

# Importance of streamflow and land use in understanding trends in water quality associated with agricultural management practices



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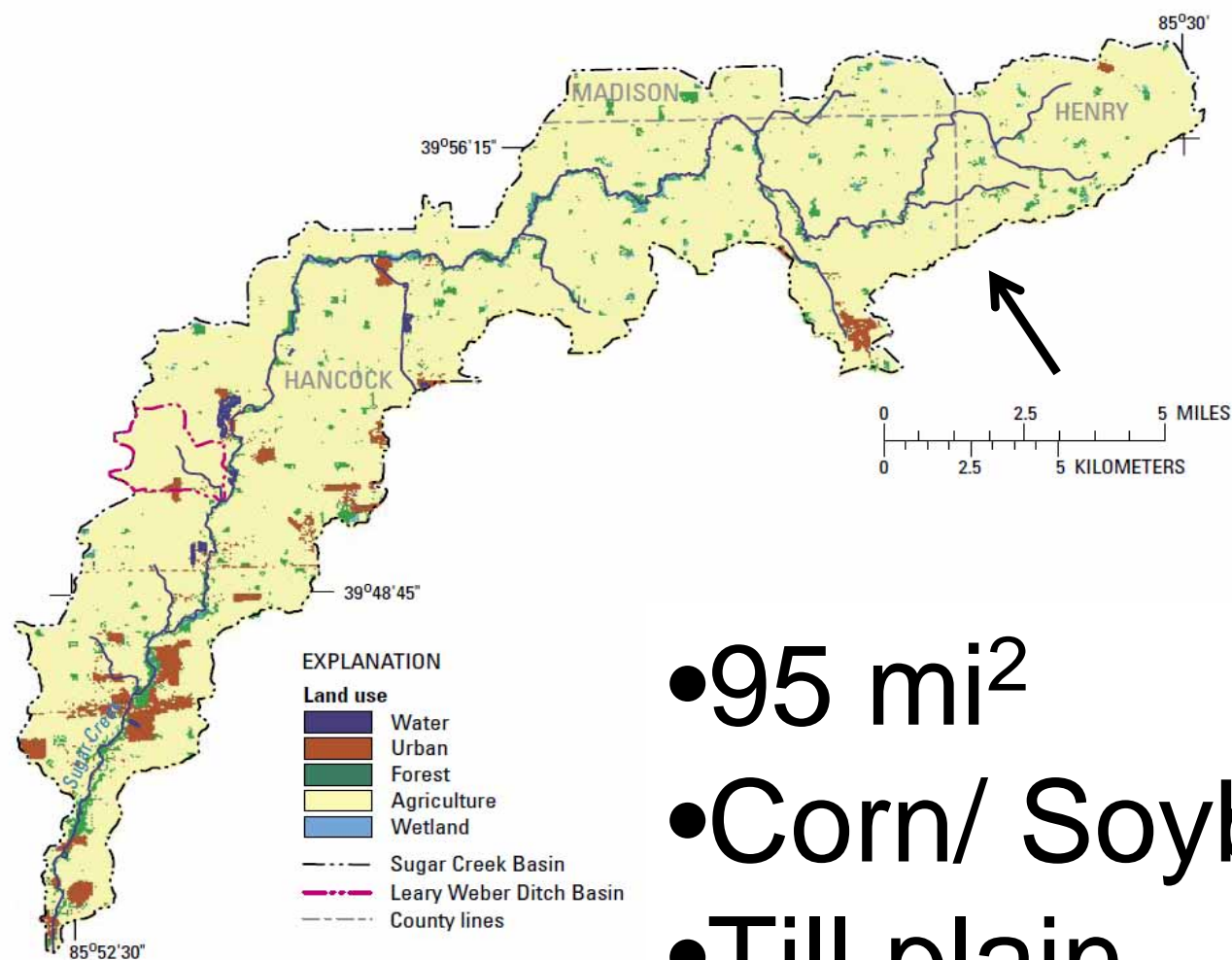


# Main Talking Points

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- Understand the hydrology
- Use the AMPs that will best show trends
- Account for the streamflow
- Conflicting pressures can hide trends
- Long-term data sets with sufficient data improve the ability to detect trends

# Sugar Creek is a Heavily Agricultural Basin



- 95 mi<sup>2</sup>
- Corn/ Soybeans
- Till plain
- Heavily tiled

# Sugar Creek Has Been Extensively Studied Since 1992 (16 years)

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- Streamflow monitored since 1967
- Nutrients (1992-2008) – 328 samples
- Sediment (1992-2008) – 299 samples
- Pesticides (1992-2008) – ~300 samples
- Ecological community sampling – 11 years
  - Algae, fish, invertebrates
  - Habitat



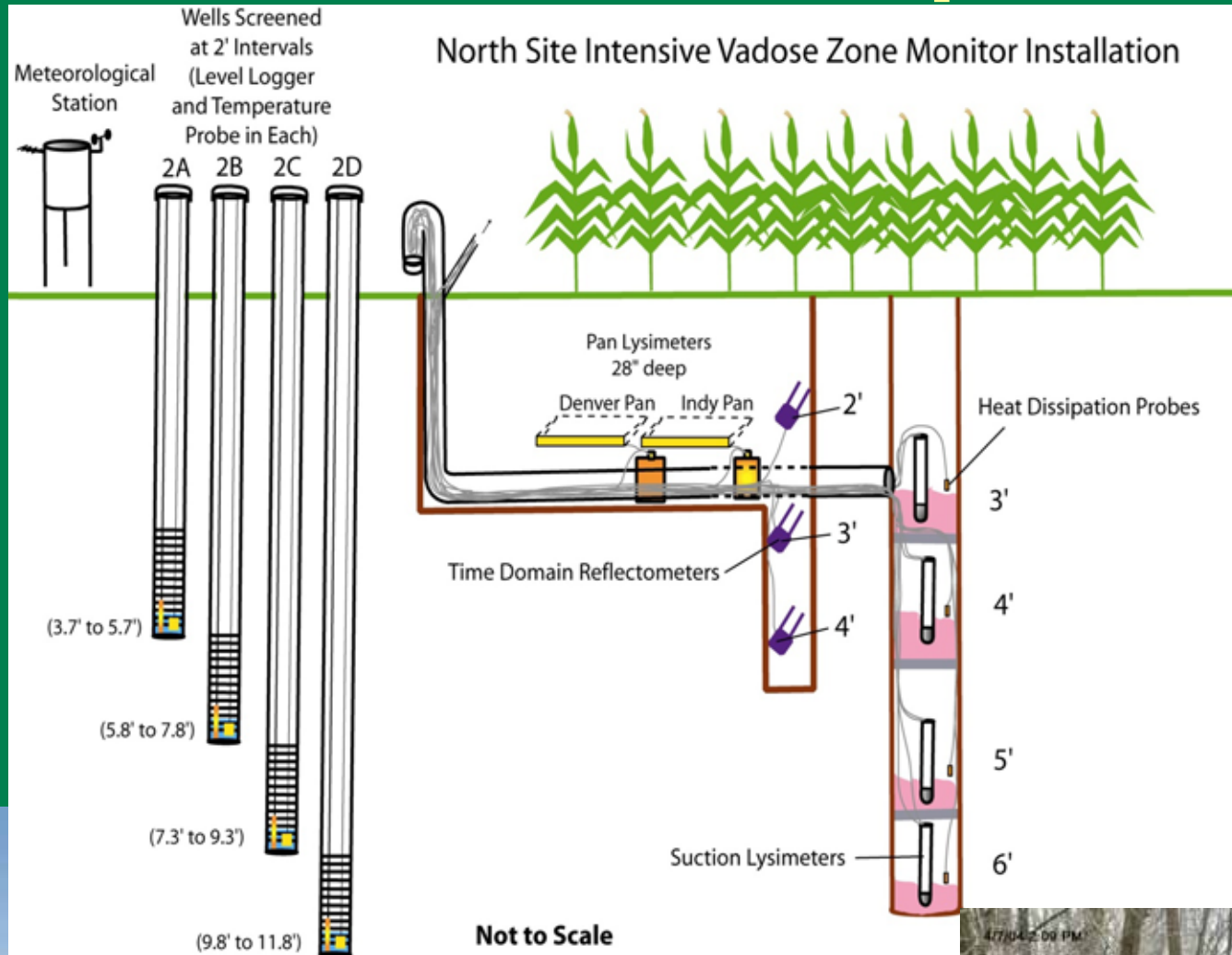
# Transport and fate of agricultural chemicals in Leary Weber Ditch



Sugar Creek Watershed



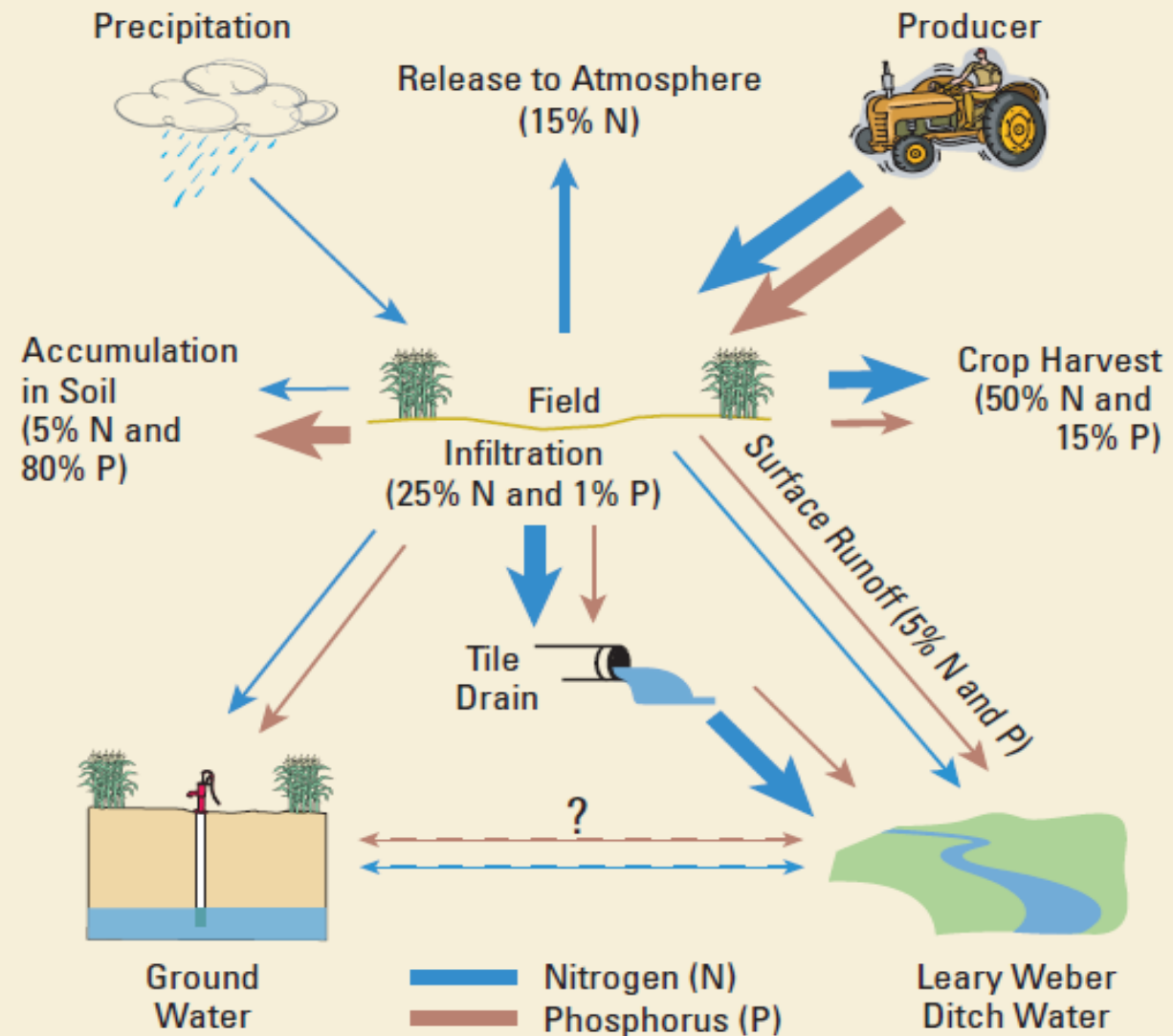
# Ground Water and Precipitation



# Overland Flow

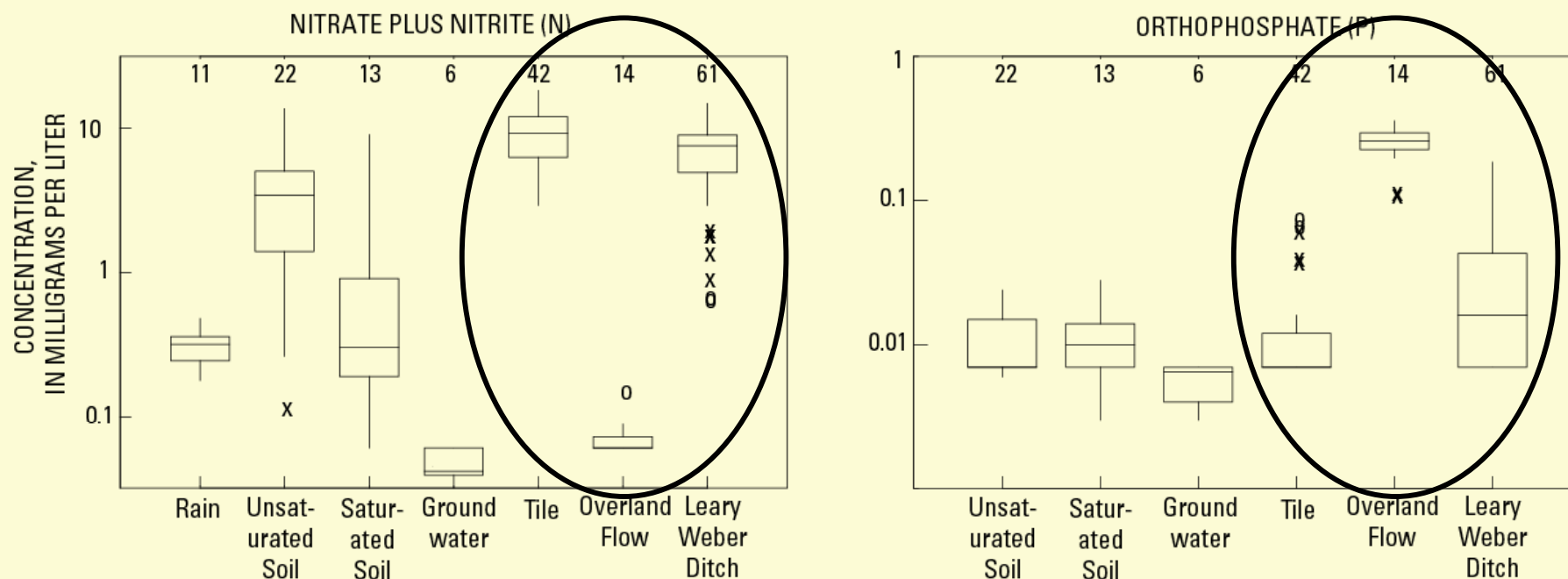


# Tile Drain



**Figure 3.** Nutrient transport pathways in Leary Weber Ditch Watershed, Hancock County, Ind. Numbers in parenthesis are approximate transport amounts for a typical rain-fed watershed (Schnepf and Cox, 2006). Arrow is dashed and queried where pathway is uncertain.

# How Do Nutrients Get Into Streams?



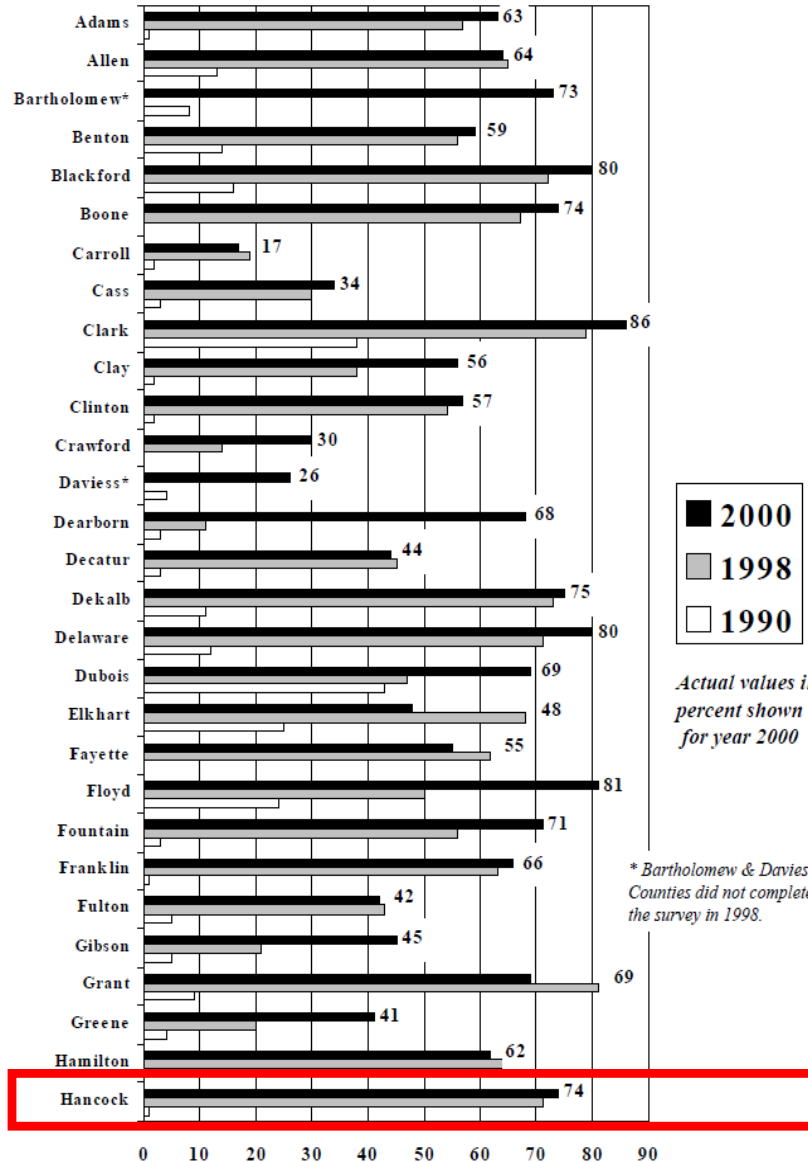
EXPLANATION

- upper adjacent
- 75th percentile
- median
- 25th percentile
- lower adjacent

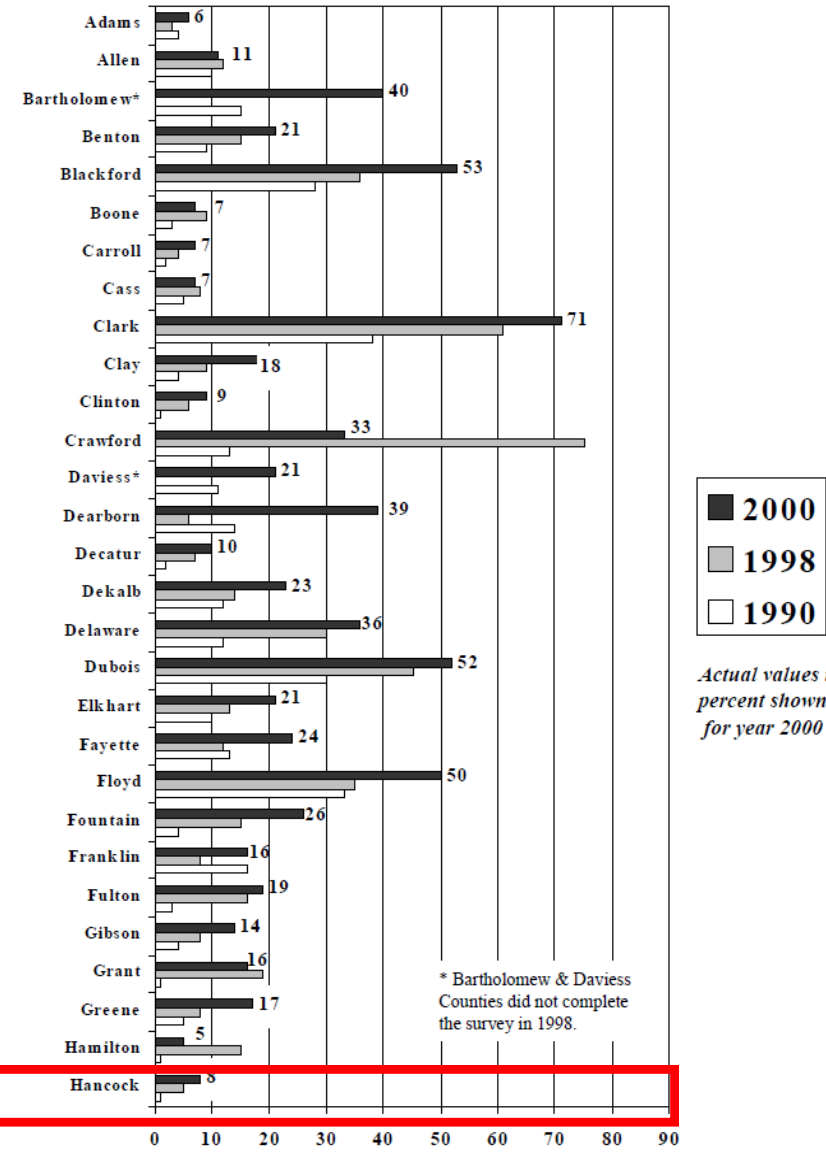
# Has Water Quality Improved with the Implementation of Agricultural Management Practices?

# No Till Conservation Tillage Increased Through the 1990's

**No-till Soybean Trends for Indiana Counties**  
(percent of all soybean acres planted in a no-till system)



**No-till Corn Trends for Indiana Counties**  
(percent of all corn acres planted in a no-till system)



From Evans & others, 2000 (CTIC)

- Transect data
- Randomly selected
- Repeated
- "Window survey"



# No Till Conservation Tillage Increased Through the 1990's

From Evans and others, 2000

**No-till Soybean Trends for Indiana Counties**  
(percent of all soybean acres planted in a no-till system)

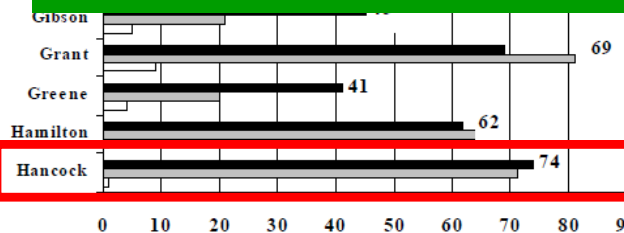


## Soybeans

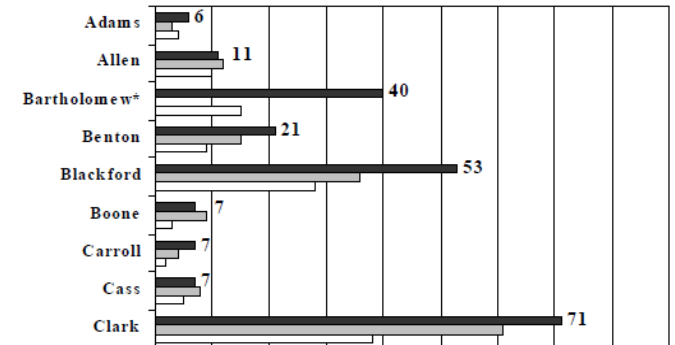
1990 – 2%

1998 – 72%

2000 – 74%



**No-till Corn Trends for Indiana Counties**  
(percent of all corn acres planted in a no-till system)

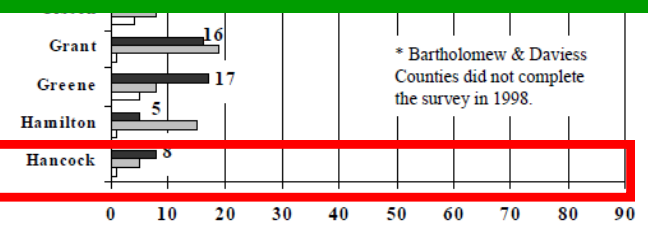


## Corn

1990 – 2%

1998 – 5%

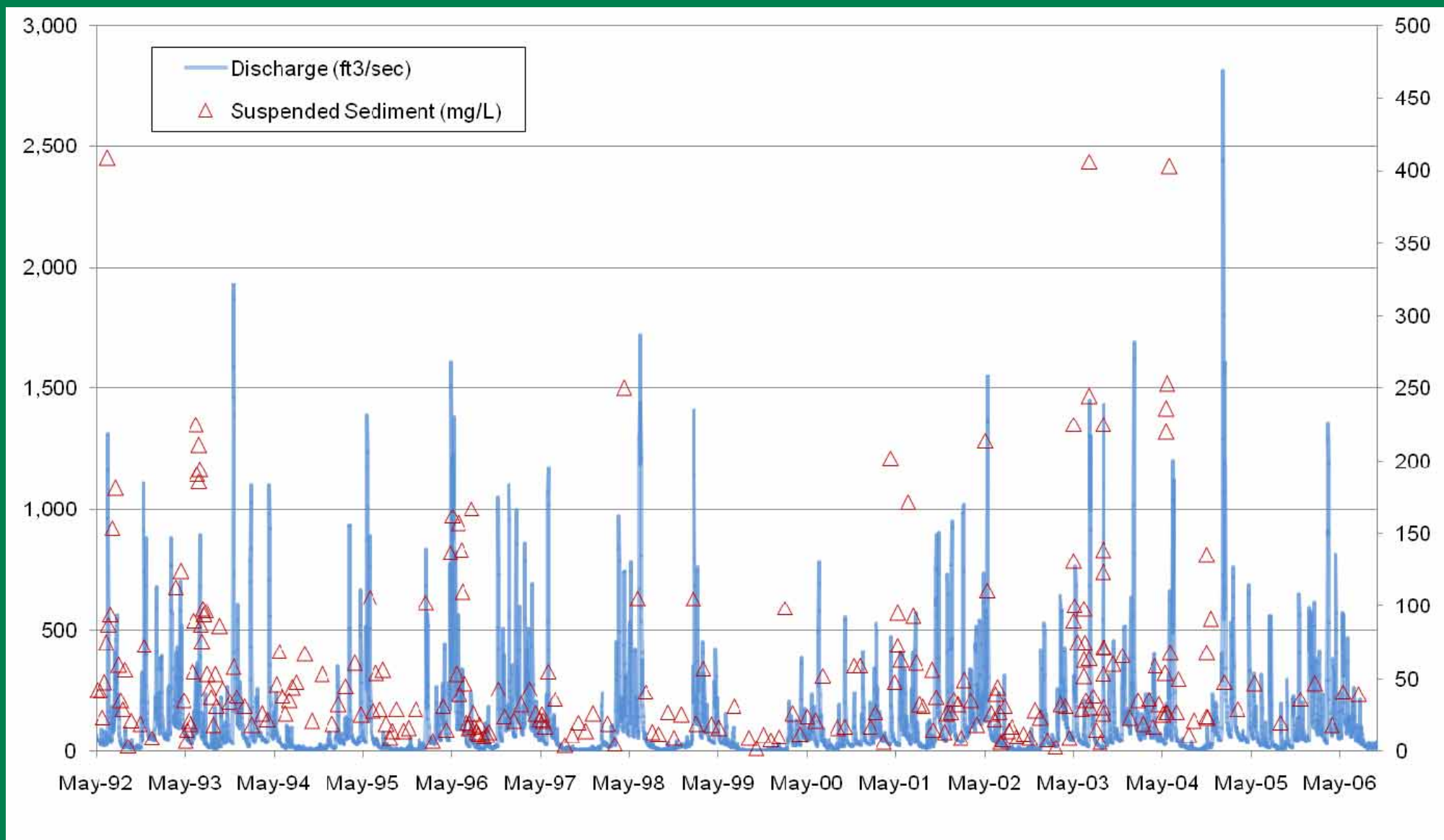
2000 – 8%



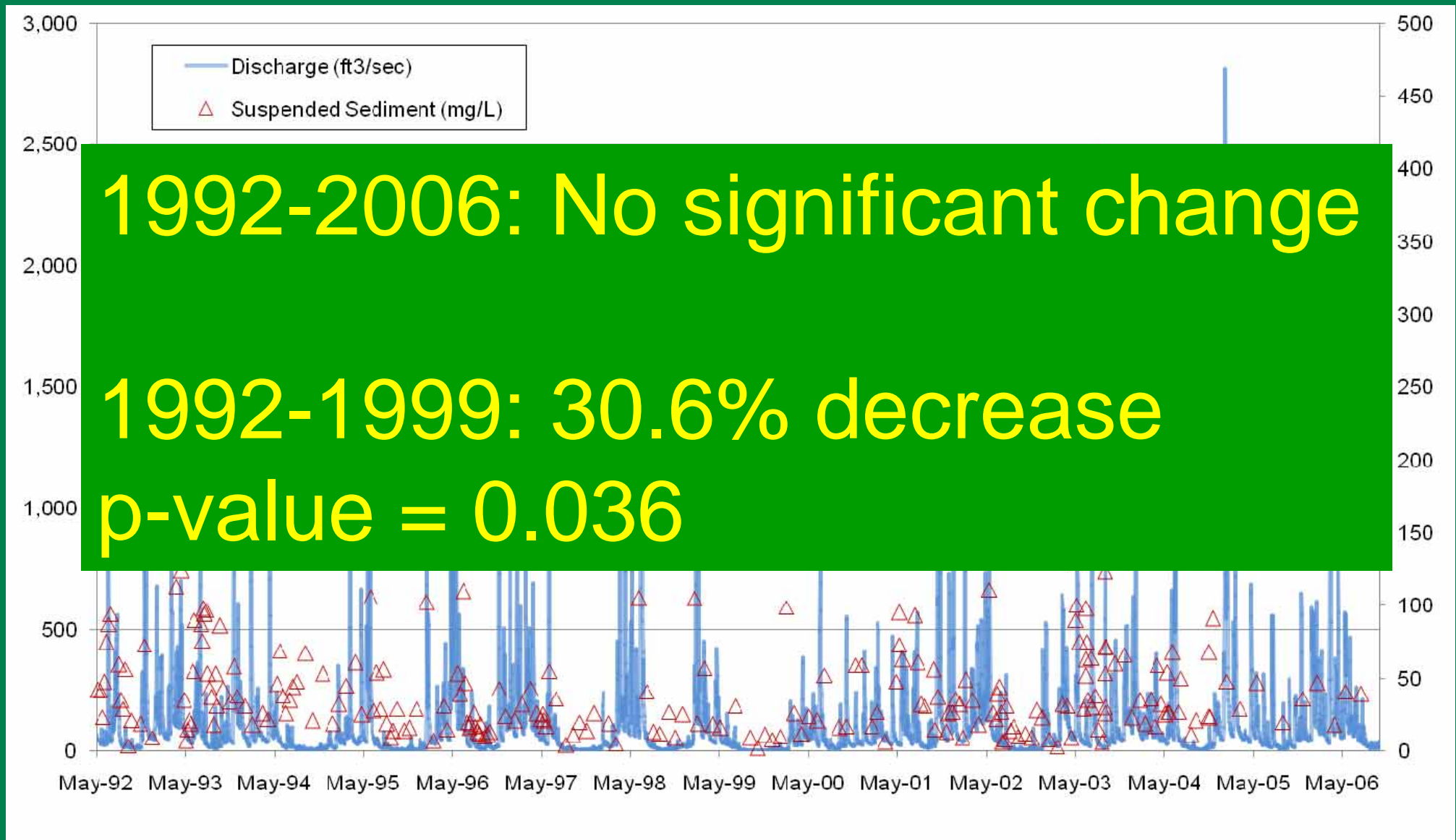
\* Bartholomew & Daviess Counties did not complete the survey in 1998.



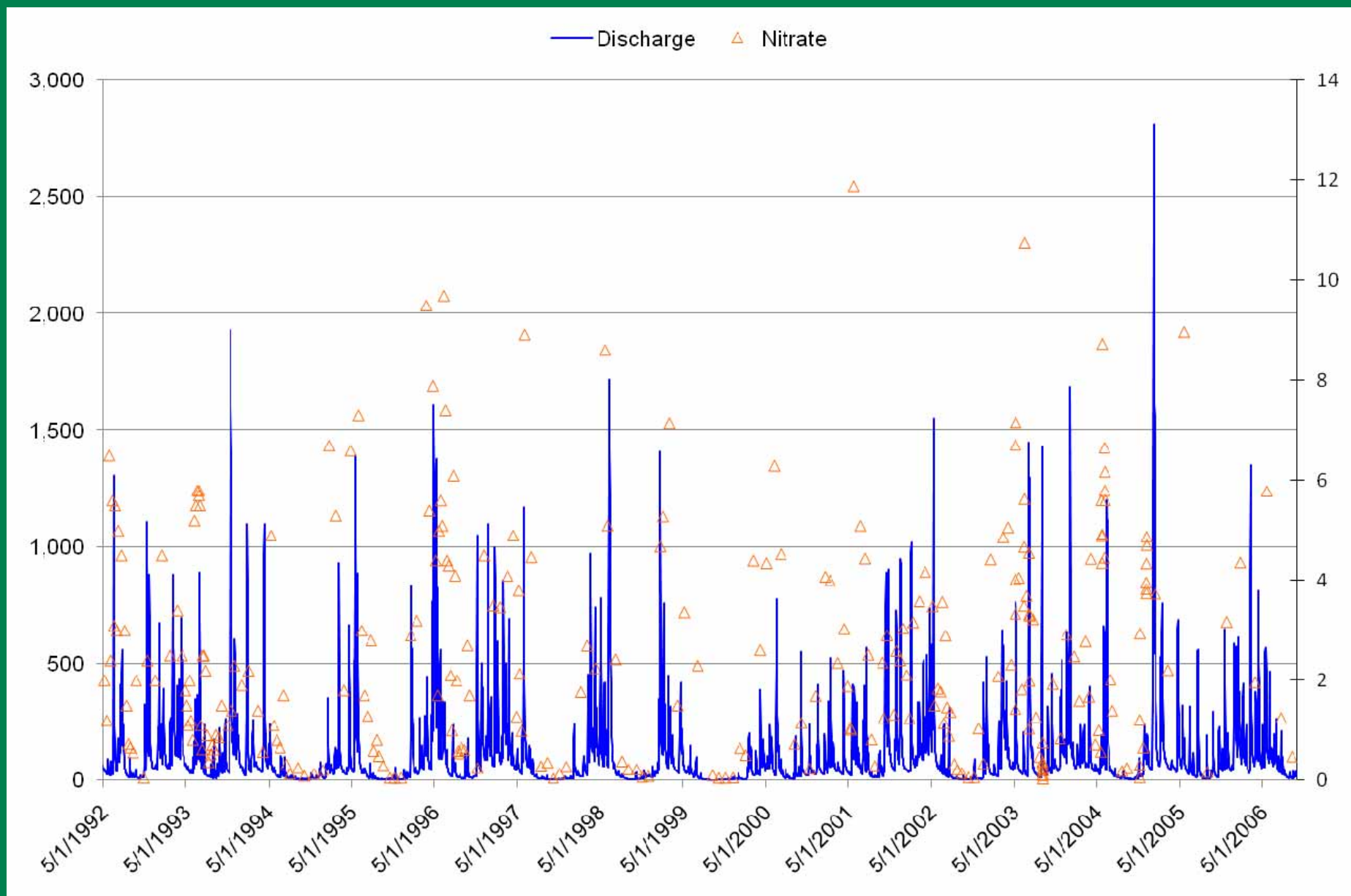
# Sediment Concentrations over Time



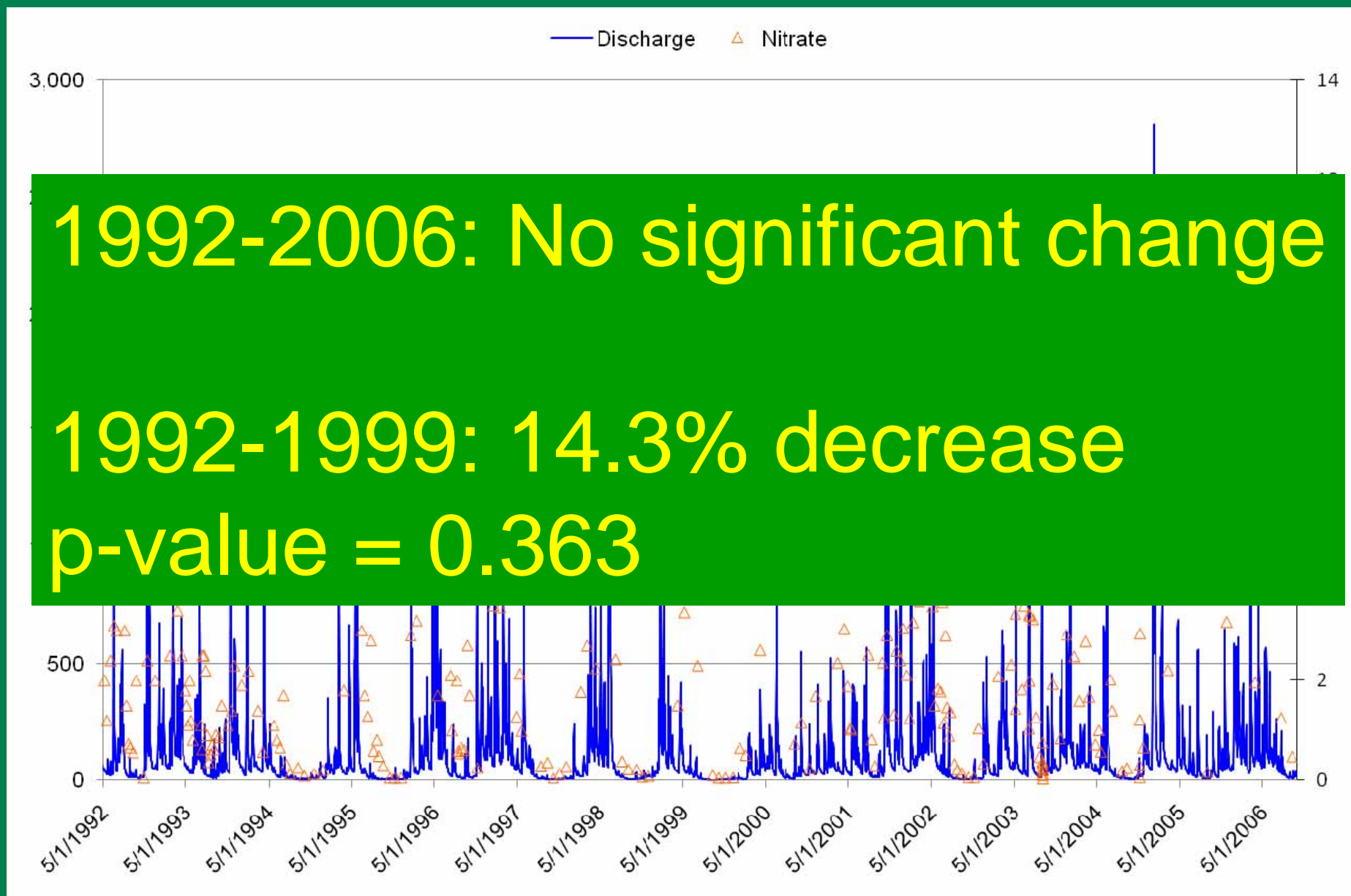
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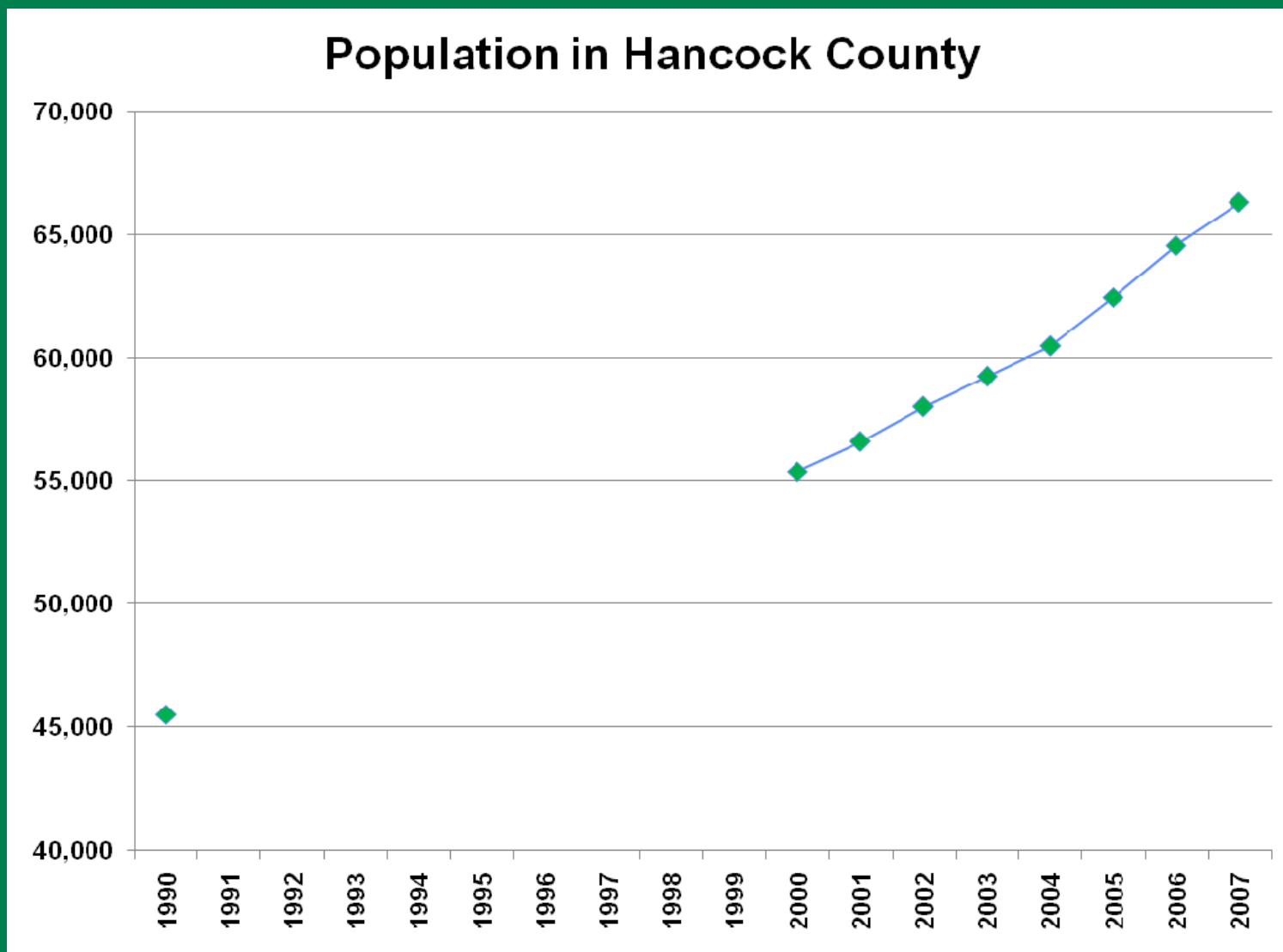
# Nitrate Concentrations over Time



# Nitrate Concentrations over Time



# Population in Hancock County Has Increased



## Sugar Creek

# Conclusions

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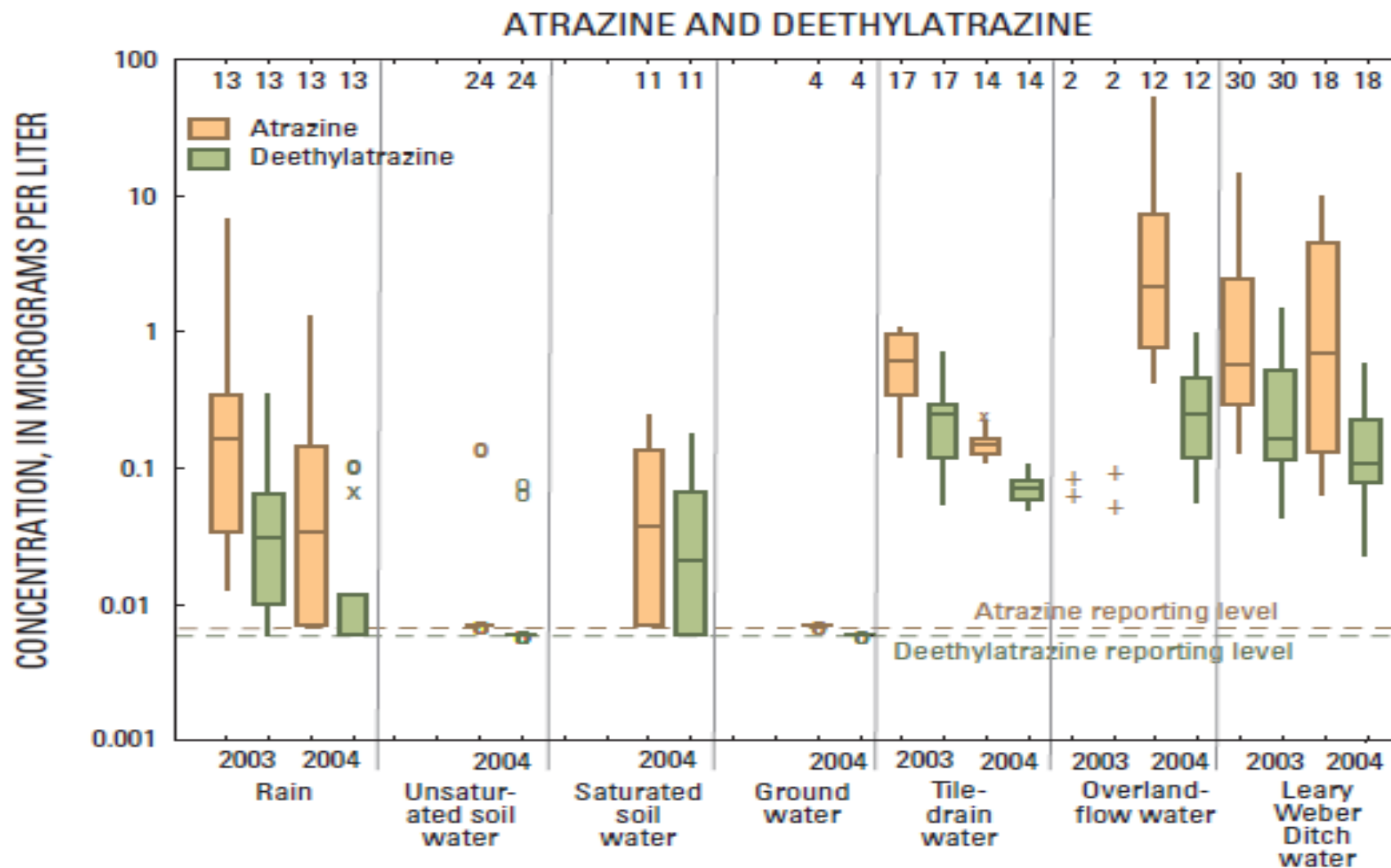
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- Use the AMPs that will best show trends
- Account for the streamflow
- Conflicting pressures can hide trends
- Ancillary data is critical
- Long-term data sets with sufficient data improve the ability to detect trends

# Indiana Water Science Center Web Page:

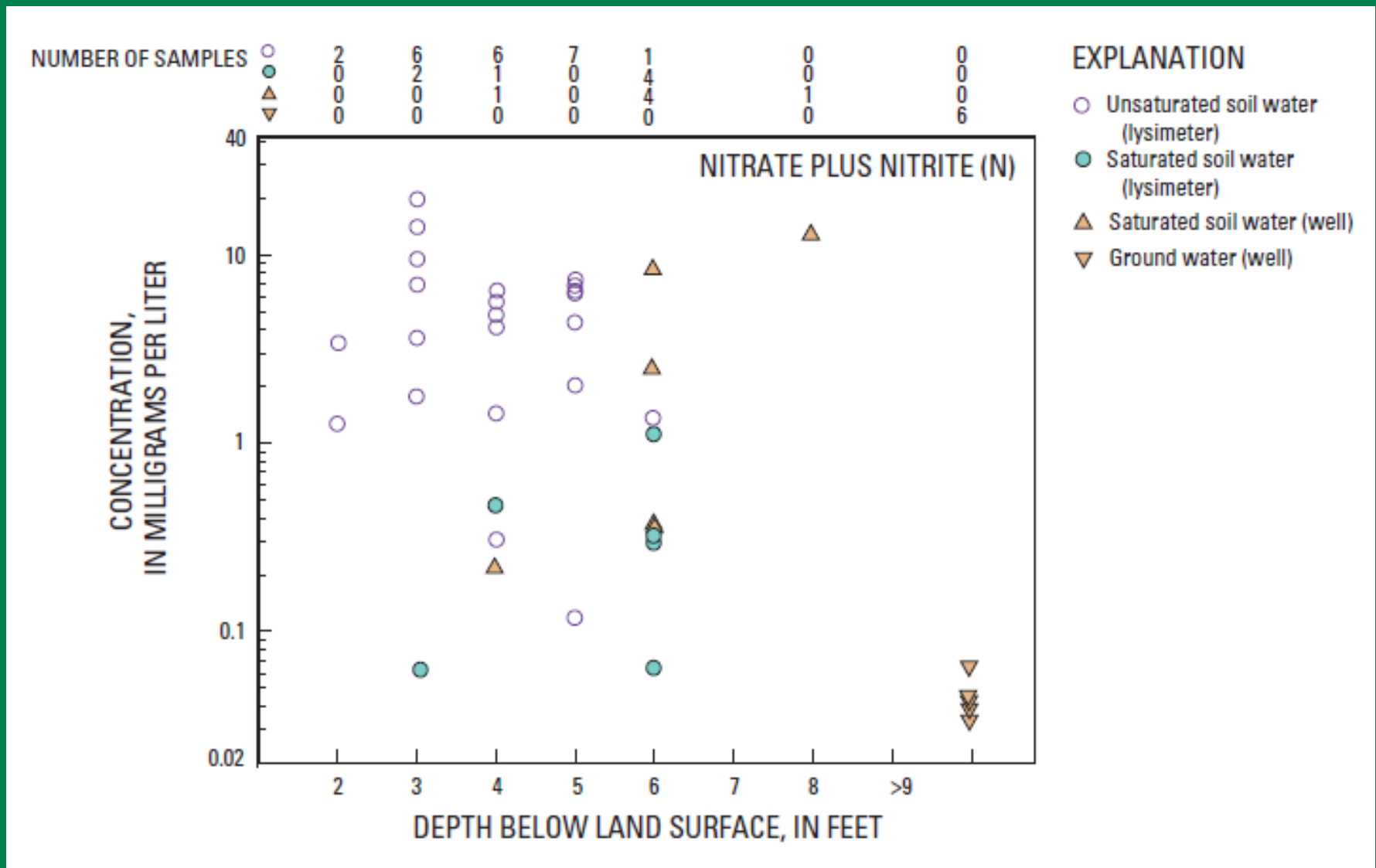
<http://in.water.usgs.gov/>

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# How Do Pesticides Get Into Streams?



# Ag Chemicals Do Not Move to the Groundwater



# Ag Chemicals Do Not Move to the Groundwater

