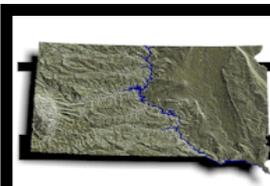


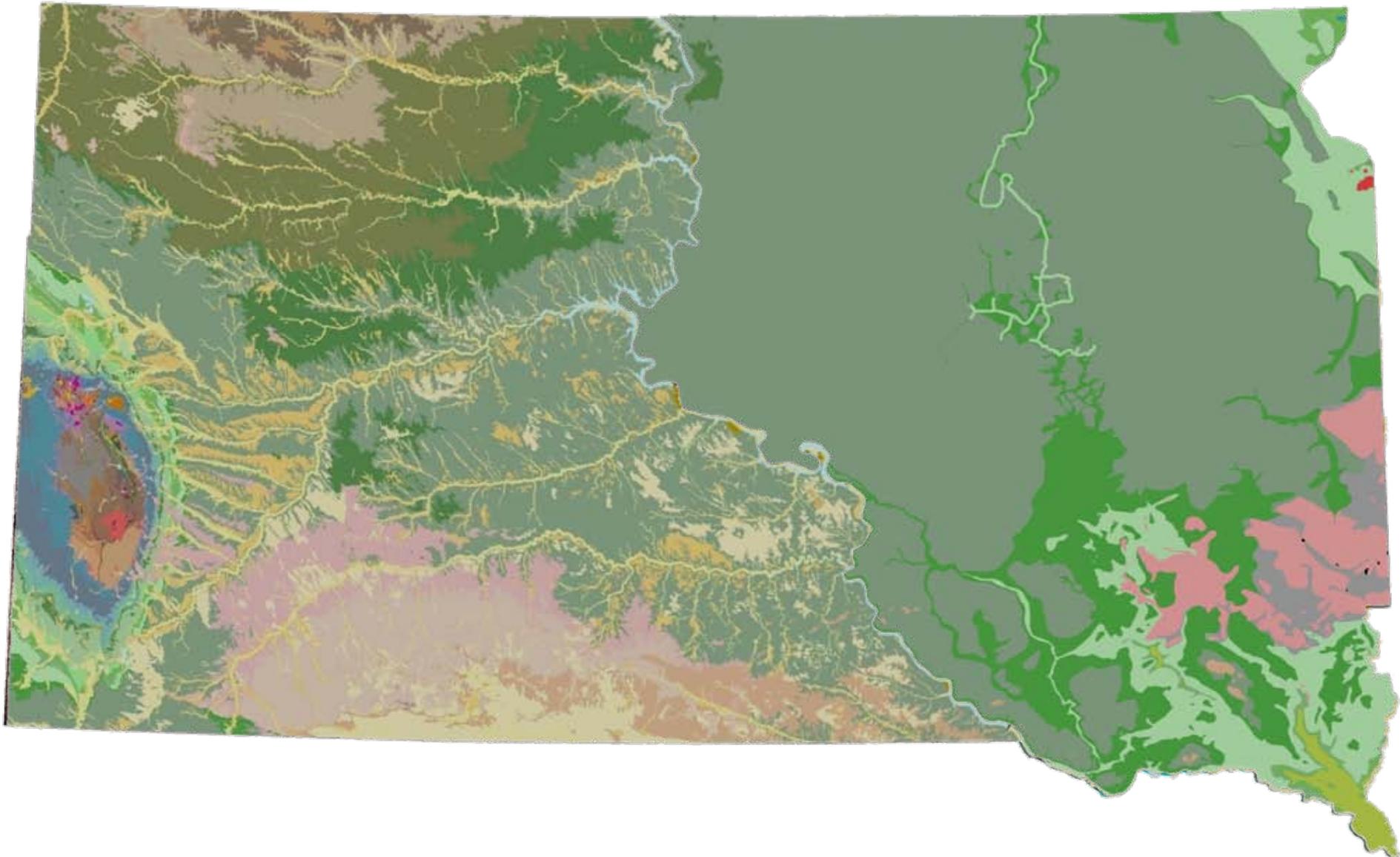
# South Dakota's Ground-Water Level and Ground-Water Quality Monitoring Networks

Presented by Derric L. Iles, South Dakota State Geologist

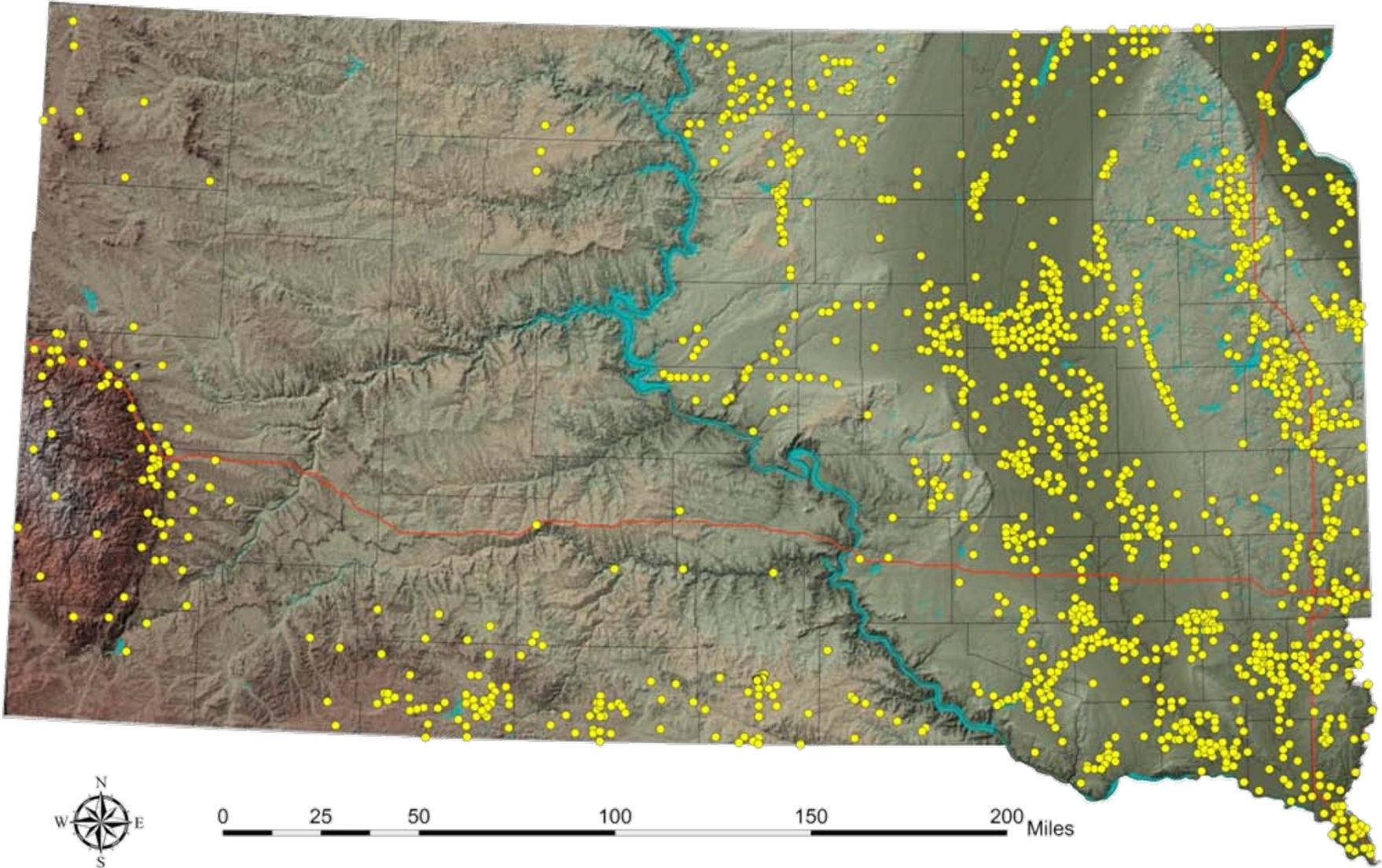


*South Dakota*  
Department of Environment  
& Natural Resources  
Geological Survey

Meeting of the Advisory Committee on Water Information  
National Water Quality Monitoring Council  
May 3-5, 2011  
New Orleans, Louisiana



# Ground-Water Level Monitoring Network



# Ground-Water Level Monitoring Network

- **~1,555 active wells**
- **15 bedrock aquifers (337 wells)**
- **89 glacial aquifers (1,218 wells)**
- **Goals of monitoring**
  - To adequately monitor significant bedrock and glacial aquifers
  - To have areal coverage within each monitored aquifer
  - To fulfill statutory requirements
- **Frequency of measurement**
  - Every 2 weeks from Spring through Fall using seasonal labor
  - Water Rights staff may collect additional measurements
  - Approximately 16,547 measurements in 2010

# Ground-Water Level Monitoring Network

- **Methods of data collection**

- Most data are collected using a hand-held well sounding apparatus
- Measurements taken to the nearest 0.1 foot
- Automatic recorders on approximately 72 wells

- **Data management**

- Water levels entered into laptop computers in the field
- Data commonly downloaded each week into a central data system

- **Data use**

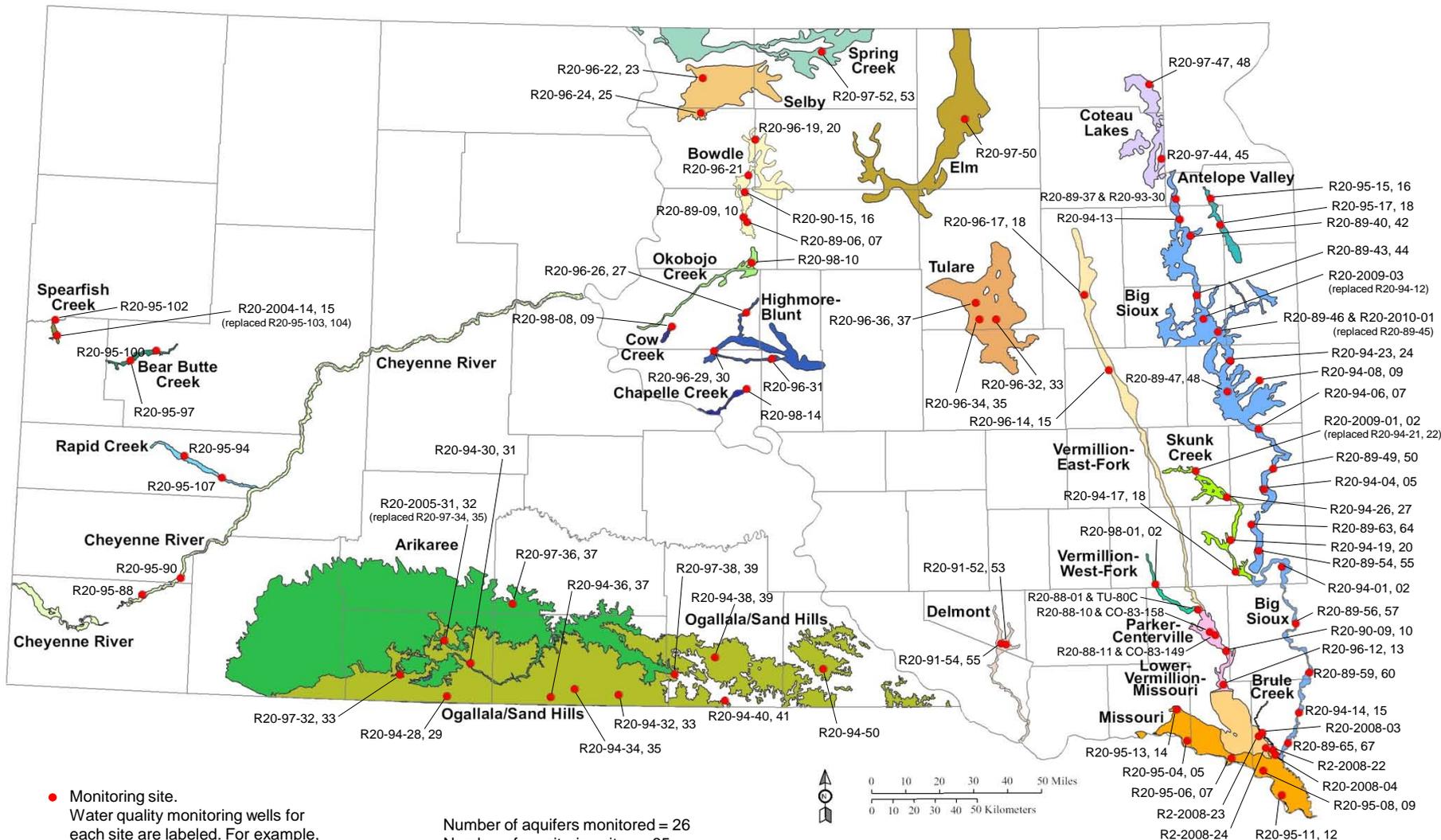
- Generation and comparison of hydrographs
- Analyses of trends and temporal influence of pumping
- Recharge; examination of ground-water use versus recharge
- Direction of ground-water movement

# Ground-Water Quality Monitoring Network



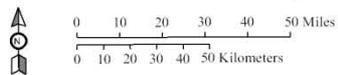
A typical monitoring site  
in eastern South Dakota

# Aquifers and Monitoring Sites in the Statewide Ground Water Quality Monitoring Network



● Monitoring site.  
 Water quality monitoring wells for each site are labeled. For example, a label of "R20-94-28, 29" indicates that wells R20-94-28 and R20-94-29 exist at that site.

Number of aquifers monitored = 26  
 Number of monitoring sites = 85  
 Number of monitoring wells = 150



# South Dakota Geological Survey's Mobile B-61 Drilling Rig



# Cross section of a nested monitoring site

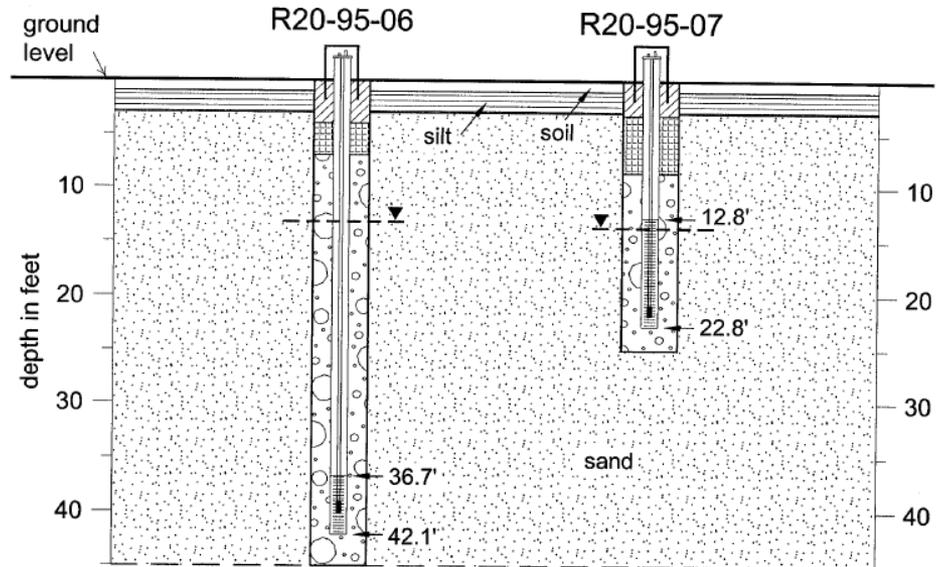
## A typical well

- Most are 4" dia.
- Some are 2" dia.



Missouri aquifer  
SE SE SE NW sec. 14, T. 32 N., R. 4 E.  
(south of Vermillion, Clay County)

W ← → E



 Neat cement

 Granular bentonite

 Native sediment (sand/gravel) and/or graded sand filter pack

 Water level on July 7, 1995

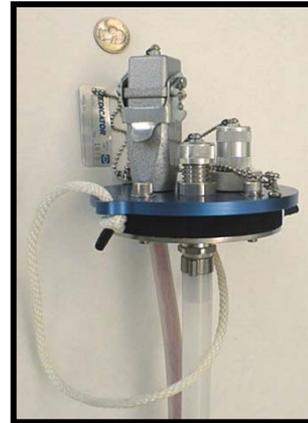


“Clean” work space in a modified van



Gasoline powered generator (220v, 110v, 12v)

Stainless steel Grundfos Redi-Flo2® pumps are dedicated to each well thereby eliminating most concerns of cross contamination and decontamination. (11½” long x 1¾” dia.)



Well seal

Grundfos Redi-Flo2® controller



### **Timing of sampling:**

Each site is sampled about the same time every year to eliminate concerns of seasonal variability

### **Water quality results available online at:**

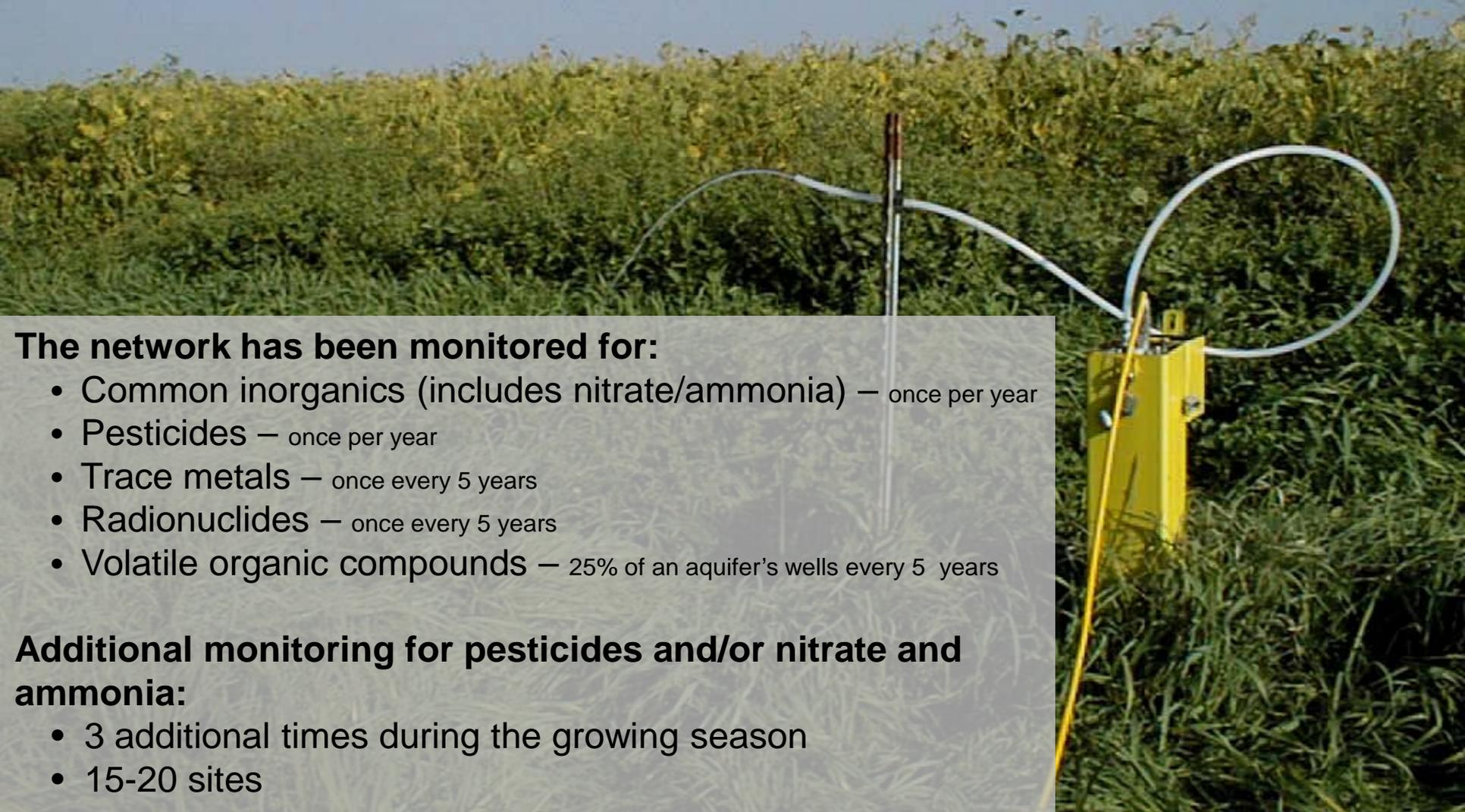
<http://www.sddenr.net/waterdb/>

### **The network has been monitored for:**

- Common inorganics (includes nitrate/ammonia) — once per year
- Pesticides — once per year
- Trace metals — once every 5 years
- Radionuclides — once every 5 years
- Volatile organic compounds — 25% of an aquifer's wells every 5 years

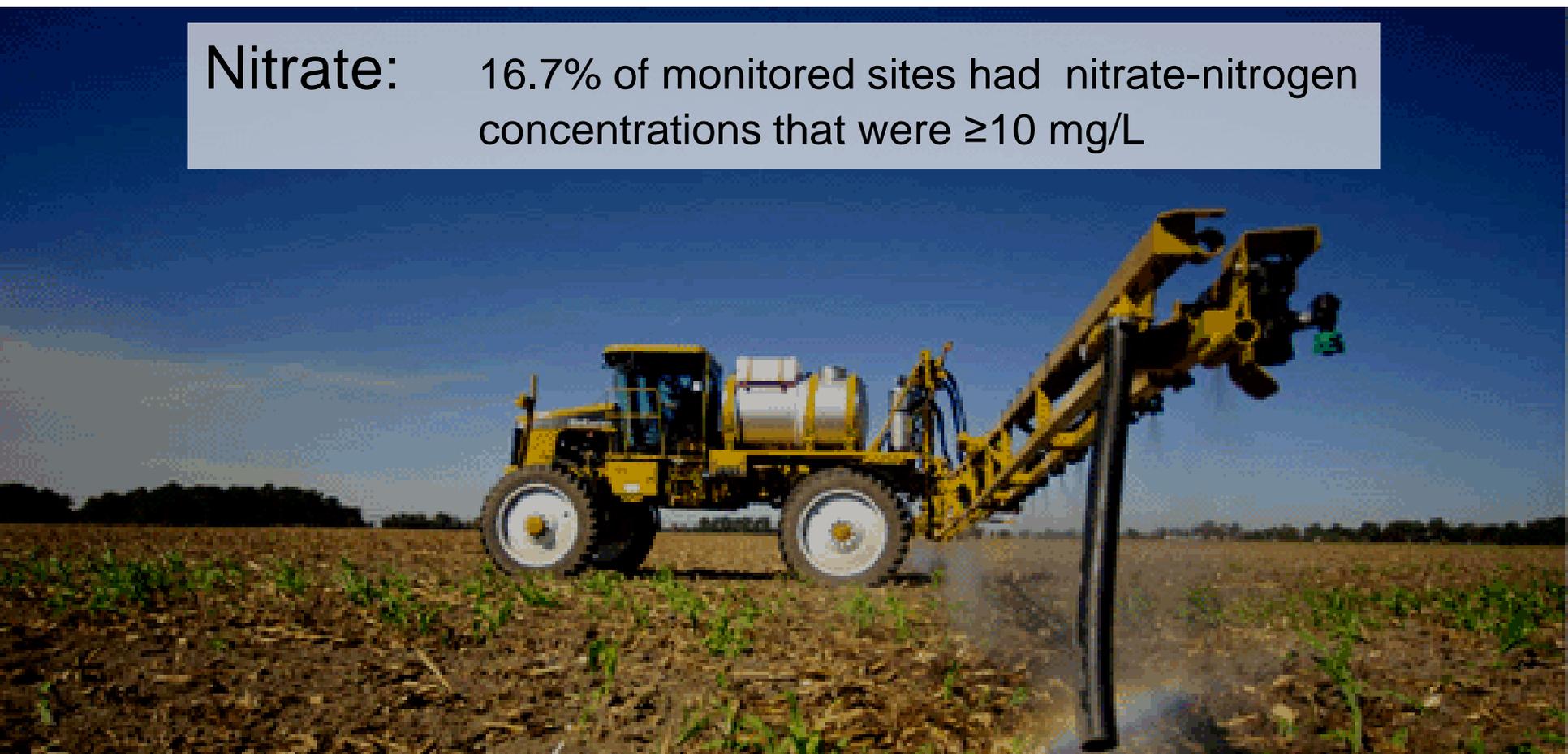
### **Additional monitoring for pesticides and/or nitrate and ammonia:**

- 3 additional times during the growing season
- 15-20 sites



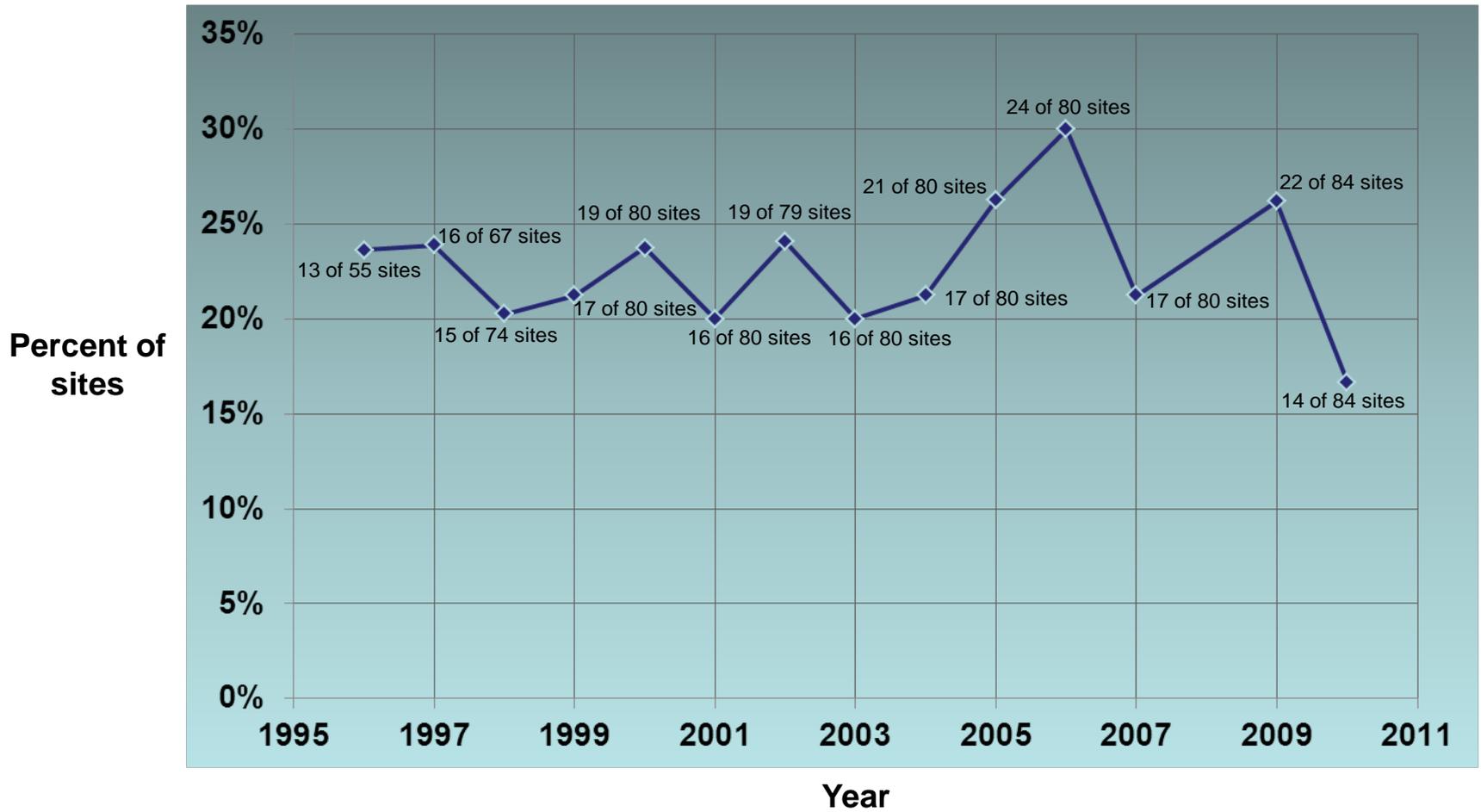
# 2010 sampling results

**Nitrate:** 16.7% of monitored sites had nitrate-nitrogen concentrations that were  $\geq 10$  mg/L

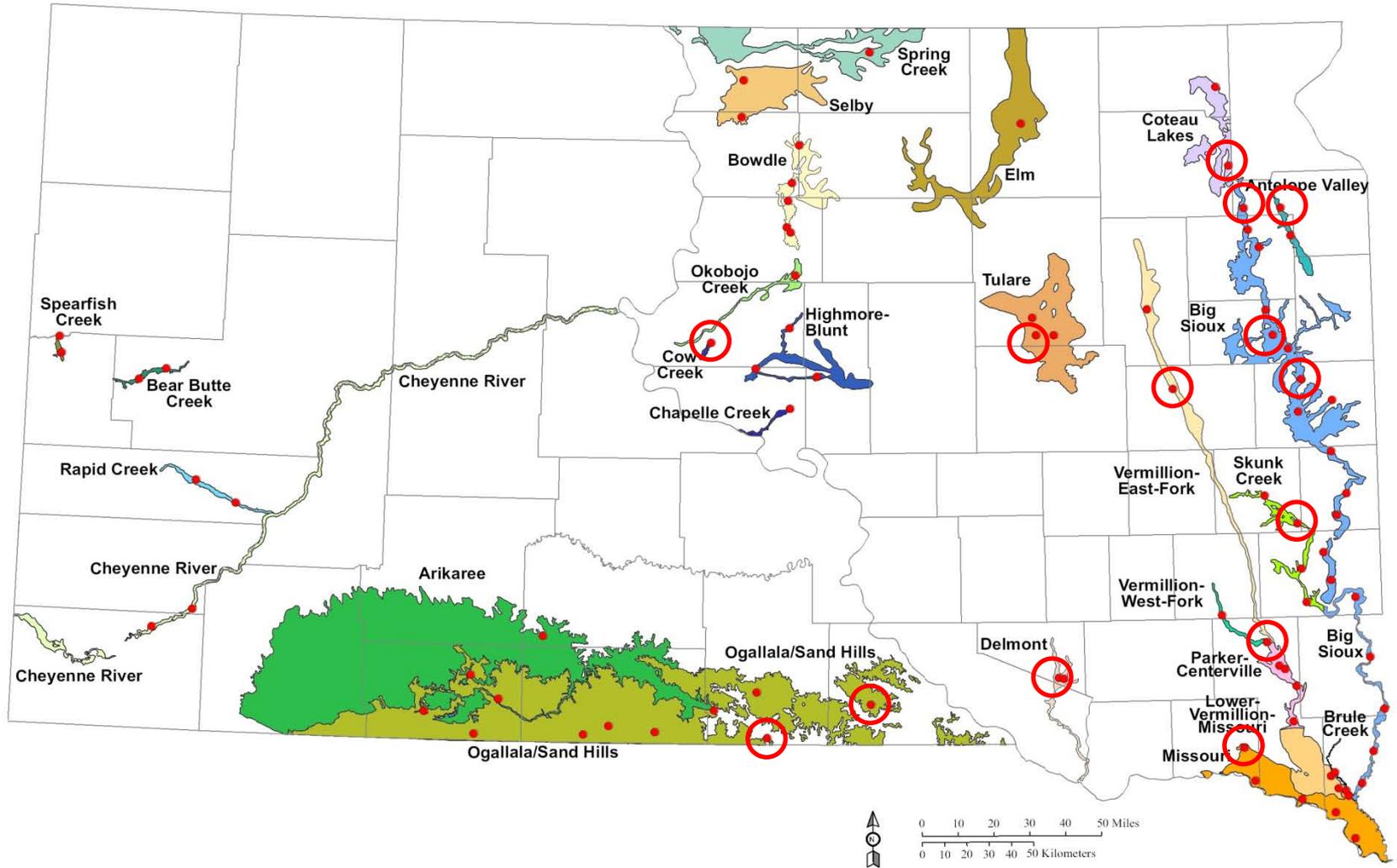


**Pesticides:** detected at 10.7% of the monitored sites but none above a drinking water or health advisory standard

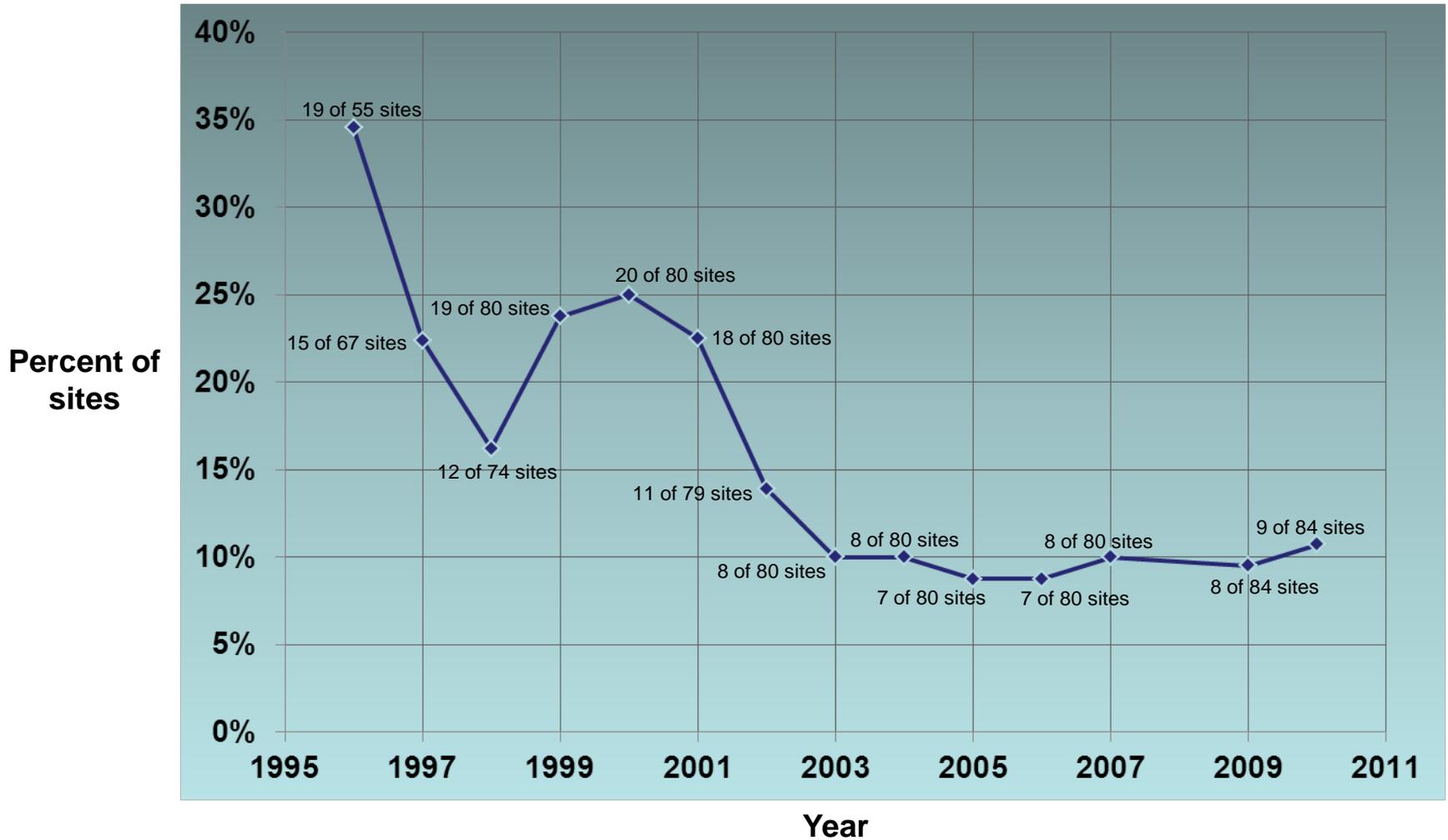
# Percent of monitoring sites in 2010 with concentrations of nitrate+nitrite as nitrogen $\geq 10$ mg/L



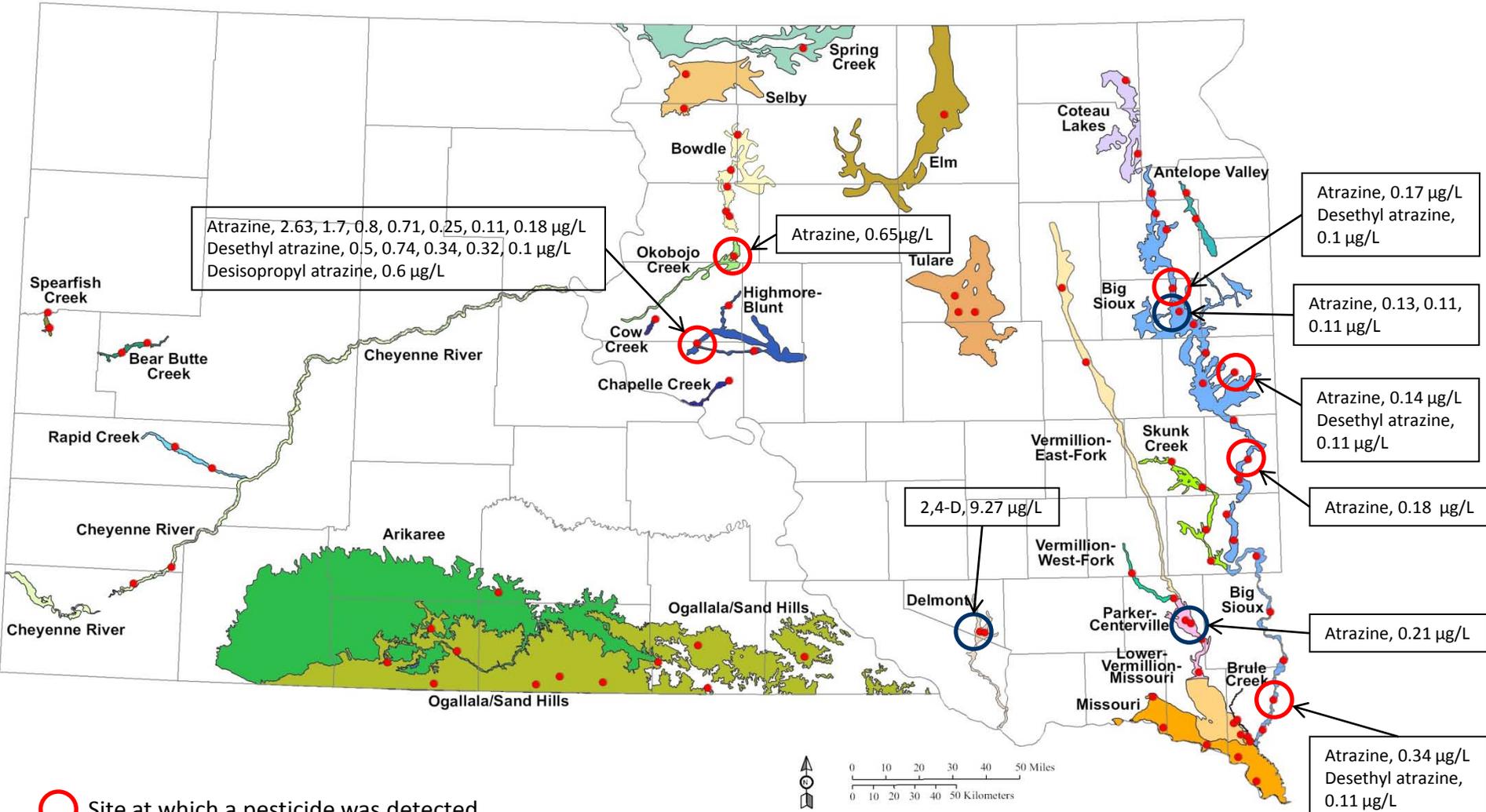
# Monitoring sites at which nitrate+nitrite as nitrogen was $\geq 10$ mg/L in 2010



## Percent of monitoring sites in 2010 with detectable pesticides



# Monitoring sites at which a pesticide was detected in 2010



Atrazine: standard = 3  $\mu\text{g/L}$   
 Desethyl atrazine: no standard or health advisory level  
 Desisopropyl atrazine: no standard or health advisory level  
 2,4-D: standard = 70  $\mu\text{g/L}$

# Questions?



[www.sdgs.usd.edu](http://www.sdgs.usd.edu)