NEBRASKA’S NRDS: MONITORING GROUND WATER FOR THE LONG HAUL

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Lower Platte South Natural Resources District
Lincoln, Nebraska
• Formed in 1972 from a variety of special-use districts
• Delineated according to major watershed boundaries
• Governed by locally-elected Boards of Directors
• Managed by professional staff
• Property taxing authority
Nebraska’s 23 NRDs

Learn more at www.nrdnet.org
Areas of Responsibility

• Water
• Soil
• Grazing Lands
• Trees & Wildlife Habitat
• Flood Control
• Urban Conservation
• Recreation
• Information & Education
Major Aquifers in Nebraska

Important Aquifers and Topographic Regions of Nebraska

Aquifers:
- High Plains Aquifer
- Paleo-Valley Aquifers
- Dakota Aquifer
- Niobrara Aquifer

Topographic Regions:
- Valleys
- Sandhills
- Surface Water

http://snr.unl.edu/csd/images/surveyareas/water/AquifersinNebraska.jpg
About 88% of Nebraskans use ground water for domestic supply (almost 100% if Omaha isn’t included)
Nitrates in Nebraska Ground Water

MOST RECENT NITRATE-N CONCENTRATIONS

Nitrate Levels
- > 0 - < 7.5 mg/L
- 7.5 - 10 mg/L
- 10 - 20 mg/L
- > 20 mg/L

NDEQ, 2018
NRD Authorities

• Restricted to nonpoint source (NPS) ground water issues
  – Point source (PS) & surface water: NDEQ

• Ground Water Management Plans & Management Areas
  – GWMAs can be designated by NRD or State

• Controls for ground water quality:
  – Use of best management practices
  – Water/soil analysis & submittal of data
  – Attendance at educational programs
  – Water quality monitoring/reporting
  – Additional reasonable rules and regulations
  – Additional controls for water quantity
“Phase” Approach

• Based on nitrate levels in NRD monitoring network wells
  – Various private well types—irrigation, domestic, stock, etc.
  – Dedicated monitoring wells—2064 in all 23 NRDs
  – Typically sampled at least annually
  – State law requires NRDs to submit monitoring results to NDEQ
    • Clearinghouse Database: 495,000 analyses (mostly nitrate)

• Increasing nitrate levels “trigger” management actions
  – Trigger levels are generally a percentage of federal MCL for nitrate (10 mg/ℓ)
  – E.g., for Lower Platte South NRD:
    • Phase I: Entire NRD
    • Phase II: 50% of network wells >50% of MCL (5 mg/ℓ)
    • Phase III: 80% of network wells > 80% of MCL (8 mg/ℓ)
  – Can be either for entire NRD or sub-areas
    • LPSNRD uses Ground Water Reservoirs & Wellhead Protection Areas
  – Majority of NRDs have Phase I and Phase II areas; relatively few with higher Phases
    • Currently, no GWMAs for any contaminant other than nitrate
“Typical” Controls/Regulations

- Nitrogen education certification (usually in conjunction w/ University of Nebraska Extension)
  - Classroom, take-home, or online
  - Certification typically applies across NRD boundaries

- Soil sampling for residual nitrogen carryover consideration
  - University of Nebraska formula commonly used

- In irrigated areas, irrigation water sampling for nitrogen credit
  - Timing and amount of irrigation/rainfall is critical

- Timing restrictions on fall/preplant nitrogen fertilizer application
  - Anywhere from November 1 to March 1
  - May require split application between preplant & sidedress

- Requirements typically greater/more restrictive at higher Phases
Success???
NDEQ, 2018
• Central Platte NRD:
  – Phase II & III areas
  – 1998-2012 data
  – Ground water nitrate declined from 19 to 15 mg/ℓ
  – Soil nitrate declined from 110 to 50 kg/ha (100 to 45 lbs/a)

(Ferguson, 2015. JEQ 44:449-459)
We’re in it for the long haul…

Nitrogen accumulation in unsaturated/vadose zone

(Snow, 2018)
New Tools….

Airborne Electromagnetic (AEM) Survey Unit
Helpful References:

• Website links for all 23 Nebraska Natural Resources Districts: www.nrdnet.org

• Nebraska Department of Environmental Quality: www.deq.ne.gov

• Ag Chemical Clearinghouse Database: http://clearinghouse.nebraska.gov/Clearinghouse.aspx

• Eastern Nebraska Water Resources Assessment (ENWRA): www.enwra.org
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Questions???

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