Reverse Osmosis Rebate Program In-Service

Treating high nitrate concentrations in private wells

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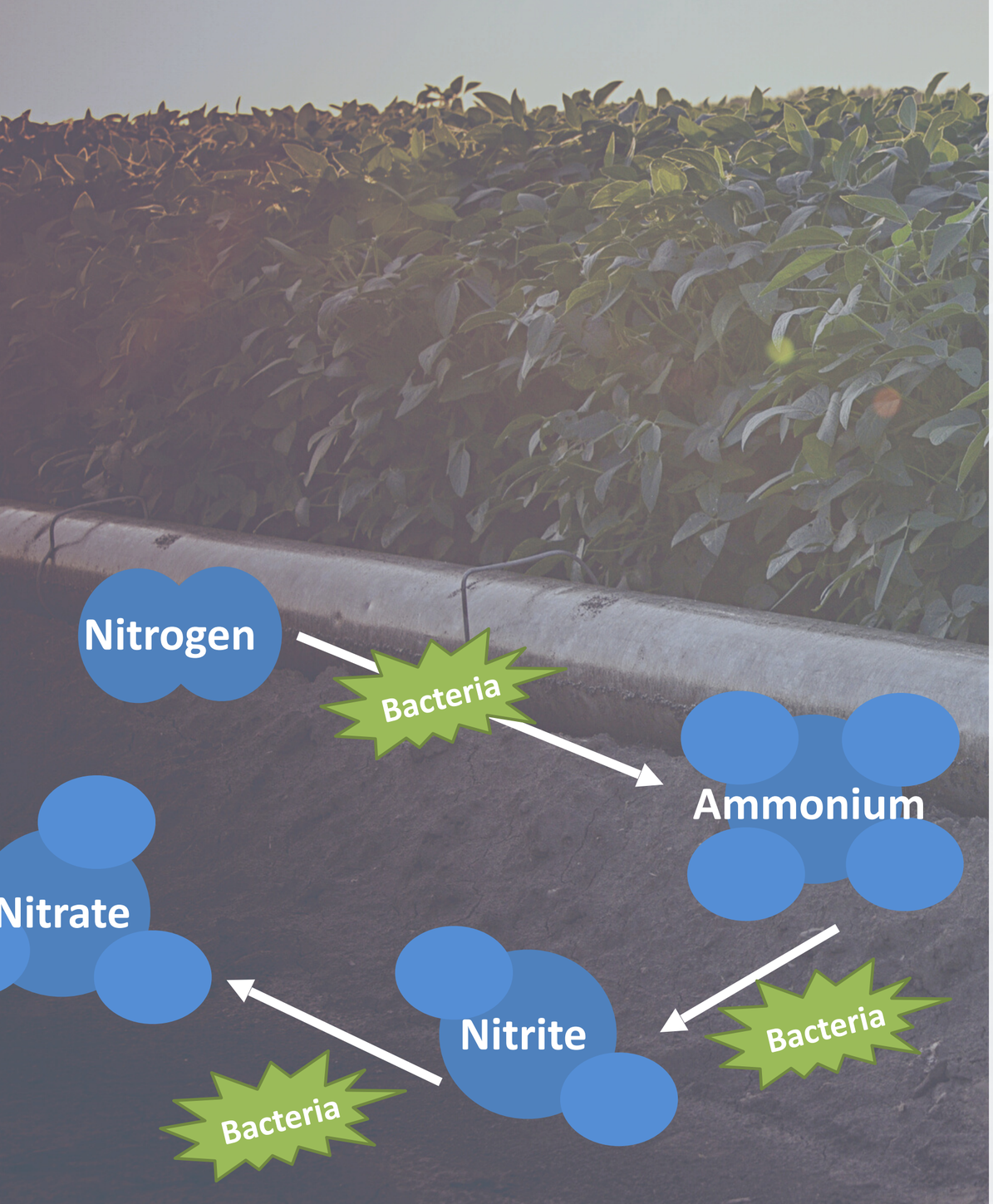
Discussion Outline

- Nebraska Nitrate Trends
- Nitrate and Human Health
- Treating Drinking Water Nitrate
- Reverse Osmosis Rebate Program Overview



Nitrate in Nebraska


Maximum Nitrate in Drinking Water for Safety = 10 mg/L Nitrate-Nitrogen

Nebraska Nitrate Trends

Alanex, Bronco, Cannon, Crop Star, Lariat, Lasso, and Partner

Bicep, Acuron, Brawl, Dual II Magnum, Matador, Prefix and Sequence

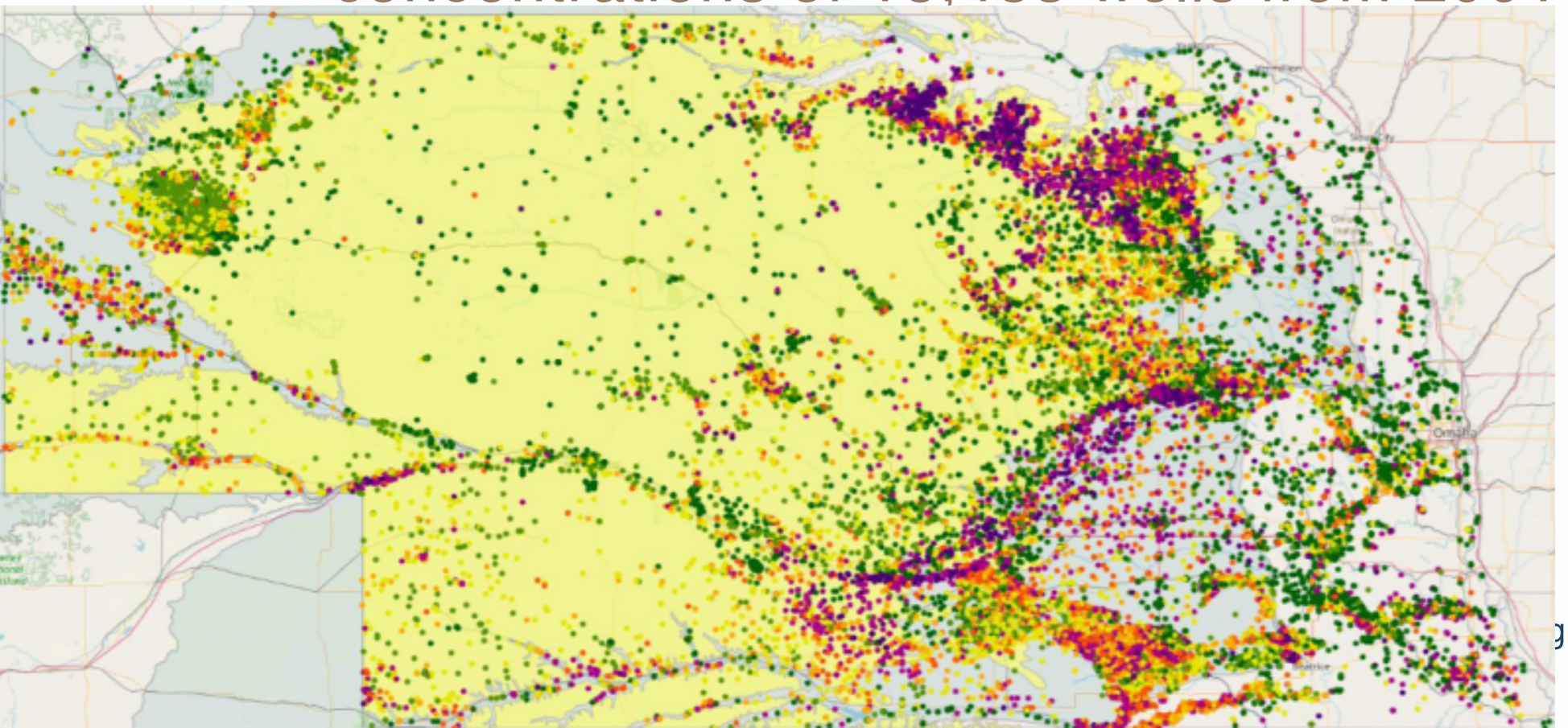
Bladex, DW3418, Fortrol, Match, and Payze

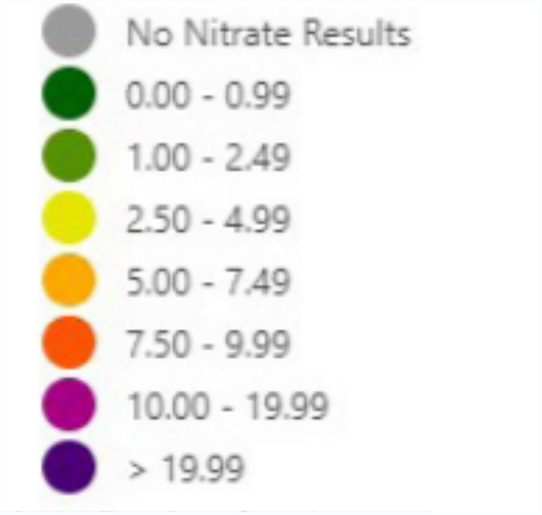
Sencor, Canopy

Compound	Total Samples Collected	Number of Samples that exceed the Reporting Limit	Percent of Samples that exceed the Reporting Limit
nitrate-N	130,713	120,127	91.90%
alachlor ethane sulfonic acid	136	71	52.21%
deethylatrazine	5,970	1,572	26.33%
atrazine	10,904	2,295	21.05%
metolachlor	9,974	1,065	10.68%
deisopropylatrazine	5,281	383	7.25%
cyanazine	10,436	422	4.04%
alachlor	10,473	305	2.91%
propazine	5,863	119	2.03%
simazine	6,445	125	1.94%
prometon	6,217	55	0.88%
metribuzin	10,330	59	0.57%

Nebraska Nitrate Trends

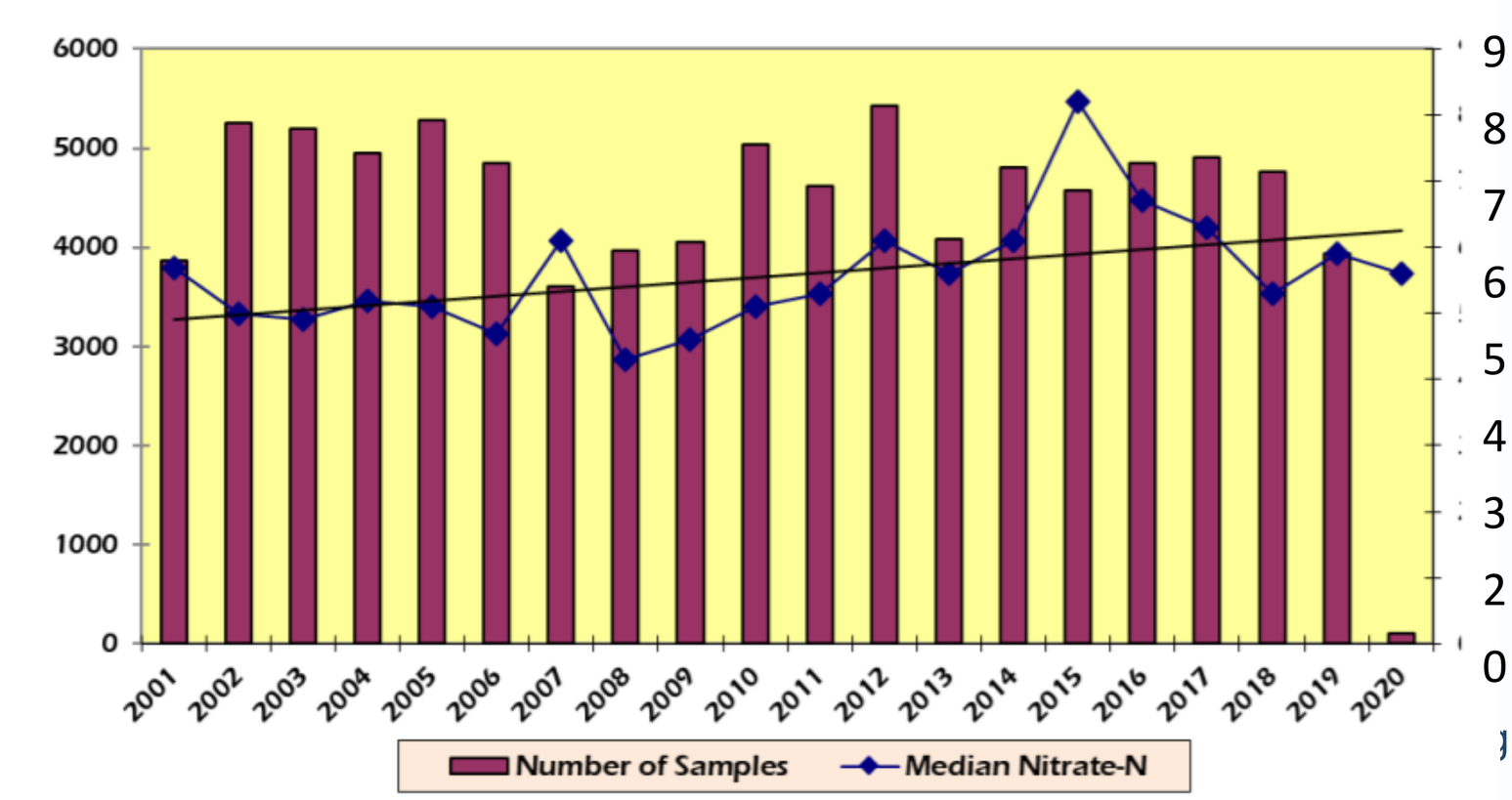
Most recent recorded Nitrate-N concentrations of 18,483 wells from 2001-2020





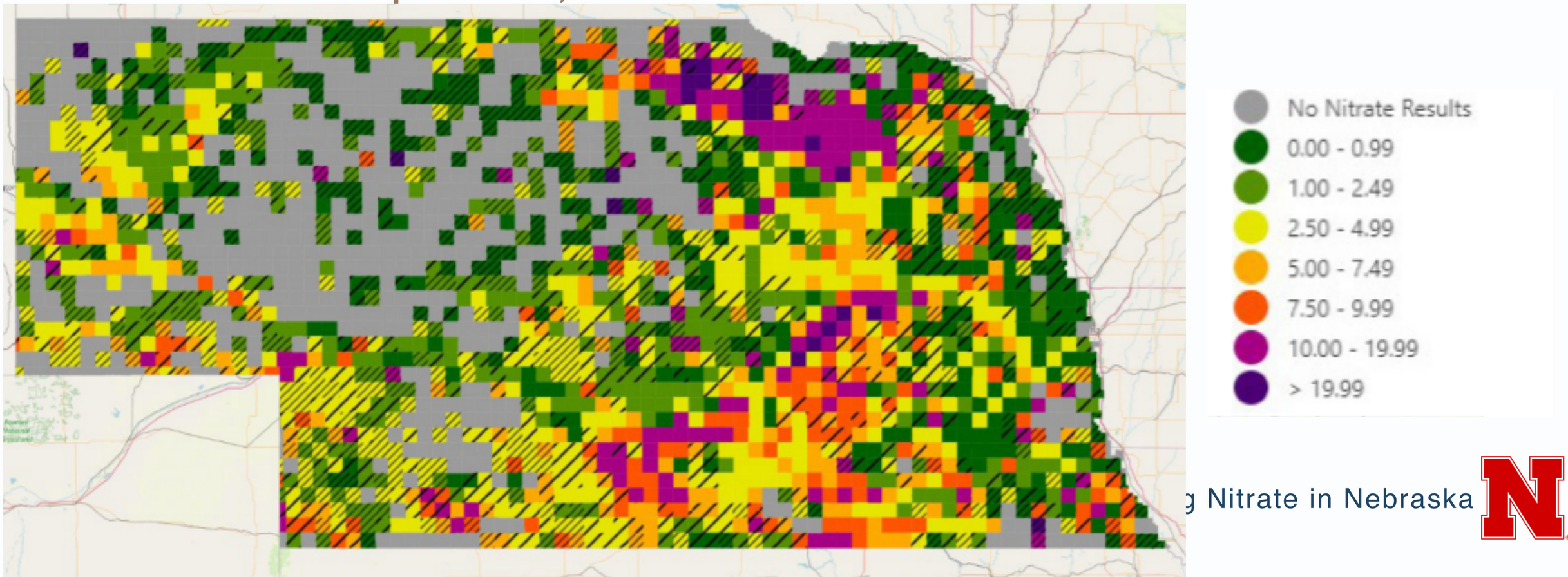
Nebraska Nitrate Trends

Statewide Number & Median of Nitrate Analyses, 2001-2020



Nebraska Nitrate Trends

Median of the most recent Nitrate-N concentration by township of 18,483 wells from 2001-2020



Nitrate and Human Health

Nitrate and Human Health

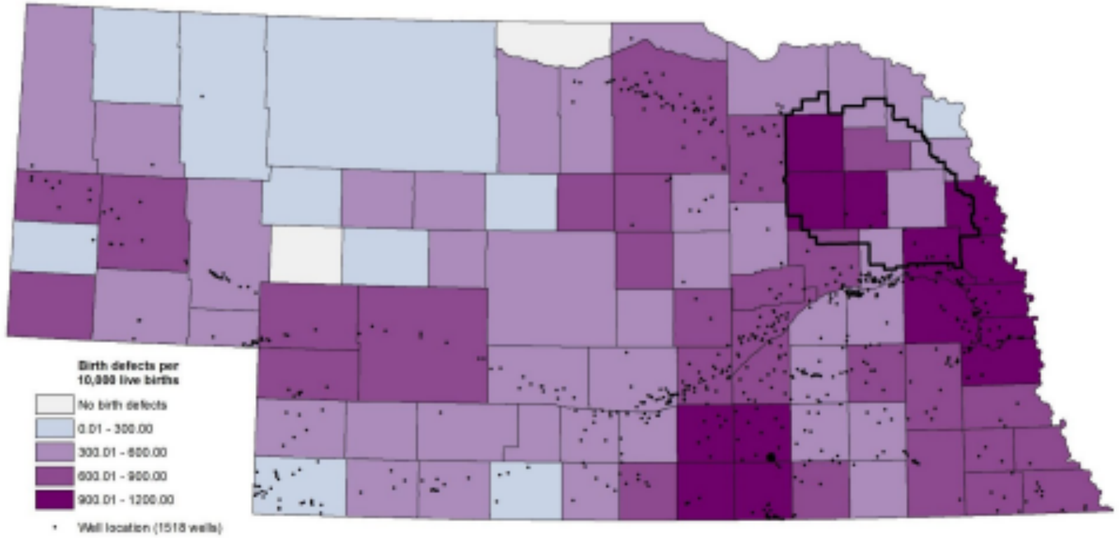
- MCL of nitrate in drinking water (10mg/L) is set for infant development of methemoglobinemia
  - **Not for other health outcomes**
  - Studies of other health outcomes continue to be published
    - High concentration of nitrate in drinking water have been linked to other adverse health outcomes
- Strongest links:
  - Minor health ailments
  - Methemoglobinemia
  - Preterm birth issues
  - Birth defects
  - Pediatric cancers
  - Adult cancers

Adult Health Research

- Minor health ailments: increased heart rate, nausea, headaches, abdominal cramps
- Cancers potentially associated:
  - Colorectal cancer
  - Thyroid disease
  - Kidney cancer
  - Bladder cancer
  - Non-Hodgkin lymphoma
- Alzheimer's, Diabetes and Parkinson's Disease
- Maternal/Fetal Health Issues
  - Miscarriages
  - Preterm births
  - Fetal growth restrictions
  - Birth defects

Birth Defects in Nebraska

- National average: 3.3% of all live births
  - Nebraska (2005-2015) 5.8%
- Counties in parts of NE reach 9-12%
- Counties with higher birth defects had greater prevalence of agrichemicals in water



New-Aaron, Moses; Meza, Jane L.; Shea, Patrick J.; and Rhoades, Martha, "Birth outcomes and water: A multidisciplinary study" (2018). *Posters and Presentations: College of Public Health*. 11. https://digitalcommons.unmc.edu/coph_pres/11

Health Issues in Children Research

- Multiple health issues have been identified in children
  - Methemoglobinemia (Infants less than 6 months)
  - Pediatric brain cancers
  - Non-Hodgkin Lymphoma
    - Non-Hodgkin Lymphoma had a three-fold increase in risk with nitrates and atrazine in Nebraska study (Rhoades et al 2013)

Pediatric Cancer in Nebraska

Incidence of pediatric cancers in Nebraska is among the **five highest** in the United States (Farazi et al., 2018).

Midwest Region	172.9
Nebraska	183.2
Minnesota	179.9
Michigan	178.9
Iowa	178.6
Kansas	177.0
Wisconsin	175.6
Illinois	171.8
Indiana	171.5
Ohio	168.3
Missouri	163.1
North Dakota	158.7
South Dakota	150.3

Courtesy of Don Coulter, MD

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

Child Health Research Institute

University of Nebraska Medical Center

Children's Hospital & Medical Center

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

Treating Drinking Water Nitrate

Nitrate Treatment Systems

Household Treatment system:

Treats all water flowing through the house to reduce the concentration of nitrate in the water.

Point of Use (POU) system:

Provides a centrally located tap to reduce the risk of adverse health effects through the ingestion of nitrate.

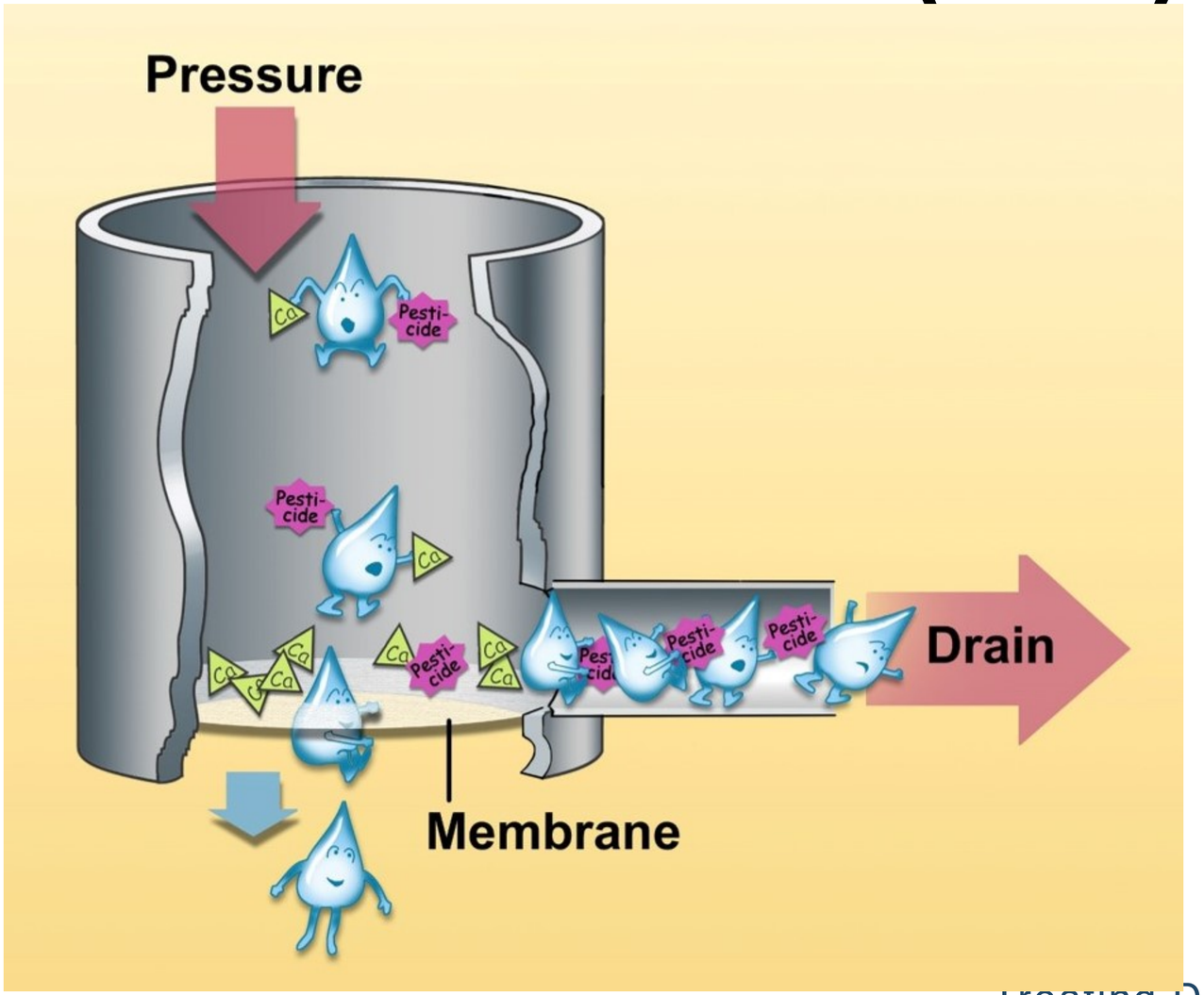
- ***REVERSE OSMOSIS (RO)***
- DISTILLATION

Reverse Osmosis (RO)

- Pressure driven membrane process
- >95% removal of most contaminants
- Pretreatment may be required:
  - Sediment filters
  - Water softening

Photo credit: Forbes.com

Reverse Osmosis (RO)



RO System Costs

- **Point-of-Use System**
  - System itself: $200 - $2000 +
  - Point of Use Installation: $100 - $800 +
  - Maintenance: $50 - $200+

- **Whole House System**
  - Largely dependent on water use factors
  - Estimates from $10,000+ for a 2 person household and up

Lifetime Treatment Considerations

- Regular Maintenance
- Pre- and Post- Filter replacement
- Contaminant concentration influences how long filters work
- Increased wastewater loads to septic systems and lagoons

RO Rebate Program Overview

RO Rebate Program Overview

Application Opens: January 1, 2023
Application Closes: June 24, 2024

Who's Eligible?

1. This program is open to anyone with a private well.
2. The private well must be registered.
3. Applicants will need to submit water quality data from the State laboratory, with testing results dated no earlier than January 1, 2022.
4. Only wells with samples above 10 ppm nitrate will be eligible for this program.

EXTENSION

Nebraskans Can Treat Their Drinking Water for Free!

If your drinking water has high concentrations of nitrate, the Nebraska Department of Environment and Energy (NDEE) is offering an opportunity for you to treat it for free with the Reverse Osmosis System rebate program.

Application opens: January 1st, 2023
Application closes: June 23, 2024

Eligibility Requirements:

1. This program is open to anyone with a private well.

2. The private well must be registered.

3. Applicants will need to submit water quality data from the State laboratory, with testing results dated no earlier than January 1, 2022.

4. Only wells with samples above 10 ppm nitrate will be eligible for this program.

Why Apply?

Treating your drinking water helps protect the health of you and your loved ones.

There are known health impacts for drinking nitrate contaminated water. The strongest linked are:

- blue baby syndrome
- preterm birth issues
- birth defects
- pediatric cancers
- adult cancers

Application for R.O. rebate program
https://go.unl.edu/roapplication

Order state lab kit
https://go.unl.edu/ordertestkit

Check if your well is registered
https://go.unl.edu/checkwell

How to register your well
https://go.unl.edu/registerwell

More program details
https://go.unl.edu/programdetails

Get up to $4,000 reimbursed!

RO Rebate Program Overview

How to Apply

1. Test your well water with the State laboratory.
2. If your nitrate concentration is higher than 10ppm, go to https://go.unl.edu/reapplication.
3. Mail or email your application to NDEE.PrivateWellRORebate@nebraska.gov

Order state lab kit
https://go.unl.edu/ordertestkit

RO Rebate Program Overview

Check Your Well Registration

RO Rebate Program Overview

Get a cost estimate from one of the following:

- Licensed plumber
- Entity that has performed at least 5 successful Private Well Reverse Osmosis Small Water Treatment Installations

This estimate must contain a written clause that states the installer

“will not charge for the installation of the installation unless post-installation testing from the state laboratory has nitrate levels below 10 mg/L”

RO Rebate Program Overview

Apply for the RO Rebate Program

Application for R.O. rebate program
https://go.unl.edu/roapplication

Nitrate and RO In-Service – THANKS!

Application for R.O. rebate program
https://go.unl.edu/roapplication

Order state lab kit
https://go.unl.edu/ordertestkit

Check if your well is registered
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How to register your well
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More program details
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Get up to $4,000 reimbursed!