Carrie Jennings, PhD, P.G.
Research and Policy Director

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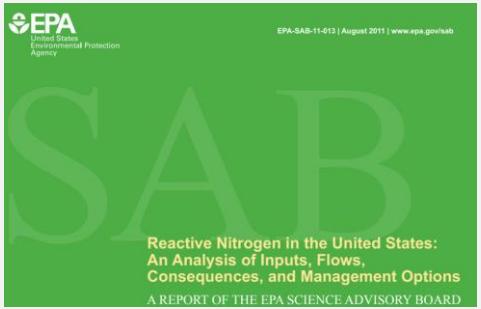
Reactive nitrogen is manufactured

- Discovery in 1913
- Increased use after WWII



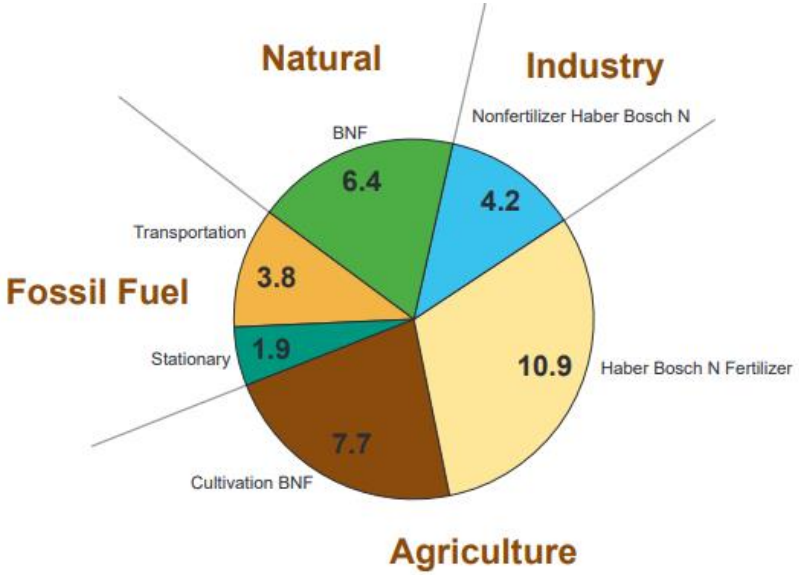
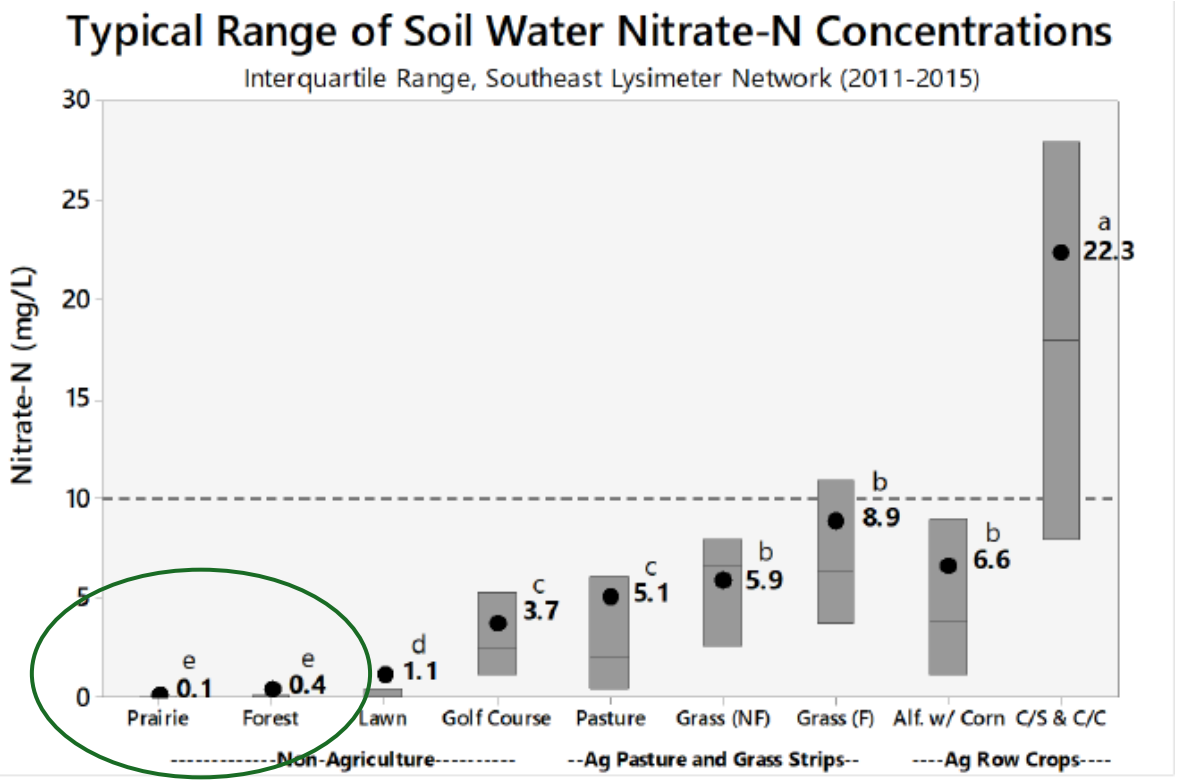


Figure ES-2: Sources of reactive nitrogen (Nr) introduced into the United States in 2002 (Tg N/yr).

A small amount is produced by plants



DEPARTMENT OF AGRICULTURE

Examination of Soil Water Nitrate-N Concentrations from Common Land Covers and Cropping Systems in Southeast Minnesota Karst

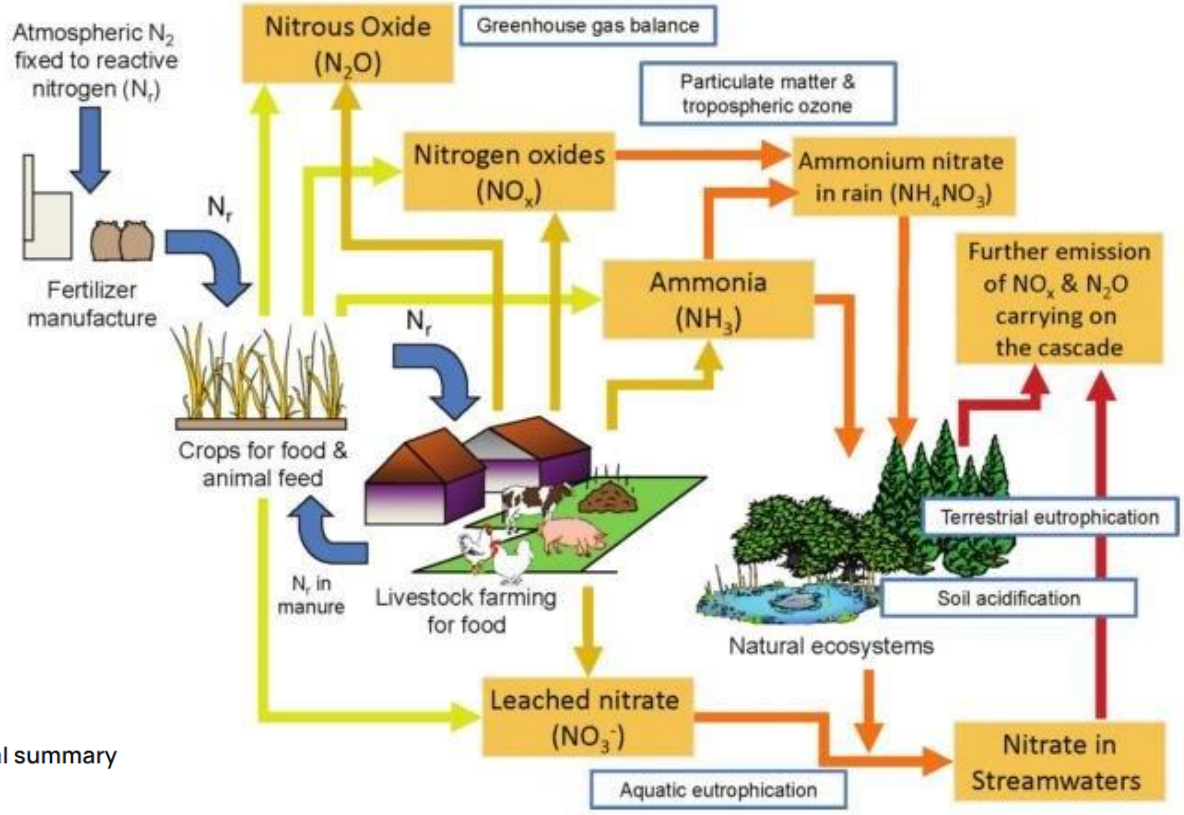
Kuehner, Kevin [1], Dogwiler, Toby[2], Kjaersgaard, Jeppe[3]

[1]Minnesota Department of Agriculture, Clean Water Technical Unit, Pesticide and Fertilizer Management Division, Preston, MN 55965

[2]Missouri State University, Department of Geography, Geology and Planning, Springfield, MO 65897

[3]Minnesota Department of Agriculture, Clean Water Technical Unit, Pesticide and Fertilizer Management Division, St. Paul, MN 55155

Simplified Nitrogen Cascade



Article | Full-text available

European nitrogen assessment - Technical summary

January 2011

M. Sutton · Gilles Billen · Albert Bleeker · Show all 9 authors · Adrian Leip

Nitrogen Increases with Corn

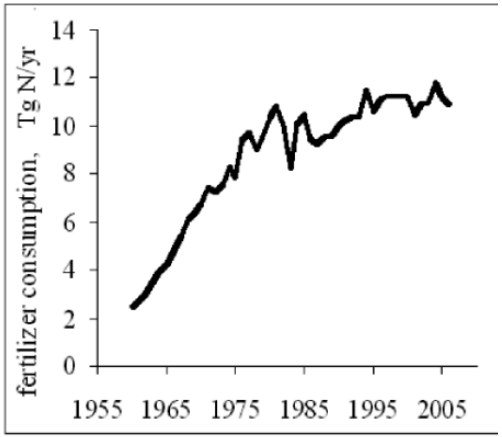
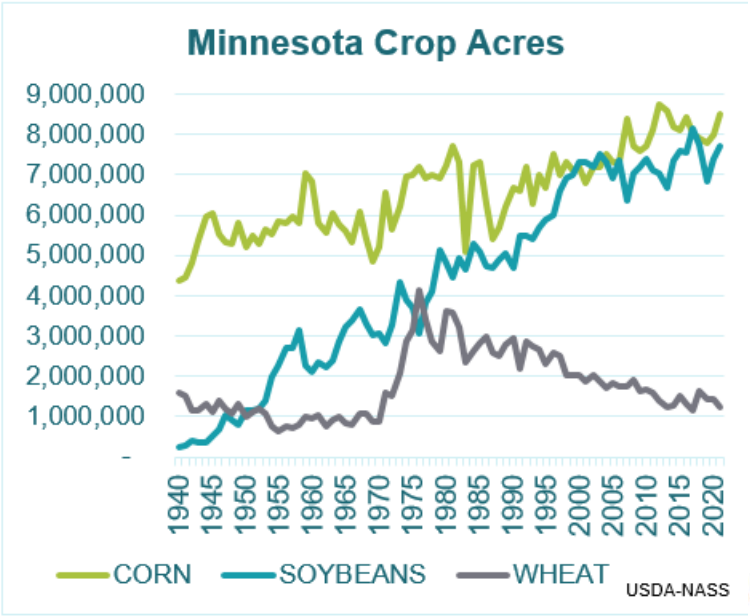


Figure 6: Fertilizer consumption in the United States, 1960 to 2006

Source: Slater et al., 2010. Reprinted with permission from the Association of American Plant Food Control Officials.



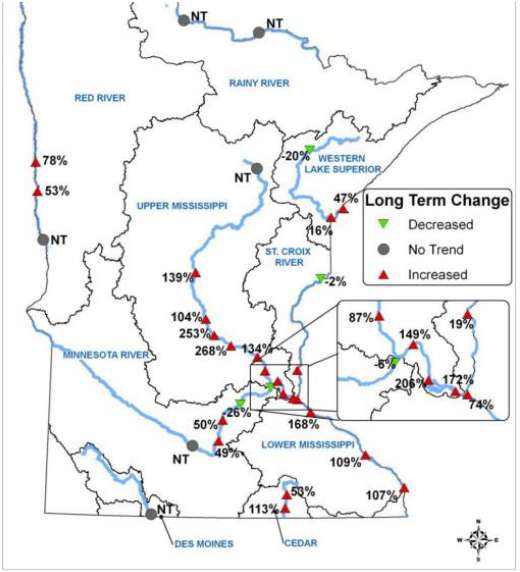
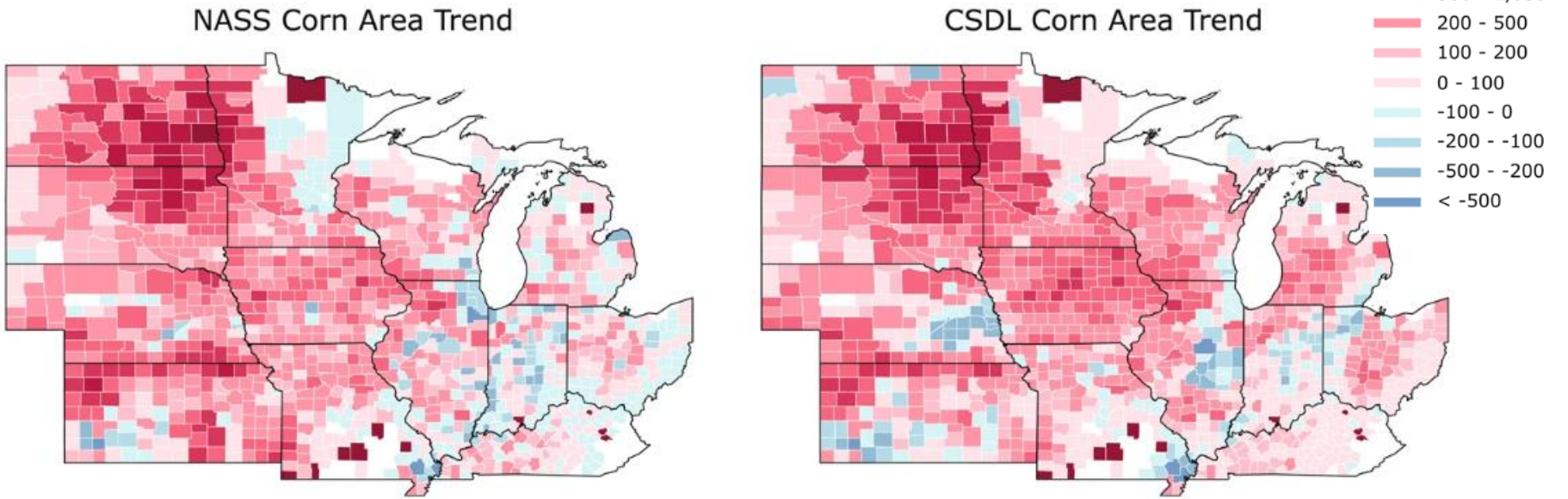


Figure 5. Long-term overall nitrate concentration trends (from mid to late 1970s until 2008-11) at mainstem river monitoring sites. Concentrations were adjusted for flow and changes are statistically significant at p<0.1.

COMPEER FINANCIAL

Corn Acres are Increasing

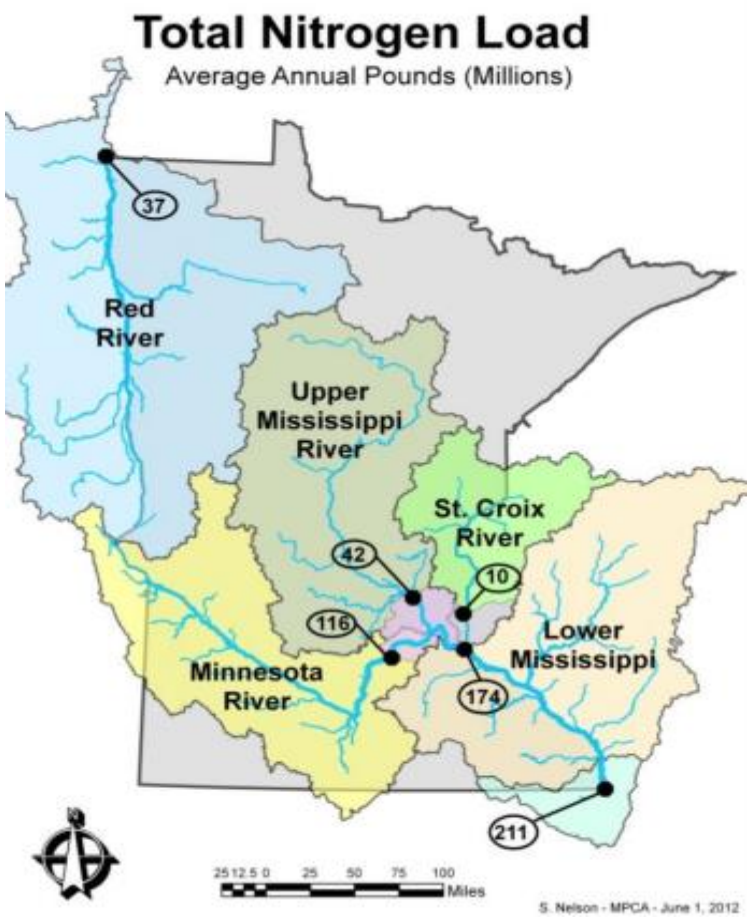
From: Mapping twenty years of corn and soybean across the US Midwest using the Landsat archive

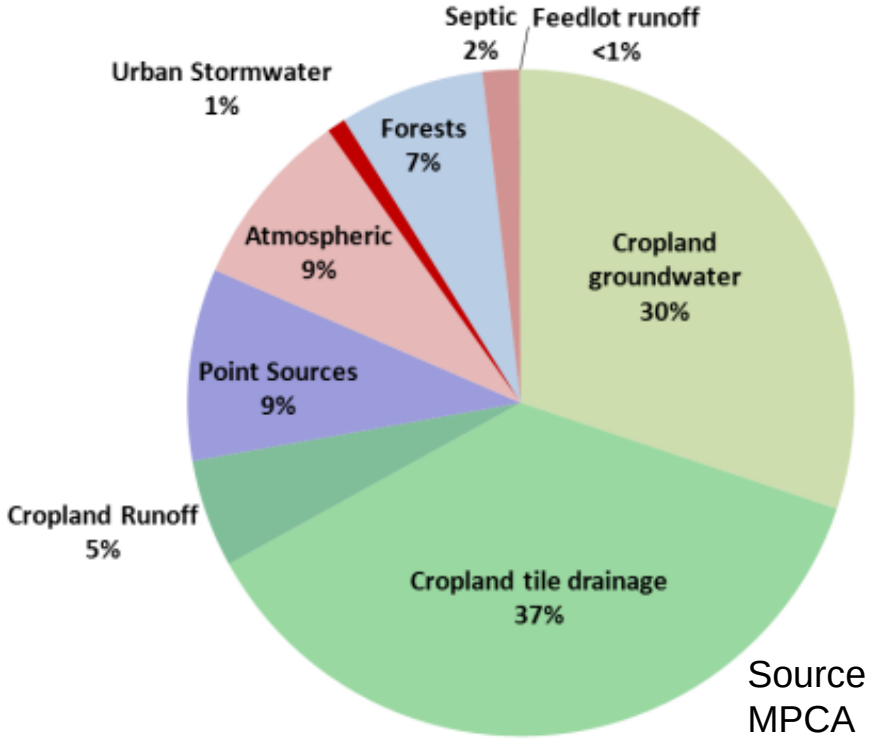


Mapping twenty years of corn and soybean across the US Midwest using the Landsat archive

Sherrie Wang, Stefania Di Tommaso, Jillian M. Deines & David B. Lobell

Scientific Data **7**, Article number: 307 (2020) | Cite this article



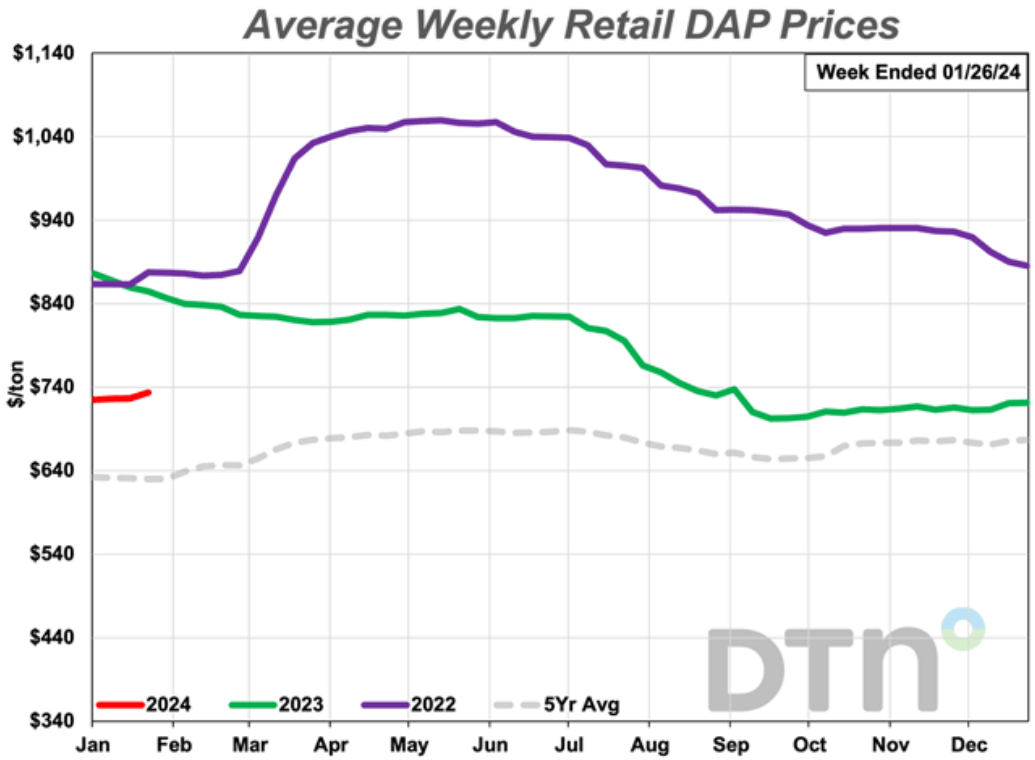


Source: MPCA

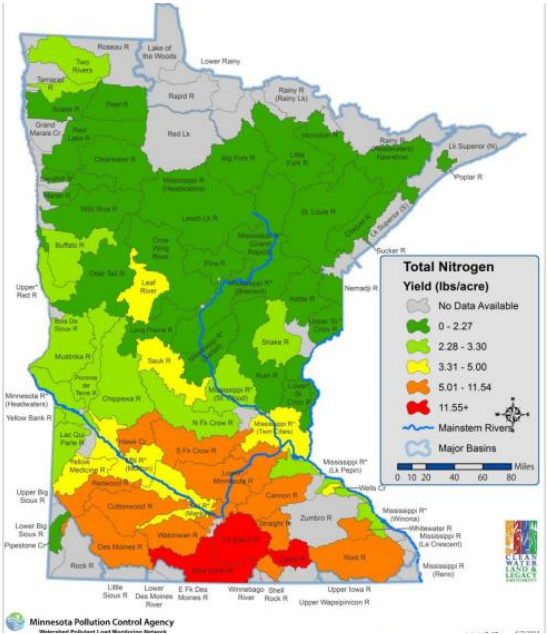
211 million lbs. of N lost to surface water each year

(110,500 tons)

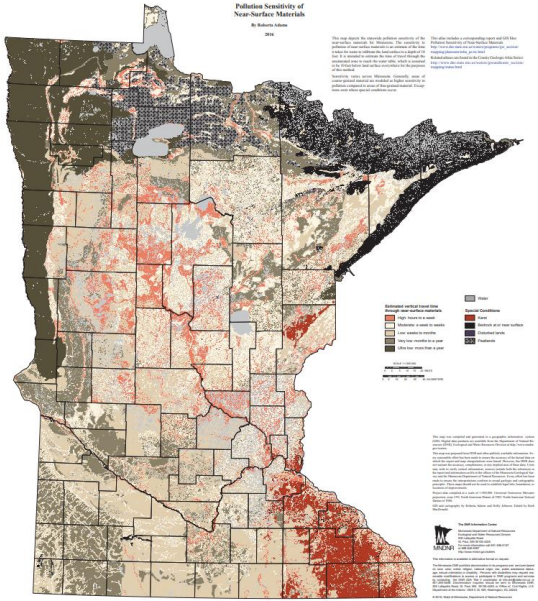
Can producers afford to lose $90 million each year?



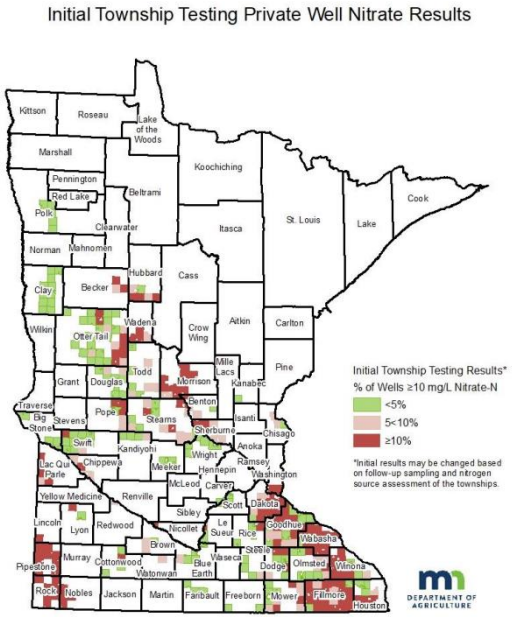
Cost of Nitrogen Fertilizer



MPCA Surface Water N



DNR Sensitive Areas

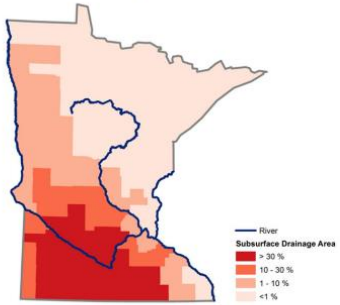


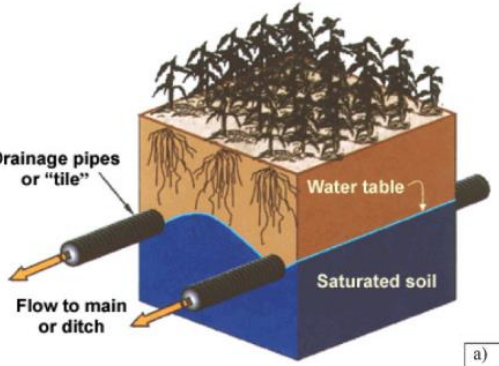
MDA Township Testing Results

N is a surface water or groundwater problem

(depending on the geology)

Tile drainage in Minnesota





Tile drainage in Minnesota is currently concentrated in the Minnesota River watershed but is expanding across the s to all soil types.

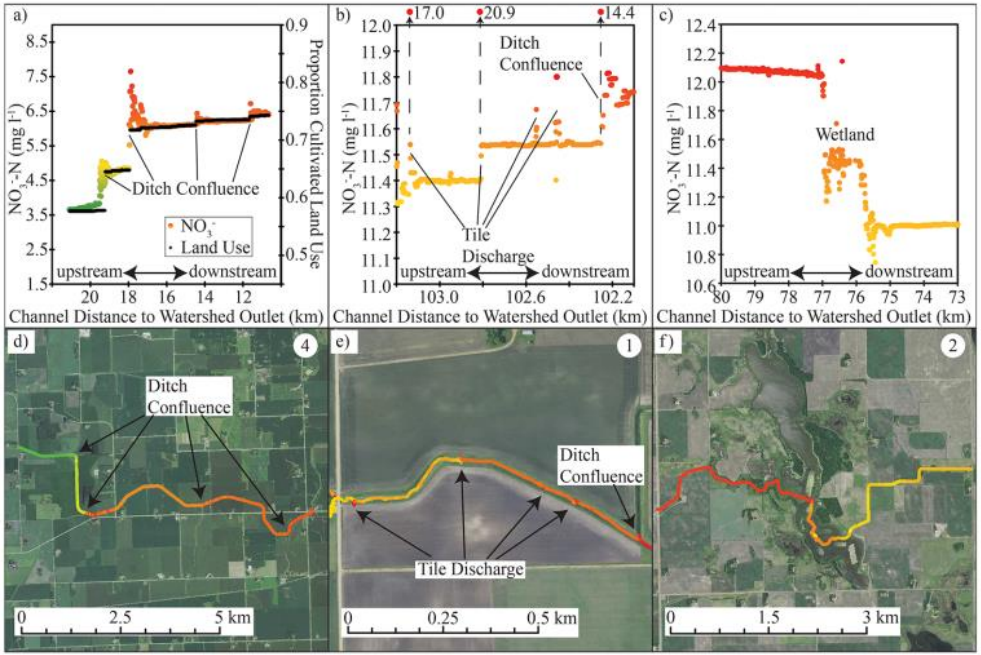
Sources: Graphic above adapted from USDA-NASS (2012); photo at right NDSU Extension

Drained land loses reactive nitrogen through tile that flow to ditches.

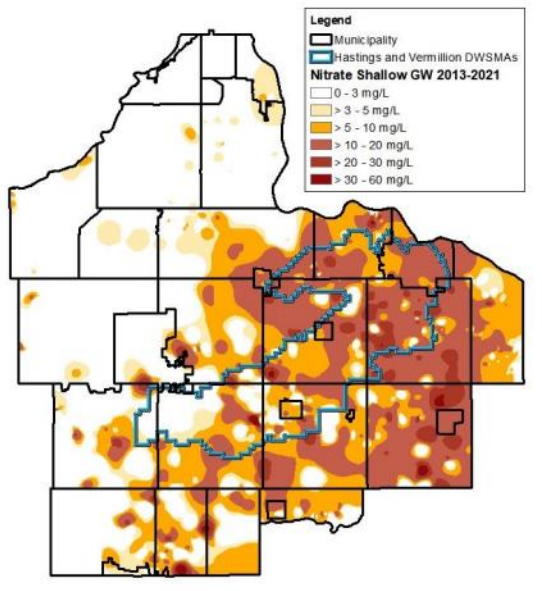
Novel, Ultralight Platform for Mapping Water Quality Parameters in Low-Order Streams

Ryan Felton, Brent J. Dalzell,* John Baker, Kade D. Flynn, and Sarah A. Porter

Cite This: https://doi.org/10.1021/acsestwater.3c00280 Read Online



Presence of nitrogen ➡ other contaminants.



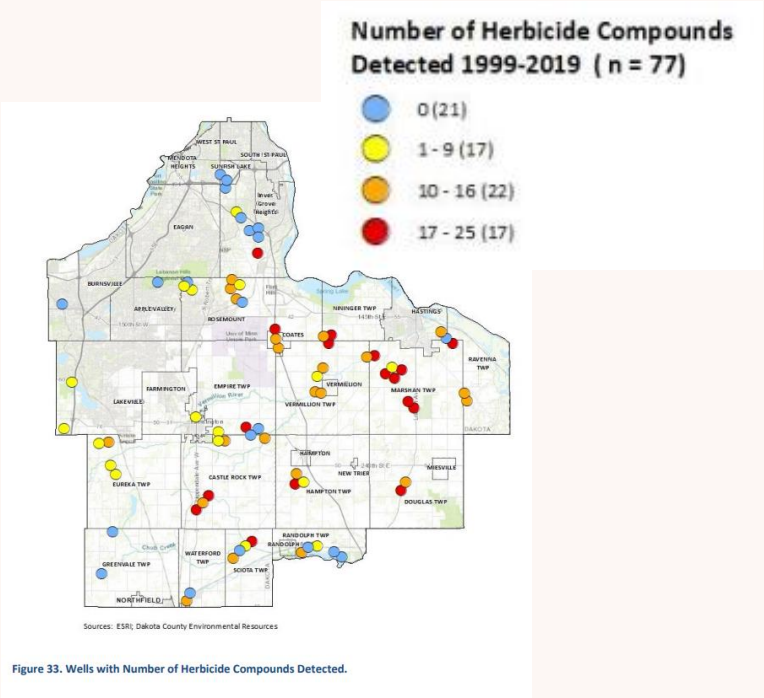


Figure 33. Wells with Number of Herbicide Compounds Detected.

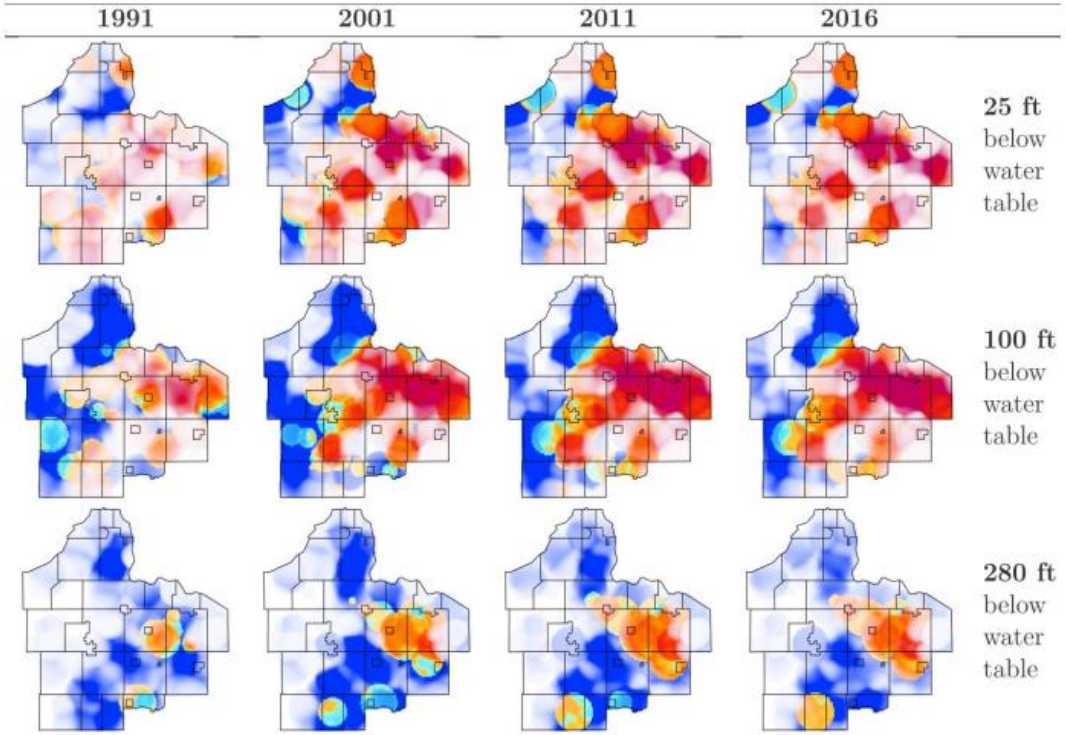
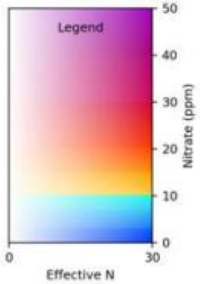


Figure 30. 90th Percentile Nitrate Concentrations Over Time and Depth.



Dakota Co. Ambient Groundwater Study, 2019

N increases over time

N deepens over time

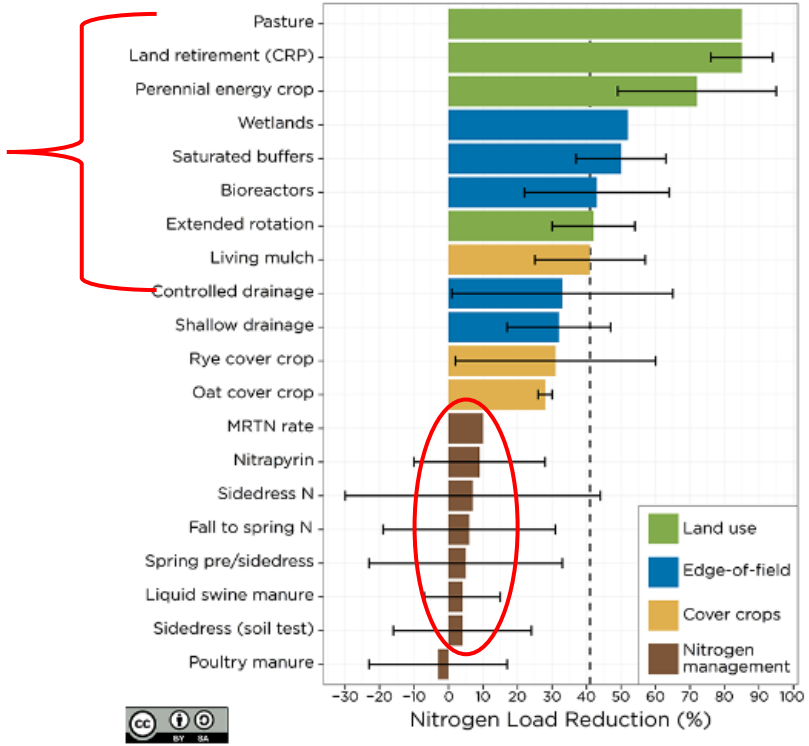

There is too much nitrogen moving around out there.

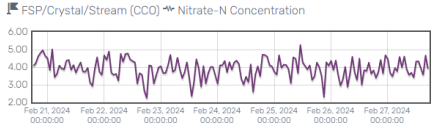
We know what works.

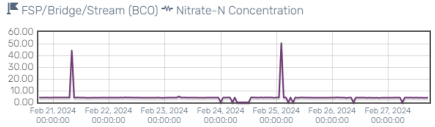
High-Touch Conservation Delivery as in the Field to Stream Partnership

Nitrogen Load Reduction

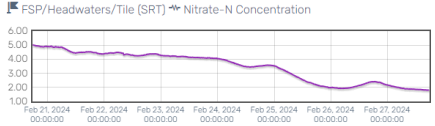
Average nitrate-nitrogen concentration or load reduction as a percentage. Horizontal bars represent one standard deviation above and below the mean. Dashed line represents the 41% nitrogen reduction goal from nonpoint sources.



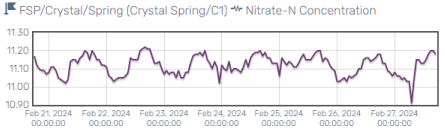


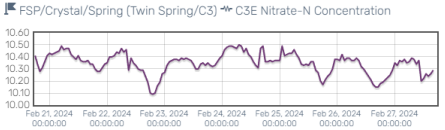


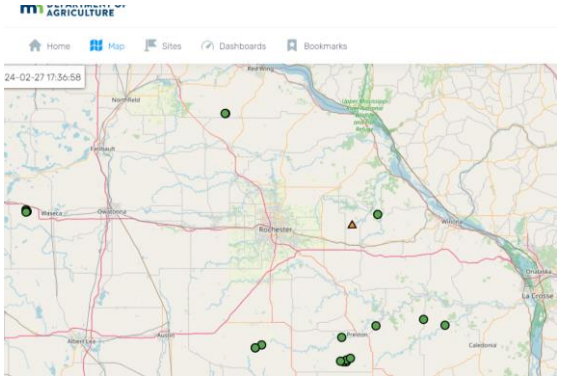
Tile Continuous Nitrate Concentration, mg/L



Springs Continuous Nitrate Concentration, mg/L







Project Partners

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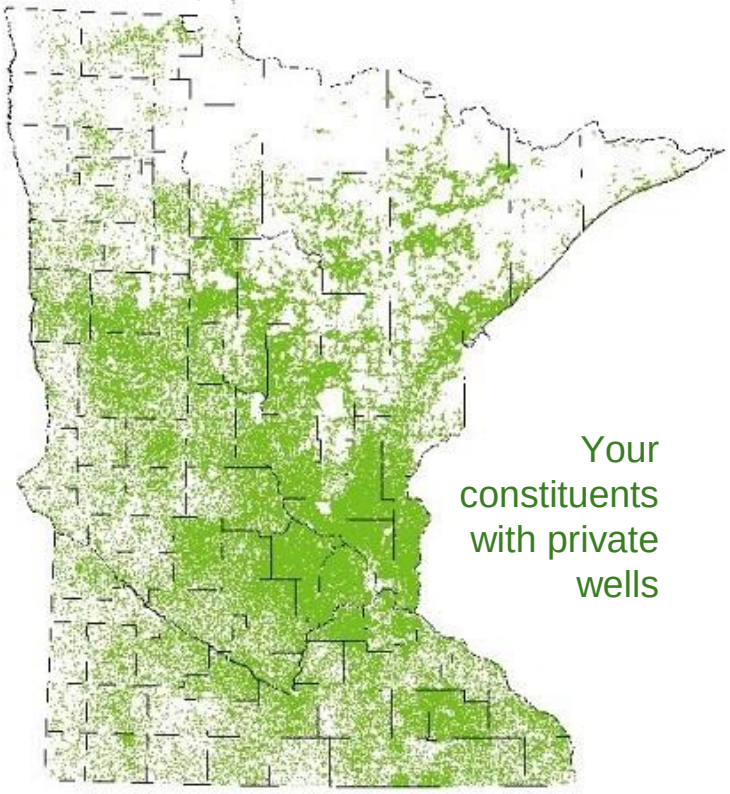
Personalized outreach and management paired with real-time monitoring

Groundwater is a shared resource.



Your constituents with private wells

How can the State help provide safe drinking water to private well owners?

Why are we waiting for groundwater to get worse before acting? *

*1989 Groundwater Protection Act set an Antidegradation Standard

Freshwater Priorities

01

Provide clean drinking water

02

Focus on sensitive areas

03

Accelerate use of existing programs

04

Leverage federal $ to do more

05

Monitor practices for impact

Carrie Jennings
cjennings@freshwater.org

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