

2024



# NEBRASKA

## KEY ACTIVITIES

### **Nebraska Department of Natural Resources**

Nebraska Department of Natural Resources (NeDNR) is the state governmental agency that manages the state's surface water quantity. NeDNR used the relationships and activities of the previous Ogallala Summits to continue ensuring the mission of preserving water across the State. NeDNR is grateful to continue partnerships and maintain positive relationships with stakeholders of varied backgrounds and types, allowing greater collaborative support for water projects, initiatives, and plans. Below are a few examples of NeDNR work in the area in which the Ogallala aquifer is located:

### ***Surface Water Irrigation Infrastructure Fund (SWIIF)***

The Surface Water Irrigation Infrastructure Fund (SWIIF) is used to provide grants to irrigation districts. The Fund received a one-time transfer of fifty-million dollars from

*Nebraska*

the Cash Reserve Fund, and the Department established procedures and criteria for awarding grants. These grants are used for the repair or construction of headgates, flumes, diversion structures, check valves, or any other physical structures used for irrigation projects. Applicants need only provide matching funds equal to ten percent of the grant amount awarded for a project, so this is a great opportunity to update outdated water infrastructure.

## ***Soil Initiative***

The Resilient Soils and Water Quality Act (RSWQA) serves to accelerate the use of best management practices for healthy soil; protect and improve soil and water quality; protect the public's health and enhance agricultural production and profitability; address soil health economics, resource stewardship, and environmental issues; increase awareness, education, and promotion of best management practices for healthy soils through producer-to-producer, peer-to-peer, and mentoring relationships; and provide proof of healthy soil benefits through demonstration and research farms. The Department identified and created a small working and advisory group with members from various commodity groups, NRCS, NRD organizations, UNL, and other agriculture and natural resources not-for-profit conservation organizations, each working to implement goals like those of the RSWQA.

## ***Resilient Soils Producer Learning Network***

Under LB 925, the Department provides support and assistance in the formation of a producer learning community (PLC). The PLC will foster the sharing of knowledge to carry out the purposes of the Resilient Soils and Water Quality Act. These efforts will be broad-based and work to recognize the diversity of soils, topography, rainfall, and cropping systems across the state. The Department established regions in which to focus demonstration and outreach events and to establish research farms that are representative of each diverse region's agriculture. The Department also implemented a website whose design is similar to other states' that have seen success reaching and engaging various target audiences. The website will focus on peer-to-peer communication opportunities to develop and expand outreach and field demonstrations for producers.

## ***Republican Telemetry***

The Republican River Basin Natural Resources Districts are engaging in efforts to install telemetered irrigation flow meters, soil moisture probes and weather stations throughout the basin. This real-time operational irrigation water management model will track water supply and demand conditions for all groundwater irrigated acres in the basin. Projects like these serve to enhance on-farm water management and conservation, with the additional goal of stabilizing regional groundwater resources and improve management of water on a basin-wide scale.

## **Nebraska Natural Resources Districts**

Nebraska's Natural Resources Districts (NRDs) have local leadership responsibilities for protecting groundwater from overuse and pollution. Each district also has a plan to protect groundwater. State law has given districts a variety of regulatory tools to deal with contamination, shortages, or user conflicts.

NRDs encourage stewardship by providing financial assistance to landowners for irrigation water management and Best Management Practices (BMPs) to protect water. BMPs such as irrigation management and proper nitrogen/pesticide applications, are needed to prevent contaminants from entering Nebraska's drinking water.

Examples of NRD recent groundwater management projects include:

- Nitrogen Dashboard to Improve Fertilizer Efficiency, Water Quality. The Nebraska Corn Board, Nebraska Association of Resources Districts (NARD) and 17 of Nebraska's 23 Natural Resources Districts (NRDs) are developing a web and mobile application suite, allows producers to access their crop reporting data and includes a fertilizer recommendation based on yield goals. This collaborative effort aims to empower agriculture producers to optimize inputs, which will enhance agricultural profitability, water quality and irrigation efficiency.
- Real-time Advanced Irrigation Water Management through Twin Platte Natural Resources District's Water Data Program. Implement advanced irrigation water management to ensure sustainability of water resources in the near and long term while also providing ecosystem benefits, reducing carbon dioxide emissions, and enabling financial savings for farmers. NRCS RCPP. Partners: Arable, GiSC.

- Twin Platte NRD's Water Data Program has 100% of certified irrigated acres voluntarily enrolled and provides accurate real-time water use online and on a mobile app. The program also creates the required groundwater models needed for the robust review of the Integrated Management Plan.
- Central Platte NRD updated their Groundwater Management Plan to address quality & quantity concerns. New triggers and controls were implemented to address future groundwater decline and two management areas were subdivided to monitor differences in irrigation development.
- Lower Big Blue NRD is developing a comprehensive and diverse structure for managing the use of groundwater across variable aquifer formations. The District has evaluated aquifer characteristics using known well depths, transmissivity, and airborne geologic surveys.
- Lower Republican NRD is collaborating with the Nebraska Department of Natural Resources and Bureau of Reclamation to install new telemetry flowmeters across the district to provide near real-time water usage and weather information to producers.
- Middle Republican NRD continues AEM surveys to help with the development of managed aquifer recharge, aquifer storage and recovery areas, as well as providing foundational information in the form of earth models for groundwater modeling.
- In 2023, the Upper Republican NRD lowered the allocation from 65" per acre over 5 years to 62.5" for the new 2023–2027 allocation period to help conserve water. The district also saw the completion of a new groundwater model that will improve decision making regarding water usage in the future.
- North Platte NRD is currently updating their Ground Water Management Plan and developing its Nutrient Management Plan, which includes nitrate testing. The District plans to mail nitrographs and hydrographs for the 600+ monitoring wells throughout the District as well as providing them on the website.

## **Irrigation Districts**

Central Nebraska Public Power and Irrigation District finalized two long-term agreements in 2023 to enhance groundwater recharge from its system of canals and laterals. Platte River Recovery Implementation Program will provide \$9.15 million for groundwater aquifer recharge services associated with the Phelps Canal and Elwood Reservoir for up to 20 years. The PRRIP also provided Central \$2 million to assist with the Elwood Dam Seepage Mitigation project to help support those recharge activities.

In addition, the State of Nebraska – through the Department of Natural Resources and partnerships with Tri-Basin and Central Platte Natural Resource Districts – will provide up to \$19.1 million to divert water into the E65 Canal, Phelps Canal, Elwood Reservoir and several Waterfowl Production Areas to provide groundwater recharge over the next 15 years.

## **University of Nebraska**

The University of Nebraska has more than 200 faculty engaged in water related research, teaching, and outreach around issues that impact the Ogallala Aquifer. They represent diverse disciplines from science and engineering, to journalism, medicine, and the arts. A few highlights of recent work:

### ***Extension and Outreach***

- Testing Agriculture Performance Solutions (TAPS): This interactive farm-management competition focuses on profitability and water and nitrogen efficiency. It expanded in the last few years to include popcorn, sorghum. Surveys show that 75% of TAPS participants have adopted new ag technology on their farm and 86% new management practices. To date, there are 360 participants, from seven states and three countries. Ninety agricultural businesses, commodity boards, financial institutions, non-profit, and governmental organizations have supported the program. The program has expanded to other states, and beginning in 2024 is adding a new location in Eastern Nebraska, a virtual TAPS (VTAPS) for high school students, and new five-state NRCS Technical Agreement to build partnerships with the Master Irrigator program.
- Nebraska On-Farm Research Network. Two recent projects include, the Precision Nitrogen Management project (2020-2024) which has conducted 120 on-farm trials to evaluate technologies. Cover Crop Interseeding project (2022-3) planted cover crops on 57 demonstration farms with 6,500 acres.
- Crop Production Clinics. In 2023 alone, 836 participants across 9 Nebraska locations attended, influencing 13 million acres. 68% increased understating their role in protecting soil and water quality.
- Soil Health Focus Area. Established annual soil health conferences and field days with nearly 300 participants in 2023. 40% of participants said they would adopt or expand soil health practices, with a self-reported value of \$6.7 million.
- Water Quality + Citizen Science. Provides free water screening kits to Nebraska residents to test both their drinking water and surface water for nutrients.

- Know Your Well. Trains high school students how to sample and test well water quality. This project is expanding between 2022 and 2025 and expects to connect with 50 schools across Nebraska. Students will compare their results with tests conducted at the University of Nebraska Water Sciences Laboratory. Over 300 private wells will eventually be tested for nitrate, nitrite, metals, pesticides, and coliform bacteria.
- Water for Food Global Conference. In 2023, Nebraska welcomed 425 participants from 27 different countries. With more than 120 speakers focusing on win-win scenarios to support improved water use in agriculture while preserving water resources for other human and environmental needs.

## **Research**

- Water, Climate, and Health Program at University of Nebraska Medical Center and the Daugherty Water for Food Global Institute. The Water, Climate and Health Program pioneers interdisciplinary research, education and collaborative solutions to public health challenges associated with water and climate in Nebraska and around the world.
- Nebraska Water Center and Water Sciences Laboratory. Conducts annual tours, conferences, seminars, and along with supporting faculty research in Nebraska and globally. A critical focus of the Water Sciences Lab are Vadose Zone Studies, these provide data about the storage, transport, and transformation of chemicals that can impact groundwater quality. Hundreds of cores above the Ogallala Aquifer are supporting decision-making throughout much of Nebraska.
- Daugherty Water for Food Global Institute: works to address the global challenge of achieving food security with less stress on water resources through water management in agricultural and food systems. Current research is focusing on: closing water productivity gaps, improving groundwater management, enhancing irrigated agriculture, supporting ecosystems and public health, and managing drought.
- National Drought Mitigation Center. Helps people, organizations and institutions build resilience to drought through monitoring and planning, and we are the academic partner and web host of the U.S. Drought Monitor. Our capabilities include climatology, social science and public engagement, and we work at all scales, from individual ranches to local, state and tribal government, and countries around the world.

## **Non-Governmental Organizations (NGO)**

Nebraska Soil Carbon Project is a Nature Conservancy-led collaboration with the Natural Resources Conservation Service (NRCS-RCPP), the Upper Big Blue and Central Platte Natural Resource Districts, the Ecosystem Services Market Consortium (ESMC), Cargill, Target and McDonald's. "Our goal is to team up with approximately 100 producers to enroll 100,000 acres over five years," says Jacob Fritton, Director of Agriculture for The Nature Conservancy in Nebraska. "Farmers who enroll will be compensated for adopting cover crops, no-till and/or diverse rotations."

The Farming for the Blue River Project is designed to abate nutrient pollution by teaming up with farmers to implement nutrient management practices on their farms. The Nature Conservancy and partners will provide a combination of financial and technical assistance to area farmers, teaming up to co-create new nutrient management regimes based on the best available science and each farm's operational realities.

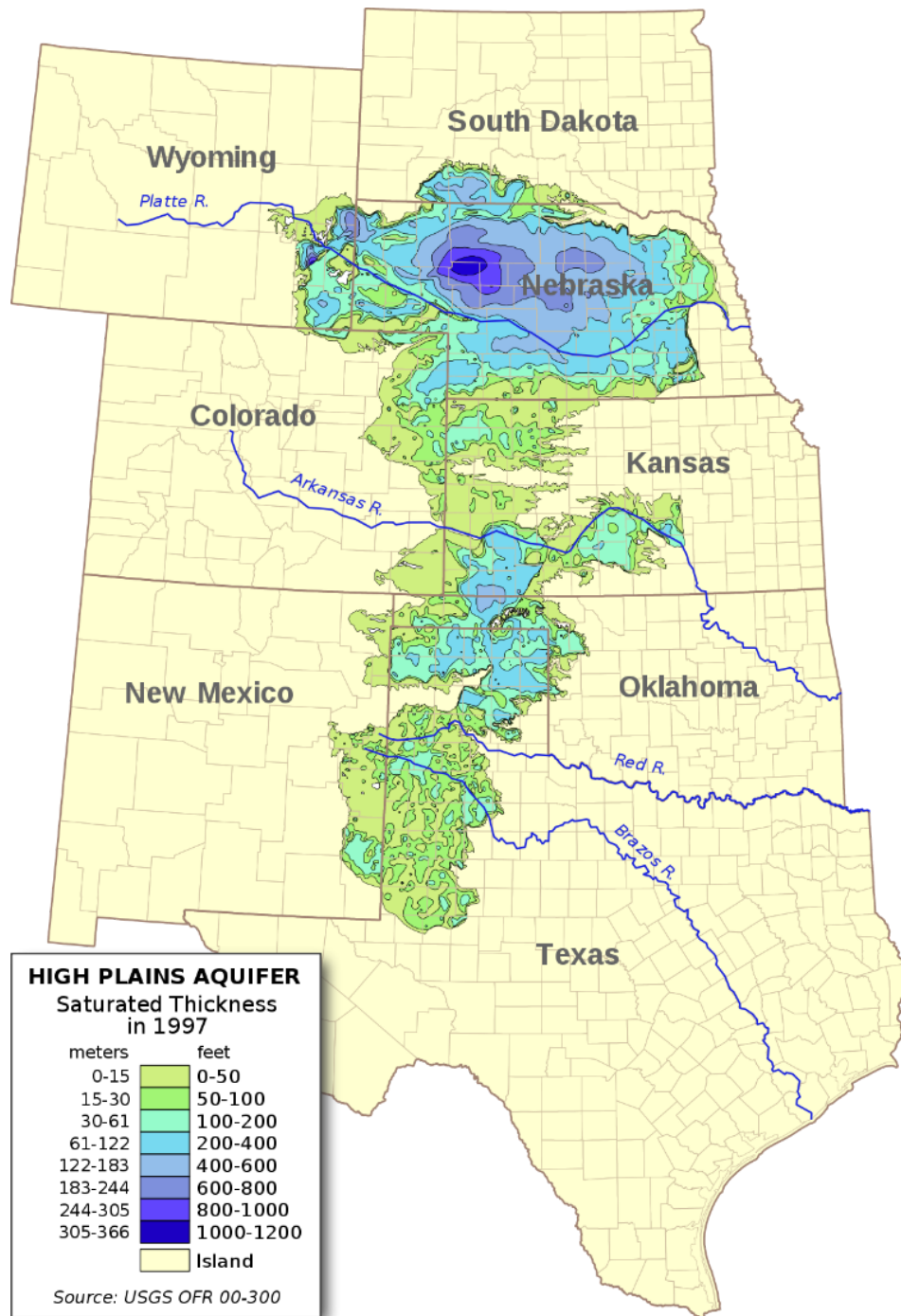
## **KEY CHALLENGES**

Nebraska is fortunate to sit atop a large portion of the Ogallala Aquifer. Water use for agricultural irrigation is a key aspect of Nebraska's economy, with 9.1 million irrigated crop acres. Adding an average annual crop value of \$1.5 billion statewide and an added property valuation of \$13–24 billion. With agricultural irrigation accounting for 91% of Nebraska's total consumptive water use, it is critical to manage this water well. 85% of Nebraska's residents also get their home drinking water from groundwater, making quantity and quality of this resource essential for the future of our state. (Powers, Nebraska Water Facts)

### ***Water Quantity***

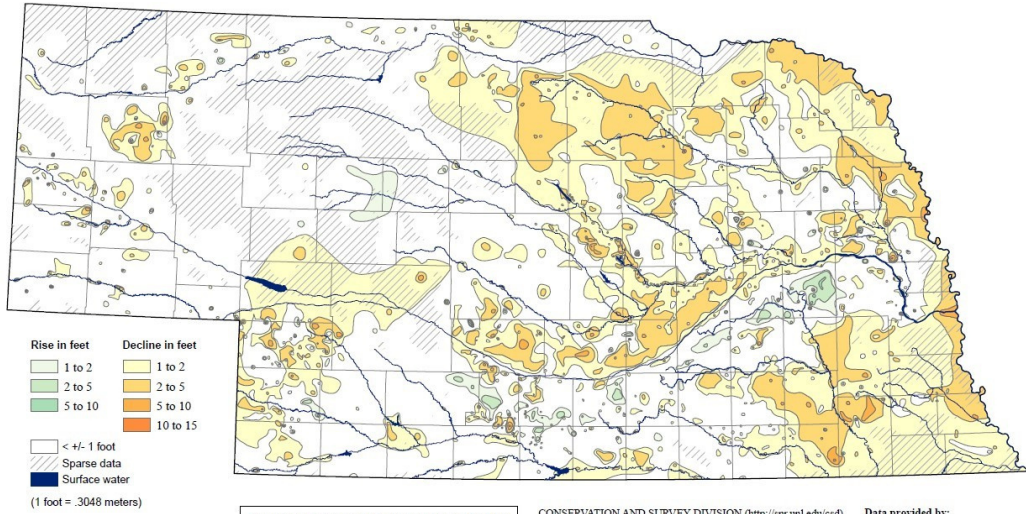
The 2022 drought made the year the second driest for Nebraska of the 21st century and the 15th-lowest on record for annual rainfall. (Olberding, 2023). More than 99% of the state was experiencing moderate to exceptional drought by the beginning of 2023 (Drought.gov). Farmers were estimated to have lost more than \$2 billion (Hammel, 2022a), and 55% percent of respondents to a Nebraska Rural Poll expressed concerns about extreme temperatures and worsening drought (Vogt, 2022). (Joeckel, Nebraska Statewide Groundwater-Level Monitoring Report 2022)

2023 saw continued drought conditions for much of Nebraska, making groundwater declines likely. Updated groundwater level information is expected early in March 2024.





## Groundwater-Level Changes in Nebraska - Spring 2021 to Spring 2022



For an explanation of information presented on this map, see the 2022 Nebraska Statewide Groundwater-Level Monitoring Report, available for download at [go.unl.edu/groundwater](http://go.unl.edu/groundwater)

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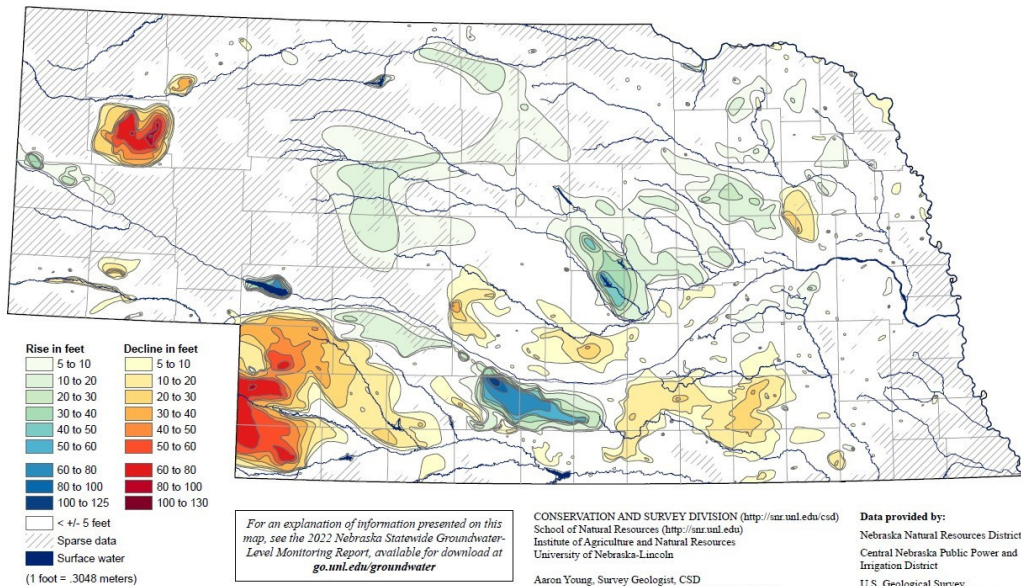
Data provided by:  
 Nebraska Natural Resources Districts  
 Central Nebraska Public Power and Irrigation District  
 U.S. Geological Survey  
 Nebraska Water Science Center  
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 Kansas-Nebraska Area Office  
 Conservation and Survey Division,  
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Disclaimer: groundwater-level changes on this map are depicted at a small scale. They are intended to provide only a general overview of regional variation.

## Groundwater-Level Changes in Nebraska - Predevelopment to Spring 2022



For an explanation of information presented on this map, see the 2022 Nebraska Statewide Groundwater-Level Monitoring Report, available for download at [go.unl.edu/groundwater](http://go.unl.edu/groundwater)

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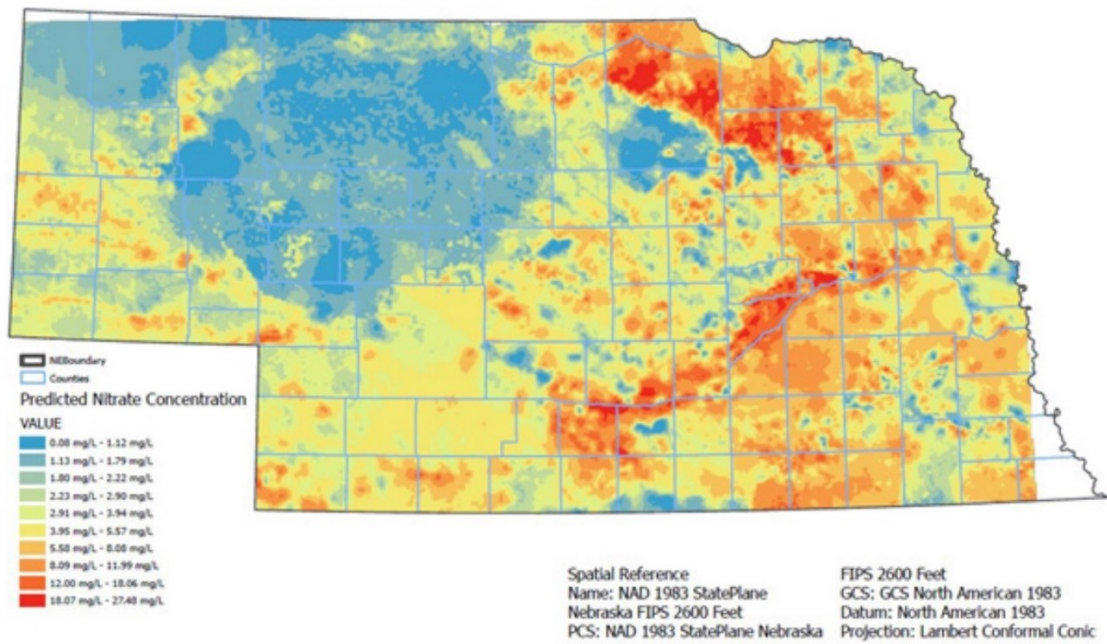
## ***Water Quality***

Nitrate continues to be the most widespread water quality concern. For the past several decades, organizations across Nebraska have taken the lead on a variety of programs seeking to address the increasing nitrate concentration in the state's groundwater.

Nitrogen is an essential element for plant growth and therefore, Nebraska's agricultural industry. However, when nitrogen leaves the crop root zone it becomes a liability for groundwater, surface water, and air quality. For more than 40 years, levels of nitrate in Nebraska's groundwater have been increasing, with several townships now above 20 ppm. In 2017, 349 towns and cities in Nebraska, serving 1.4 million people (about three-quarters of the state's population), had nitrate levels above background. The primary source of nitrate in Nebraska is identified as commercial fertilizers and is most evident in areas beneath irrigated corn fields, on sandy soils, with shallow depth to groundwater. Currently 26–35% of applied nitrogen to corn is still lost to the environment in Nebraska. This loss is related to management practices, hydrogeology, and climate.

In 1992, Nitrate became a regulated compound under the Federal Clean Drinking Water Act. A maximum safe level of 10 ppm was established based on epidemiological studies of methemoglobinemia (blue baby syndrome). A growing body of recent research is also showing connection with drinking water nitrate and increased lifetime risk for cancers, particularly colorectal and pediatric, thyroid disease, and adverse reproductive outcomes.

Fertilizer lost as nitrate is both an economic loss to the farmer and a loss to the community. For small communities of less than 500, the cost of nitrate treatment in Nebraska ranges from \$90 to \$650 per person annually. Treating the water at the tap (point of use) costs between \$50 and \$250 per person annually. The impacts of these factors can become a liability to local and regional growth. (Powers & Pekarek 2021).



Illustrative Heatmap for Nitrate-N concentrations from 8,943 water wells (all types) during 2015–2020. (Source: Nebraska Groundwater Quality Clearinghouse, 2023). White areas indicate no data reported, not the absence of nitrate in groundwater. Nebraska Department of Environment and Energy 2023 Groundwater Quality Report