Nitrate in Idaho's Ground Water – Statewide Program Overview and Canyon County

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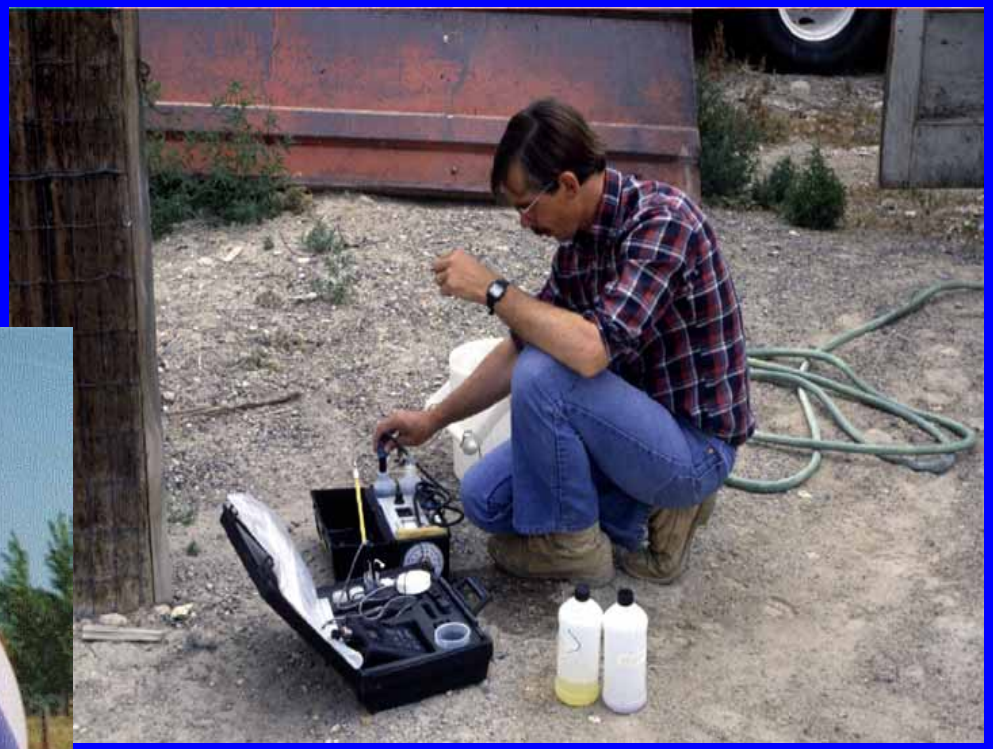
Main Points

- Statewide Program
- Canyon Nitrate Occurrences
- Canyon Nitrate Trends

Ground Water Quality Monitoring is a 3-part program in Idaho

- Statewide
- Regional



- Local

1. Statewide Program Overview

Objectives

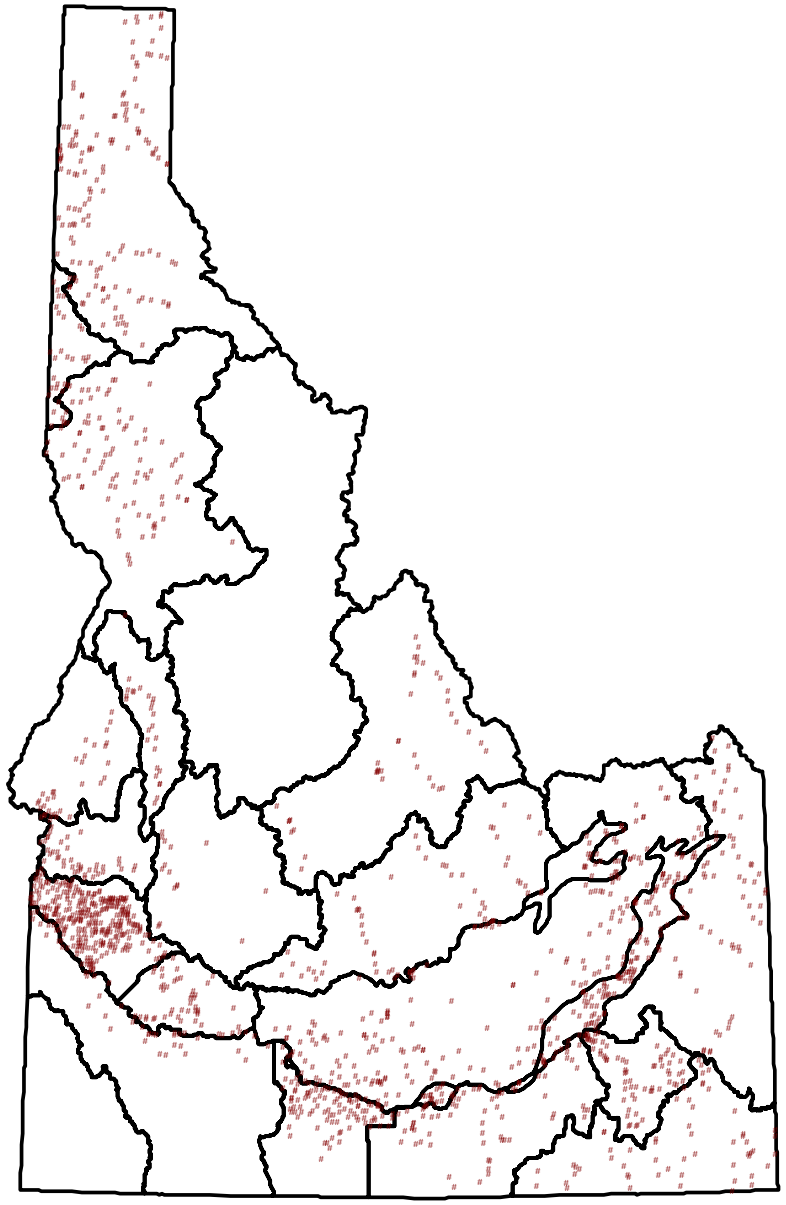
- Characterization
- Trend Analyses
- Identify Potential Problems

20 subareas

Stratified random sampling

Data from about 1,900 monitoring Sites

~1,600 Active Sites



Program Development

- First Round (1991 - 94)
- Second Round (1995 - 98)
- Third Round (1999 – 2003)
- Fourth Round to start in 2004
- Annual Sites since 1995
- Most sites on 5 year rotation

Constituents Monitored

Field parameters

Common Ions

Nutrients/Bacteria

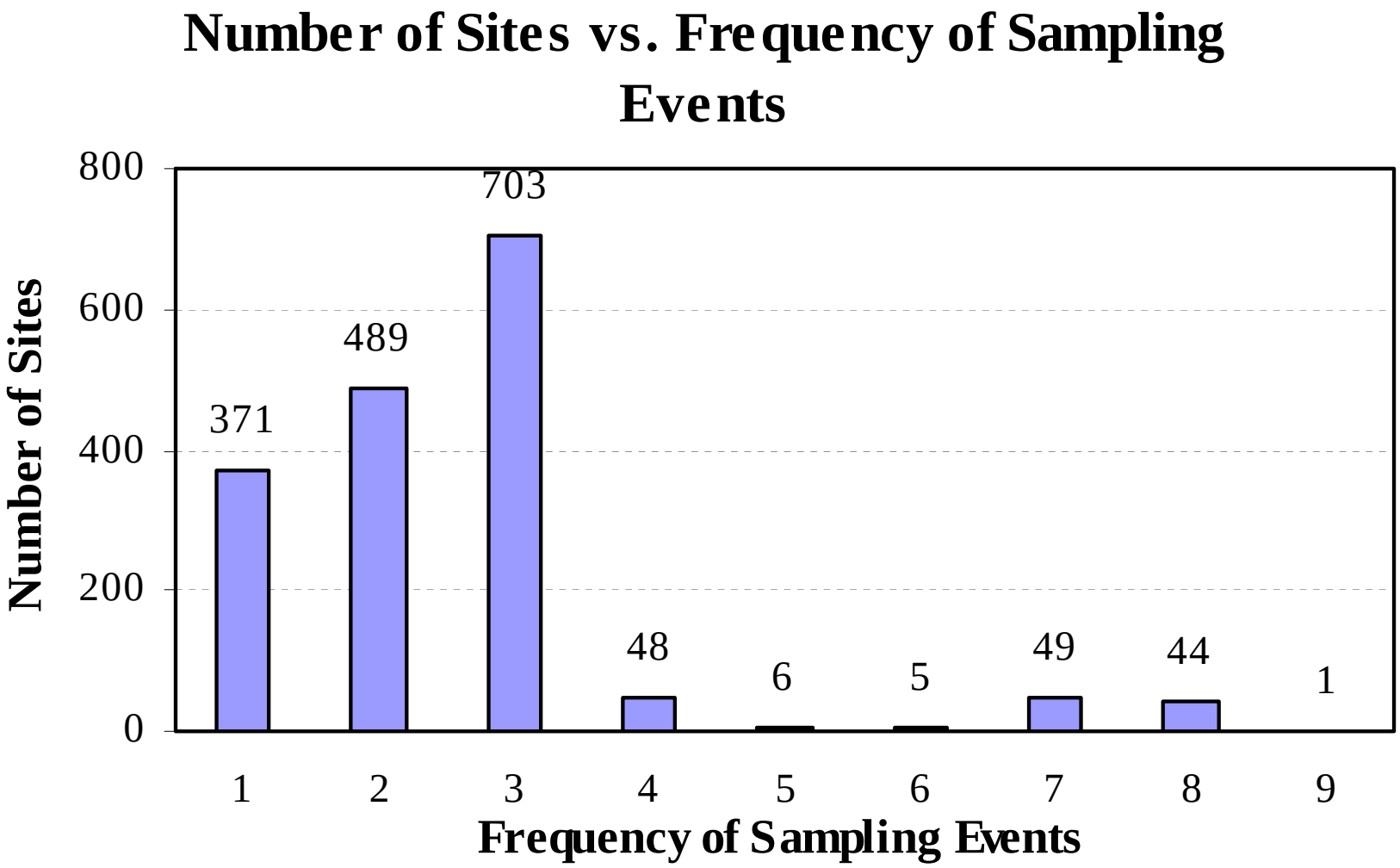
Trace Elements

Radioactivity

VOCs

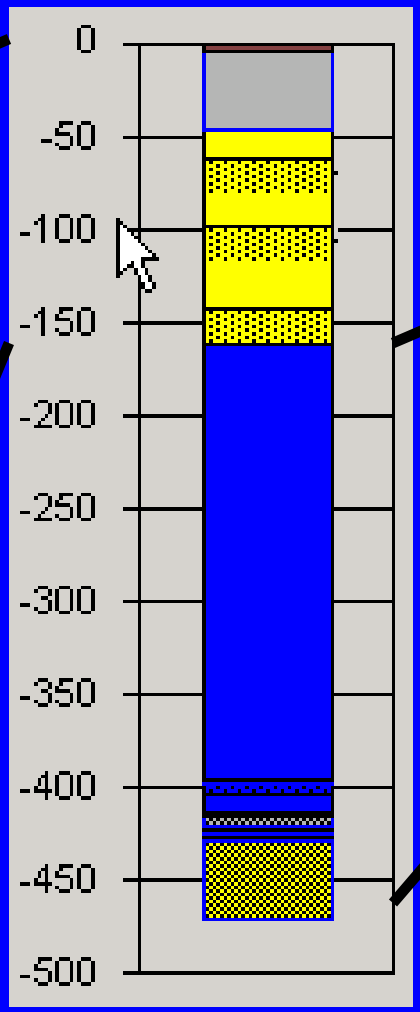
Pesticides

of Samples/Sites



Treasure Valley Hydrogeology

Snake River Group

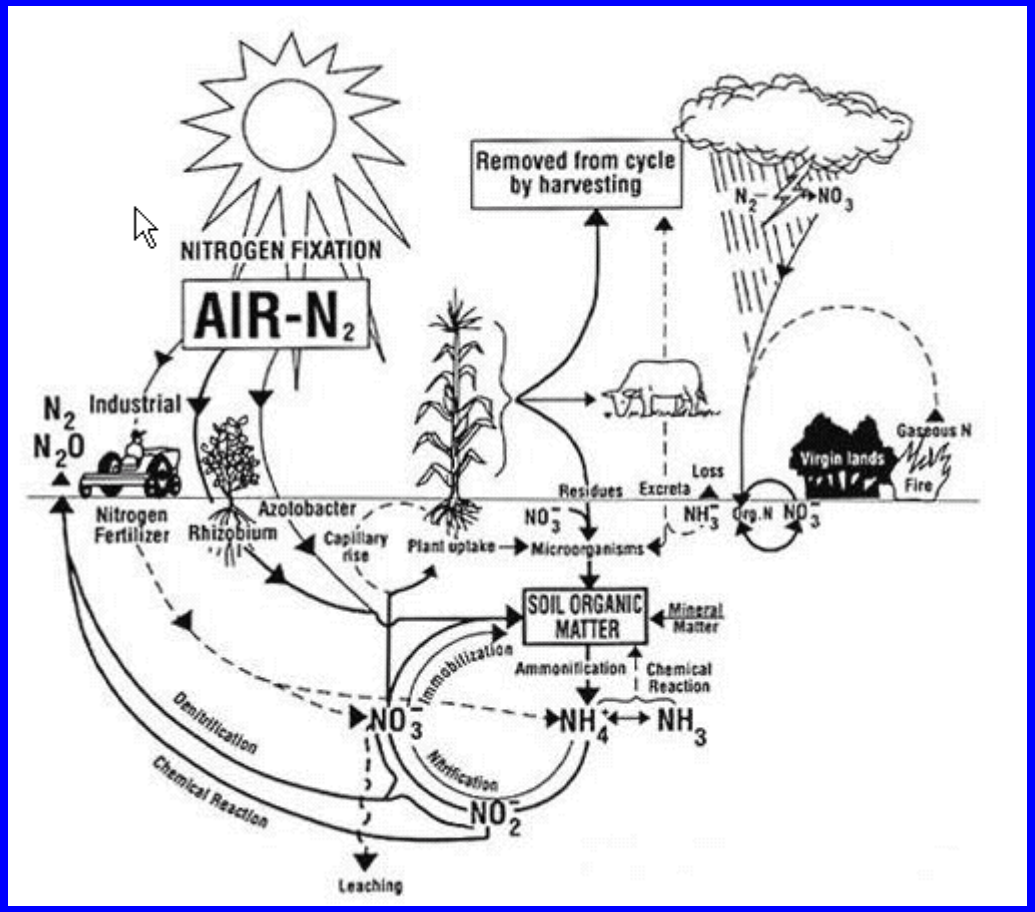


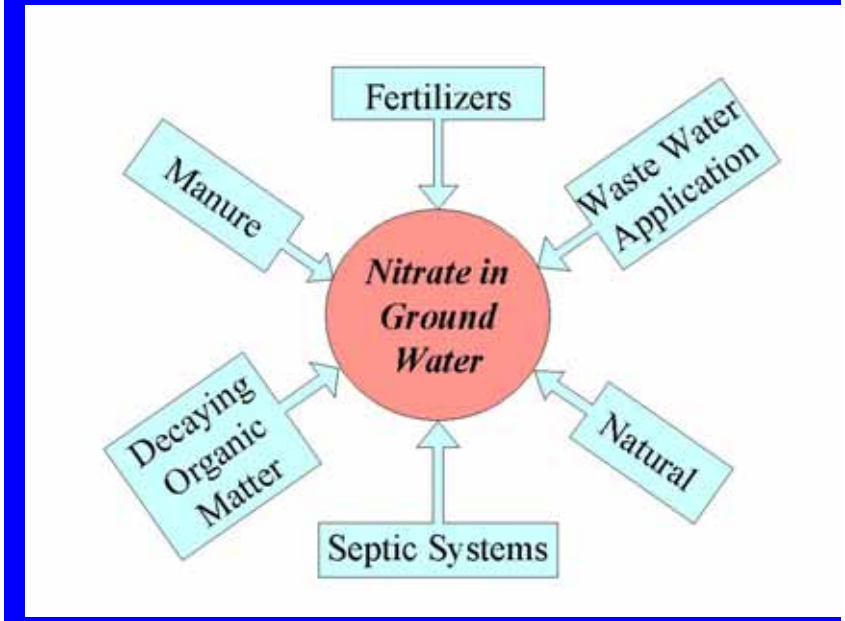
Idaho Group

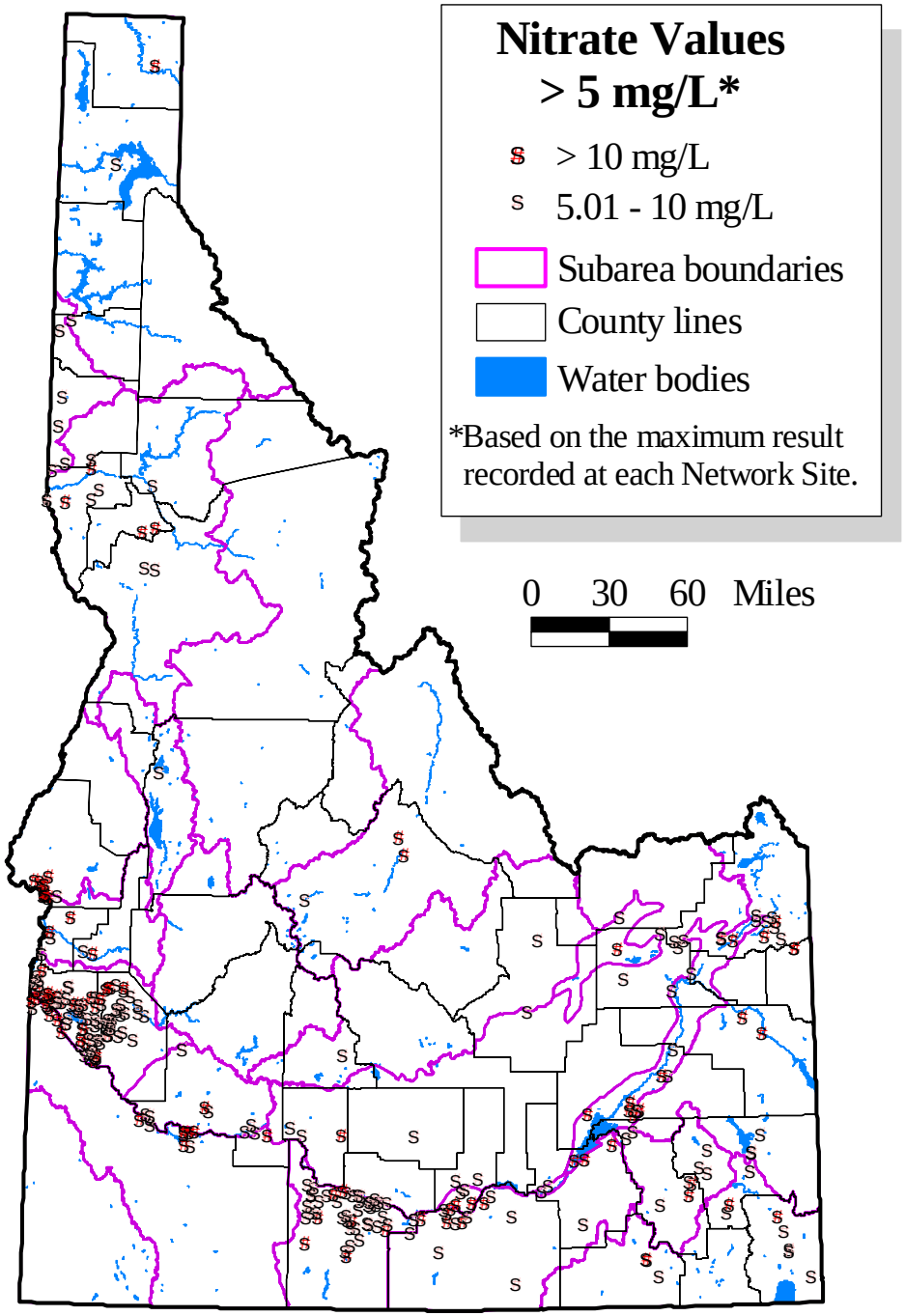
Canyon County has lots of wells

Canyon County has a long history of farming.

Nitrates


NITROGEN FIXATION
AIR-N_2
Removed from cycle by harvesting
N_2
NO_3
N_2
N_2O
Industrial
Nitrogen Fertilizer
Rhizobium
Azolobacter
Capillary rise
Plant uptake
Microorganisms
Residues
Excreta
Loss
NO_3^-
NH_3^-
Org.N
NO_3^-
Virgin lands
Fire
Gaseous N
SOIL ORGANIC MATTER
Mineral Matter
Immobilization
Ammonification
Chemical Reaction
NO_3^-
NH_4^+
NH_3
Nitrification
NO_2^-
Denitrification
Chemical Reaction
Leaching


Fertilizers
Manure
Waste Water Application
Nitrate in Ground Water
Decaying Organic Matter
Natural
Septic Systems

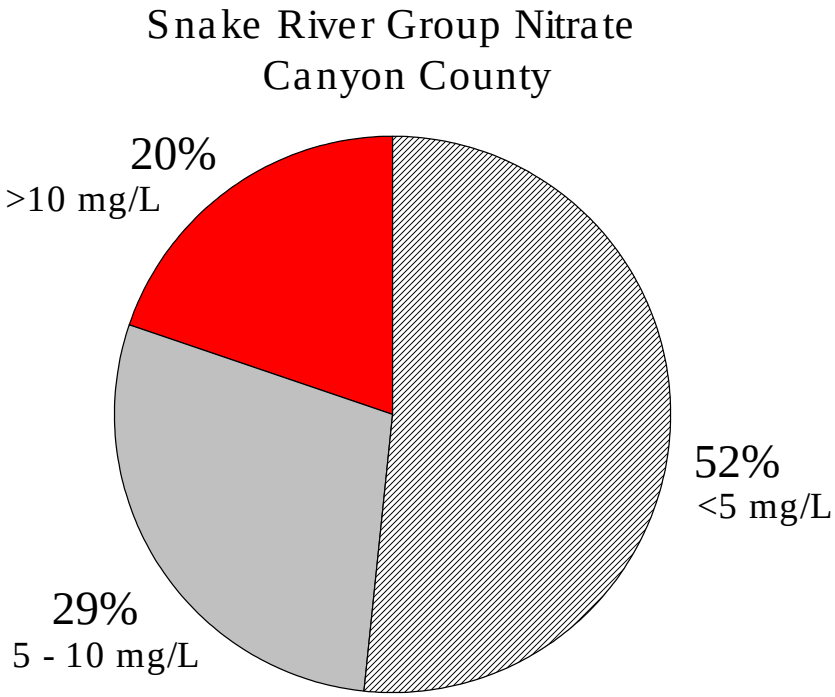

Nitrate Values
> 5 mg/L*
> 10 mg/L
5.01 - 10 mg/L
Subarea boundaries
County lines
Water bodies
*Based on the maximum result recorded at each Network Site.
0 30 60 Miles

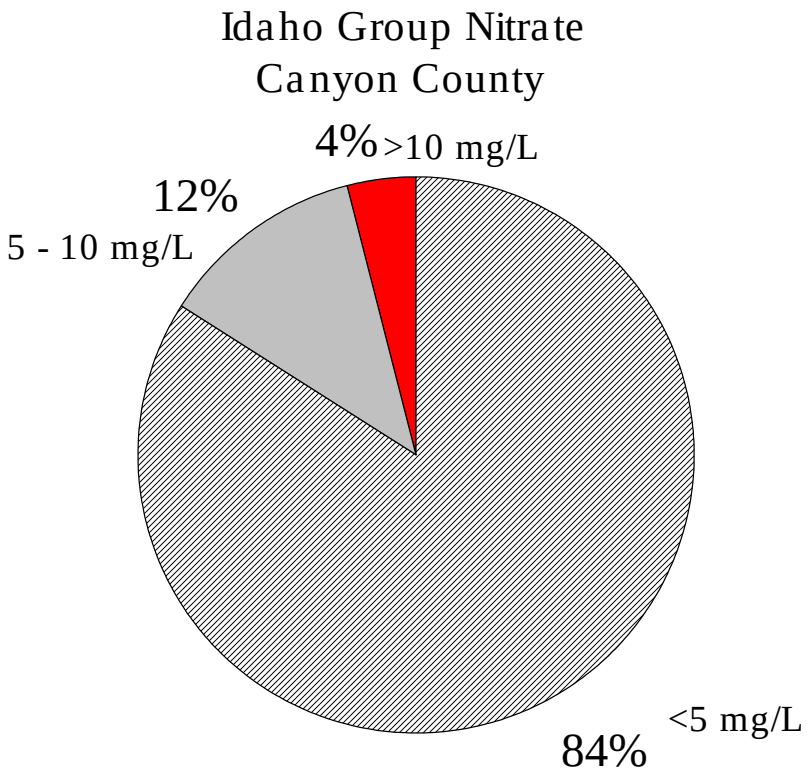
Canyon N03 Statistics

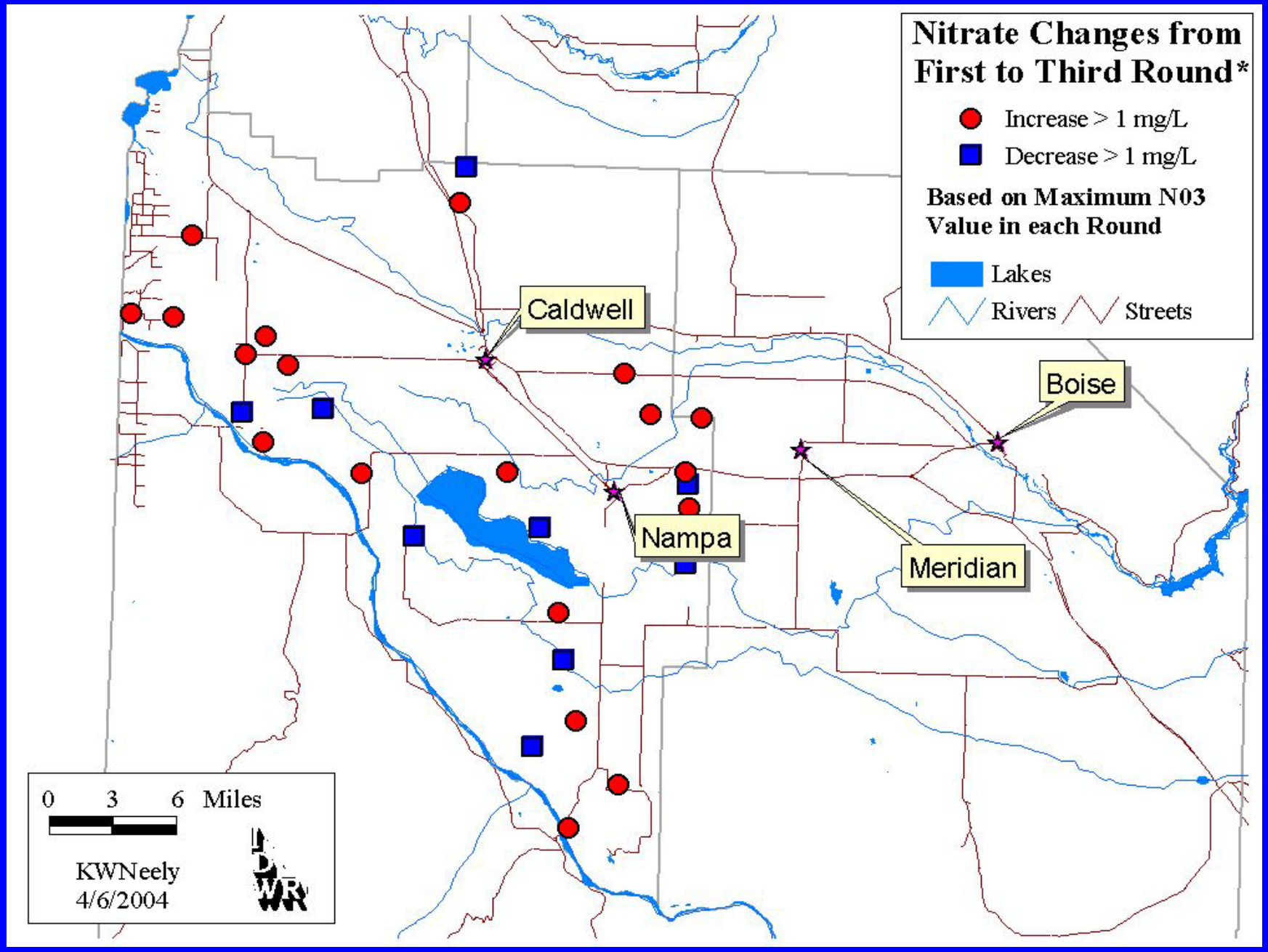
Aquifer Type	# of Wells	Minimum	Maximum	Mean	Median
Snake River Group Wells	91	<0.05 mg/L	29.8 mg/L	6.3 mg/L	4.8 mg/L
Idaho Group Wells	75	<0.05 mg/L	21 mg/L	2.3 mg/L	0.6 mg/L

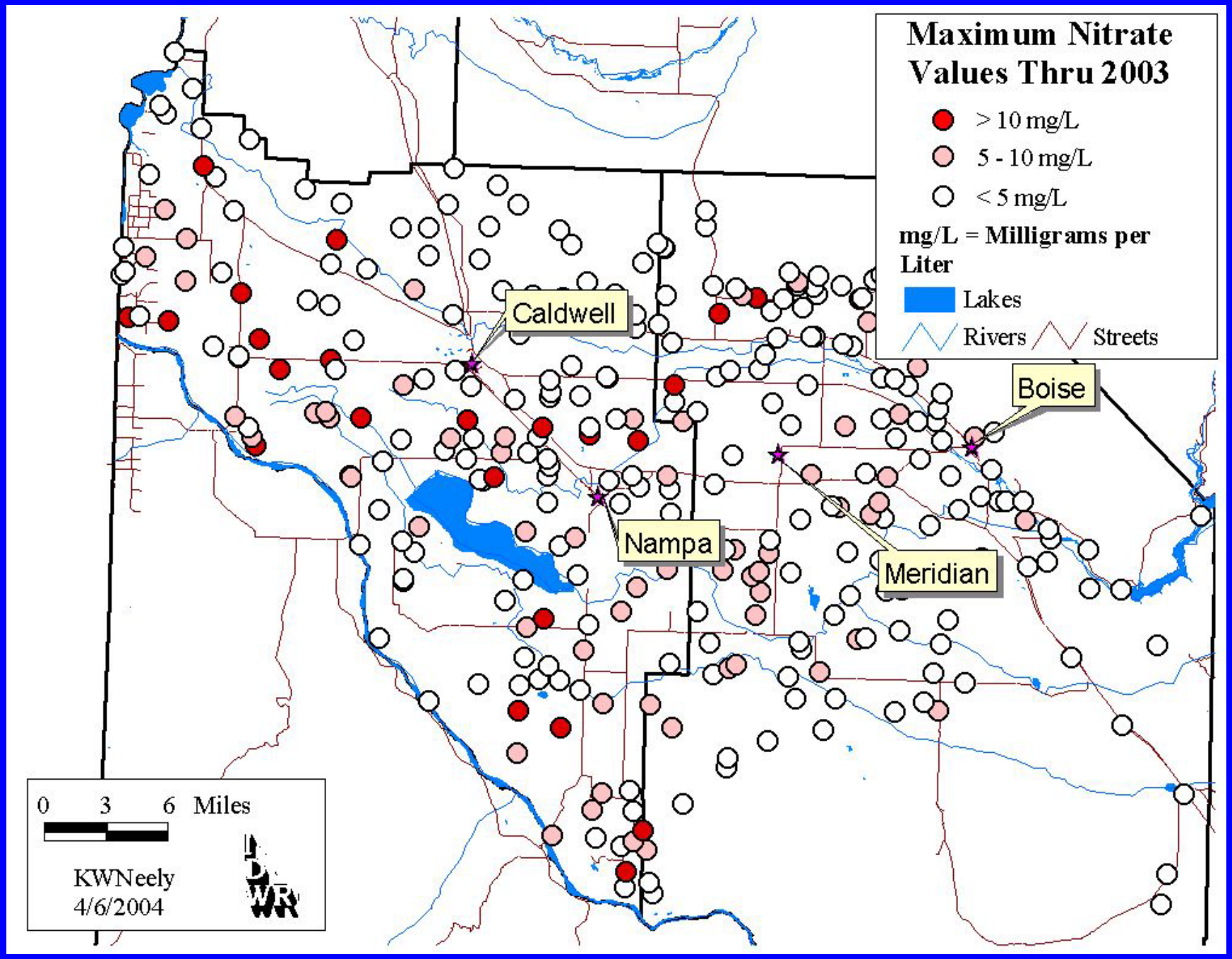
Based on the maximum nitrate value at each site.

Maximum N03 Values





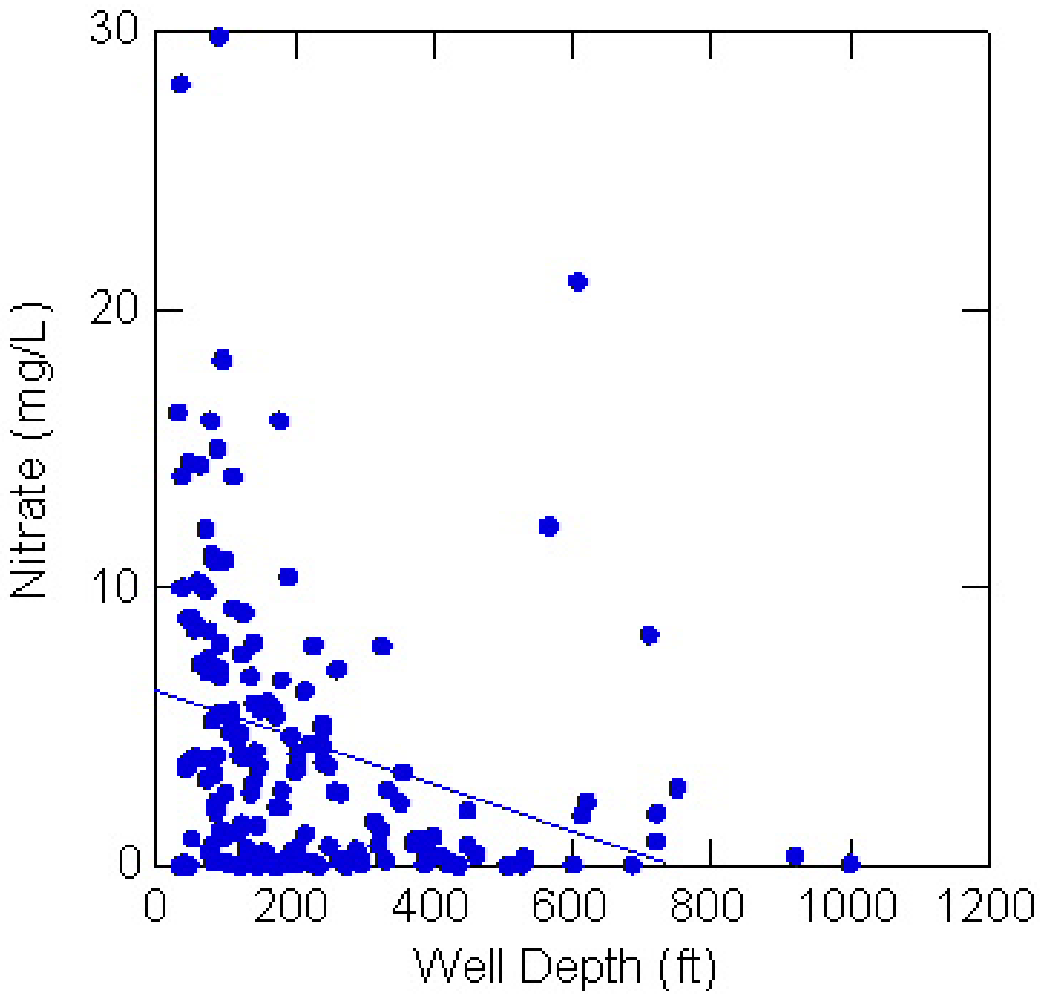

Nitrate Changes from First to Third Round*
Increase > 1 mg/L
Decrease > 1 mg/L
Based on Maximum N03 Value in each Round
Lakes
Rivers
Streets
Caldwell
Boise
Nampa
Meridian
0 3 6 Miles
KWNeely
4/6/2004


Maximum Nitrate Values Thru 2003
> 10 mg/L
5 - 10 mg/L
< 5 mg/L
mg/L = Milligrams per Liter
Lakes
Rivers
Streets
Caldwell
Nampa
Meridian
Boise
0 3 6 Miles
KWNeely
4/6/2004
IDWR

Relationships and Trend Analyses

- **Depth vs. concentration**
- **Concentration change over time throughout the area or at specific sites.**
- **Models**

Ada and Canyon N03 vs. Well Depth



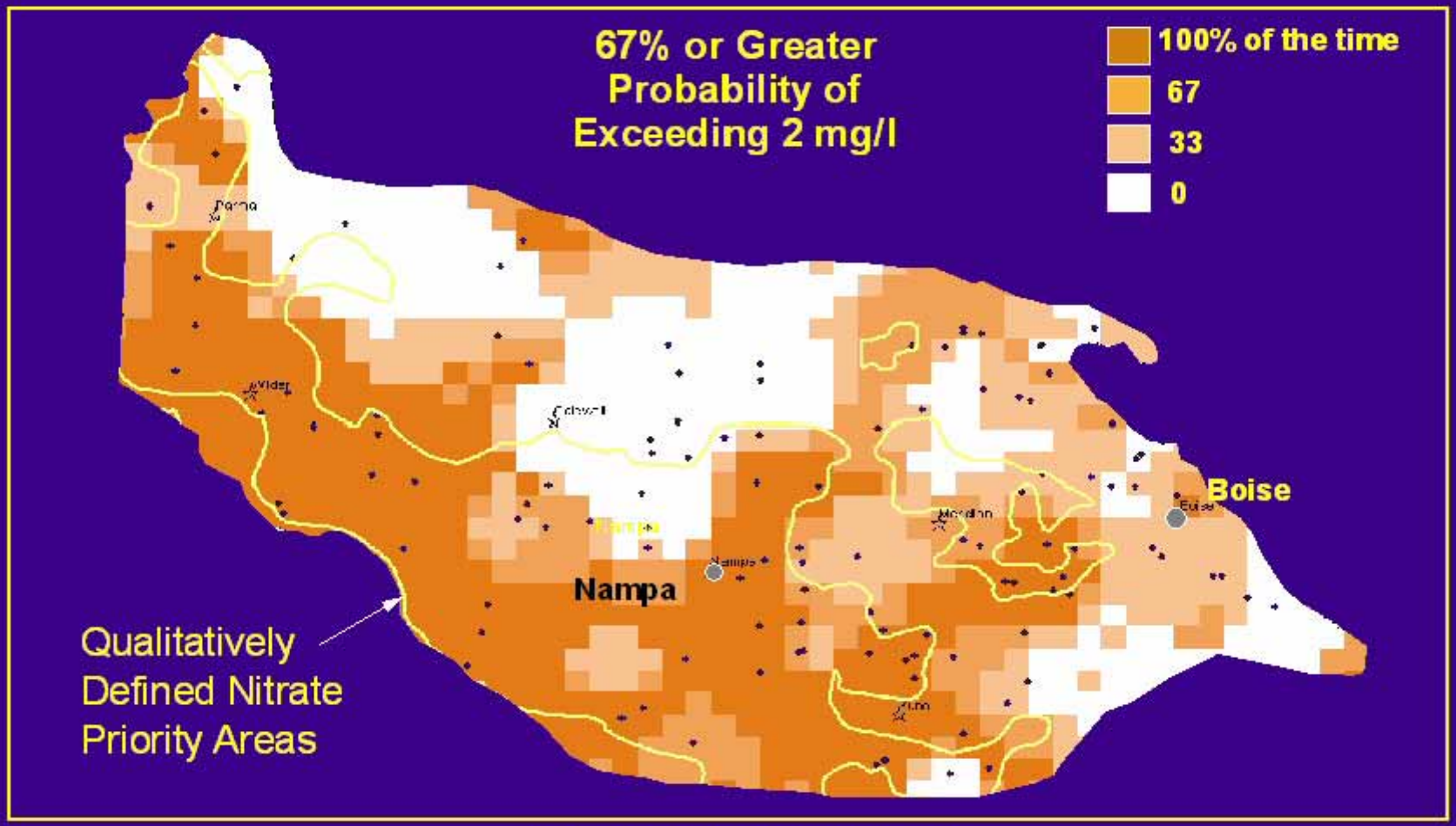
Changes in N03 Values from First to Third Rounds

For wells in Ada and Canyon Counties. Based on the maximum value at each well in each round.

Aquifer Type	# of Wells	Range of Changes	Increase > 1 mg/L	Decrease > 1 mg/L
Snake River Group Wells	86	-6.7 to 13.6 mg/L	35 (41%)	6 (7%)
Idaho Group Wells	87	-7.1 to 7 mg/L	5 (6%)	4 (5%)

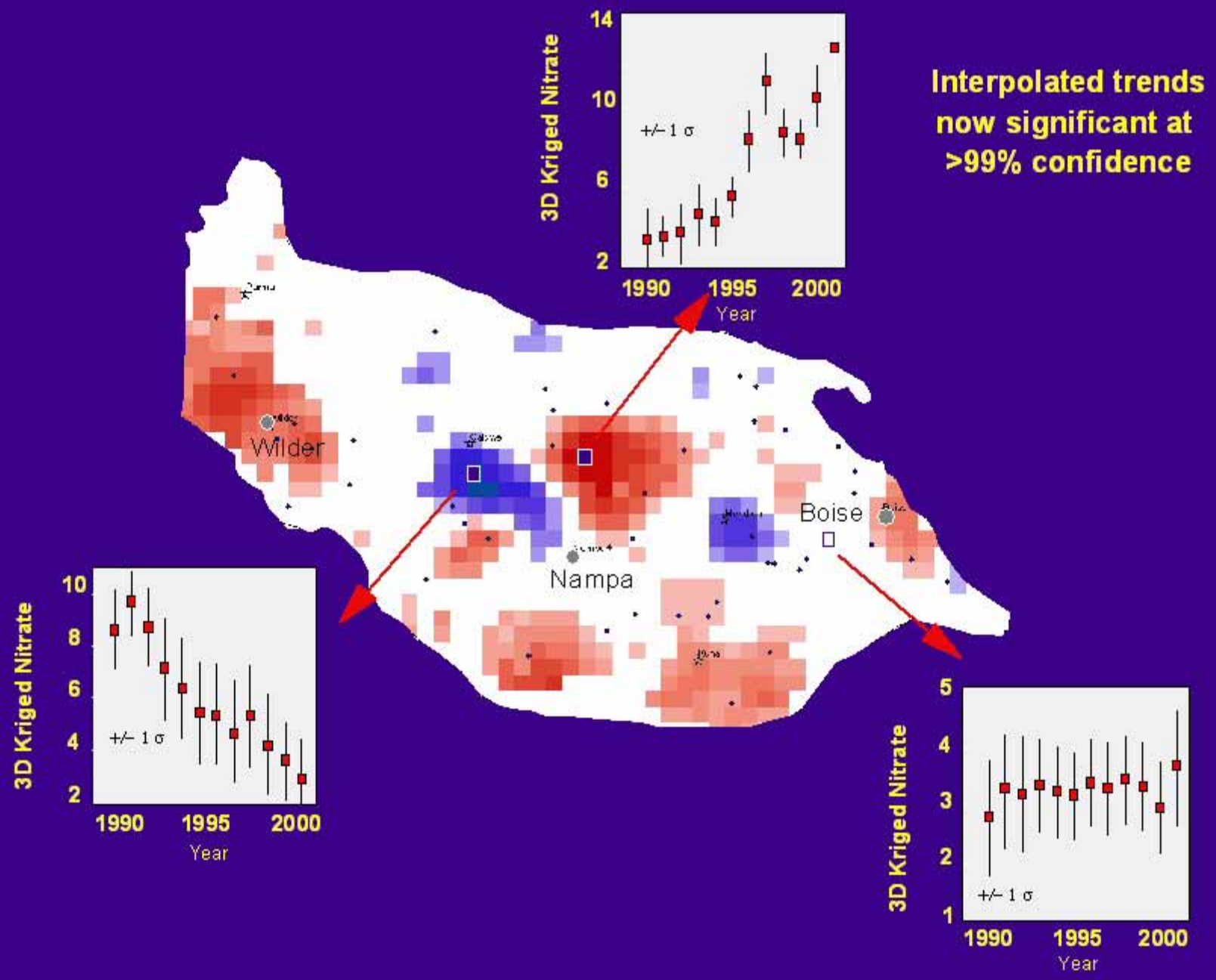
Results from a recent Kriging study done by Dr. John Welhan.

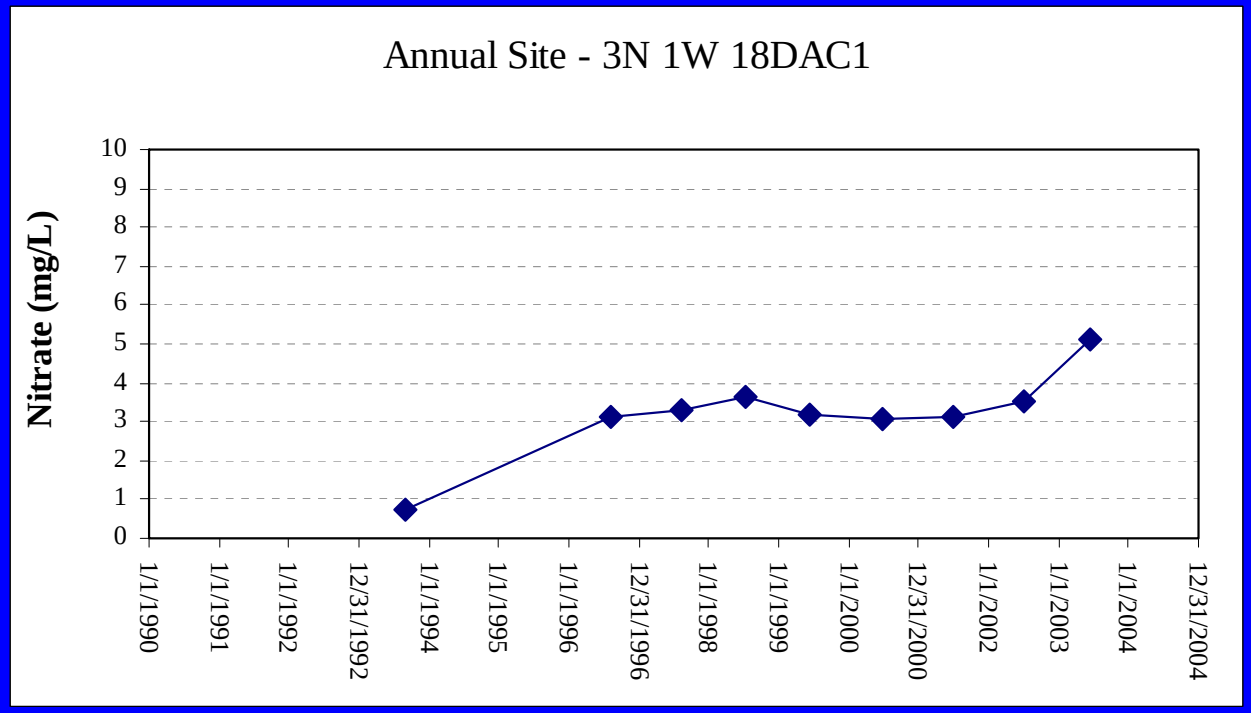
Areas of Chronic Exceedance Over Three Periods



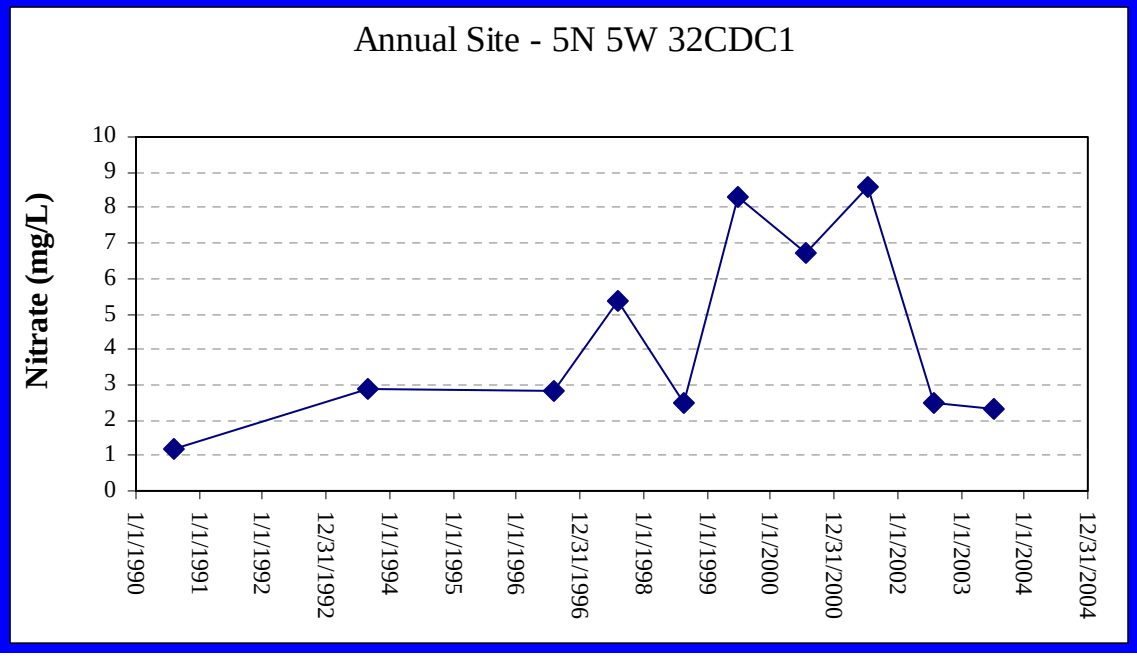
Calculated from Composited Data
1990-93; 1994-97; 1998-01

Results from a recent Kriging study done by Dr. John Welhan.





Results from two Annual Statewide Program sites



Pesticides

Pesticide detections are common, but concentrations are below drinking water standards in most wells

Contact

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- website
http://www.idwr.state.id.us/hydrologic/info/statewide/