National Ground-Water Monitoring Network

USGS initiative provides funding to NDEQ

Two main tasks:

1) Picking wells (CSD)
2) Establishing database connections

https://cida.usgs.gov/ngwmn/

ACWI
Advisory Committee on Water Information

National Ground-Water Monitoring Network

The National Ground-Water Monitoring Network (NGWMN) is a product of the Subcommittee on Ground Water of the Federal Advisory Committee on Water Information (ACWI). The NGWMN is a compilation of selected groundwater monitoring wells from Federal, State, and local groundwater monitoring networks across the nation.

The NGWMN Data Portal provides access to groundwater data from multiple, dispersed databases in a web-based mapping application. The portal contains current and historical data including water levels, water quality, lithology, and well construction. The NGWMN is currently in the process of adding new data providers to the Network. Agencies or organizations collecting groundwater data can find out more about becoming a data provider for the Network.

Funding to support data providers to the National Ground-Water Monitoring Network is provided through USGS Cooperative Agreements. Agencies can also find information about the status of the USGS cooperative agreements .

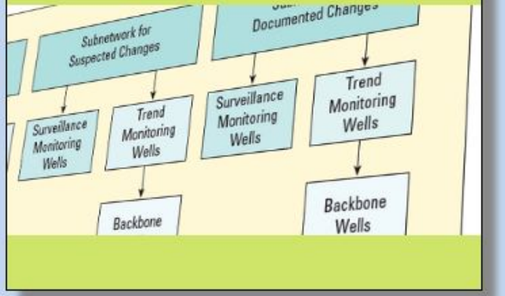
CURRENT NETWORK:

7290 water-level wells
1956 water-quality wells

10 subnetworks

29 contributing agencies
54 administrative units
63 principal aquifers

LEARN about the Network



EXPLORE the Network

version: 2.1.4

https://cida.usgs.gov/ngwmn/index.jsp

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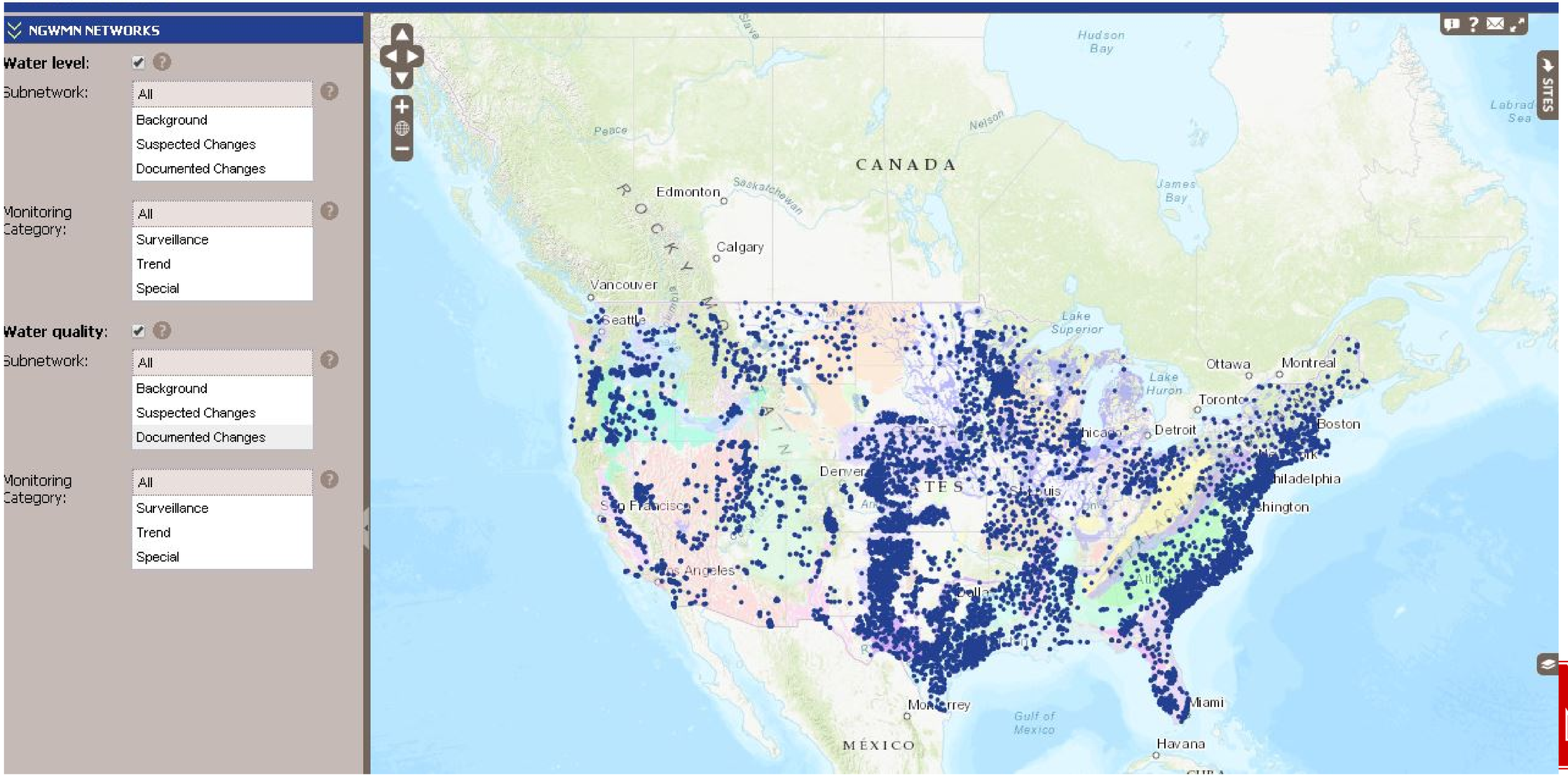
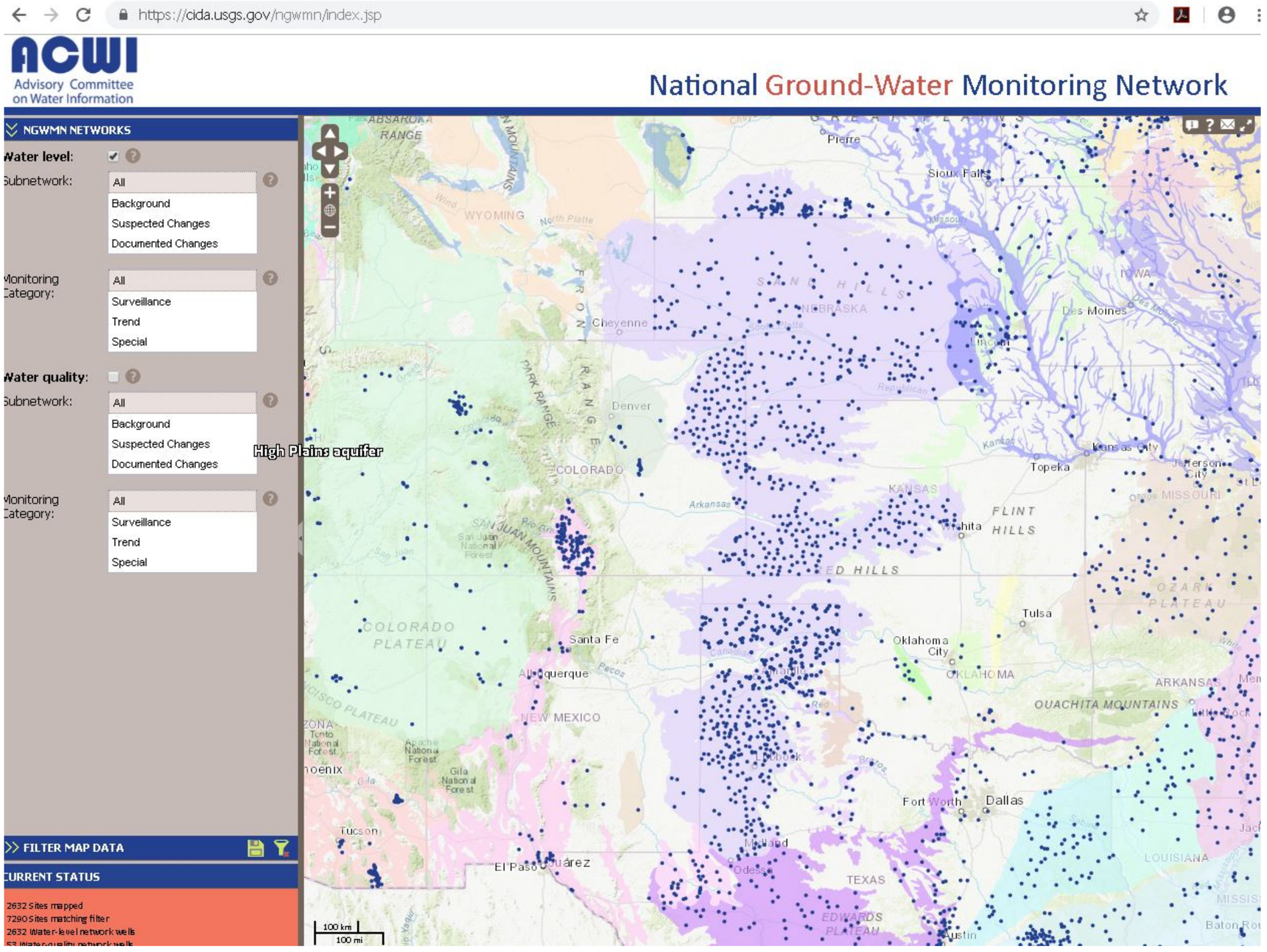
National Ground-Water Monitoring Network

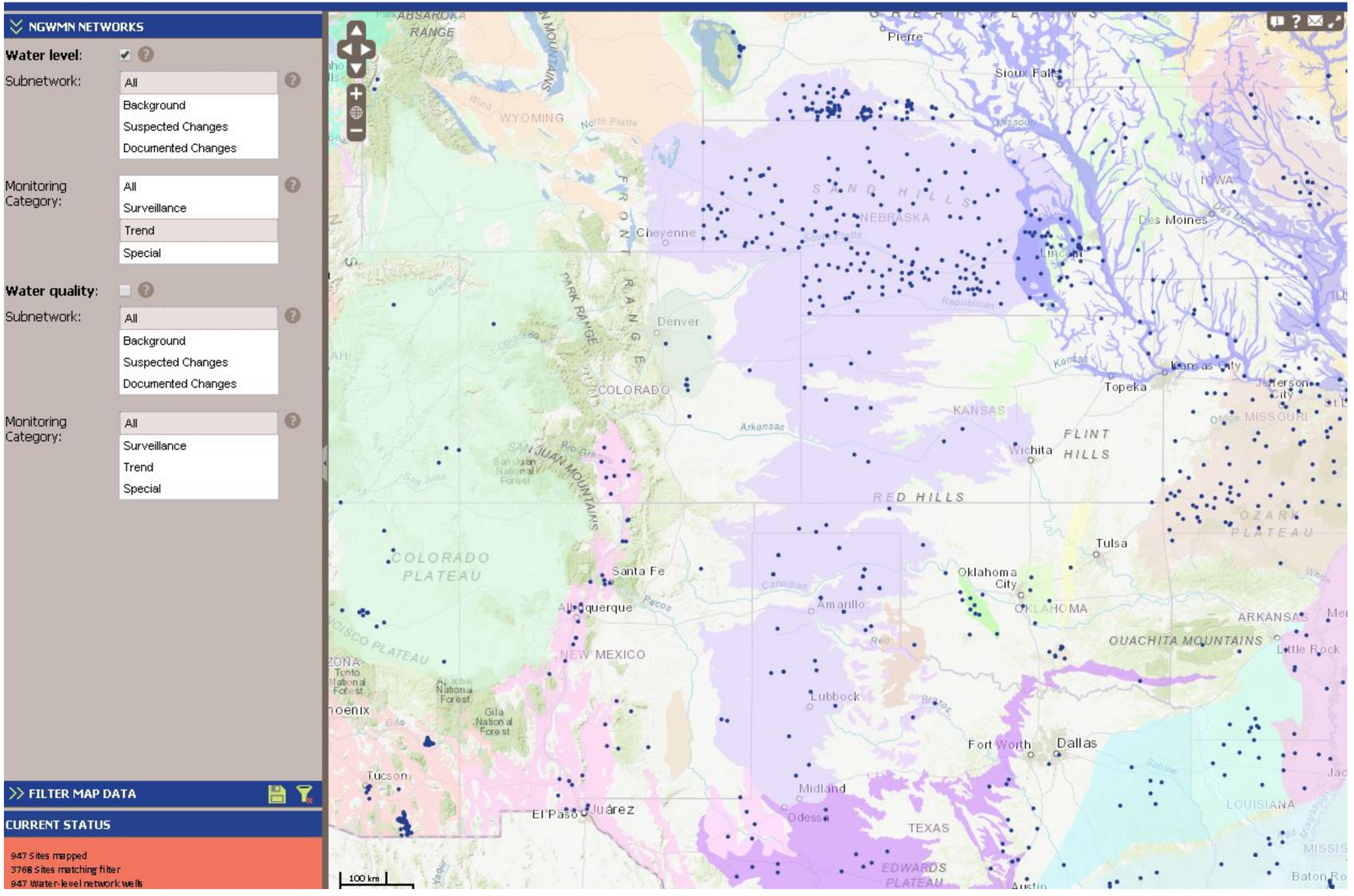


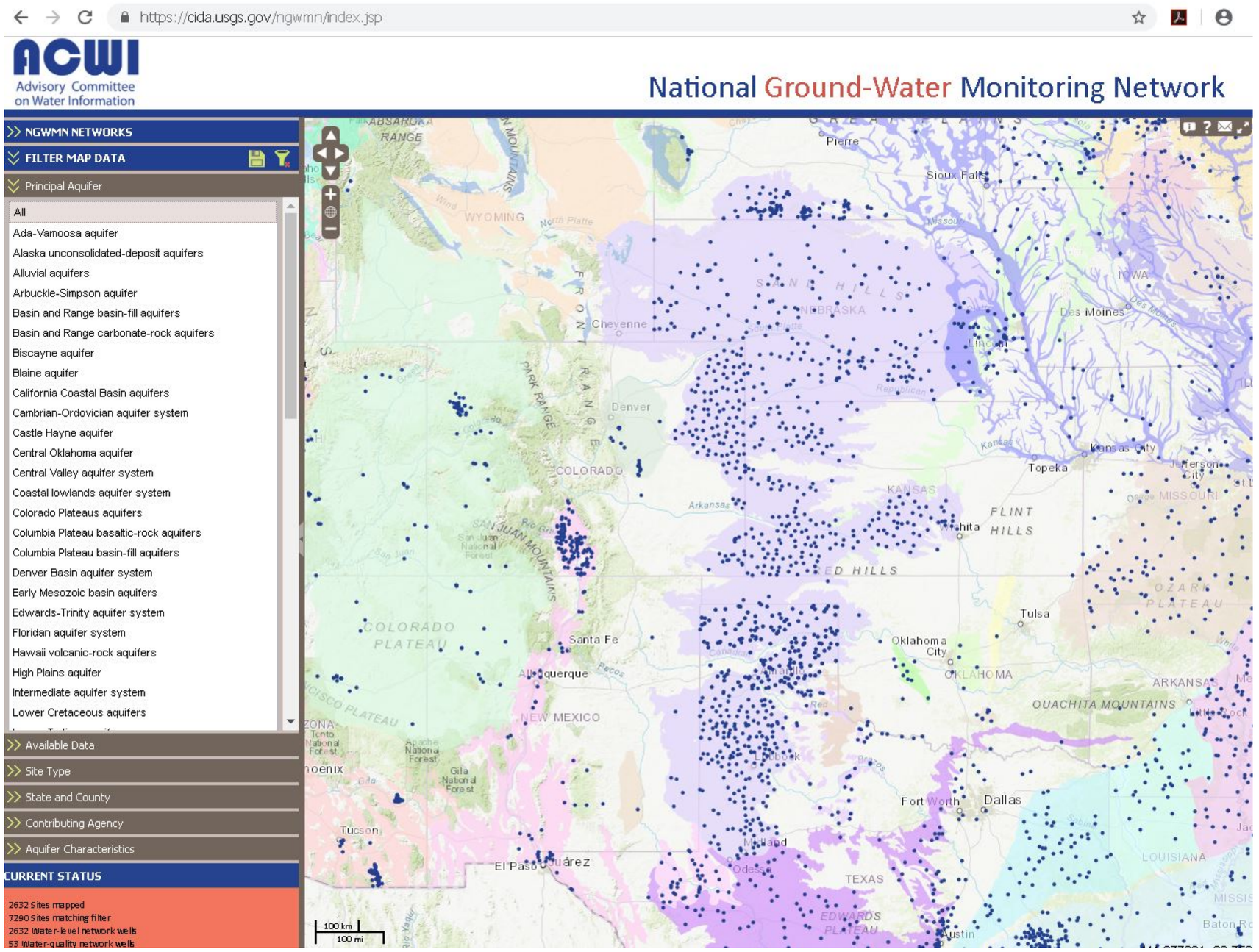

https://cida.usgs.gov/ngwmn/index.jsp
ACWI
Advisory Committee on Water Information
National Ground-Water Monitoring Network
NGWMN NETWORKS
Water level:
Subnetwork:
All
Background
Suspected Changes
Documented Changes
Monitoring Category:
All
Surveillance
Trend
Special
Water quality:
Subnetwork:
All
Background
Suspected Changes
Documented Changes
Monitoring Category:
All
Surveillance
Trend
Special
High Plains aquifer
FILTER MAP DATA
CURRENT STATUS
2632 Sites mapped
7290 Sites matching filter
2632 Water-level network wells
Pierre
Sioux Falls
WYOMING
NEBRASKA
Cheyenne
Des Moines
IOWA
Denver
COLORADO
Topeka
Kansas City
KANSAS
FLINT HILLS
Wichita
Tulsa
OZARK PLATEAU
Oklahoma City
OKLAHOMA
ARKANSAS
OUACHITA MOUNTAINS
Santa Fe
Albuquerque
NEW MEXICO
COLORADO PLATEAU
Fort Worth
Dallas
Tucson
El Paso
Juárez
TEXAS
LOUISIANA
Austin
100 km
100 mi

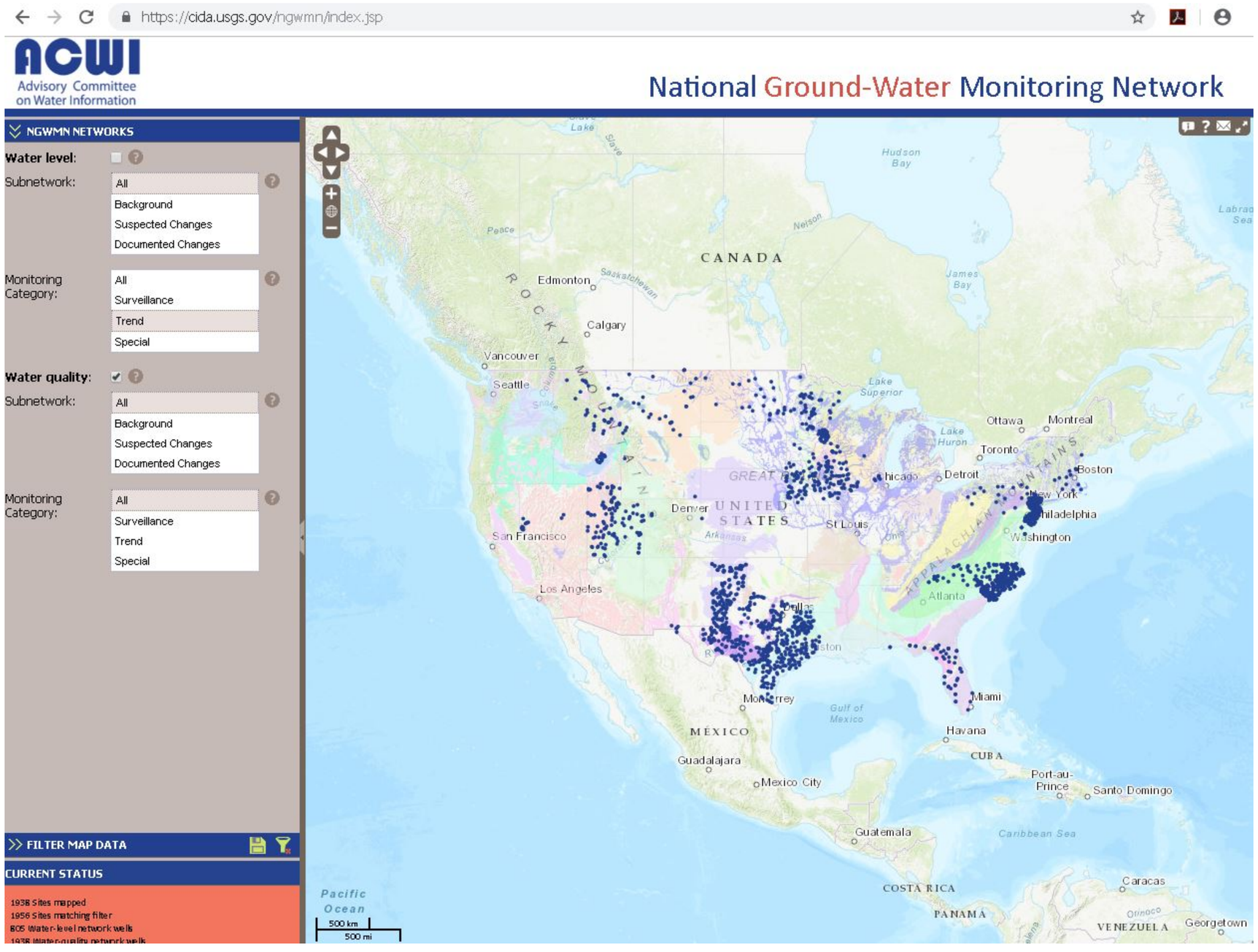
https://cida.usgs.gov/ngwmn/index.jsp

ACWI Advisory Committee on Water Information

National Ground-Water Monitoring Network




https://cida.usgs.gov/ngwmn/index.jsp
ACWI
Advisory Committee on Water Information
National Ground-Water Monitoring Network
NGWMN NETWORKS
FILTER MAP DATA
Principal Aquifer
All
Ada-Vamoosa aquifer
Alaska unconsolidated-deposit aquifers
Alluvial aquifers
Arbuckle-Simpson aquifer
Basin and Range basin-fill aquifers
Basin and Range carbonate-rock aquifers
Biscayne aquifer
Blaine aquifer
California Coastal Basin aquifers
Cambrian-Ordovician aquifer system
Castle Hayne aquifer
Central Oklahoma aquifer
Central Valley aquifer system
Coastal lowlands aquifer system
Colorado Plateaus aquifers
Columbia Plateau basaltic-rock aquifers
Columbia Plateau basin-fill aquifers
Denver Basin aquifer system
Early Mesozoic basin aquifers
Edwards-Trinity aquifer system
Floridan aquifer system
Hawaii volcanic-rock aquifers
High Plains aquifer
Intermediate aquifer system
Lower Cretaceous aquifers
Available Data
Site Type
State and County
Contributing Agency
Aquifer Characteristics
CURRENT STATUS
2632 Sites mapped
7290 Sites matching filter
2632 Water-level network wells
53 Water-quality network wells
Pierre
Sioux Falls
WYOMING
Cheyenne
Denver
COLORADO
Des Moines
IOWA
NEBRASKA
Topeka
Kansas City
KANSAS
Wichita
FLINT HILLS
Tulsa
Oklahoma City
OKLAHOMA
ARKANSAS
OUACHITA MOUNTAINS
Santa Fe
Albuquerque
NEW MEXICO
COLORADO PLATEAU
Tucson
El Paso
Juárez
Fort Worth
Dallas
TEXAS
LOUISIANA
Austin
100 km
100 mi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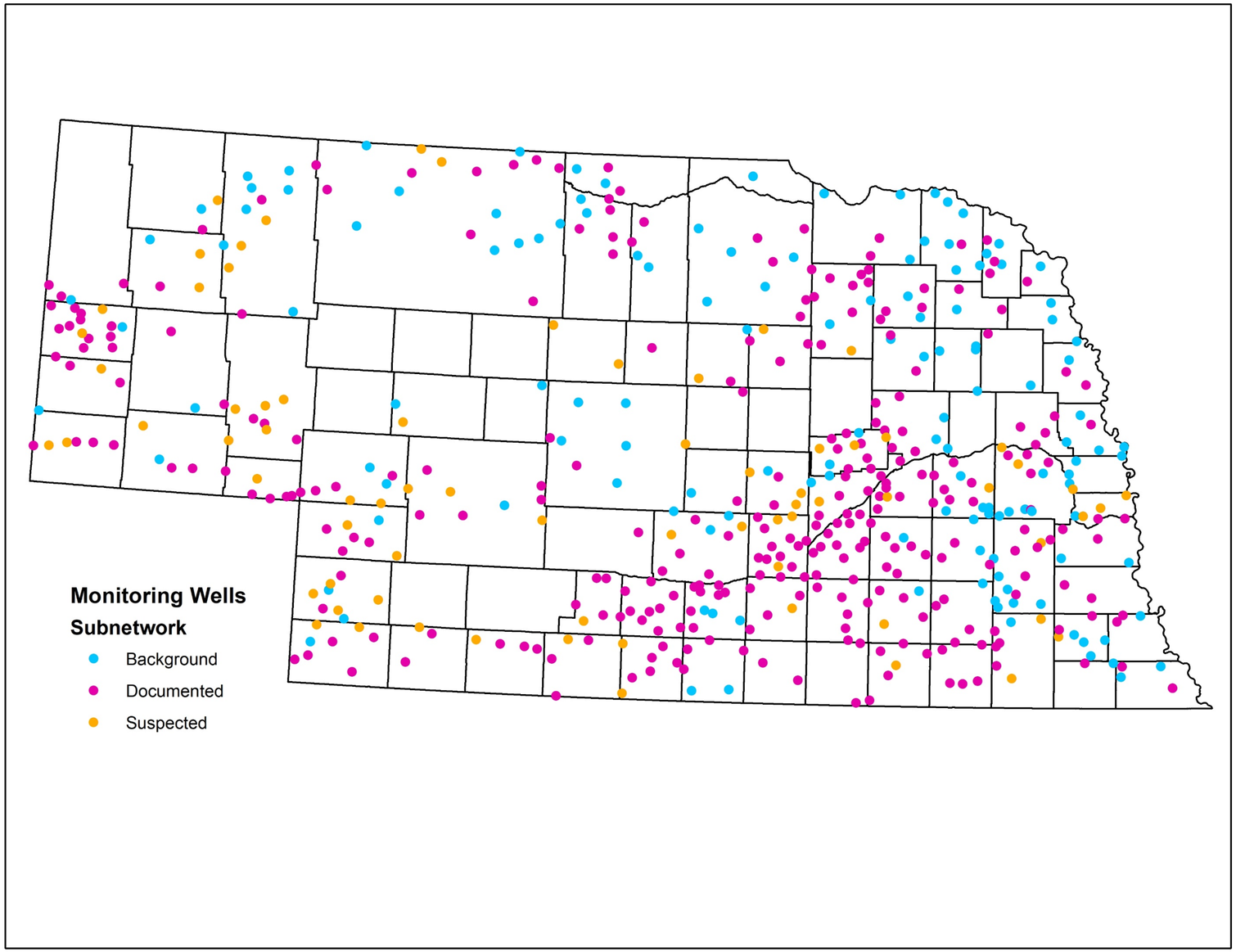
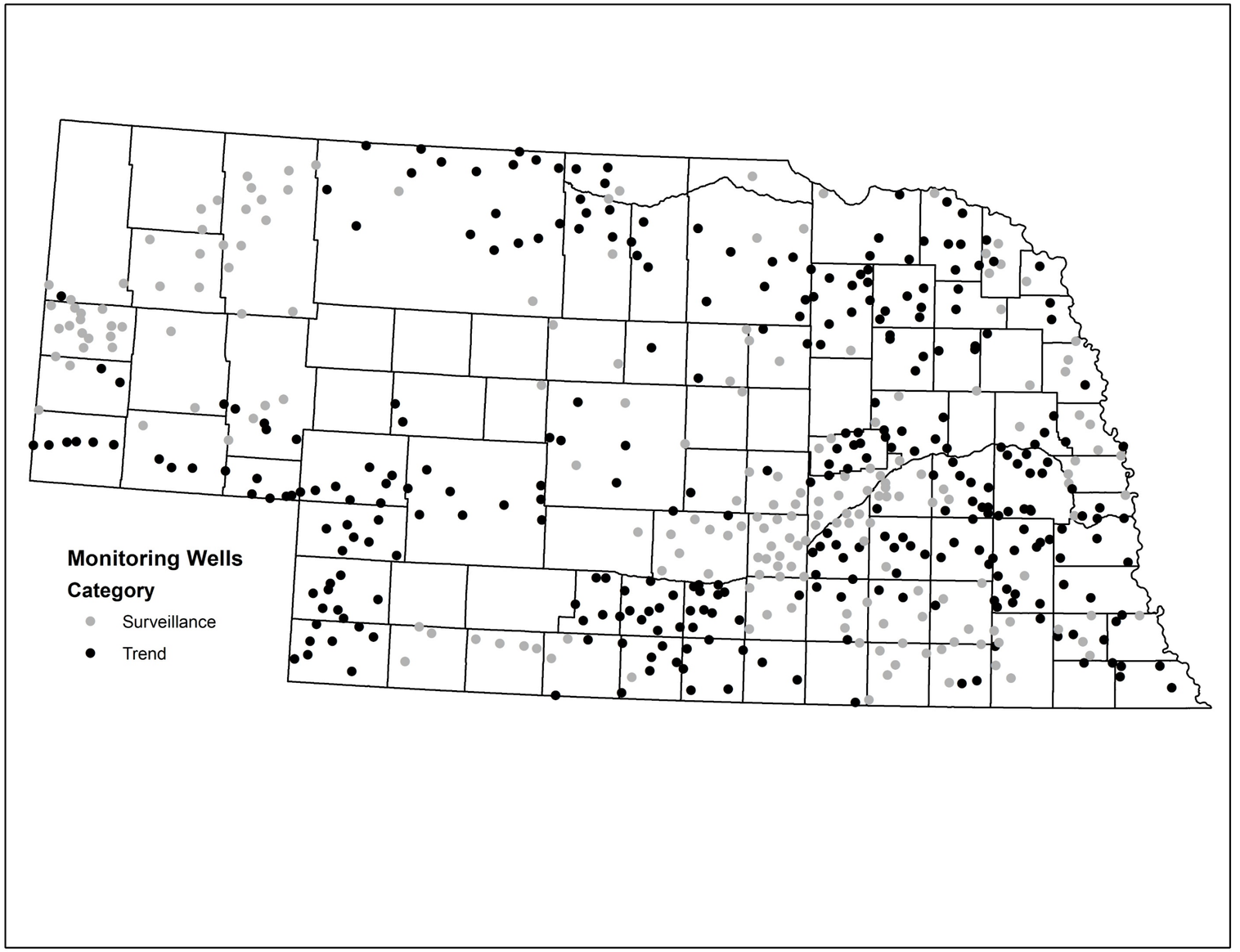
Water quality:
Subnetwork:
All
Background
Suspected Changes
Documented Changes
Monitoring Category:
All
Surveillance
Trend
Special
FILTER MAP DATA
CURRENT STATUS
1938 Sites mapped
1956 Sites matching filter
805 Water-level network wells
1938 Water-quality network wells
CANADA
Edmonton
Calgary
Vancouver
Seattle
Ottawa
Montreal
Toronto
Boston
Detroit
Chicago
Denver
UNITED STATES
St Louis
San Francisco
Los Angeles
Atlanta
Washington
Philadelphia
Miami
Havana
CUBA
Port-au-Prince
Santo Domingo
Monterrey
MÉXICO
Guadalajara
Mexico City
Guatemala
COSTA RICA
PANAMA
Caracas
VENEZUELA
Georgetown
Hudson Bay
James Bay
Lake Superior
Lake Huron
Gulf of Mexico
Caribbean Sea
Pacific Ocean
500 km
500 mi

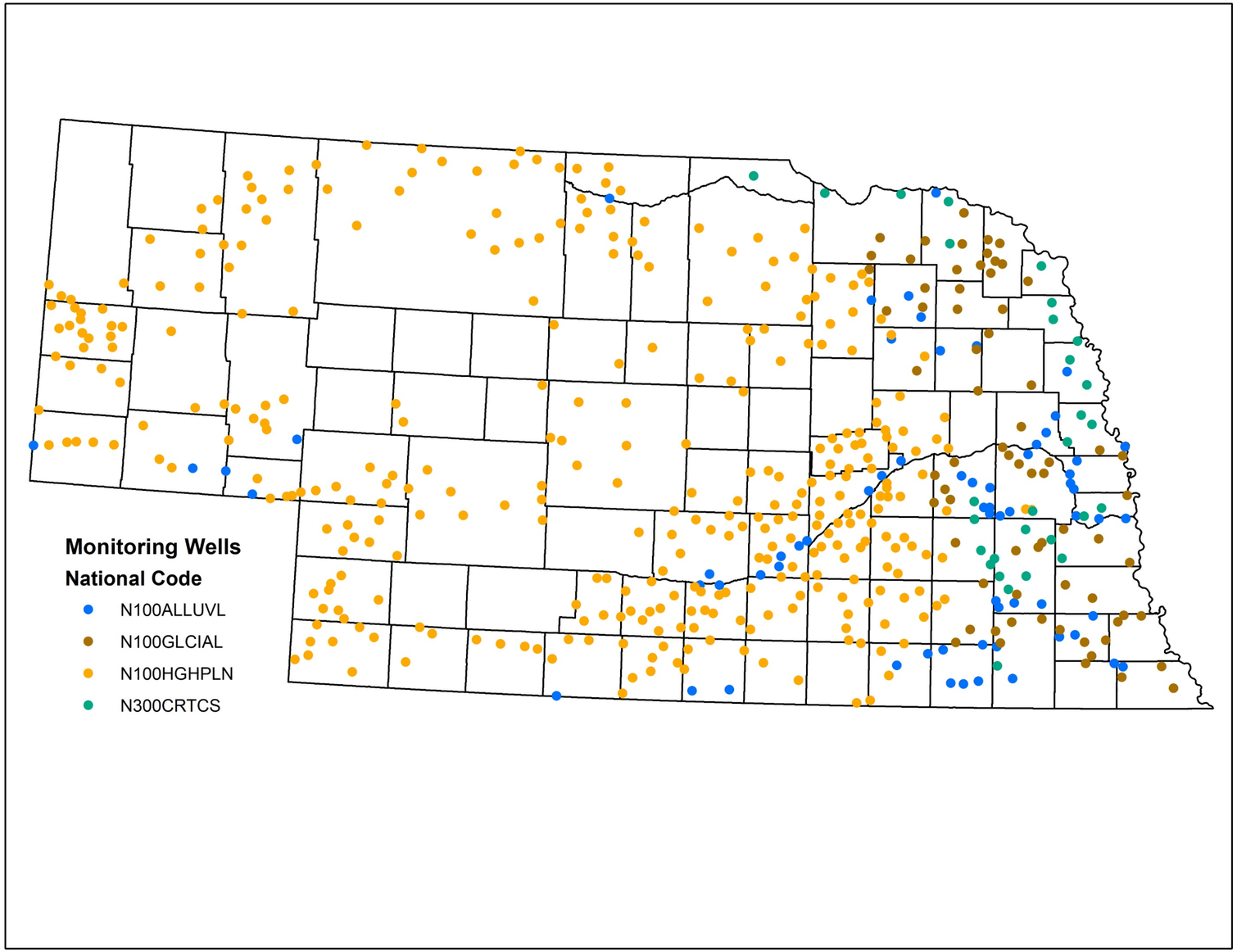
Nebraska wells by subnetwork



Nebraska wells by category

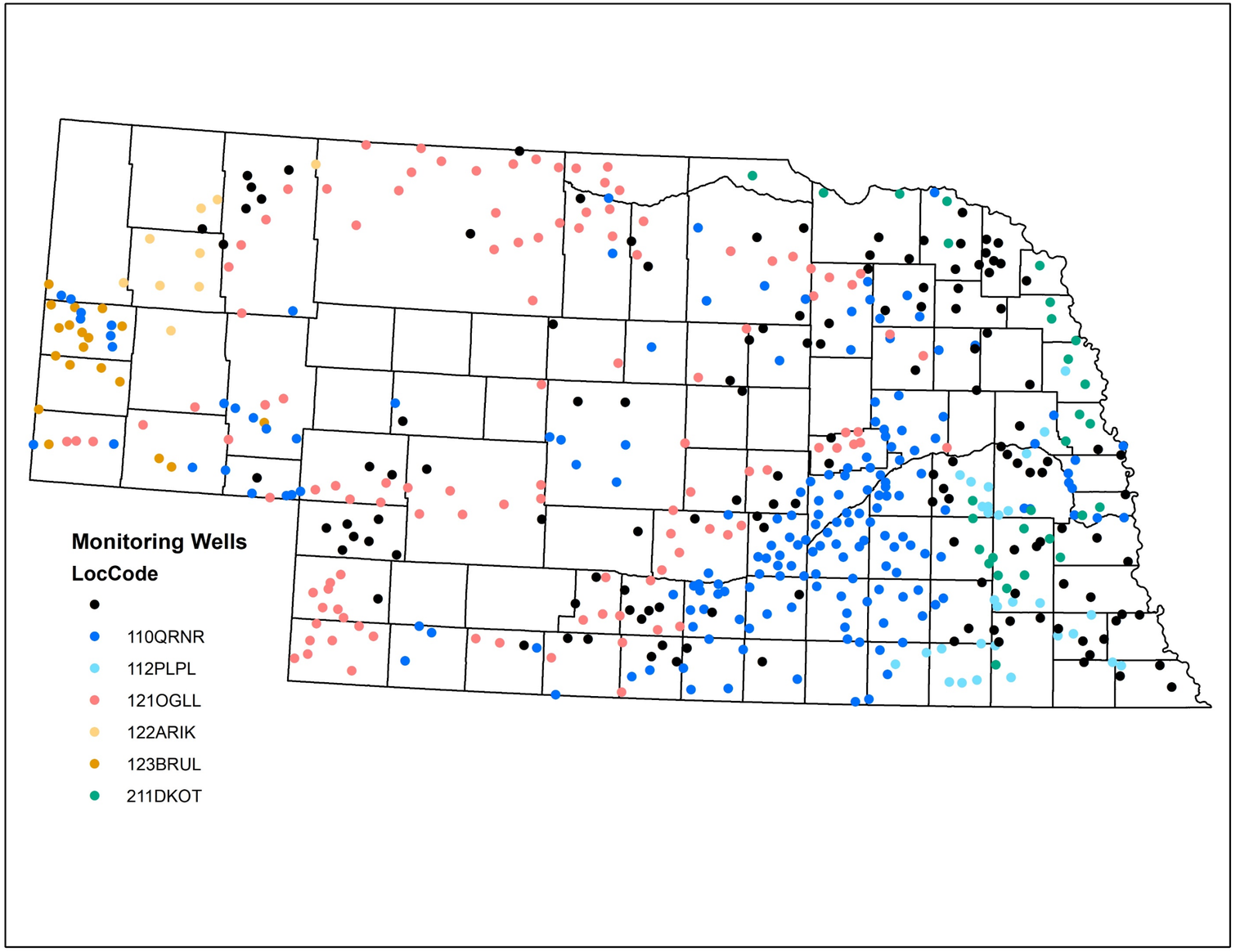


Nebraska wells by national aquifer



National and local aquifer classification

Nebraska wells by local aquifer



Next Steps

1) Import the various data elements
   well location, screen, lithology

2) Establish connection between Nebraska Quality-Assessed Agricultural Contaminant Database and the National Ground-Water Monitoring Network

Characterizing aquifer properties in the vicinity of a groundwater mound in the High Plains aquifer, south-central Nebraska

Dana Divine, Mikaela Cherry, Troy Gilmore
University of Nebraska

Nolan Little, John Thorburn
Tri-Basin Natural Resources District

Kevin Orvis, Mike Onnen
Little Blue Natural Resources District

Acknowledgements

Funded in part by Nebraska Environmental Trust

The Nebraska Environmental Trust
preserving NATURAL NEBRASKA™ for future generations

Also thanks to Marty Stange,
Hastings Utilities

Outline

- Overview of High Plains aquifer in Nebraska
- Postulated evolution of the Platte River in study area
- Shape of the groundwater mound
- Interpretive geologic cross sections
- Distribution of nitrate
- Future work

Geologic chart for study area

Out-dated Pleistocene classification

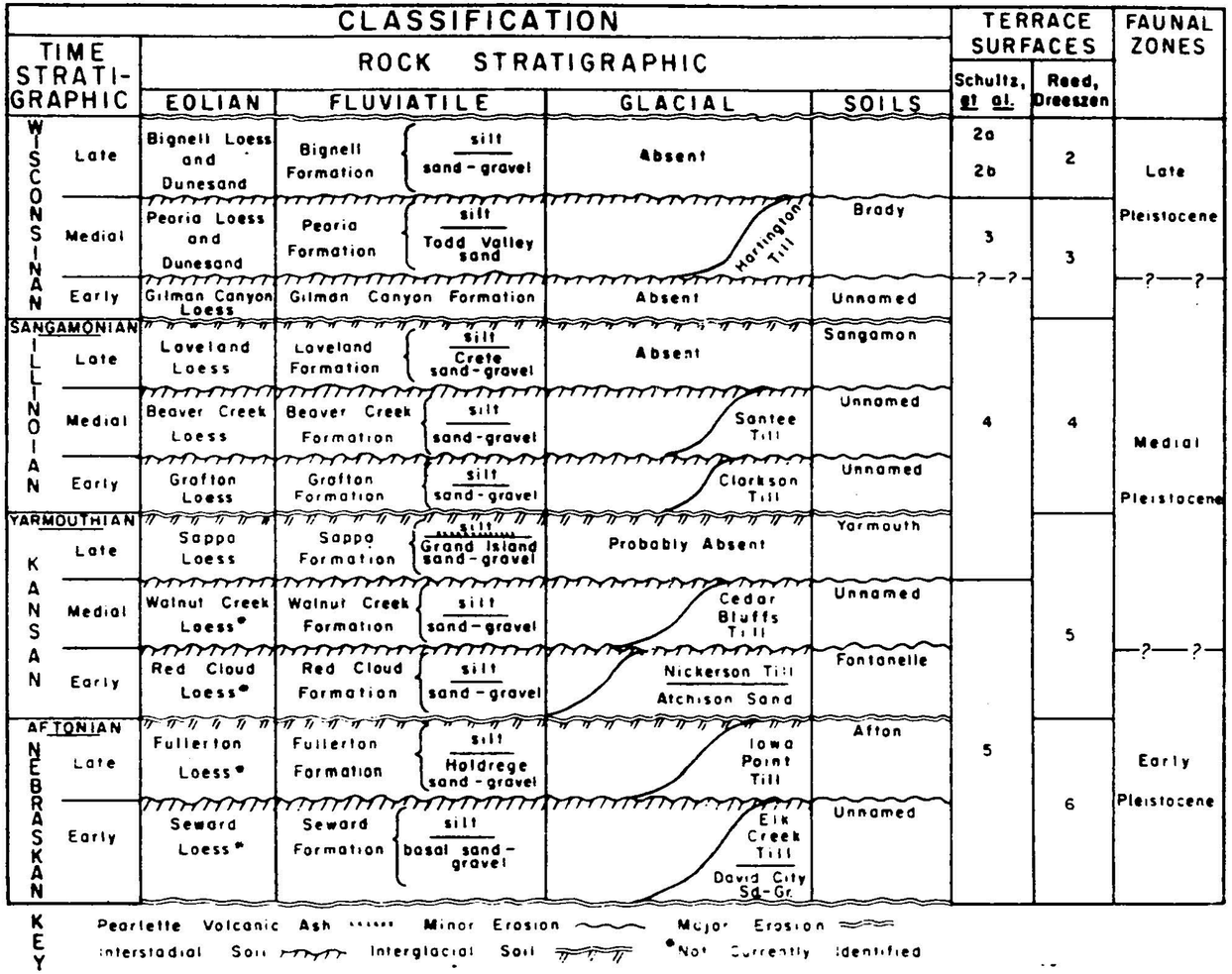
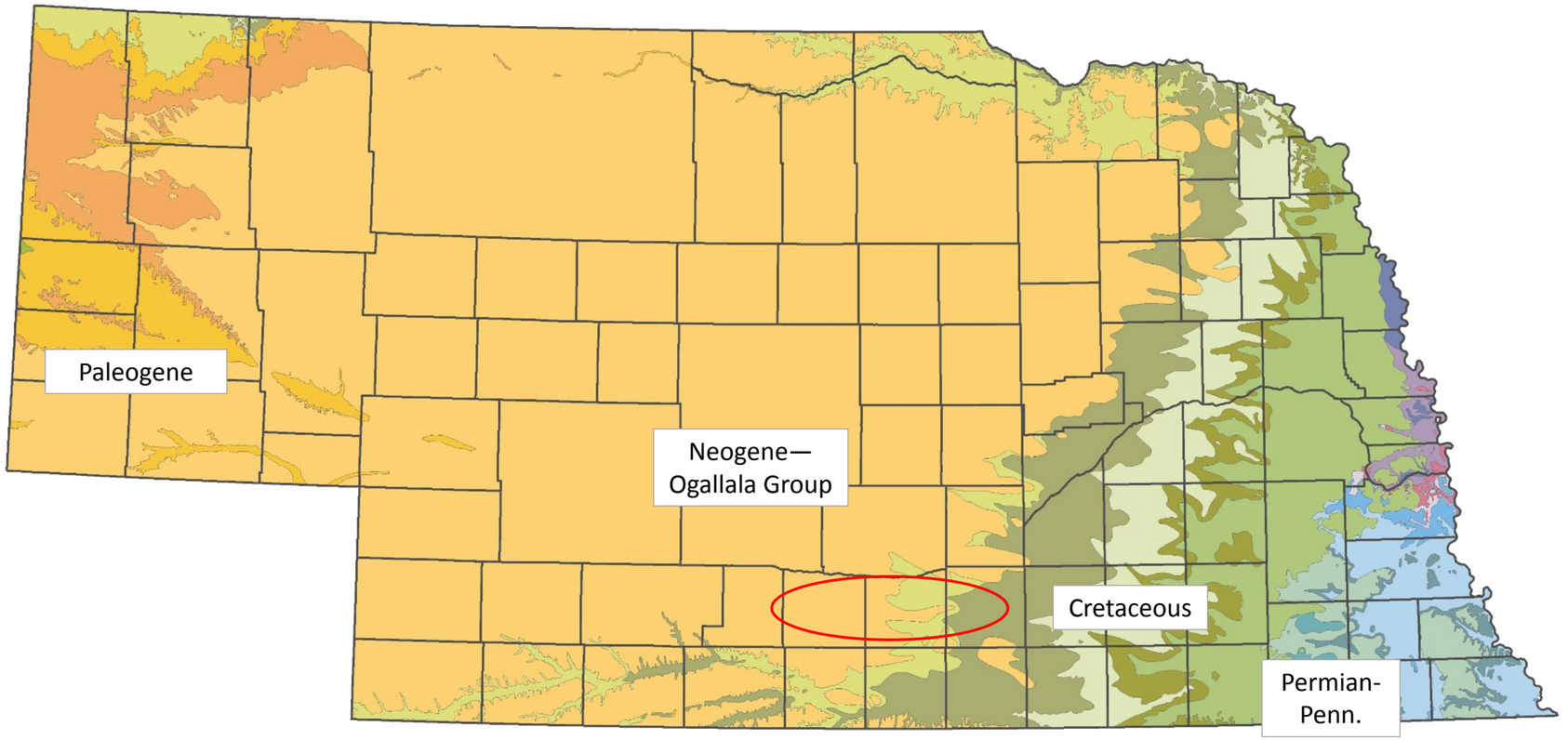
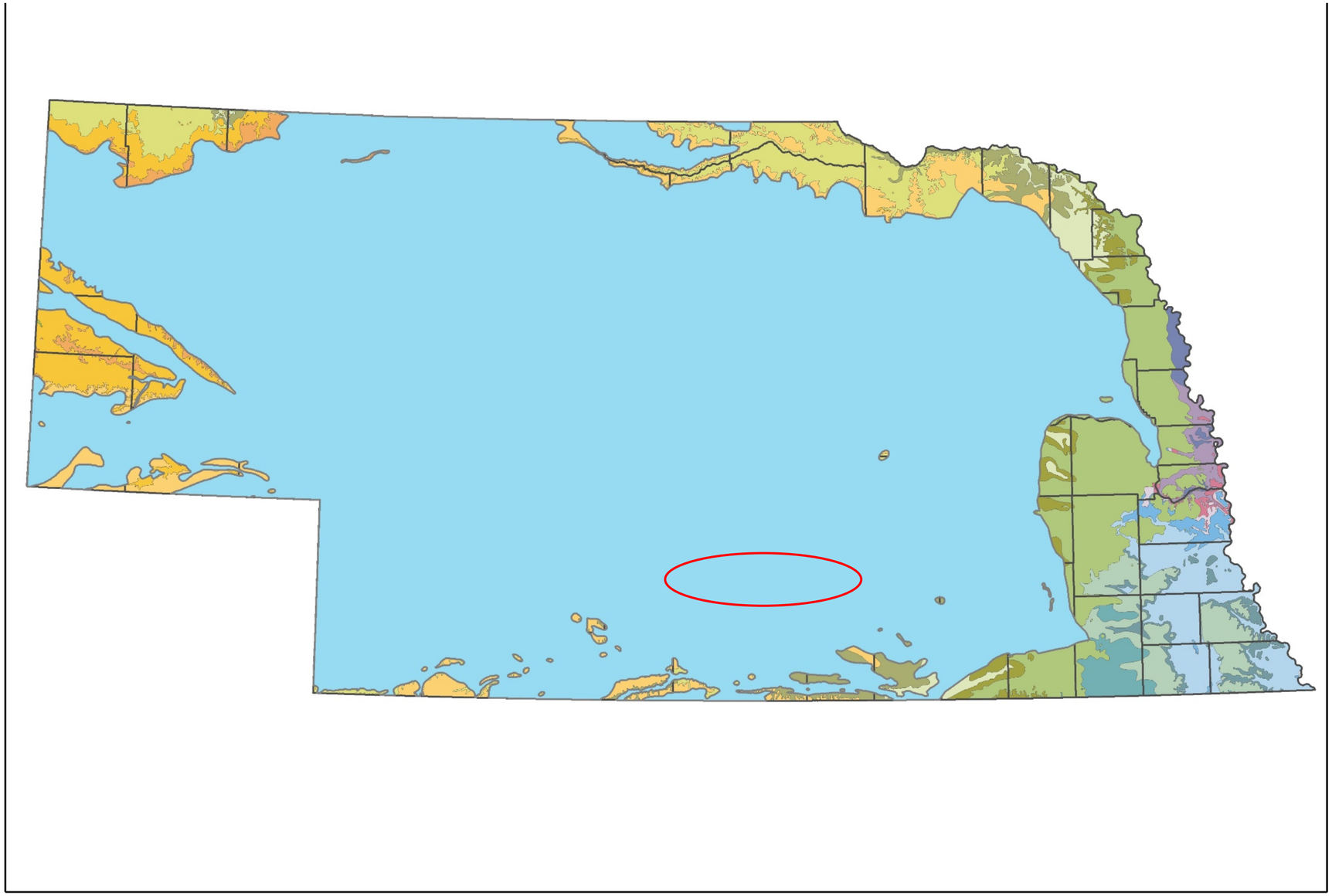


Figure 13. - Classification of Pleistocene deposits in Nebraska (after Reed and Dreeszen, 1965)

Bedrock geology of Nebraska



Approximate extent of HPA in Nebraska



Groundwater mounds in the HPA in Nebraska

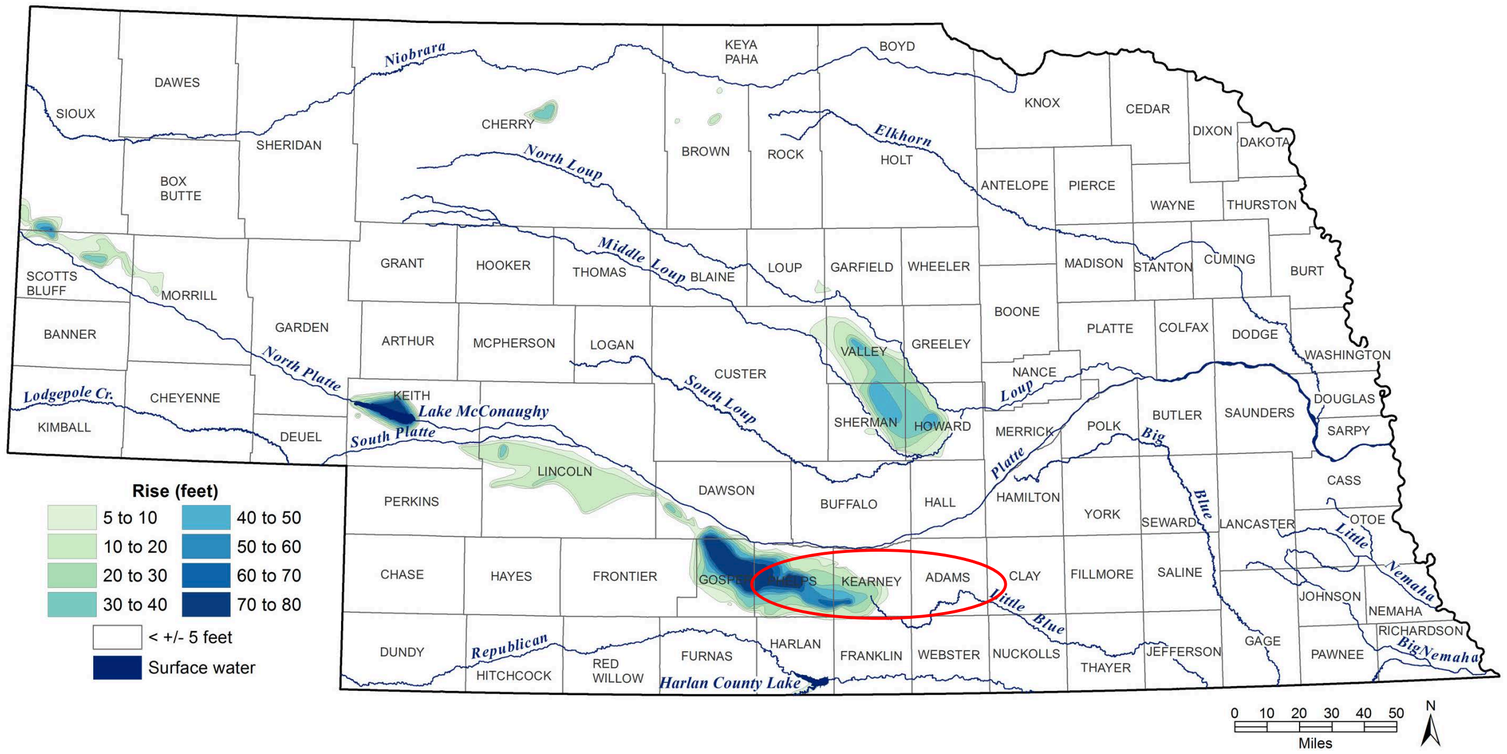
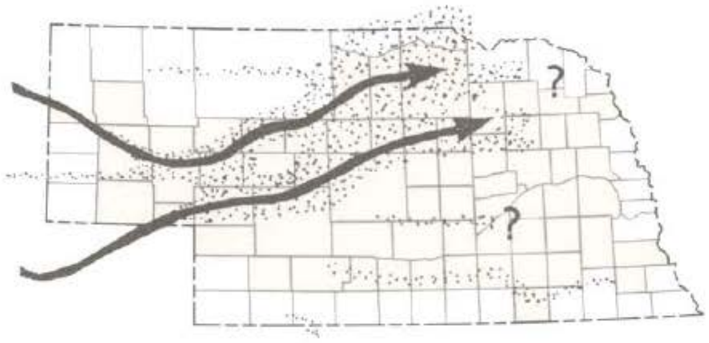


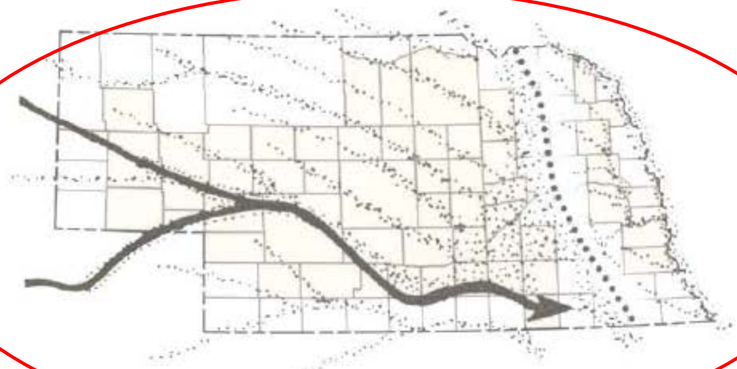
Figure 5. Rises in groundwater levels as a result of seepage from surface water canals and reservoirs, from predevelopment to Spring, 2012.

Korus et al., 2013

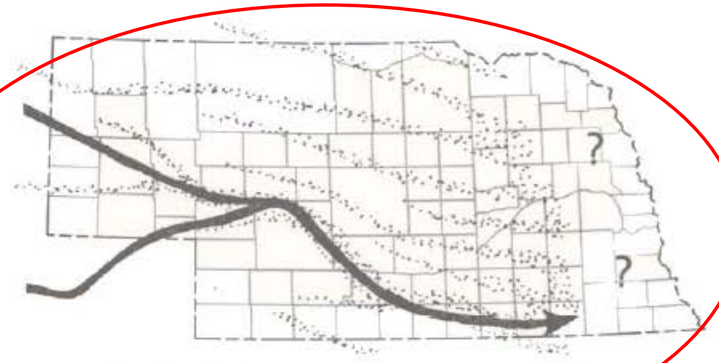
Postulated evolution of the Platte River



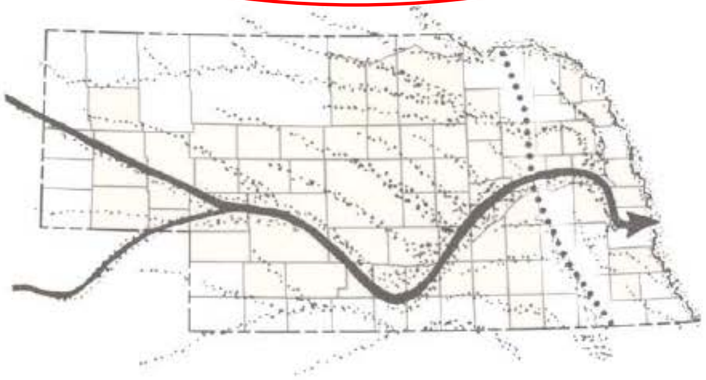
1. Late Pliocene (≃2.5 million years ago)



3. Illinoian (≃200,000 thousand years ago)



2. Early Pleistocene (≃1.5 million years ago)



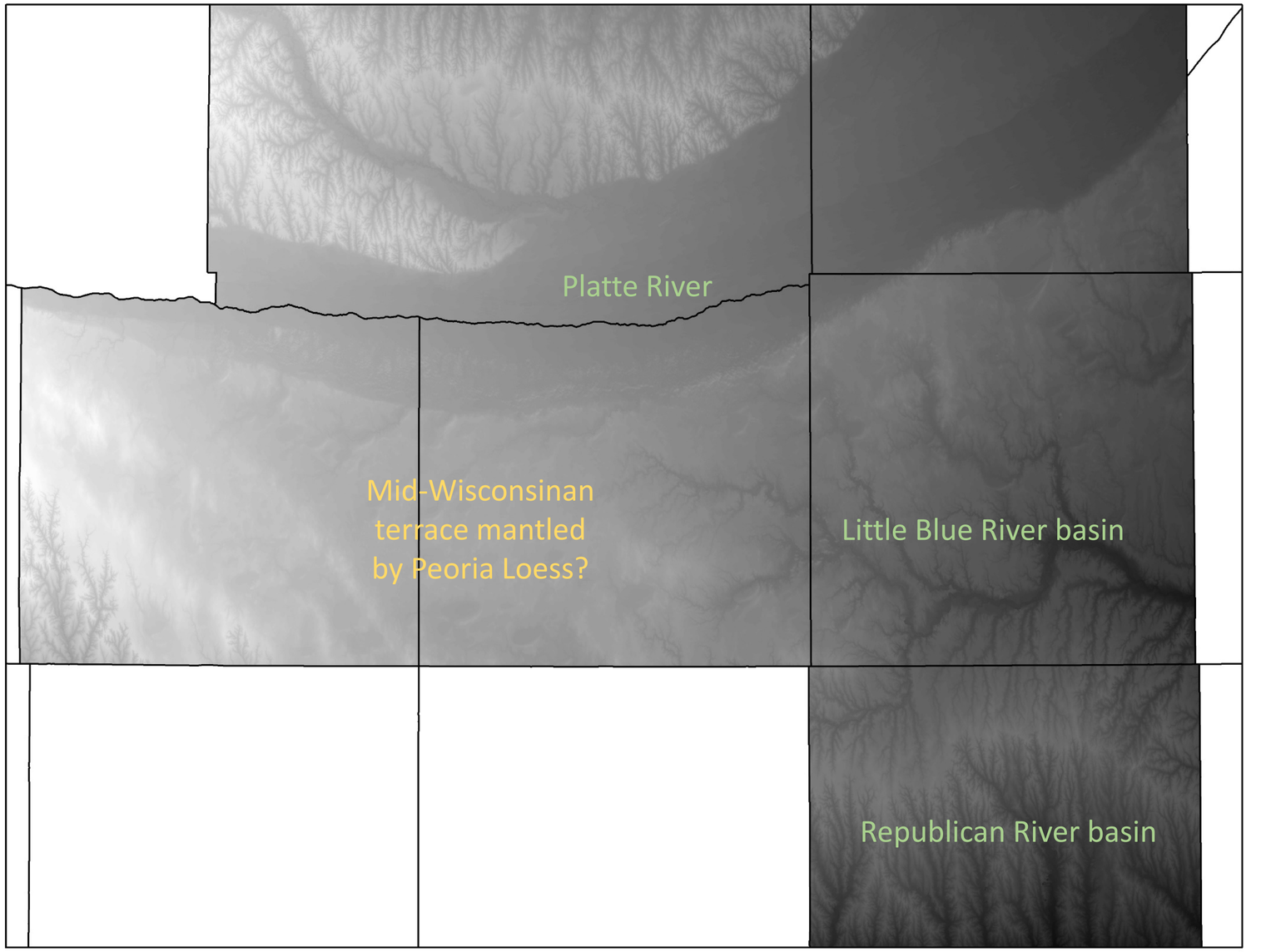
4. Late Wisconsin (≃30 thousand years ago)

POSTULATED EVOLUTION OF PLATTE RIVER AND RELATED DRAINAGES

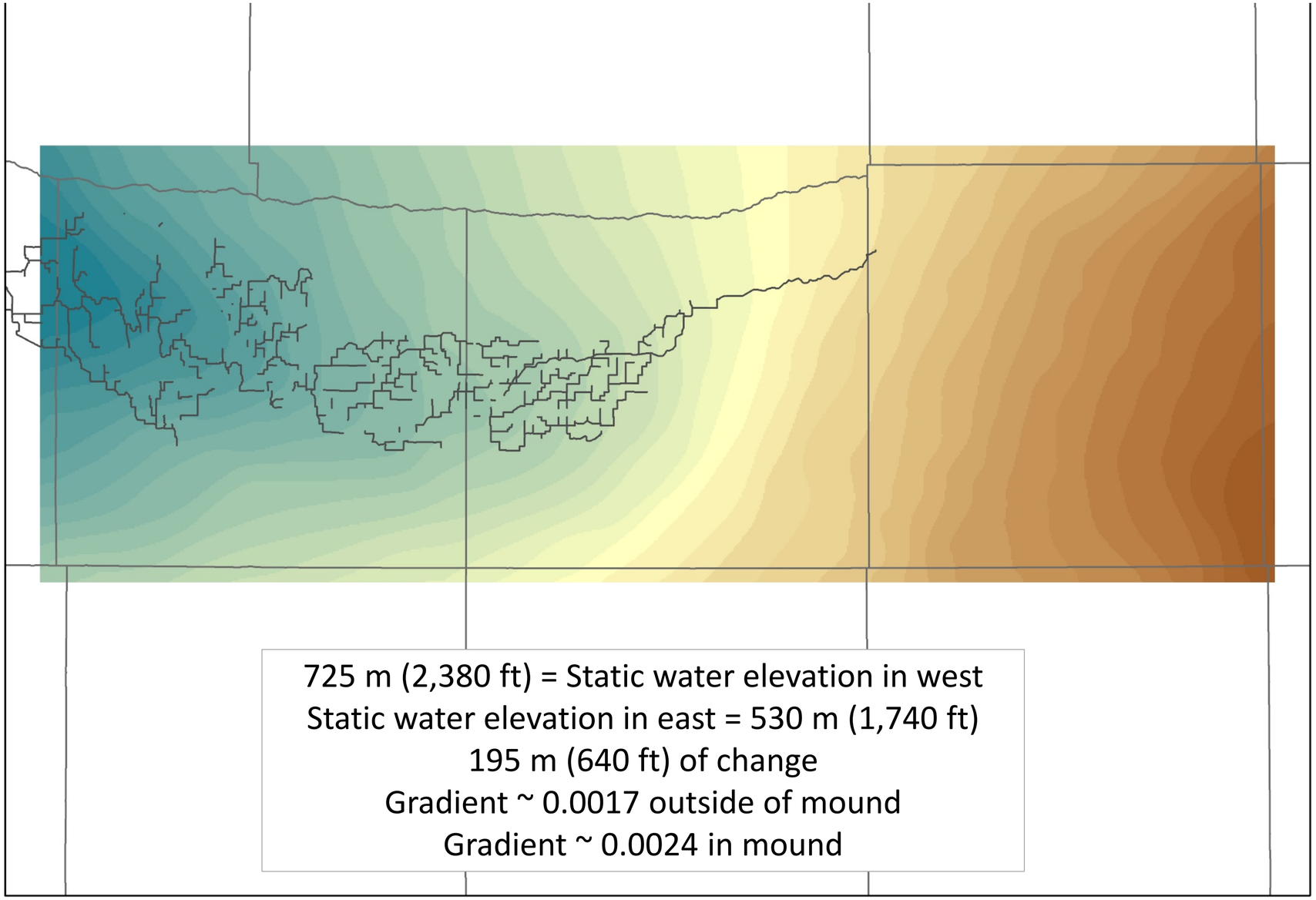
Sketch maps showing postulated drainage patterns when there was glacial ice in eastern Nebraska. Solid lines show main ancestral drainage of Platte River. Heavy dotted line represents terminal moraines of one or more pre-Illinoian glacial maxima, undifferentiated. Stippled pattern indicates probable areas of long-term fluvial deposition before and after the suggested dates. Queried where eastward extent of fluvial deposition unknown. Diagrams compiled from published and unpublished maps and stratigraphic sections by V.L. Souders, S.B. Swinehart, and V.H. Dreeszen, Conservation and Survey Division, University of Nebraska.

Swinehart et al., 1994

Modern topography of the study area

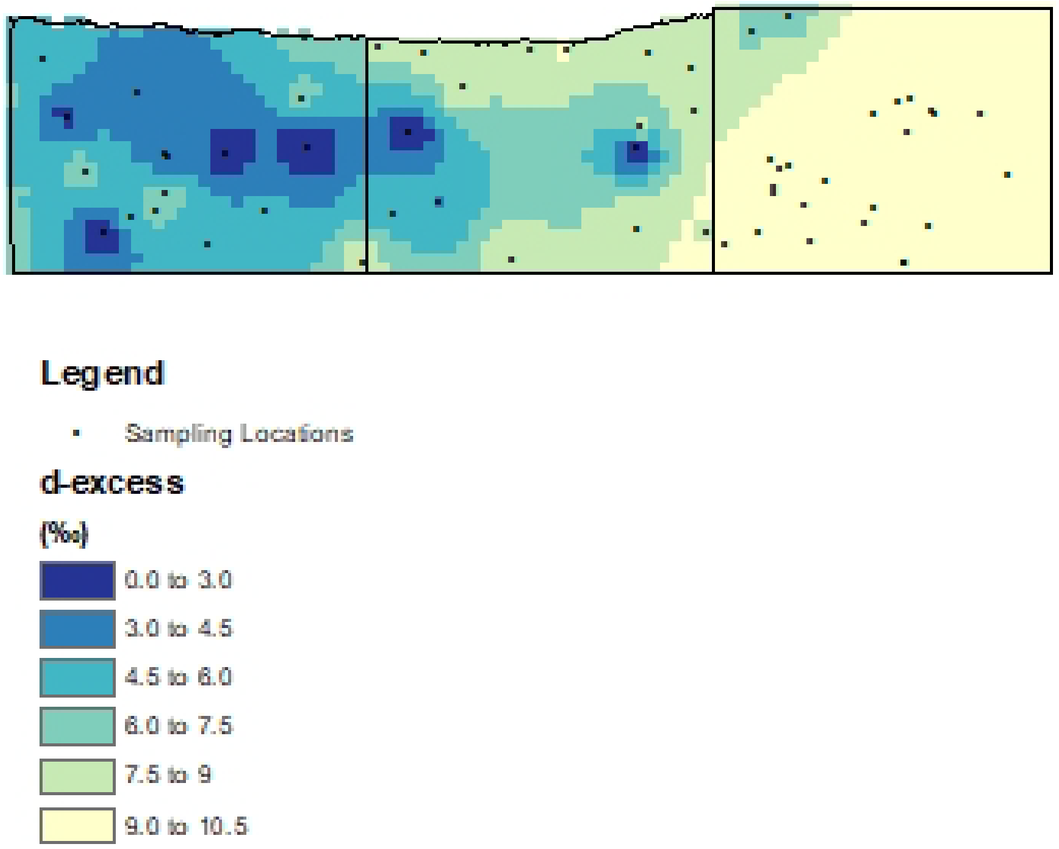


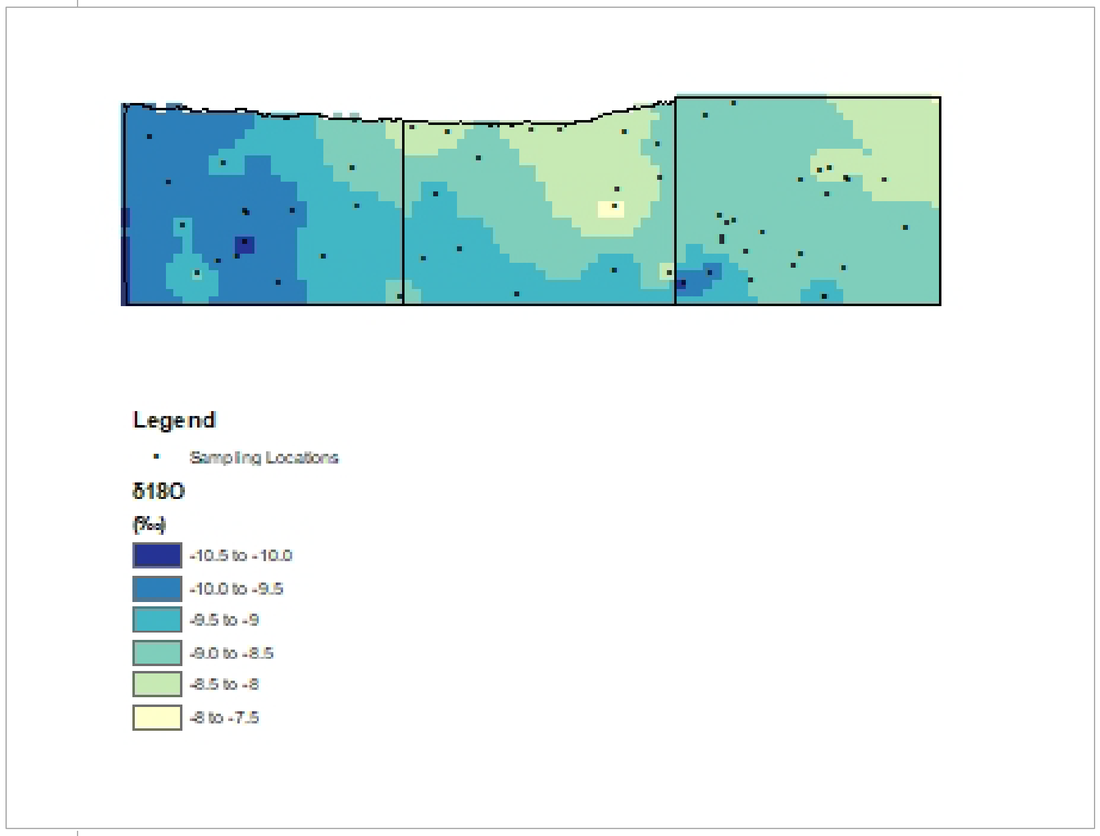
Canal system and static water elevation



725 m (2,380 ft) = Static water elevation in west
Static water elevation in east = 530 m (1,740 ft)
195 m (640 ft) of change
Gradient ~ 0.0017 outside of mound
Gradient ~ 0.0024 in mound

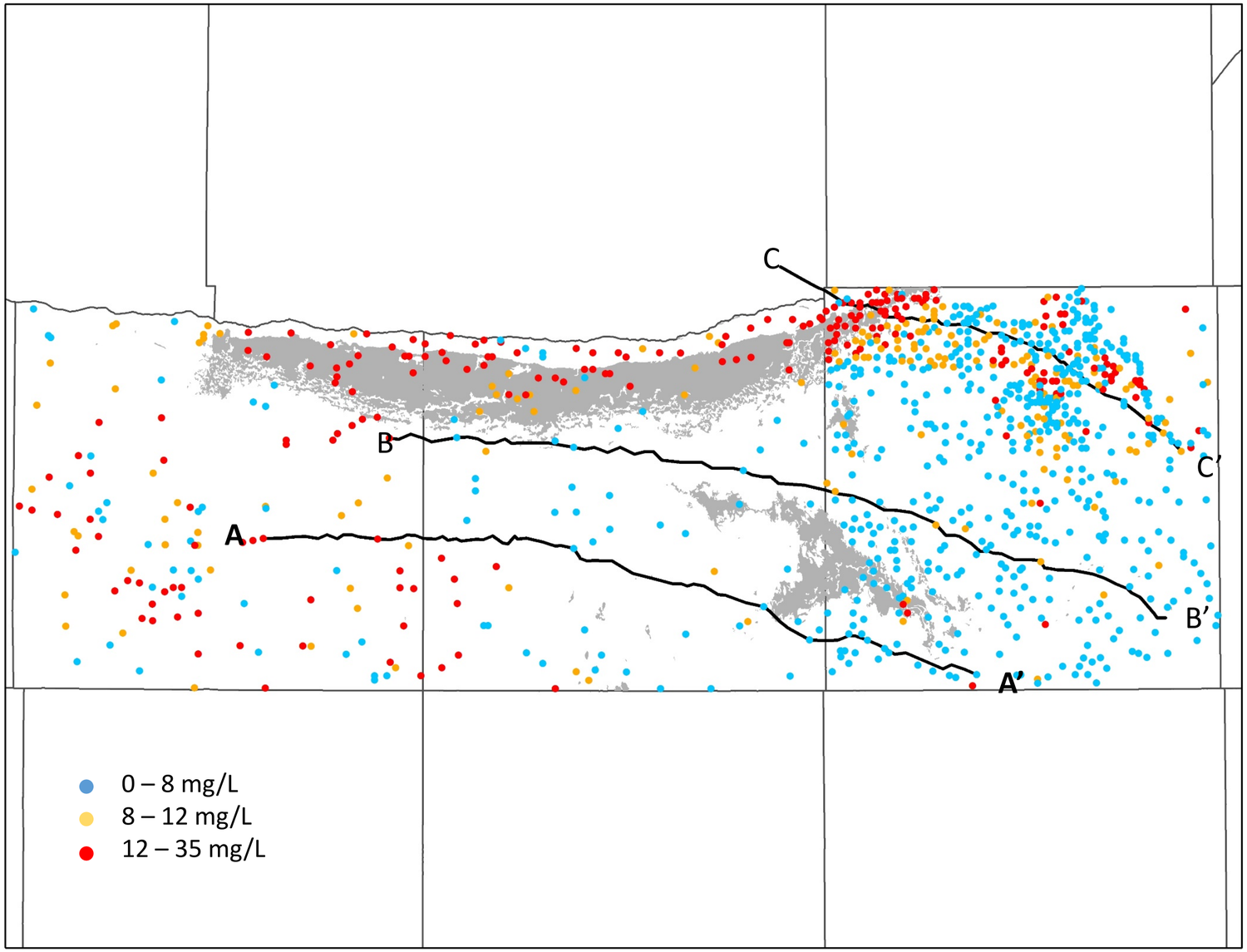
Mound delineated with isotopes



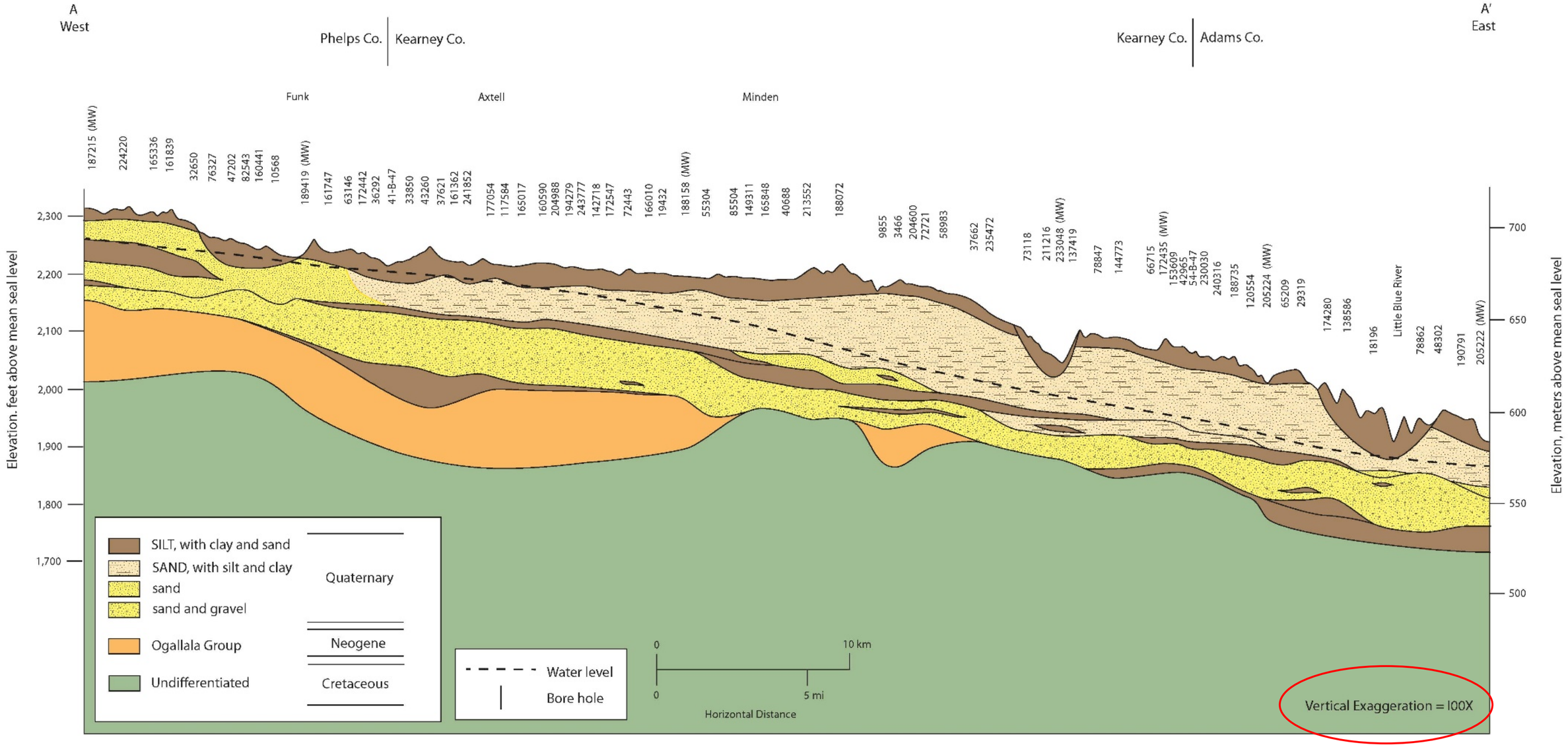


Cherry, Gilmore, and Gates, in review

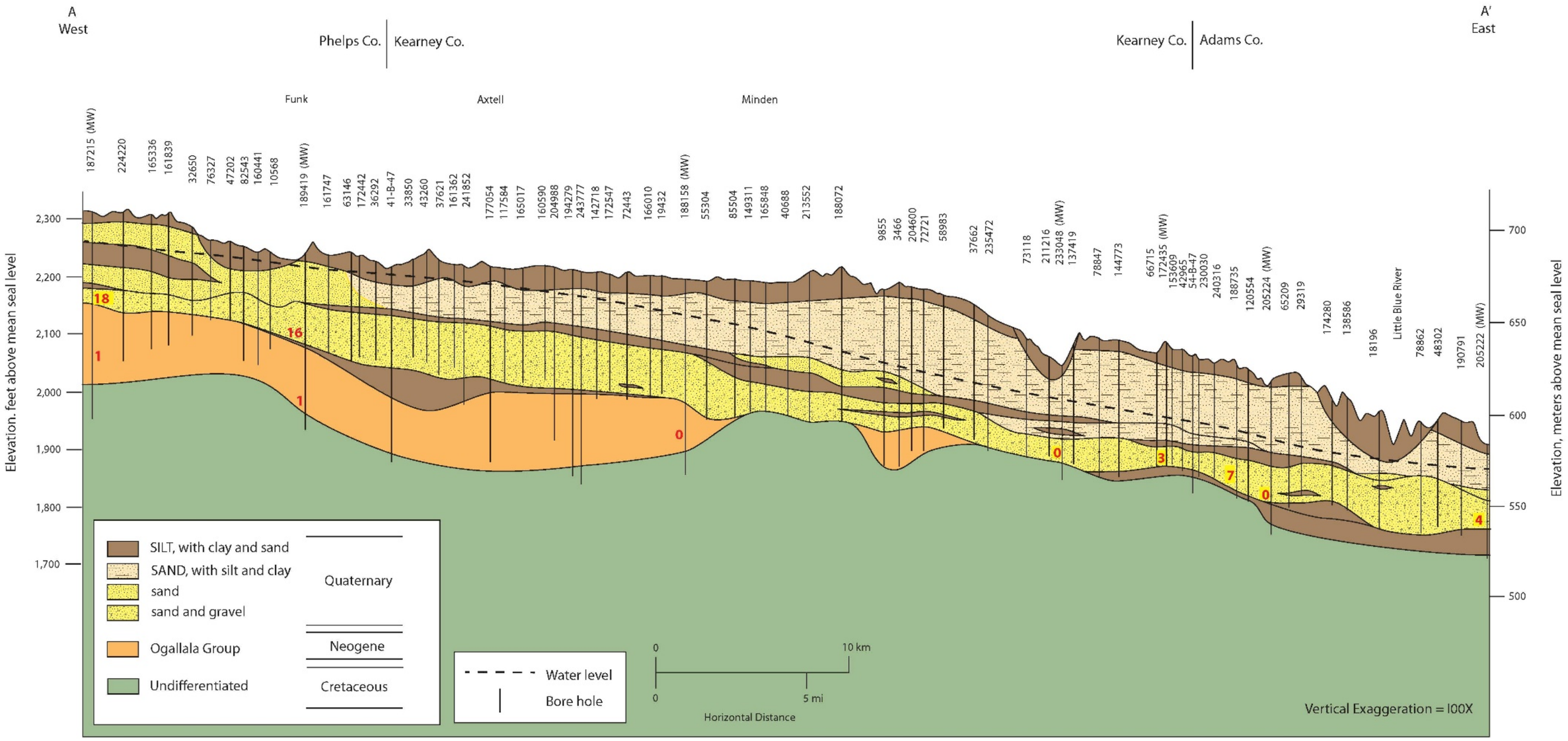
Nitrate data and cross section locations



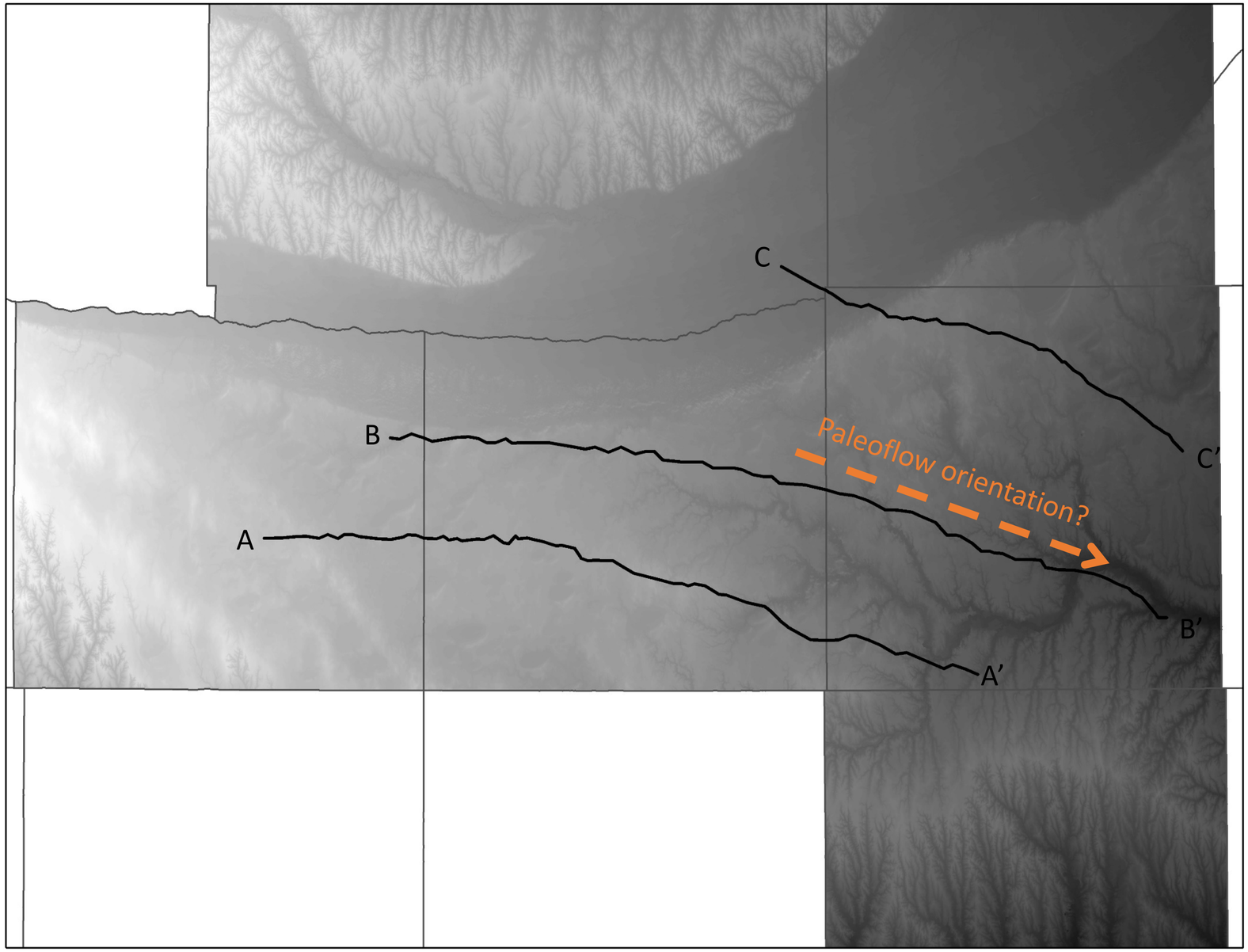
Interpretive geologic cross section A-A’



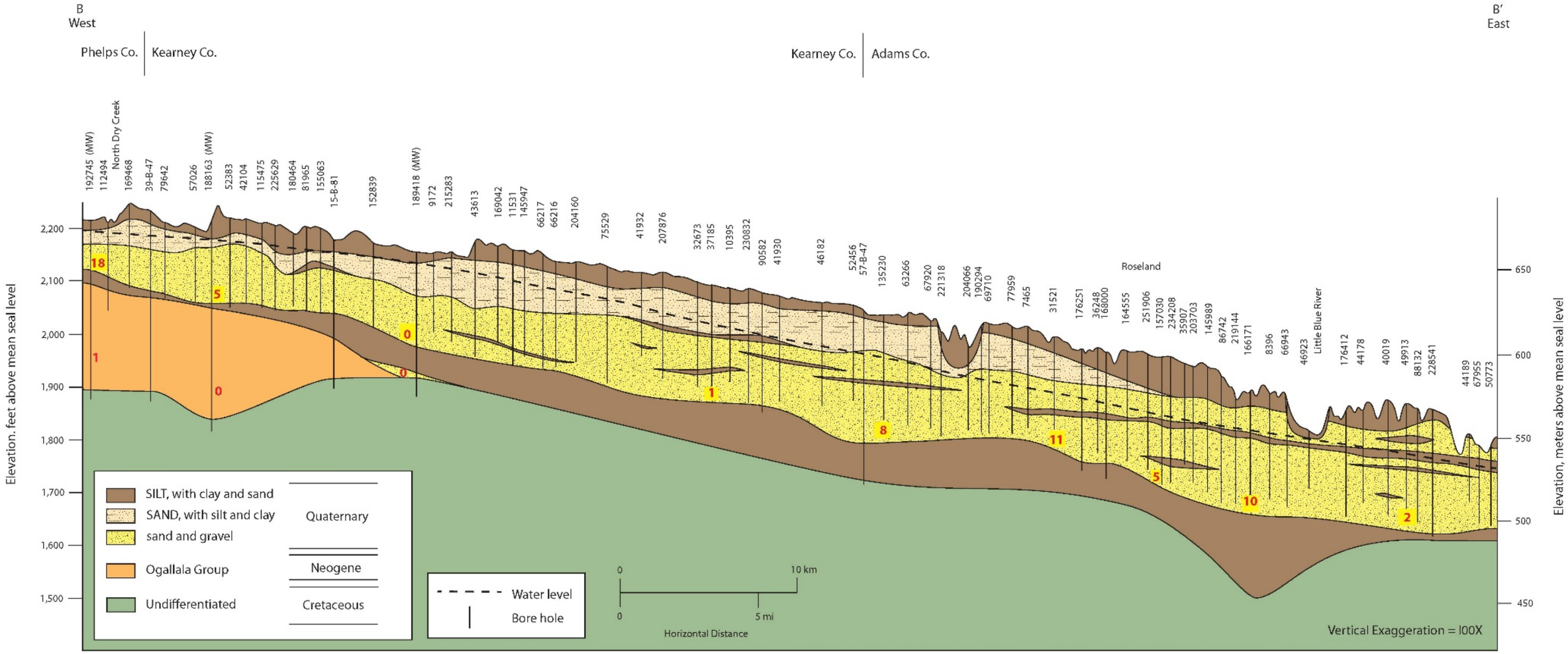
Interpretive geologic cross section A-A’



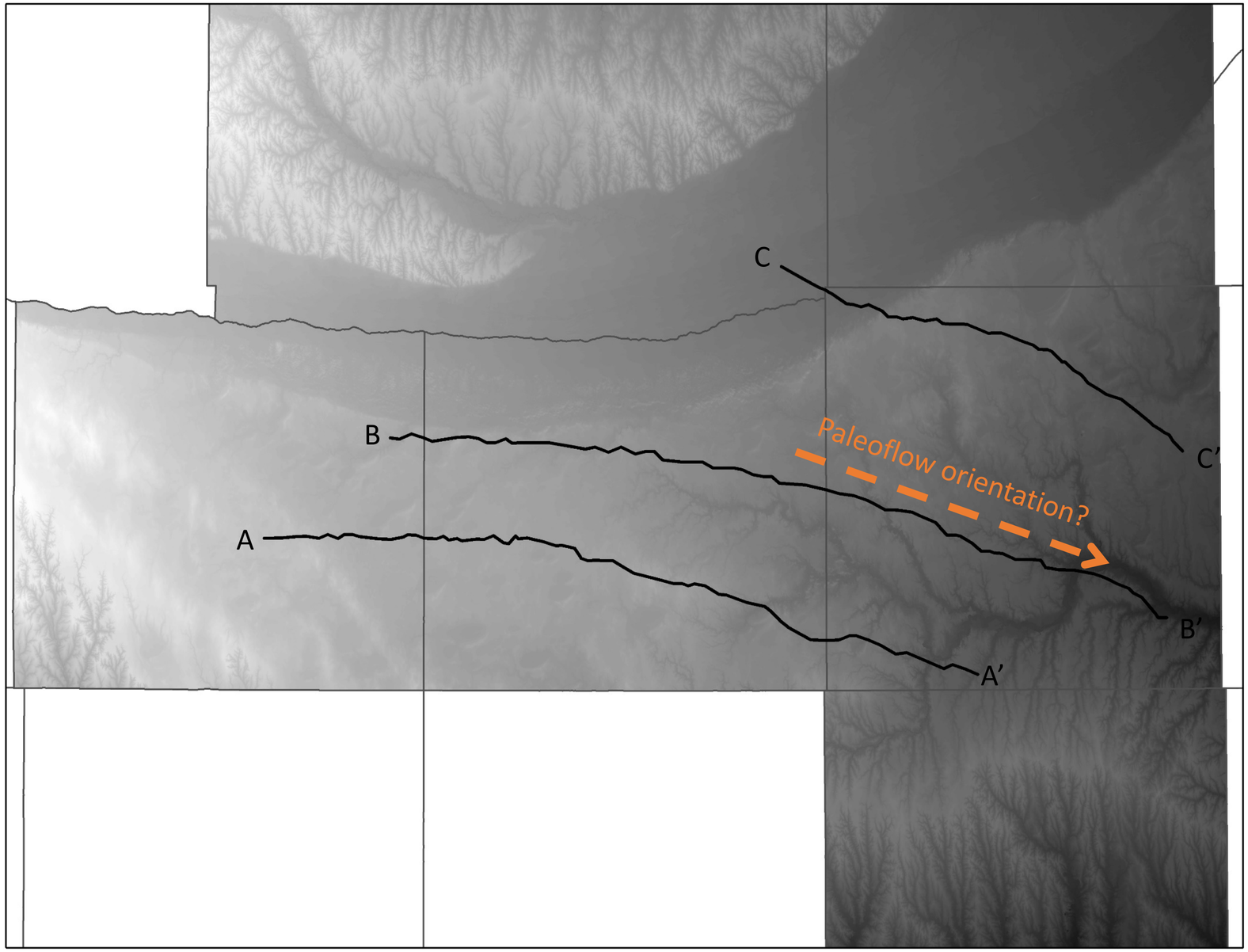
Cross section locations



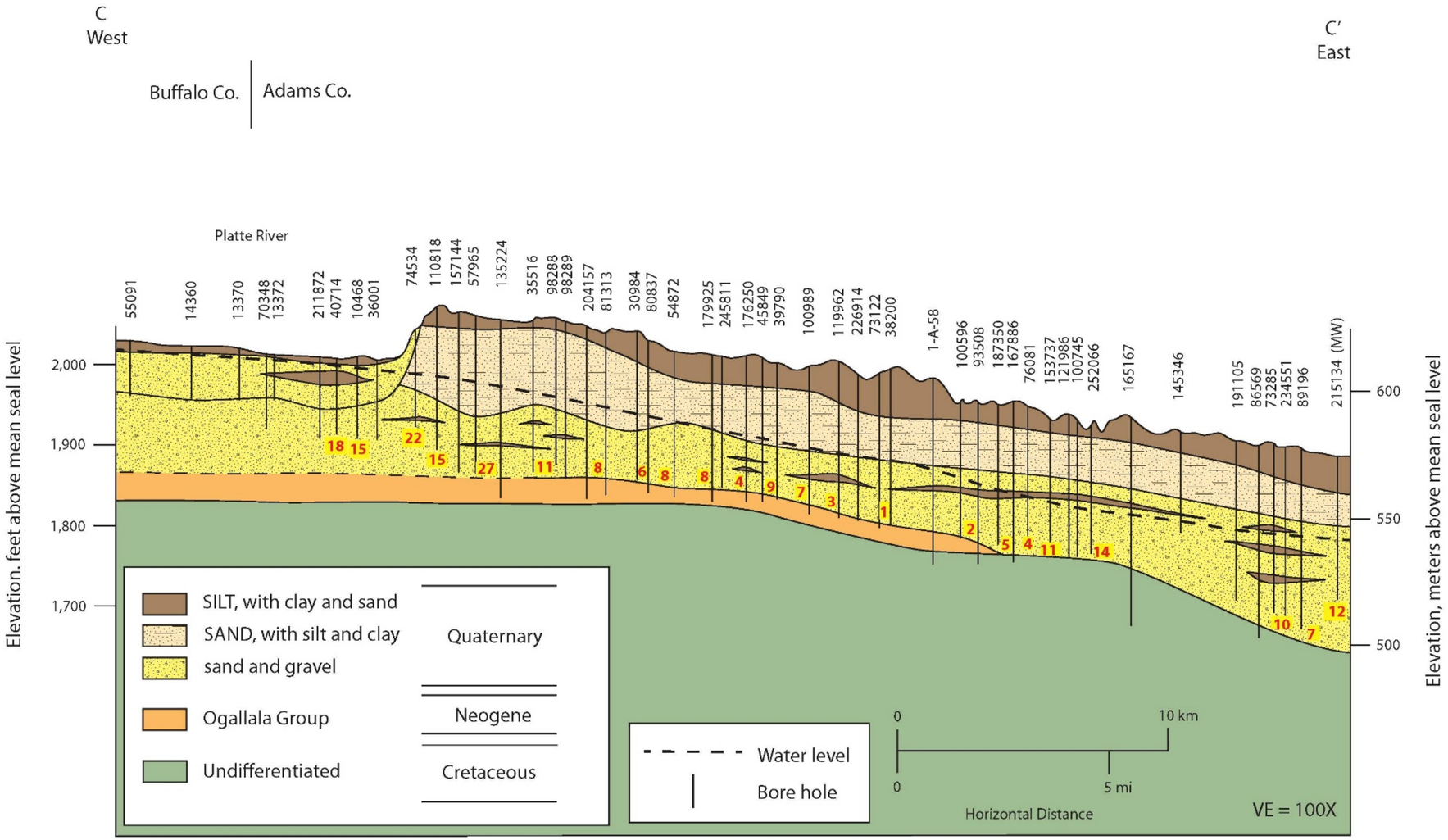
Interpretive geologic cross section B-B’



Cross section locations



Interpretive geologic cross section C-C’



Conclusions

- Shape of groundwater mound correlates fairly closely with the configuration of the canal system
- There is possibly an old, unnamed loess that may be fairly widespread
- Complexity at depth in Little Blue basin may be terraces of the ancestral Platte River
- The Ogallala Group appears to have lower nitrate than overlying Quaternary sand and gravel

Next steps (geology)

- Drill test holes at select locations along the cross sections to better characterize geology, including proposed loess
- Draw interpretive geologic cross sections perpendicular to hypothesized ancestral Platte valley
- Look for similar terrace patterns farther down the postulated valley

Next steps (water quality)

- Install nested monitoring wells at test hole locations
- PhD candidate collects samples for age dating (Tritium and ^{14}C), ^{18}O, NO_3, N_2 in select wells
- NRDs collect DO, pH, Temp, EC in many wells
- Compare DO and NO_3 to find areas where denitrification may be controlling
- Compare age, isotope and water quality parameters to geology, especially (partial) confining units and Ogallala Group