

Nebraska Water Quality

Issues, Impacts, & Conservation



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School of Natural Resources

IN OUR GRIT, OUR GLORY™



Who Manages/Monitors/Makes Rules for Water in Nebraska?

Who Manages Nebraska's Water?

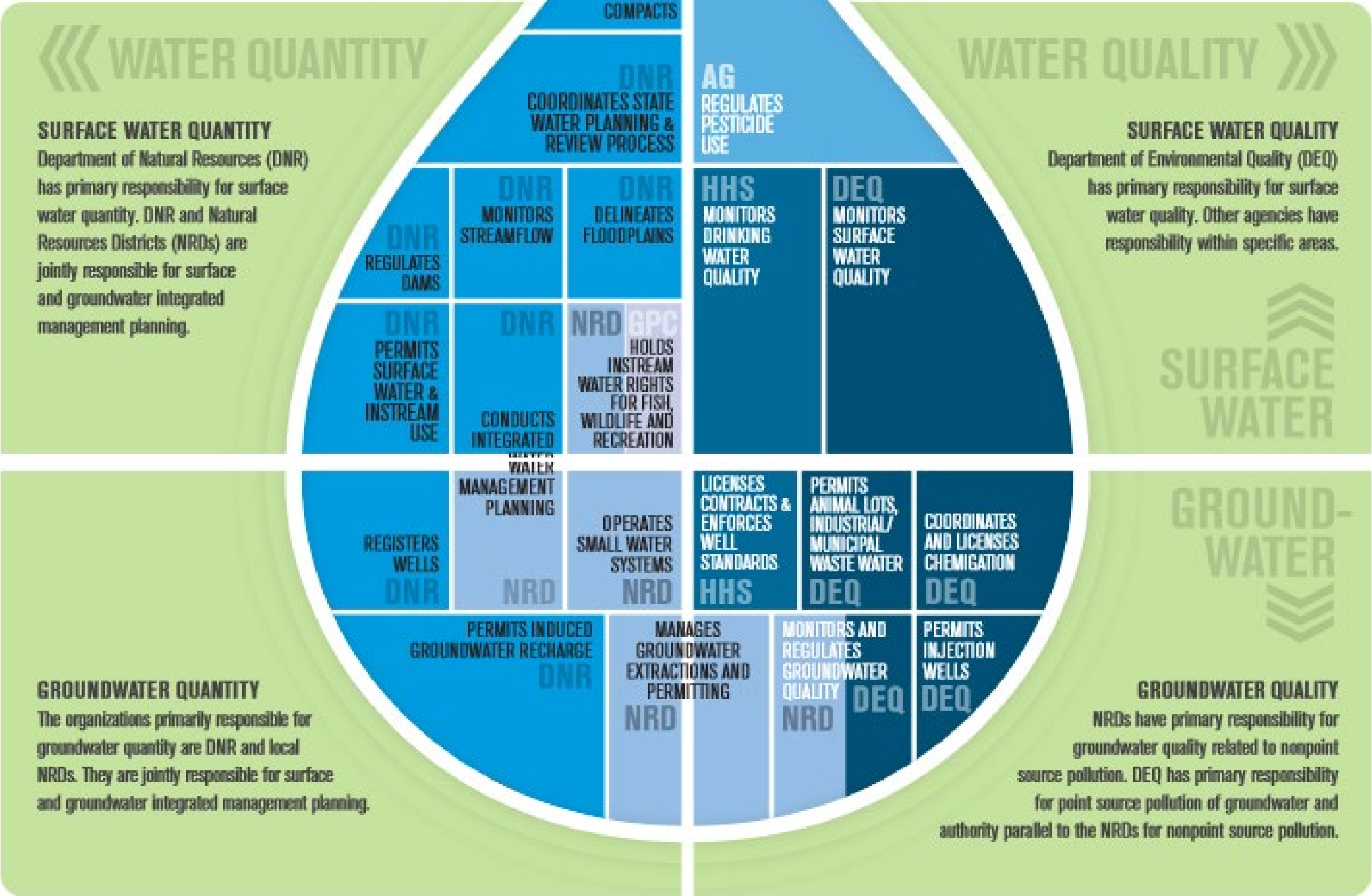


Image courtesy of Nebraska DNR



Surface Water Quality in Nebraska

Pollution Sources

Point Source

Nonpoint Source



Ambient Stream Monitoring

- 100 sites statewide
- Beneficial Use Designations
 - Primary Contact Recreation
 - Aquatic Life – Coldwater, Warmwater
 - Water Supply – Public Drinking Water, Agriculture, Industrial
 - Aesthetics



Ambient Stream Monitoring

- Monitoring
 - 12 months per year
 - TSS, chloride, ammonia, nitrate+nitrite, kjeldahl nitrogen, total phosphorus, water temperature, dissolved oxygen(DO), pH, conductivity, turbidity, stream discharge
 - monthly pesticides, May-Sept.
 - Atrazine, acetochlor, metolachlor
 - quarterly metals, Jan, Apr, July, Oct,
 - Se, Hg, Na, Mg, Ca As, Ca, Cr, Cu, Pb, Ni, Ag, Zn

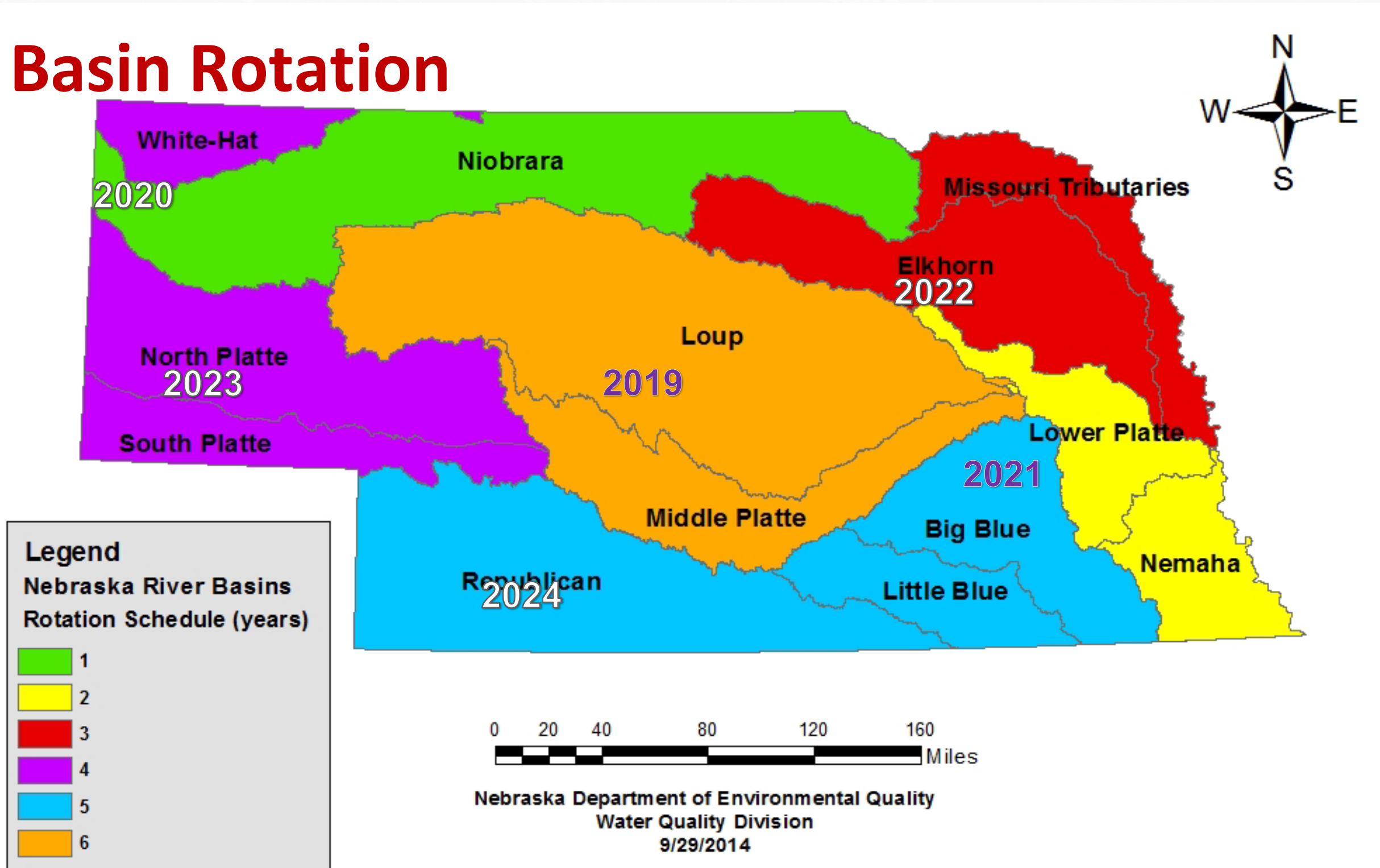


Basin Rotation Monitoring

- 35-45 sites per year – 6 year schedule
- Weekly, May –Sept (22 weeks)
 - TSS, chloride, ammonia, nitrate+nitrite, kjeldahl nitrogen, total phosphorus
 - water temperature, dissolved oxygen (DO), pH, conductivity, turbidity, stream discharge
- weekly pesticides, May-June
 - Atrazine, acetochlor, metolachlor
- E. coli

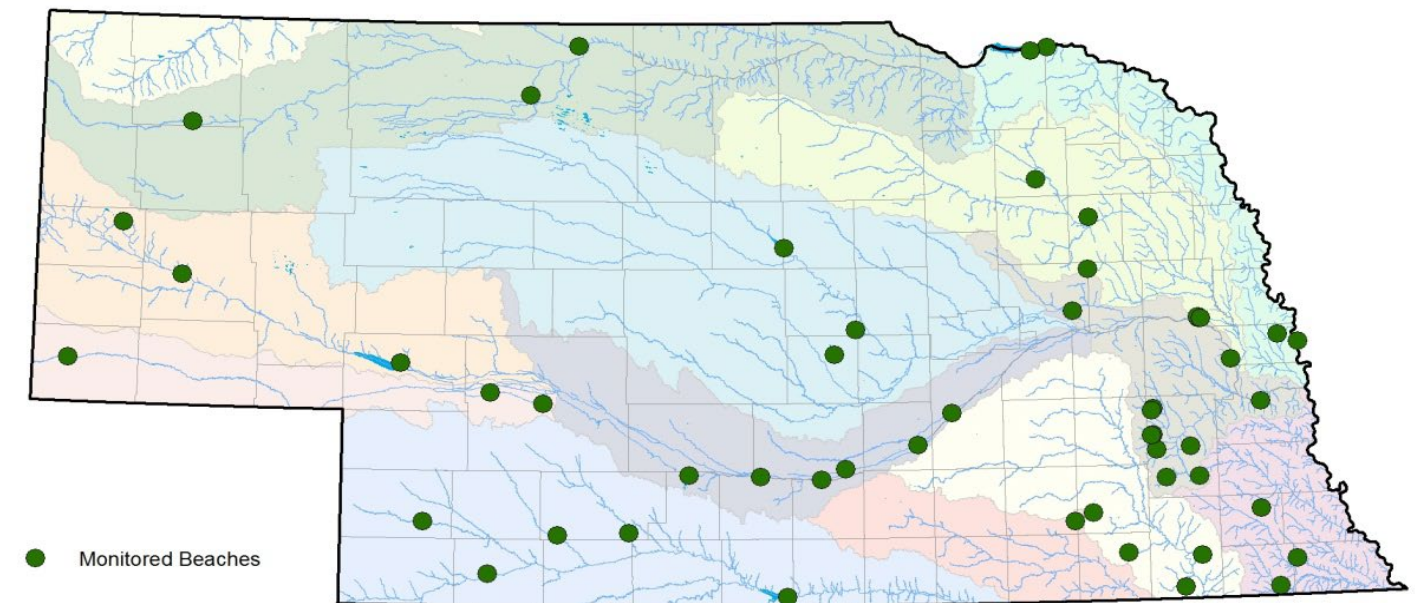
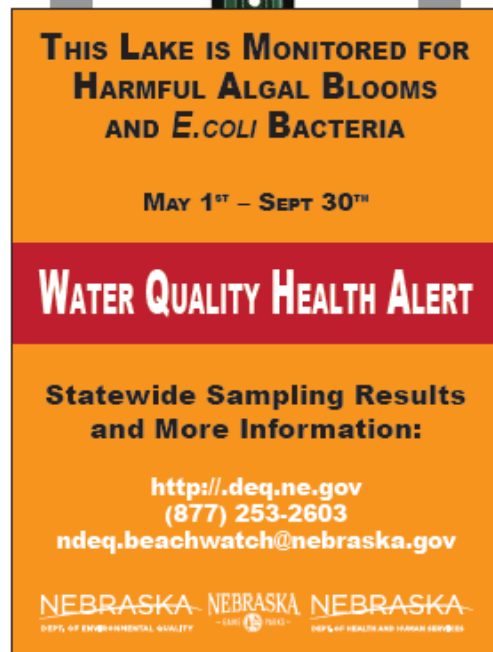


Basin Rotation



Public Beach Monitoring

- Public Beaches – 51 sites
- Weekly, May 1 – Sept. 30 (22 weeks)
- Bacteria, microcystin
- Weekly results posted <http://dee.ne.gov>

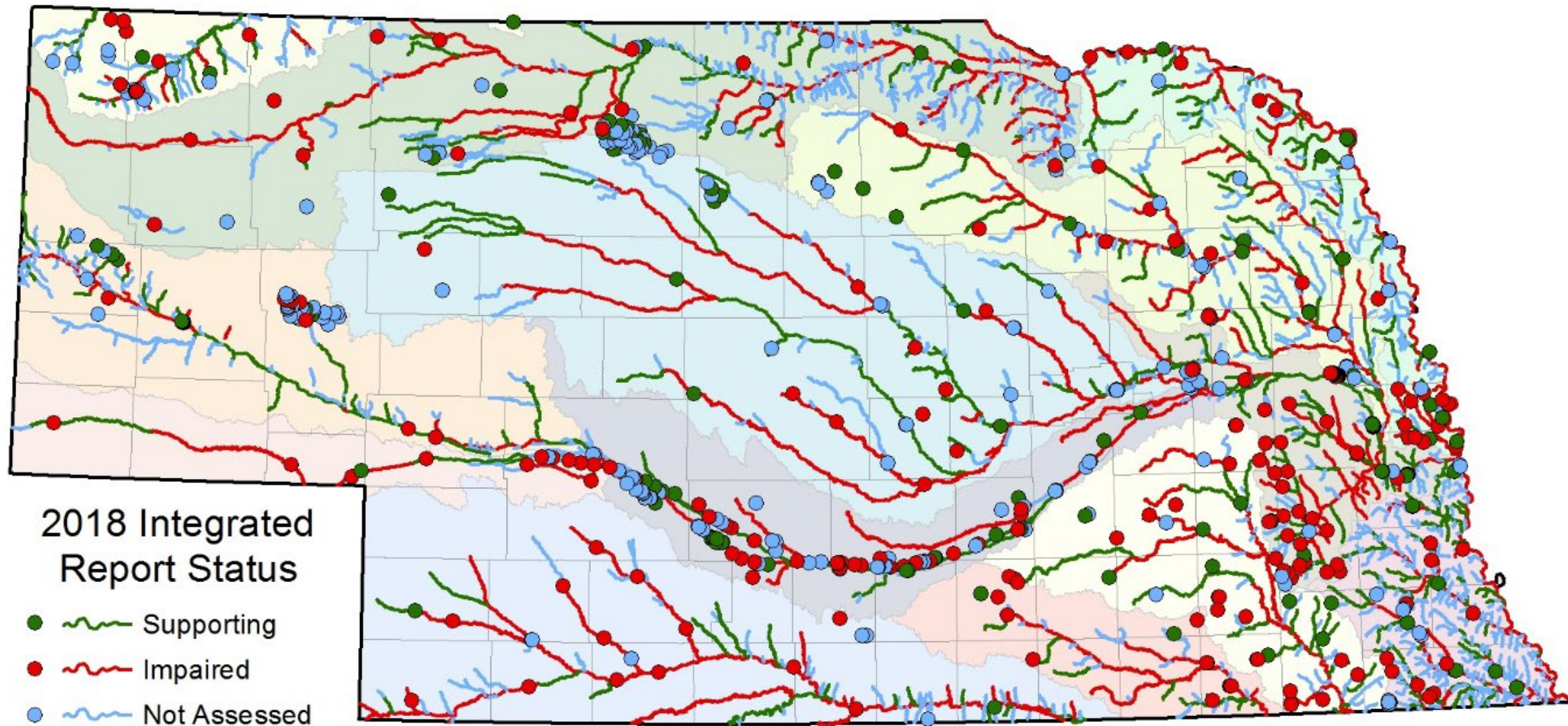


Other Monitoring

- **Ambient Lake**
 - 45 lakes
 - Monthly, May – Sept.
- **Fish Tissue**
 - 30-60 lakes and streams
 - Typically 50-120 fish samples
 - Basis of fish consumption warnings
- **Stream Biological ~ 30-40 sites**
 - Habitat assessment
 - Bugs, fish
 - Field parameters



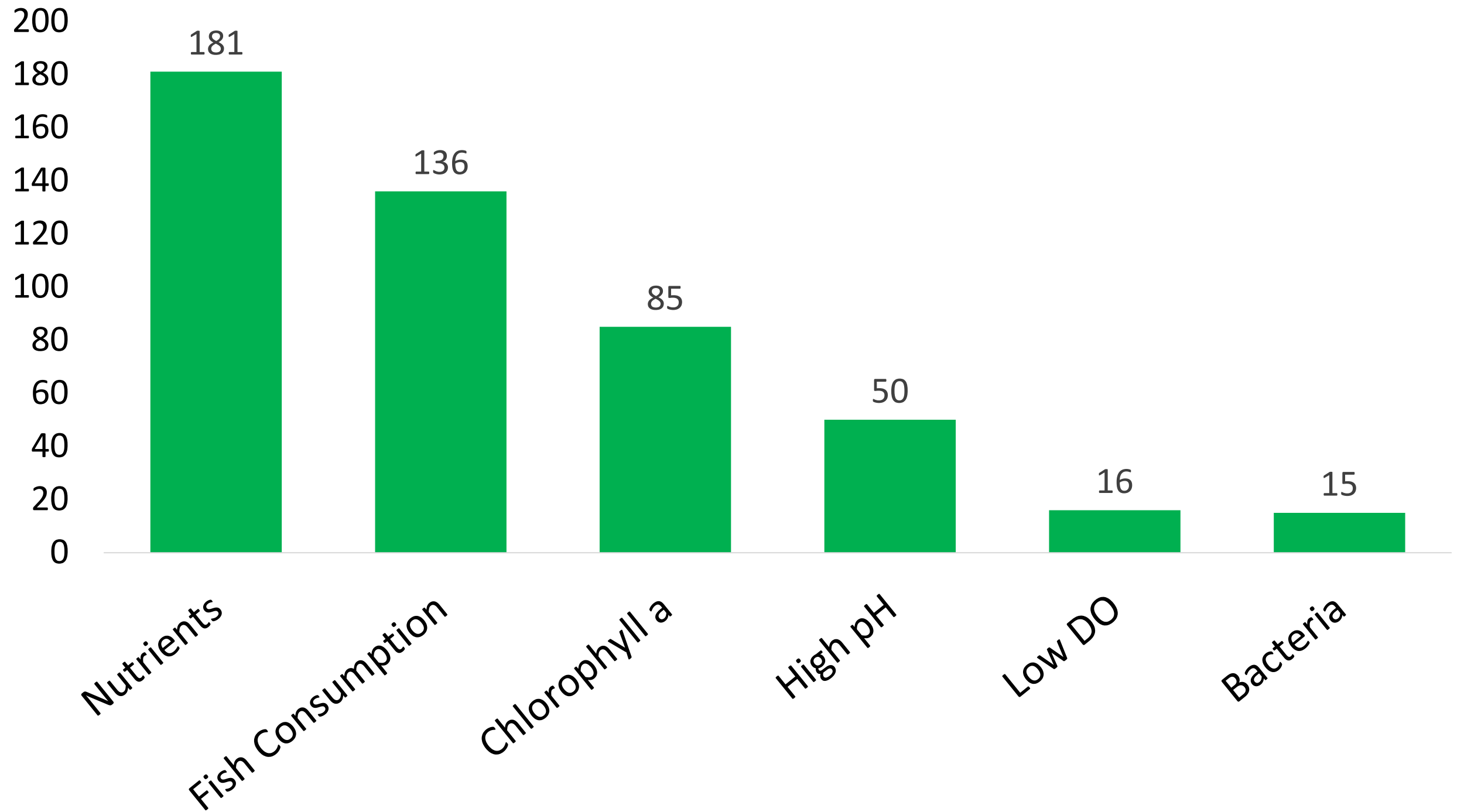
Integrated Report



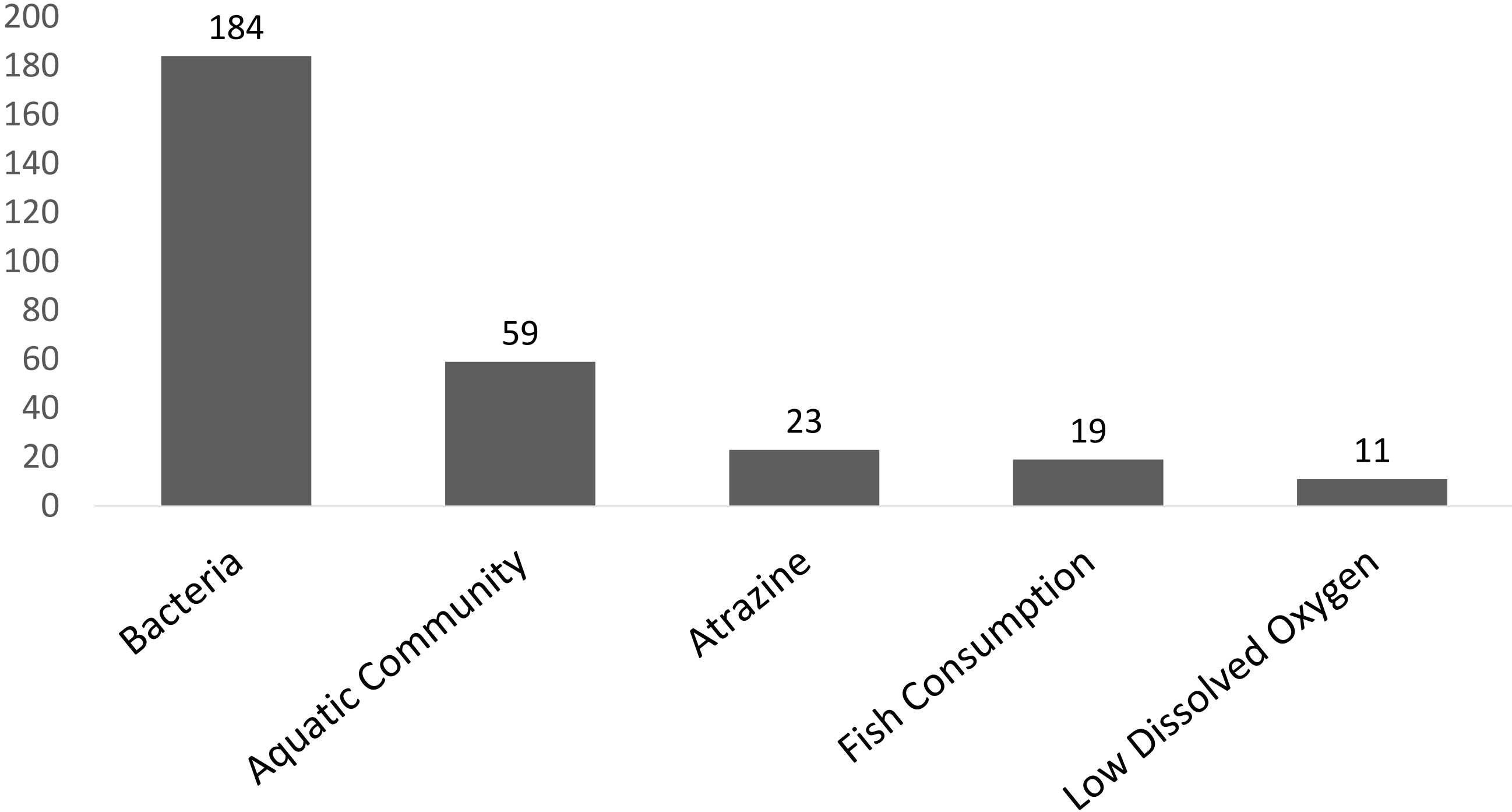
Next Integrated Report to be submitted to EPA April 1, 2024



Surface Water Quality - 2018 Most Common **Lake** Impairments



Surface Water Quality - 2018 Most Common **Stream** Impairments



TMDL – Total Maximum Daily Load

- **Pollutant Loads from**
 - Point sources
 - Nonpoint sources
 - Natural/background

Permit updates/revisions – NPDES permits

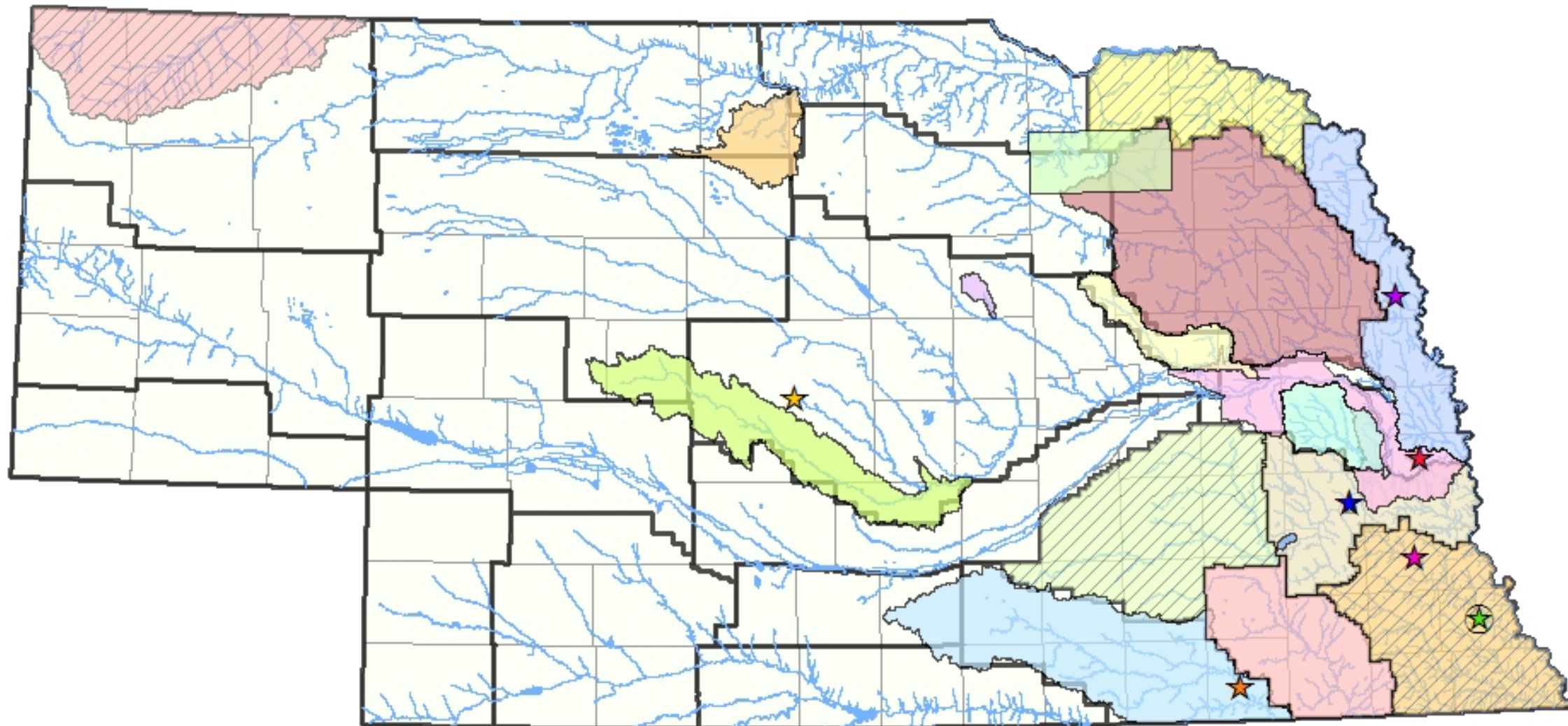
- Reissued every 5 years

Watershed/Basin Management Plans

- Incorporate TMDL
- Nonpoint source pollution focused
- Community Based Planning



NRDs Working on Protecting Groundwater & Surface Water with Long-Term Watershed Management Plans



Active Plans

- Auburn
- Bazile Groundwater Management Area
- Clear Creek/Pibel Lake
- Conestoga Lake
- Long Pine Creek
- LBBNRD
- LBNRD
- LENRD
- LPRCA
- LPSNRD
- PMRNRD
- Shell Creek
- South Loup River
- Wahoo Creek

Planning In Progress

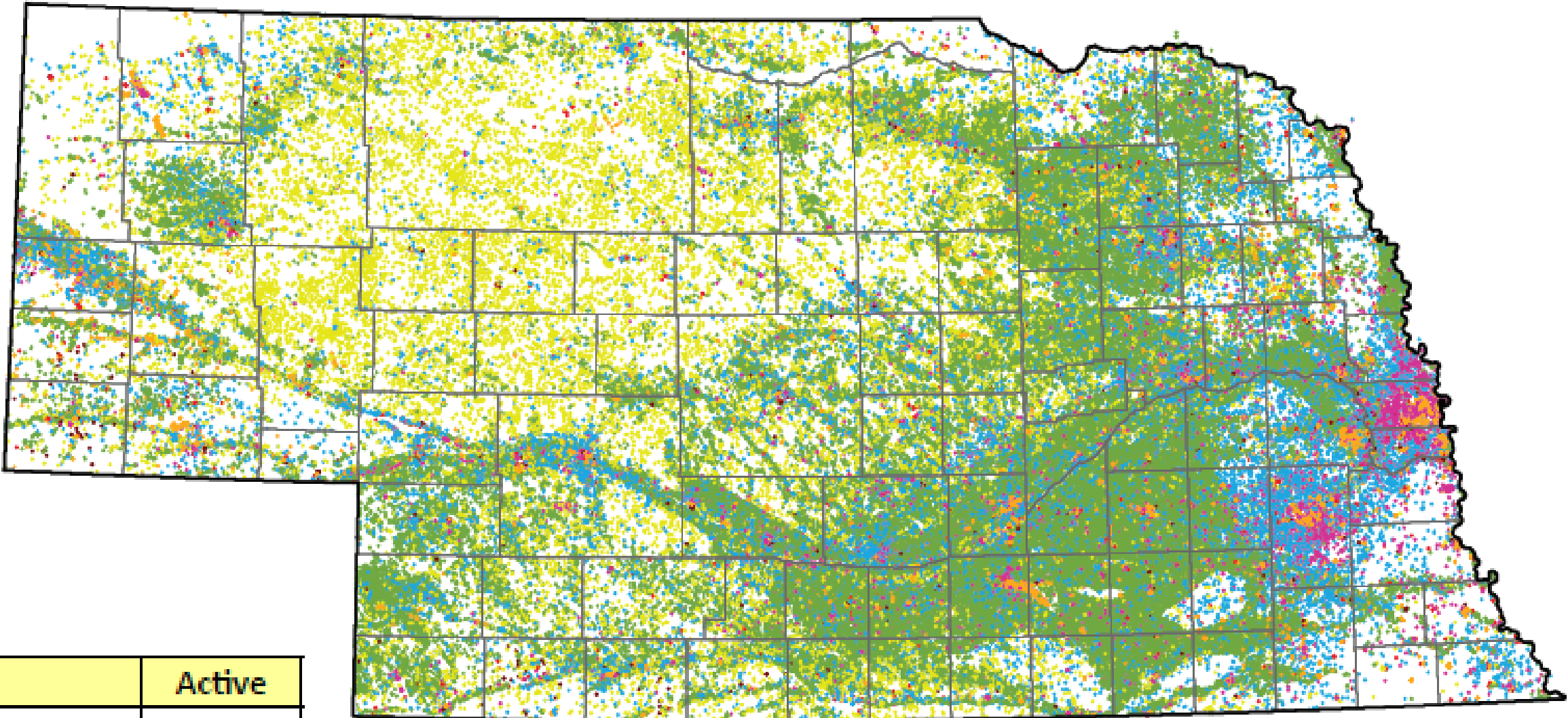
- Broken Bow
- Fairbury
- Springfield
- Syracuse
- Tekamah
- Waverly
- L&CNRD
- Nemaha River Basin
- UBBNRD
- White River/Hat Creek



Groundwater Quality in Nebraska



Ground Water Quality

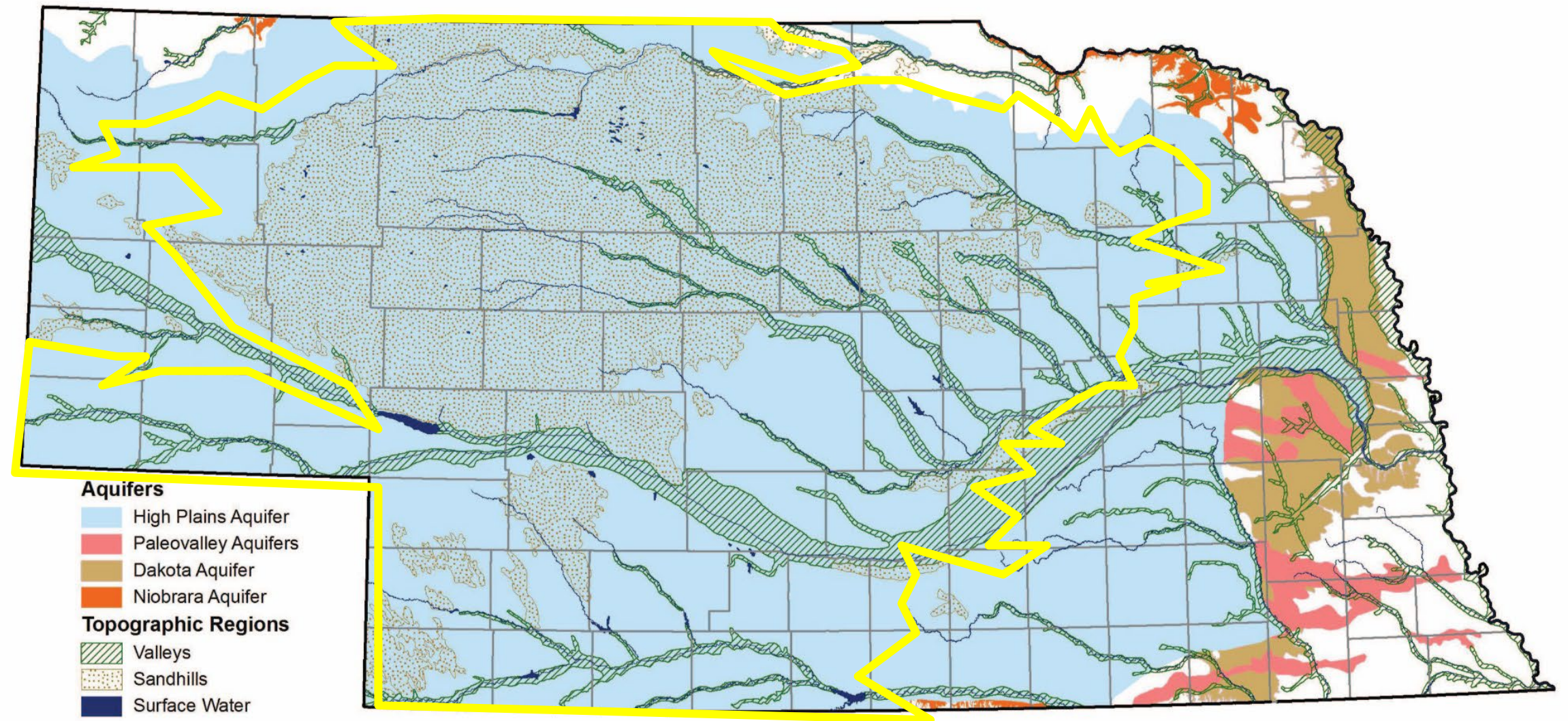


	Water Use	Active
●	Irrigation	96,265
●	Domestic	31,661
●	Livestock	22,048
●	Monitoring (groundwater quality)	16,780
●	Public Water Supply	3,029
●	Commercial/Industrial	1,769
●	Other	14,103
	TOTAL	185,628

Source: NDEE “2019 Nebraska Groundwater Quality Monitoring Report” Nov. 2019

Ground Water Quality – Where does Ground Water come from?

Important Aquifers and Topographic Regions of Nebraska



Source: 2009 Nebraska Statewide Groundwater-Level Monitoring Report Nebraska Water Supply Paper 76. Conservation Survey Division, School of Natural Resources, University of Nebraska-Lincoln.



Who Monitors Groundwater in Nebraska?

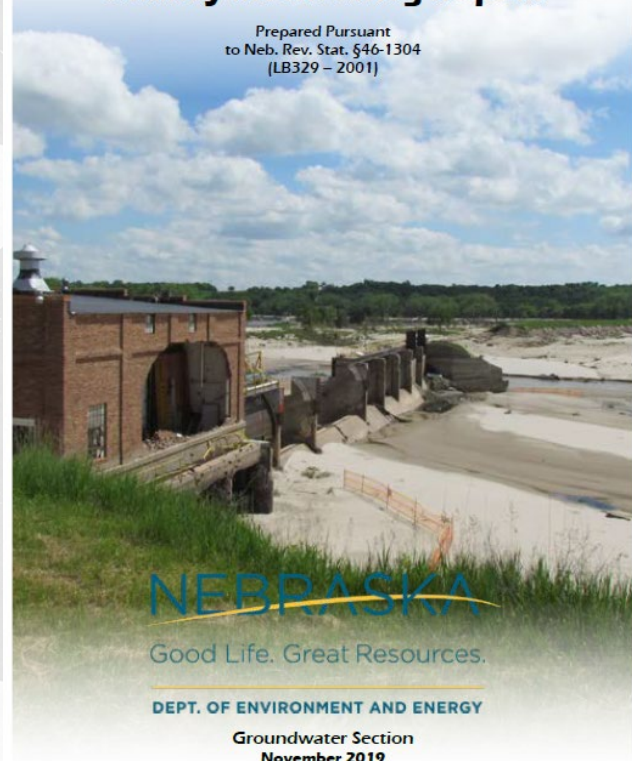
- Natural Resources Districts (23)
- Nebraska Department of Agriculture
- Nebraska Department of Environment and Energy
- Nebraska Department of Health and Human Services
- Public Water Suppliers
- University of Nebraska-Lincoln
- United States Geological Survey



Ground Water Quality – Quality- Assessed **Agrichemical** Contaminant **Database** for Nebraska Groundwater

2019 Nebraska Groundwater Quality Monitoring Report

Prepared Pursuant
to Neb. Rev. Stat. §46-1304
(LB329 – 2001)



Provides Groundwater Monitoring Results for Agricultural Compounds in Nebraska to the public.

Provides an indicator of the methodologies used in sampling and analysis for each of the results.

Types of Wells Sampled

Well Type	Number of Analyses
Monitoring	257,035
Irrigation	118,557
Domestic	76,874
Public Water Supply	38,244
Commercial/Industrial	2,514
Livestock/Other	2,065
Heat Pump (GW Source)	8
Total	495,297



Ground Water Quality

Compound	Total Samples Collected	Number of Samples that exceed the Reporting Limit	Percent of Samples that exceed the Reporting Limit
nitrate-N	126,645	116,441	91.94%
alachlor ethane sulfonic acid	136	71	52.21%
deethylatrazine	5,847	1,571	26.87%
atrazine	10,768	2,291	21.28%
metolachlor	9,838	1,065	10.83%
deisopropylatrazine	5,159	381	7.39%
cyanazine	10,300	422	4.10%
alachlor	10,338	305	2.95%
propazine	5,741	119	2.07%
simazine	6,309	125	1.98%
prometon	6,095	55	0.90%
metribuzin	10,194	59	0.58%





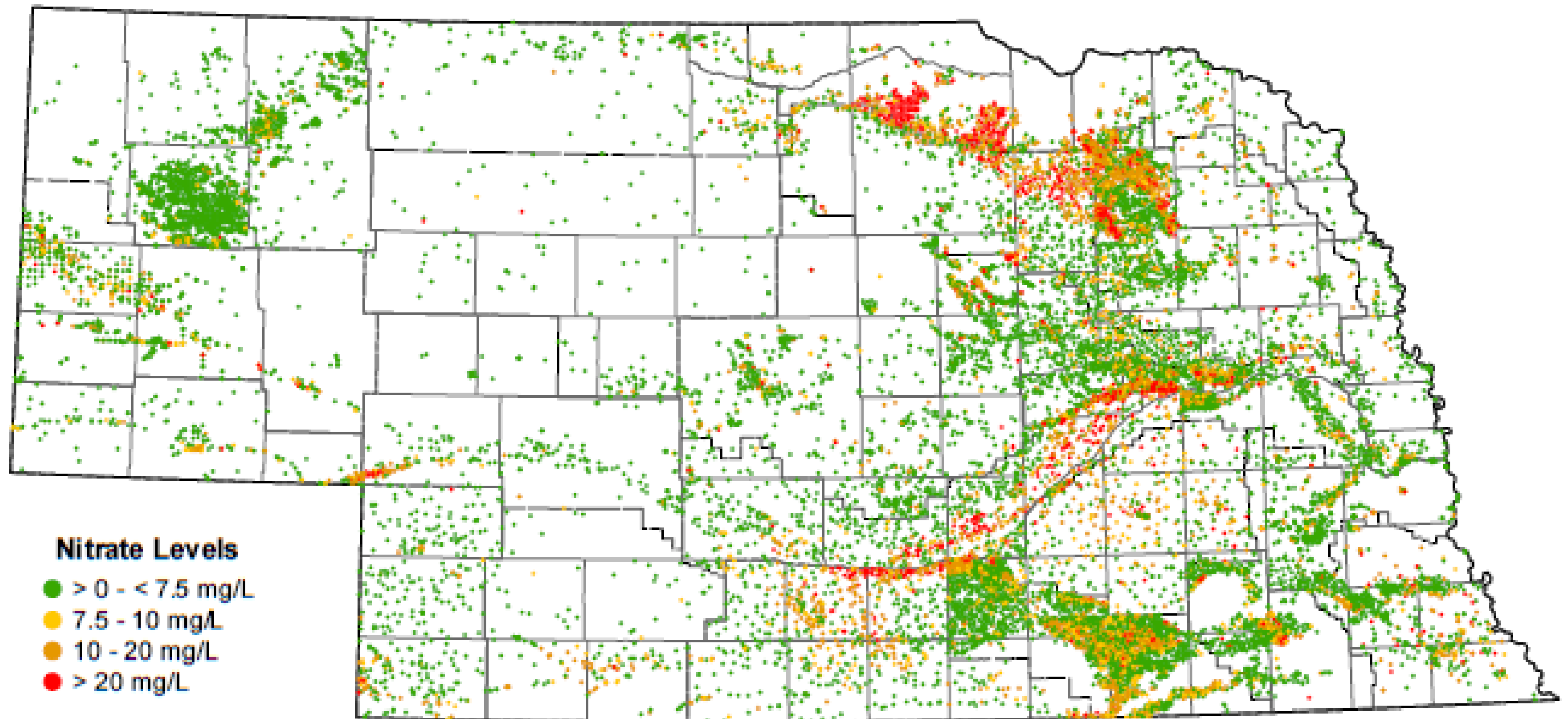
Groundwater Nitrate in Nebraska



Ground Water Quality – Nitrate Trends

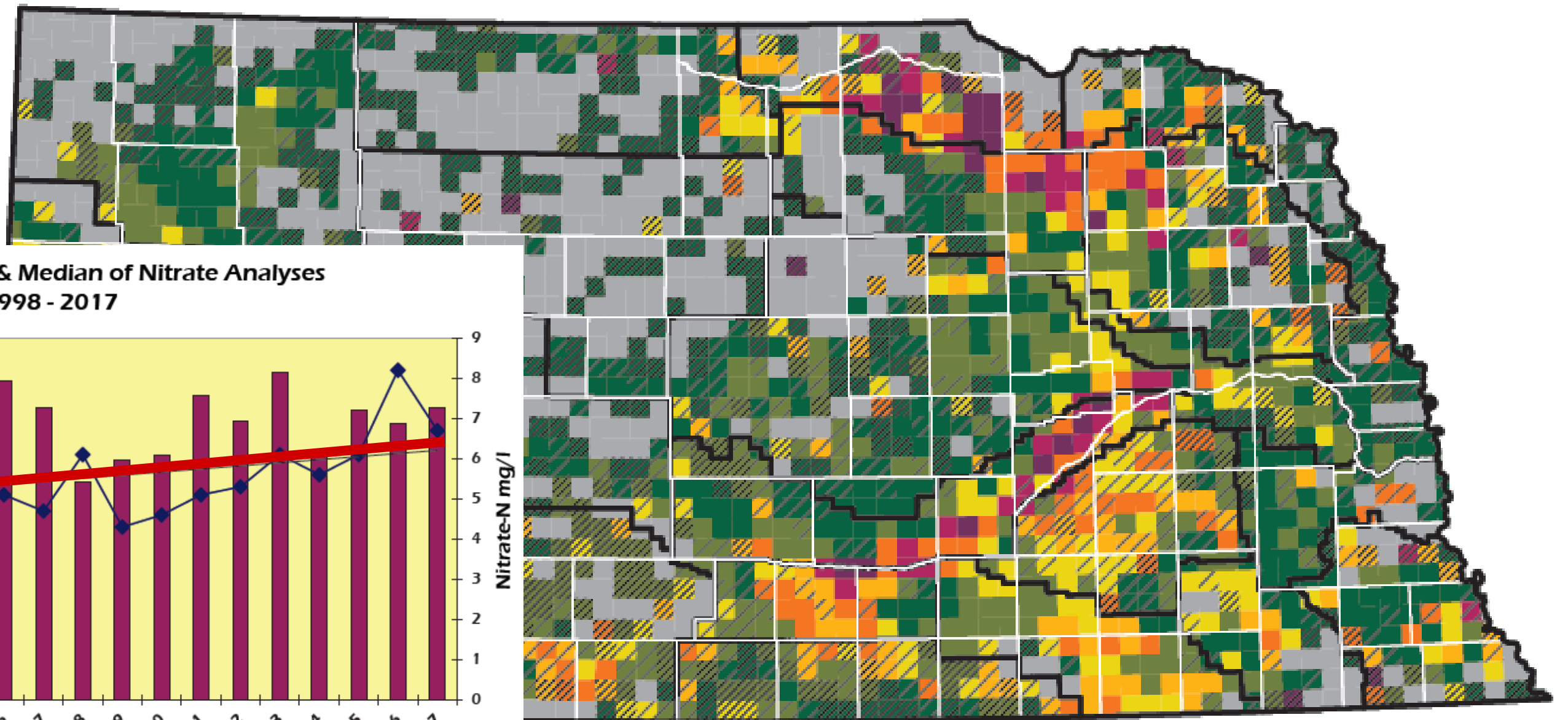
MOST RECENT NITRATE-N CONCENTRATIONS

Figure 11. Most recent recorded Nitrate-N concentrations of 18,299 wells from 1999-2018.
(Source: Quality-Assessed Agrichemical Database for Nebraska Groundwater, 2019)
Empty areas indicate no data reported, not the absence of nitrate in groundwater.

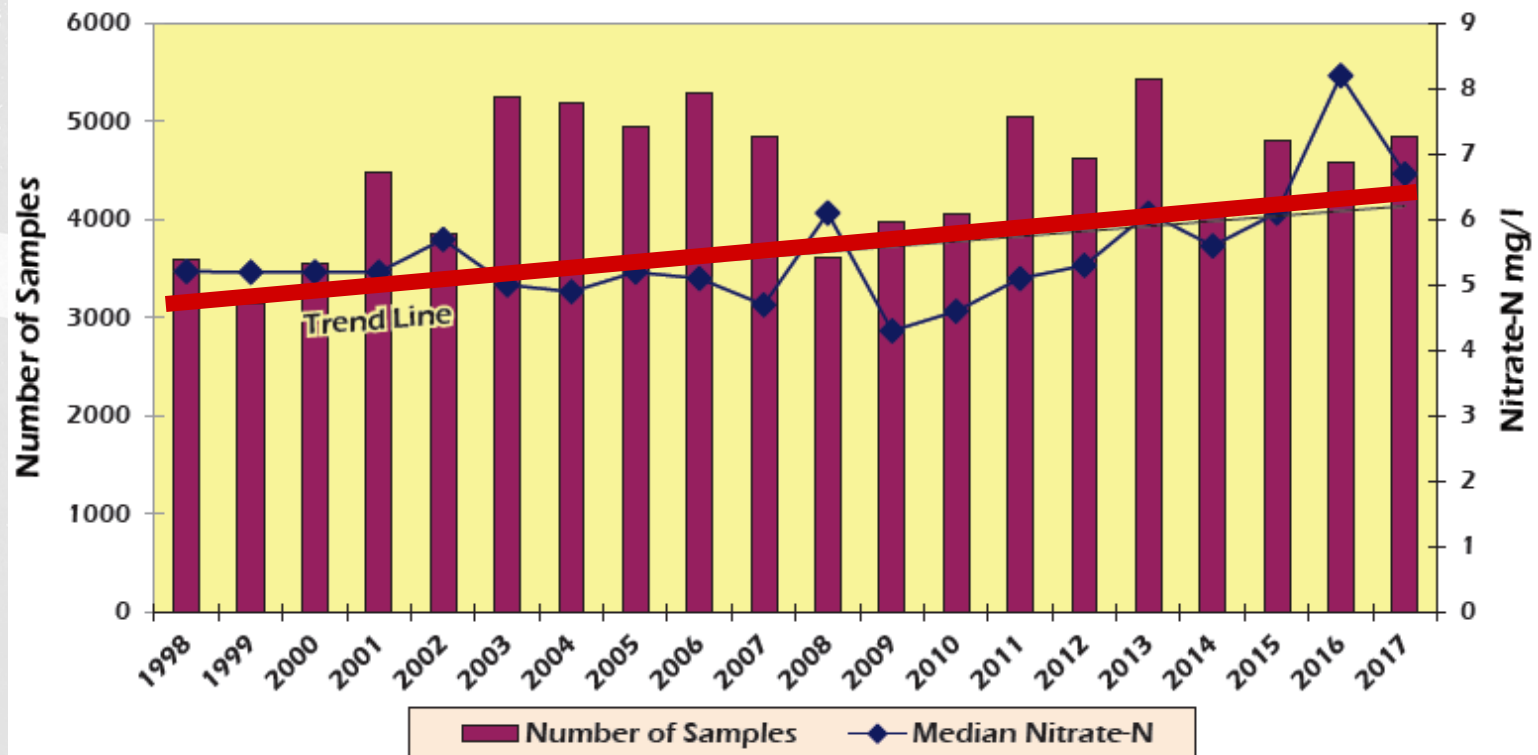


Median of Most Recent Nitrate-N By Township, 1998 - 2017

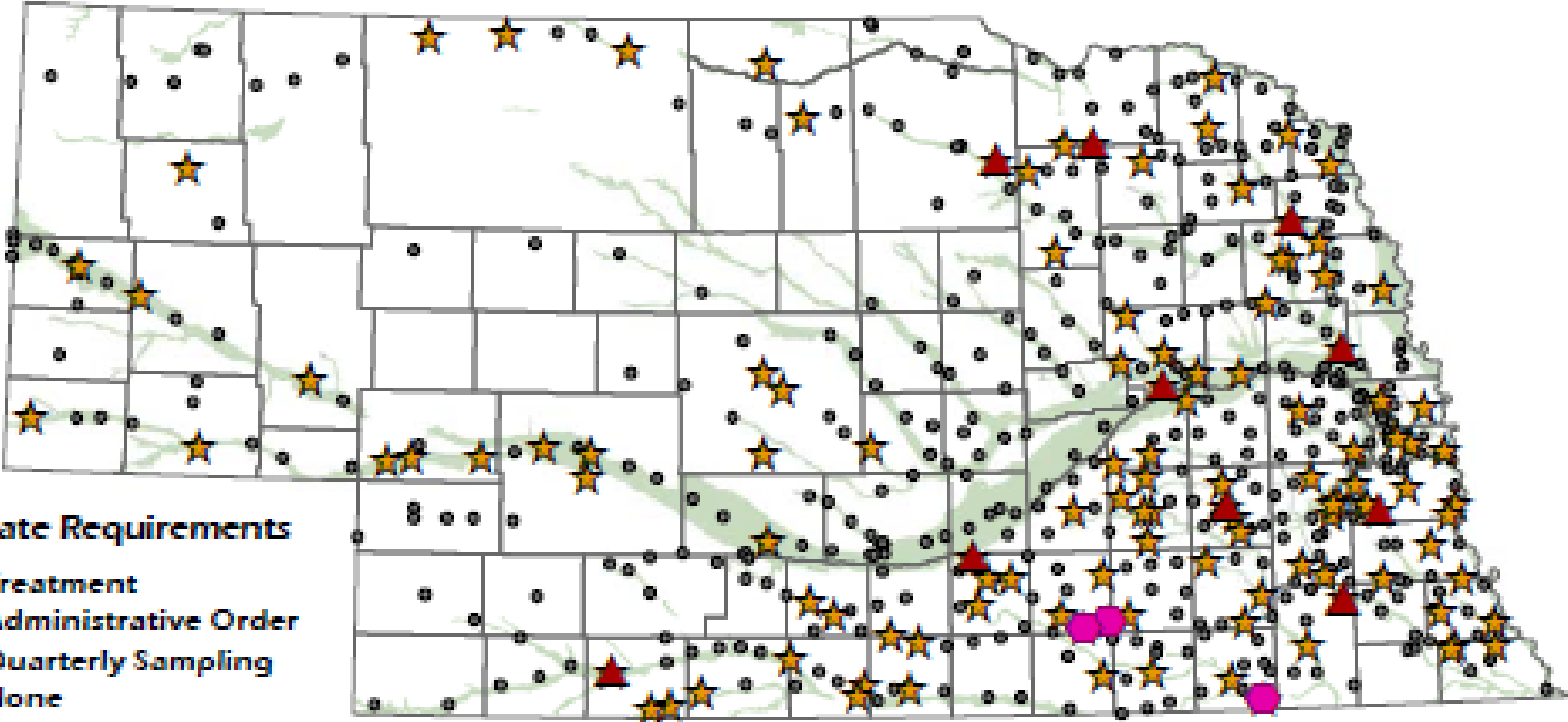
N



Statewide Number & Median of Nitrate Analyses
1998 - 2017



Community Public Water Supply Systems with requirements for Nitrate



Nitrate Requirements

- ▲ Treatment
- Administrative Order
- ★ Quarterly Sampling
- None
- Valleys Topographic Region



Typical Ground Water Management Plan BMP Requirements

- **Ground water nitrate analysis**
- **Soil analysis for nitrogen**
- **Manure analysis for nitrogen**
- **Use nutrient analysis in calculating application rate**
- **Fall/winter fertilizer application Prohibited.**

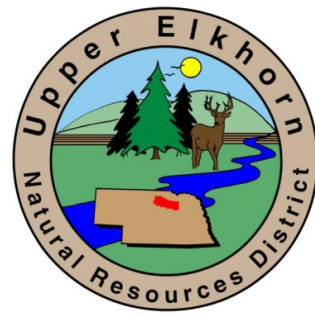


Typical Ground Water Management Plan BMP Requirements

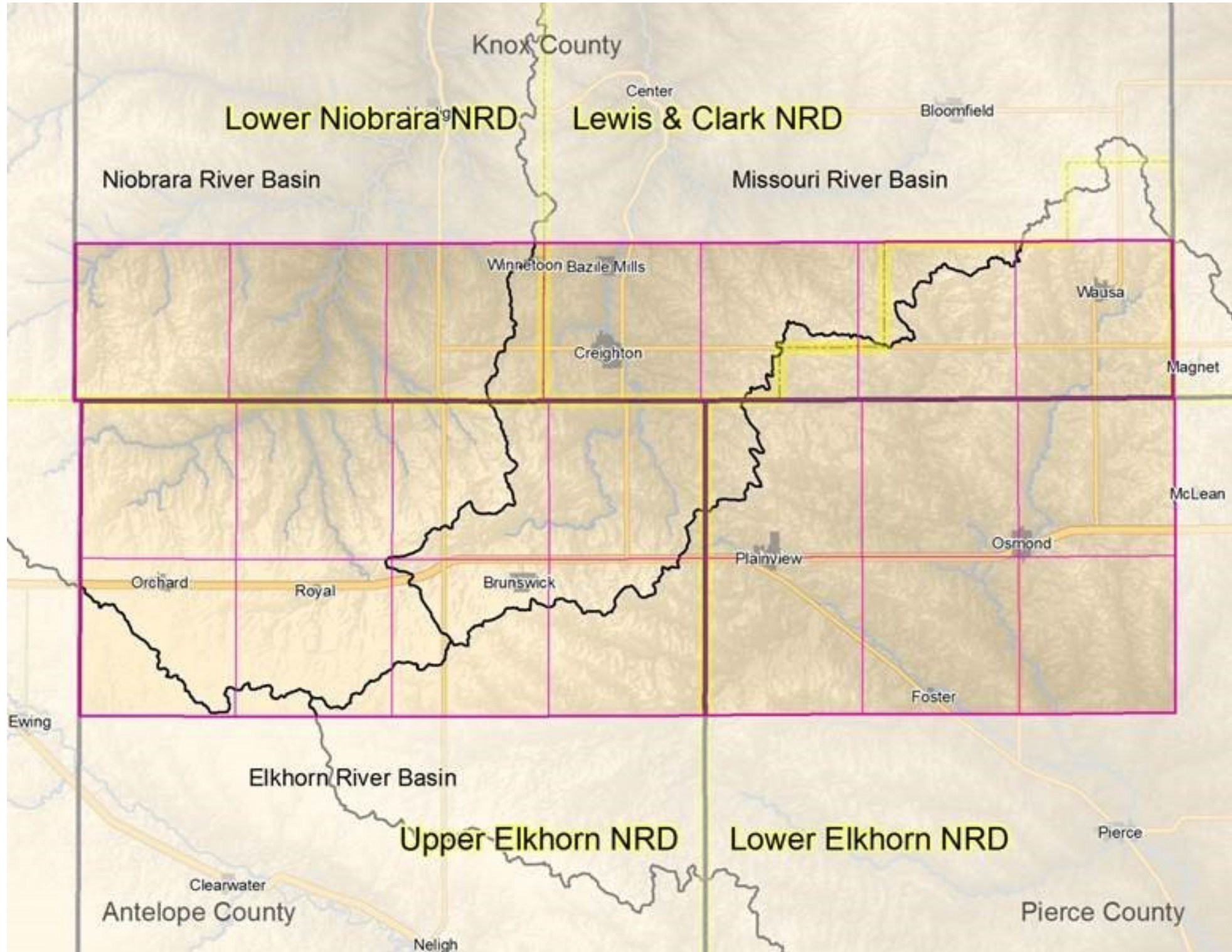
- Issue permit for drilling new wells > 50 gpm
- Use of nitrogen inhibitors
- Annual crop report
- Split fertilizer application
- Irrigation scheduling/management
- Farmer education/certification every 4 years



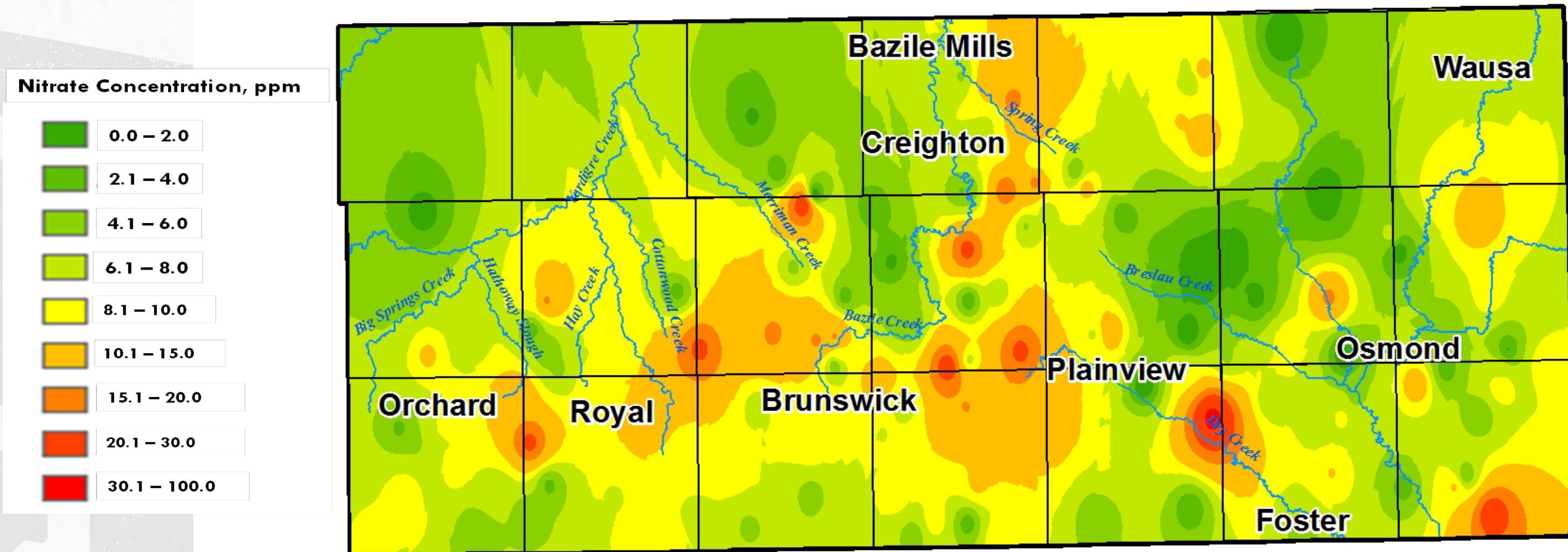
Bazile Groundwater Management Area



Location

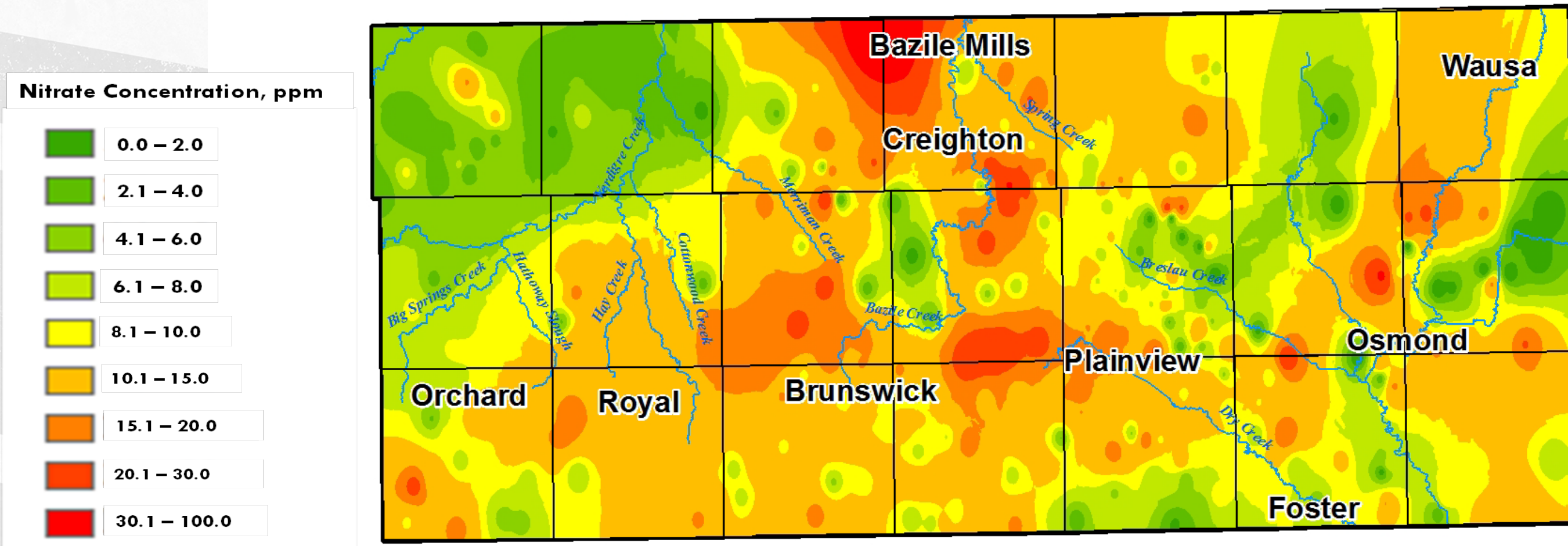


BGMA: Nitrate Content In Groundwater 1980-89



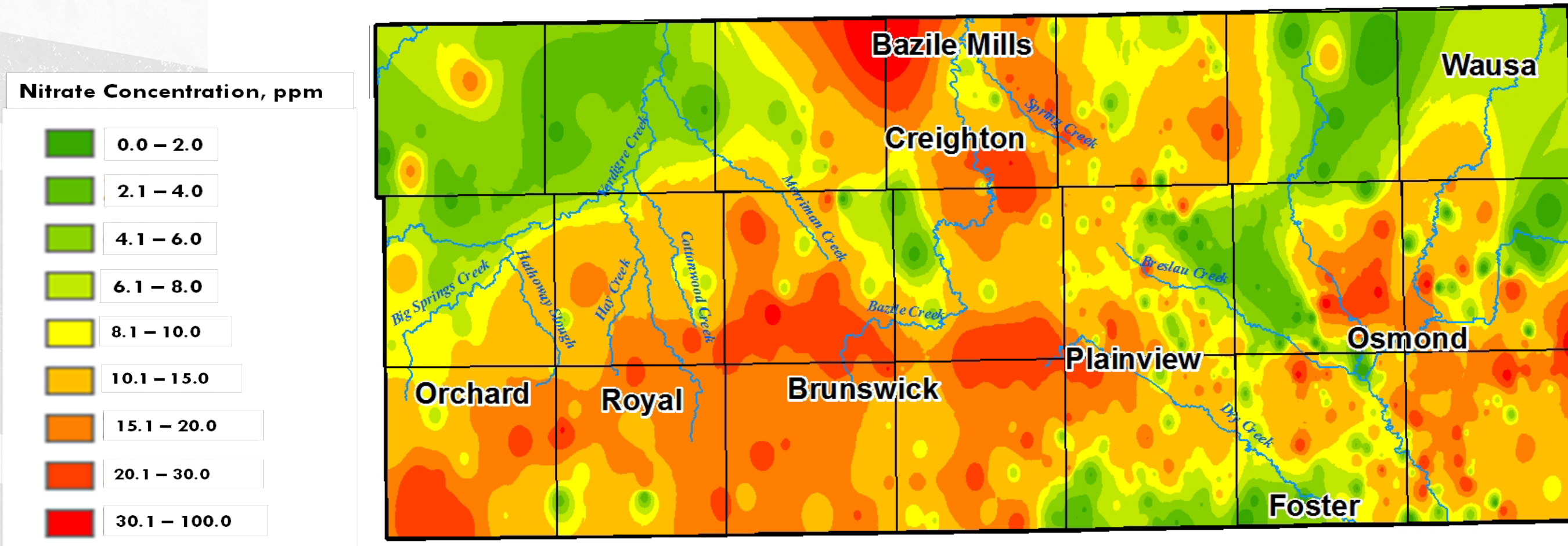
Data from the Nebraska Department of Natural Resource's Clearinghouse database

BGMA: Nitrate Content In Groundwater 1990-1999



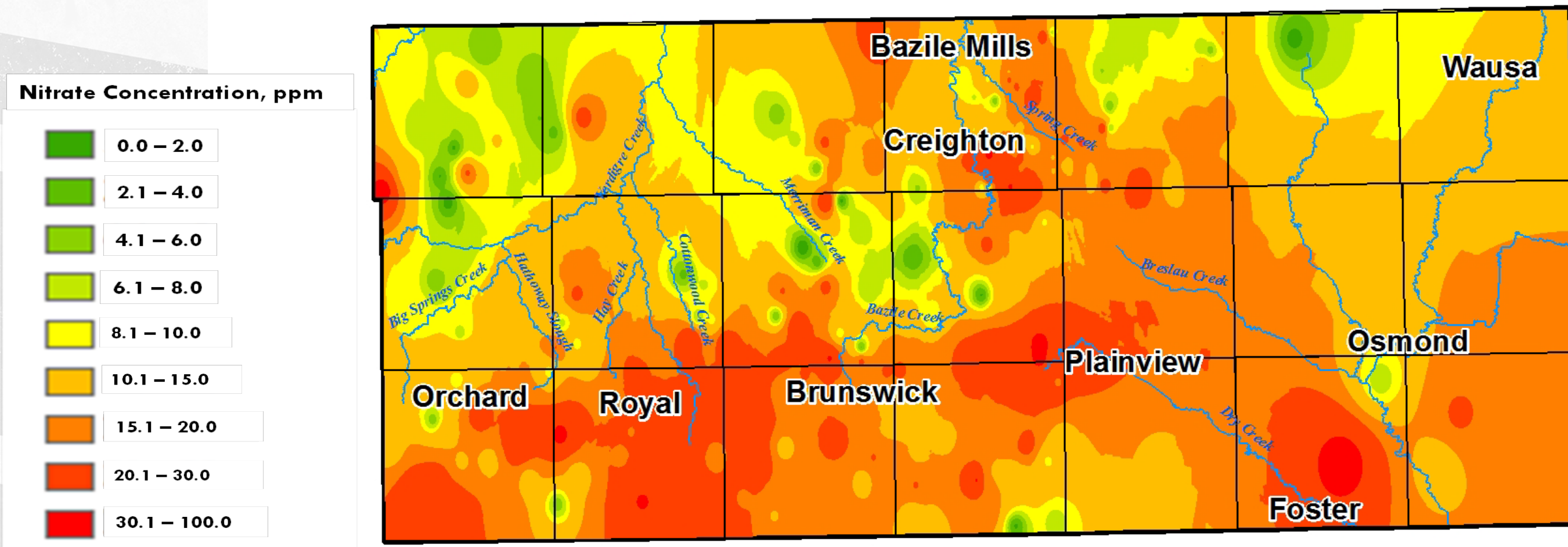
Data from the Nebraska Department of Natural Resource's Clearinghouse database

BGMA: Nitrate Content In Groundwater 2000-2009



Data from the Nebraska Department of Natural Resource's Clearinghouse database

BGMA: Nitrate Content In Groundwater 2010-2018



Data from the Nebraska Department of Natural Resource's Clearinghouse database

What can I do in my operation?

- NWQI
- NRCS 10%
- BGWMP
- LENRD Plan
- WHPA
- Drinking Water Protection Plans
- Sourcewater Plans



Takeaways: What does this all mean?

- Nebraska's Water Quality is closely monitored.
- Nebraska's water management approach is used as a model internationally.
- Local groundwater has high nitrate levels.
- Find out what kind of water quality you have.
- Take action!



Find out what's in your water!

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