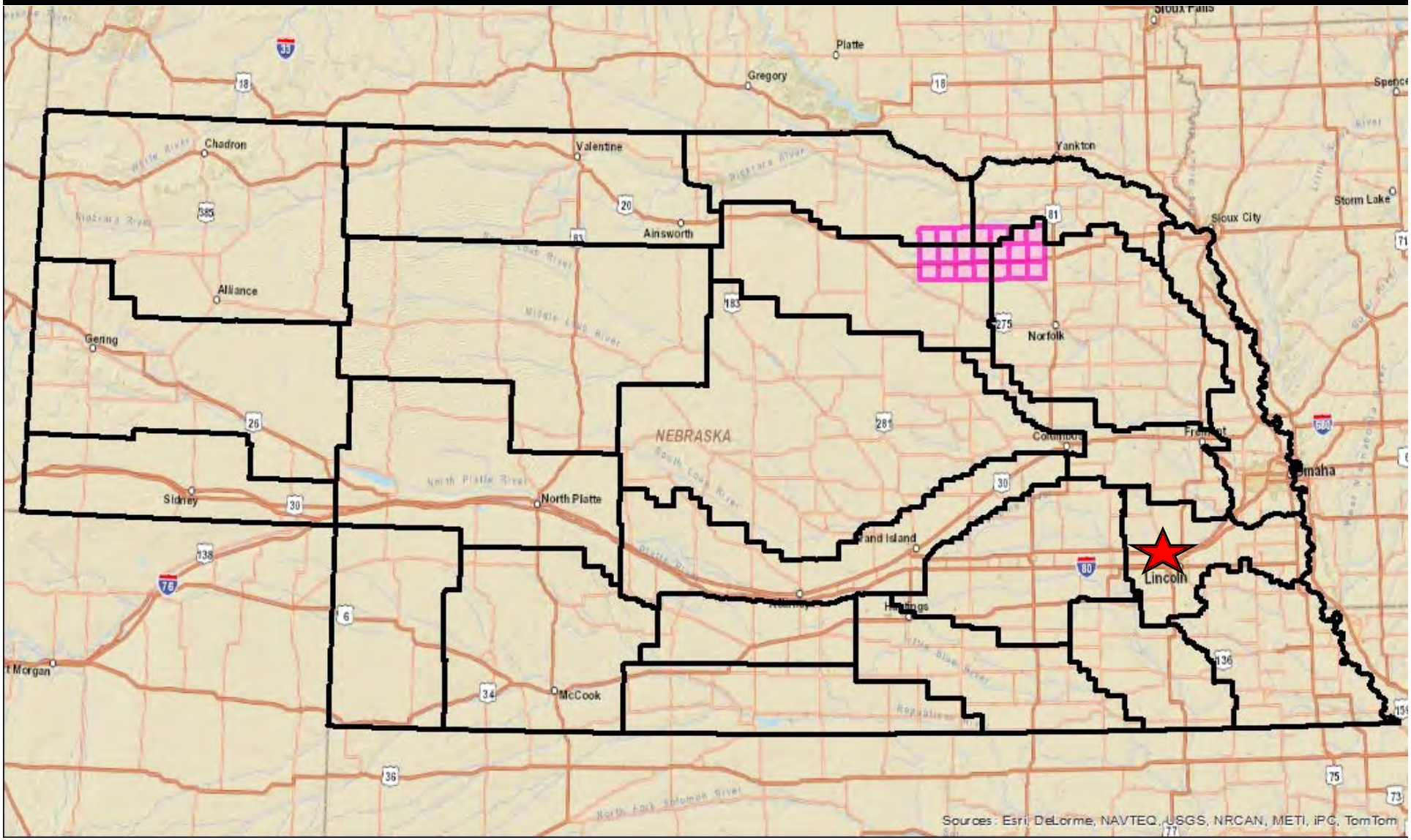
Community Based Watershed Planning

Nebraska's Groundwater Management Plan for the Bazile Creek Area

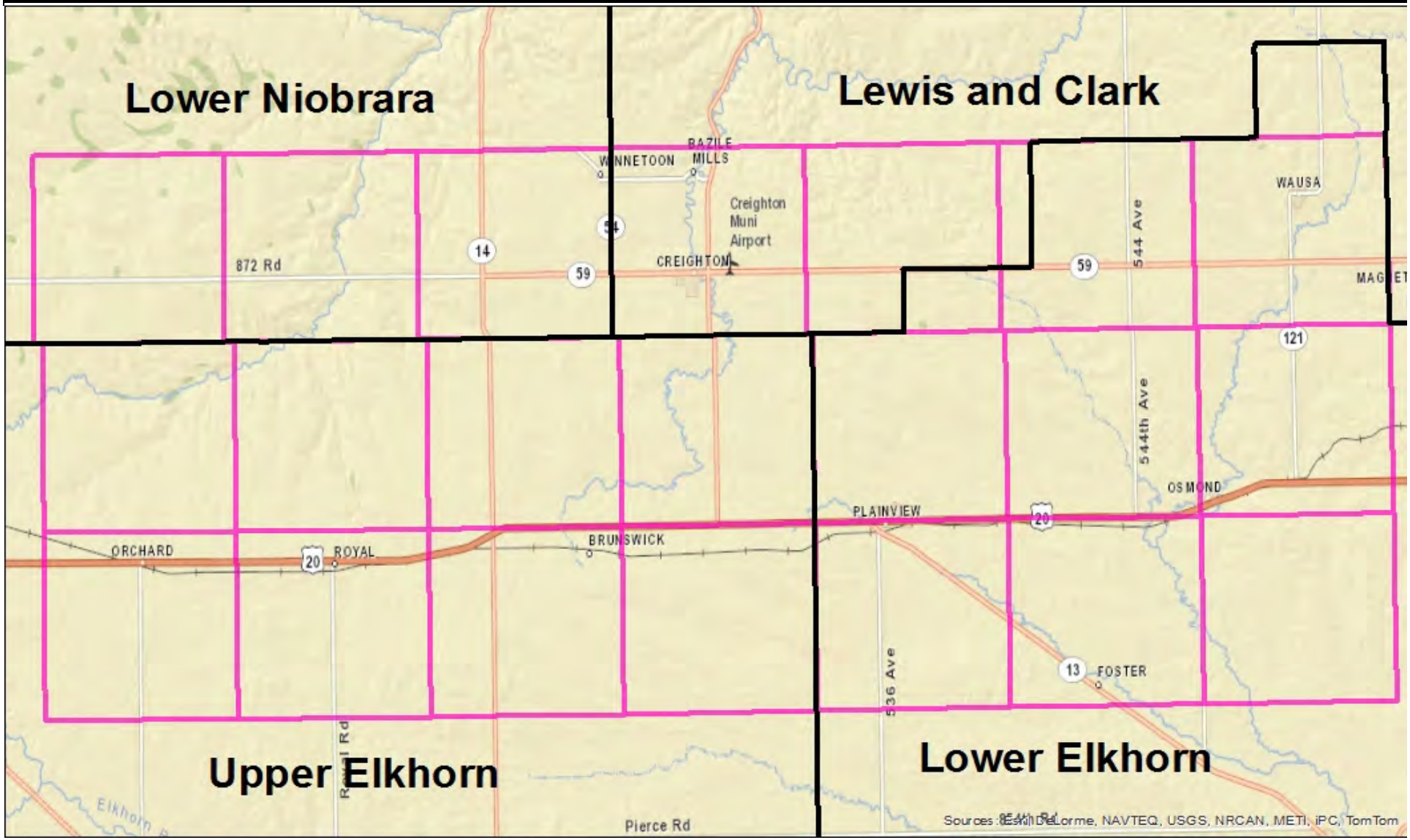
Ryan Chapman **& Many Others**

Nebraska Department of Environmental Quality

Bazile GWMA Location



Bazile Groundwater Management Area



History

- 1989 – Bazile Triangle GW Study Began

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

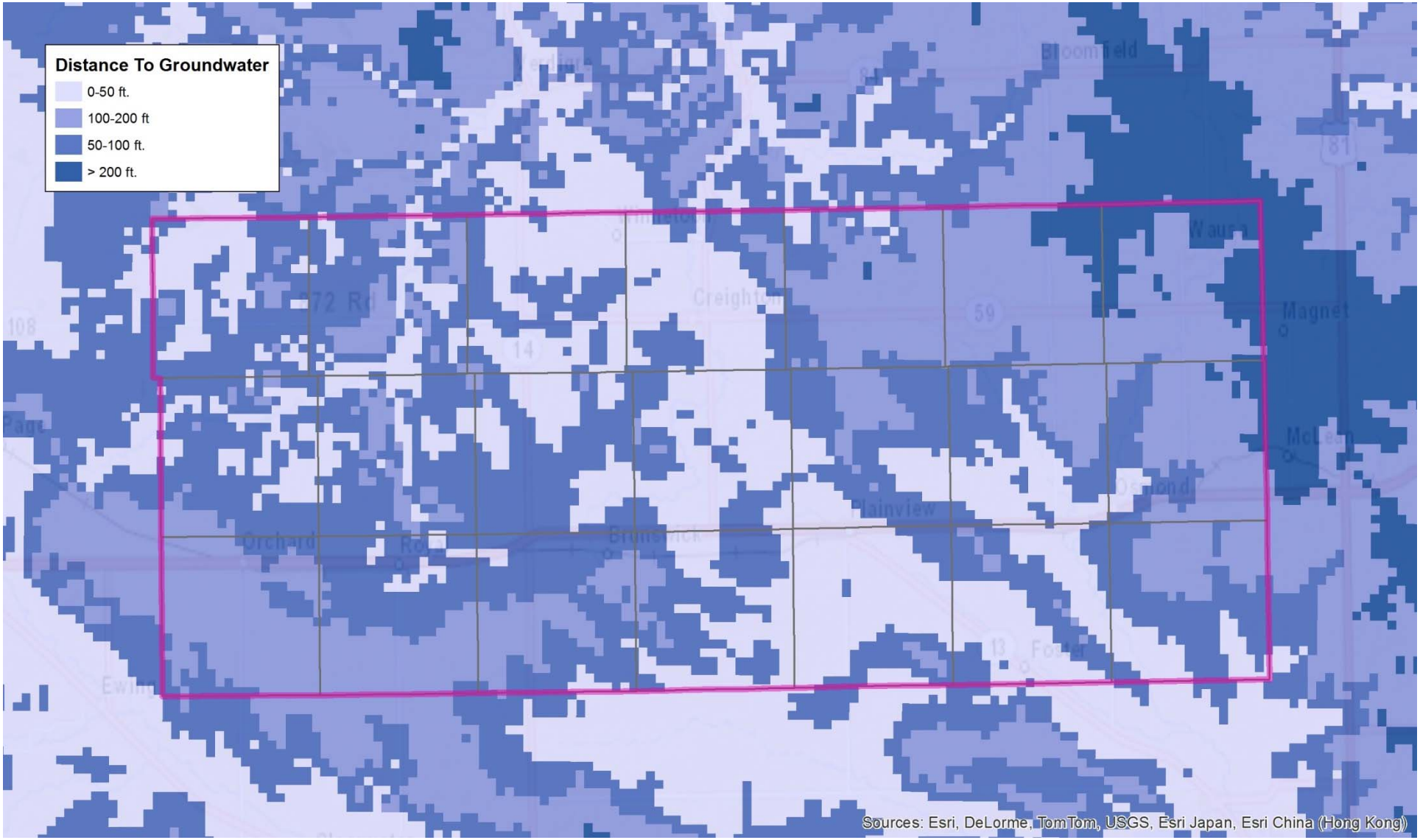
- 125 wells sampled
- Ogallala is still relatively uncontaminated
- Glacial till inhibits vertical migration
- "… source of GW contamination is most likely related to fertilizer application practices."
- Creighton PWS predicted to reach 30 mg/l

History

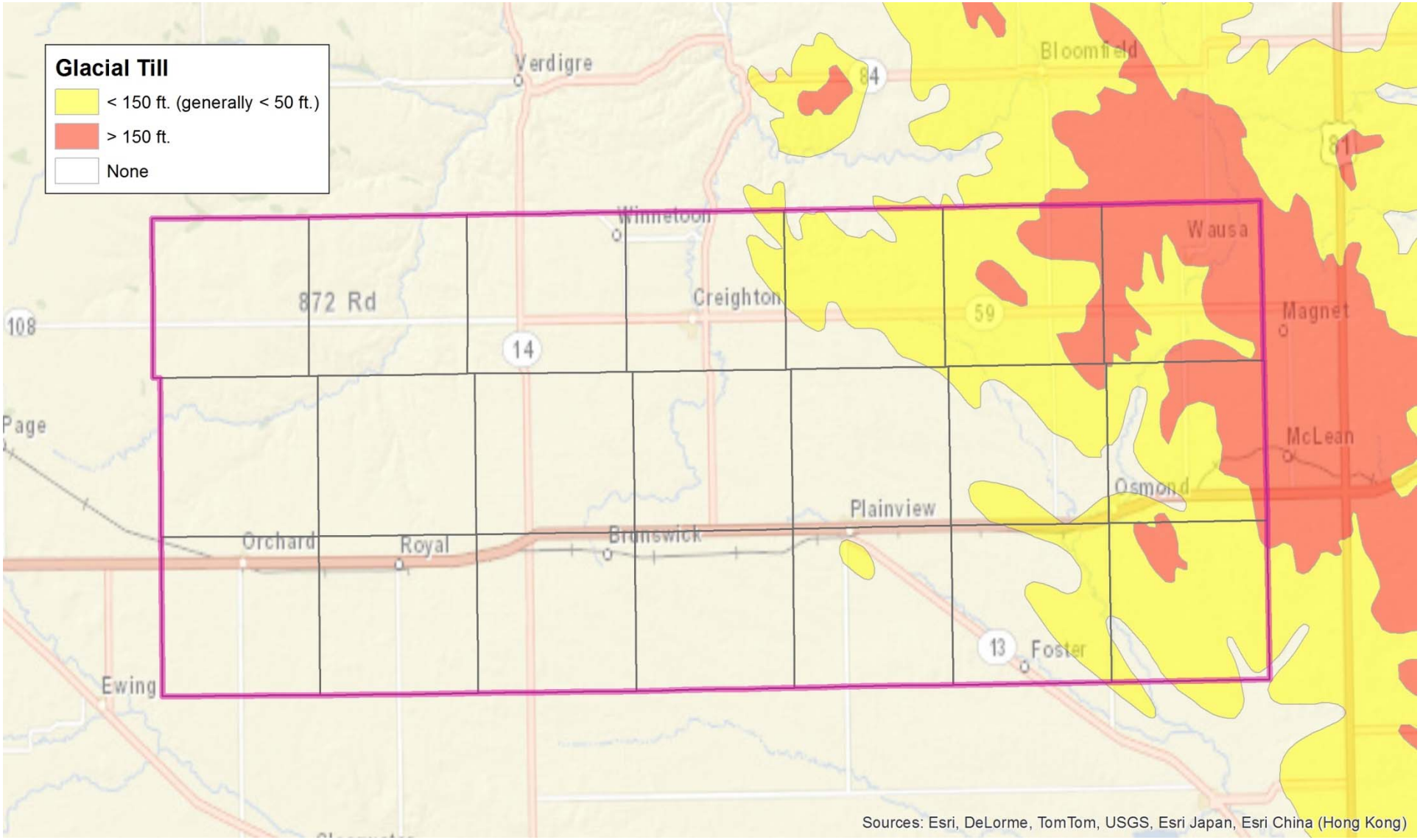
- 2000 – Evaluation & Assessment of Ag Contaminants in Creighton, NE

- 2011 – NRD hosted meeting with residents of BGMA and formally requested assistance from NDEQ

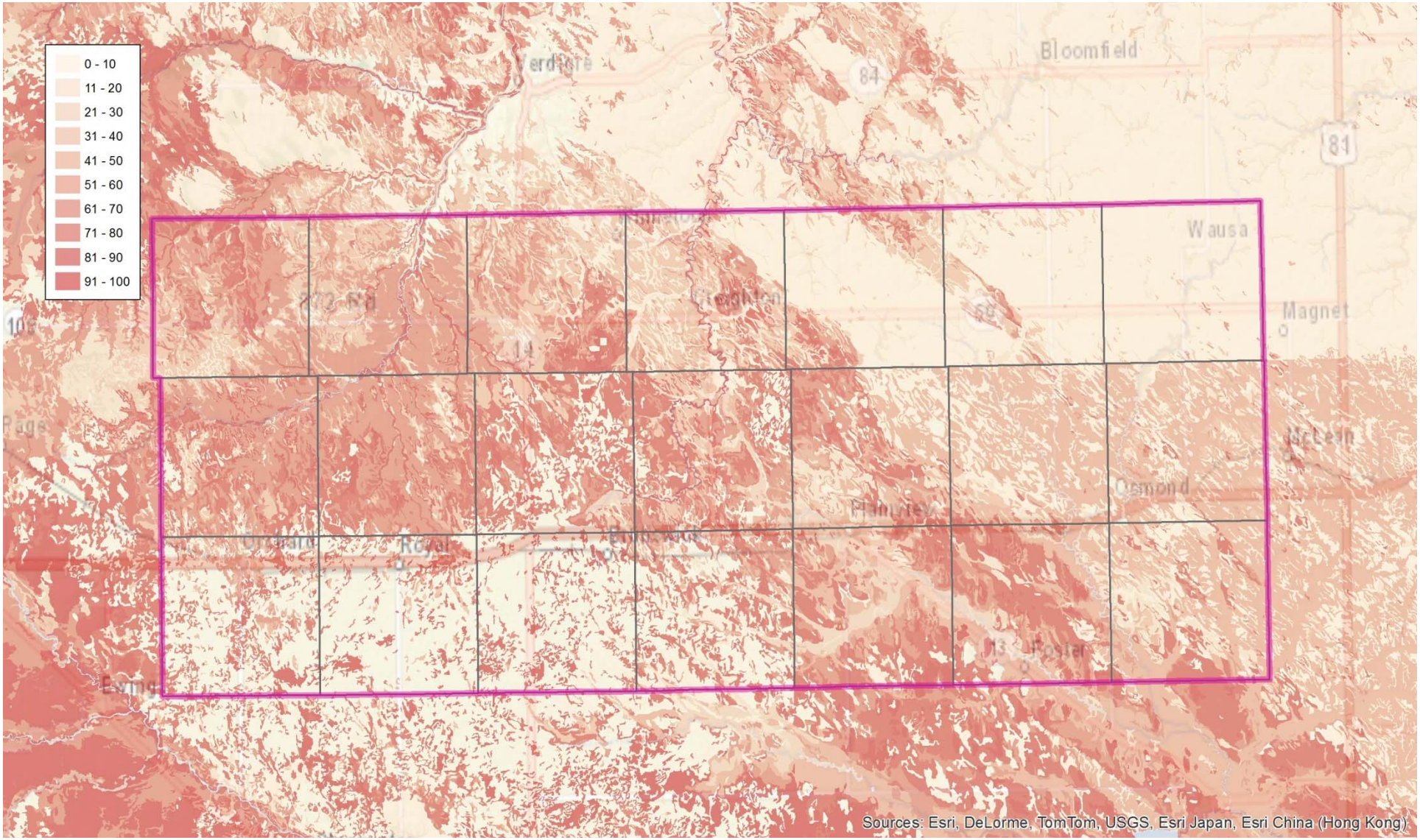
Depth to Groundwater



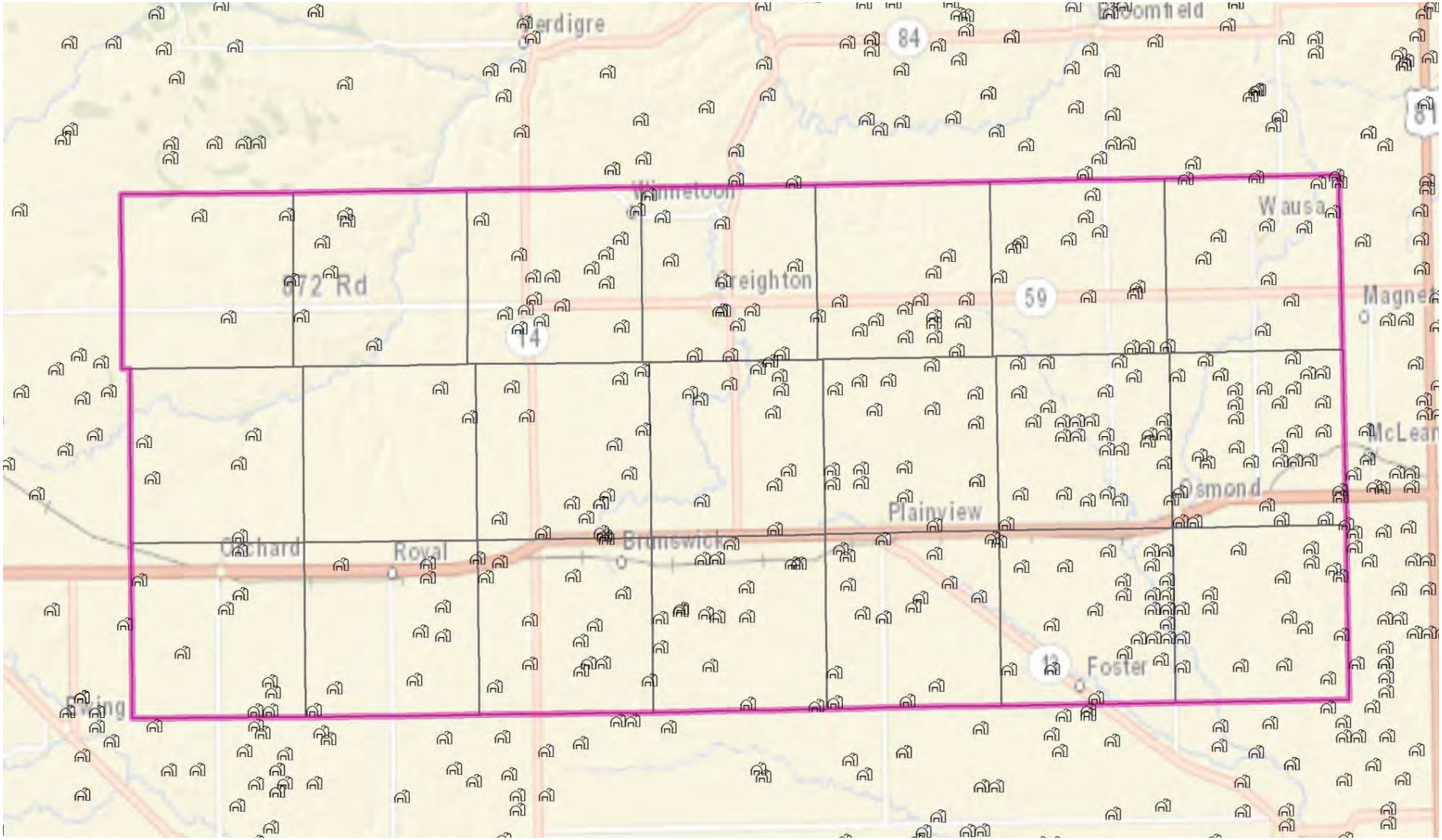
Thickness of Glacial Till



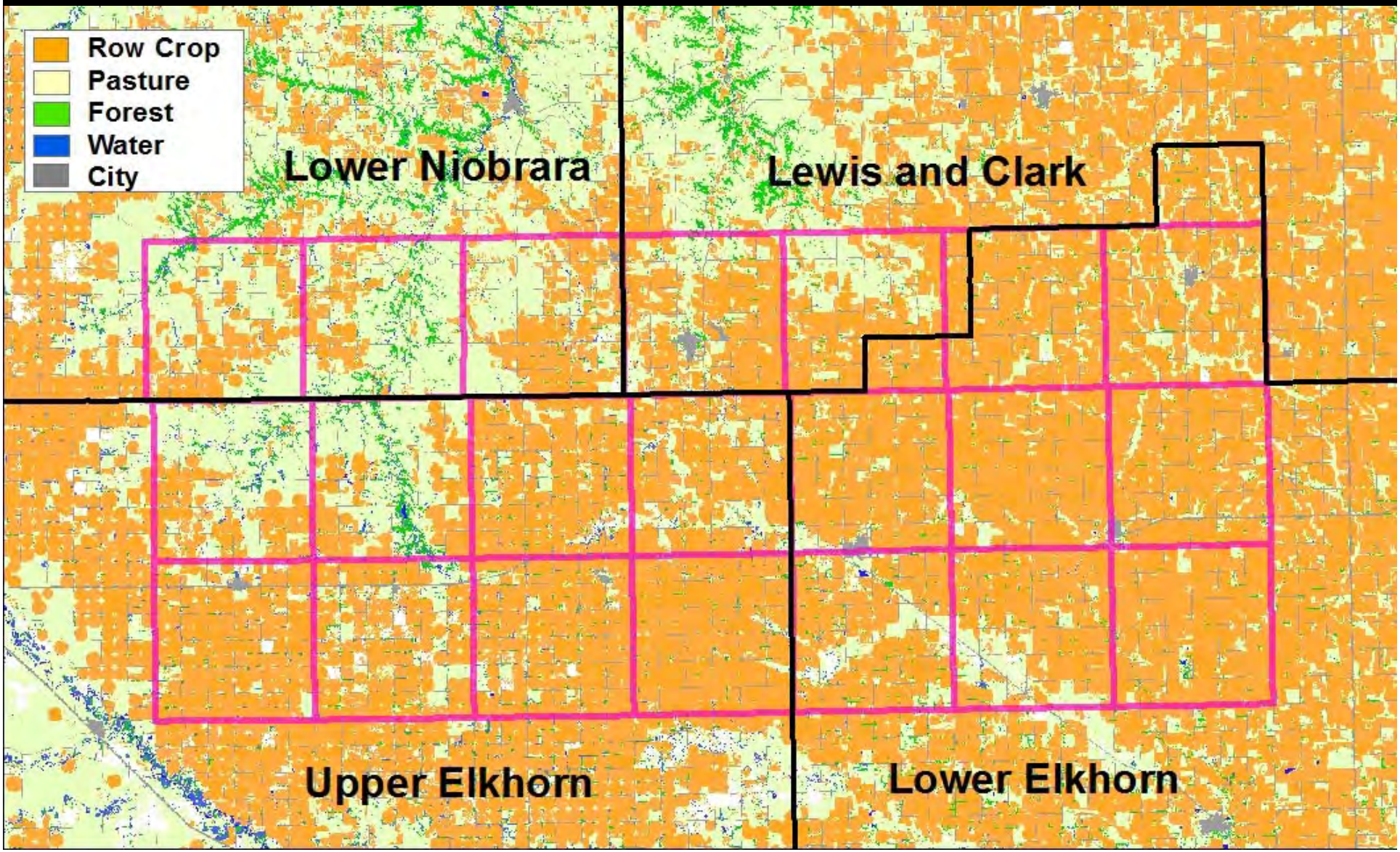
Sand Percent



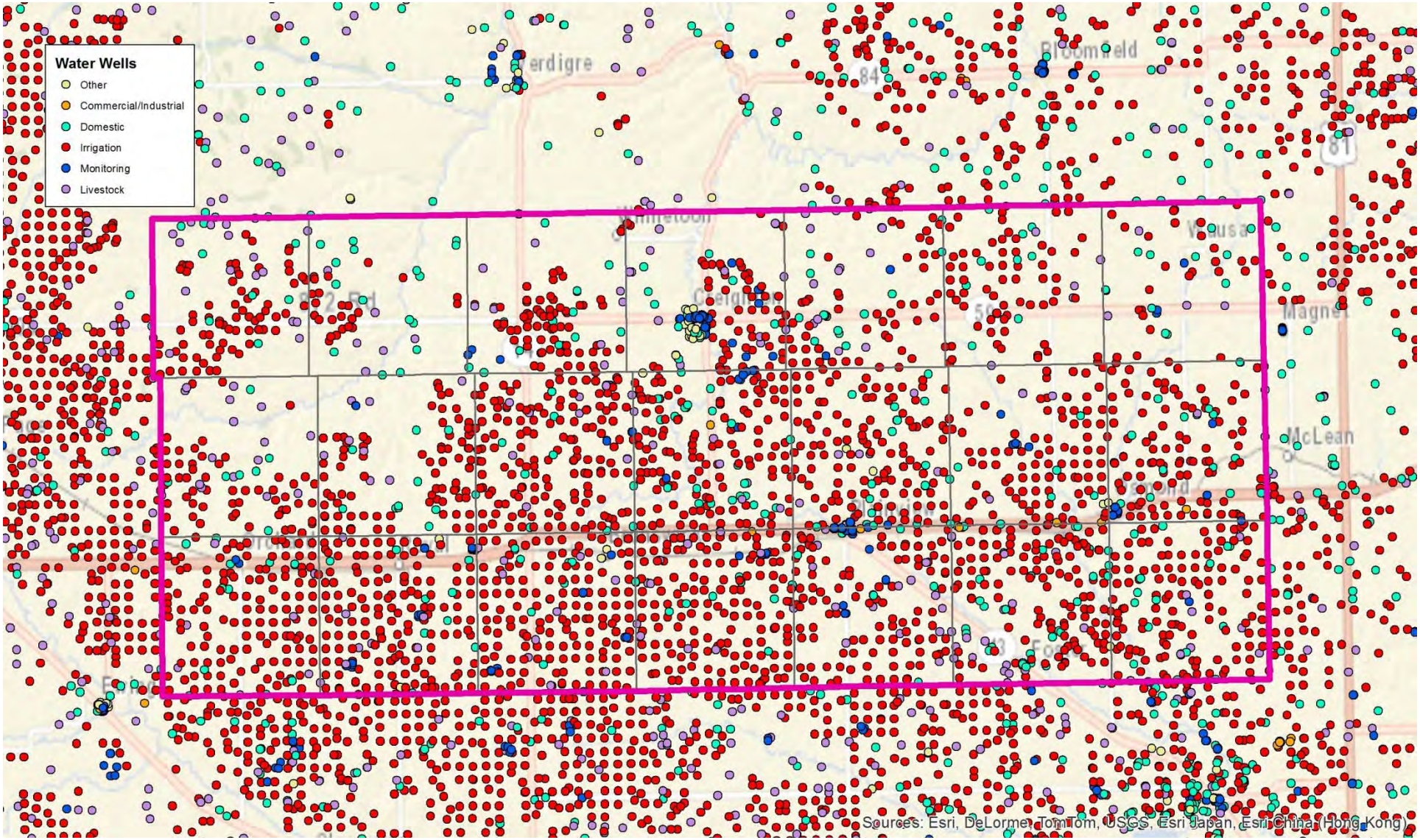
Livestock Waste Control Facilities



Land Use


Row Crop
Pasture
Forest
Water
City
Lower Niobrara
Lewis and Clark
Upper Elkhorn
Lower Elkhorn

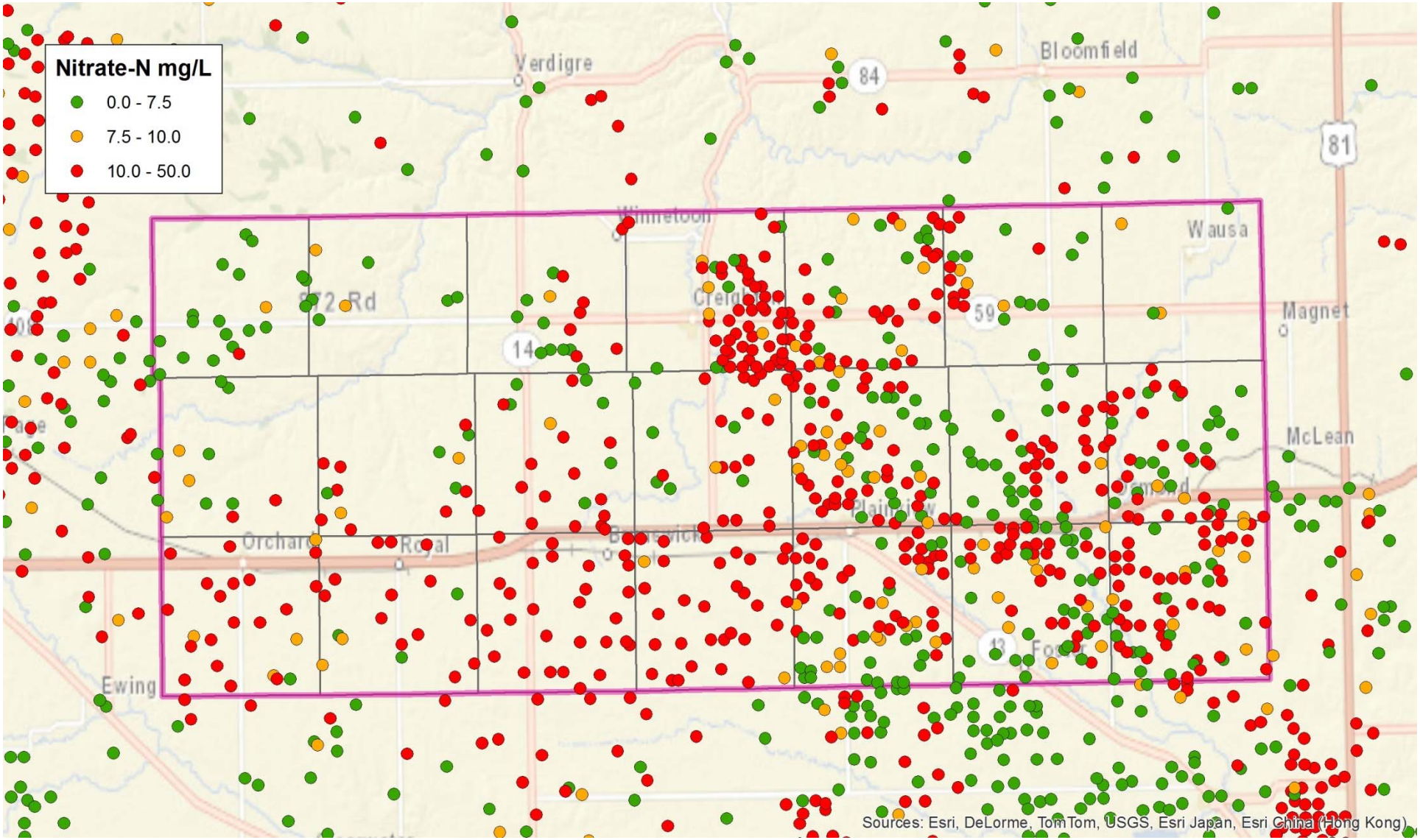
Registered Wells



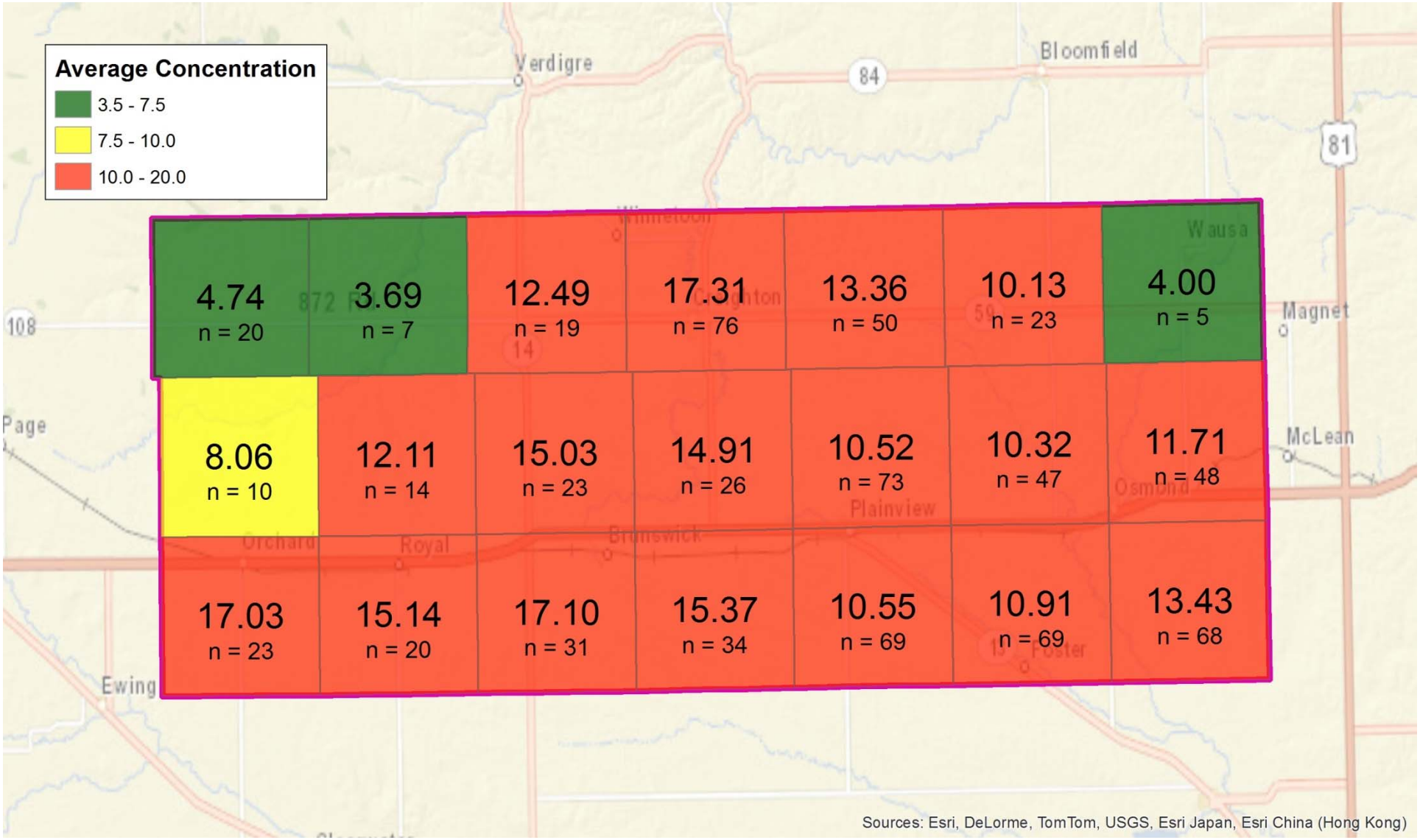
Irrigation is Common

Nitrate Contamination

- (most recent analysis)

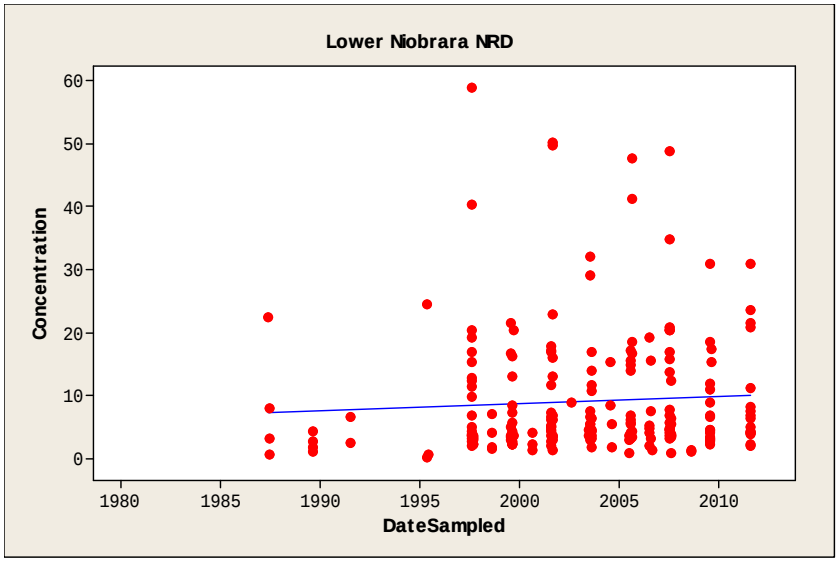


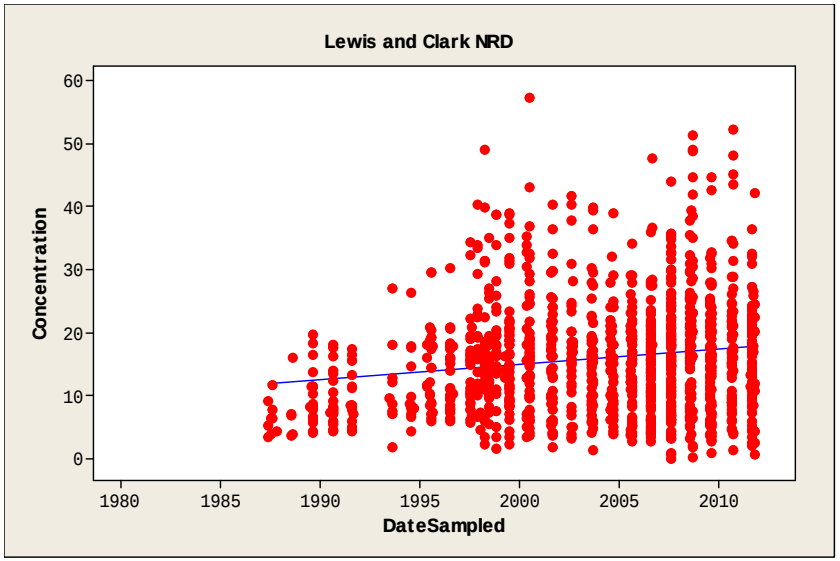
Average Nitrate Concentrations

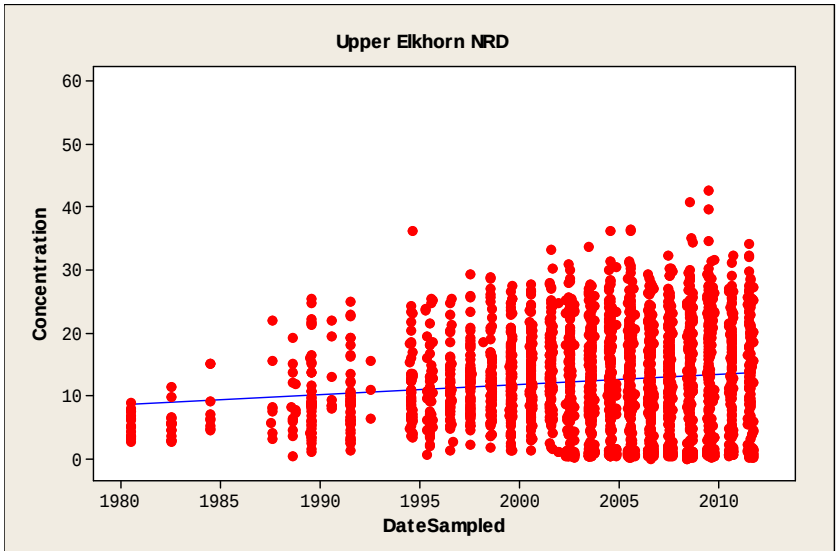


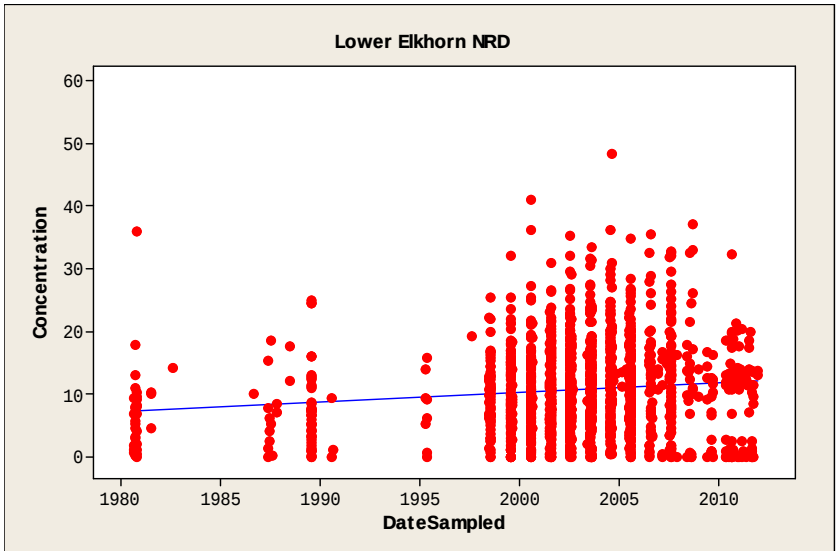
All Bazile Wells Sampled by NRD

- (all wells sampled, 1980 – 2011)



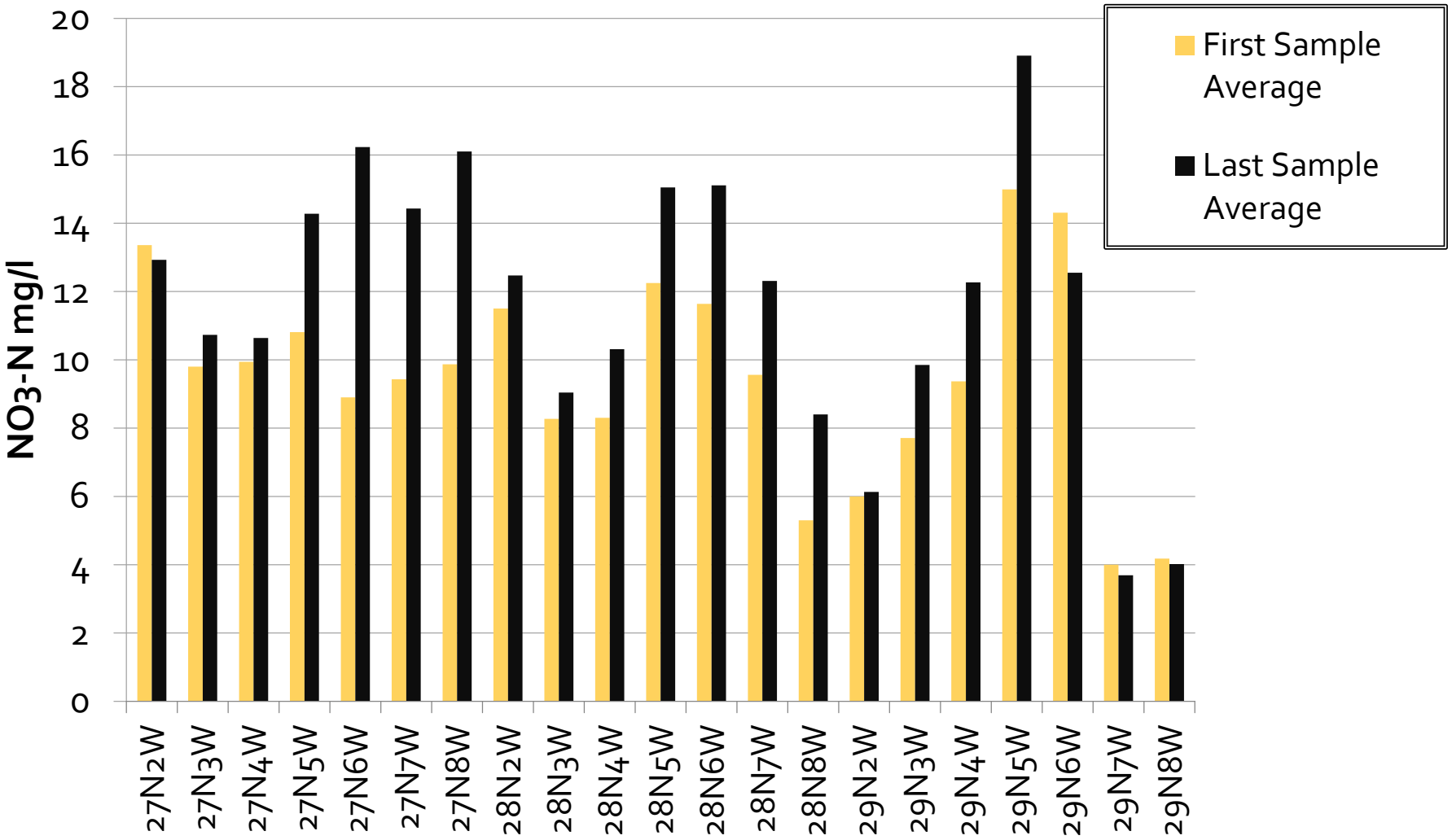






Nitrate Contamination Over Time

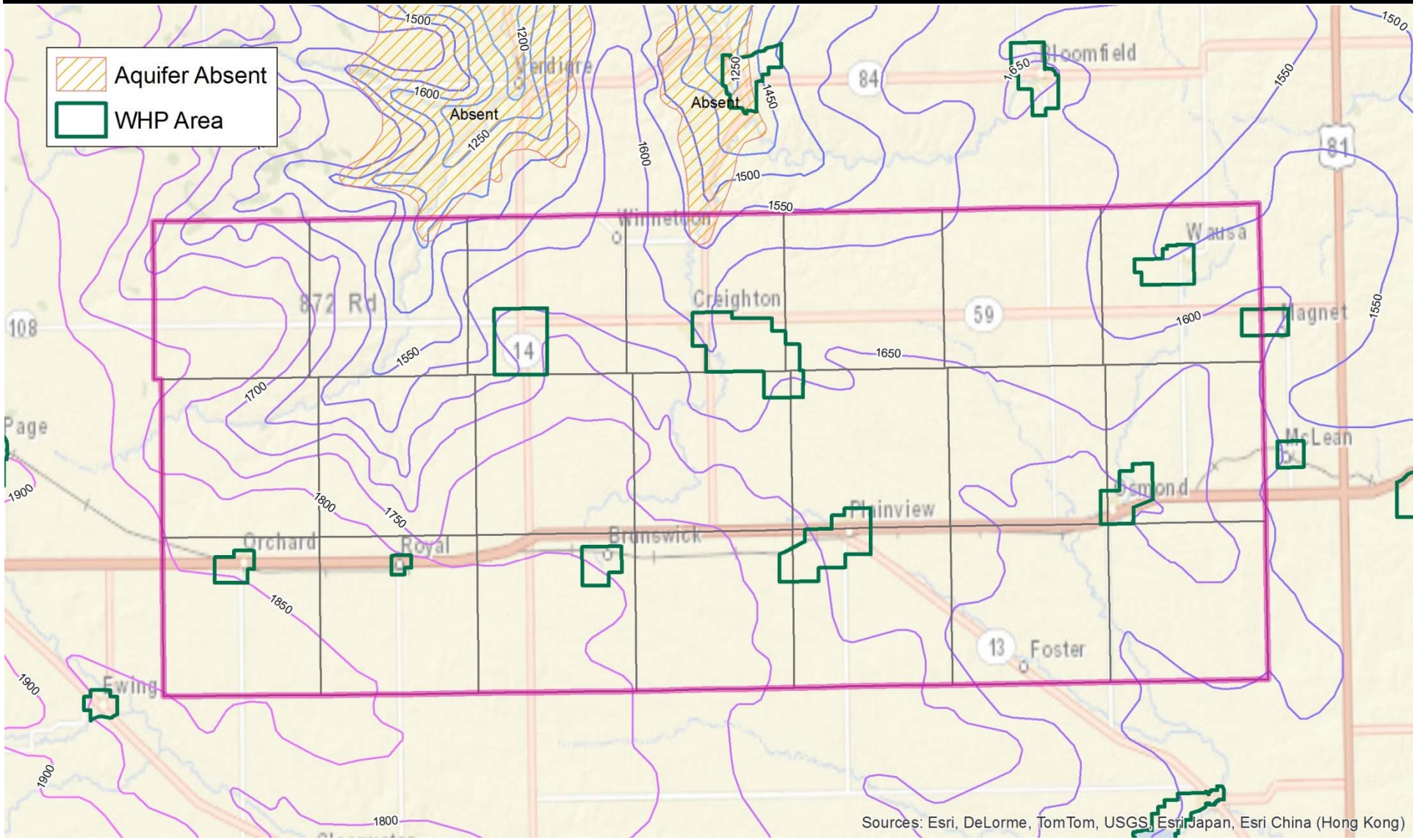
- (by Township)



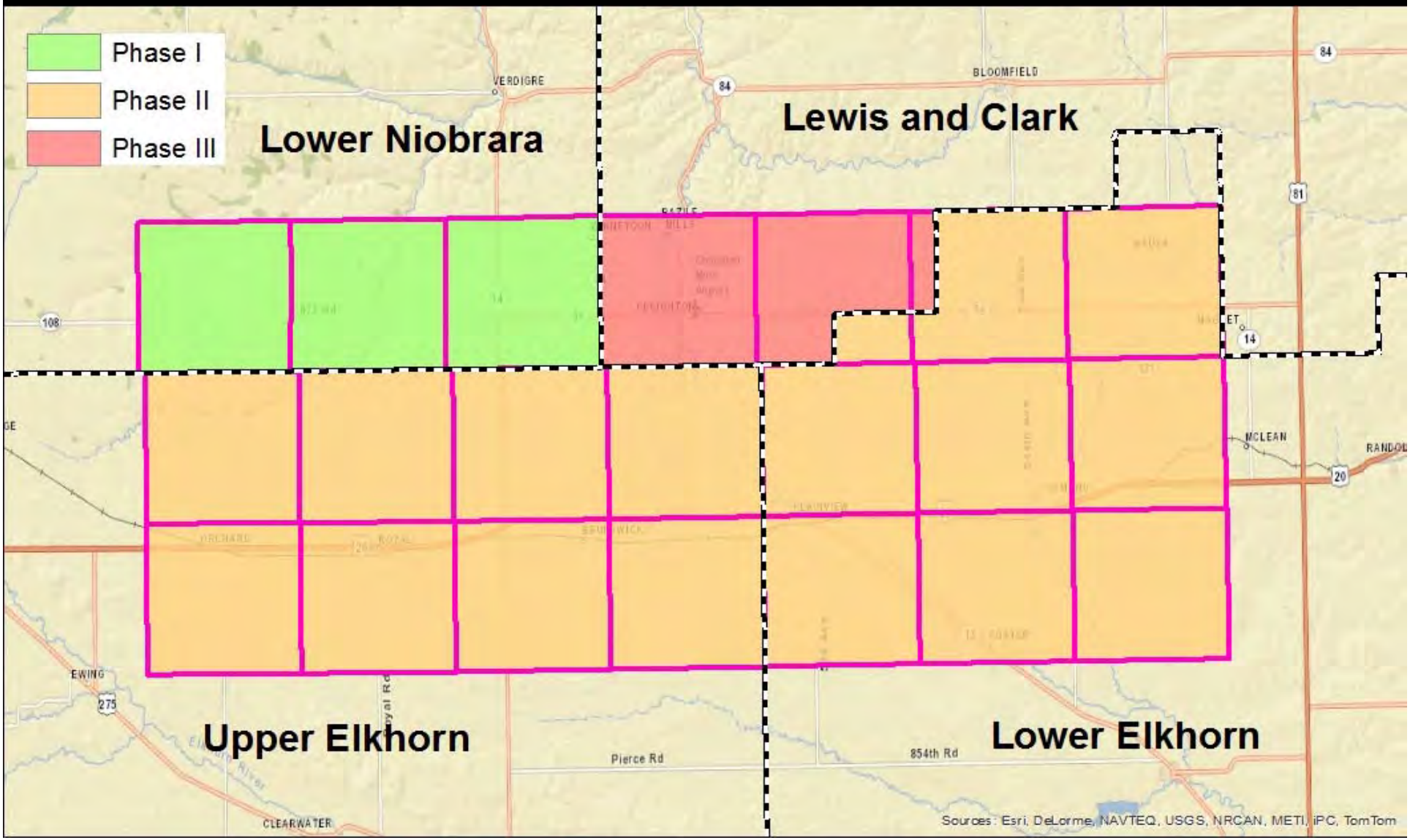
Nitrates in Drinking Water - Treatment Cost

PWS	Popula-tion	AO	Treatment	Cost	
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		Replace wells, mains, and meters	SRF 2014 Request	$ 594,839
Orchard	391	AO	Place "Bad well" (9.83 ppm) on emergency use		
Osmond	796	near 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**	

Wellhead Protection Areas



GWMP Phase Areas



GWMP Phase Change Triggers

District	Phase I	Phase II	Phase III
Lower Niobrara	Nitrates 0-7.5 ppm	50% of wells > 7.5 ppm	after 4 yrs in Phase II, 50% of wells > 9.5 ppm
Upper Elkhorn	Nitrates 0-7.5 ppm	> 7.5 -9.5 ppm	> 9.5 ppm
Lower Elkhorn	Nitrates 0-5.0 ppm	5.0-9.0 ppm	> 9 ppm
Lewis & Clark	Nitrates 0-5.0 ppm	5.0 ppm for 2 yrs	after 3 yrs 50% of wells > 9 ppm

Lower Niobrara

Currently in Phase I

- Nitrogen Management once every four years
- Fall applications discouraged
- Water analysis every four years
- Permit for wells > 50 gpm
- Deep soil sampling encouraged

Upper Elkhorn

Currently in Phase II

- Nitrogen applicator education every four years
- Deep soil sampling
- Annual Report: nutrient, pest and irrigation mgmt
- Encourage manure credit
- No application before 11/1
- Encourage monitoring equipment

Lower Elkhorn

Currently in Phase II

- Mandatory Certification
- Deep soil testing for corn-corn, water
- Annual fertilizer report

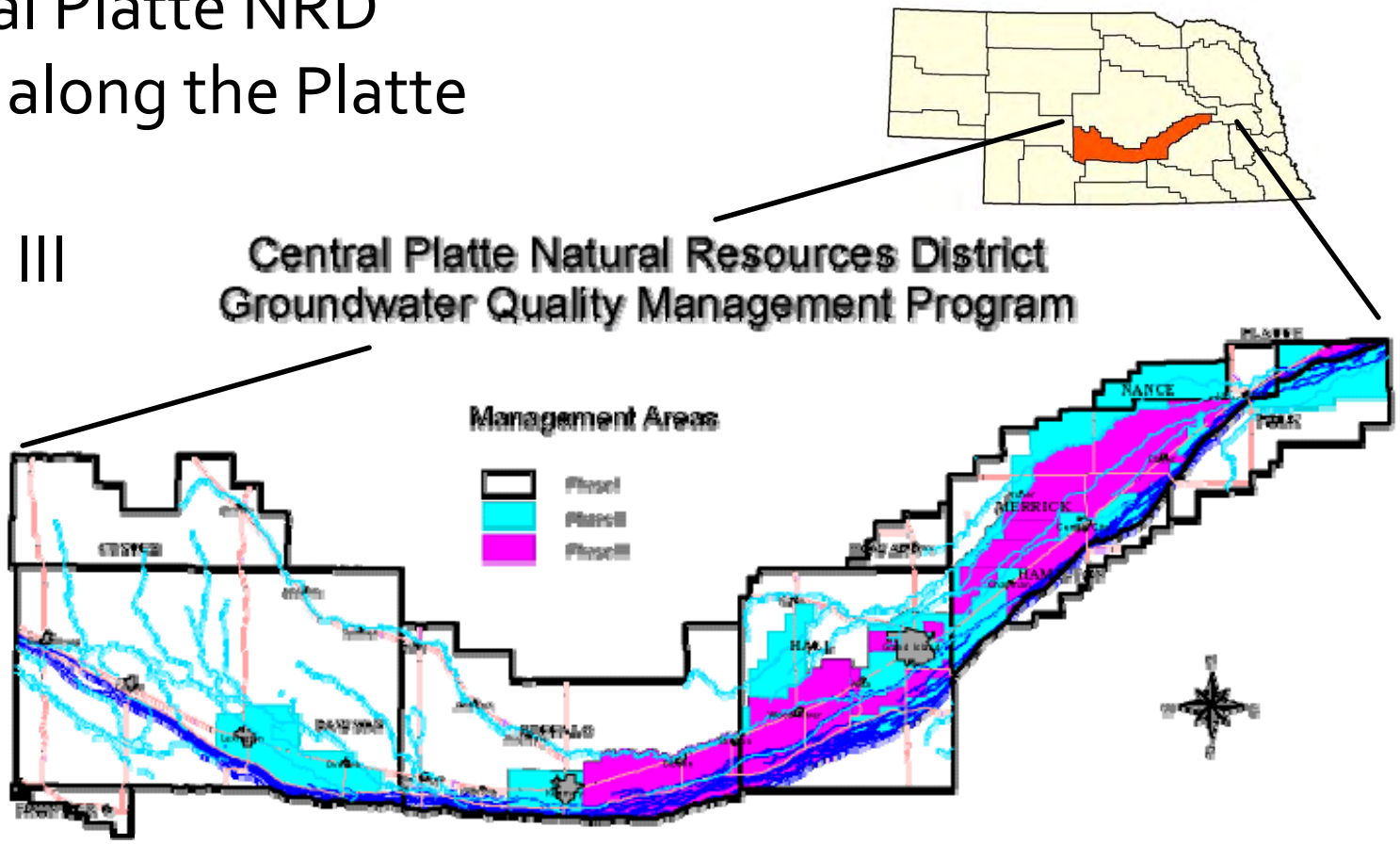
Lewis and Clark

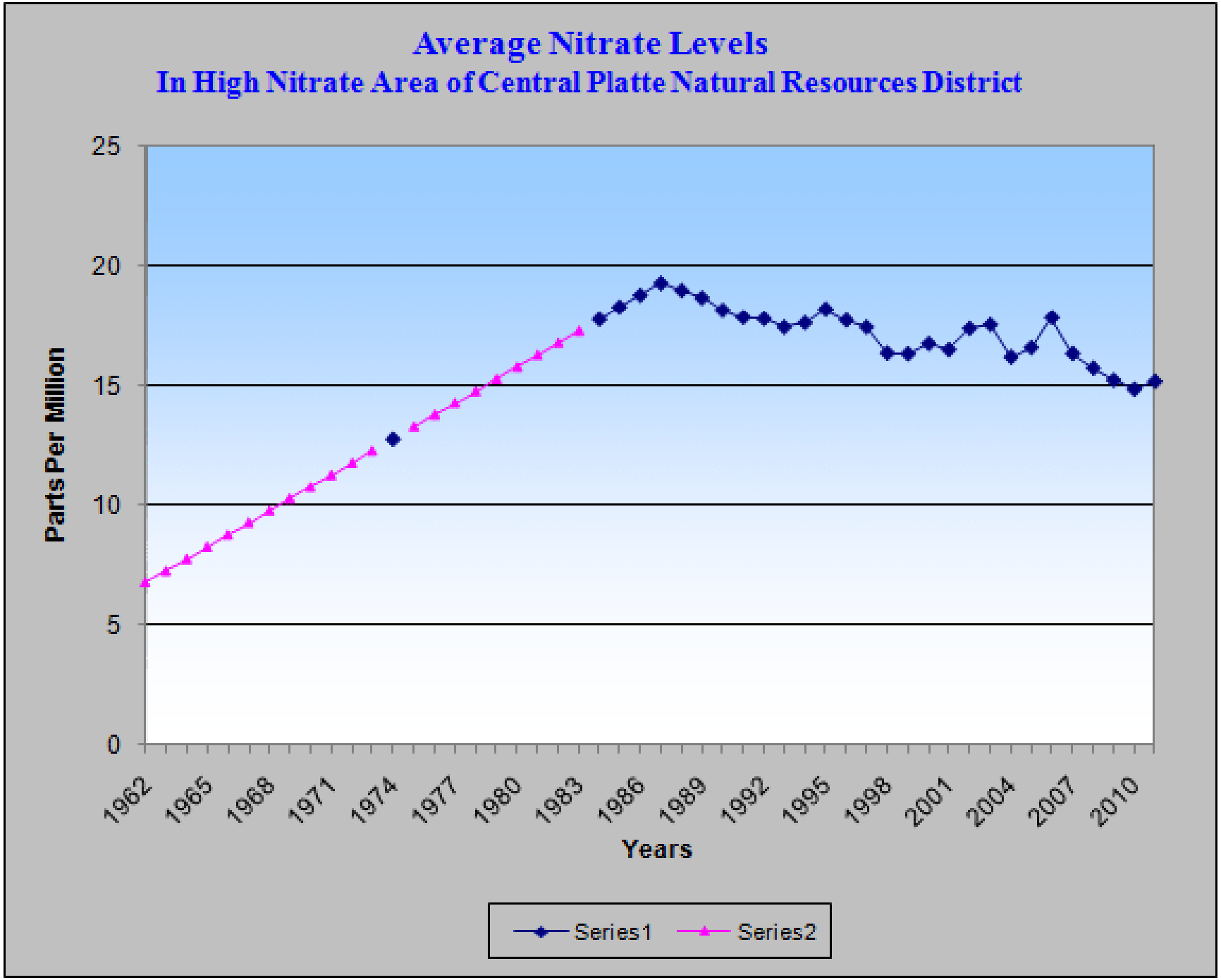
Currently in Phase III

- Nitrogen Applicator Education (every 4 years)
- Deep Soil testing
  - Annual corn-corn, biannual bean-corn
- Water analysis changes to every two years
- No fall/winter application
- Spring application >100 lbs/acre encouraged to split

Can Improvements be Achieved?

- Central Platte NRD
- Areas along the Platte River
- Phase III




Average Nitrate Levels
In High Nitrate Area of Central Platte Natural Resources District
Parts Per Million
25
20
15
10
5
0
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007
2010
Years
Series1
Series2

Groundwater Planning

- In July 2013, NDEQ was successful in petitioning EPA Headquarters to allow planning and project implementation for groundwater areas **when One or More Public Water Supplies in the area are**:
  - Treating for Nitrates
  - Under Administrative Order for Nitrates
  - Required to conduct quarterly sampling for Nitrates.

Community Based Planning Process

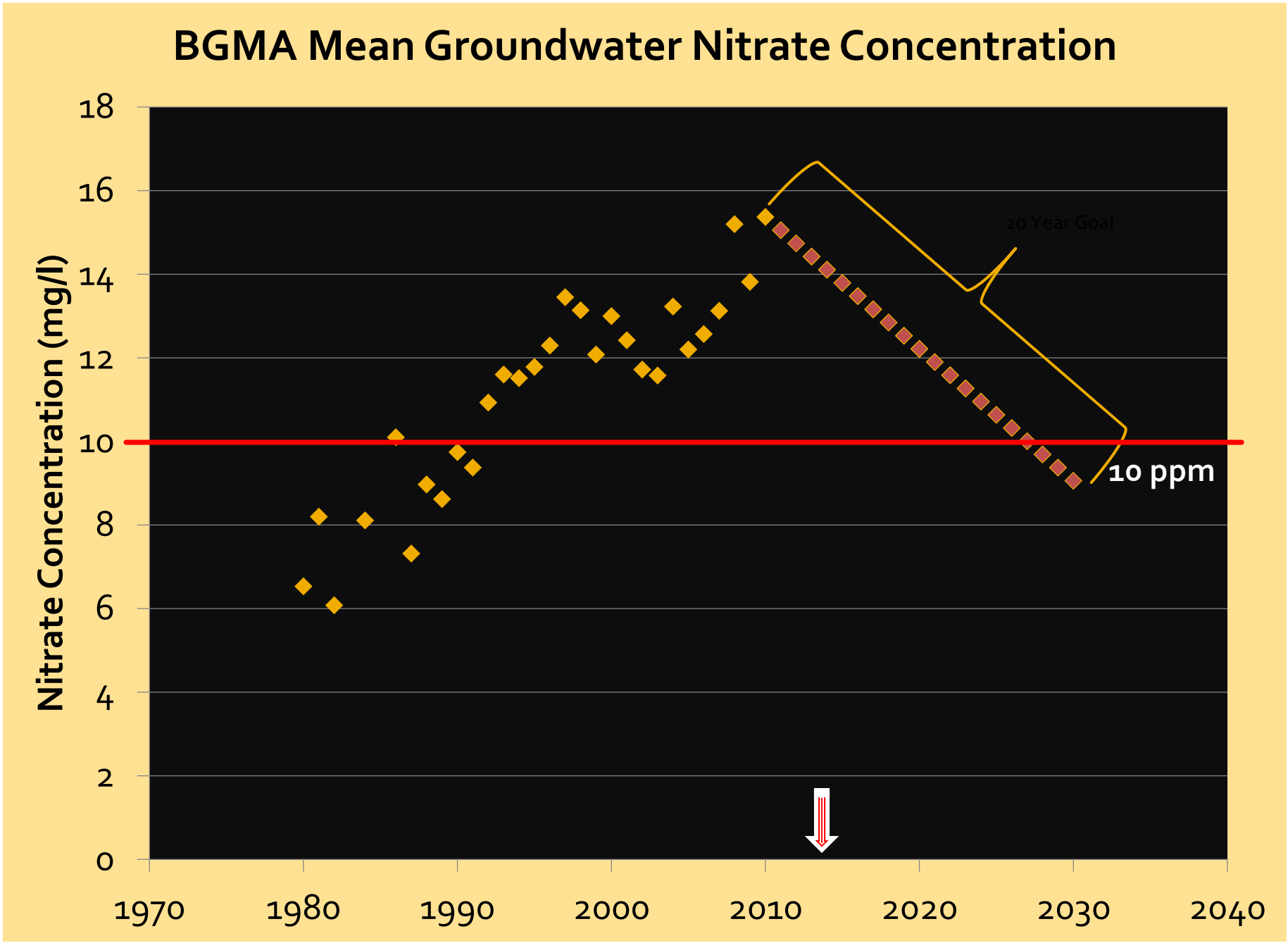
Bazile GWMA Plan Goals

SHORT TERM – 5 YEARS

- Educate 100% stakeholders in the area
- Reduce BGMA Nitrate Concentration by 3.2 mg/l
- Reduce nitrate concentrations below 10 mg/l in community wellhead protection areas

LONG TERM – 20 YEARS

- Reduce average BGMA nitrate concentration to below 10 mg/l
- Maintain an adequate and sustainable supply of GW for all beneficial uses
- Ensure GW contamination doesn't impair surface water beneficial uses


BGMA Mean Groundwater Nitrate Concentration
Nitrate Concentration (mg/l)
18
16
14
12
10
8
6
4
2
0
1970
1980
1990
2000
2010
2020
2030
2040
20 Year Goal
10 ppm

Actions and Tasks

- **Education**
  - mailings, new releases, meetings, workshops, demonstration plots, WHP, 1 on 1 discussions, etc.
- **Monitoring**
  - Irrigation water, soil, crop tissue and residue, flow meters, soil moisture sensors, vadose zone sampling
- **Nitrogen Management**
  - Documentation and decision making with: application timing, split applications, fertigation, nitrification inhibitors, variable application, nitrogen budgeting, subsurface irrigation & well rehabilitation

Where we are today

- Bazile GWMA Plan has been adopted by all four NRD Boards and is approved by NDEQ, EPA-319 Hdqtrs, & EPA Region 7.
- 319 grant and NET grant application to hire a coordinator and implement BMPs
- NRDs have pledged funds to match grants


Lower
Niobrara
Natural Resources District


LEWIS & CLARK
NRD
NATURAL
RESOURCES
DISTRICT


Nebraska
DEQ


Upper Elkhorn
Natural Resources District


LOWER ELKHORN
NRD
NORFOLK
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Questions?