Nebraska

Water & Health overview

Crystal A. Powers

University of Nebraska

EXTENSION

Nebraska Water Center

Daugherty Water for Food Global Institute

THE DAUGHERTY WATER for FOOD GLOBAL INSTITUTE

at the University of Nebraska

- Partners
- Health risks
- Education
- Policy
- Research

Partnerships

The Partners
Nebraska Nitrate Working Group

Nebraska's Natural Resources Districts

Upper Elkhorn Natural Resources District

USGS science for a changing world

CENTRAL Nebraska Public Power and Irrigation District

NEBRASKA
DEPT. OF WATER, ENERGY, AND ENVIRONMENT

Lower Niobrara Natural Resources District

LOWER LOUP NATURAL RESOURCES DISTRICT

LOWER PLATTE SOUTH natural resources district

Nebraska Public Power District

Nebraska CornGrowers ASSOCIATION

LOWER PLATTE NORTH Natural Resources District

Upper Niobrara White Natural Resources District

NEBRASKA AGRI-BUSINESS ASSOCIATION, INC.

Tri Basin Natural Resources District

UPPER BIG BLUE NATURAL RESOURCES DISTRICT

CPNRD CENTRAL PLATTE NATURAL RESOURCES DISTRICT

LEWIS & CLARK NRD NATURAL RESOURCES DISTRICT

NEBRASKA FARM BUREAU

Audubon NEBRASKA

NEBRASKA CONSERVATION VOTERS

Nebraska CornBoard

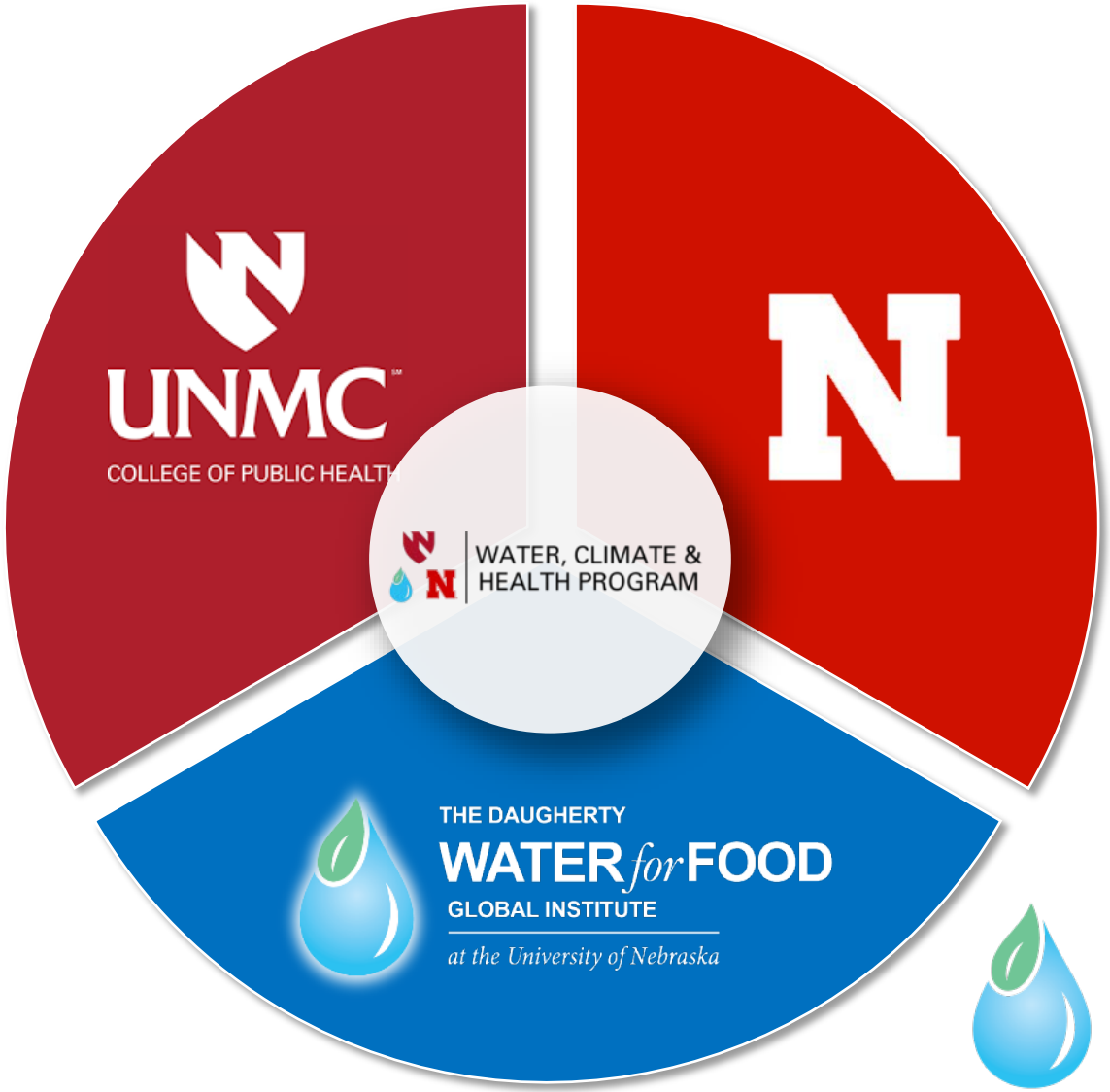
HASTINGS UTILITIES

LOWER ELKHORN Natural Resources District

NEBRASKA GAME PARKS

The Nature Conservancy Nebraska

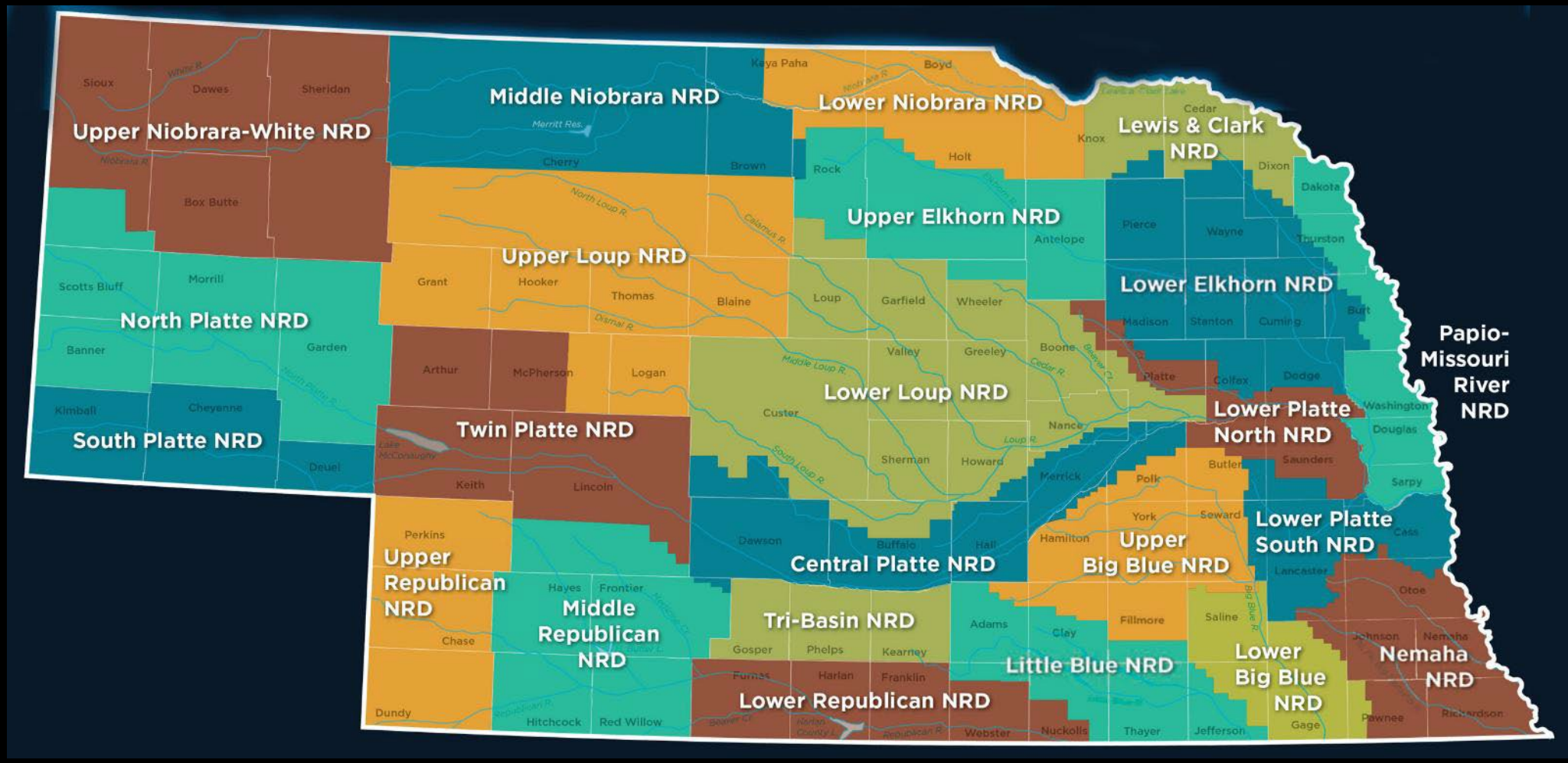
Water, Climate, and Health Program



EXTENSION

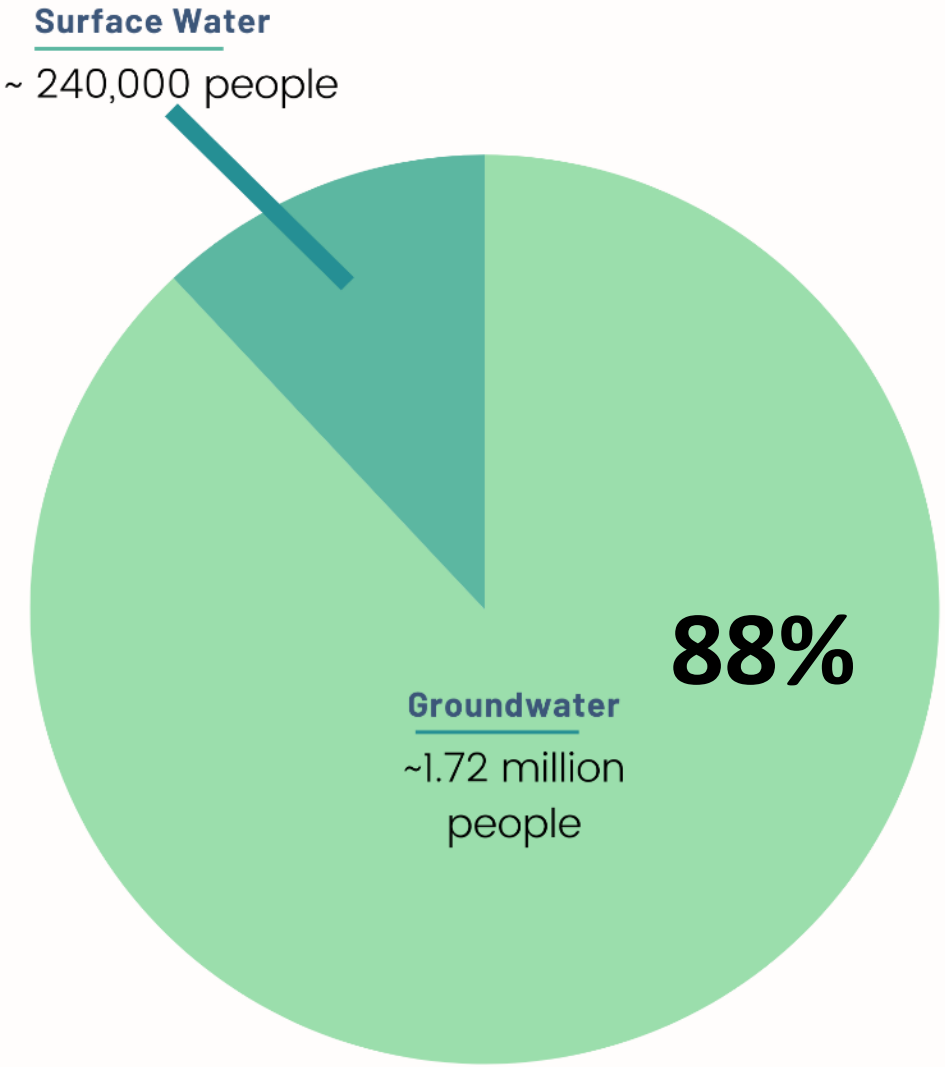
Nebraska
Water Center
Daugherty Water for Food Global Institute

Nebraska's Natural Resources Districts (NRDs)



1. Watershed boundaries
2. Political subdivision with property taxing authority
3. Locally elected boards
4. 13 statutory responsibilities

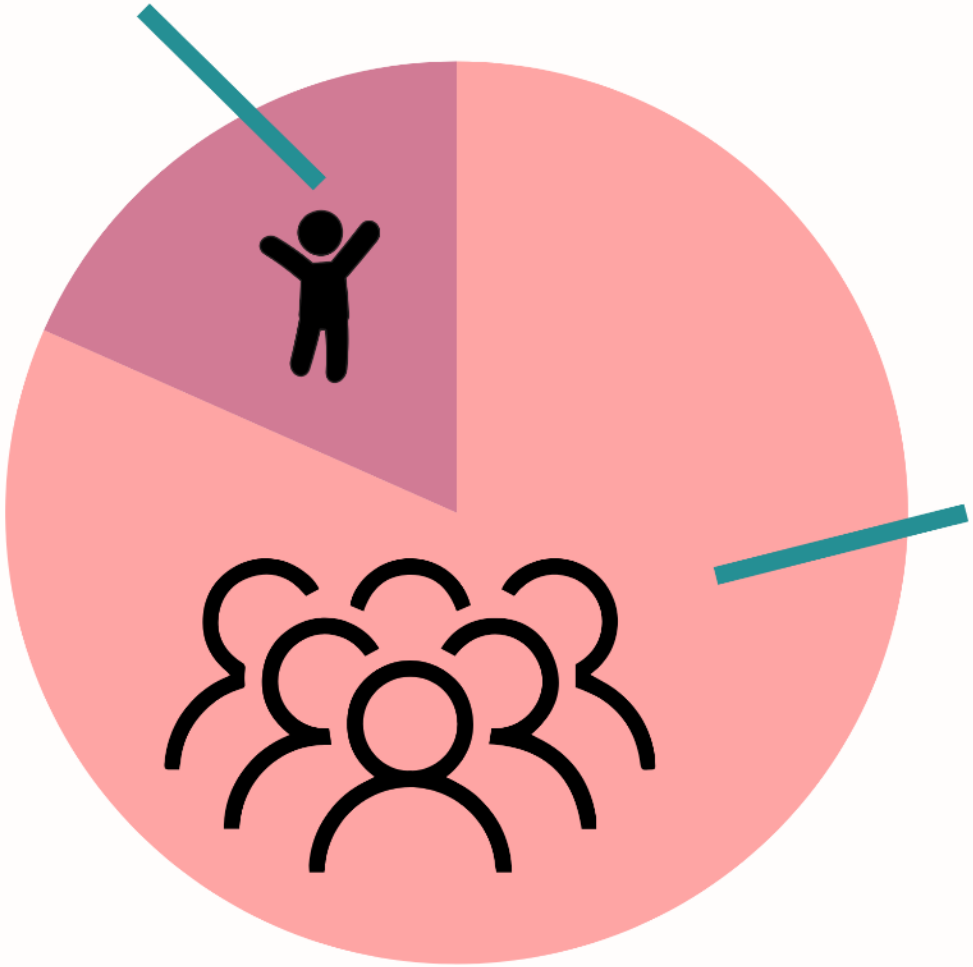
Where do Nebraskan's get their drinking water?



EXTENSION

Where do Nebraskan's get their drinking water?

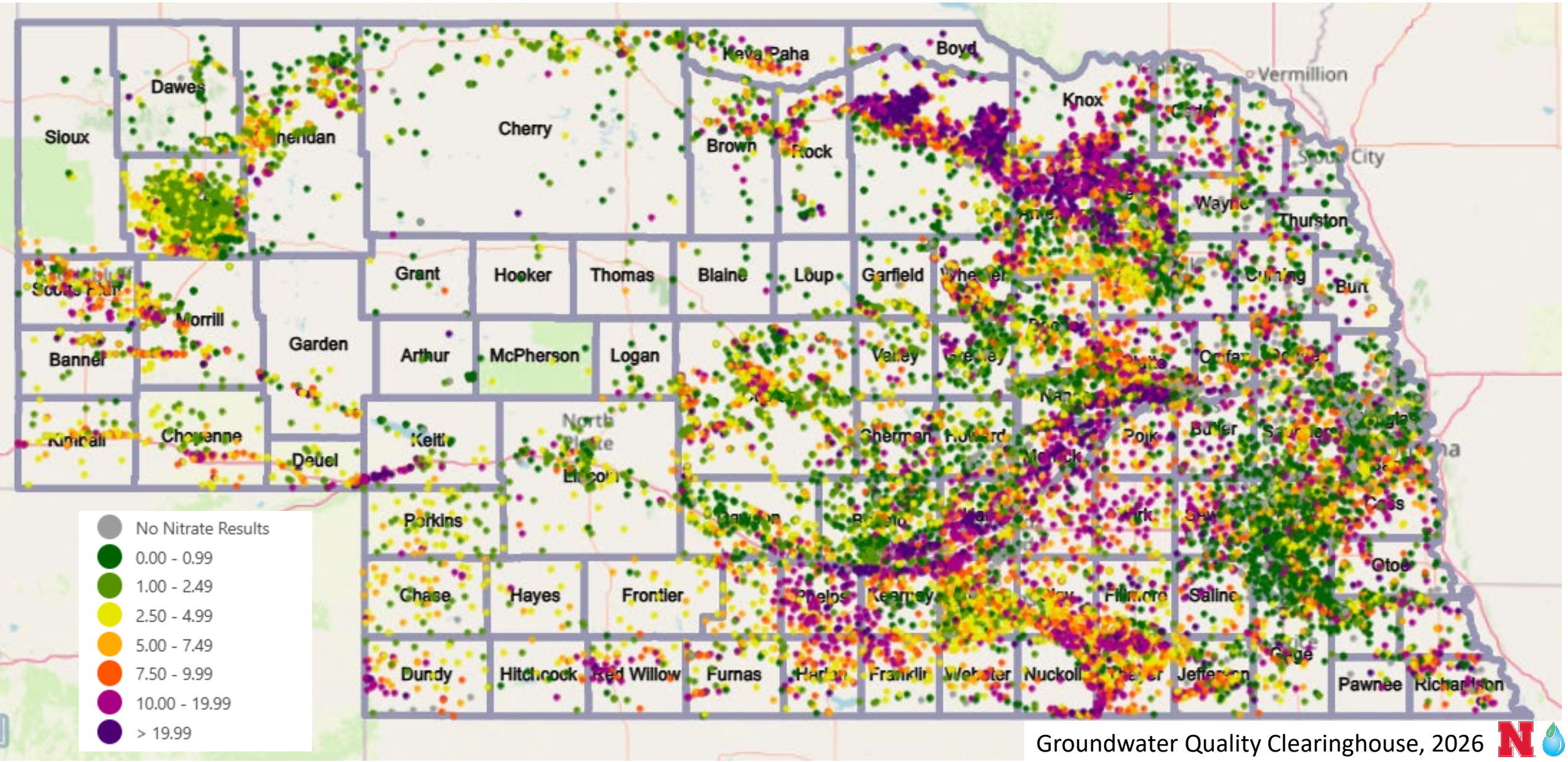
~360,000 Nebraskans on
Private Drinking Water Wells



~1.6 million people on
Public Water Systems

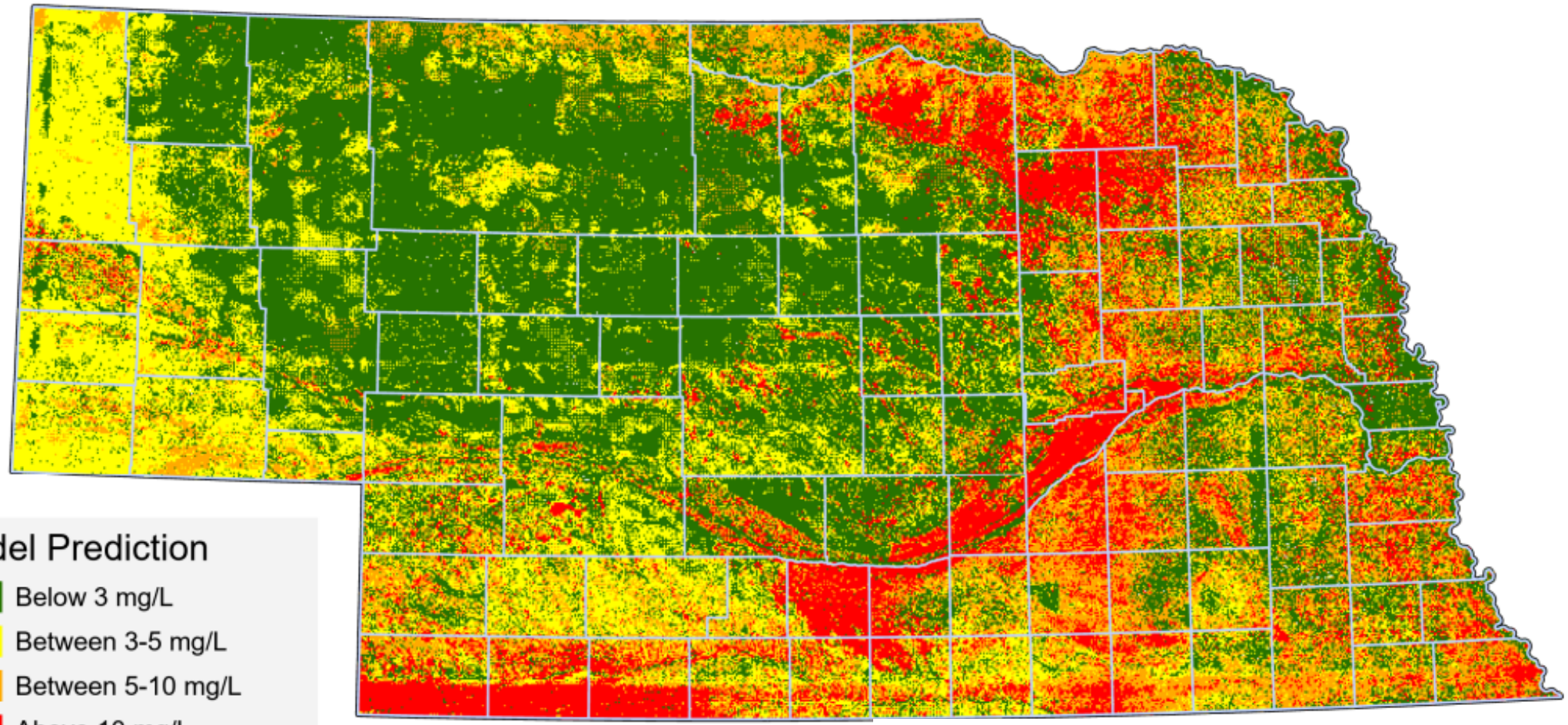
NEBRASKA EXTENSION

Nitrate is the widest-spread risk in Nebraska



Groundwater Quality Clearinghouse, 2026

Nitrate is the widest-spread risk in Nebraska



Credits: NDEE Drinking Water and Groundwater Division
Spatial Reference: NAD 1983 State Plane Nebraska FIPS 2,600 Feet
Projection: Lambert Conformal Conic

NEBRASKA
DEPT. OF WATER, ENERGY, AND ENVIRONMENT

2025

This article was originally published March 22, 2023

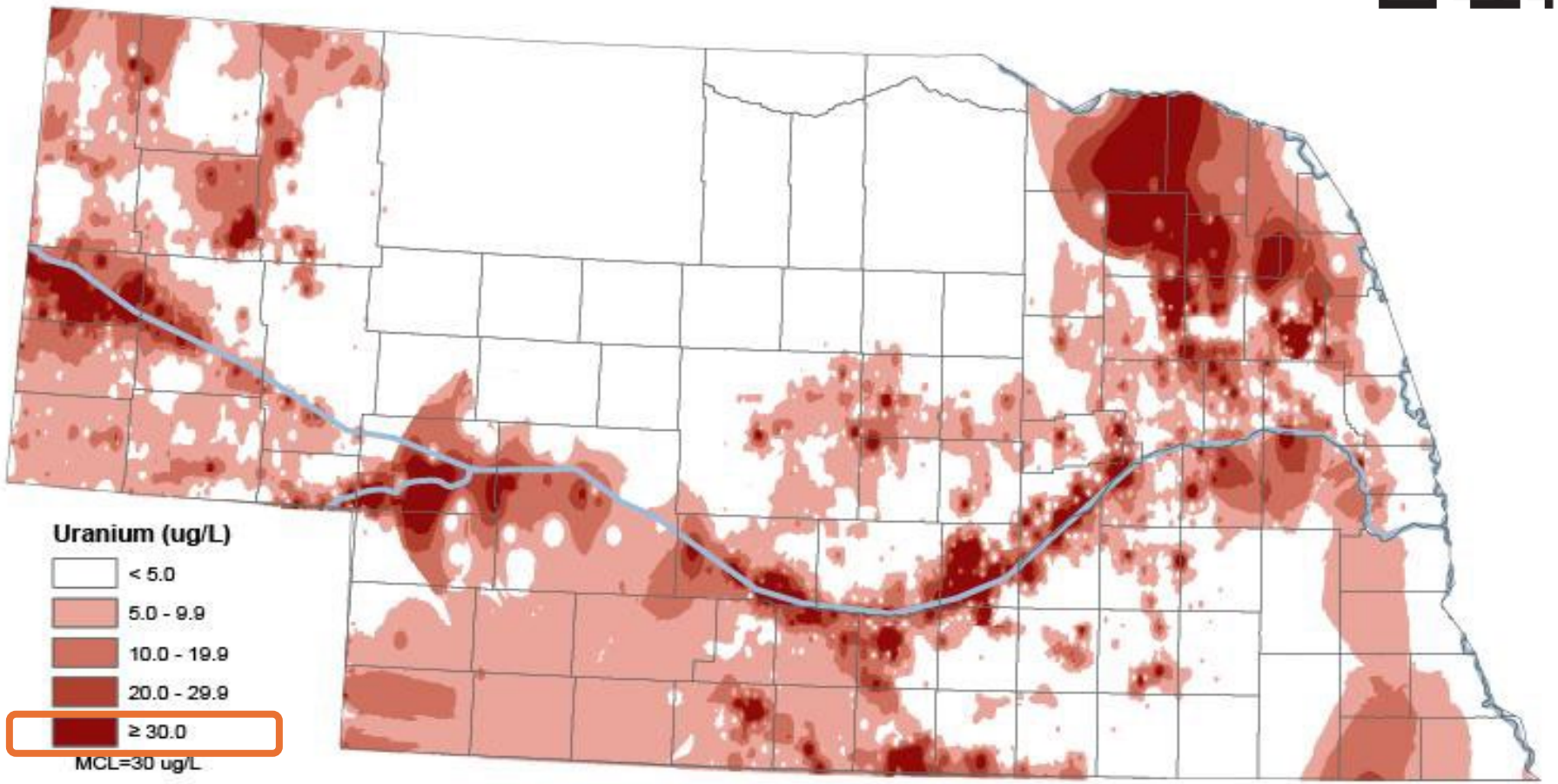
Study confirms nitrate can draw uranium into groundwater

EXPERIMENT REINFORCES LINK BETWEEN CONTAMINANTS

By Scott Schrage | University Communication and Marketing

Groundwater uranium in Nebraska

US EPA Limit:
30 ug/L
Goal: zero

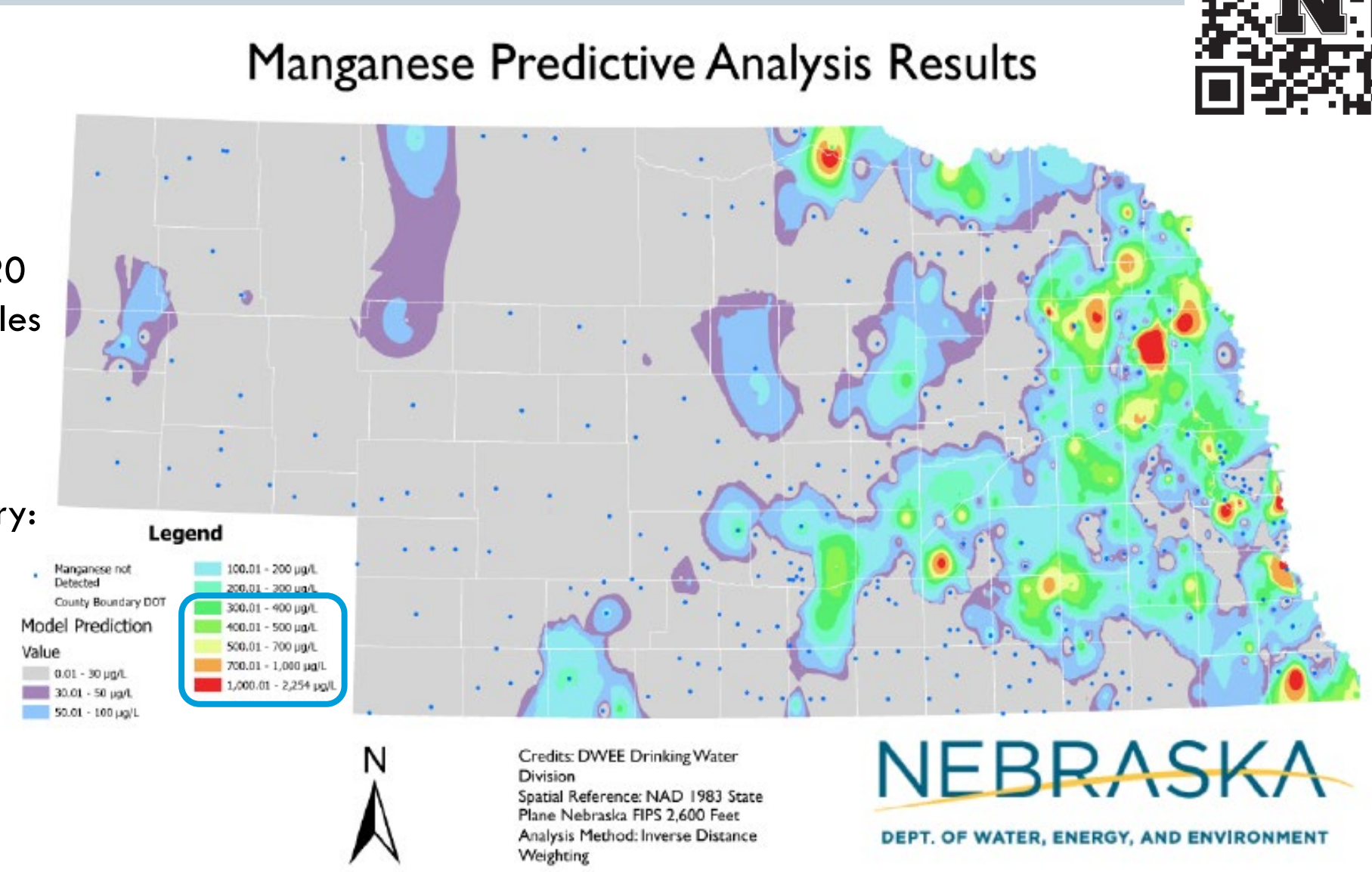


Nolan and Weber, 2015 *Environ Sci Technol Letters*

Manganese in Nebraska

- Data based on the 2020 manganese study samples

- SMCL: 0.050 mg/L (aesthetic issues)
- Lifetime Health Advisory: 0.3 mg/L
- Acute Health Advisory: 1mg/L



Groundwater arsenic in Nebraska

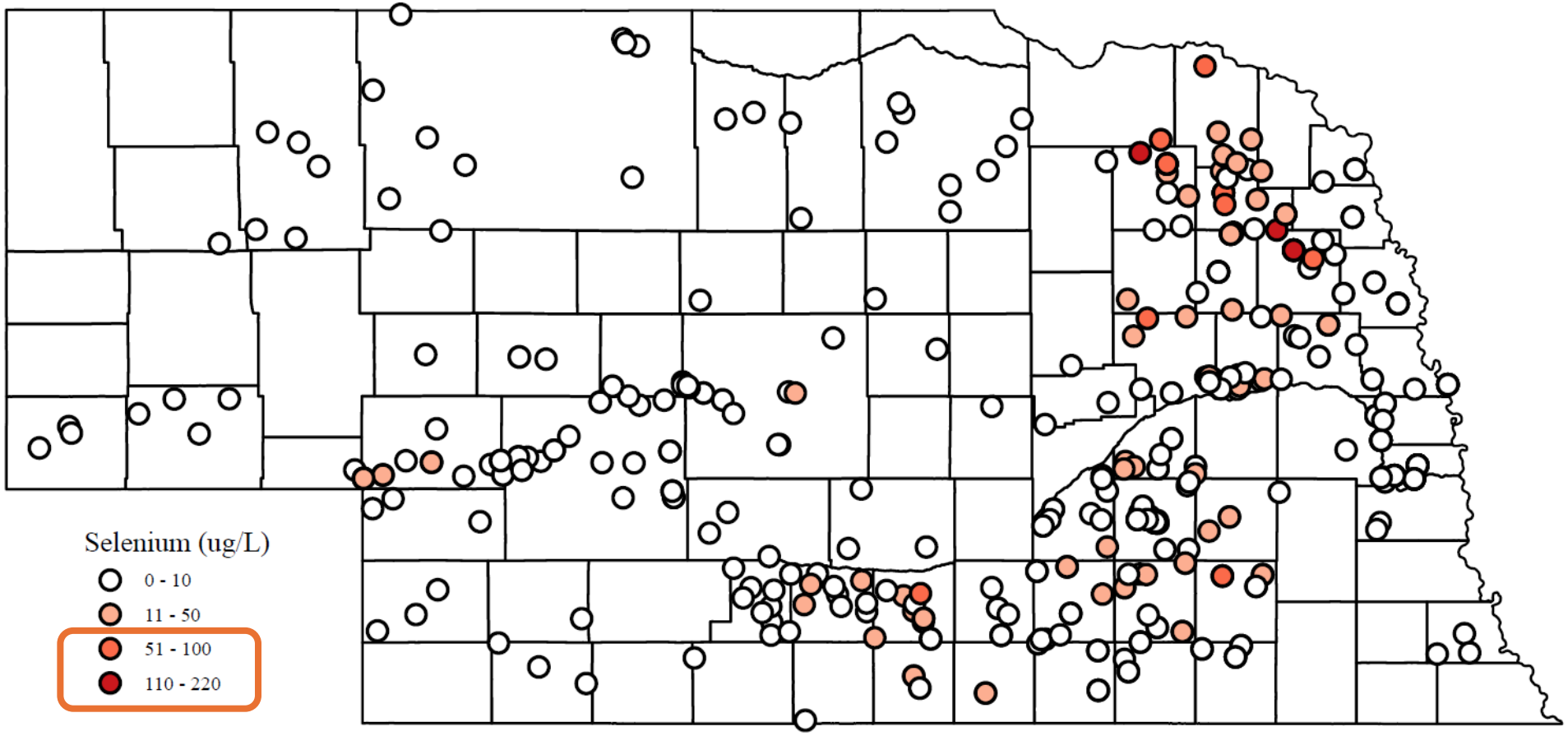
US EPA Limit:
10 ug/L
Goal: Zero

Source: US Geological Survey
National Water Information System

CONSERVATION AND SURVEY DIVISION
School of Natural Resources
EXTENSION

Groundwater selenium in Nebraska

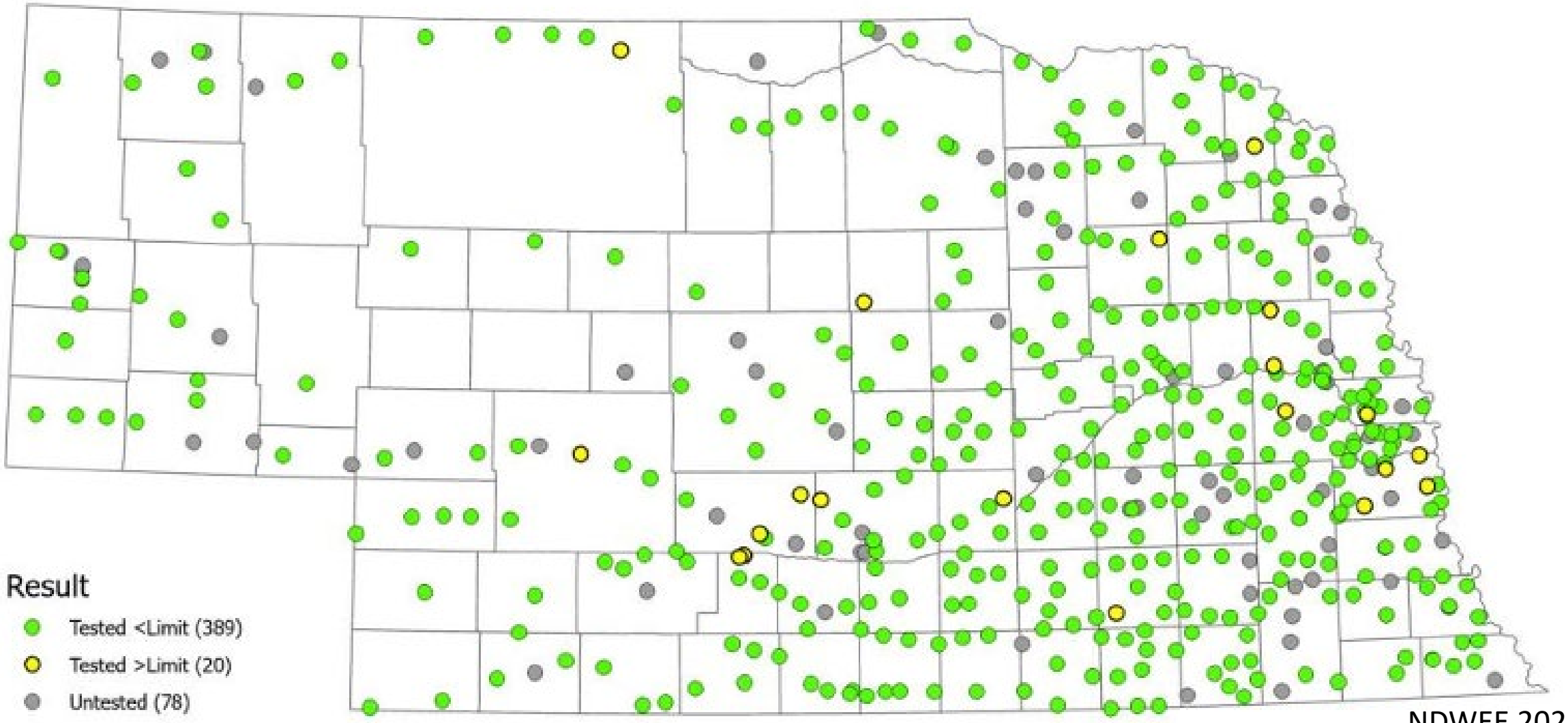
Health hazard above 50 µg/L



Source: US Geological Survey
National Water Information System

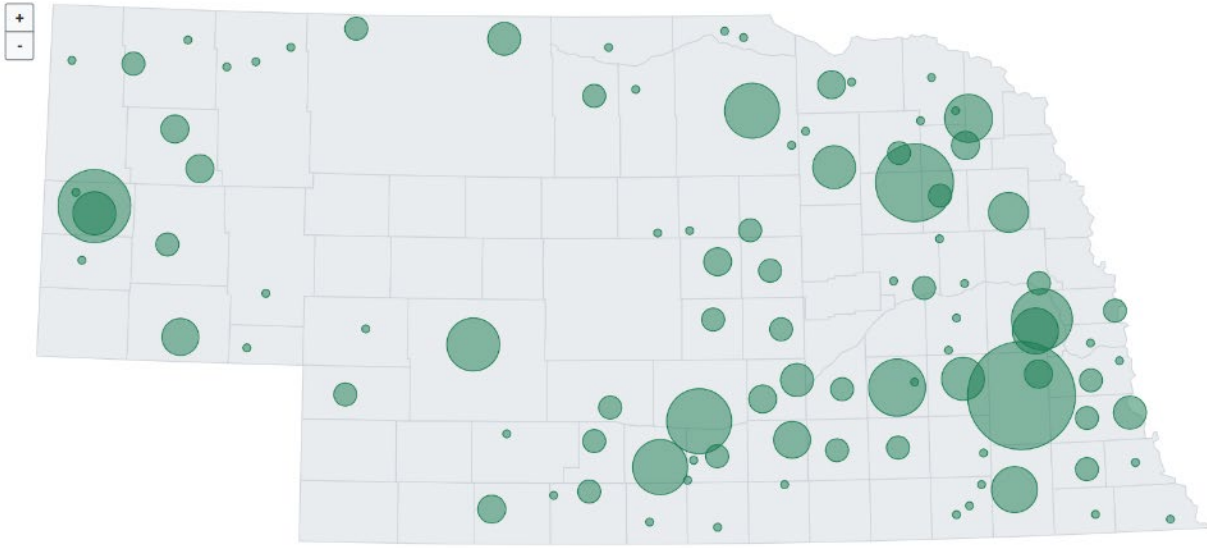
Public Water Systems PFAS Results

NDEE + UCMR Sampling updated Jan 2, 2025



Education

EXTENSION



Water for Today

- 63 events
- Youth & community
- Health, test, treat

Water.unl.edu

Water for Tomorrow

- 5,500 water & N participants
- 1,500 soil health
- 86% TAPS adopt practices
- N-Time farmers save 30% N

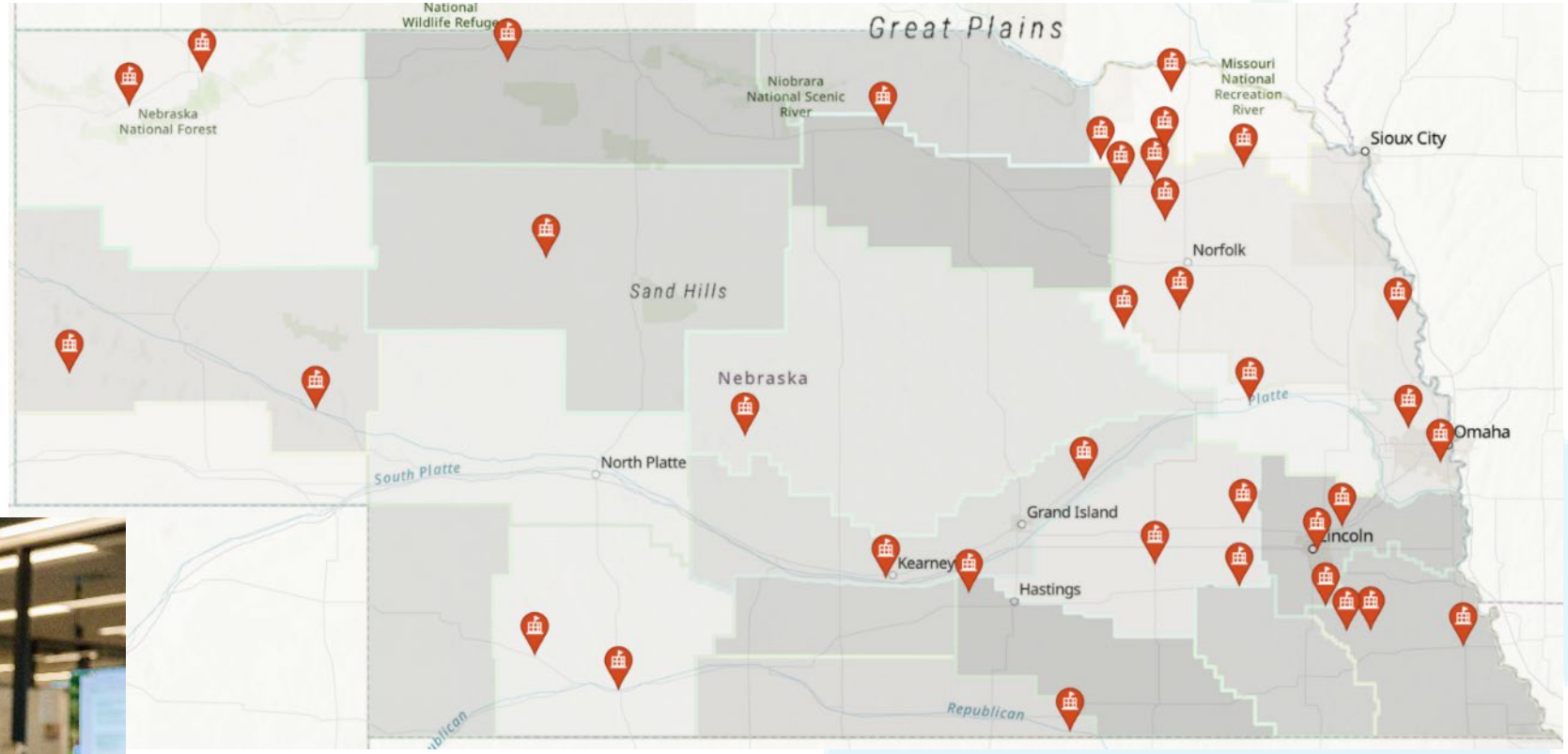
Cropwatch.unl.edu

NEBRASKA ON-FARM RESEARCH NETWORK

UNL TAPS
TESTING AG PERFORMANCE SOLUTIONS

Know Your Well

High School Curriculum



knowyourwell.unl.edu

Citizen Science Water Quality Monitoring

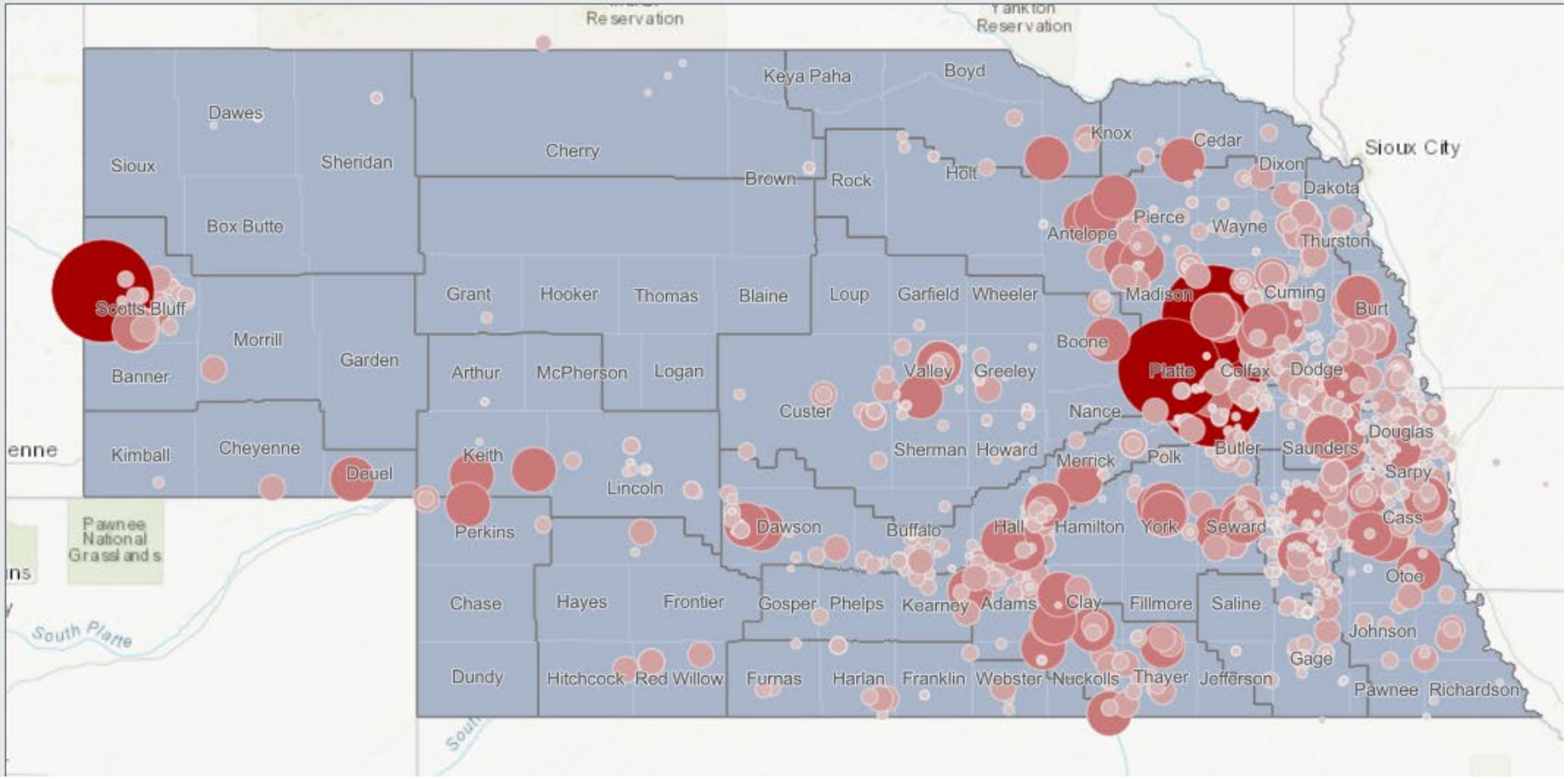
SuWell - Citizen Science Data Dashboard

Water Quality + Citizen Science

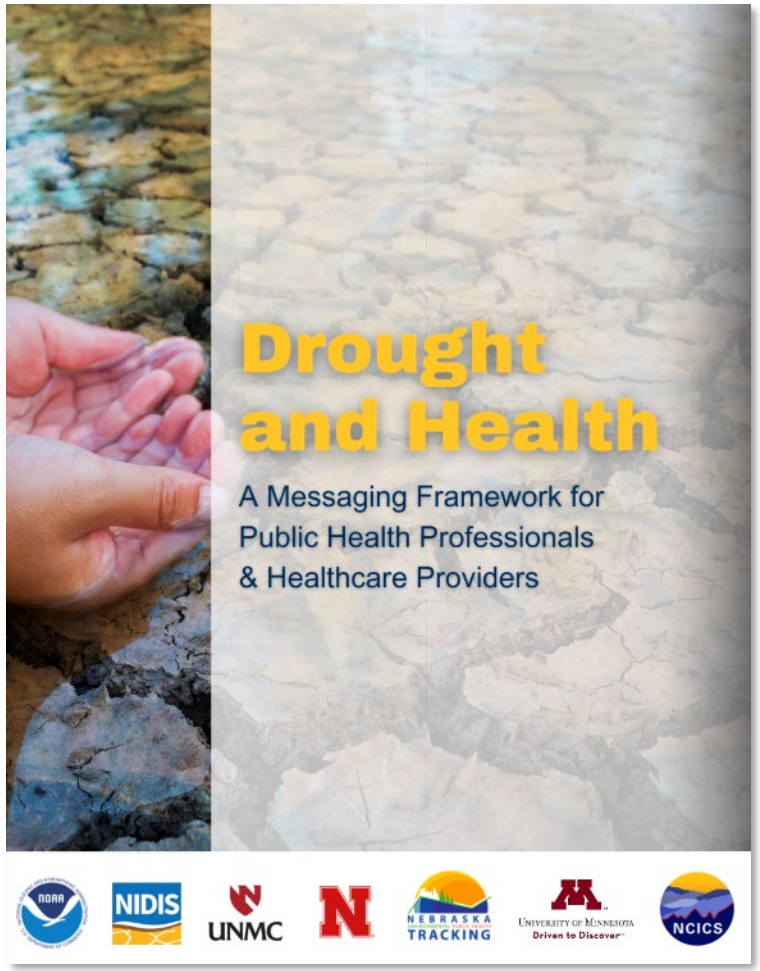
Good water quality is important to the health of the public. In communities surrounded by agriculture, there is potential for contamination of water resources by manure and fertilizer application. Nitrates and phosphates are plant nutrients needed for improved growth, but excesses of these nutrients cause adverse impacts on water resources. Excess plant nutrients also pose a health risk to those who depend on these water resources.

Why are we monitoring water quality?

The goal of our program is to measure levels of plant nutrients present in well water, rivers and streams within Nebraska. The reason we are testing private wells on farms is to give an opportunity to farm



Drought & Health Messaging Toolkit



The Stages of Drought

Drought is categorized into five severity-based stages. While different geographic locations face conditions specific to their region during each drought stage, there are certain drought stage characteristics that apply to all locations. See the Drought Impacts by State and U.S. Drought Monitor Category tool for more detailed information about drought stages specific to your location.

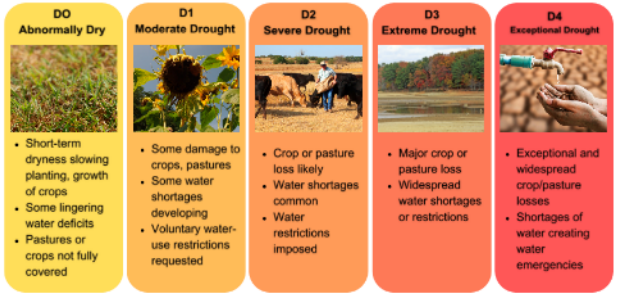


Figure 2: The Stages of Drought, adapted from NIDIS Drought Impacts, www.drought.gov/impacts#impacts-table

How do I know what stage of drought my area is experiencing?

Knowing what stage of drought your area is experiencing will help you tailor your response and messaging to the public. You can determine this quickly using the following sources:

1) The County Drought Information tool from the National Integrated Drought Information System (NIDIS), which will give a county-level summary of drought conditions in your area.

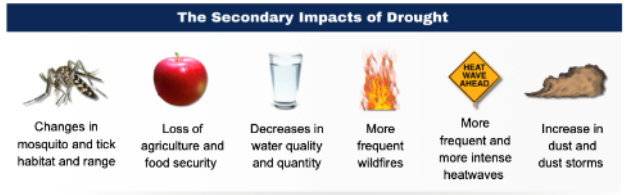
2) The U.S. Drought Monitor at www.droughtmonitor.unl.edu.

3) Your state climatologist's office

Figure 3: Image from NIDIS County Drought Information, www.drought.gov/county

The Health Impacts of Drought

Drought can have multiple impacts on public health. As a drought event occurs, changes in the environment can cause secondary impacts to emerge. Secondary impacts of drought can include changes in mosquito and tick habitats, loss of agriculture and food stability, decreases in water quality and quantity, more frequent wildfires, more frequent and intense heatwaves, and increased dust and dust storms. These impacts can happen over both short and long periods of time.



Each of these secondary impacts are associated with several negative health outcomes and one or more of these can increase the risk of 1) negative mental health outcomes (ex: depression, anxiety, and suicide), 2) infectious diseases (ex: West Nile virus & Lyme disease), 3) heat-related illnesses (ex: heat stroke and heat exhaustion), 4) respiratory illnesses (ex: exacerbation of asthma symptoms and hospitalizations), 5) gastrointestinal illness (ex: Vibrio vulnificus & E. coli), 6) injuries, 7) hunger or famine, and 8) allergy-related illnesses. It is important to note that environmental and socioeconomic factors can affect the severity and risk of each health outcome.

NEBRASKA ENVIRONMENTAL PUBLIC HEALTH TRACKING

NEBRASKA Good Life. Great Mission. DEPT. OF HEALTH AND HUMAN SERVICES

DIVISION OF PUBLIC HEALTH

CDC Centers for Disease Control and Prevention

WATER, CLIMATE & HEALTH PROGRAM

NRD Water Education

- Youth Water Festivals (1000s of youth annually)
- Outdoor classrooms & field days
- Envirothon
- Well testing events

- Nitrogen certification

NEBRASKA

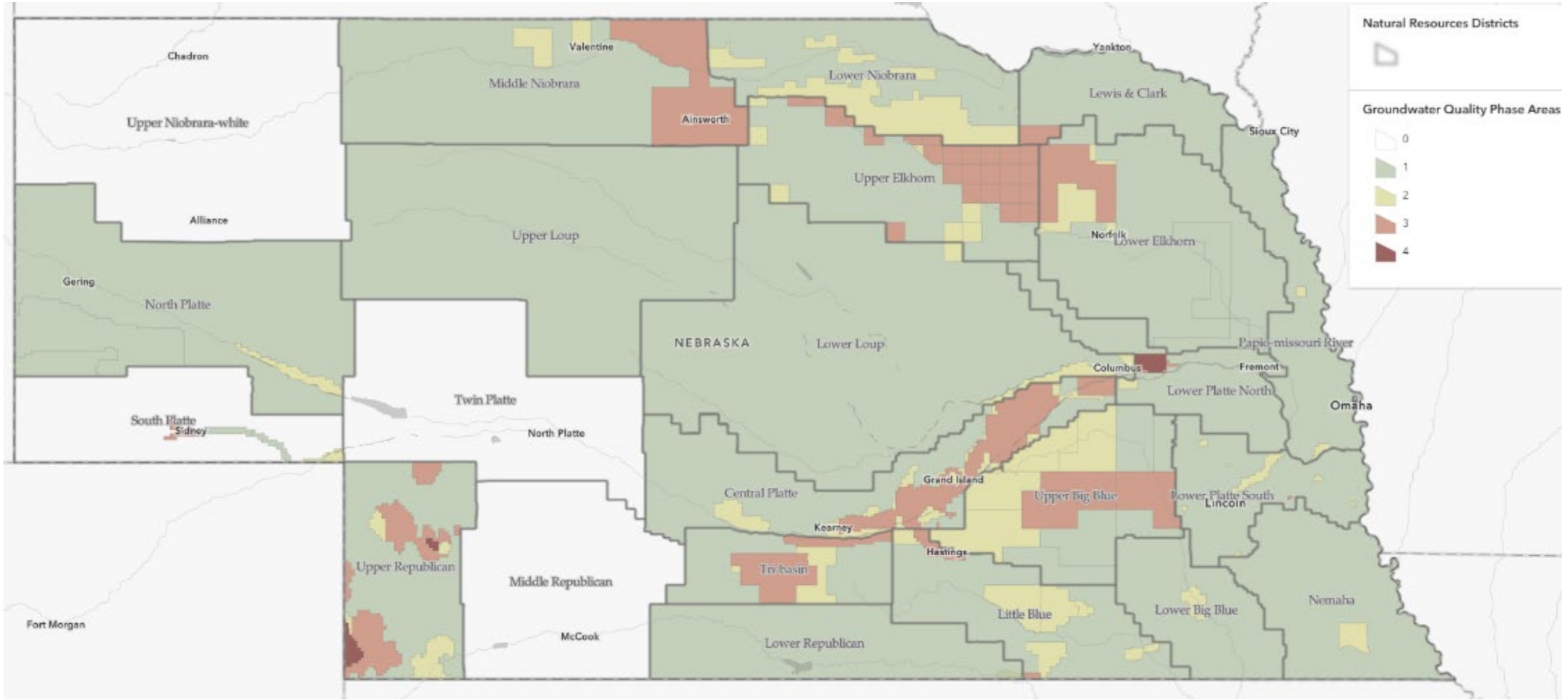
DEPT. OF WATER, ENERGY, AND ENVIRONMENT

- Drinking Water Watch (community water system data)
- Beach Watch (HABs)
- Groundwater Quality Clearinghouse
- Public Health Environmental Lab
- Water Planning – Wellhead Protection Areas
- EPA programs – first groundwater-based 319 plan

Policy

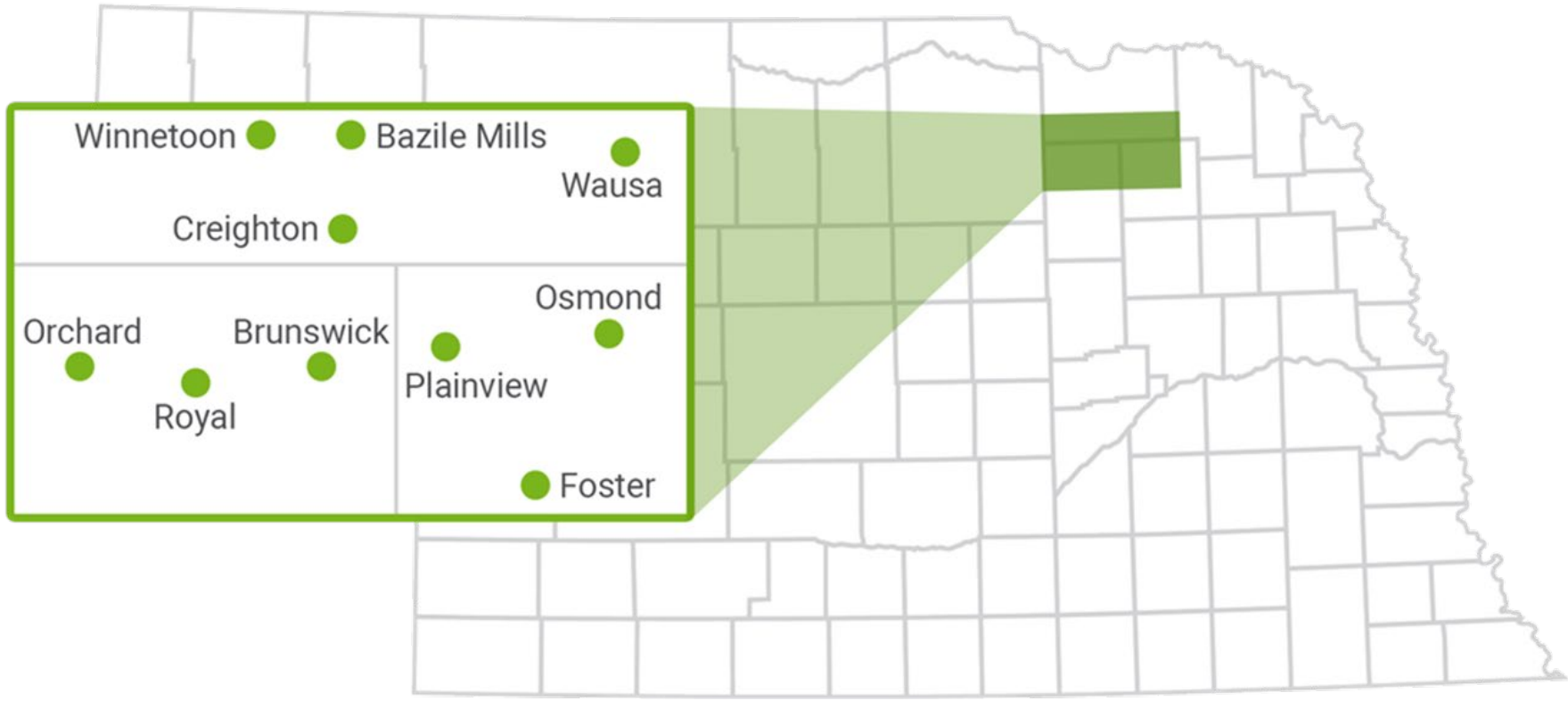
Local management | State and federal support

NRD Groundwater quality policy areas



Bazile Groundwater Management Area

EPA's first **groundwater** 319 Nonpoint program



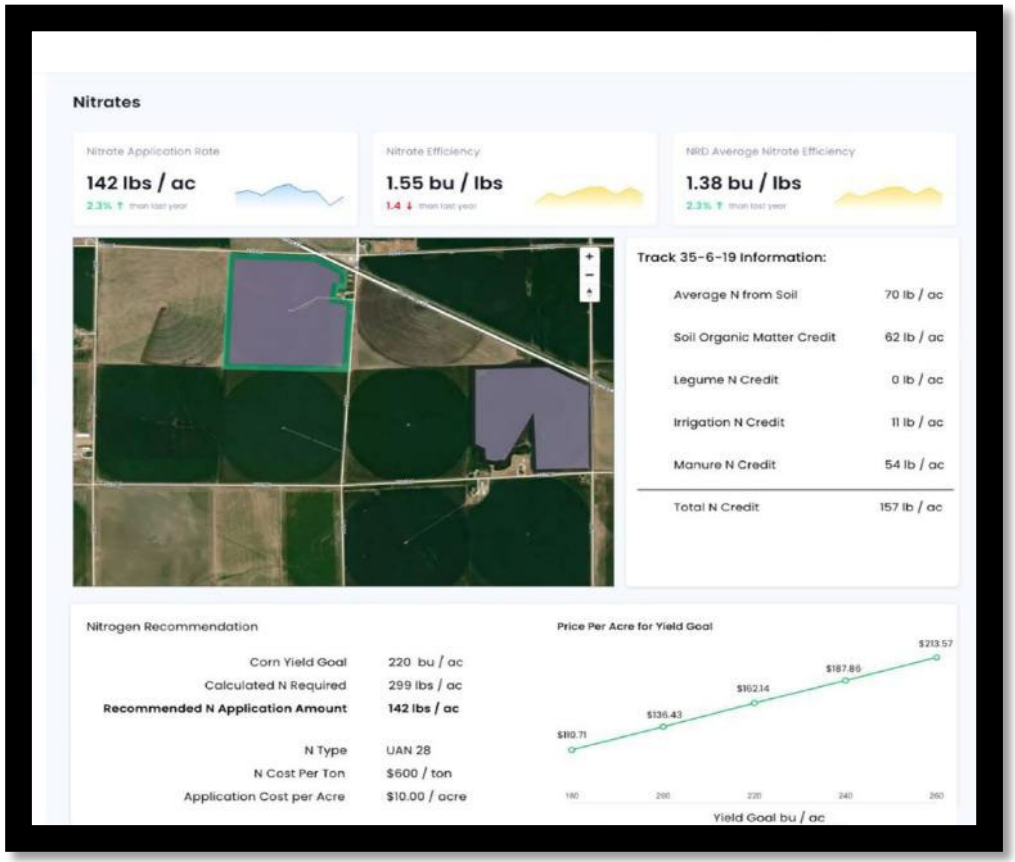
NRD incentives vary by district

- Free drinking water nitrate testing
- Reverse osmosis cost-share
- Wide variety of farm best practices incentives

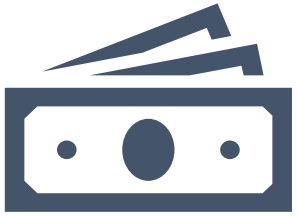
NRD Regulations

- Unique to each NRD
- Phases based on nitrate levels
  - Phase 1: Education & Awareness
  - Phase 2: increased reporting and nutrient requirements
  - Phase 3: stricter fertilizer timing/application controls
  - Phase 4: strongest regulatory control and limitations

Authority to use cease & desist



State incentives:
Reverse Osmosis Tax Credit



50% of the cost,

up to $1,000

Qualify if greater than:

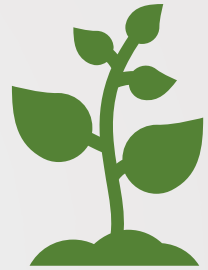
10 ppm nitrate

4 ppt PFAS

30 ppb uranium

State initiatives

2026 Nebraska Governor's Water Task Force

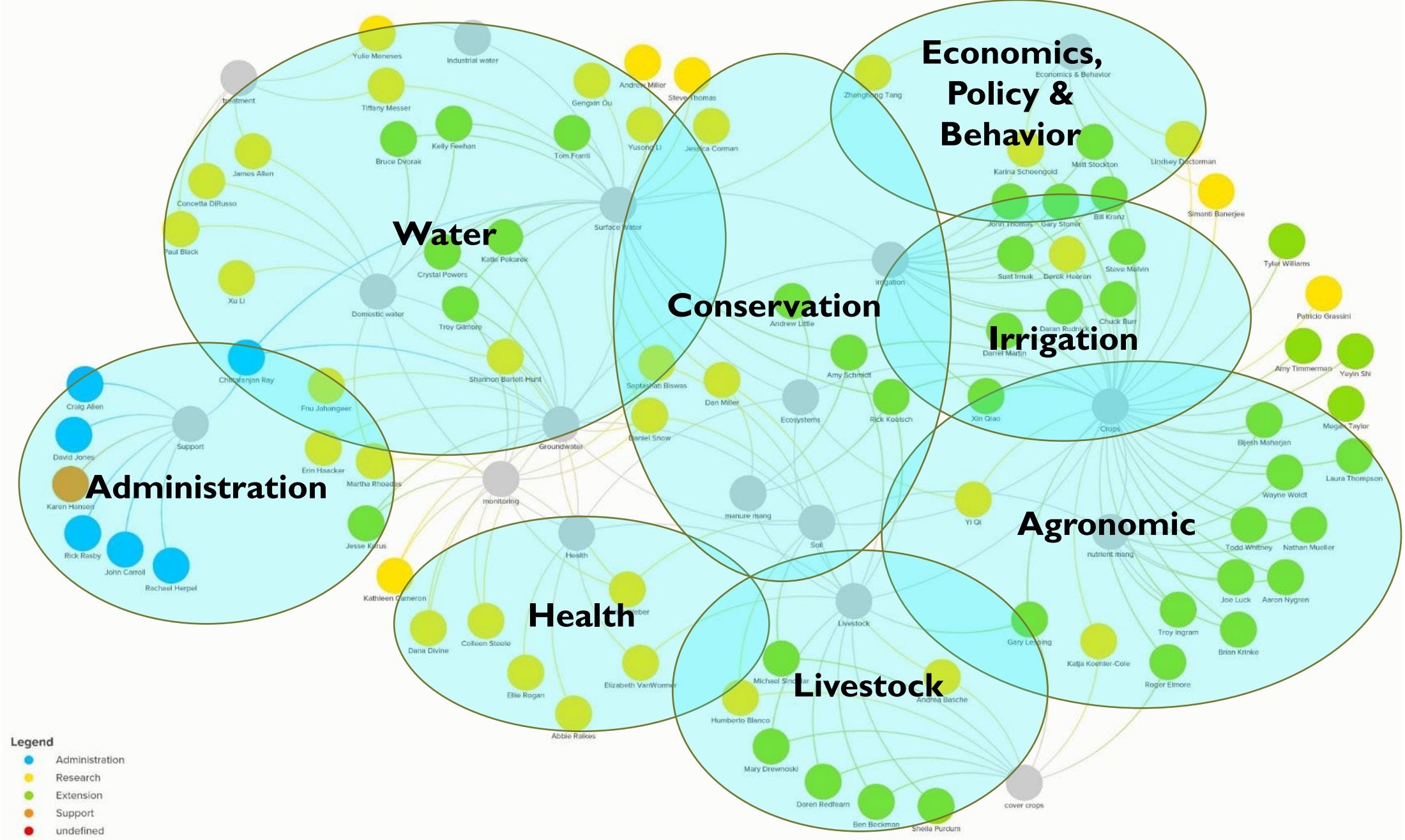


New farm incentive programs

Nitrogen reduction incentive

Nitrogen use efficiency

Research


Economics, Policy & Behavior
Water
Conservation
Irrigation
Administration
Health
Livestock
Agronomic
Legend
Administration
Research
Extension
Support
undefined

Nebraska research focus areas:

UNL

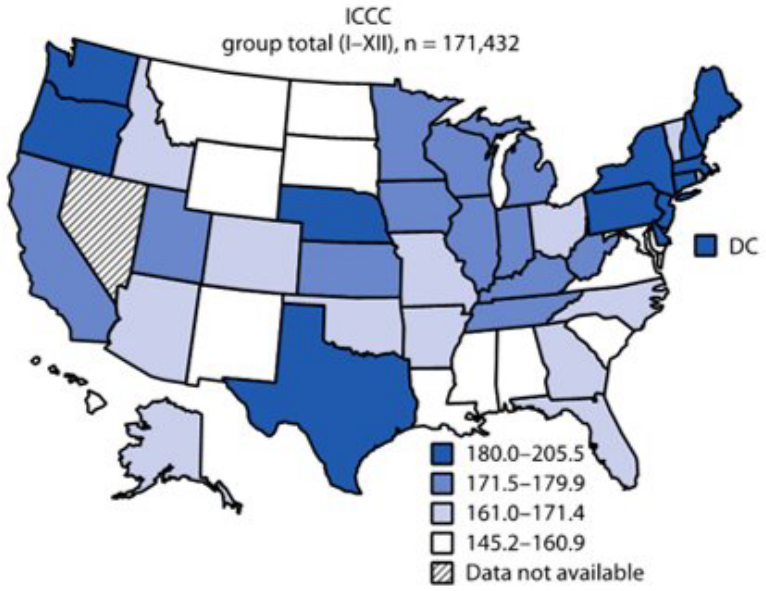
- Groundwater movement & chemistry
- Irrigation
- In-season nitrogen

UNMC

- Nebraska Environmental Public Health Tracking Program
- Societal and Economic Costs of Water (DWFI)

Health research focus: pediatric cancer

Data from 2003 – 2014 and reported as age-adjusted incidence rates of childhood cancer per 1 million:



ICCC: International Classification of Childhood Cancer

United States	173.7
New Hampshire	205.5
New Jersey	192.3
Maine	190.5
New York	190
Pennsylvania	186.6
Connecticut	185.8
Nebraska	183.2
Texas	183.2
Oregon	182.6
Massachusetts	181.5

Siegel et al. Geographic Variation in Pediatric Cancer Incidence - US, 2003–2014. *MMWR*, 2018

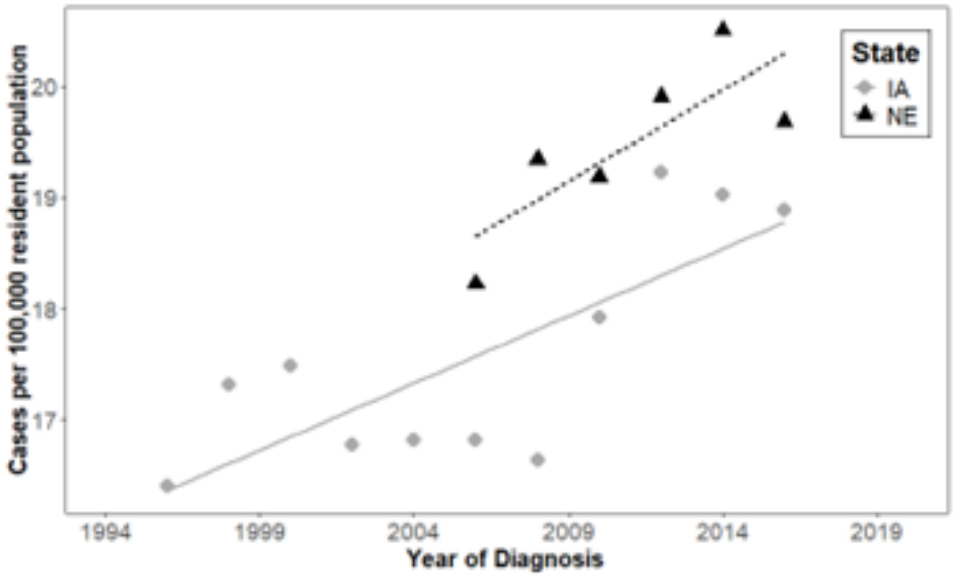
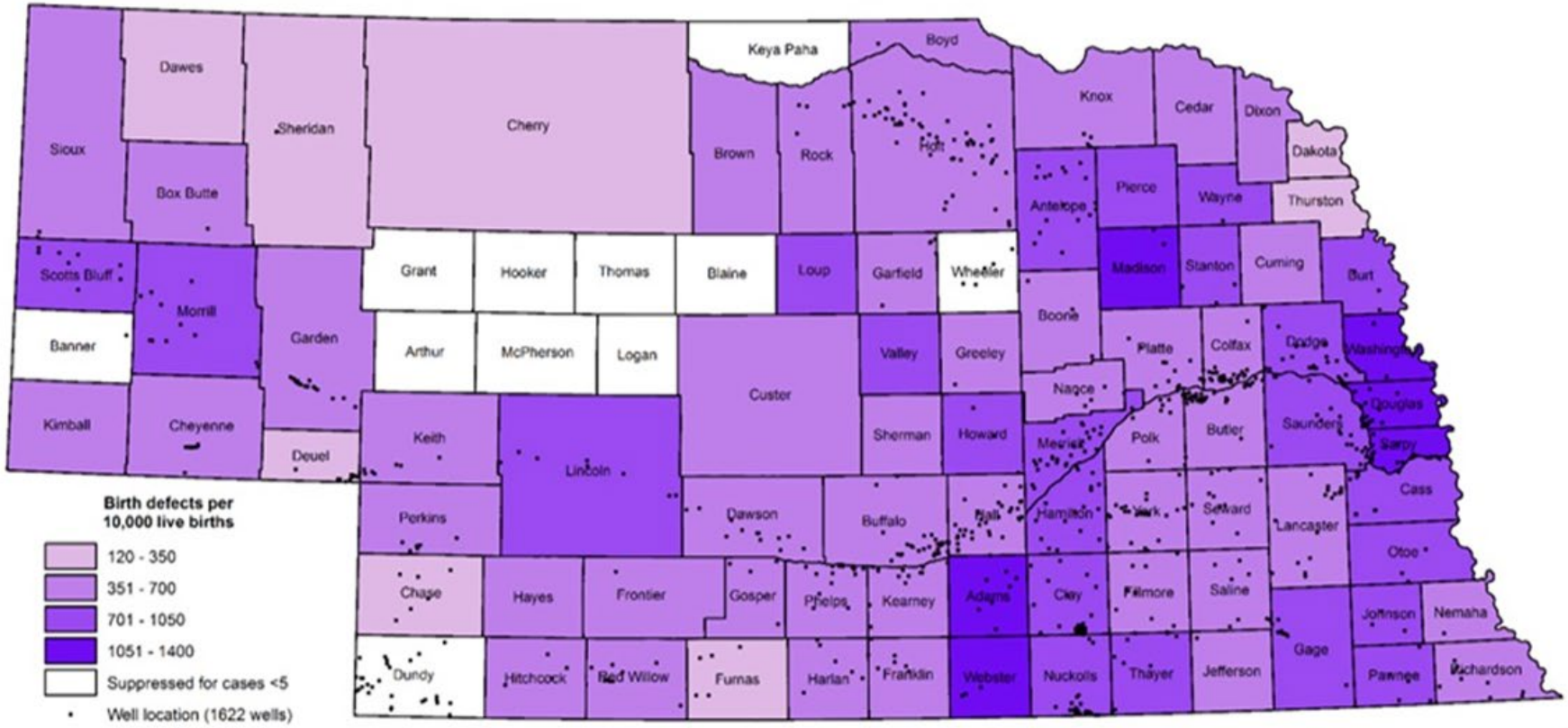


Figure 2. Change in PC Rates in Iowa and Nebraska (1994-2019)

Courtesy of Don Coulter, MD

Heath research focus: birth outcomes:

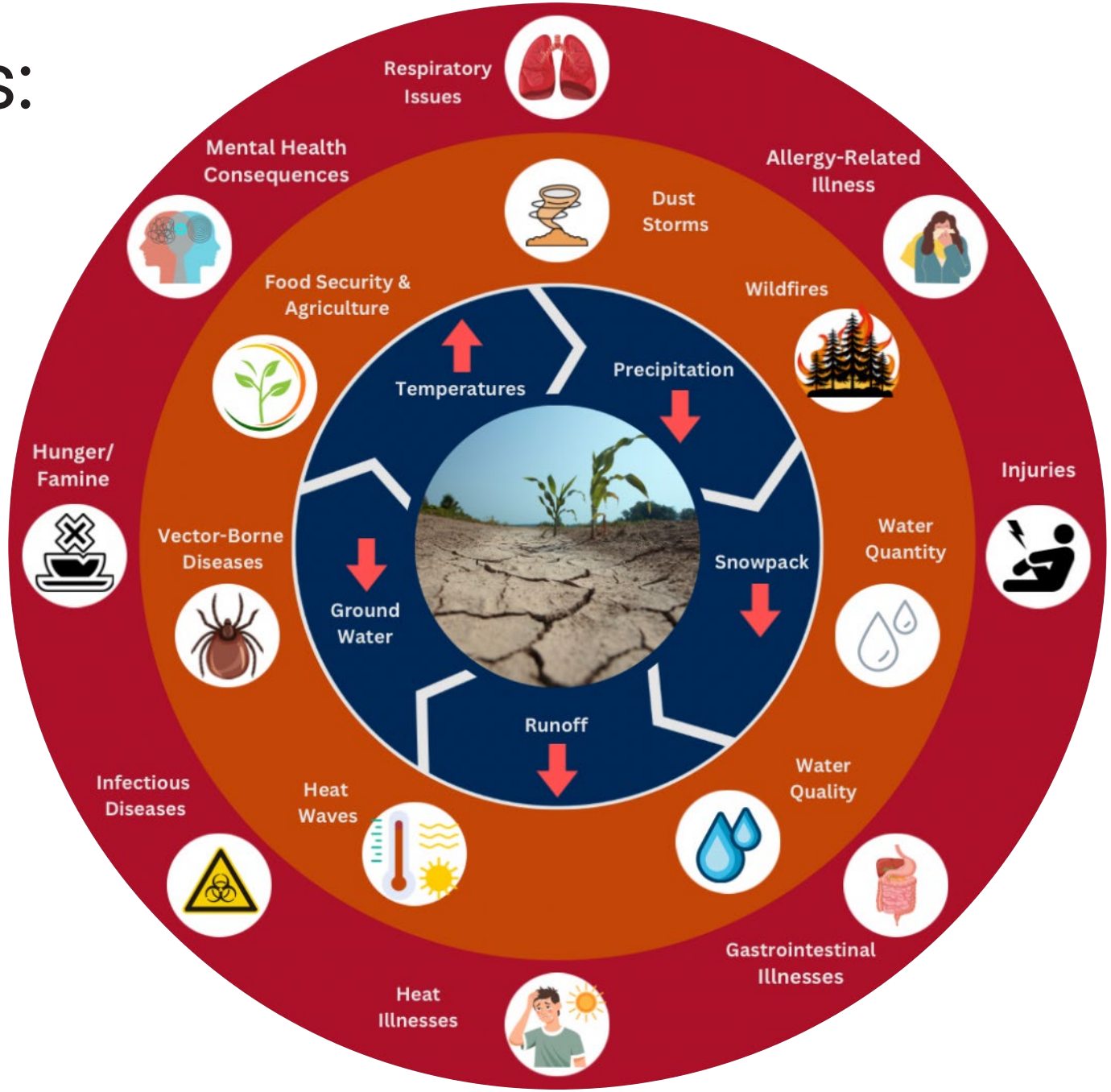
Nebraska birth defect rates by county and wells positive for nitrate + nitrosatable agrichemical



Birth defect rates 2005-2014. Source: Nebraska Department of Health and Human Services
Source for well data: Quality-Assessed Agrichemical Contaminant Database for Nebraska Groundwater (queried Fall 2015)

SCHOOL OF NATURAL RESOURCES

Health focus: Drought



Water Sciences Lab

- $3 million+ in state-of-the-art equipment
- Offers over 200 analytical methods
- Can develop custom methods

watersciences.unl.edu

Thank you!

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EXTENSION

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Daugherty Water for Food Global Institute

THE DAUGHERTY WATER for FOOD GLOBAL INSTITUTE
at the University of Nebraska