Nitrate Contamination of Ground Water in New Jersey
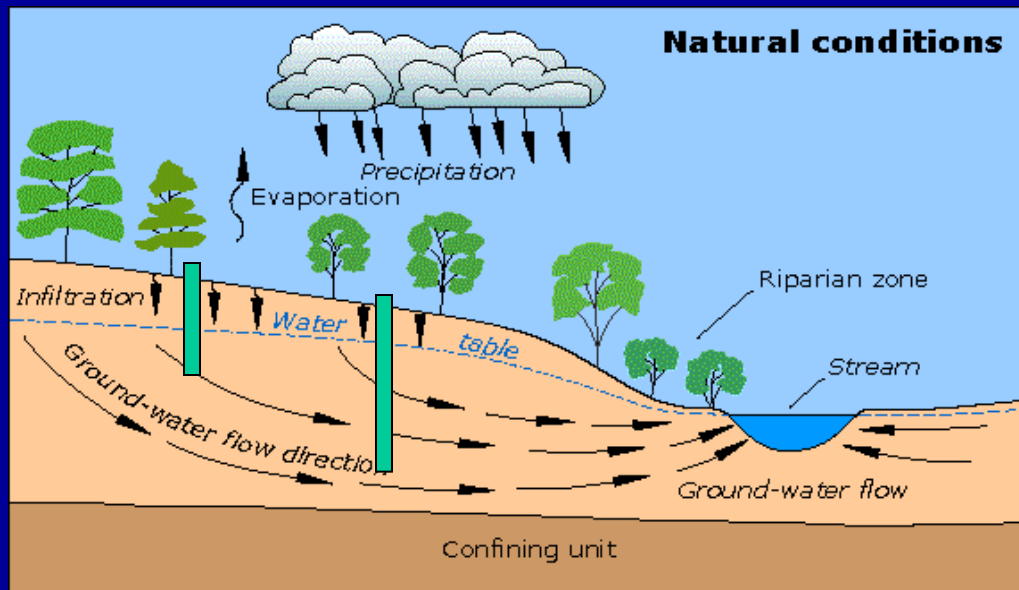
Michael Serfes

NJDEP, New Jersey Geological Survey

NJ Water Monitoring Council Meeting

September 6, 2007

Ground Water Quality

Major Controls

http://wwwga.usgs.gov/edu/earthgwdecline.html

- Natural conditions
  - water-rock interactions
- Non-point sources
  - land use
- Ground water data
  - AGWQMN (young GW)
  - PWTA (older GW)
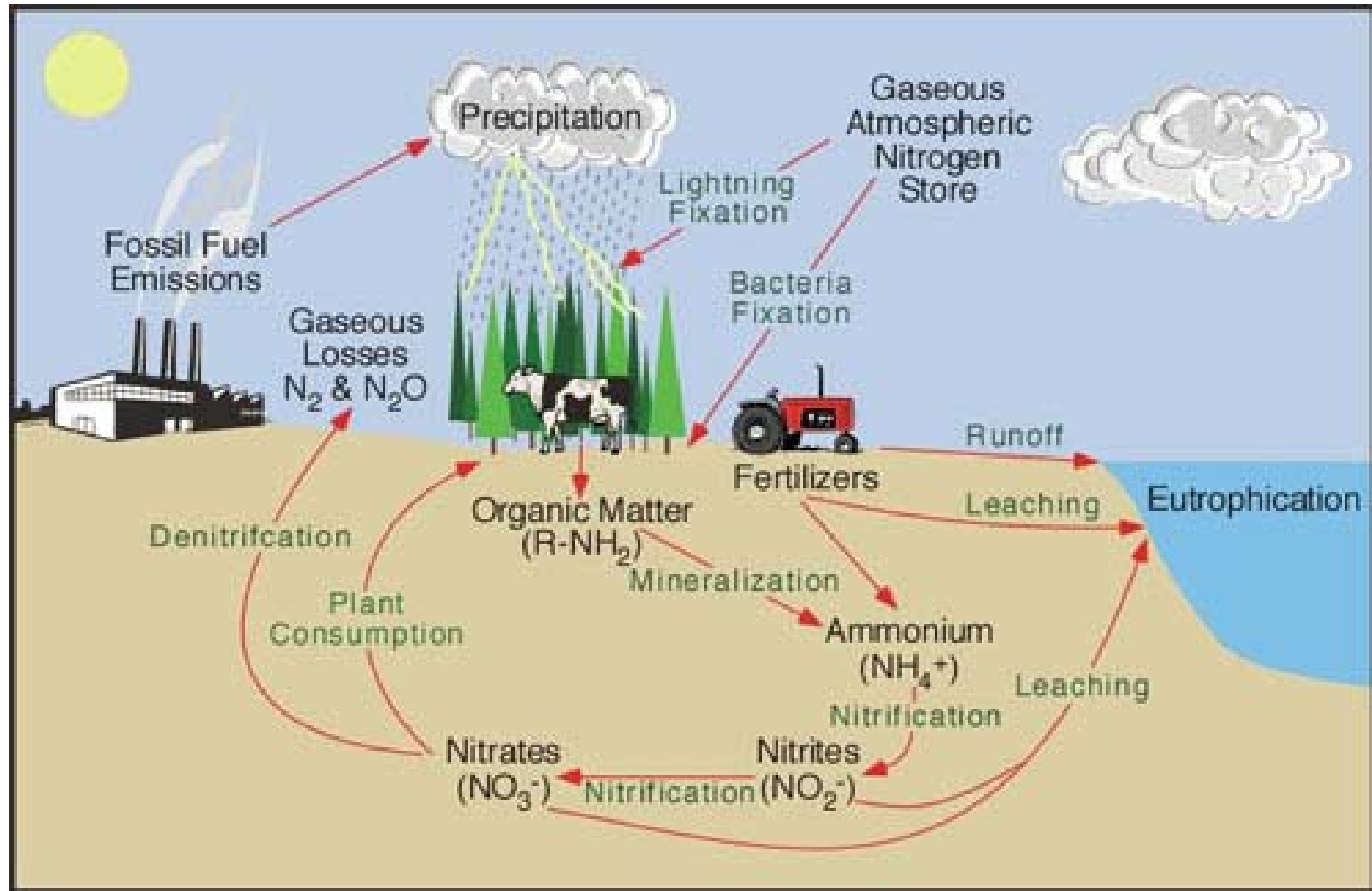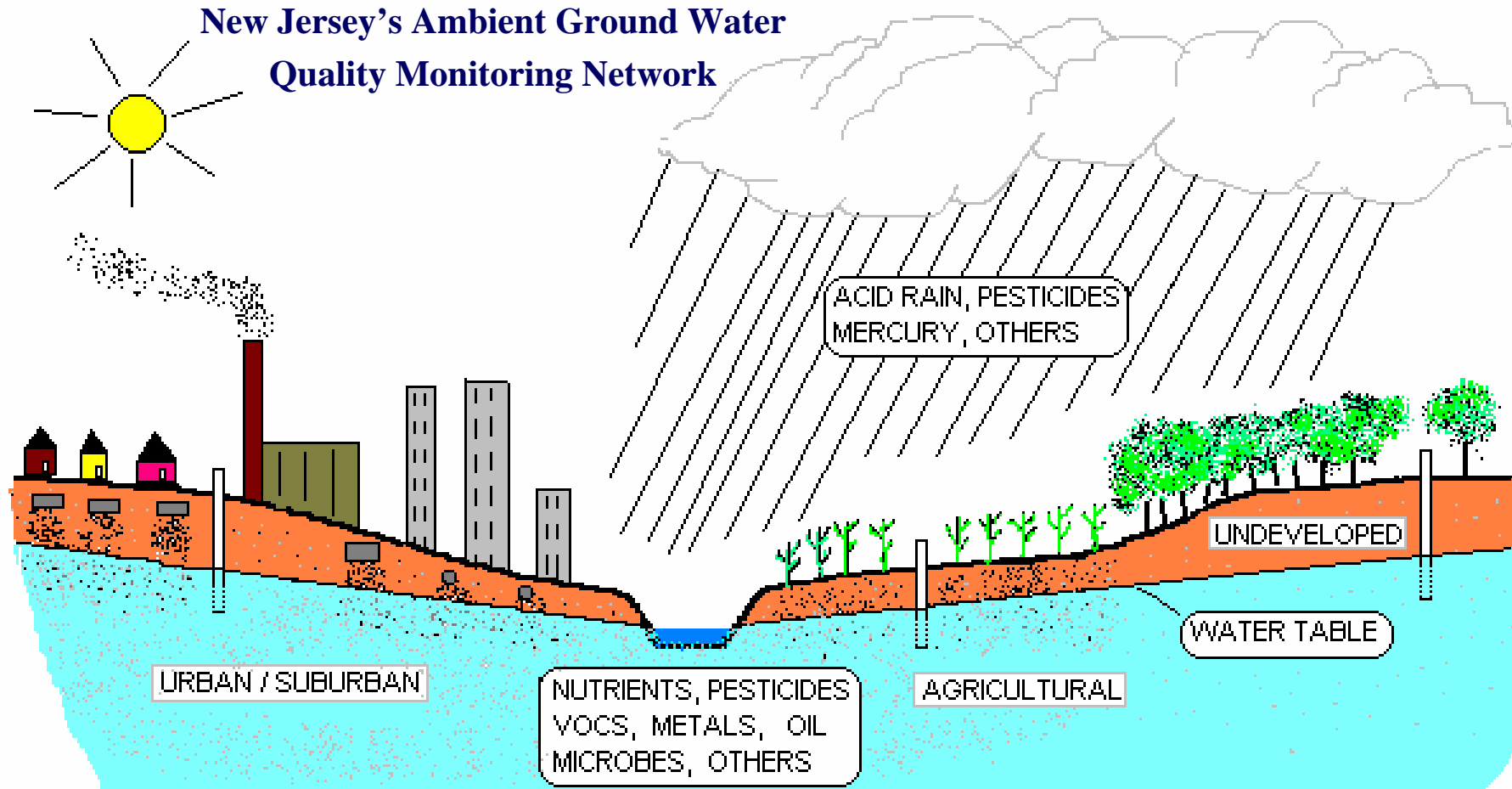
Nitrogen Biogeochemical Cycle

Figure created by Michael Pidwirny at Okanagan University College.

New Jersey's Ambient Ground Water Quality Monitoring Network

ACID RAIN, PESTICIDES MERCURY, OTHERS

UNDEVELOPED

WATER TABLE

URBAN / SUBURBAN

NUTRIENTS, PESTICIDES VOCS, METALS, OIL MICROBES, OTHERS

AGRICULTURAL

Use shallow wells to evaluate non-point source pollution groundwater in NJ.

Stratified as a function of Urban (60 wells), Agricultural (60 wells) and Undeveloped (30 wells) land uses.

Network consists of 150 randomly placed shallow ground-water wells. Sampled 30 per year with a 5 year network cycle frequency.

# NJDEP/Bureau of Freshwater & Biological Monitoring sampling a flush mounted well


MW 127, located on Rt. 172 and Gibbons Drive on the
Rutgers Campus in New Brunswick, Middlesex (urban well)

New Jersey's
Ambient Ground-Water
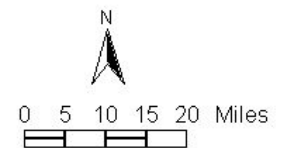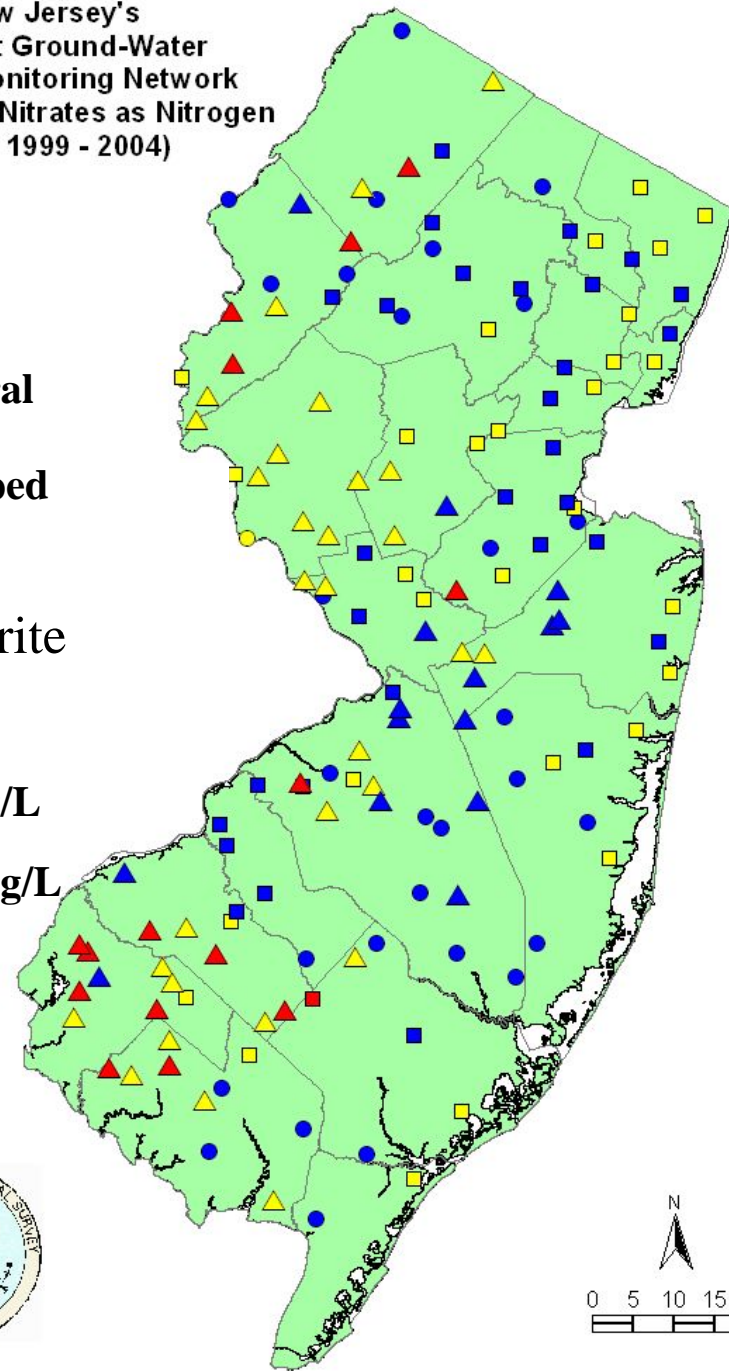Quality Monitoring Network
Nitrites plus Nitrates as Nitrogen
(Data 1999 - 2004)

☐ **urban**

△ **agricultural**

◯ **undeveloped**

Nitrate + nitrite

🟦 **0–1 mg/L**

🟨 **1.1–10 mg/L**

🟥 **10.1–56 mg/L**

25% Ag
2% Urb
0% Und
9% total

0 5 10 15 20 Miles

Nitrate + Nitrite

Northern Bedrock

Southern Unconsolidated
n = 39

milligrams per liter as N

60.0
50.0
40.0
30.0
n = 20
20.0
n = 25
10.0
n = 28
n = 10
n = 19
0

undeveloped
agricultural
urban
undeveloped
agricultural
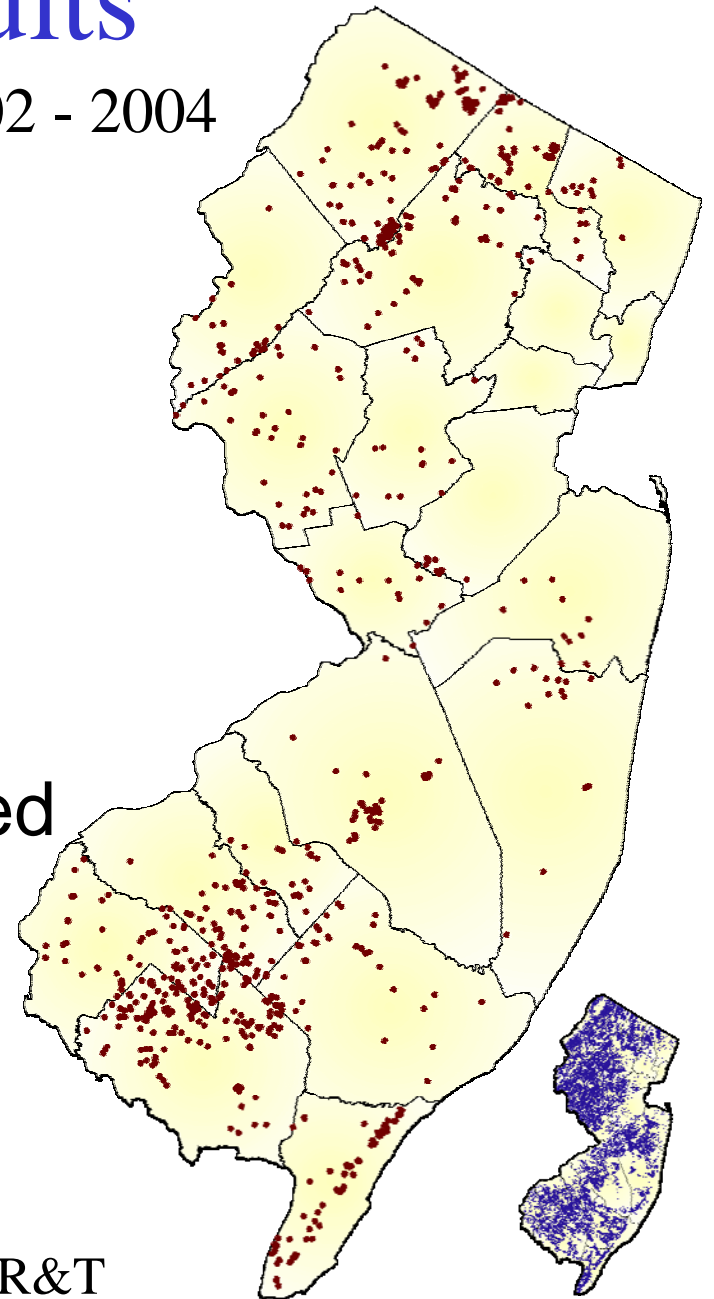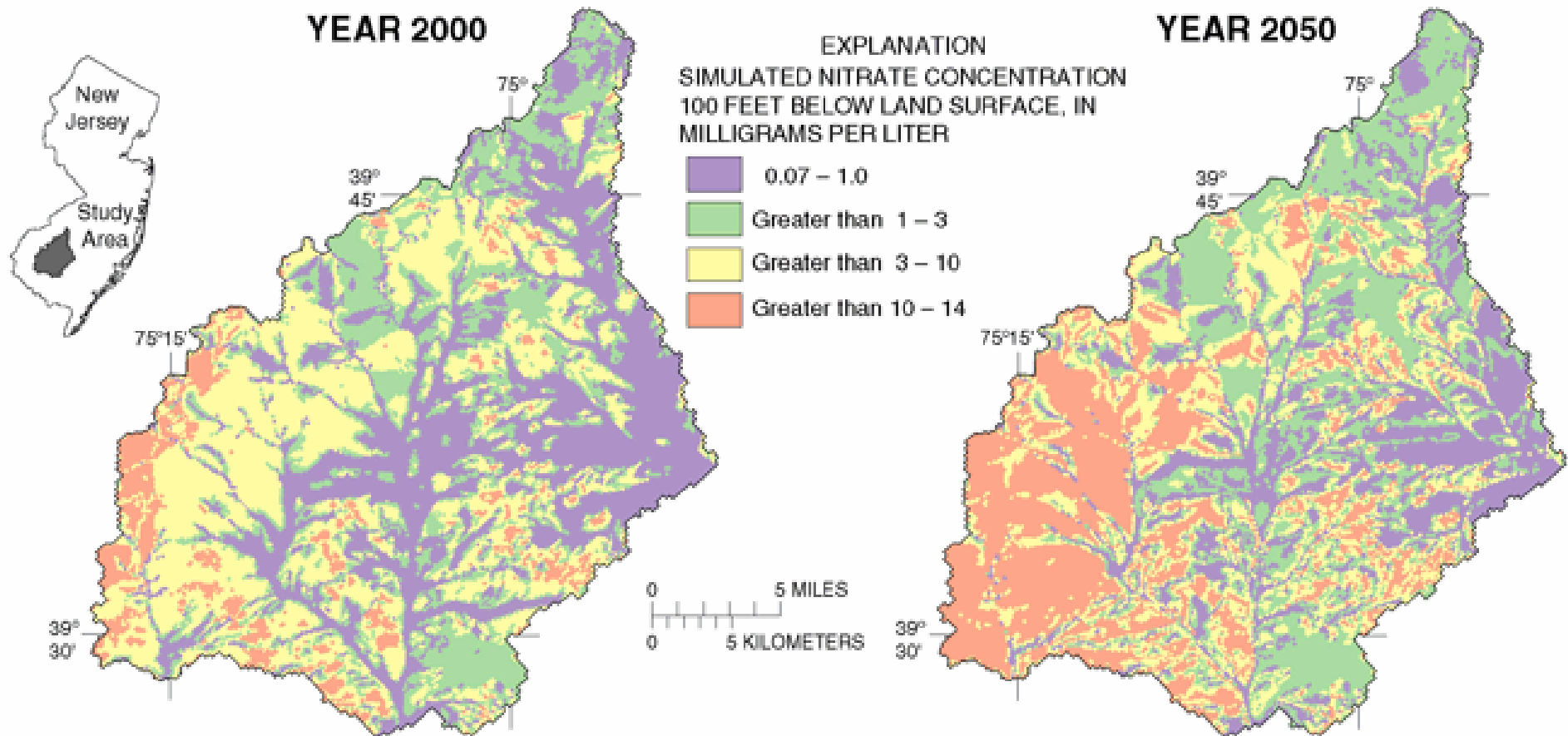urban
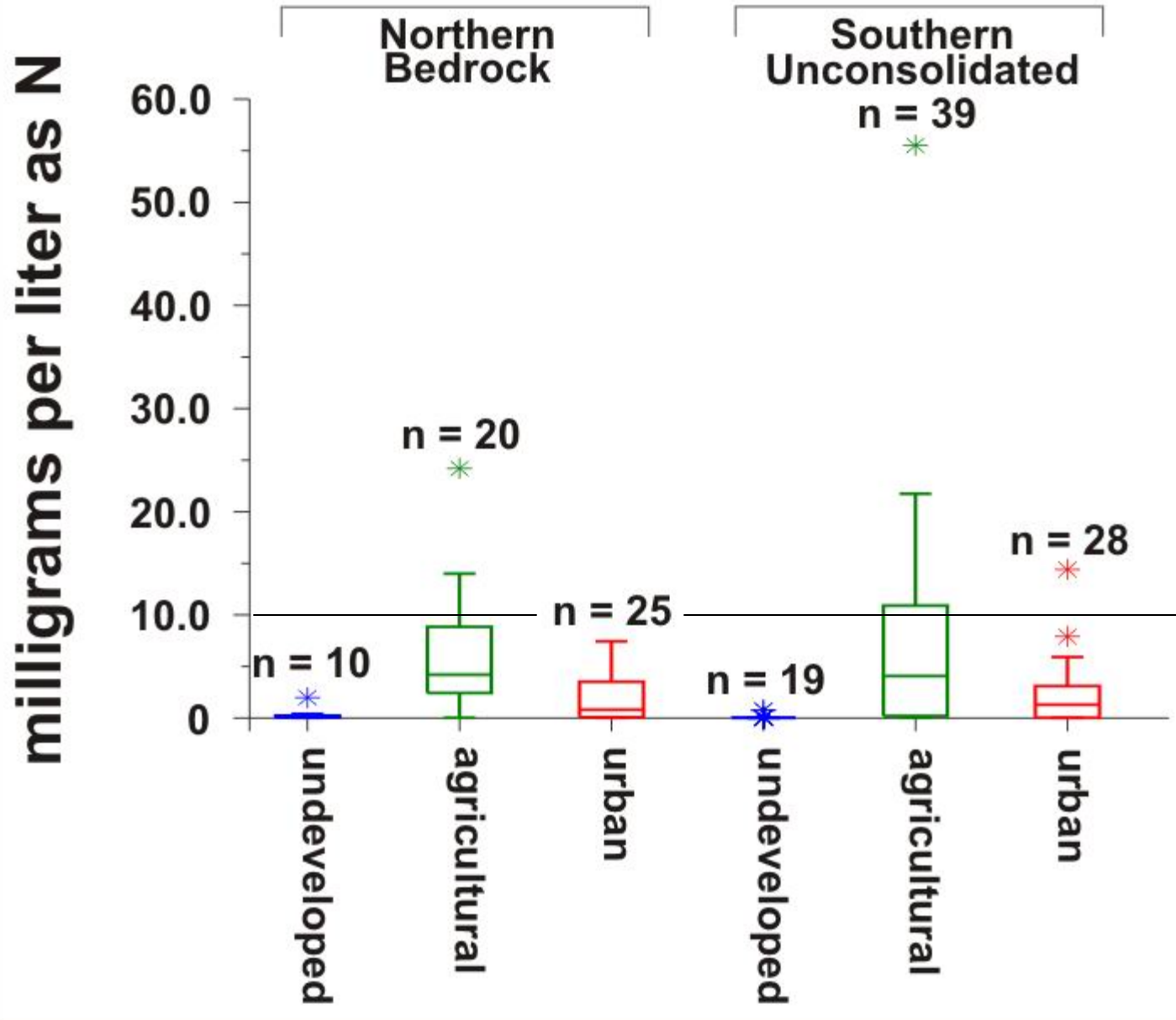
Nitrate Results

PWTA 2 years of data: 2002 - 2004

- **Nitrate**: all 44,177 wells are required to sample & test.

- **Exceedance**: above the 10 ppm drinking water standard.

- **Results:** 1,148 wells (2.6%) tested above the nitrate standard.

- **Range:** nitrate concentrations ranged from N.D. to 153 ppm.

Compliments Judy Louis, DSR&T

Figure 17. Domestic wells in the Kirkwood-Cohansey aquifer of southern New Jersey are commonly completed at a depth of 90-100 feet below land surface. Simulated nitrate concentrations at this depth in the Glassboro study area for the years 2000 and 2050 indicate that ground water in areas of intensive nitrogen fertilizer use is likely to exceed the drinking-water standard for nitrate of 10 mg/L by 2050. This simulation assumes nitrate inputs remain unchanged from year 2000.

http://pubs.usgs.gov/circ/circ1201/major_findings_2.htm