



National Water-Quality Assessment (NAWQA) Program

What is the background concentration of nitrate in groundwater?

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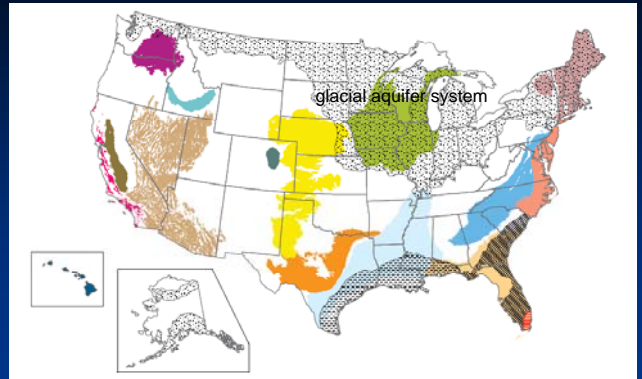
Background concentration

The concentration of a substance in a particular environment that is indicative of minimal influence by human sources (USGS, 2004).

Background concentrations in pristine areas

McKenna and others (1988)	<1.3	Illinois, US
Postma and others (1991)	<0.1	Denmark
Mueller and Helsel (1996)	<2.0	United States
Panno and others (1996)	1.4	Illinois
Leenhouts and others (1998)	4.5	Arizona
Cho and others (2000)	<1.0	South Korea
Brye and others (2001)	<0.3	Wisconsin
Perakis and Hedin (2002)	0.0019	South America
Nolan and Hitt (2003)	<1.0	United States

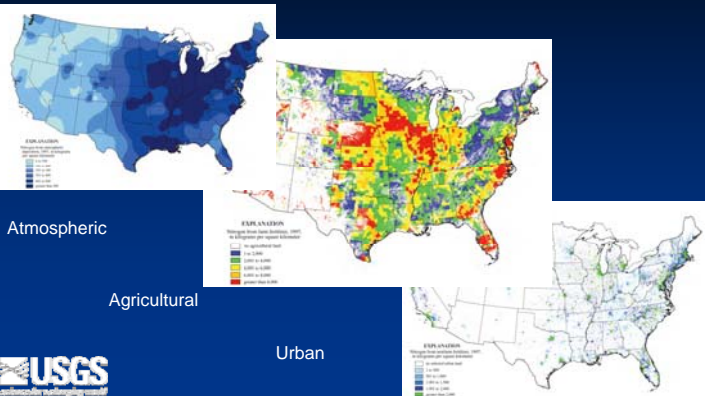
Glacial aquifer system in the United States



The glacial aquifer system is unconsolidated and heterogeneous



Sources of nitrogen are over the glacial aquifer system



A network of 'reference wells' is established to assess the background nitrate concentration

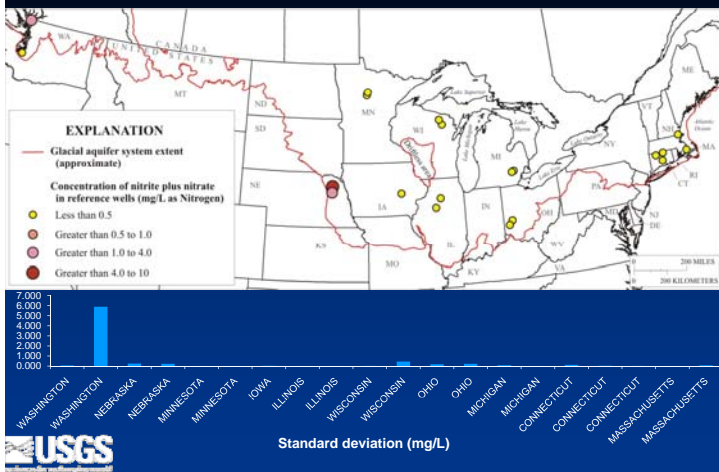


Site selection criteria for wells selected?

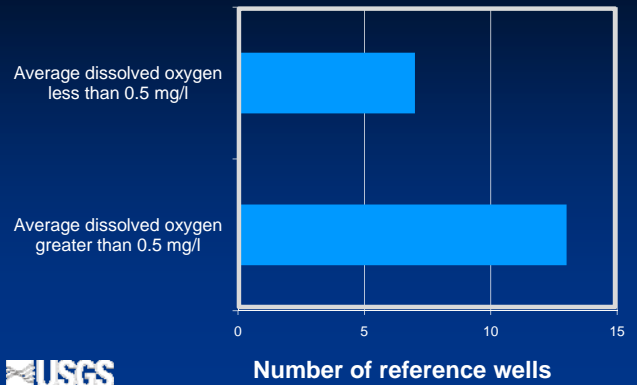
- 1.) Install well
- 2.) Location
- 3.) Depth
- 4.) Minimize pumping influence
- 5.) Stable land use
- 6.) Access



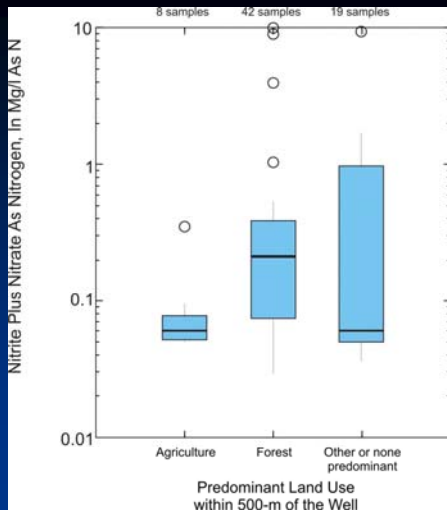
Variability



Geochemical environment



Land use

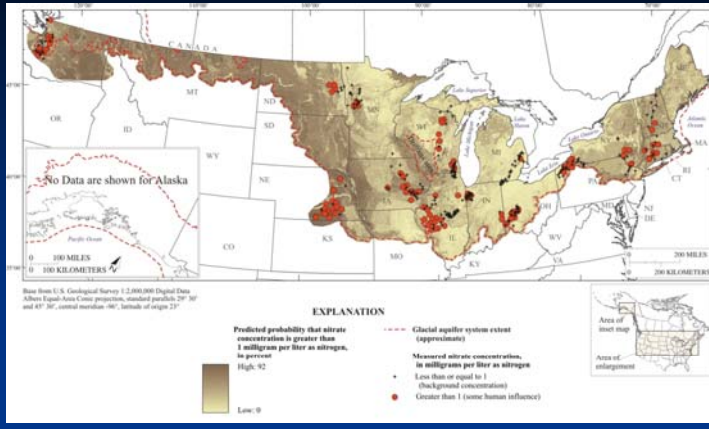


Statistical approach

- 85% of the 76 reference well samples were below 1.0 mg/L
- The 15% of wells above 1.0 mg/L were in the most susceptible areas



Probability and background concentration



Summary and implication for policy

Nitrate is a naturally occurring constituent so detection is not the issue, but the concern arises when nitrate appears to be increasing above a given threshold such as background concentration.

- Understand differences in determining background concentration
- Consider the bias
- Apply the information as a screening tool

