Seward County Water Conservation District Informational Meeting, Nov. 20, 2023

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CONSERVATION AND SURVEY DIVISION
School of Natural Resources

EXTENSION

Conservation and Survey Division

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Associate Director for Conservation and Survey and State Geologist
R.M. (Matt) Joeckel, 2014-present

Mission

The Conservation and Survey Division (CSD), the natural resource survey component of the School of Natural Resources, is a unique, multi-disciplinary research, service and data-collection organization established by state statute in 1921. CSD's mission is to investigate and record information about Nebraska's geologic history, its rock and mineral resources, the quantity and quality of its water resources, land cover and other aspects of its geography, as well as the nature, distribution and uses of its soils.

My approach to answering questions submitted by the board

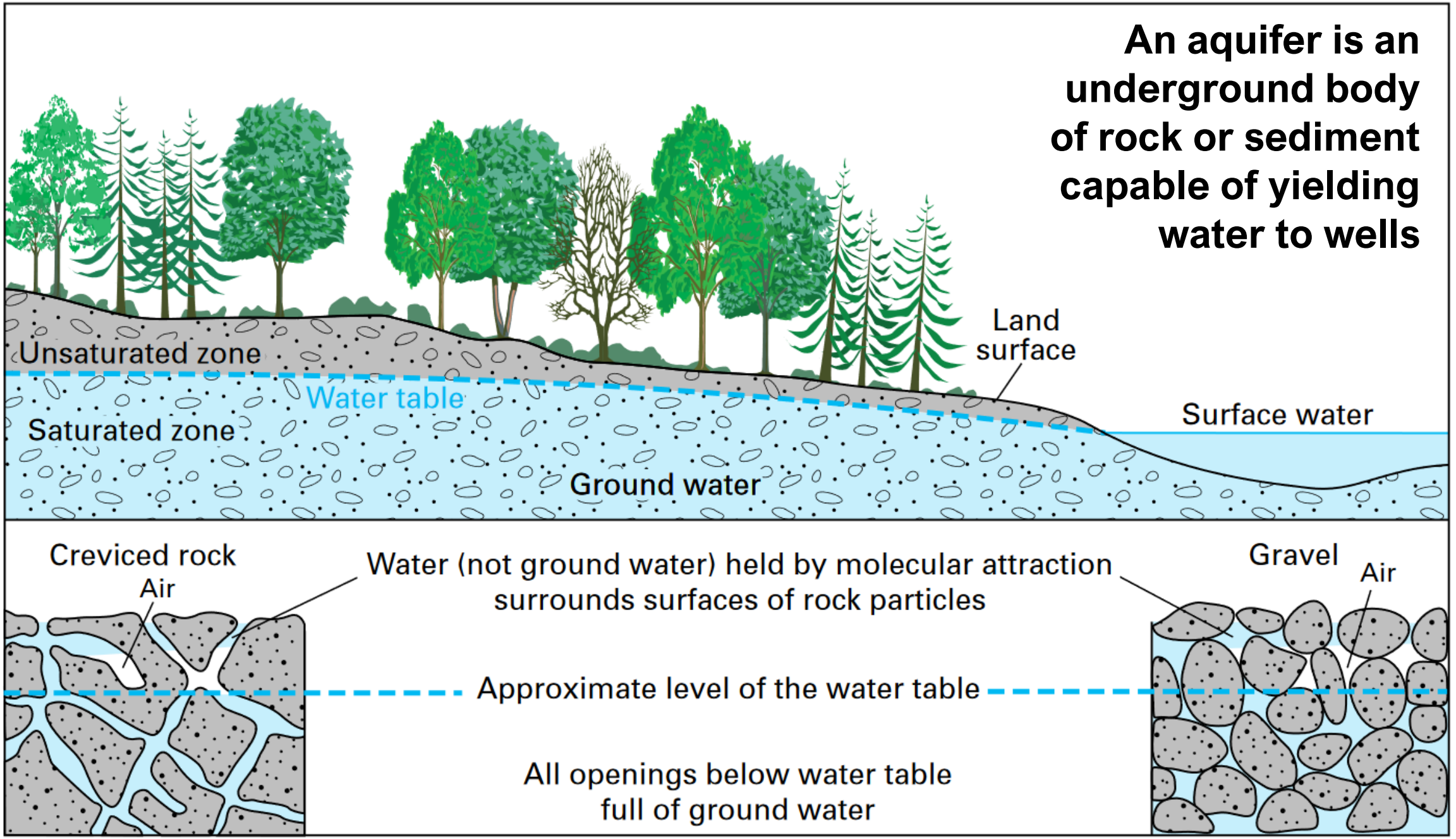
- Is it something we know?
- If so, I will give examples and point you toward resources.
- If not, is it knowable?
- How difficult would it be to gain that knowledge or to fill the knowledge gaps?

Online resources

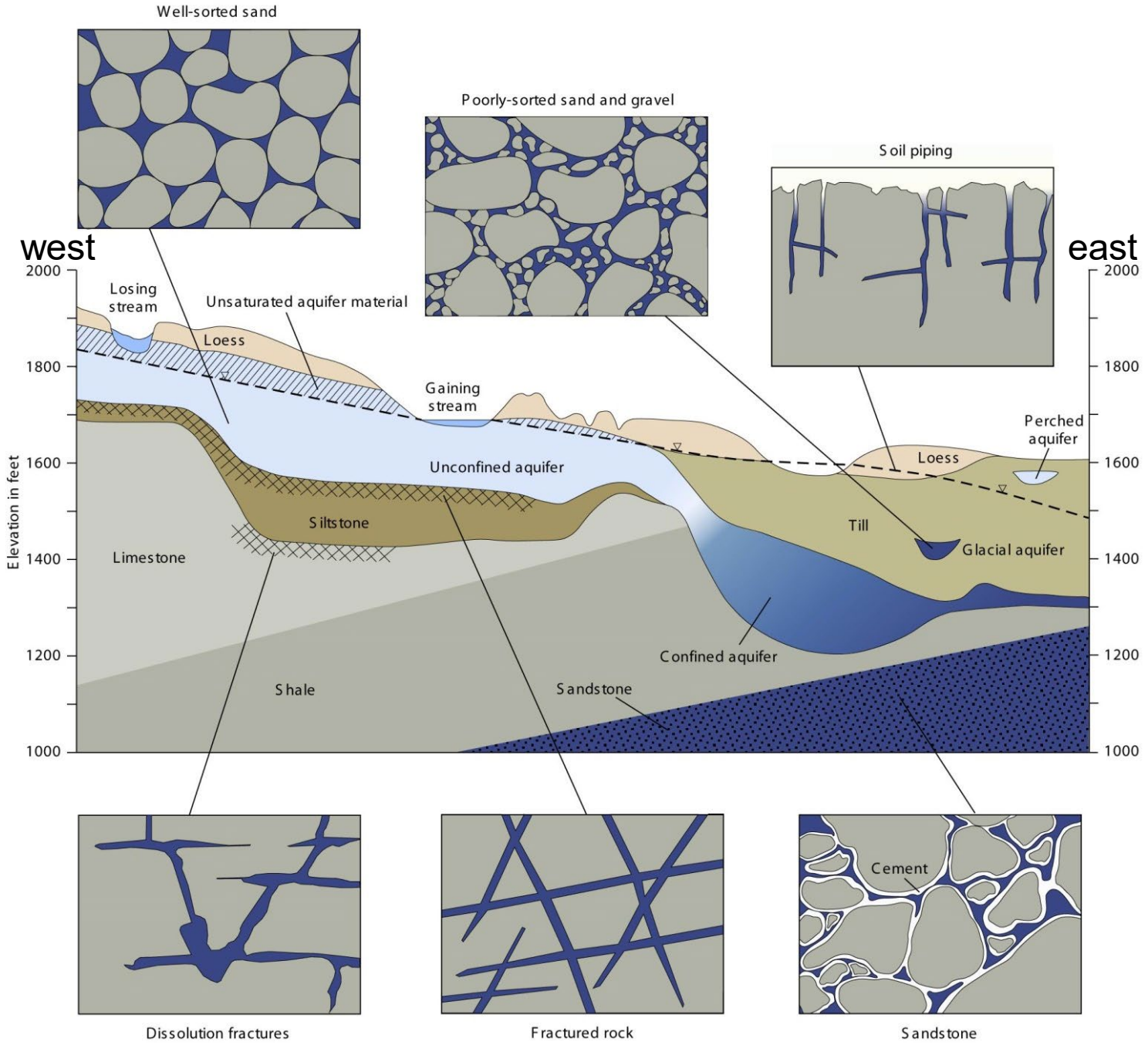
- CSD interactive map
  - go.unl.edu/csdinteractivemap/
- Nebraska GeoCloud
  - go.unl.edu/geocloud
- UNL Watershed Aquifer Virtual Education System (WAVES)
  - https://nebraskawaves.org/
- UNL Extension Water Website
  - https://water.unl.edu/
- Eastern Nebraska Water Resources Assessment (ENWRA)
  - https://enwra.org/
- Department of Natural Resources INSIGHT
  - https://nednr.nebraska.gov/INSIGHT/
- Nebraska Groundwater Quality Clearinghouse
  - https://clearinghouse.nebraska.gov/
- U.S. Geological Survey National Water Information System
  - https://waterdata.usgs.gov/nwis

Aquifers

An aquifer is an underground body of rock or sediment capable of yielding water to wells



A conceptualization of Nebraska's aquifers from west to east



Korus et al., 2013. The Groundwater Atlas of Nebraska. Conservation and Survey Division, School of Natural Resources, University of Nebraska-Lincoln. Resource Atlas 4b, 64 p.

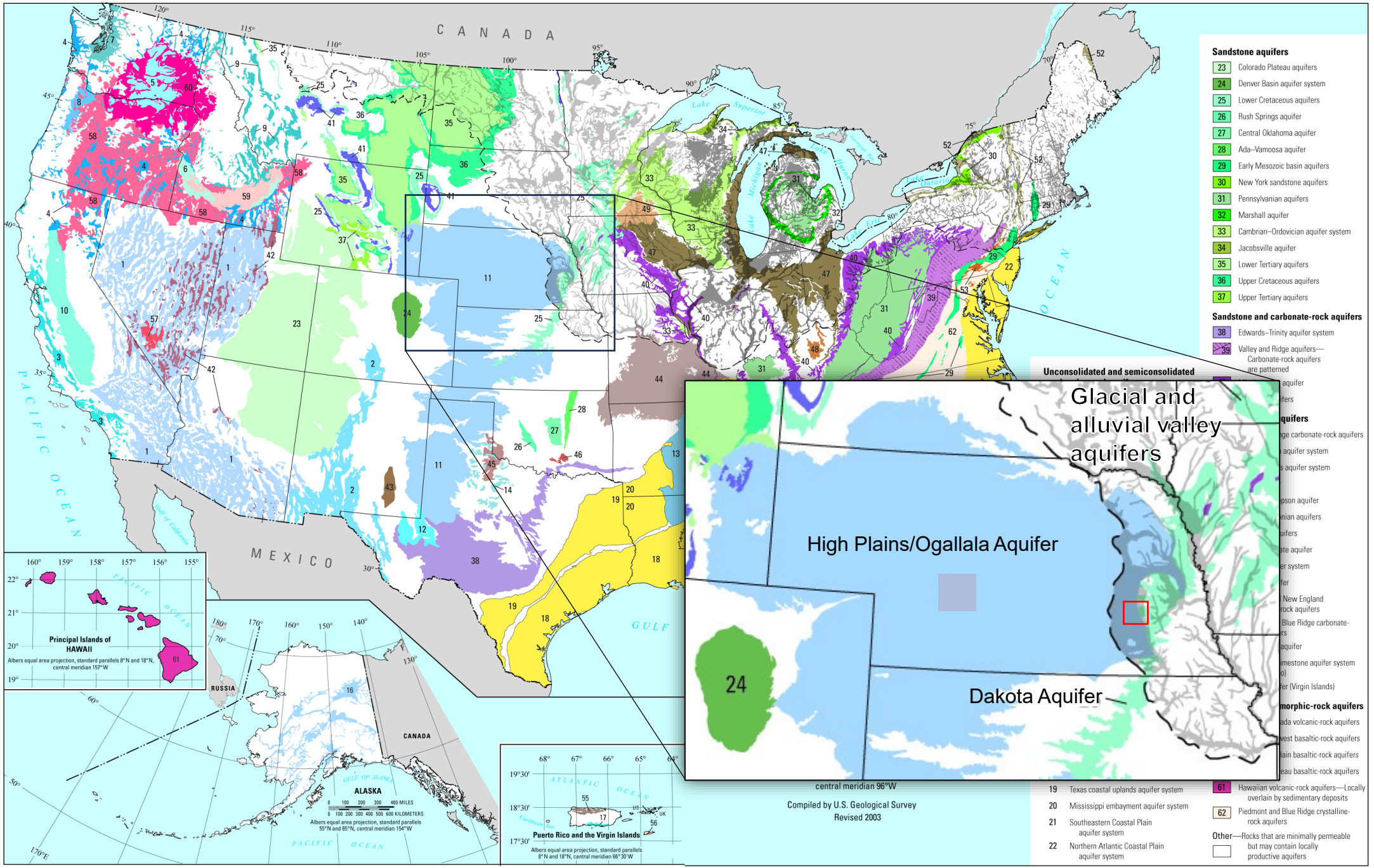
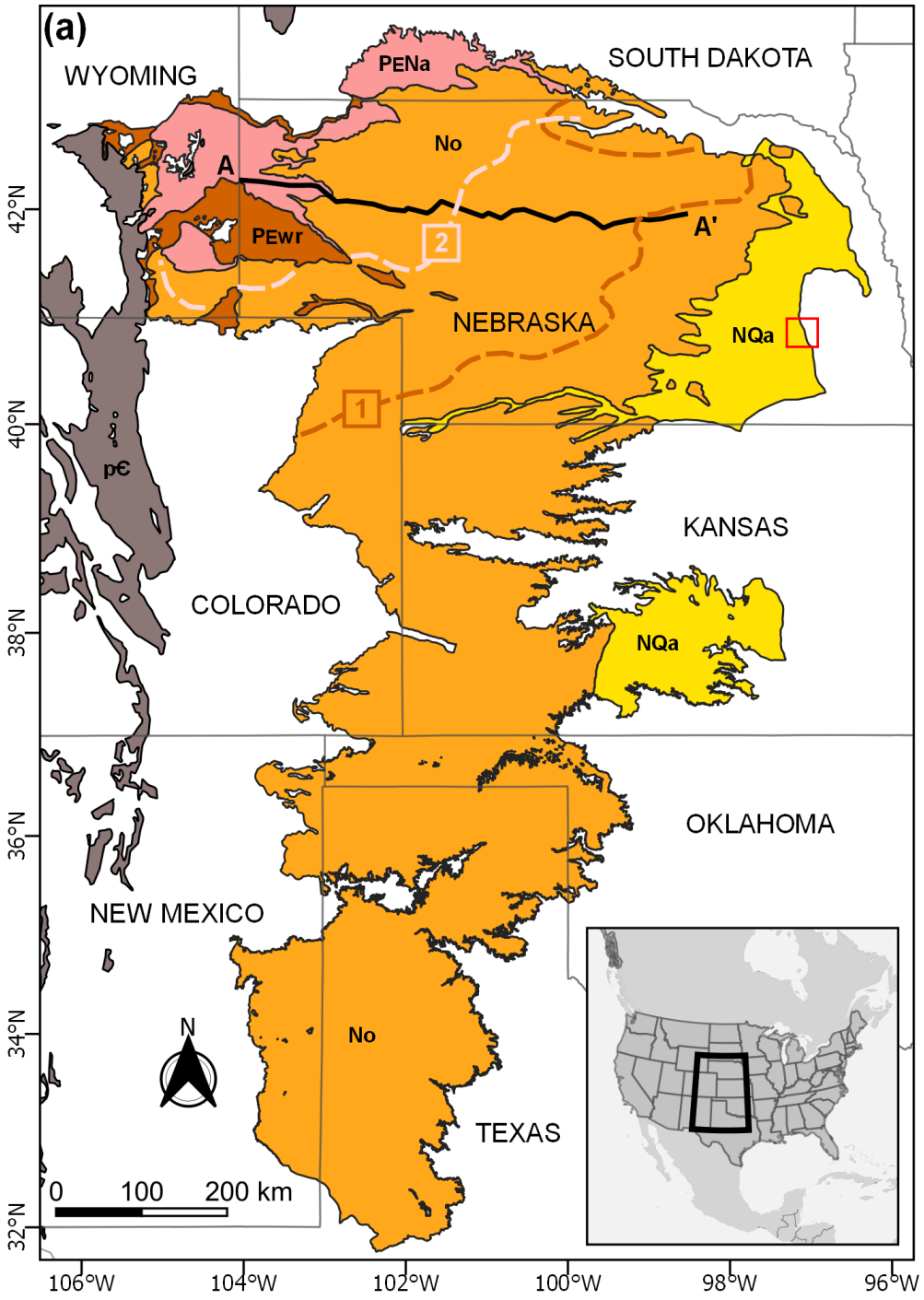


Figure 2. Principal aquifers of the United States (modified from Principal Aquifers, U.S. Geological Survey, 2003).



Qs	Dune sands (Holocene)
NQa	Alluvial sediments (Pliocene-Pleistocene)
No	Ogallala Group (Neogene)
PENa	Arikaree Group (Paleogene-Neogene)
PEwr	White River Group (Paleogene)
K	Cretaceous (undiff.)
pC	Precambrian basement rocks

A

Korus and Joeckel, 2022. Quarterly Journal of Engineering Geology and Hydrogeology **55: qjegh2021-171. DOI: 10.1144/qjegh2021-171**

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CSD Ground Water and Geology

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Select Search Layer

Layer List

Layers

- Test Holes
- Active Water Levels
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- Bedrock Geology
- Basement Rock Type
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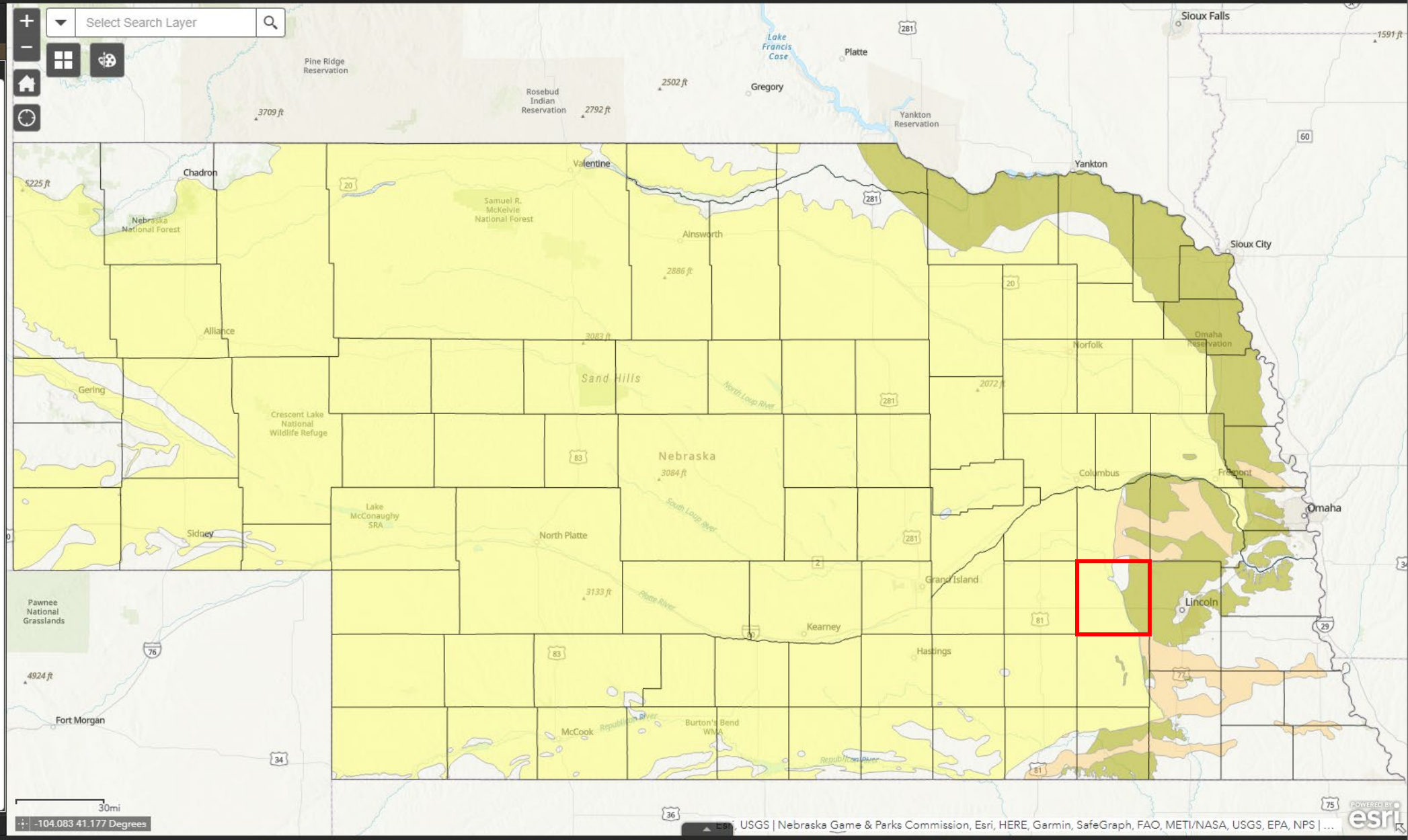
- Aquifer Boundaries (Click Here for Options)
  - HPA_Outline
  - Paleovalleys Boundary
  - Dakota Aquifer Boundary
- 2022 Water Level Changes (Click Here for Options)
- 2022 Precipitation (Click Here for Options)
- AEM_Flight_Lines



System	Series	Stratigraphic unit	Thickness (feet)	Character and distribution	Water supply
Quaternary	Holocene	Surficial terrace and floodplain deposits and soil	0 - 10±	Widespread soils; terrace and floodplain deposits of clay, silt, sand, and gravel	Significant only because it transmits recharge to the groundwater reservoir
	Pleistocene	Unconsolidated deposits, undifferentiated	0 - 450	Water-laid and windblown stratified deposits of clay, silt, sand, and gravel; stream-deposited sand and gravel containing layers of clay and silt of wind and stream origin; ice-deposited till (nonsorted, nonstratified sediment carried or deposited by a glacier); underlies much of the county	Principal source of water to wells in the county; medium- and coarse-textured deposits yield more than 1,000 gallons per minute of water where sufficiently permeable, thick, and saturated
Cretaceous	Upper Cretaceous	Carlile Shale	0 - 40	Medium- to dark-gray shale, calcareous in part; contains thin layers of limestone; occurs where the bedrock is at highest altitude in the northwestern and south-central parts of the county	Does not yield water to wells
		Greenhorn Limestone	0-25	White and gray limestone and calcareous shale; underlies about half the county; not present in the bedrock valleys	As above
		Graneros Shale	0-70	Dark-gray shale, calcareous in upper part; underlies about half the county; not present in the bedrock valleys	As above
	Lower Cretaceous	Dakota Group (undivided)	150-500	Interbedded clayey shale, sandy shale, and sandstone; underlies the entire county	Yields small to large amounts of water to a few wells in Seward County; quality of the water ranges from good to substandard

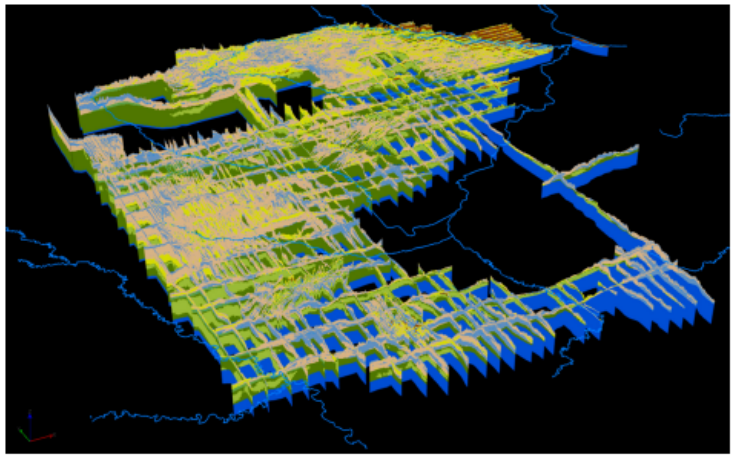
Keech, 1978, Water Resources of Seward County, Nebraska

Eastern Nebraska Water Resources Assessment (ENWRA)
https://enwra.org/
Nebraska GeoCloud
https://go.unl.edu/geocloud

AGF
Aqua Geo Frameworks

December 4, 2019

"Airborne Electromagnetic Mapping and Hydrogeologic Framework of Selected Regions of the Eastern Nebraska Water Resources Assessment Area" Chapter on the Lower Platte South Natural Resources District



Prepared for the:
Lower Platte South Natural Resources District
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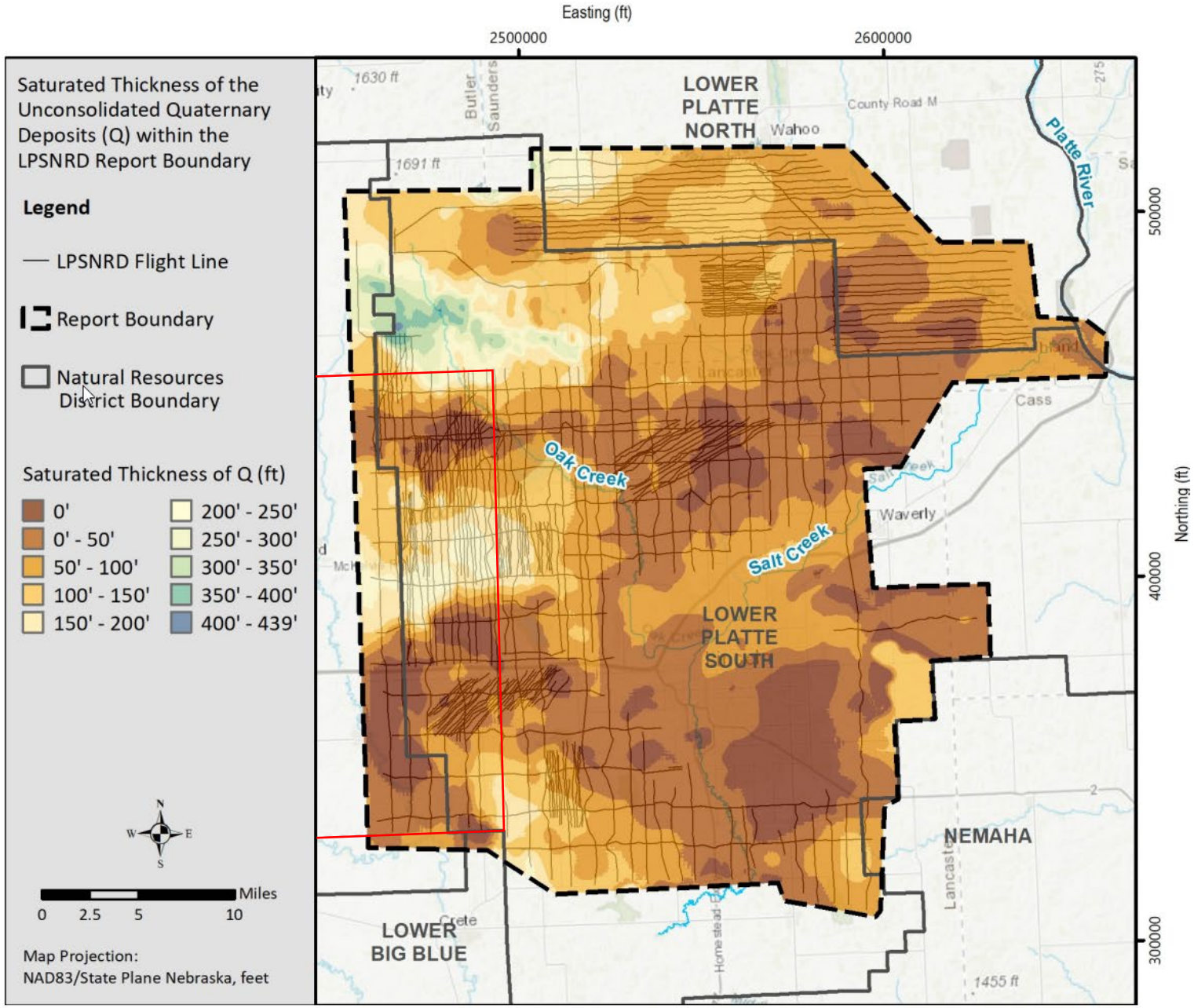

Figure 3-93. Map of the saturated thickness of *Q* aquifer materials within the 2018 LPSNRD Reconnaissance survey area. Saturated thickness varies from 0 to 439 feet. Flight lines are indicated by the grey lines. Note the greater thicknesses are on the west side of the project area. The geologic unit present in this image includes the *Q*= Quaternary. Horizontal datum is NAD83 State Plane Nebraska (feet).

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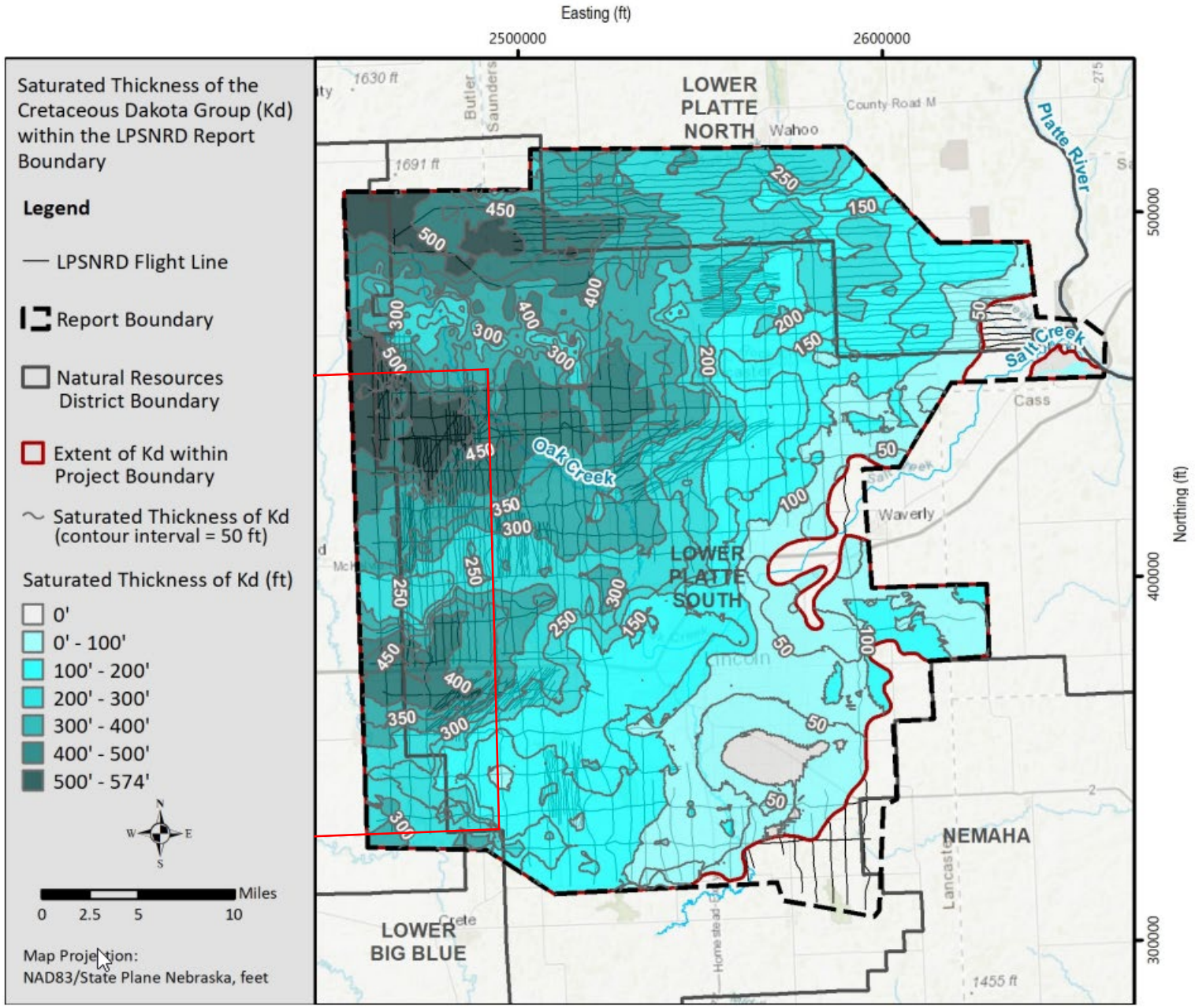

Figure 3-71. Map of the saturated thickness of Cretaceous Dakota Group (*Kd*) within the 2018 LPSNRD AEM survey area. Flight lines are indicated by the gray lines. The projection is NAD83 State Plane Nebraska (feet).

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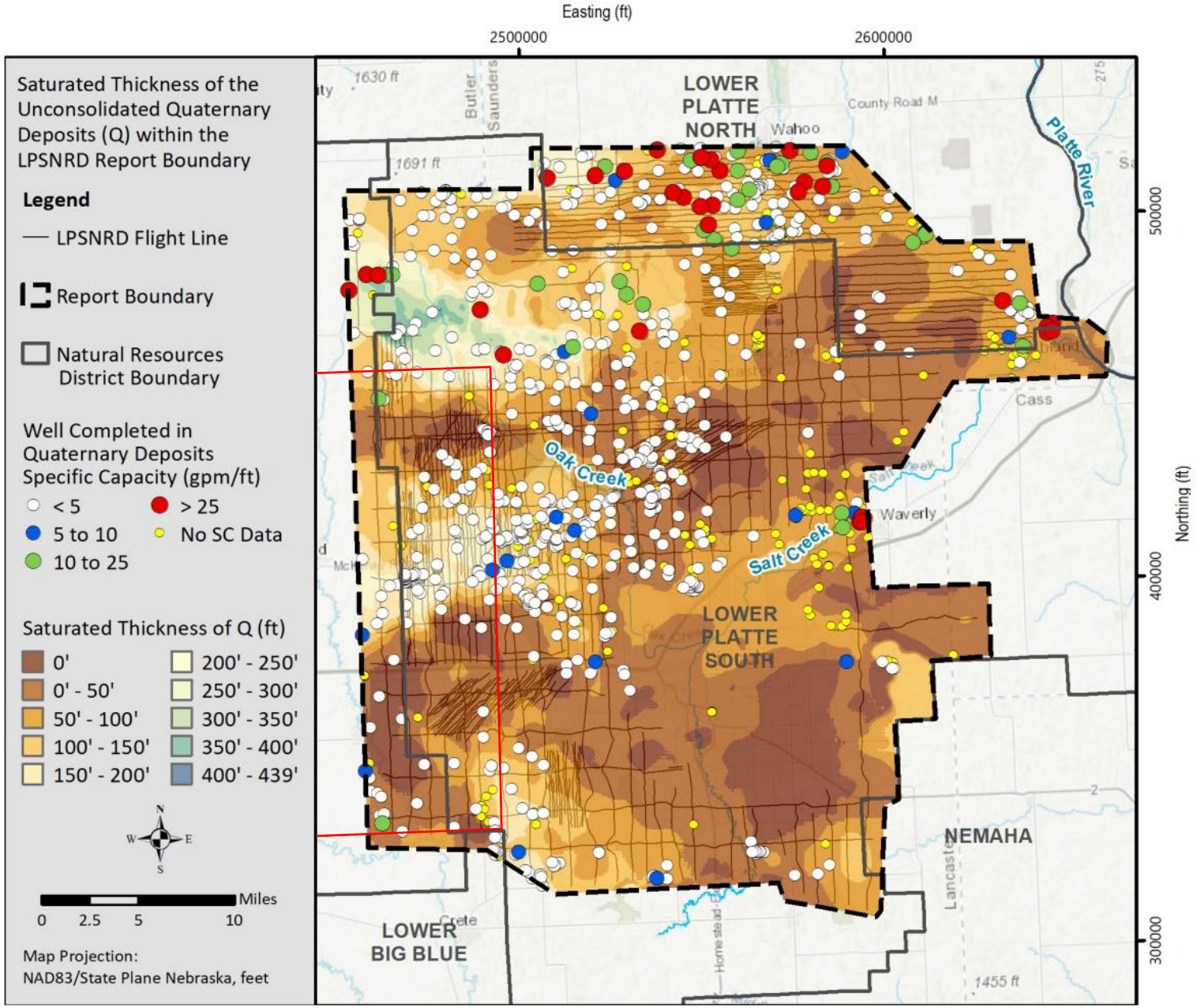

Figure 3-94. Map of the saturated *Q* aquifer thickness for the LPSNRD 2018 Reconnaissance AEM survey area plus the specific capacity of wells screened within the *Q* from the NE-DNR registered well database. The specific capacity of the wells range from <5 to >25 gpm. Overall the <5 gpm wells make up most of the wells in the project area. Horizontal datum is NAD83 State Plane Nebraska (feet).

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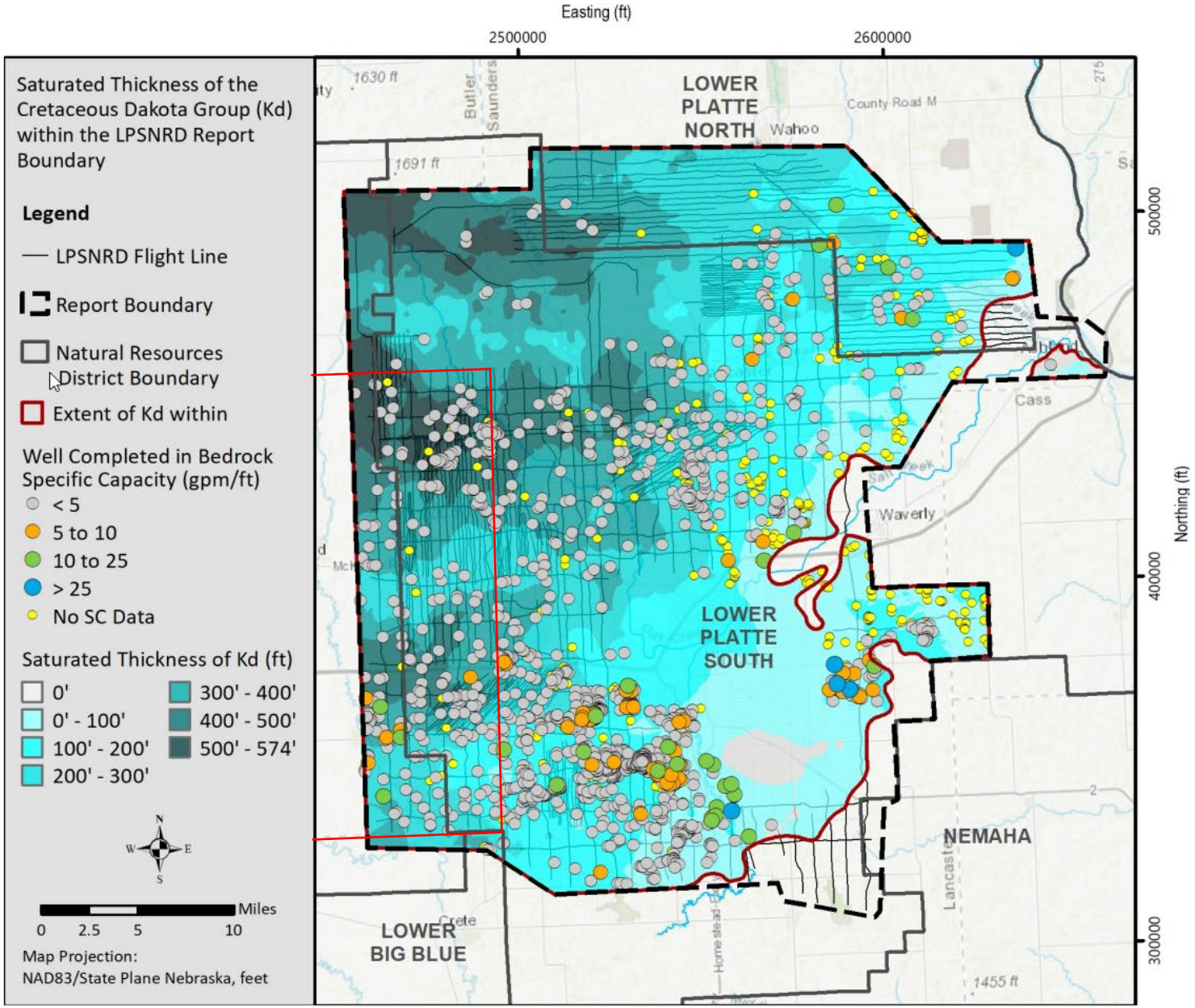
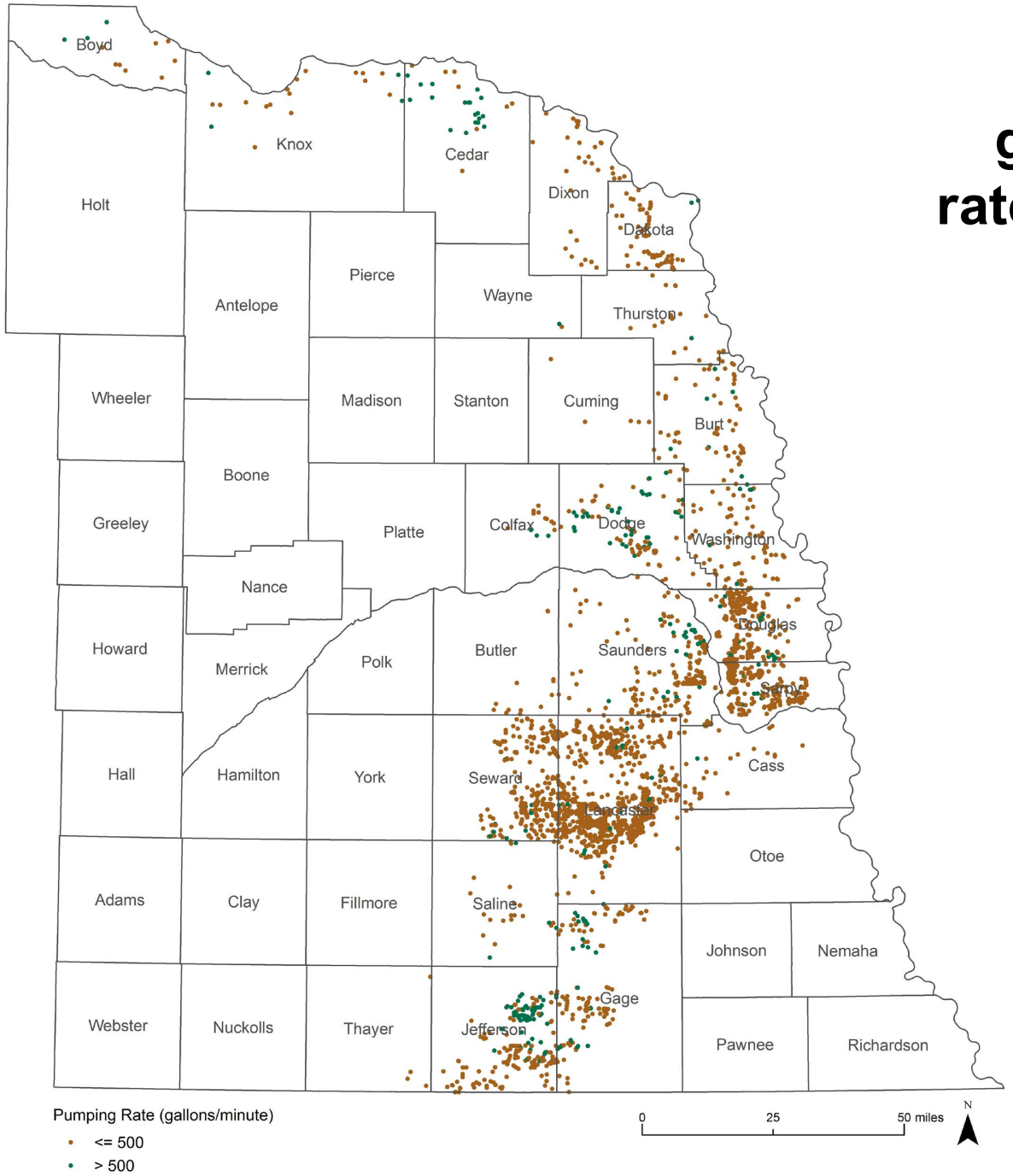


Figure 3-99. Map of the saturated *Kd* aquifer thickness for the LPSNRD 2018 Reconnaissance AEM survey area plus the specific capacity of wells screened within the *Kd* from the NE-DNR registered well database. The specific capacity of the wells varies from <5 to >25 gpm. Overall the <5 gpm wells make up most of the wells in the project area. Flight lines are indicated by the grey lines. The geologic unit present in this image includes the *Kd*= Cretaceous Dakota Group. Horizontal datum is NAD83 State Plane Nebraska (feet).

Locations and general pumping rates of wells in the Dakota Aquifer

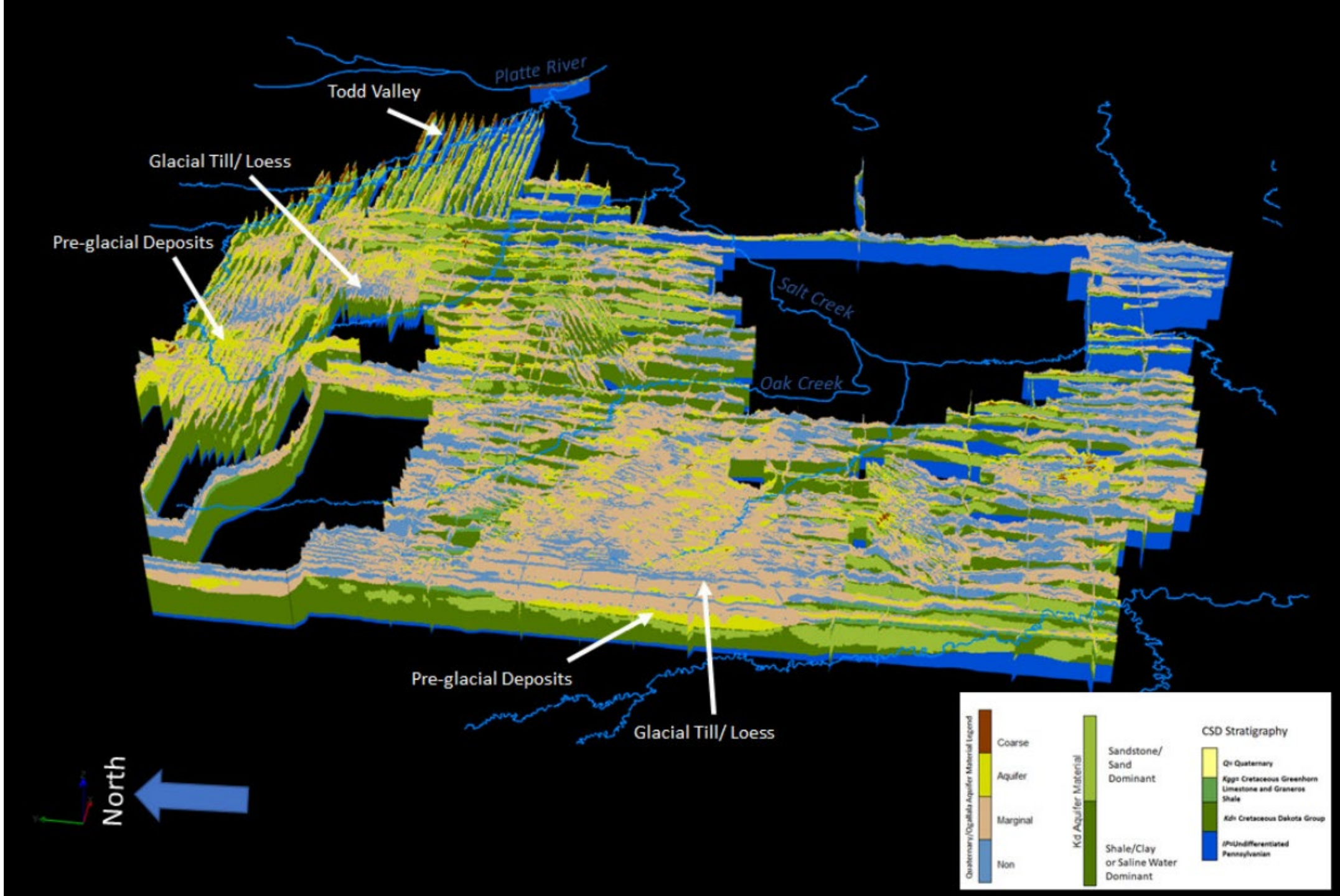


Divine and Sibray, 2017, An Overview of Secondary Aquifers in Nebraska. University of Nebraska–Lincoln, Conservation and Survey Division, Educational Circular No. 26, 44 p.

County	Average Static Water Level, ft	Average Total Depth, ft	Average yield, gpm
Boyd	175	1,021	352
Burt	98	218	127
Butler	168	392	39
Cass	65	127	87
Cedar	102	660	746
Colfax	121	321	153
Cumming	133	304	16
Dakota	105	236	65
Dixon	167	365	43
Dodge	74	271	353
Douglas	124	236	96
Gage	88	162	200
Jefferson	91	201	309
Knox	199	810	414
Lancaster	90	182	44
Saline	74	188	160
Sarpy	108	196	55
Saunders	67	173	127
Seward	143	300	55
Thayer	65	168	11
Thurston	104	267	113
Washington	141	250	96

Divine and Sibray, 2017, An Overview of Secondary Aquifers in Nebraska. University of Nebraska–Lincoln, Conservation and Survey Division, Educational Circular No. 26, 44 p.

LPSNRD 2018 AEM Survey & Hydrogeological Framework Report **enwra.org**

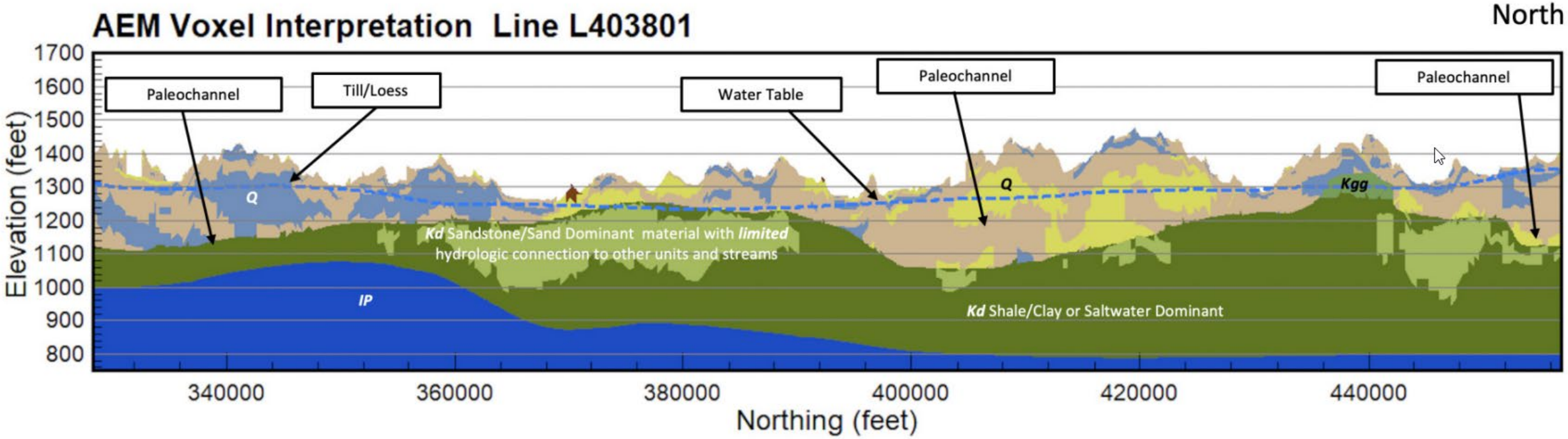


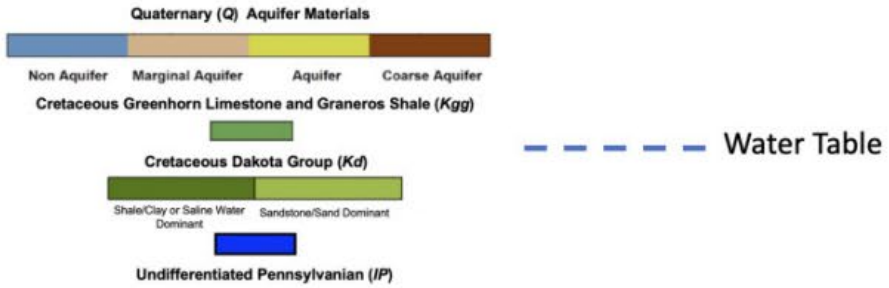
Pleasant Dale

Garland

South

North





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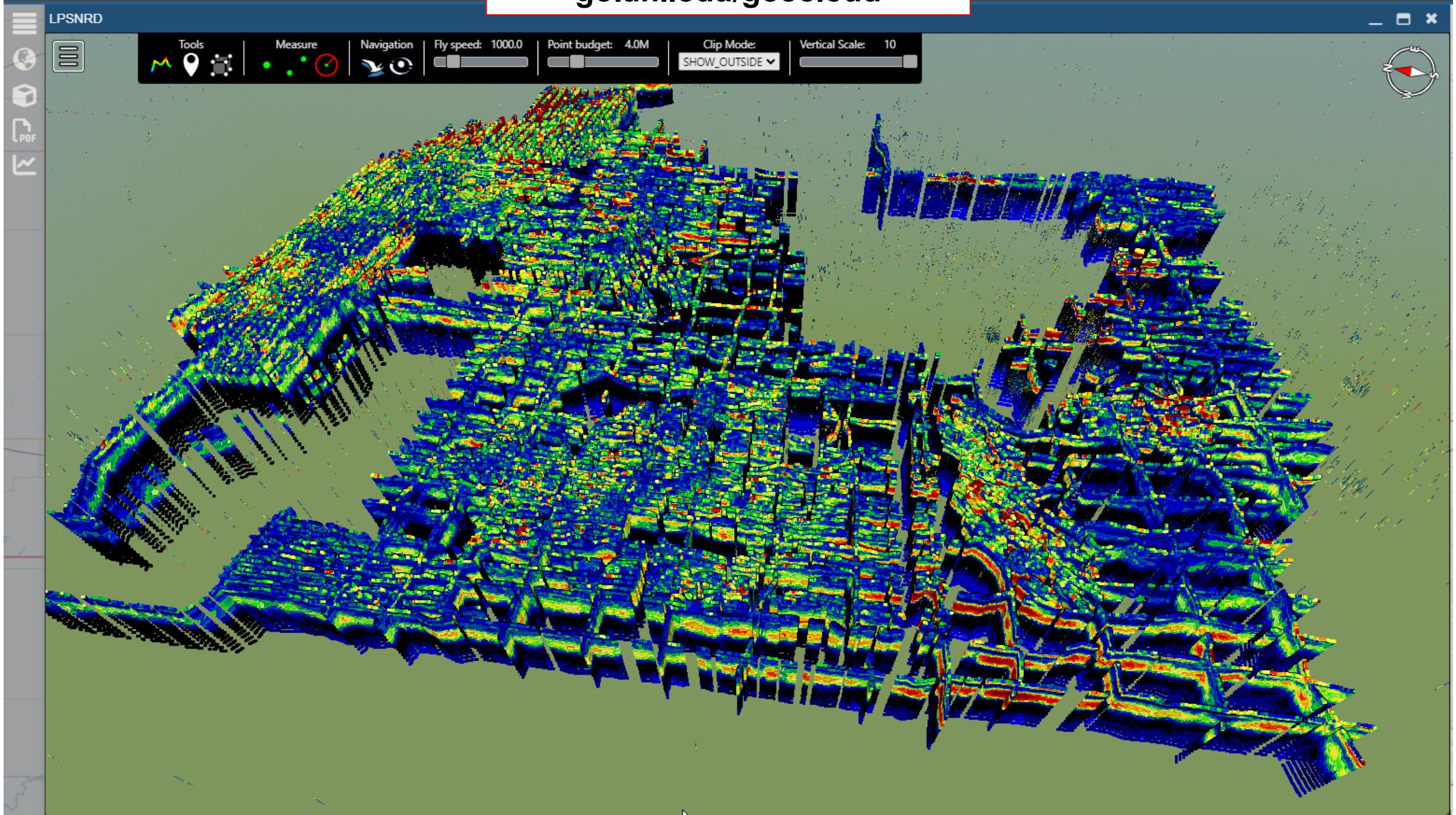

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The Nebraska GeoCloud Project

snr.unl.edu/csd/geology/nebraskageocloud.aspx

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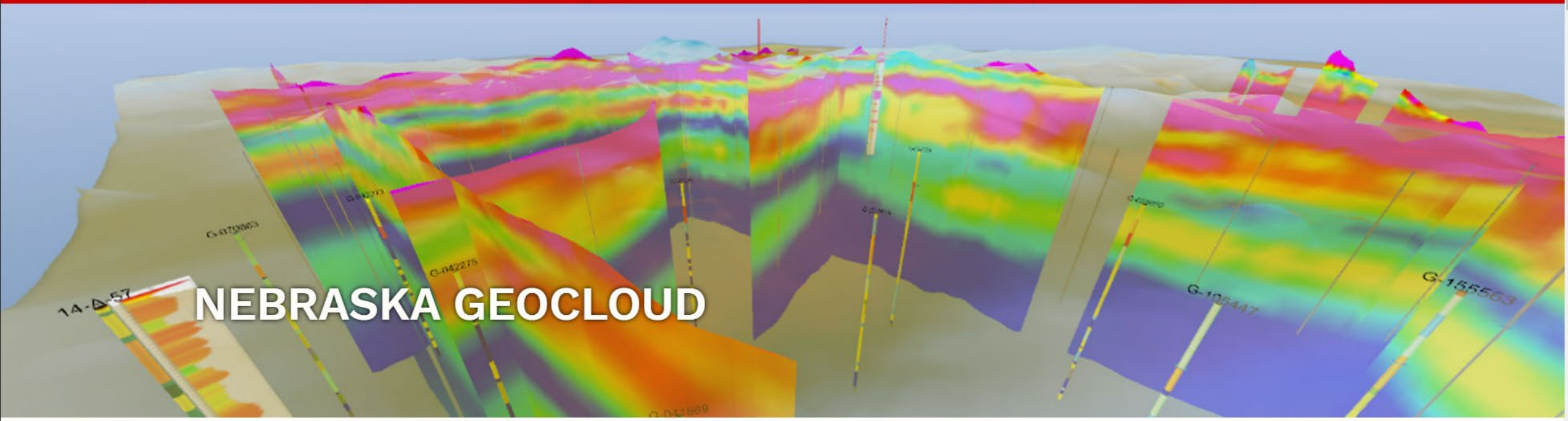

The Nebraska GeoCloud (NGC) is a web-based digital platform for geophysical, geological, and groundwater data and models. The purpose of the NGC is to archive Nebraska's vast volume of data and make it accessible to both model builders and model users. The NGC consists of databases, web servers, and web interfaces designed for data storage, sharing, and distribution. It contains one interface for Projects and another interface for Data. Projects may include software files, reports, and other information related to a project. It can be used to store and share project files, or it can be used as the final repository for completed projects. The Data interface is built upon structured databases that support the upload and download of data and models used in typical hydrogeological studies. Users can access the data contained in this part of the NGC via the GeoScene3D data portal. These data can also be viewed on an interactive web map and they are accessible via a web map service (WMS) in GIS programs (e.g. ArcGIS, QGIS). To request a user account to the NGC, please contact Jesse Korus at jkorus3@unl.edu.

Request User Access | Nebraska Geocloud Projects | Nebraska Geocloud Data

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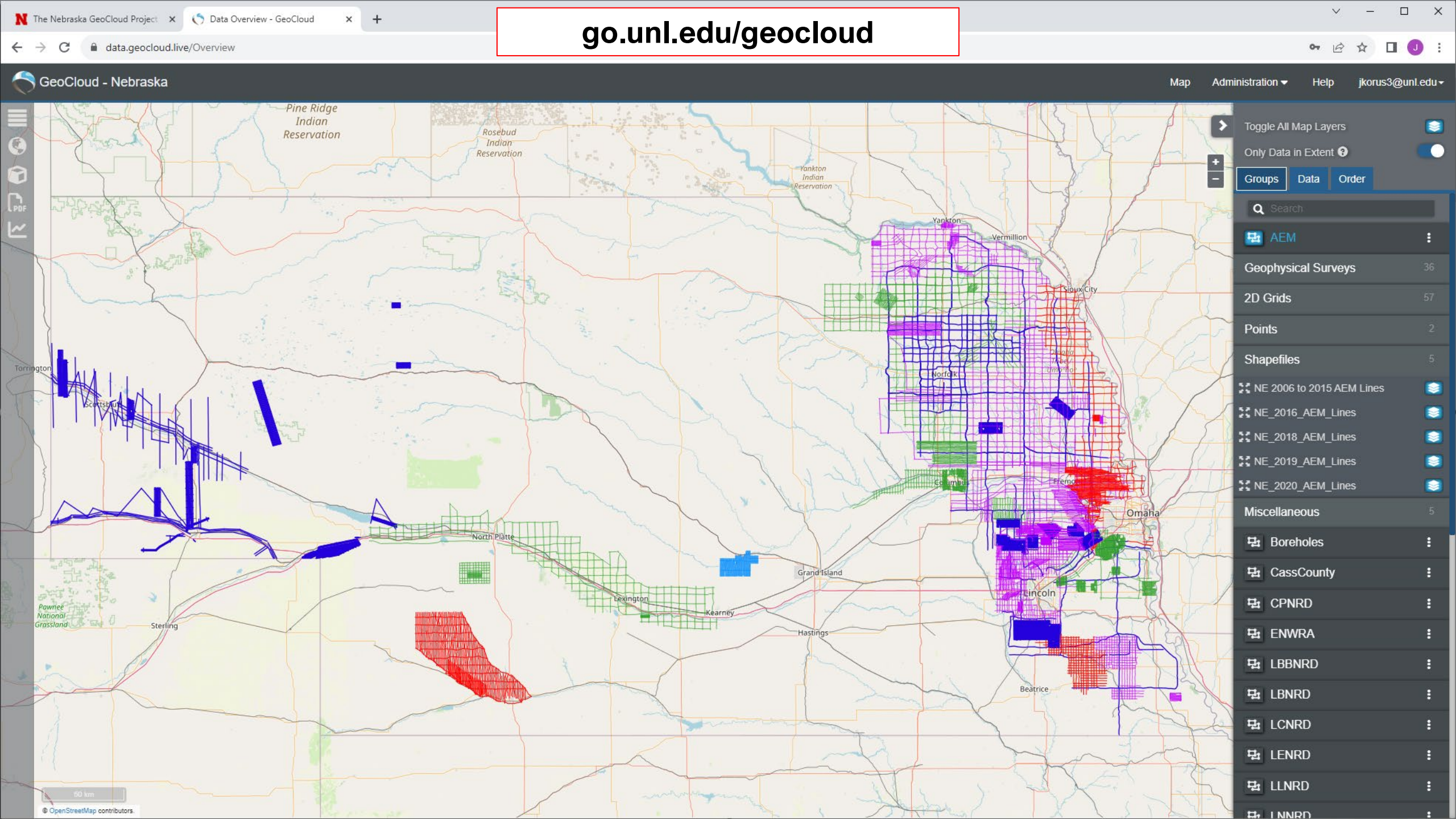

The Nebraska GeoCloud Project | Data Overview - GeoCloud

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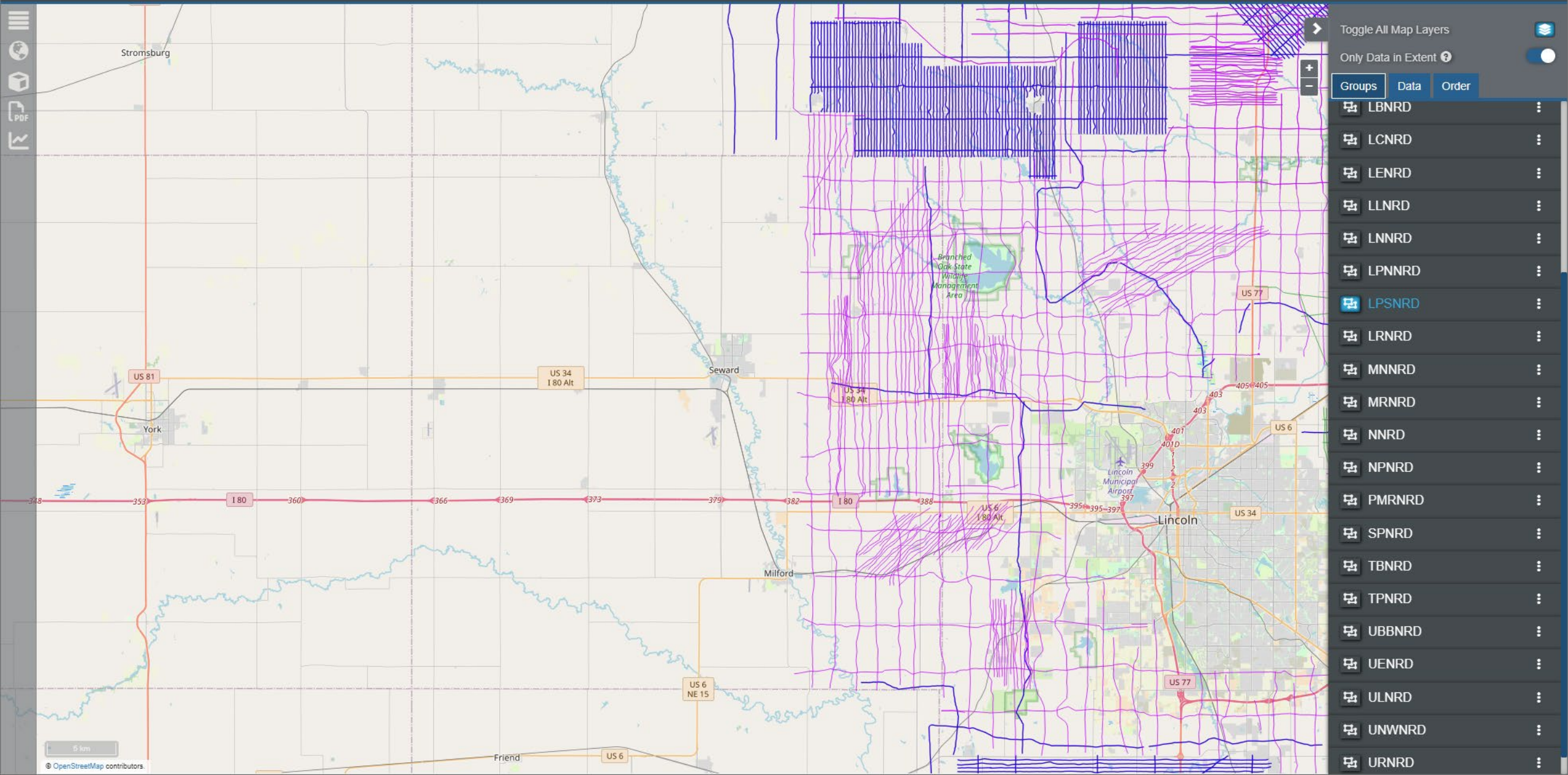
data.geocloud.live/Overview

GeoCloud - Nebraska

Map | Administration | Help | jkorus3@unl.edu



Toggle All Map Layers

Only Data in Extent

Groups | Data | Order

- LBNRD
- LCNRD
- LENRD
- LLNRD
- LNNRD
- LPNNRD
- LPSNRD
- LRNRD
- MNNRD
- MRNRD
- NNRD
- NPNRD
- PMRNRD
- SPNRD
- TBNRD
- TPNRD
- UBBNRD
- UENRD
- ULNRD
- UNWNRD
- URNRD

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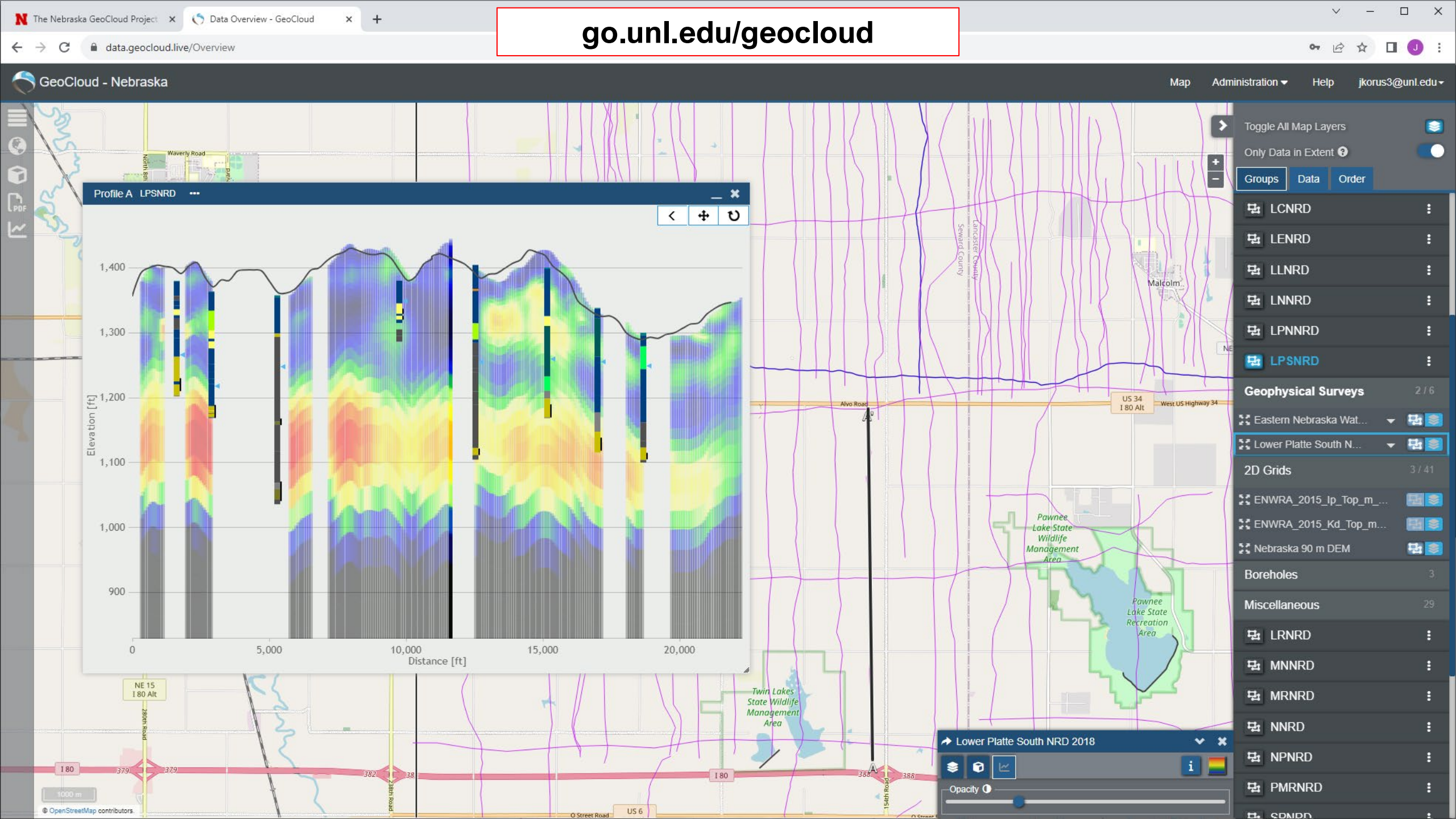
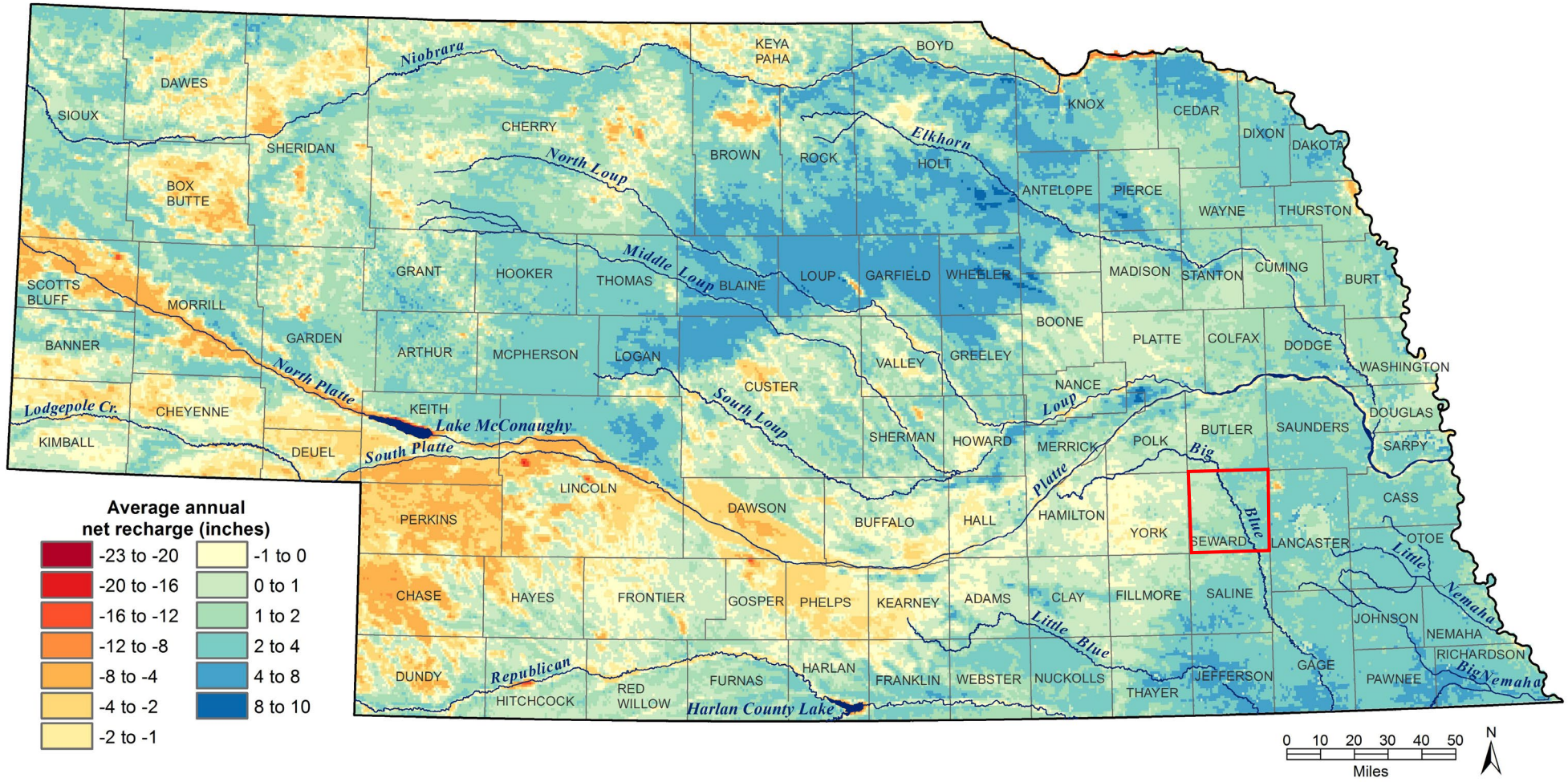


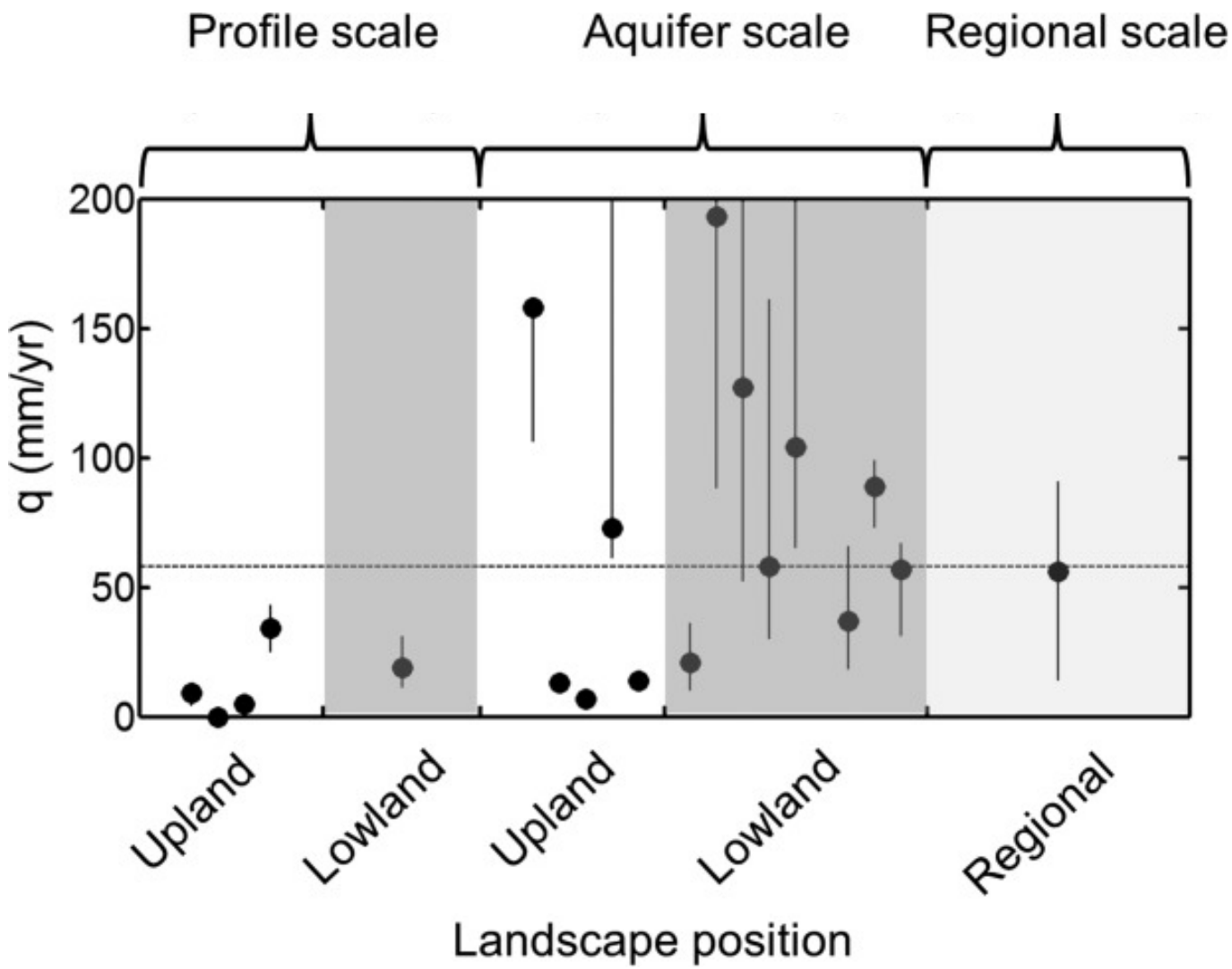
Recharge

Satellite-based recharge estimation for Nebraska



Korus et al., 2013, The Groundwater Atlas of Nebraska, Conservation and Survey Division, School of Natural Resources, University of Nebraska-Lincoln. Resource Atlas 4b, 64 p.

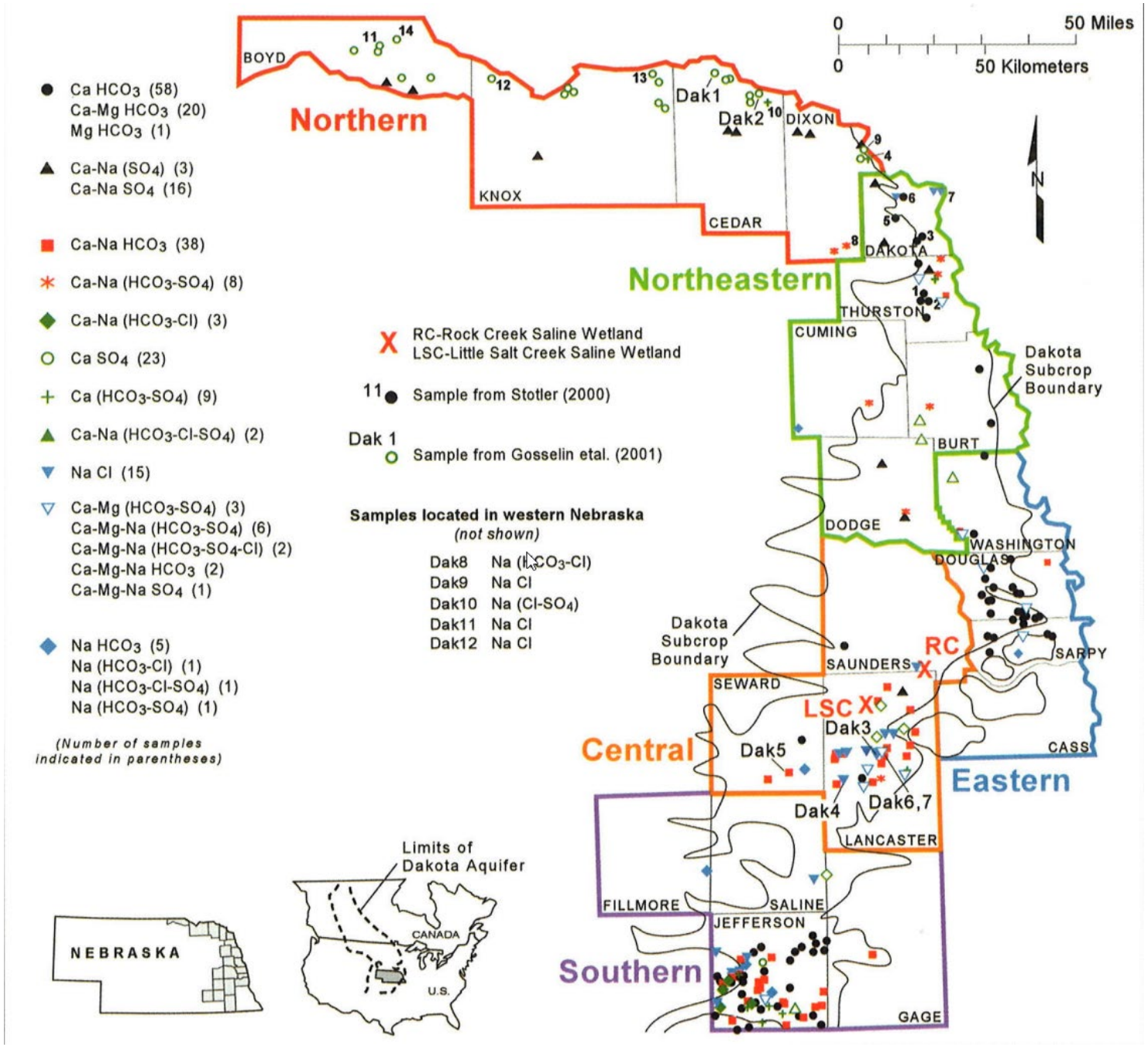
Estimated recharge rate varies with scale



Gates et al., 2014. Water Resources Research, Volume: 50, Issue: 1, Pages: 466-481. DOI: (10.1002/2013WR014073)

Summary of recharge sources to the Dakota Aquifer

- Pleistocene glacial meltwater
- Ancient (~50,000 years ago) recharge in the Black Hills and Rocky Mountain Front Range
- Recent, local precipitation
- Wells sampled in Seward County indicate recent, local precipitation as the source of recharge (Gosselin et al., 2001)



1. Gosselin et al., 2001, Groundwater 39:1, 98-108.
2. Gosselin et al., 2003. Conservation and Survey Division, Earth Science Notes 126.
3. Stotler et al., 2010, Groundwater 48:3, 448-464.

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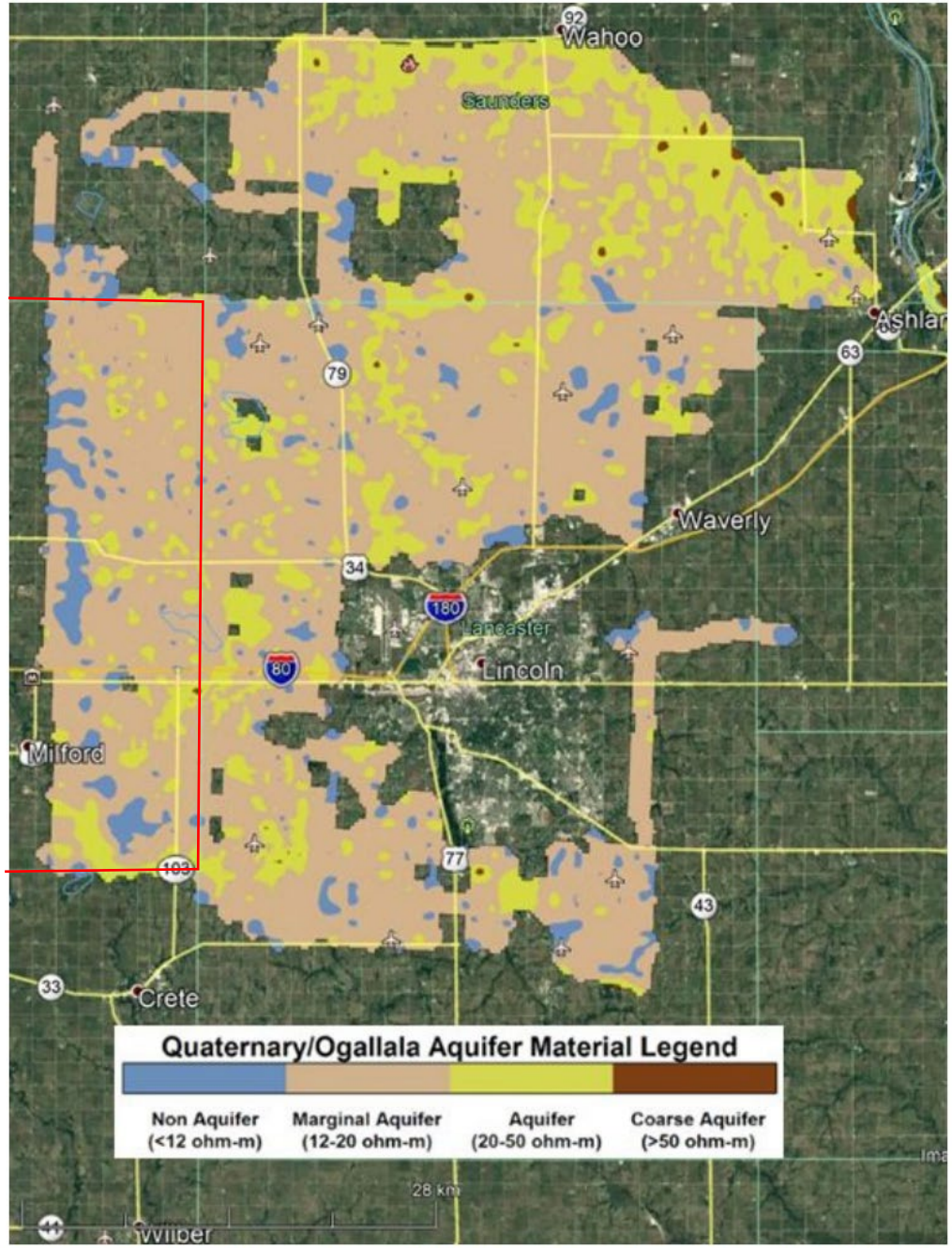

Figure 3-280. Google Earth image of potential soil recharge by aquifer material type in the first 10.8 feet over the 2018 LPSNRD AEM survey area. This kmz included in Appendix 3-Deliverables\KMZ\ Recharge.

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Pine Ridge Reservation
Rosebud Indian Reservation
Lake Francis Case
Platte
Gregory
Yankton Reservation
Yankton
Sioux Falls
Sioux City
Omaha
Pawnee National Grasslands
Fort Morgan
3709 ft
2792 ft
2502 ft
1591 ft
4924 ft

30mi

-102.644 41.602 Degrees

USGS | Nebraska Game & Parks Commission, Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS | ...

Water Use and Impacts

What are the factors that influence sustainable yield?

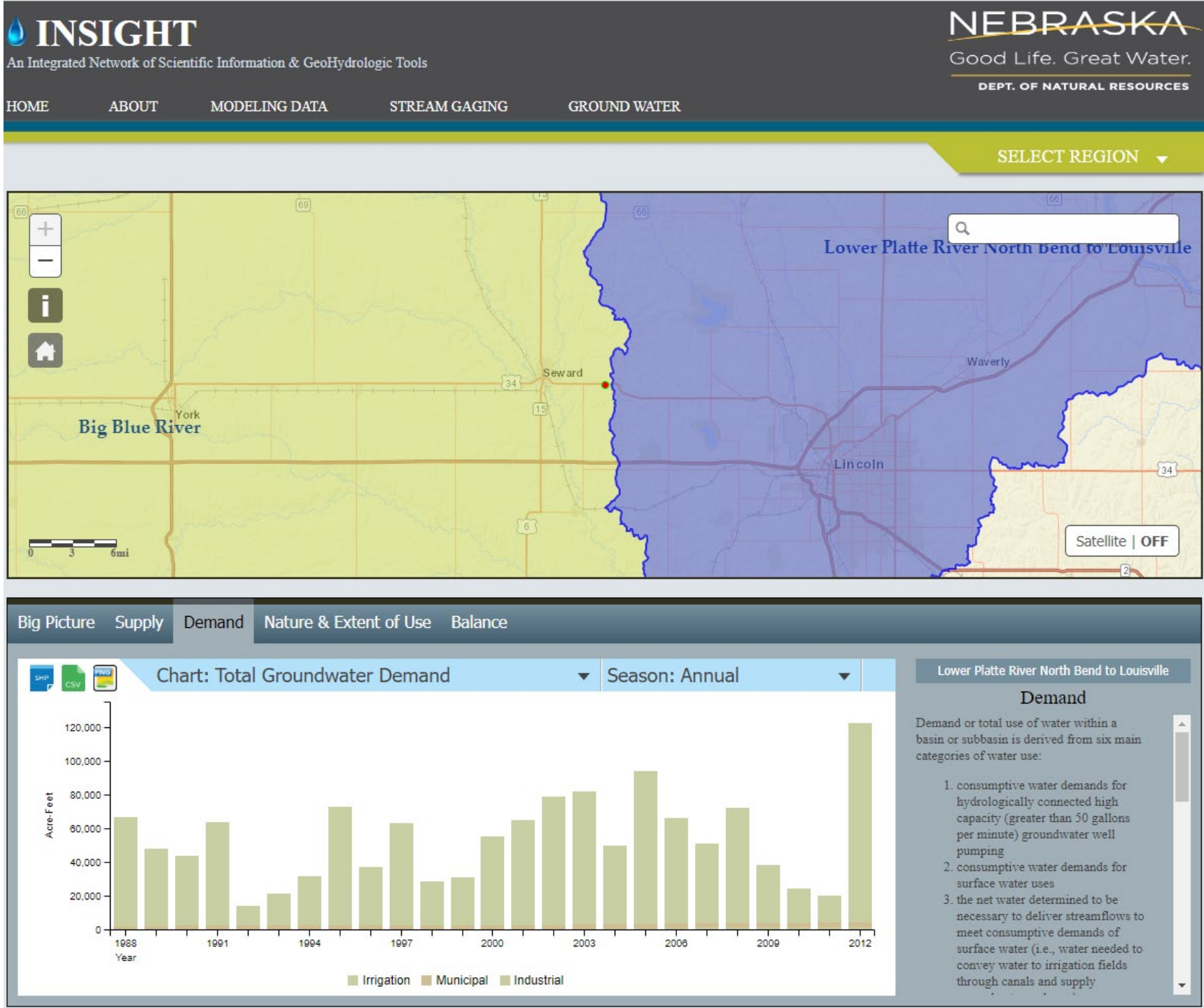
- Physical limits of the aquifer system
- Aquifer properties (thickness, storativity, permeability)

Aquifer characterization

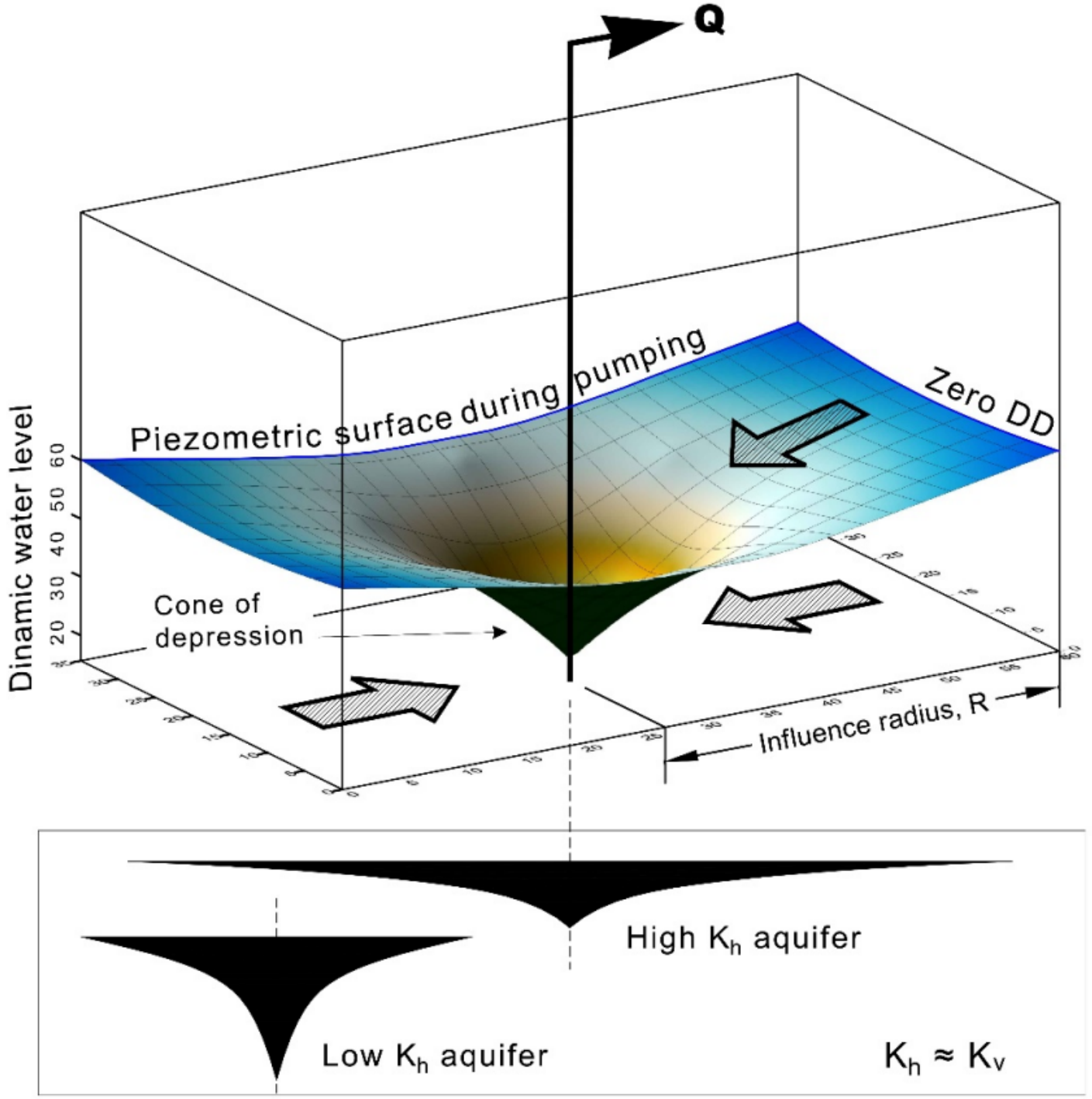
- Recharge from all sources
  - infiltration of precipitation
  - flow from adjacent aquifers
  - seepage from streams, lakes, and wetlands
  - induced leakage from overlying aquitards
- Discharge from all sources
  - pumping
  - seepage into streams, lakes, and wetlands
  - flow into adjacent aquifers
  - evapotranspiration

Water budget analysis

nednr.nebraska.gov/INSIGHT



Cone of depression formed by a pumping well



Strelec et al., 2021
Sensors, 21, 7175.
https://doi.org/10.3390/s21217175

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Yankton
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Omaha
Pawnee National Grasslands
Fort Morgan
3709 ft
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1591 ft
4924 ft

30mi

-102.644 41.602 Degrees

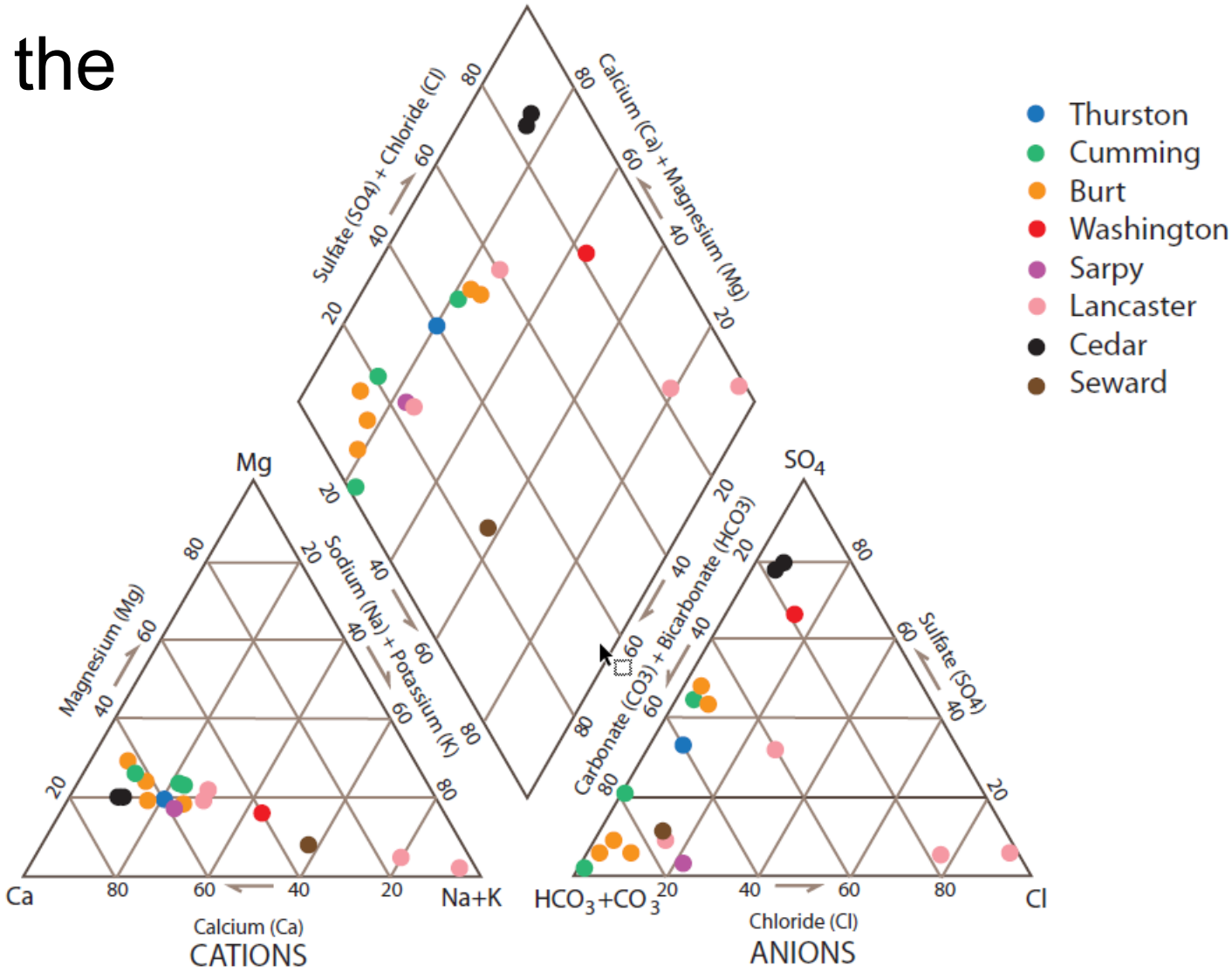
USGS | Nebraska Game & Parks Commission, Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS | ...

Water Quality

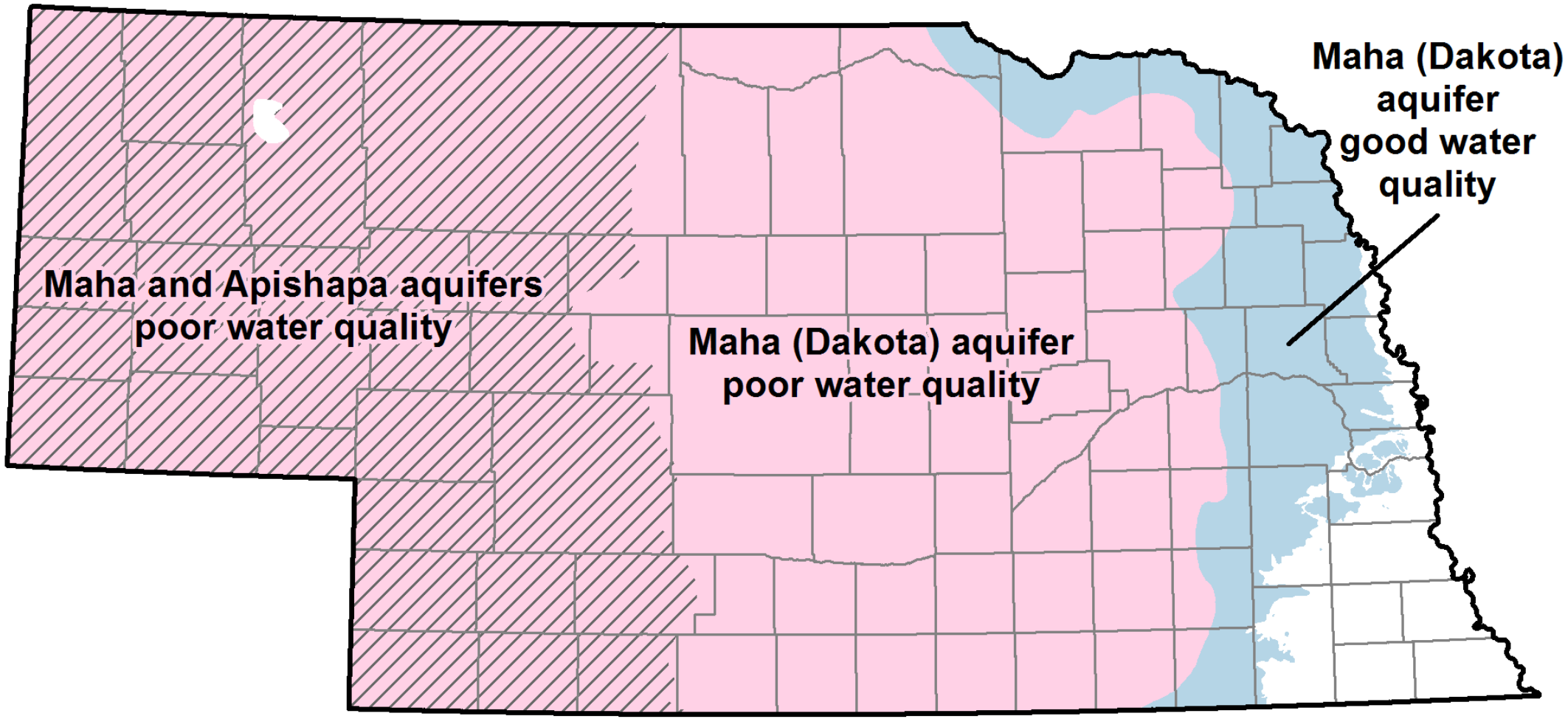
Natural water quality of the Dakota Aquifer

Groundwater in the Dakota Aquifer may have elevated levels of:

- Sulfate (SO4) – typically in northeastern Nebraska
- Sodium (Na) and Chloride (Cl) – common in Lancaster County



Divine and Sibray, 2017, An Overview of Secondary Aquifers in Nebraska. University of Nebraska–Lincoln, Conservation and Survey Division, Educational Circular No. 26, 44 p.



Korus et al., 2013, The Groundwater Atlas of Nebraska, Conservation and Survey Division, School of Natural Resources, University of Nebraska-Lincoln. Resource Atlas 4b, 64 p.

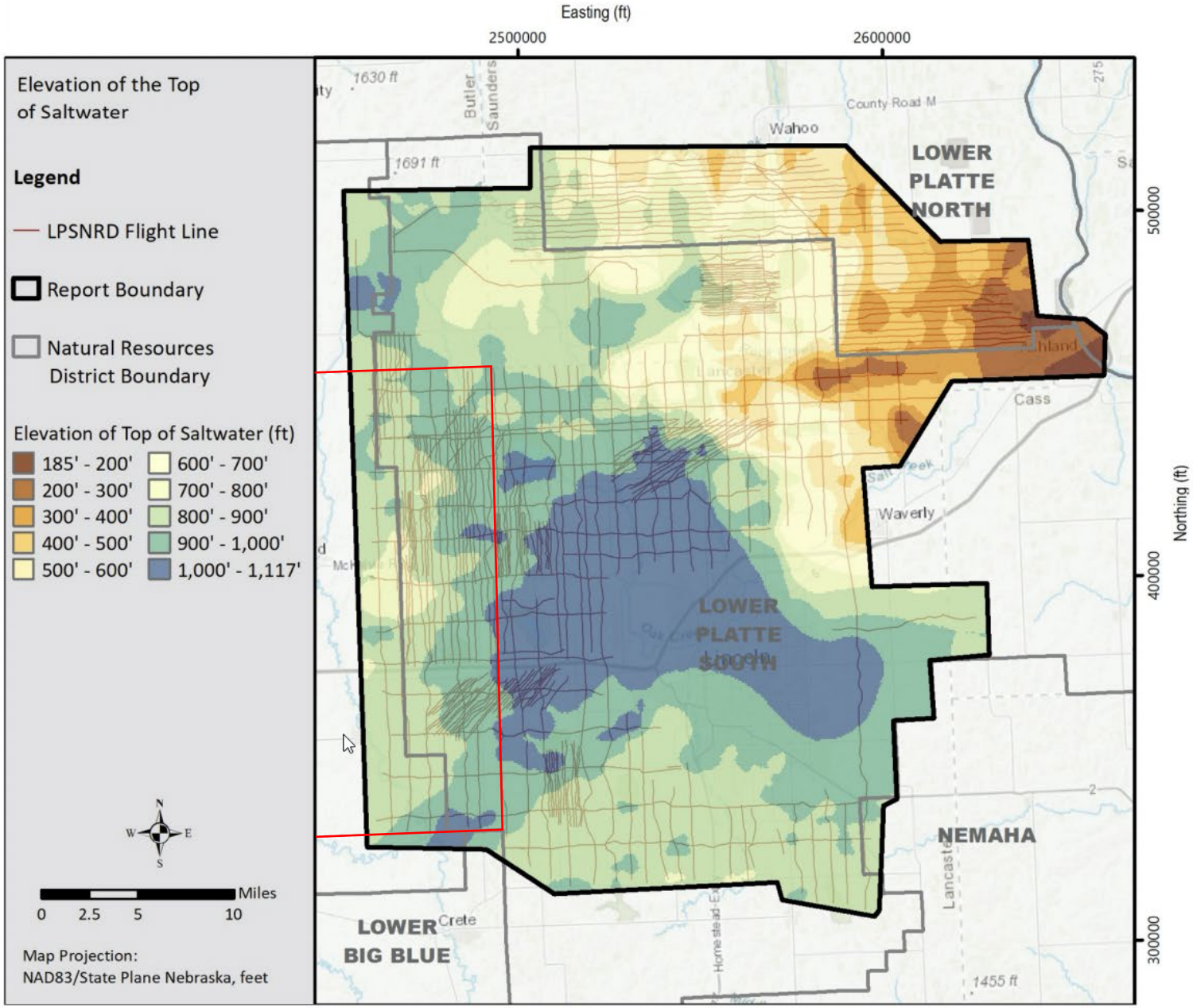


Figure 3-102. Map showing where saltwater is present within the project area and these areas represent where a value of 4 ohm/m which indicates the presence of saltwater. Flight lines are indicated by the grey lines. Horizontal datum is NAD83 State Plane Nebraska (feet). Section 3.1 explains how this determination was made.

NE Clearinghouse

https://clearinghouse.nebraska.gov/

clearinghouse.nebraska.gov/?wellPageSize=50&wellPage=1&samplePageSiz

Explorer

Nebraska Groundwater Quality Clearinghouse

Reset All Filters | Export Filter Results | Download Database

Sample Result Explorer

Applied Filters:

Clearinghouse Number	Sample Date	Analyte/CAS #	Concentration	Units	%
373616	2023/04/20	Chloride (CAS #: 16887-00-6)	24.8	mg/l	
373616	2023/04/20	Fluoride (CAS #: 16984-48-8)	Not Detected	ug/l	
373616	2023/04/20	Sulfate (CAS #: 14808-79-8)	1090	mg/l	
373616	2023/04/20	Nitrate-N (CAS #: 14797-55-8)	119	mg/l	1
373616	2023/04/20	Nitrite as NO2 (CAS #: 14797-65-0)	Not Detected	mg/l	
373624	2023/03/22	Nitrite as NO2 (CAS #: 14797-65-0)	Not Detected	mg/l	
373624	2023/03/22	Chloride (CAS #: 16887-00-6)	44.4	mg/l	
373624	2023/03/22	Fluoride (CAS #: 16984-48-8)	143	ug/l	3
373624	2023/03/22	Sulfate (CAS #: 14808-79-8)	36.8	mg/l	
373624	2023/03/22	Nitrate-N (CAS #: 14797-55-8)	54.3	mg/l	5
206230	2023/03/22	Nitrate-N (CAS #: 14797-55-8)	20.3	mg/l	2
206230	2023/03/22	Chloride (CAS #: 16887-00-6)	18.2	mg/l	
206230	2023/03/22	Fluoride (CAS #: 16984-48-8)	138	ug/l	3
206230	2023/03/22	Sulfate (CAS #: 14808-79-8)	49.2	mg/l	
206230	2023/03/22	Nitrite as NO2 (CAS #: 14797-65-0)	Not Detected	mg/l	
373623	2023/03/21	Nitrate-N (CAS #: 14797-55-8)	32.1	mg/l	3
373623	2023/03/21	Nitrite as NO2 (CAS #: 14797-65-0)	0.019	mg/l	0
373623	2023/03/21	Chloride (CAS #: 16887-00-6)	43.3	mg/l	
373623	2023/03/21	Fluoride (CAS #: 16984-48-8)	199	ug/l	4
373623	2023/03/21	Sulfate (CAS #: 14808-79-8)	165	mg/l	
373622	2023/03/21	Nitrite as NO2 (CAS #: 14797-65-0)	Not Detected	mg/l	
373622	2023/03/21	Nitrate-N (CAS #: 14797-55-8)	27.3	mg/l	2
373622	2023/03/21	Chloride (CAS #: 16887-00-6)	67.7	mg/l	
373622	2023/03/21	Fluoride (CAS #: 16984-48-8)	166	ug/l	4

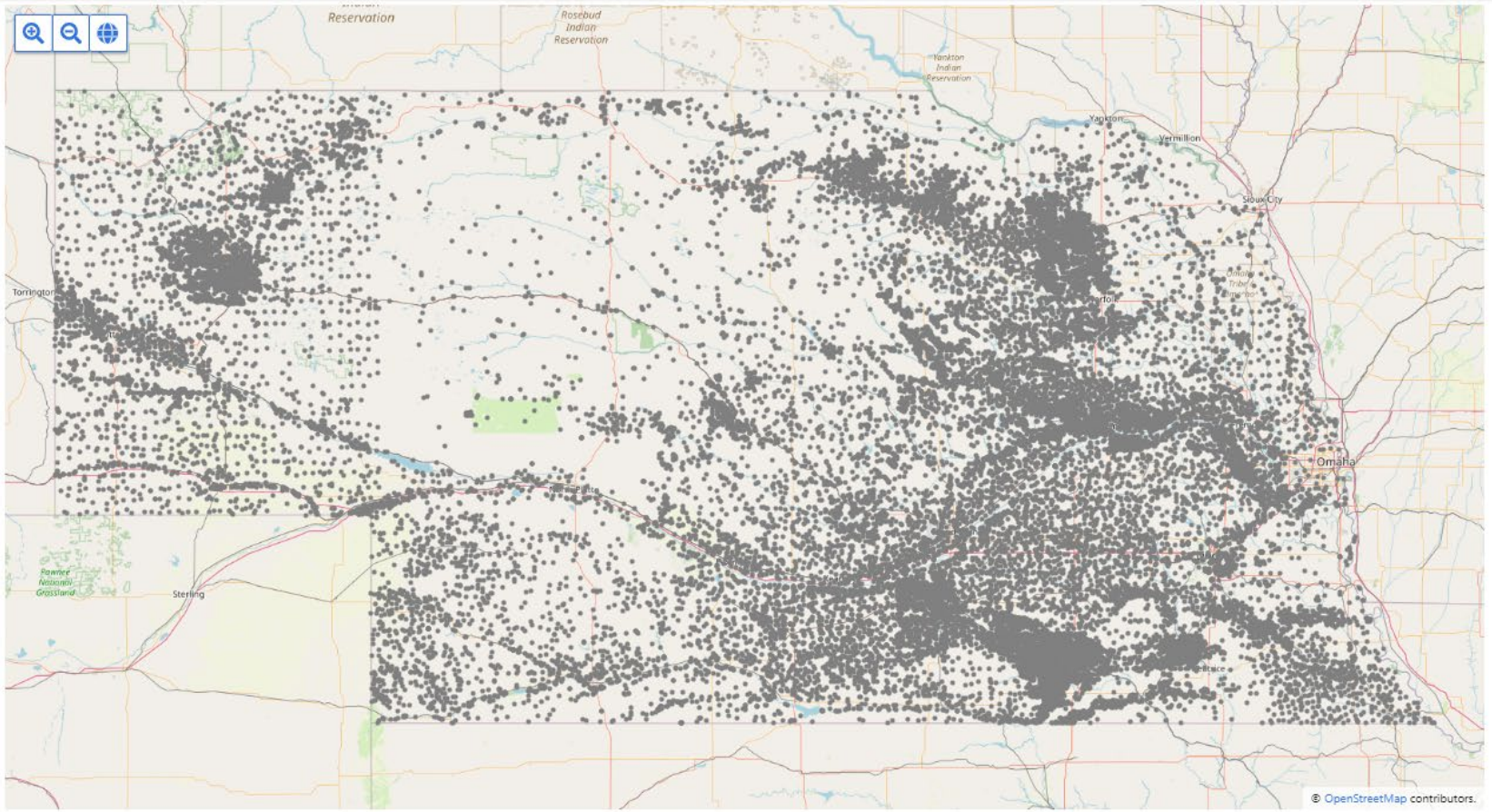
<< < > >> **468370** Total Results | Page **1** of **9368**

| Go to page: 1 Show 50

Aggregate Nitrate Chart

All Time

Map



Well Explorer

Applied Filters:

Clearinghouse Number	DNR Registration Number	DNR Well ID	Well Type	County	NRD	Township | Range | Section	Latitude (NAD83)	Longitude (NAD83)
3	G-080540	89196	Irrigation	Adams	Little Blue	7N|9W|22	40.5642650929	-98.330777612
6	G-080920	89576	Irrigation	Adams	Little Blue	7N|10W|7	40.58617	-98.48253
7	G-081130	89785	Domestic	Adams	Little Blue	7N|10W|5	40.59894	-98.46106
9	G-081236	89891	Irrigation	Adams	Little Blue	5N|11W|23	40.3903422954573	-98.5202460696071

https://clearinghouse.nebraska.gov/

Explorer

Nebraska Groundwater Quality Clearinghouse

Reset All Filters | Export Filter Results | Download Database

Sample Result Explorer

Applied Filters:

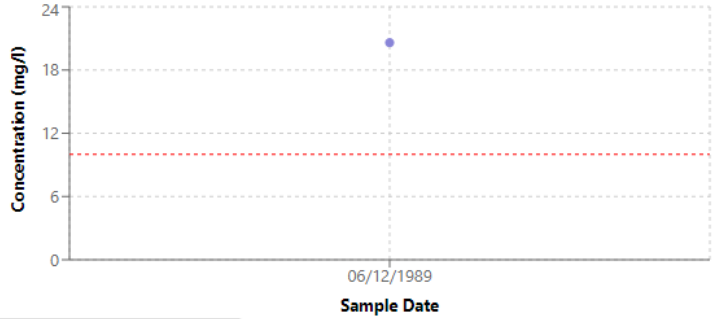
Clearinghouse Number	Sample Date	Analyte/CAS #	Concentration	Units	%
373616	2023/04/20	Chloride			
373616	2023/04/20	Fluoride (			
373616	2023/04/20	Sulfate (C			
373616	2023/04/20	Nitrate-N			
373616	2023/04/20	Nitrite as			
373624	2023/03/22	Nitrite as			
373624	2023/03/22	Chloride			
373624	2023/03/22	Fluoride (			
373624	2023/03/22	Sulfate (C			
373624	2023/03/22	Nitrate-N			
206230	2023/03/22	Nitrate-N			
206230	2023/03/22	Chloride			
206230	2023/03/22	Fluoride (			
206230	2023/03/22	Sulfate (C			
206230	2023/03/22	Nitrite as			
373623	2023/03/21	Nitrate-N			
373623	2023/03/21	Nitrite as			
373623	2023/03/21	Chloride			
373623	2023/03/21	Fluoride (			
373623	2023/03/21	Sulfate (C			
373622	2023/03/21	Nitrite as			
373622	2023/03/21	Nitrate-N			
373622	2023/03/21	Chloride			
373622	2023/03/21	Fluoride (			

<< < > >> | Go to page: 1

Details

All Time

Clearinghouse # 117499 - Nitrate Levels



Well Details | Well Screens | Sample Results

Well

Clearinghouse Number: 117499
DNR Registration Number:
DNR Well ID:
Well Type: Domestic
Well Depth (Feet): 50
Well Completion Date:
DNR Link:

Location

County: Seward
NRD: Upper Big Blue
Township|Range|Section: 12N|4E|31
Latitude (NAD83): 40.9611561569
Longitude (NAD83): -97.0229192318

Aquifer

Local Aquifer:
National Aquifer:

Sample Count: 1

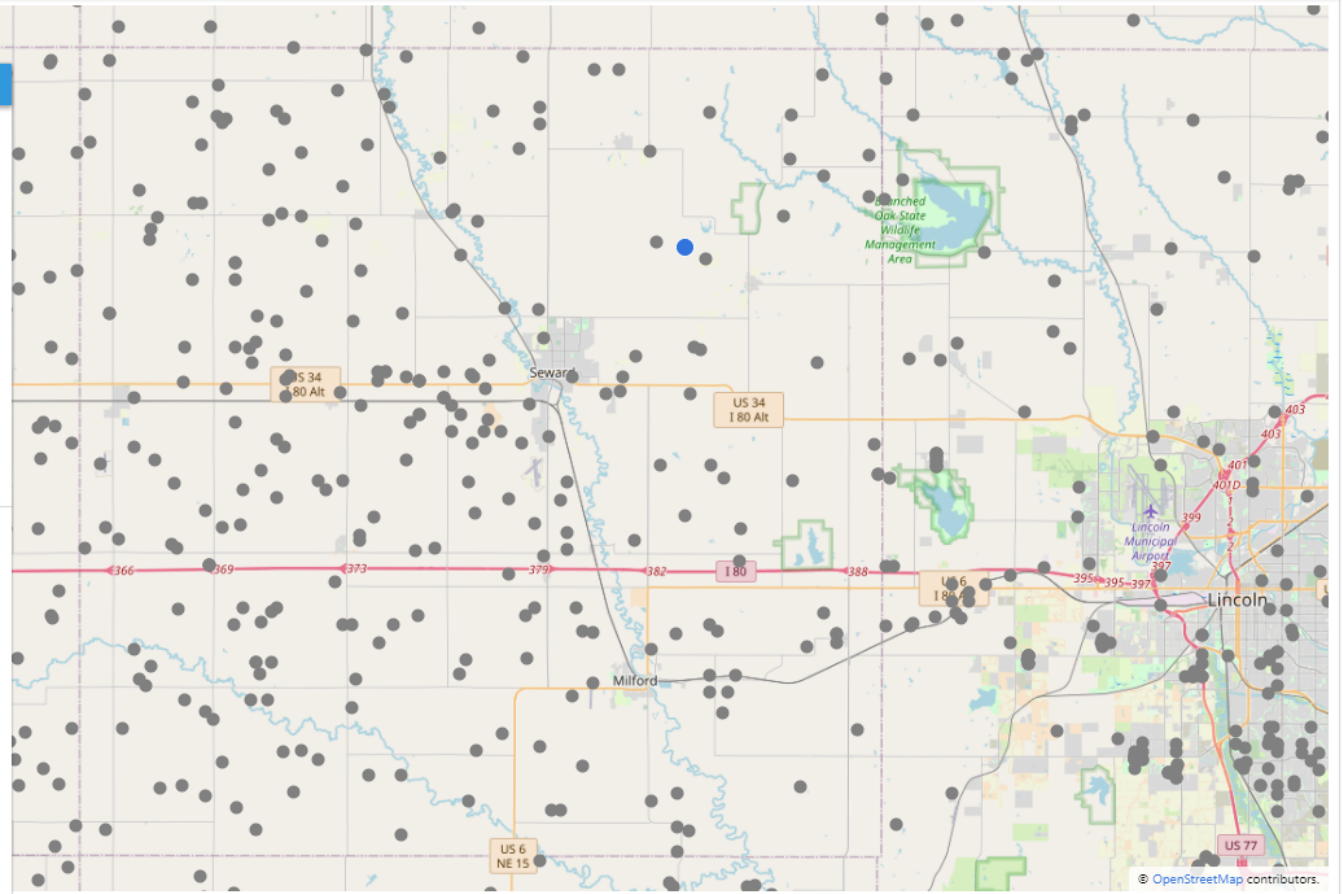
Last Sample Date: 1989/06/12

Most Recent Pesticide Sample Date: None

Nitrate Overview

Min: 20.6 **Max:** 20.6
Mean: 20.6 **Median:** 20.6

Map



Applied Filters:

ation Number	DNR Well ID	Well Type	County	NRD	Township | Range | Section	Latitude (NAD83)	Longitude (NAD83)
	89196	Irrigation	Adams	Little Blue	7N|9W|22	40.5642650929	-98.330777612
	89576	Irrigation	Adams	Little Blue	7N|10W|7	40.58617	-98.48253
	89785	Domestic	Adams	Little Blue	7N|10W|5	40.59894	-98.46106
G-081236	89891	Irrigation	Adams	Little Blue	5N|11W|23	40.3903422954573	-98.5202460696071

Aggregate Nitrate Chart

All Time

Monitoring and Studies

CSD Interactive Data Map | Cons

CSD Ground Water and Geology

csdportal.unl.edu/csdportal/apps/webappviewer/index.html?id=7016a4a1c52b48d0a2

go.unl.edu/csdinteractivemap

CSD Ground Water and Geology Data Portal

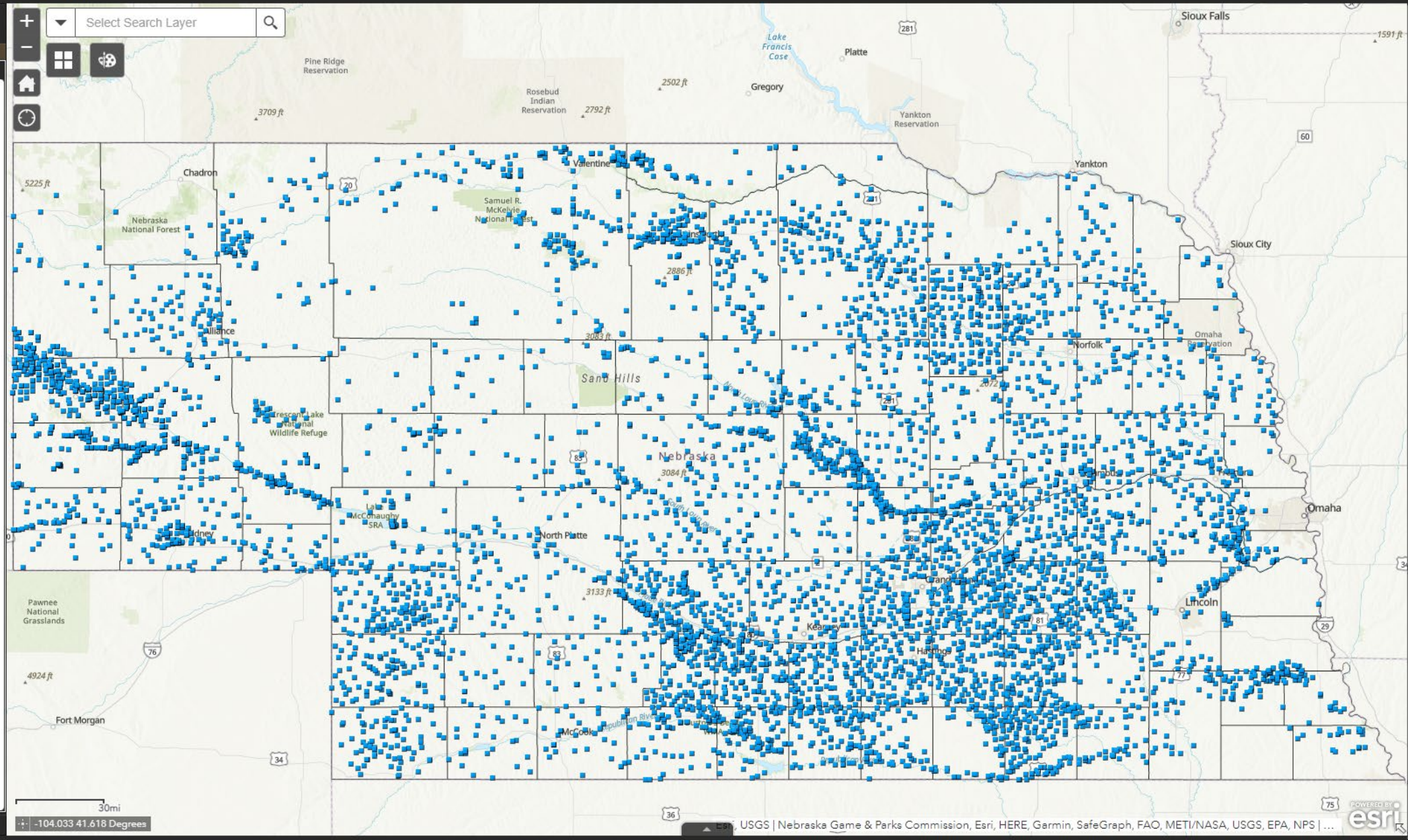
CSD Website | Nebraska GeoCloud | NDEE GW Quality Clearinghouse

Select Search Layer

Layer List

Layers

- Test Holes
- Active Water Levels
- Real-Time Observation Wells
- DNR-Registered Wells
- Bedrock Geology
- Basement Rock Type
- Navigation Layers (Click Here for Options)
- Aquifer Boundaries (Click Here for Options)
- 2022 Water Level Changes (Click Here for Options)
- 2022 Precipitation (Click Here for Options)
- AEM_Flight_Lines



CSD Interactive Data Map | Cons | CSD Ground Water and Geology | Historic Chart | Groundwate

go.unl.edu/csdinteractivemap

csdportal.unl.edu/csdportal/apps/webappviewer/index.html?id=7016a4a1c52b48d0a2

CSD Ground Water and Geology Data Portal

CSD Website | Nebraska GeoCloud | NDEE GW Quality Clearinghouse

Select Search Layer

Layer List

Layers

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- Active Water Levels
- Real-Time Observation Wells
- DNR-Registered Wells
- Bedrock Geology
- Basement Rock Type
- Navigation Layers (Click Here for Options)
- Aquifer Boundaries (Click Here for Options)
- 2022 Water Level Changes (Click Here for Options)
- 2022 Precipitation (Click Here for Options)
- AEM_Flight_Lines

Observation Well Informatic

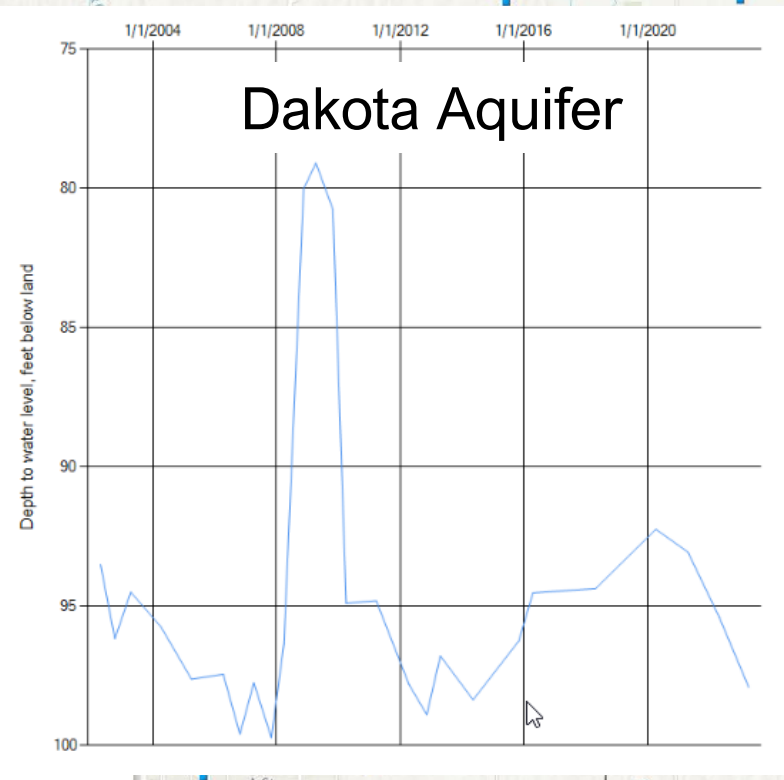
Well ID: 404940096543001
Well Depth: 175
Legal Description: 10N 5E 1
Predevelopment DTW:

Year	DTW
2023	97.92
2022	95.40
2021	93.06
2020	92.24
2019	

View Hydrograph and Additional Water Levels

Download CSD Groundwater-Level Database

Zoom to



Dwight
Ulysses
Valparaiso
Gresham
Agnew
Staplehurst
Branched Oak SRA
Garland
Utica
Tamora
Seward
Alvo Rd
Goehner
O St Rd
Beaver Crossing
Riverside Park
Pleasant Dale
Lincoln Creek
Plum Creek
North Fork Johnson Creek
Friend
Dorchester
Exeter
Lancaster
College View
Old Cheney Rd
W Denton Rd
Saltillo
Saltillo Rd
Palmyra
Bennet
Roca Rd

-97.347 40.662 Degrees

Esri, NASA, NGA, USGS | Nebraska Game & Parks Commission, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, ...

CSD Ground Water and Geology | Historic Chart | Groundwater | W

csdportal.unl.edu/csdportal/apps/webappviewer/index.html?id=7016a4a1c52b48d0a2dffe95185b9e82

CSD Ground Water and Geology Data Portal

CSD Website | Nebraska GeoCloud | NDEE GW Quality Clearinghouse

Select Search Layer

Layer List

Layers

- Test Holes
- Active Water Levels
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- DNR-Registered Wells
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- Basement Rock Type
- Navigation Layers (Click Here for Options)
- Aquifer Boundaries (Click Here for Options)
- 2022 Water Level Changes (Click Here for Options)
- 2022 Precipitation (Click Here for Options)
- AEM_Flight_Lines

Observation Well Information

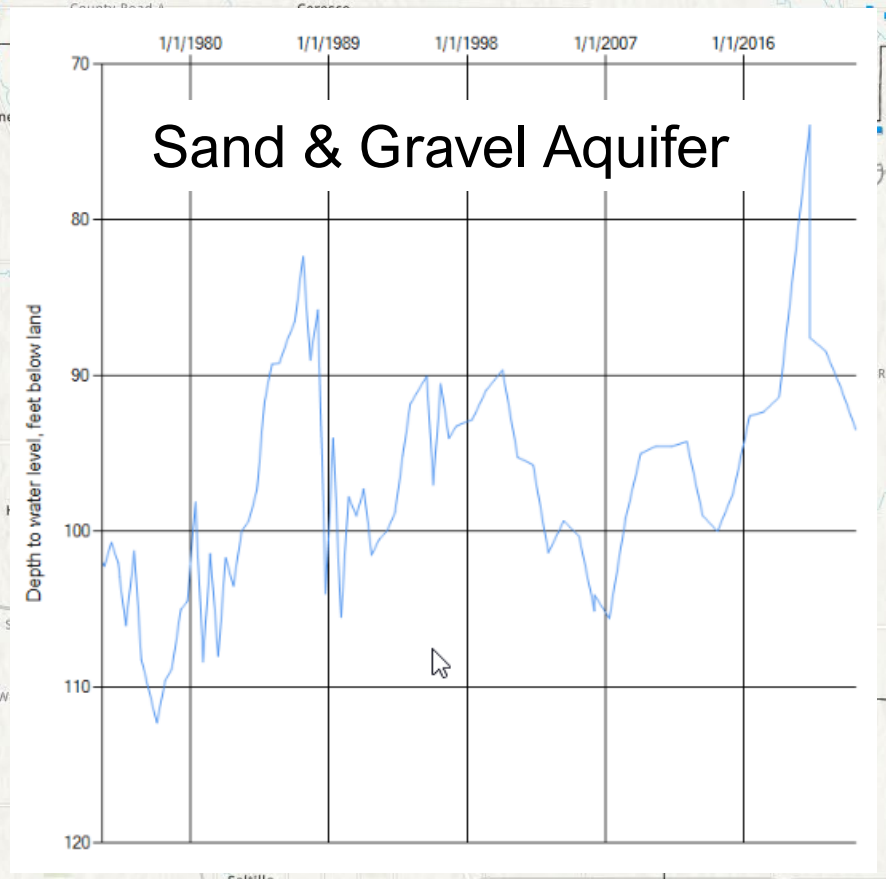
Well ID: 405412097010301
Well Depth: 166
Legal Description: 11N 4E 19CD
Predevelopment DTW:

Year	DTW
2023	93.46
2022	90.73
2021	88.40
2020	87.55
2019	

View Hydrograph and Additional Water Levels

Download CSD Groundwater-Level Database

Zoom to



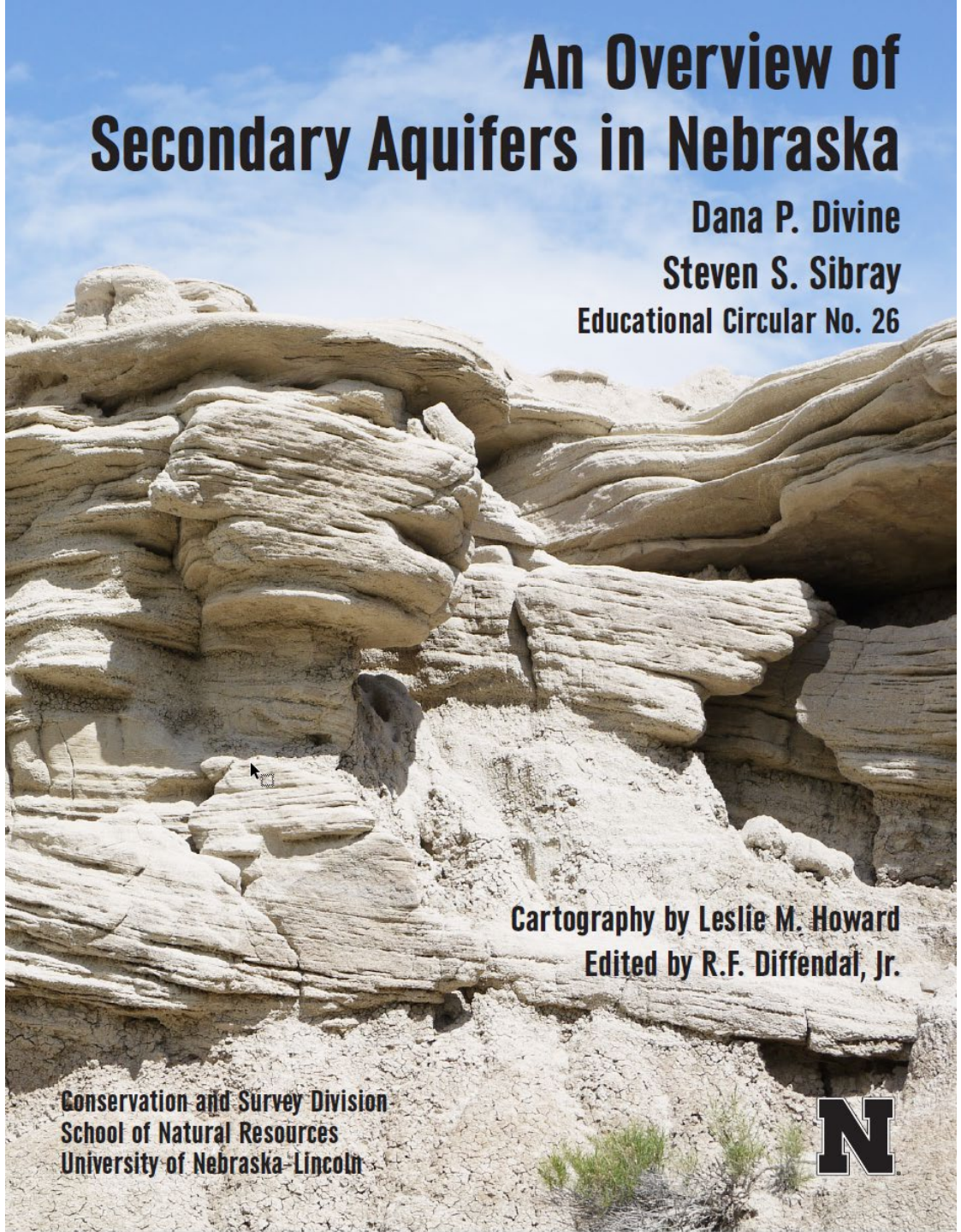
Dwight
Ulysses
Valparaiso
Memphis
Gresham
Staplehurst
Lincoln Creek
County Road 280
Plum Creek
Highway 69
Utica
Tamora
Seward
Goehner
80F
238th
O St Rd
364th
462nd
Beaver Crossing
Riverside Park
Pleasant Dale
SW 84th St
154th
1535 ft
North Fork Johnson Creek
State Spur 76A
103
Friend
Dorchester
Crete
Saltillo
Saltillo Rd
Bennet
Palmyra
SW 100th St
S 68th St
Roca Rd
4mi
-96.789 41.011 Degrees

City of Lincoln/Lancaster County, Nebraska Game & Parks Commission, Esri, HERE, Garmin, SafeGraph, GeoTechnologi...

Recent studies

- Divine & Sibray, Secondary Aquifers of Nebraska
- 2018 Airborne Electromagnetic (AEM) survey and hydrogeologic framework report for Lower Platte South NRD
- 2023 Hydrogeologic Framework report scheduled for completion before January 1, 2024 (Lower Platte South NRD)

https://digitalcommons.unl.edu/conservationsurvey/39/

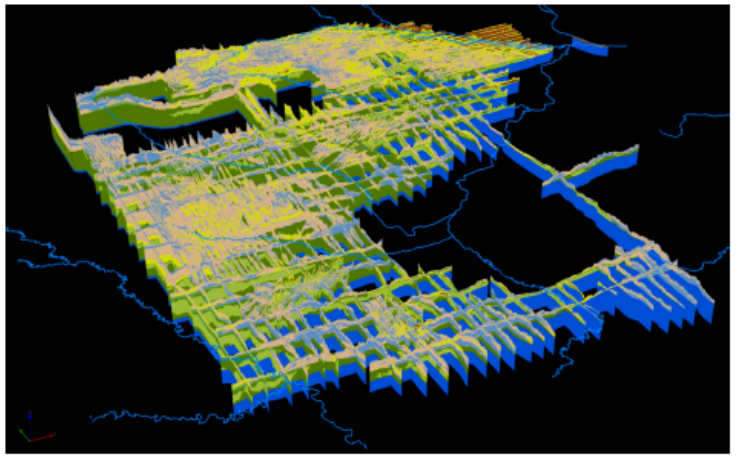


Eastern Nebraska Water Resources Assessment (ENWRA)
https://enwra.org/
Nebraska GeoCloud
https://go.unl.edu/geocloud

AGF
Aqua Geo Frameworks

December 4, 2019

"Airborne Electromagnetic Mapping and Hydrogeologic Framework of Selected Regions of the Eastern Nebraska Water Resources Assessment Area" Chapter on the Lower Platte South Natural Resources District



Prepared for the:
Lower Platte South Natural Resources District
3125 Portia Street
Lincoln, NE 68521

Submitted by:
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Tammi L. Renninger, ElephantFish, LLC
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Online resources

- CSD interactive map
  - go.unl.edu/csdinteractivemap/
- Nebraska GeoCloud
  - go.unl.edu/geocloud
- UNL Watershed Aquifer Virtual Education System (WAVES)
  - https://nebraskawaves.org/
- UNL Extension Water Website
  - https://water.unl.edu/
- Eastern Nebraska Water Resources Assessment (ENWRA)
  - https://enwra.org/
- Department of Natural Resources INSIGHT
  - https://nednr.nebraska.gov/INSIGHT/
- Nebraska Groundwater Quality Clearinghouse
  - https://clearinghouse.nebraska.gov/
- U.S. Geological Survey National Water Information System
  - https://waterdata.usgs.gov/nwis