



2019 Papio-Missouri River NRD Groundwater Quality Monitoring Results

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2019 Groundwater Quality Results

- Background
- 2019 sites sampled and results
 - Nitrate, arsenic, manganese, and pesticides
 - Pharmaceuticals and hormones
- 2020 sampling plan
- Publications and available data

Background

- USGS has collected groundwater quality samples in cooperation with the P-MRNRD since 1992
- Support the P-MRNRD groundwater management plan
 - Monitor trends for selected State of Nebraska Title-118 analytes that have been detected at 30% of the maximum contaminant level
 - Monitor additional nutrients and pesticides

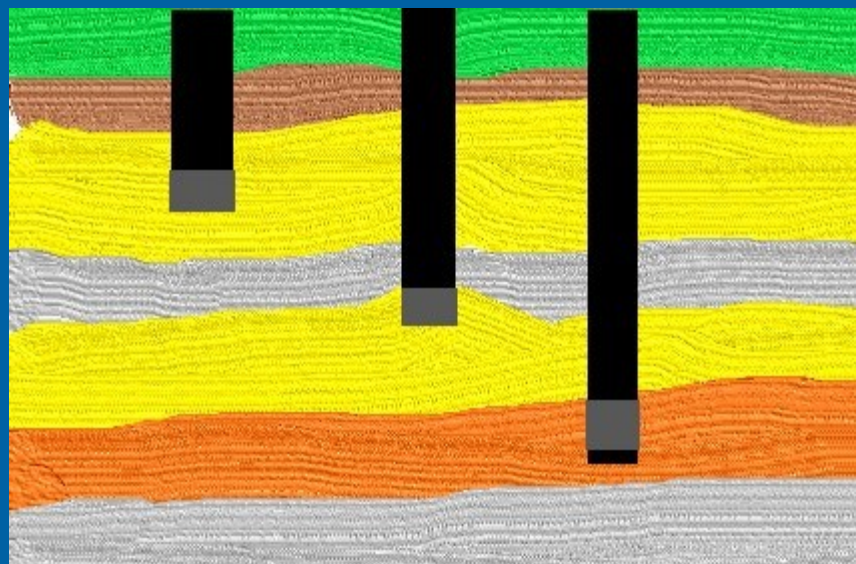
Background

- Well screened in four defined aquifers throughout the NRD
 - Network wells
 - Privately owned wells
 - Focus on a single specific aquifer each year

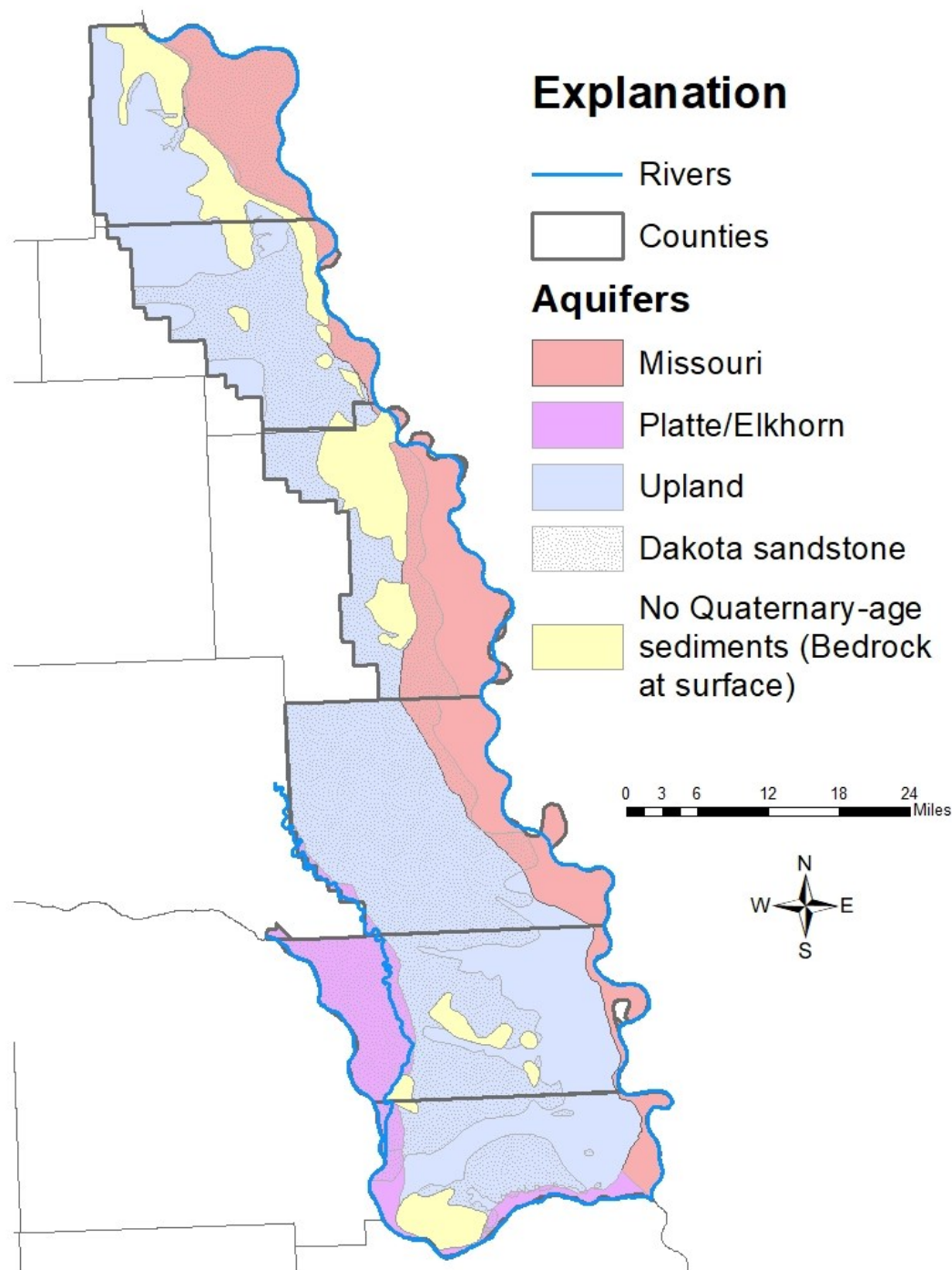


Background

- **Monitoring well clusters**
 - Dedicated monitoring wells owned by the NRD
 - Multiple wells at each location, screened at different elevations
 - Each well sampled every two years to support the DEQ in production of the Nebraska Groundwater Quality Report (LB329-2001)



Aquifers within the P-MRNRD



2019 Sites Sampled

- 44 total samples collected
 - 25 Platte/Elkhorn alluvial aquifer samples
 - 13 private wells
 - 5 cluster well sites (12 samples)
 - 19 monitoring well cluster samples
 - Samples collected at 9 sites

Explanation

- 2019 cluster well locations
- 2019 network well locations

Rivers

Counties

Aquifers

Missouri

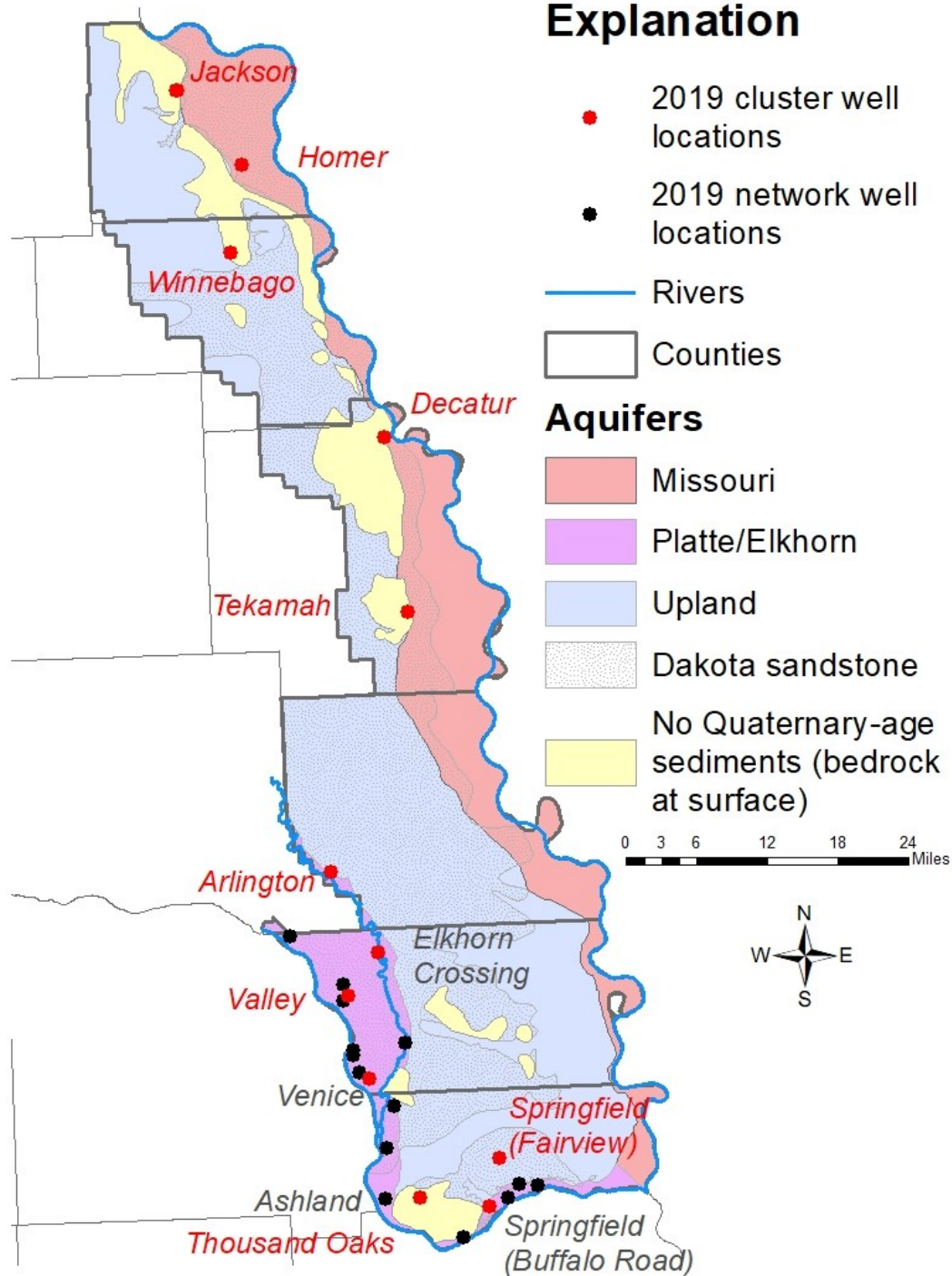
Platte/Elkhorn

Upland

Dakota sandstone

No Quaternary-age
sediments (bedrock
at surface)

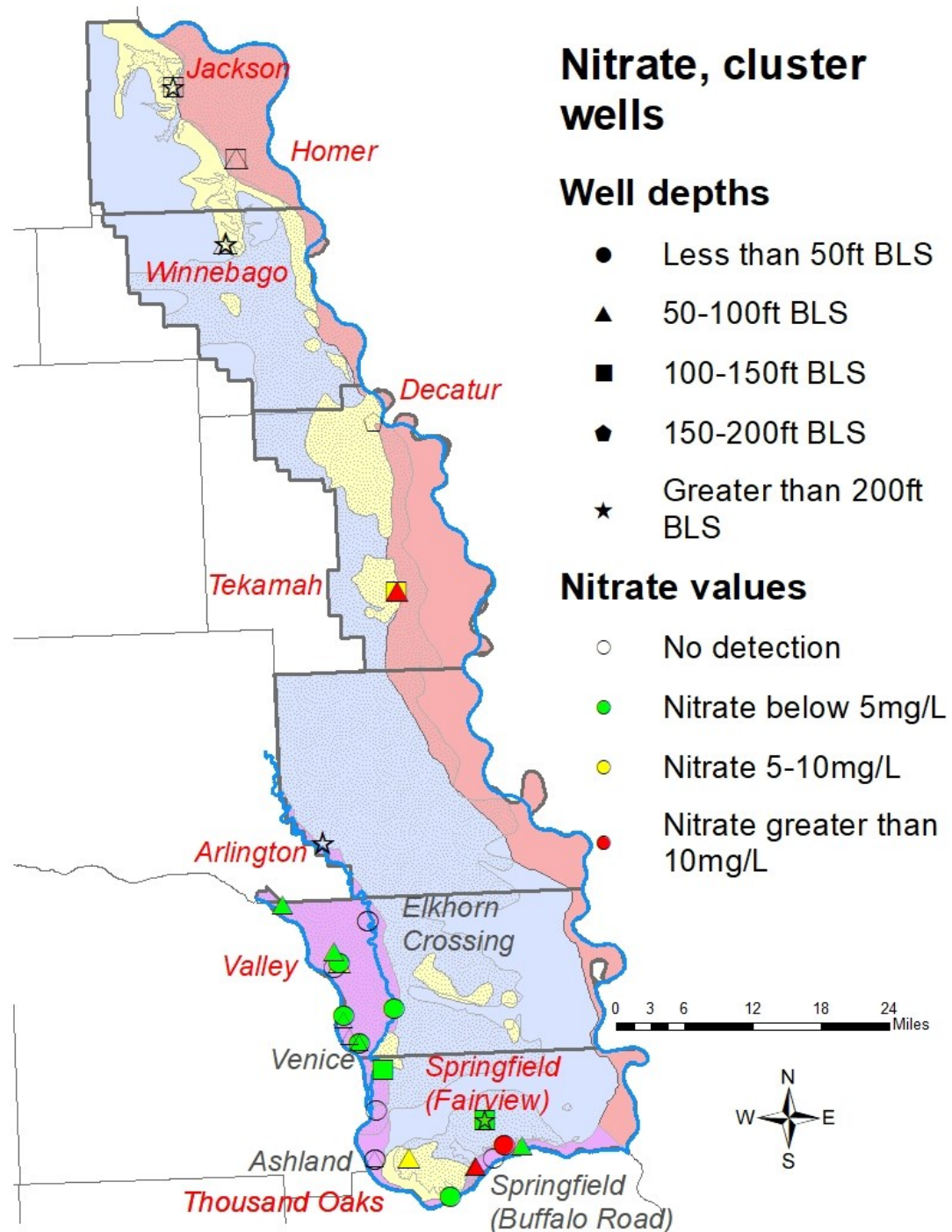
0 3 6 12 18 24 Miles



2019 Analytes

- Selected major ions, trace elements, and nutrients
- 5 samples analyzed for an in-depth pesticide suite

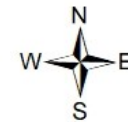
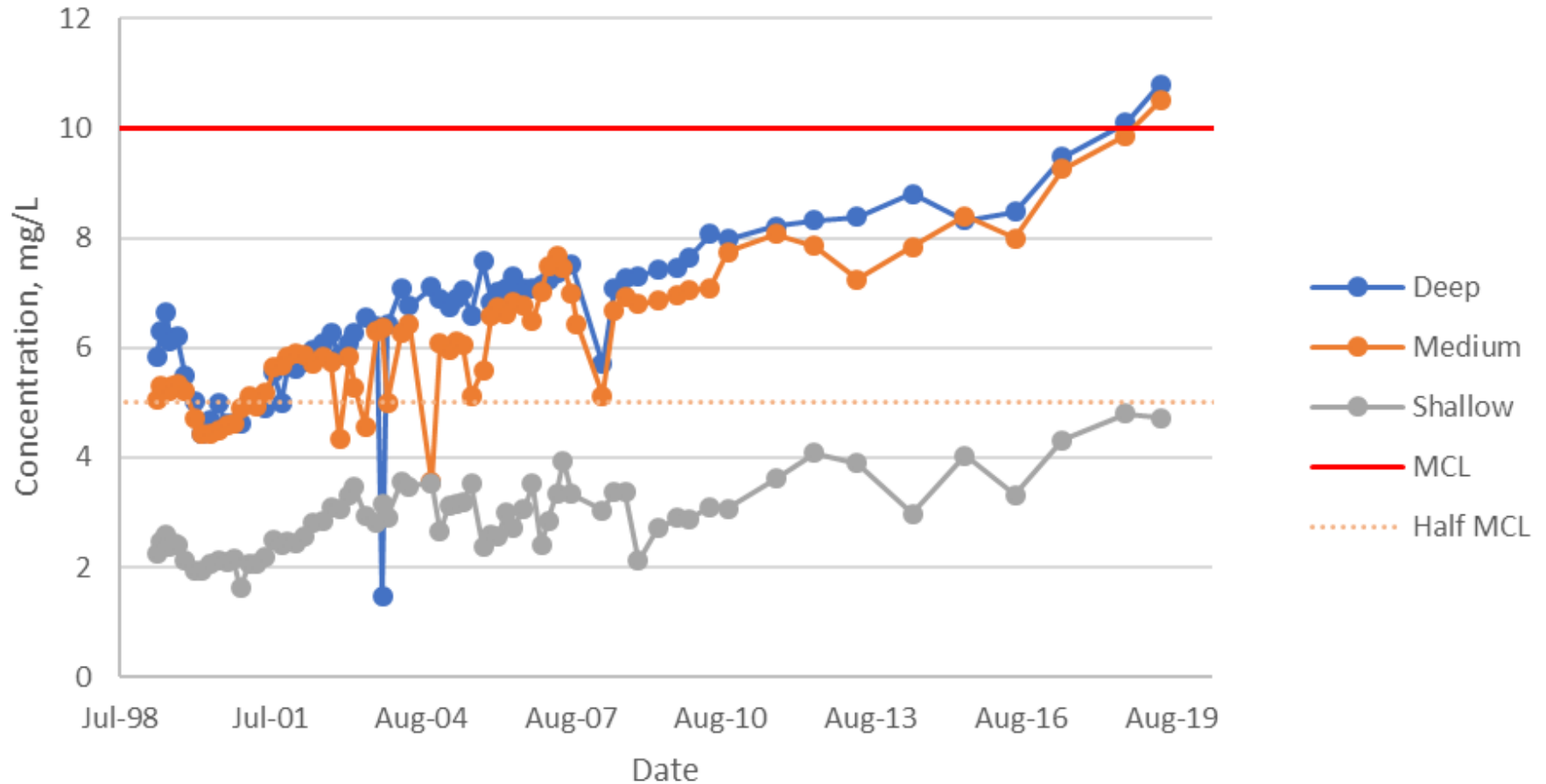
Nitrate Results





Nitrate, cluster

Springfield nitrate

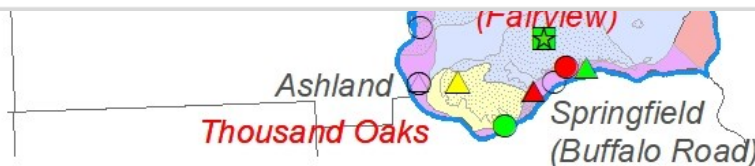
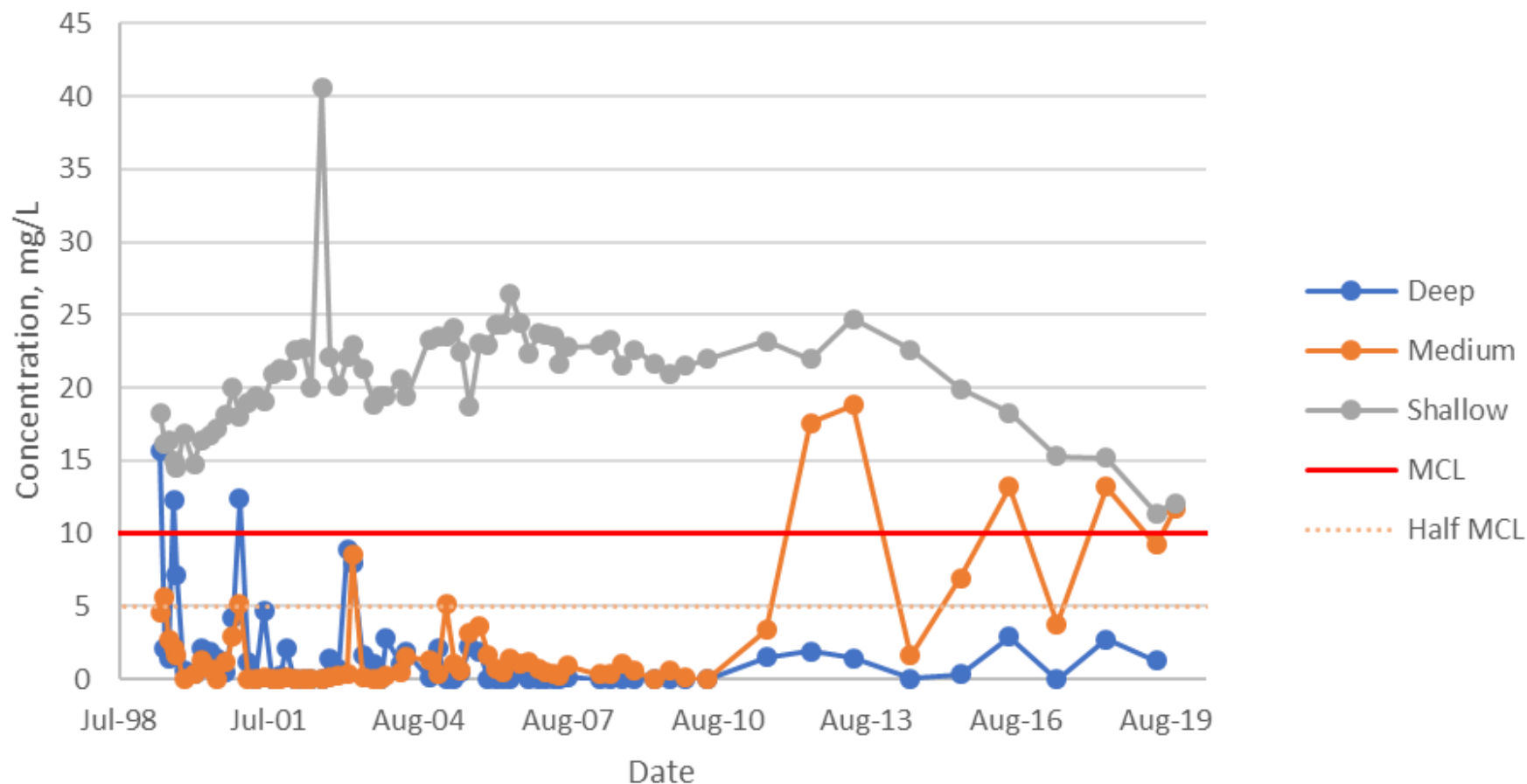


Nitrate

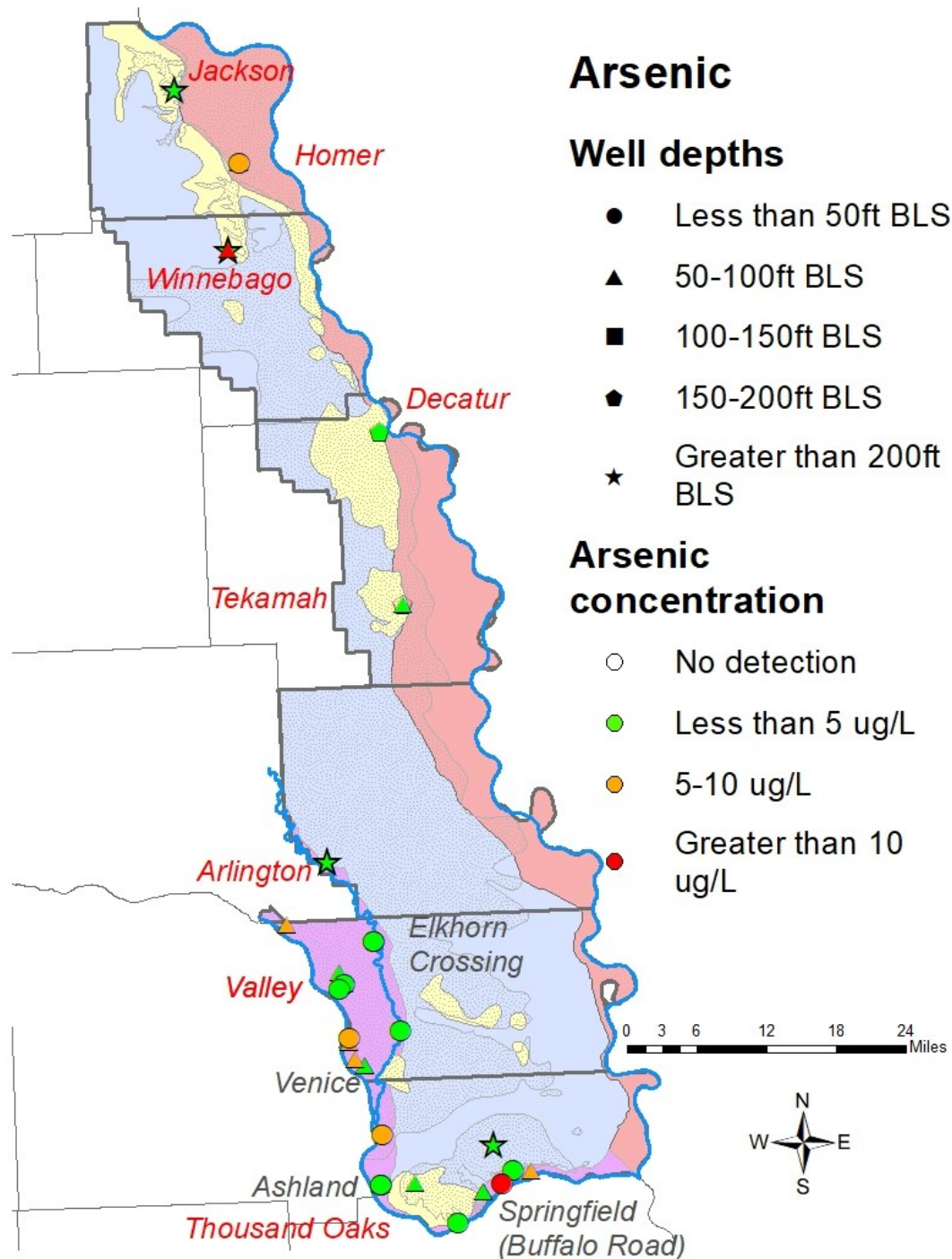


Nitrate, cluster wells

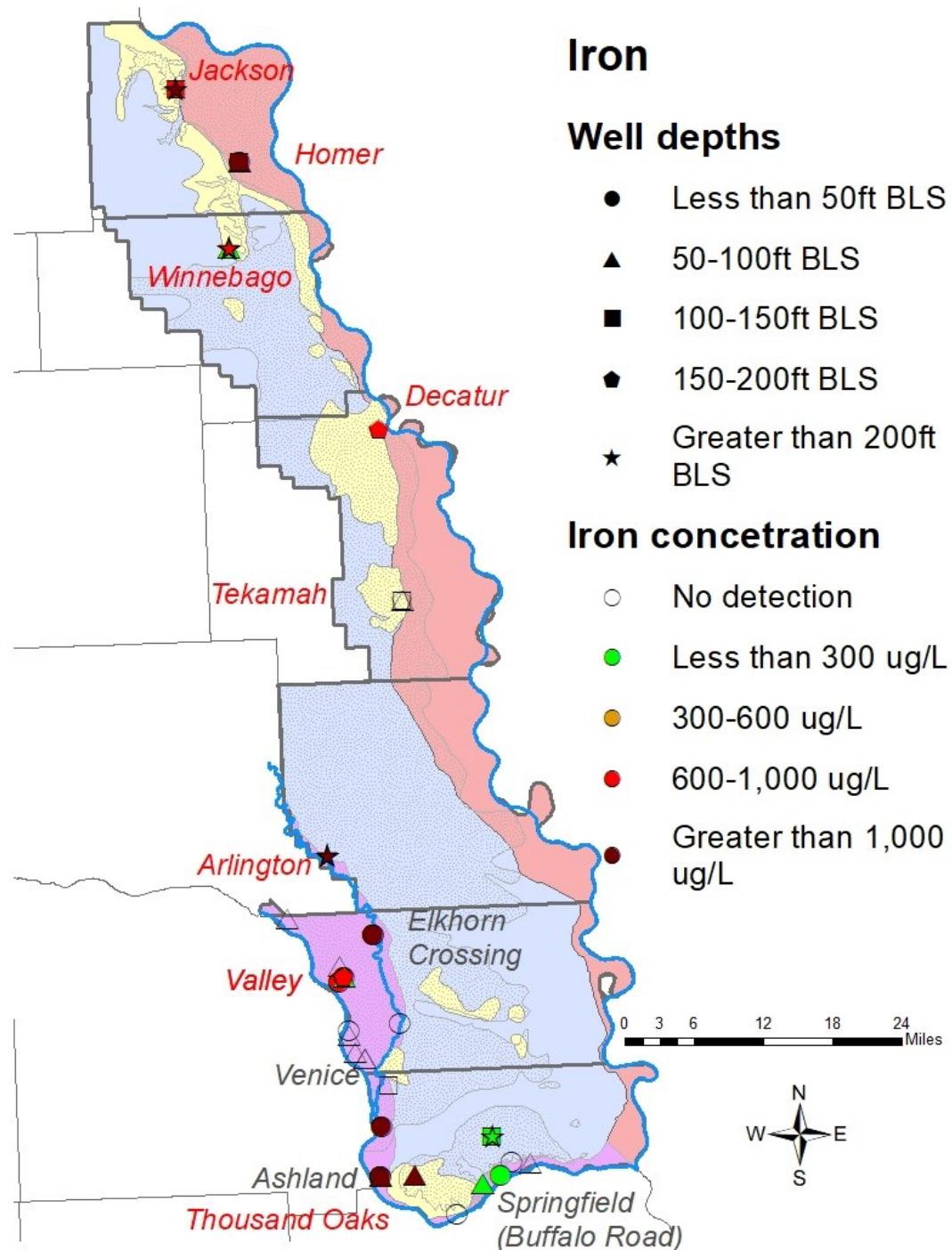
Tekamah nitrate



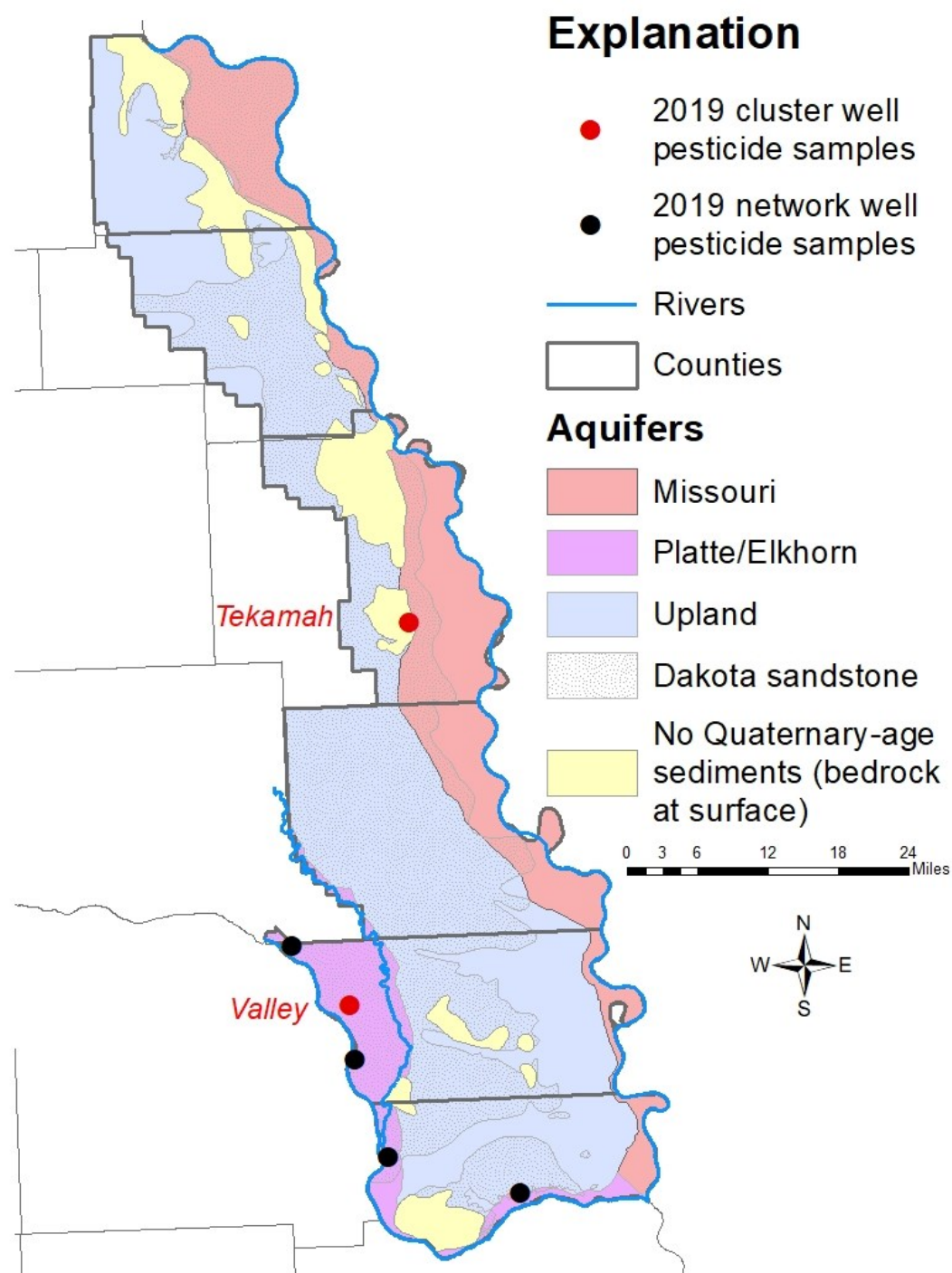
Arsenic Results



Iron Results



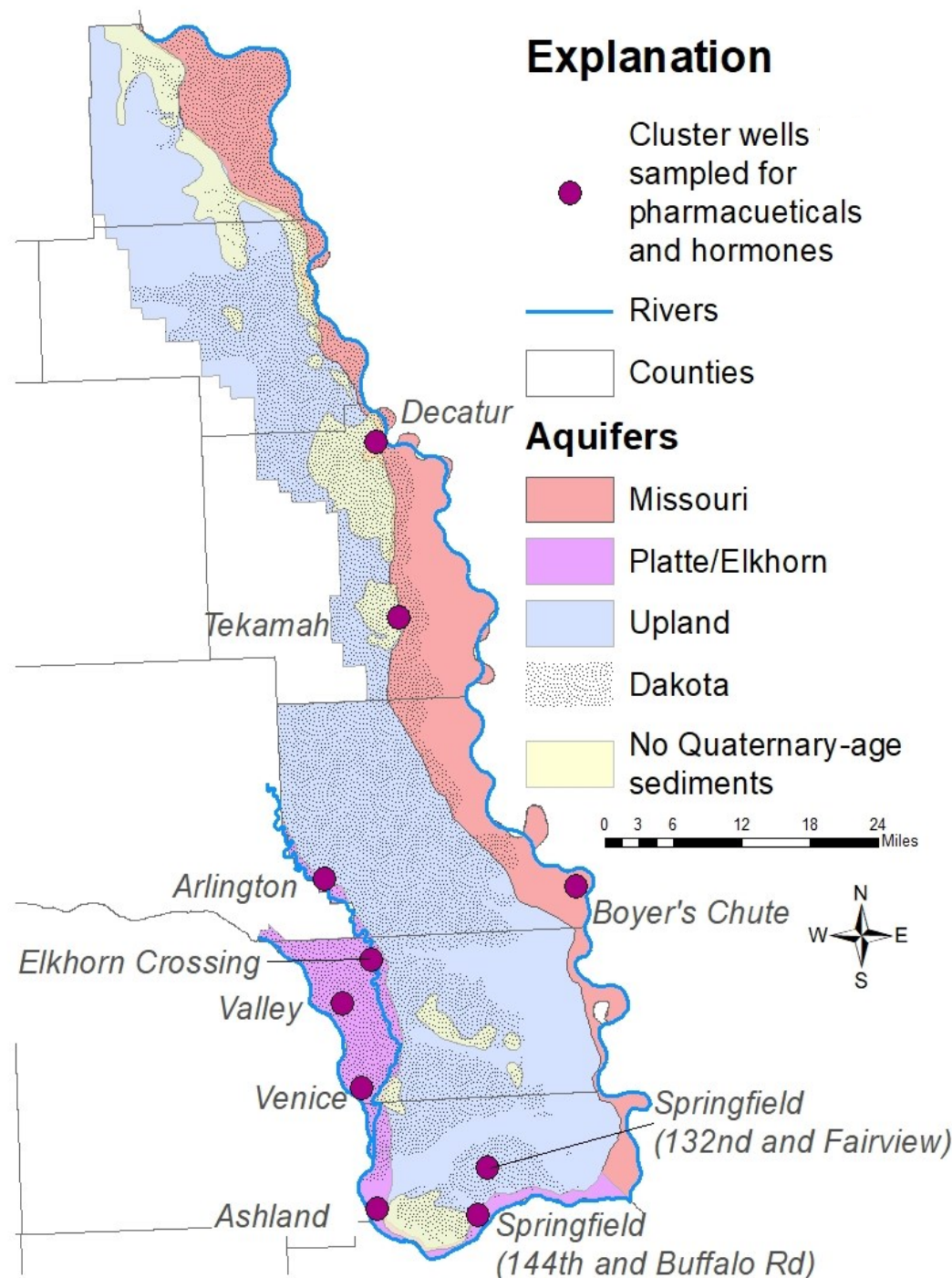
Pesticide Results



2019 Sampling

Pharmaceutical and hormone sampling

- 17 samples per collection period
- First sample collected June 2019
- Second sample collected Oct-Nov 2019



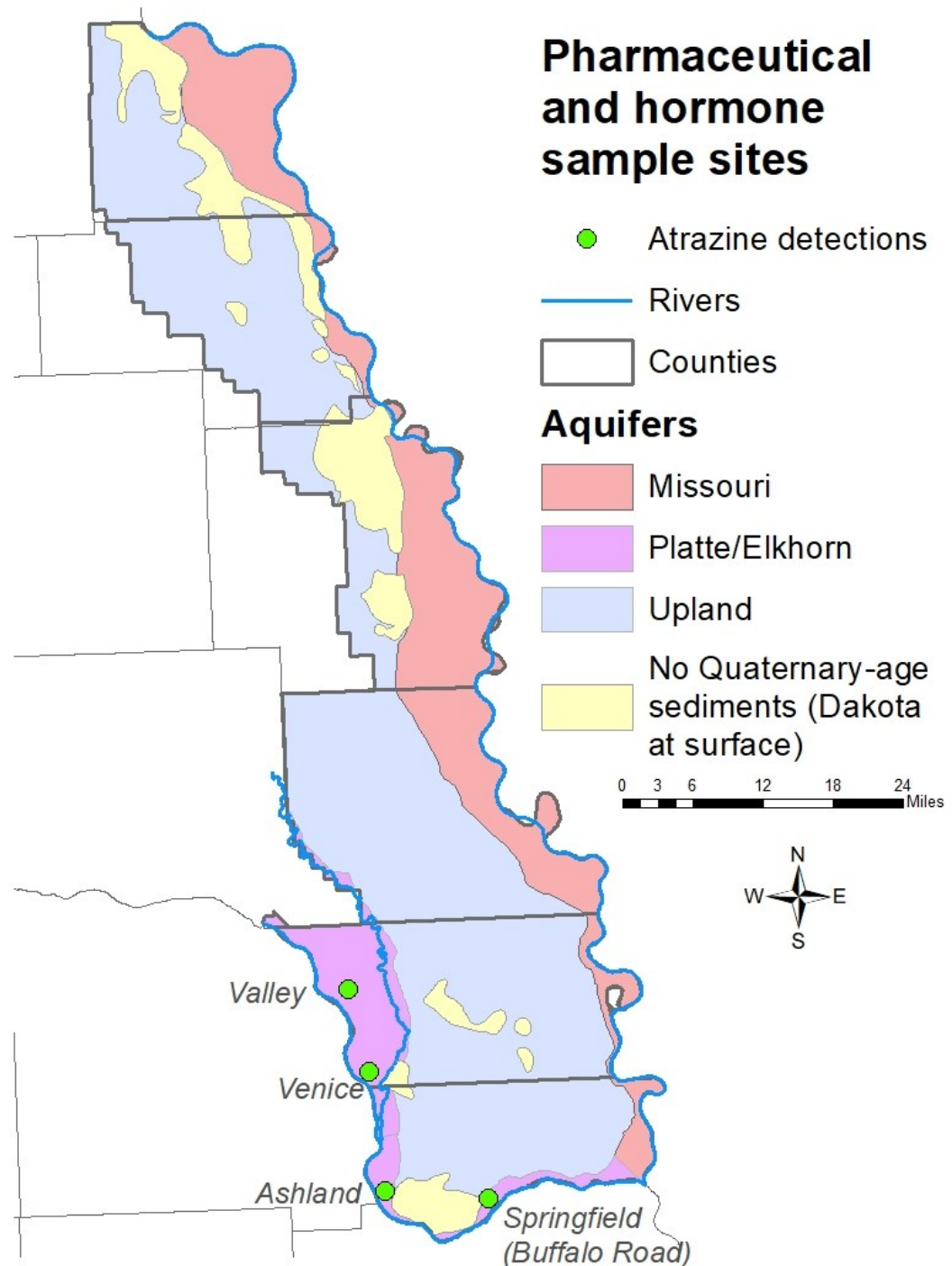
2019 pharmaceutical and hormone sampling

- 134 total compounds
 - 112 pharmaceuticals, including
 - Acetomenphine
 - Atrazine
 - Caffeine
 - Nicotine
 - Codeine
 - Diazepam
 - Methotrexate
 - Gabapentin
 - Hydrocortisone
 - 22 hormones, including
 - Cholesterol
 - Esterol
 - Progesterone
 - Testosterone

Pharmaceutical detection

Atrazine

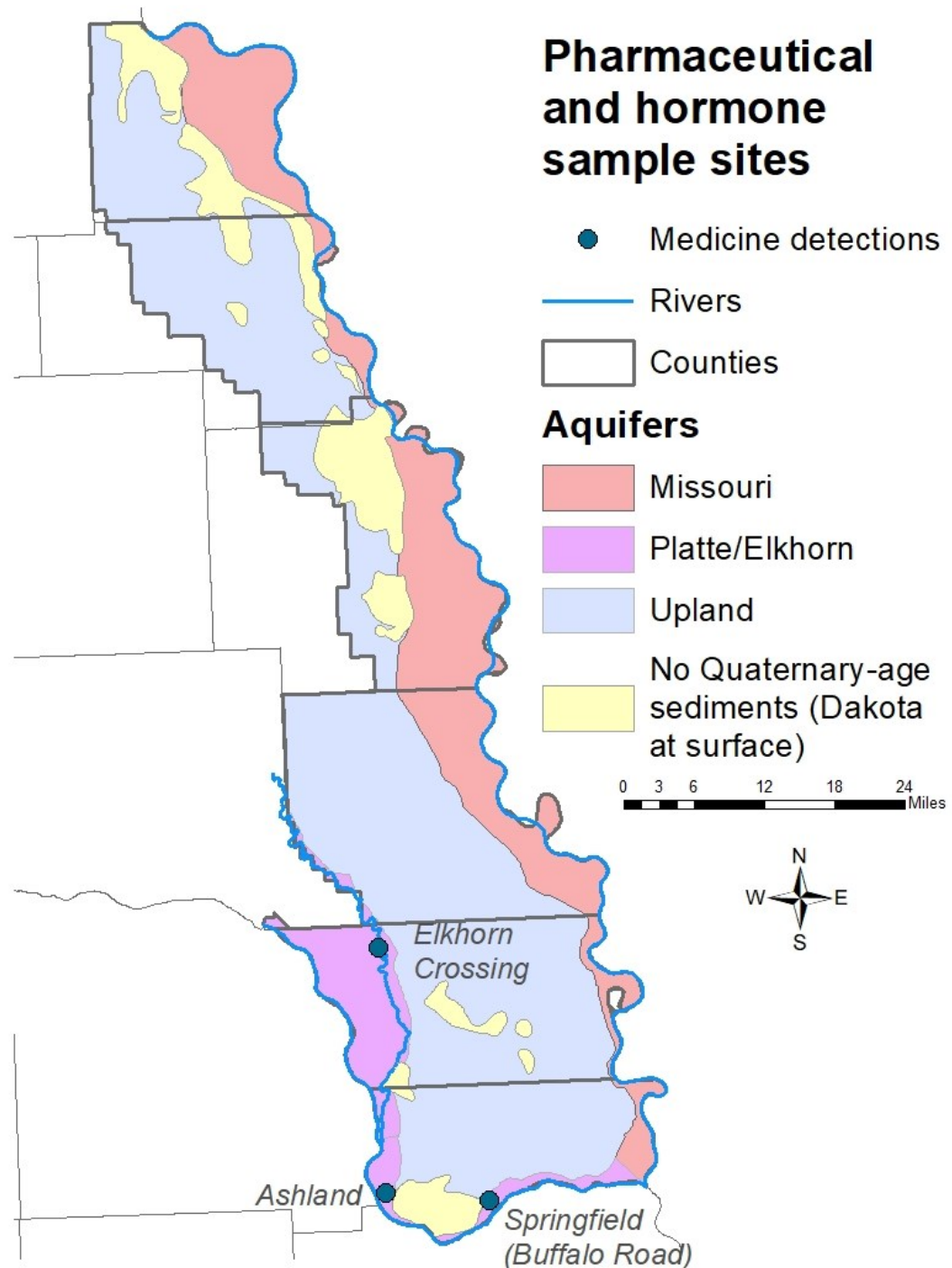
- Found in 15 samples at 4 sites



Pharmaceutical detection

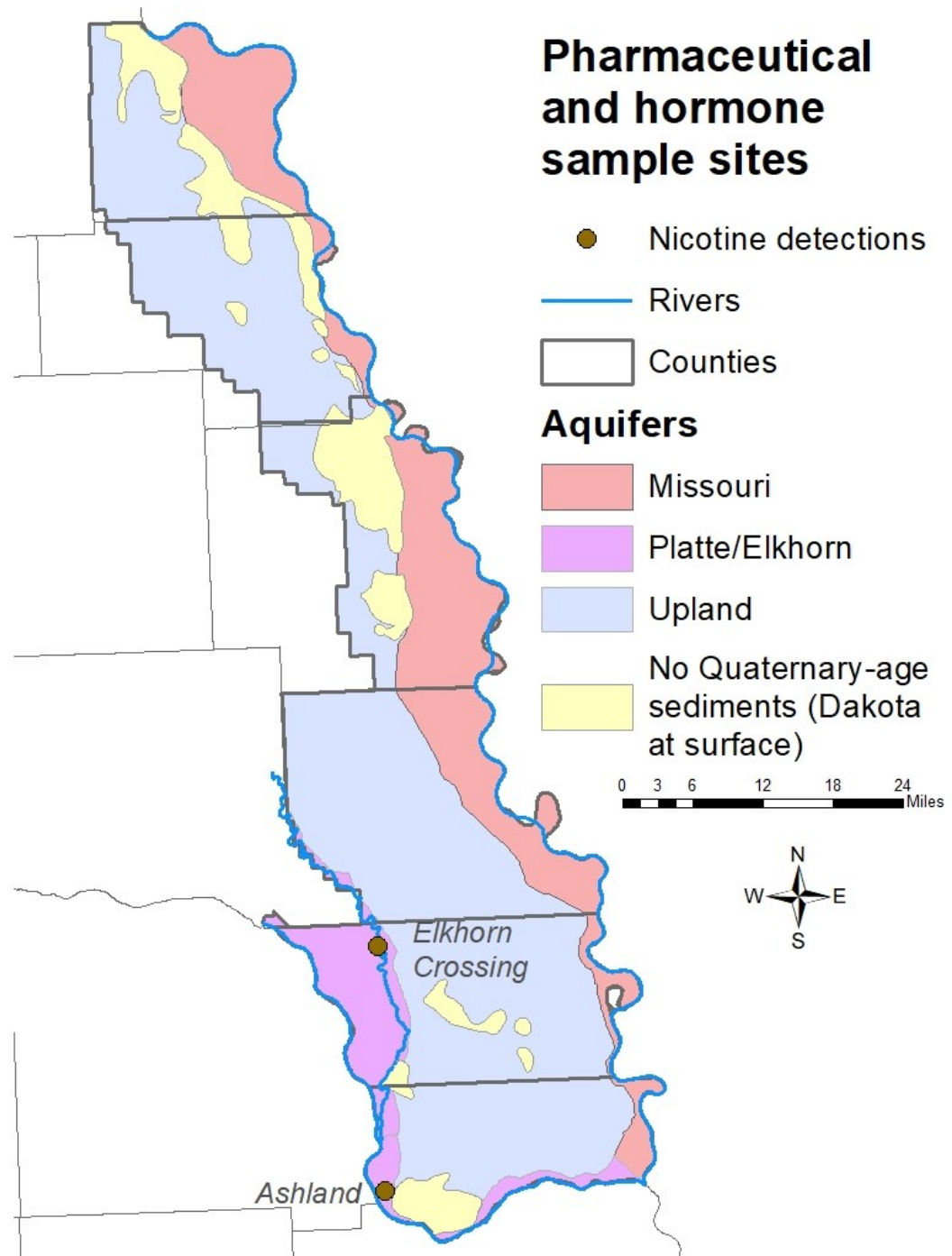
Medicines

- Acetaminophen
- Metformin
- Hexamine
- Gantanol



Pharmaceutical detection

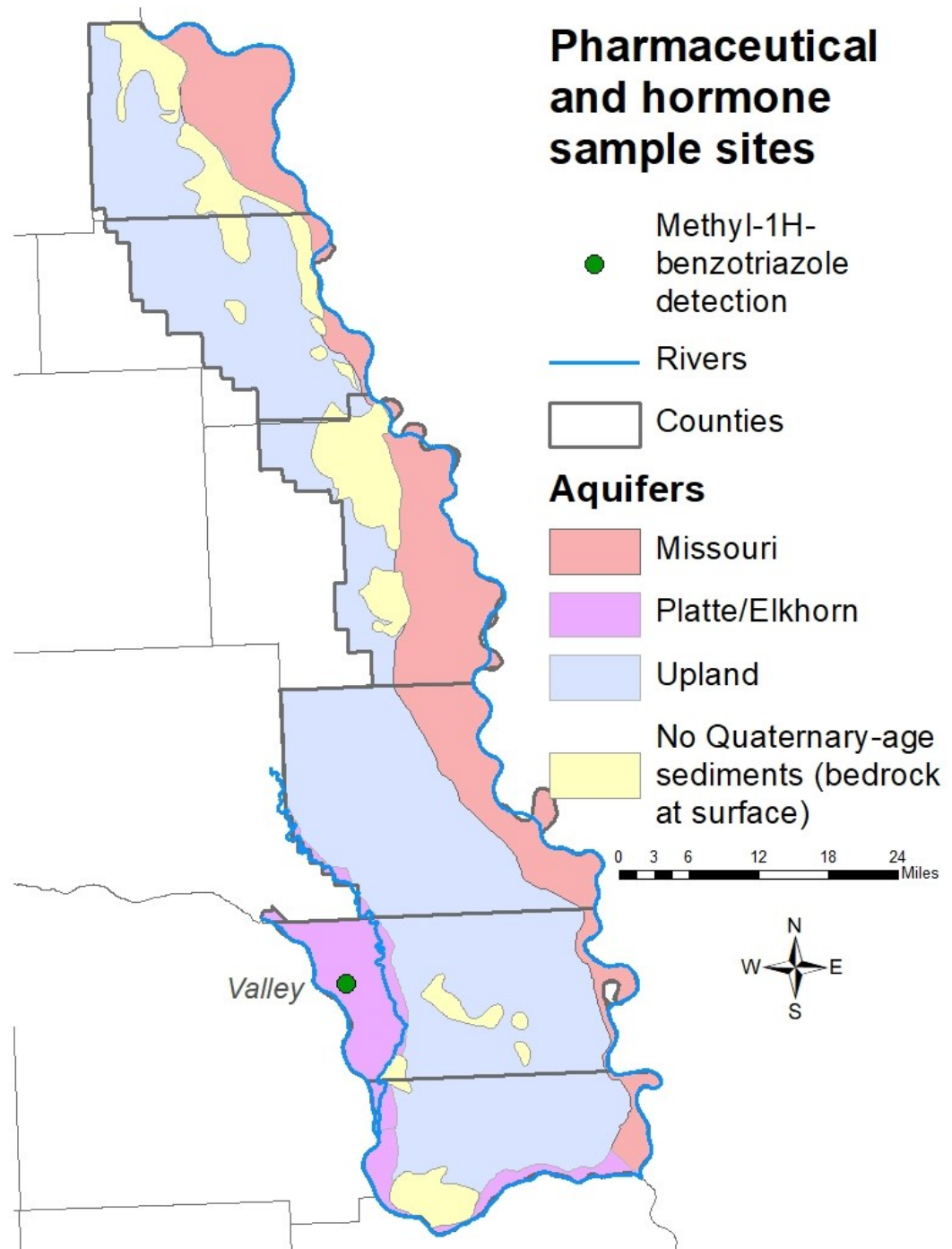
Nicotine



Pharmaceutical detection

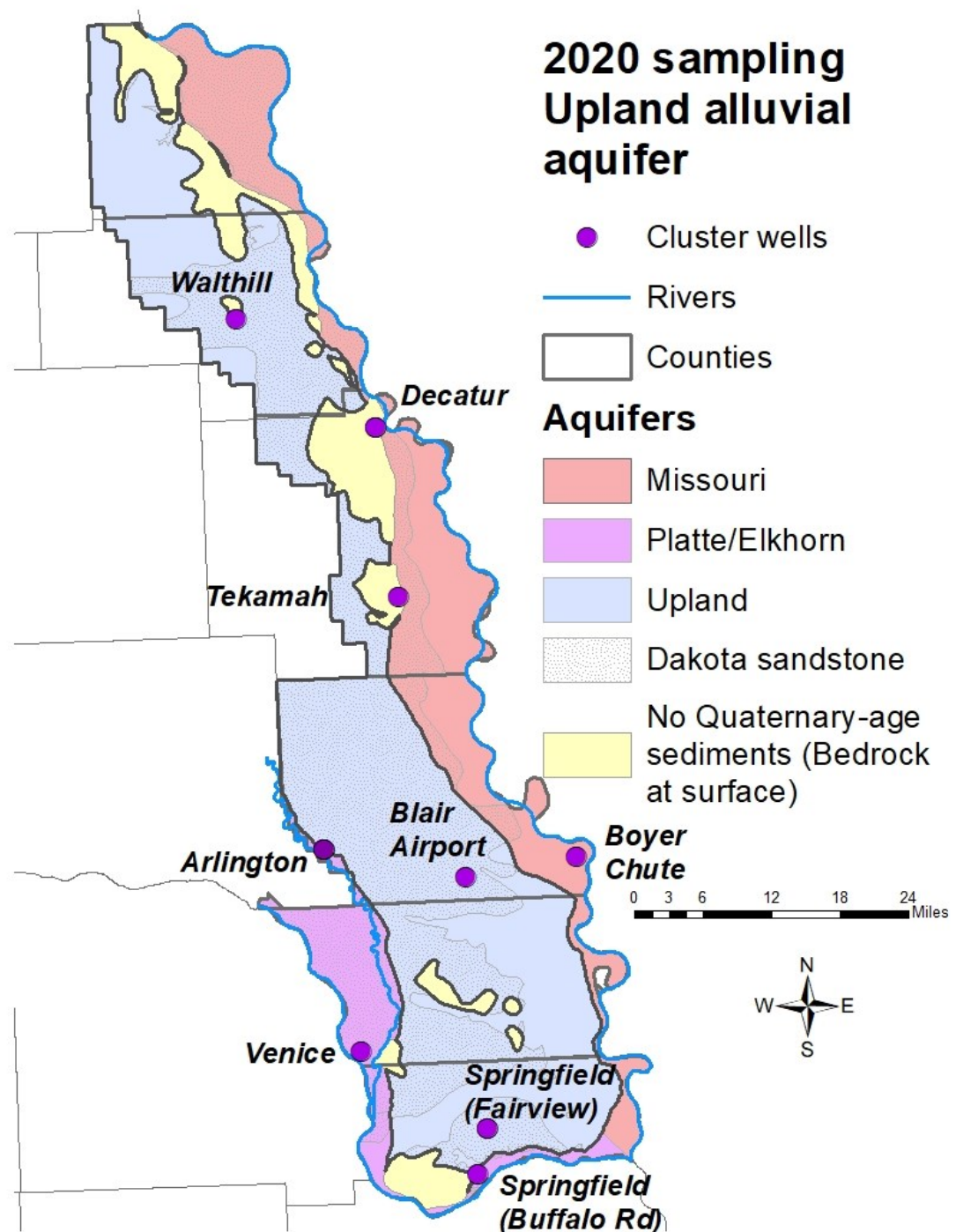
Methyl-1H-benzotriazole

- Industrial fluid
- Manufacturing fluid
- pesticide



2020 sampling plan

Upland alluvial aquifer and selected monitoring well clusters



Publications

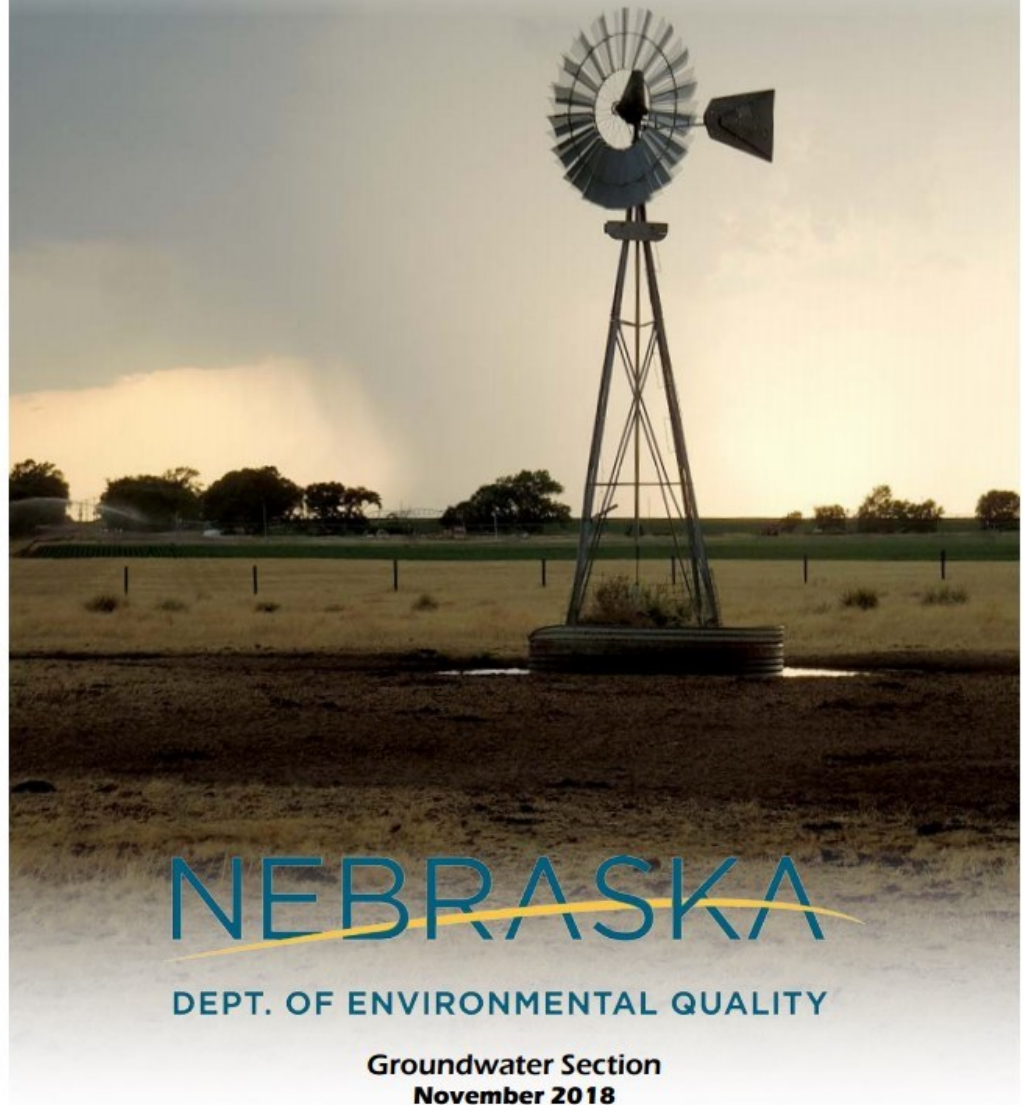
- Website
 - Available at <https://www.usgs.gov/centers/ne-water/science/papio-missouri-river-natural-resources-district-groundwater-quality>
- Quality-Assessed Agrichemical Contaminant Database for Nebraska Groundwater
 - Reports and data can be accessed at <http://dnrdata.dnr.ne.gov/Clearinghouse/Clearinghouse.aspx>
- Scientific Investigations Report:
 - Altitude, Age and Quality of Groundwater, Papio-Missouri River Natural Resources District, Eastern Nebraska, 1992-2009
<http://pubs.usgs.gov/sir/2012/5036/>

Publications

- Nebraska Groundwater Quality Monitoring Report
 - http://deq.ne.gov/publica.nsf/Pubs_Wat.xsp

2018 Nebraska Groundwater Quality Monitoring Report

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



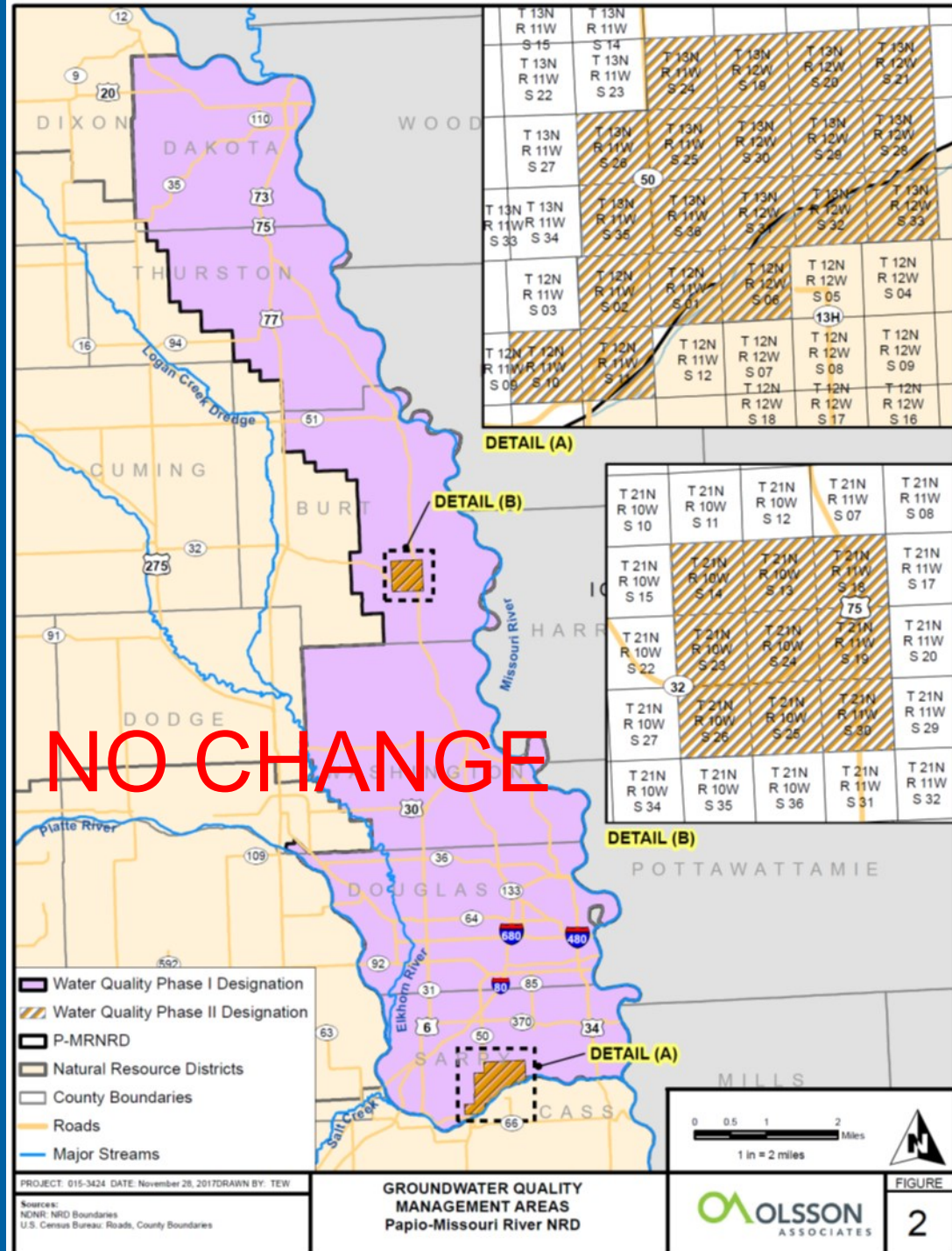
GWMP Implications

- **GWMP Requirements:**
 - 50% of samples, >5 mg/L before becoming Phase II Groundwater Quality Management Area

Groundwater Sub-Areas of interest (updated thru 2018)	Total Count	Nitrate greater than 5 mg/L	Percent greater than 5mg/L	Notes
Phase II Subarea, south of Springfield	339346	248223	64%	Increasing trend at depth in Springfield cluster
Platte/Elkhorn, Douglas and Sarpy County	469474	14	3%	Venice and Ashland clusters
South Sarpy Dakota	3539	11	3128%	Not sampled frequently until 2013; South Sarpy and Springfield 2 cluster wells installed in 2016. Does not include wells sampled from undefined aquifers
Phase II Subarea, Tekamah Cluster	446122	7478	64%	Med and deep wells show all 7477 > 5 ppm and account for 7476 out of 446119 samples or 6465%

GWMP Implications

- GWMP:
 - NO CHANGE in GW Quality Management Areas based on 2018 WQ monitoring results



CONTACT INFORMATION

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