

A grayscale photograph of a rural farmstead. In the foreground, there is a stone structure, possibly a well or a small dam, with a concrete base and a gravel area. A wooden fence runs across the middle ground. In the background, there are several farm buildings, including a large house and a barn, surrounded by trees and fields.

# **A History of Agricultural BMPs Implemented in the Octoraro Watershed, and Associated Nutrient Load Reductions to the Chesapeake Bay**

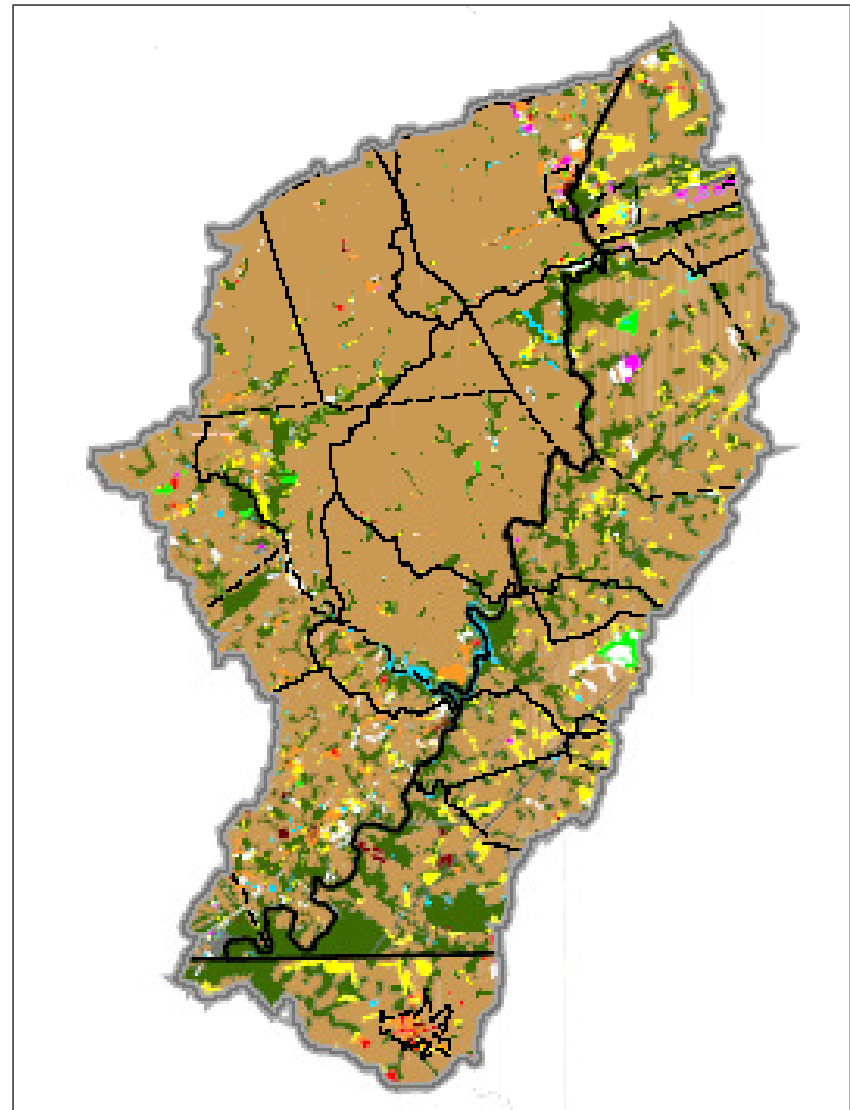
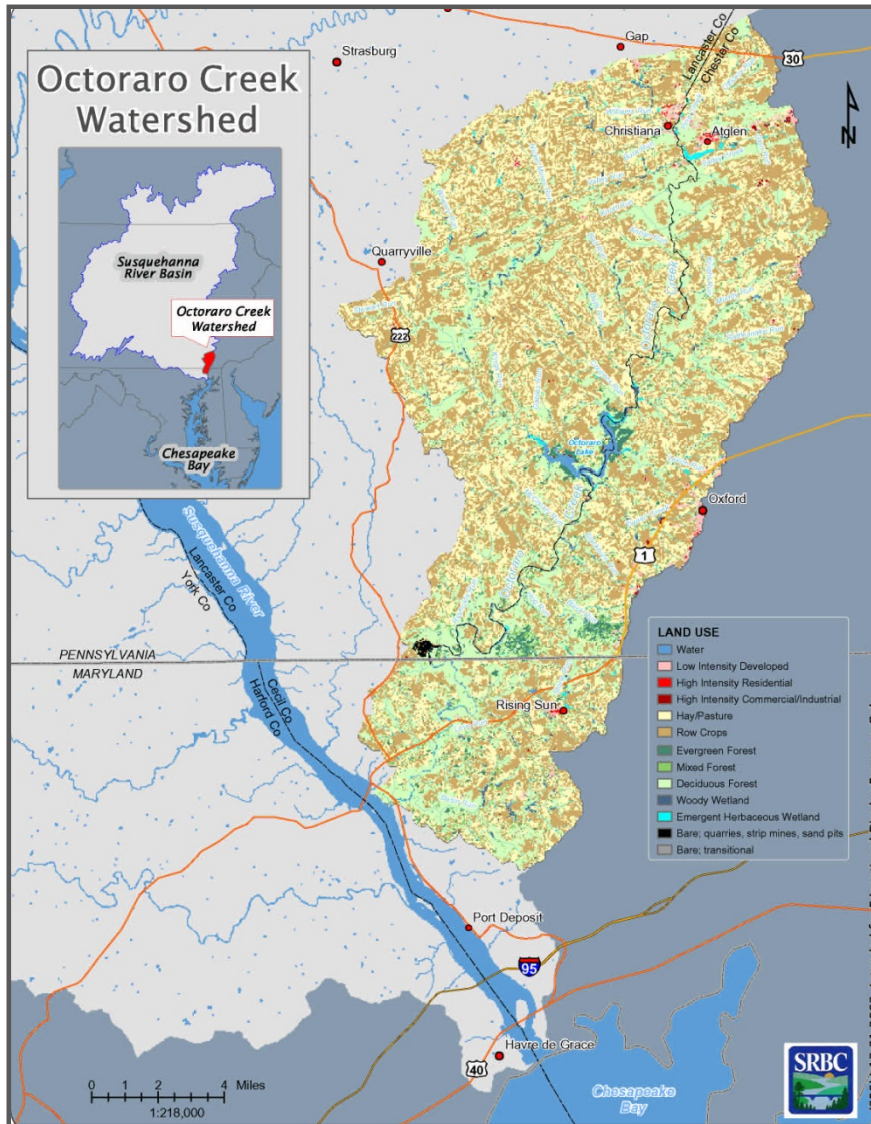
**John Shuman**

**Johnson, Mirmiran & Thompson**

**Octoraro Watershed Association**

# Octoraro Watershed: *LAND USE*

# Agriculture



## Octoraro Watershed: *AGRICULTURE AND THE PLAIN SECT COMMUNITY*



Land Use is 75 percent agriculture

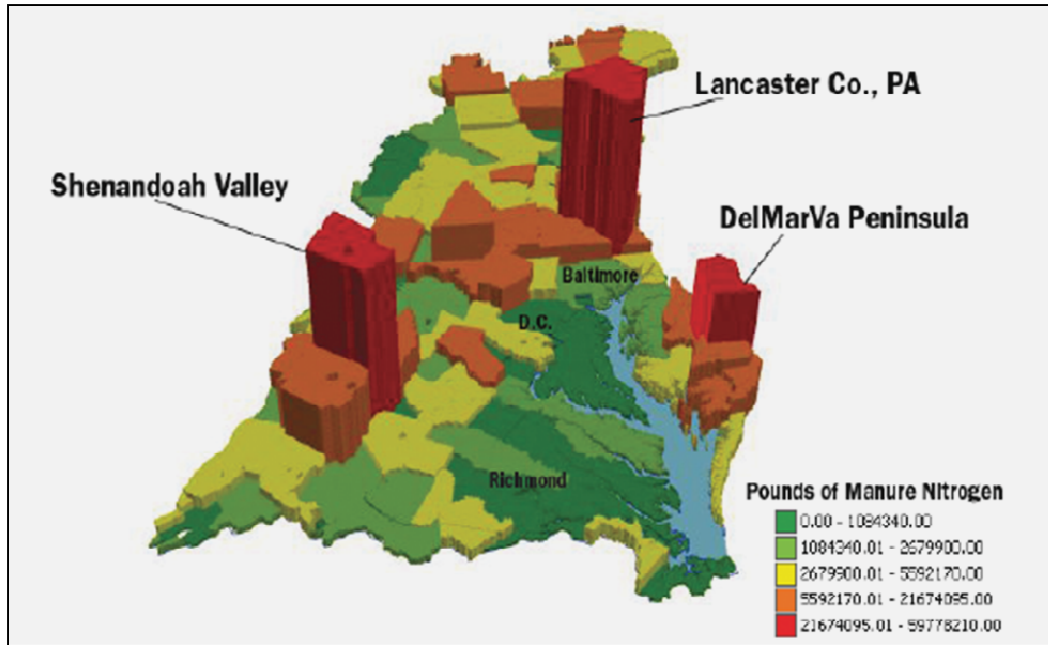
70 percent of farmers are Plain Sect (Old Order Amish)

208 mi<sup>2</sup> watershed

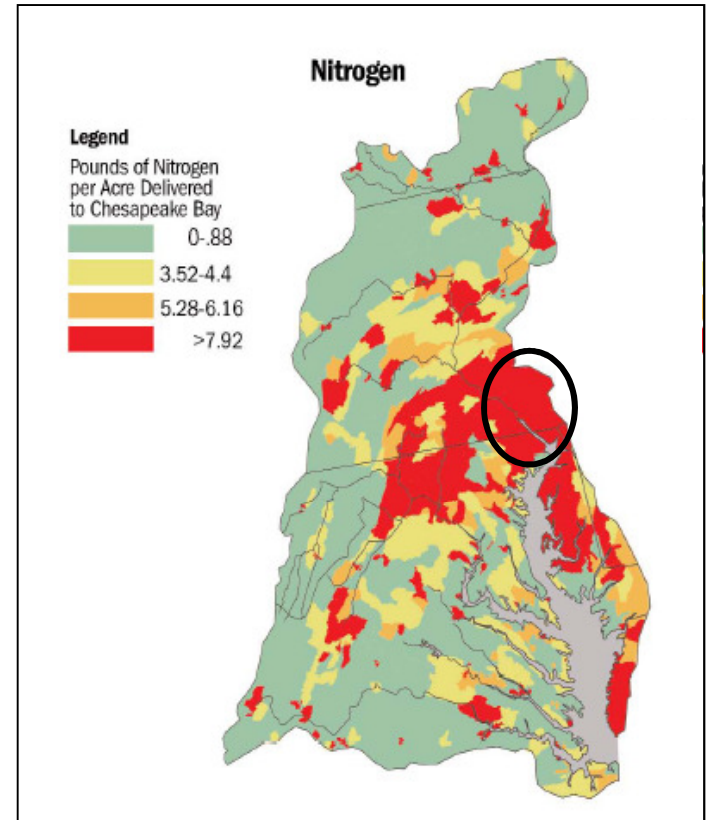
Largely rural landscape



# Octoraro Watershed: *MANURE AND NITROGEN*

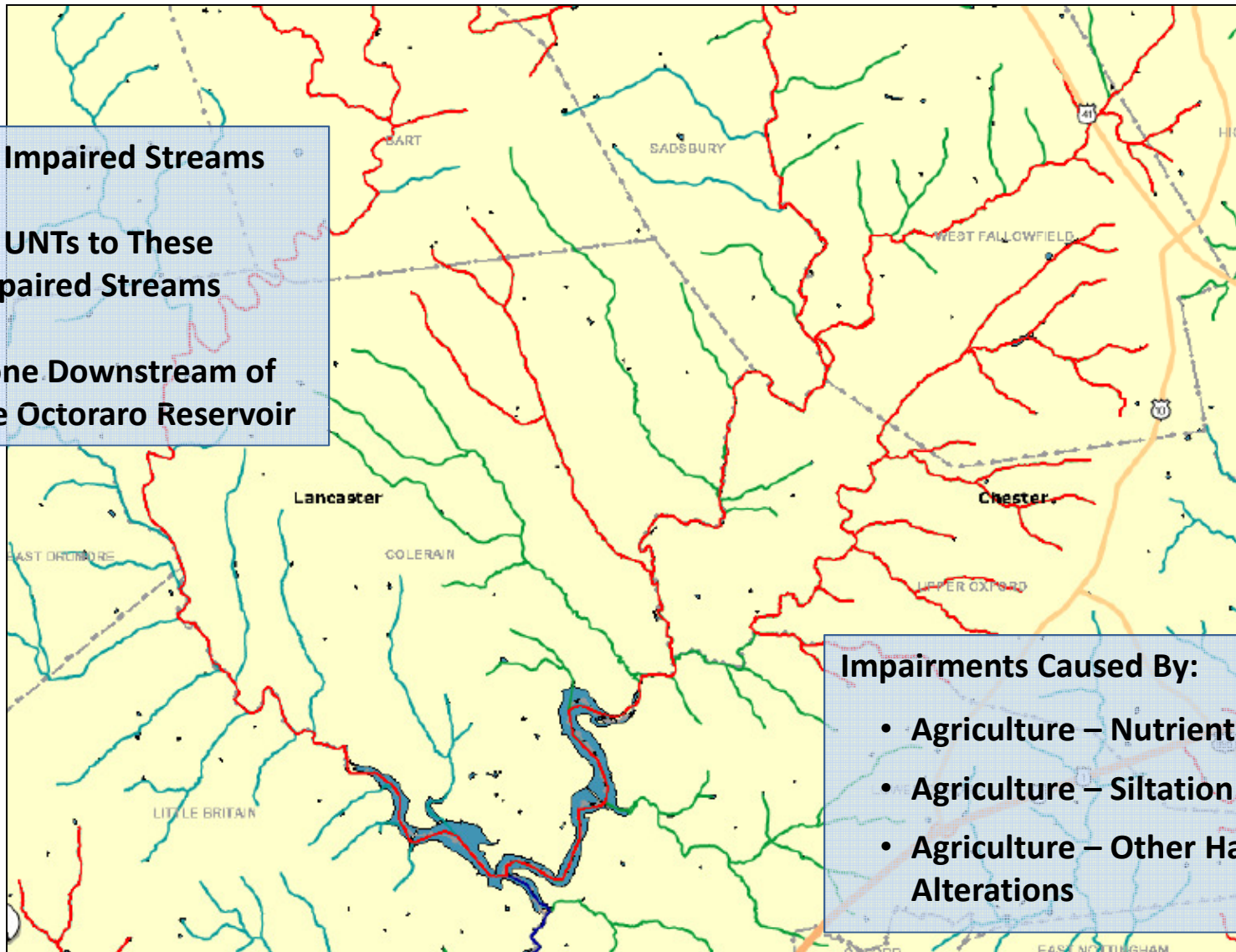


# Chesapeake Bay



## Octoraro Watershed: *IMPAIRED WATERS*

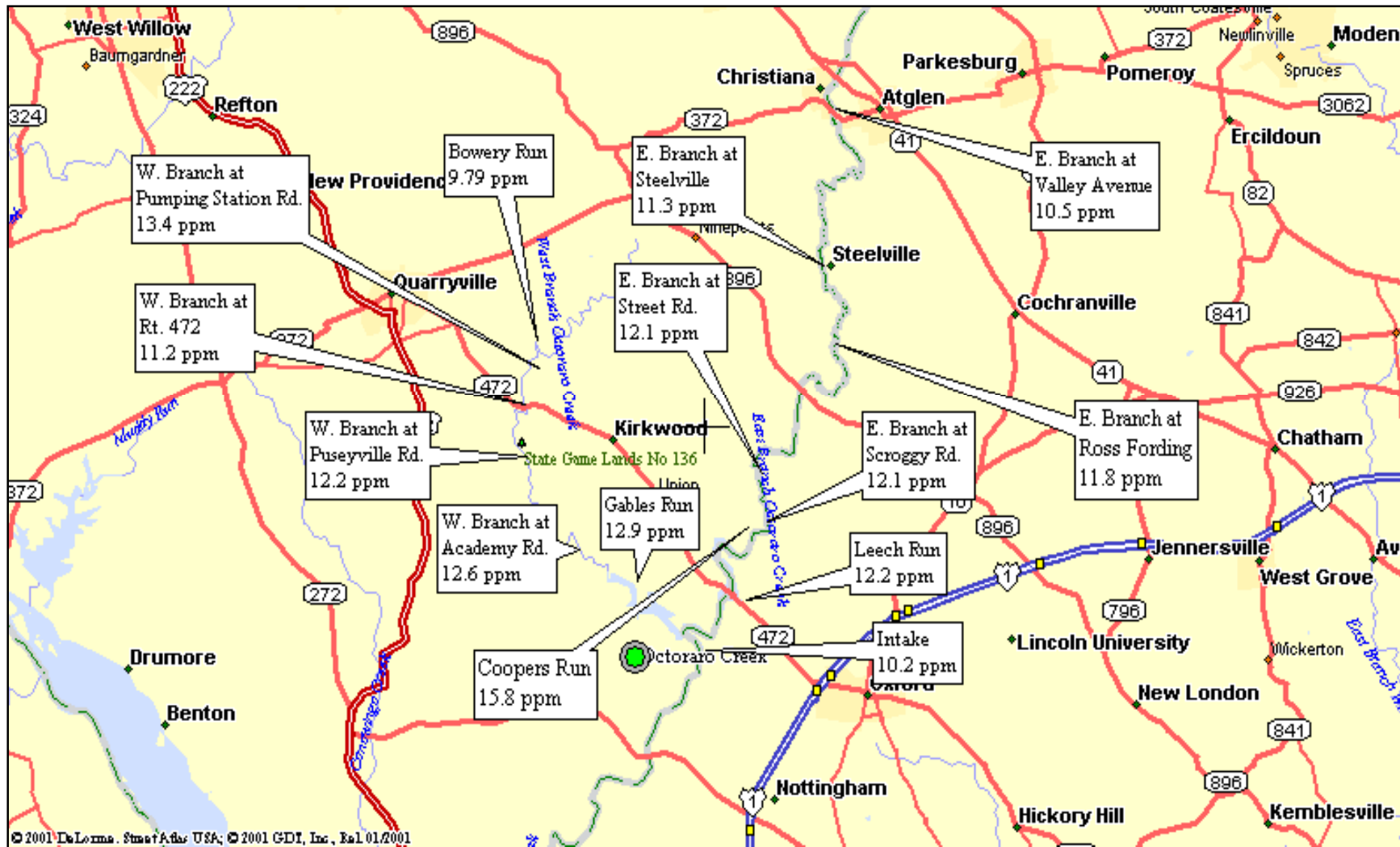
- 13 Impaired Streams
- 35 UNTs to These Impaired Streams
- None Downstream of the Octoraro Reservoir



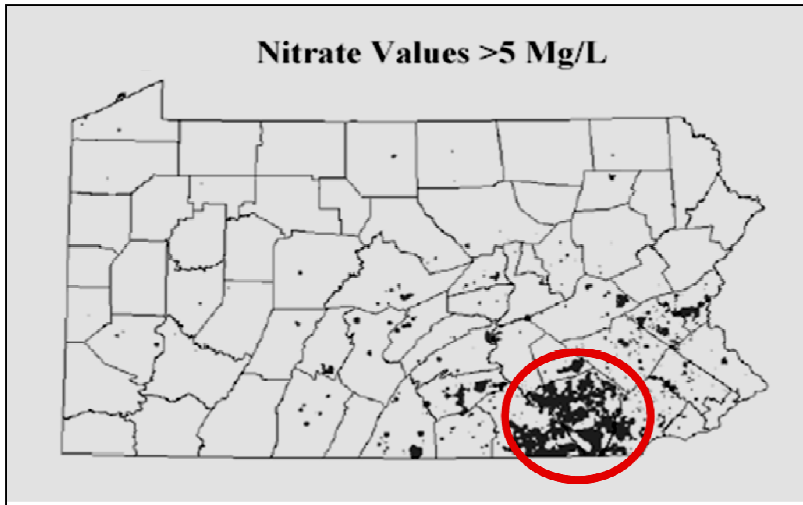
### Impairments Caused By:

- Agriculture – Nutrients
- Agriculture – Siltation
- Agriculture – Other Habitat Alterations

# Octoraro Watershed: *STREAM WATER QUALITY*



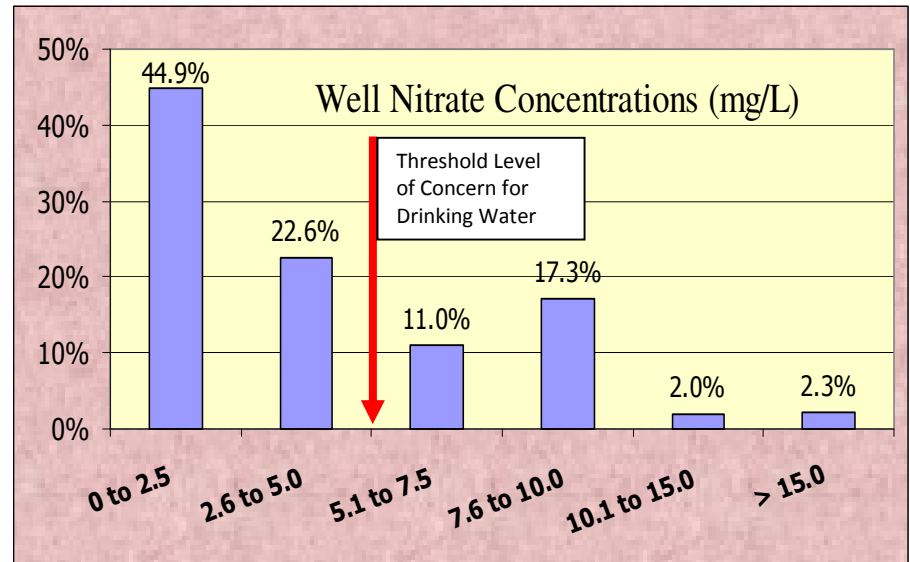
# Octoraro Watershed: *GROUNDWATER WATER QUALITY*



Land Use is 75 percent agricultural

70 percent of farmers are Plain Sect (Old Order Amish)

208 mi<sup>2</sup> watershed



**Octoraro  
Watershed  
Association**



**Celebrating 44  
years of preserv-  
ing and protecting  
the natural and  
historic resources  
of the Octoraro**

To restore and protect the natural resources of the scenic Octoraro Creek, and to preserve and protect its farmlands, forest, and rural heritage through education, outreach, restoration and community stewardship.





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Watershed  
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## **Best Management Practices**

- **Riparian buffers**
- **Streambank fencing**
- **Farmland preservation**
- **Stream restoration**
- **Streambank stabilization**

# BMPs - Protecting Local Water Quality

## Streamside Buffer

Streamside buffers of trees, grasses or shrubs filter nutrients and other pollutants coming off the land. They also control flooding and erosion, stabilize streambanks, and slow rainwater runoff while providing needed wildlife habitat.



## Stream Crossing

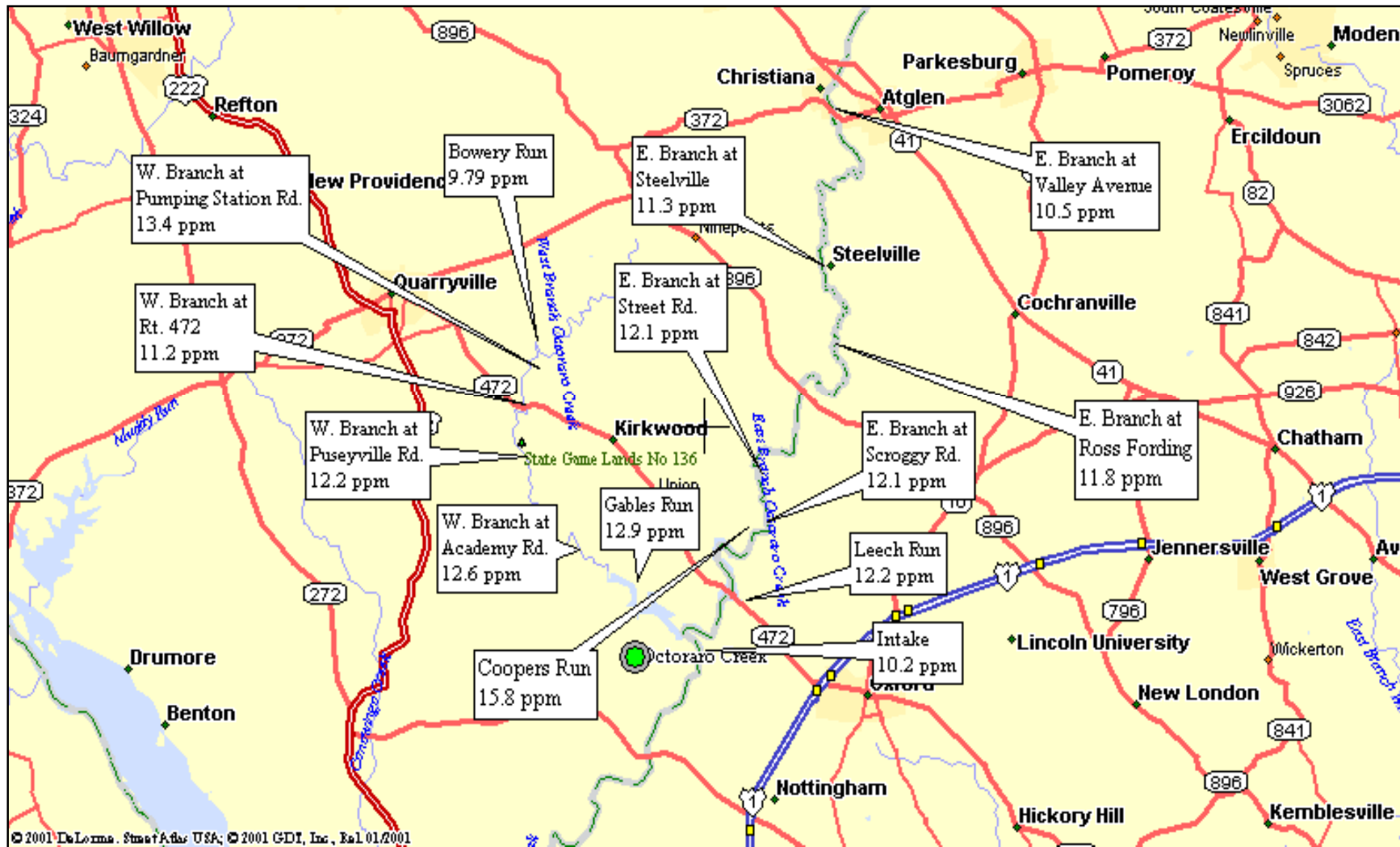
These crossings help keep animals out of waterways where they can cause erosion and streambank damage.

## Watering Facility

Watering facilities provide a clean, reliable water supply for animals away from streams. They also help prevent streambank erosion caused by animal traffic.



# Octoraro Watershed: *STREAM WATER QUALITY*



# Sampling Locations in the Octoraro Creek Watershed

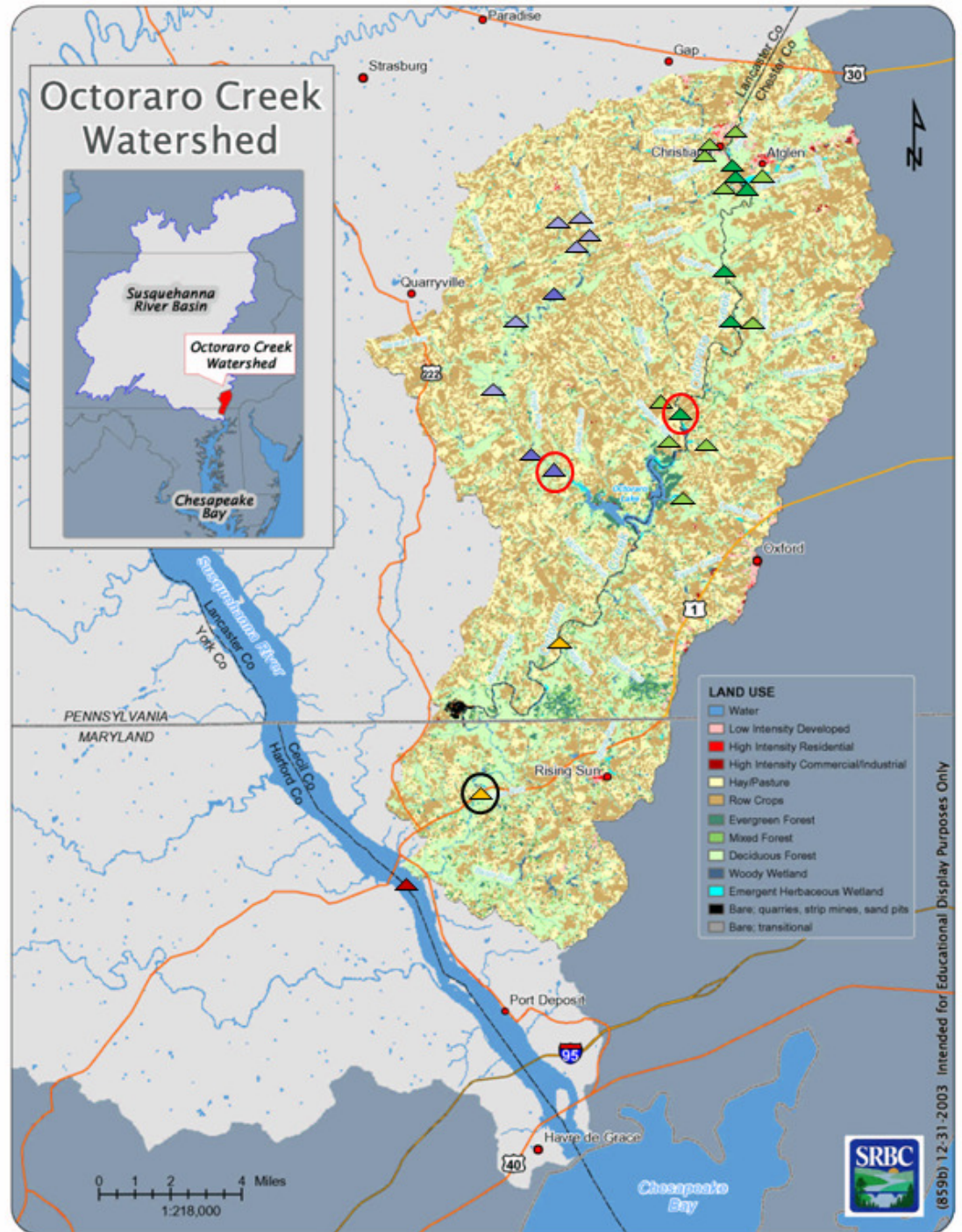
23 Sites for the Octoraro TMDL

2 Sites by Chester Water Authority (n = 192 each)

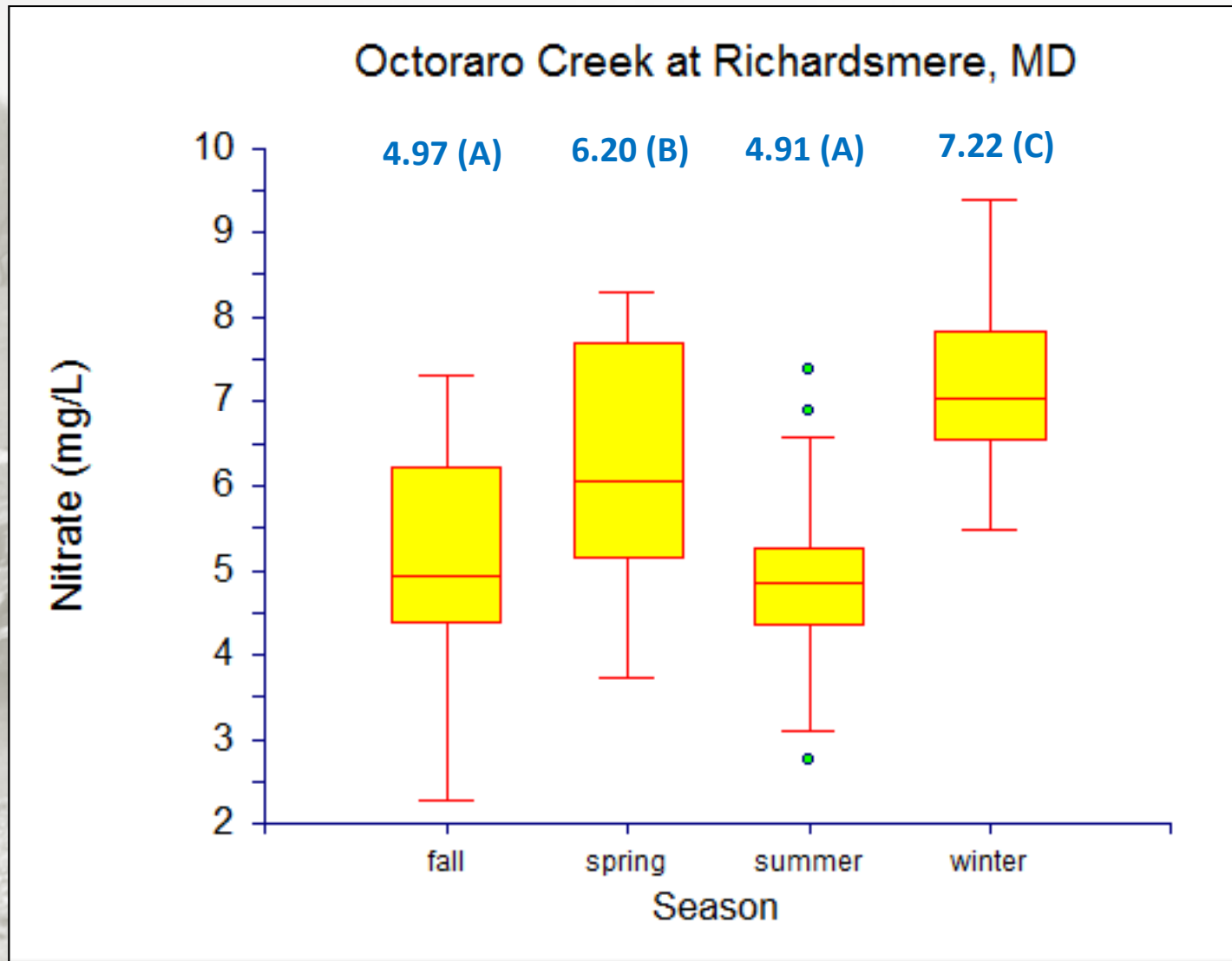
1 Real Time USGS Site (n = 77)

4 Historic USGS Sites

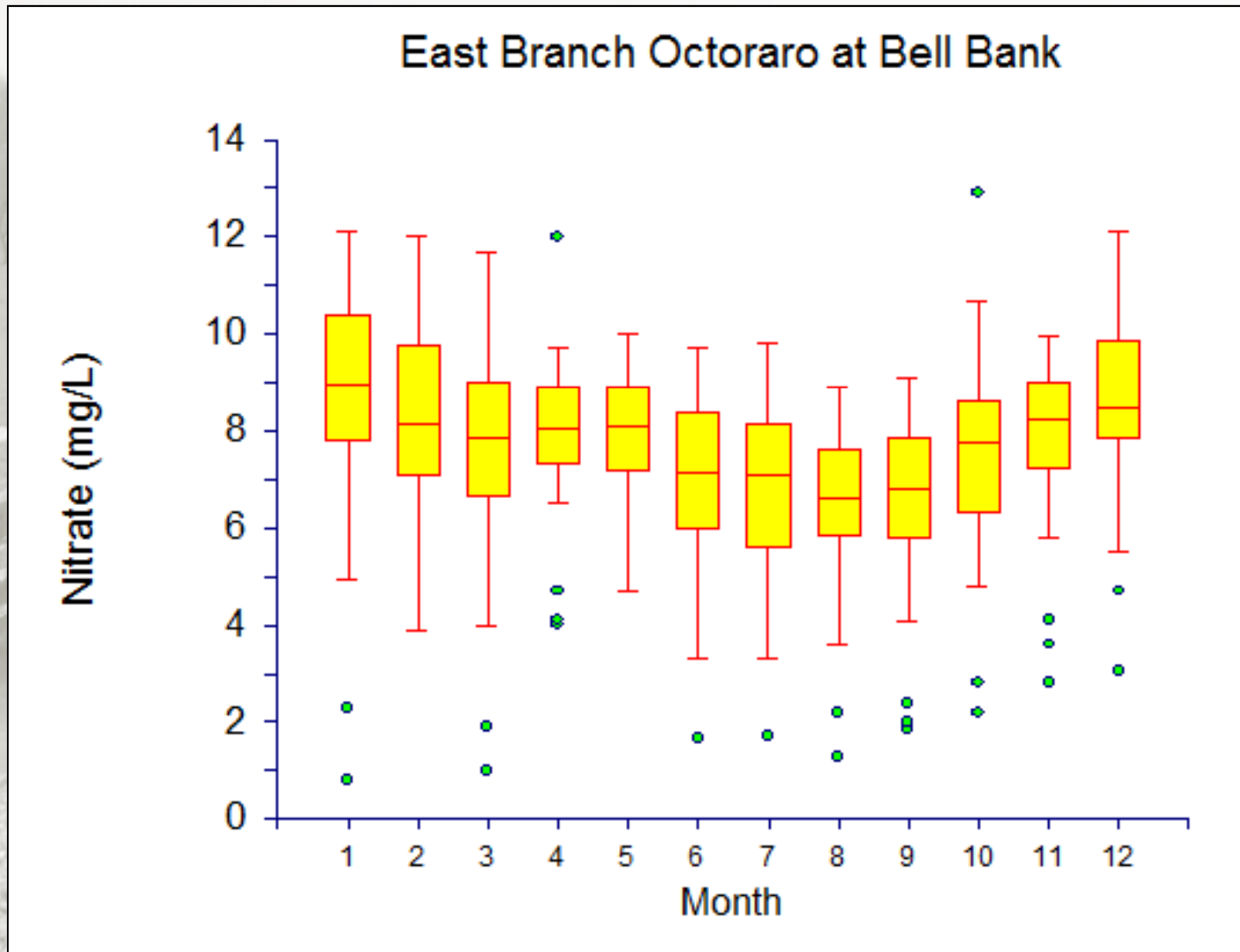
2 Sites Downstream of the Octoraro Reservoir



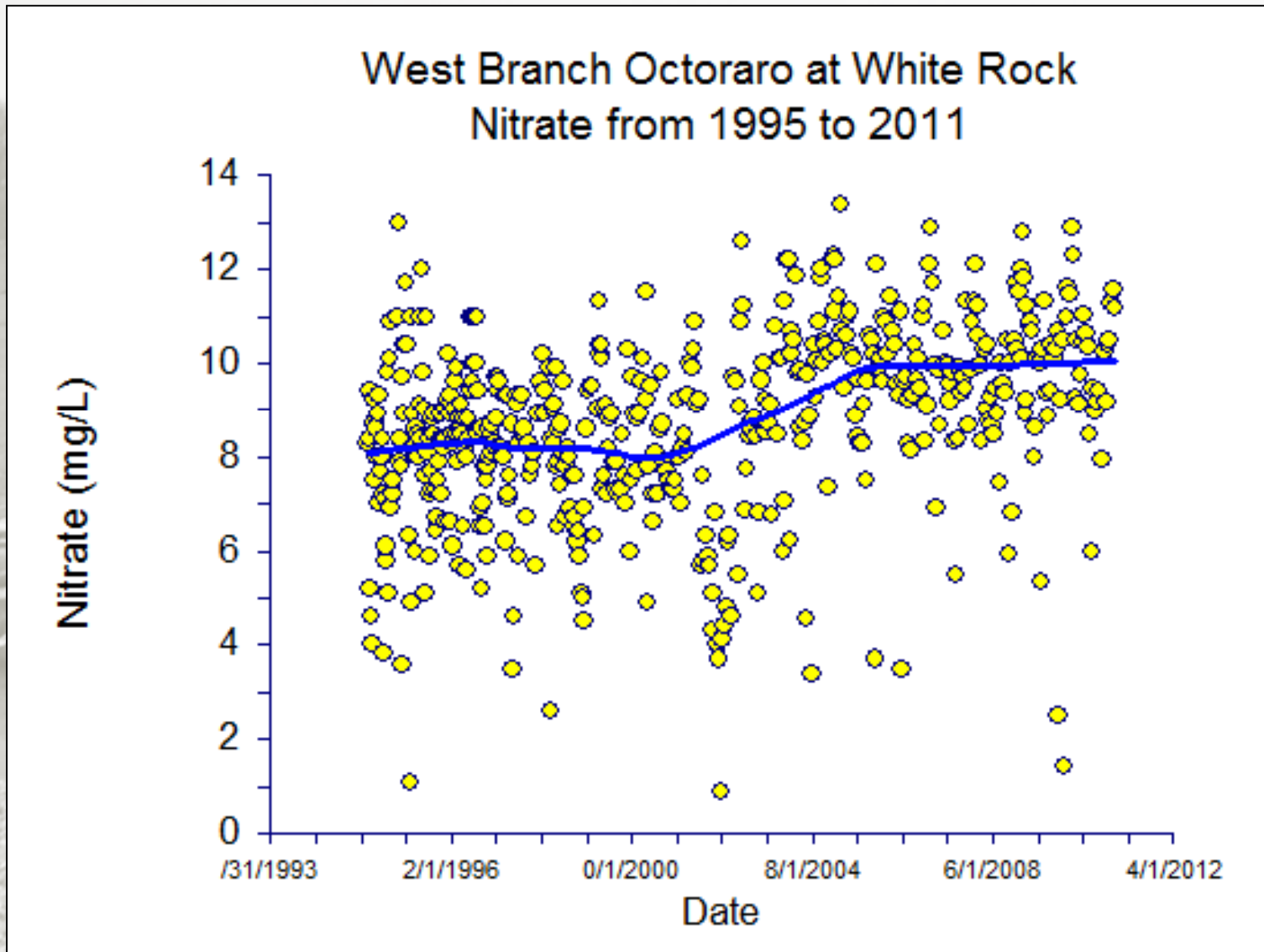
# Nitrate by Season from 2005 to 2010



# Nitrate by Month from 1995 to 2011

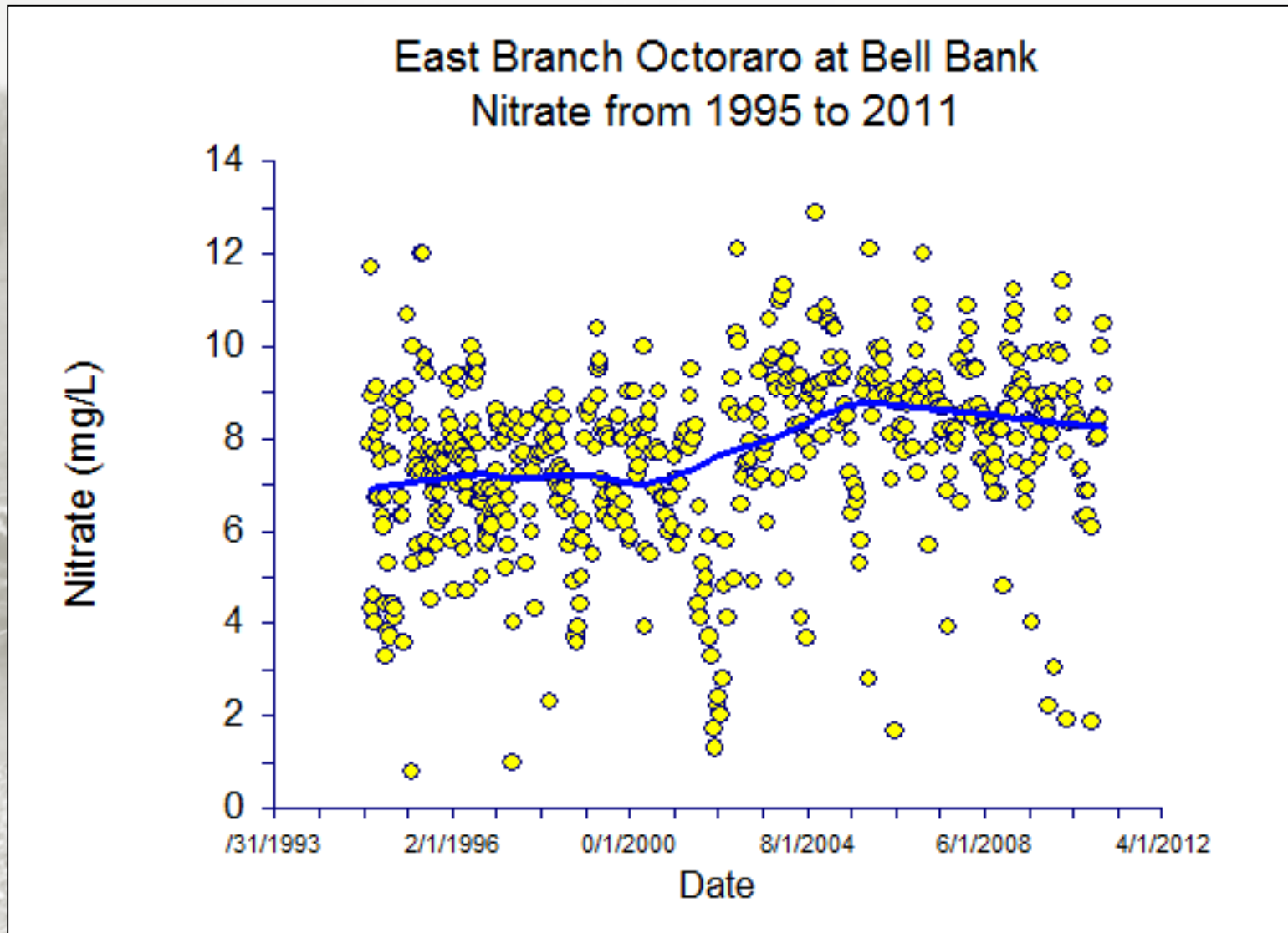


# Nitrate from 1995 to 2011



Linear (+): (P < 0.001)

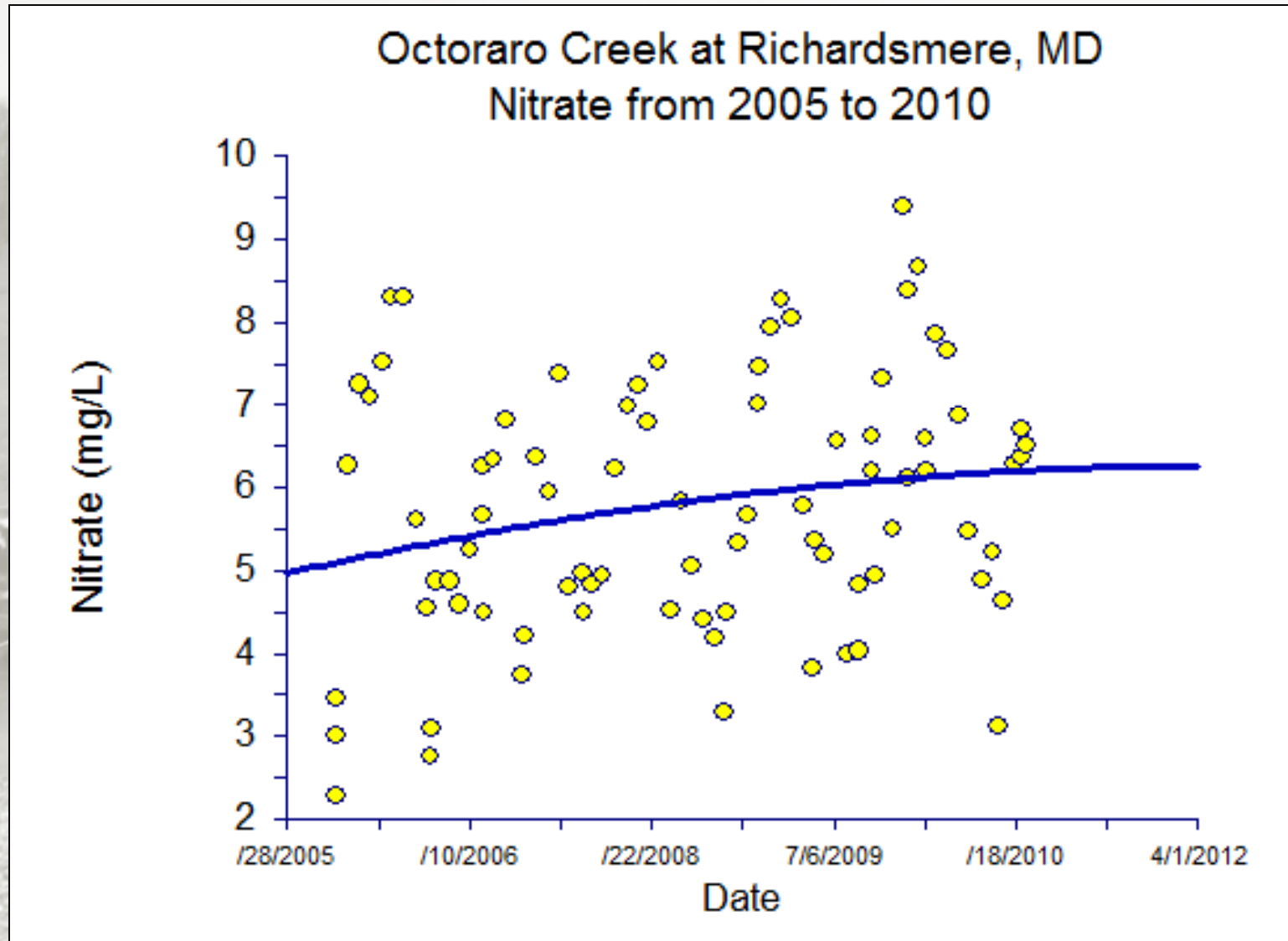
# Nitrate from 1995 to 2011



Linear (+): (P < 0.001)

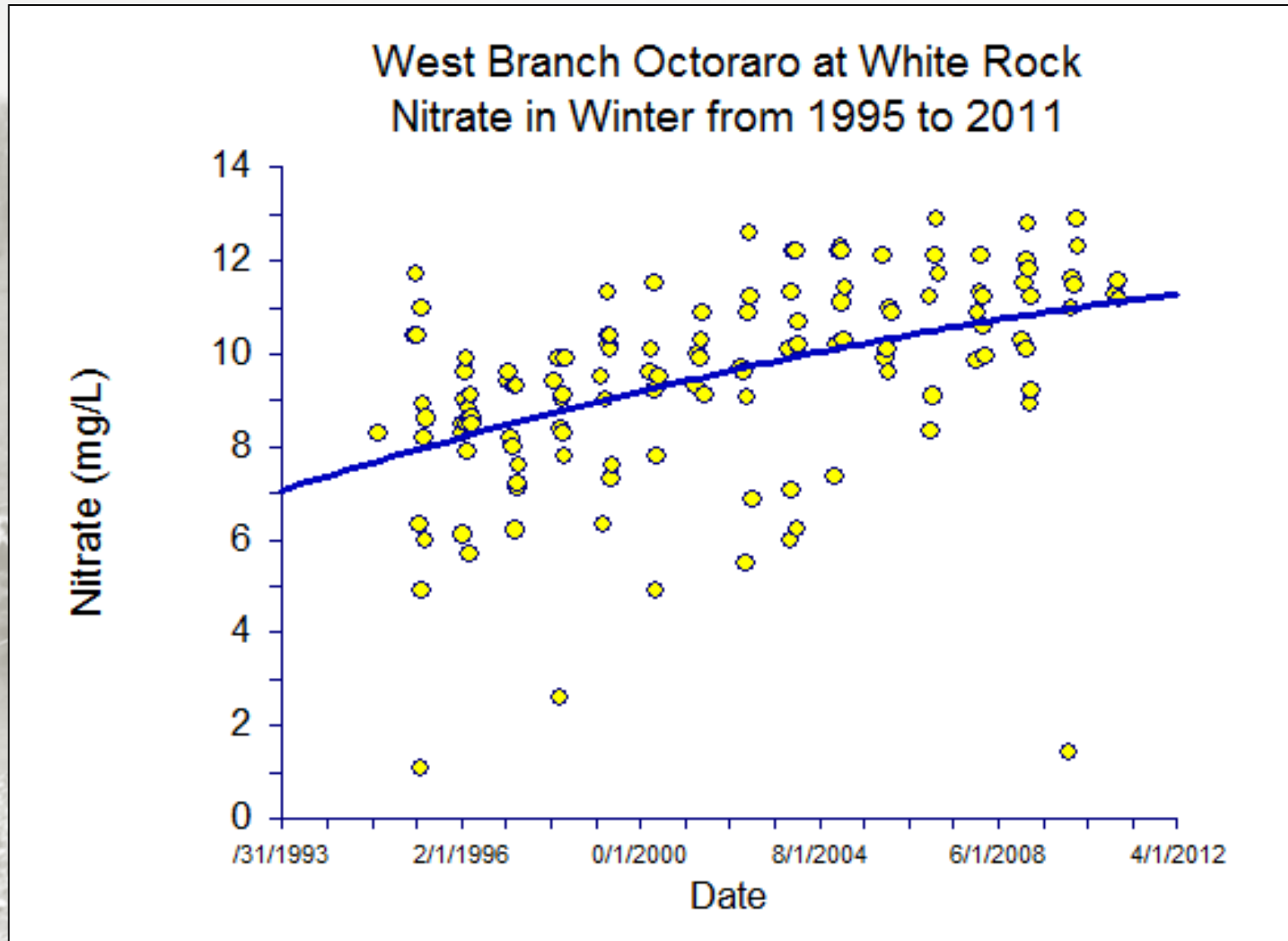


# Nitrate from 2005 to 2010

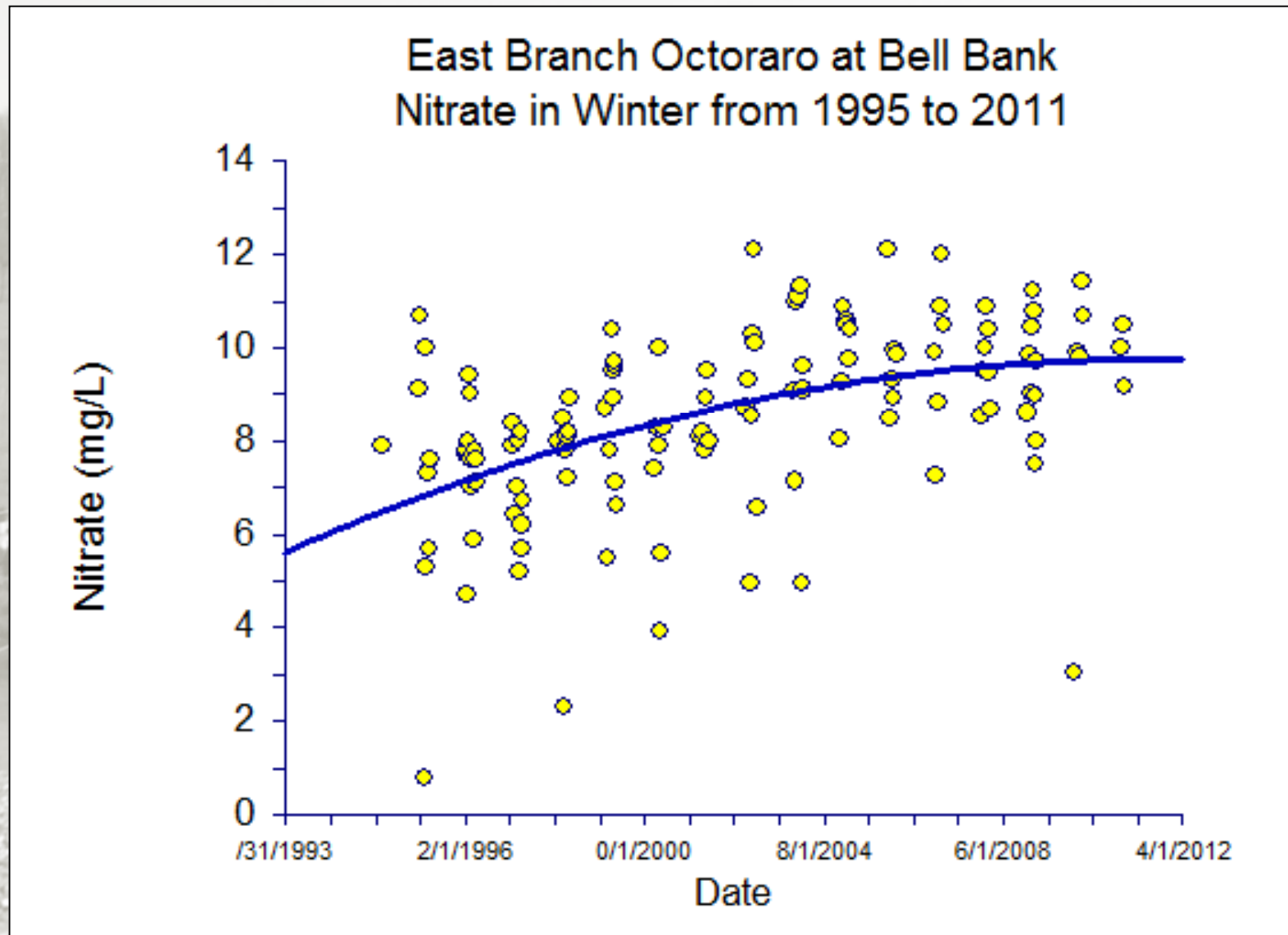


Linear (+): (P < 0.05)

# Nitrate in Winter from 1995 to 2011

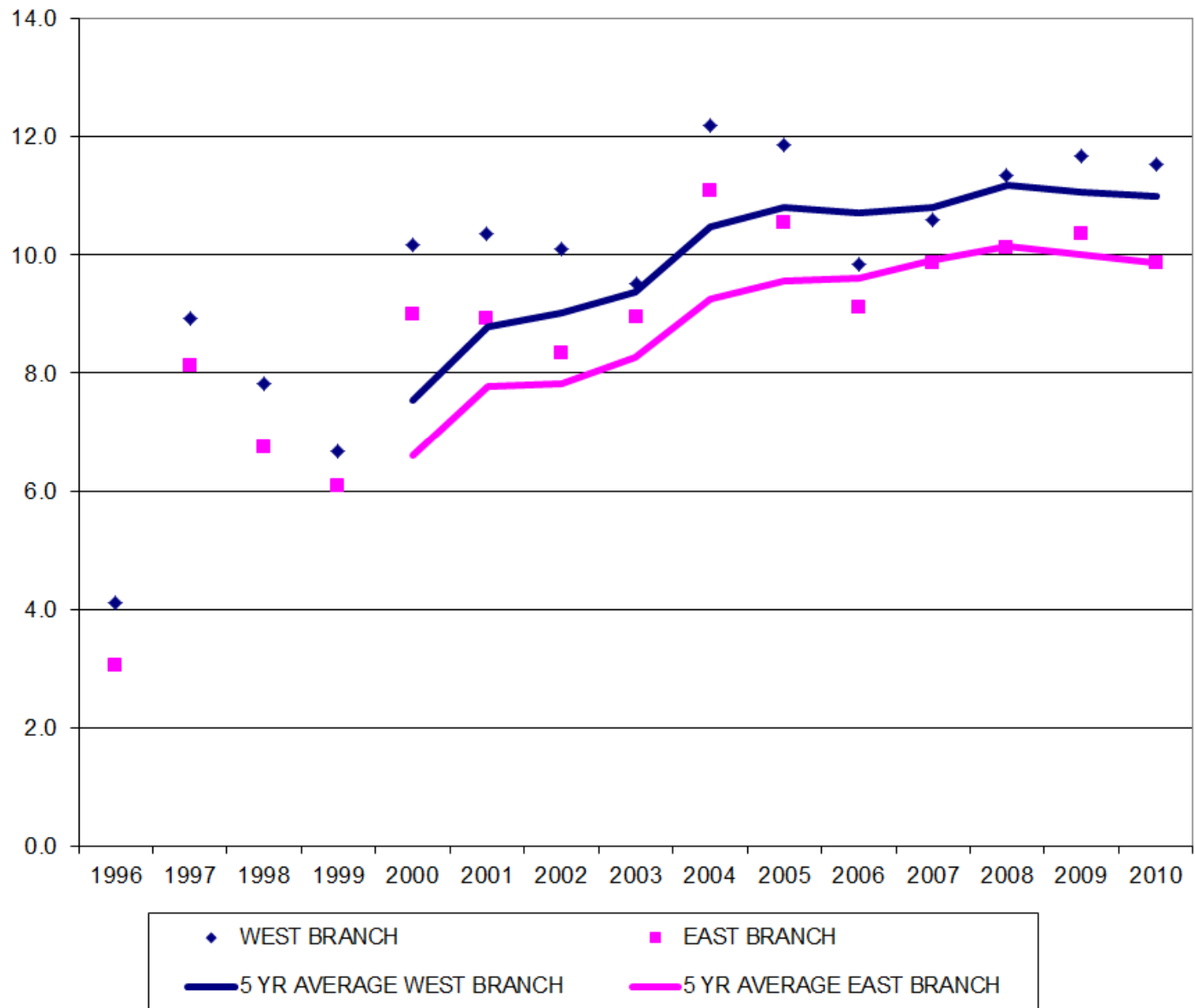


# Nitrate in Winter from 1995 to 2011

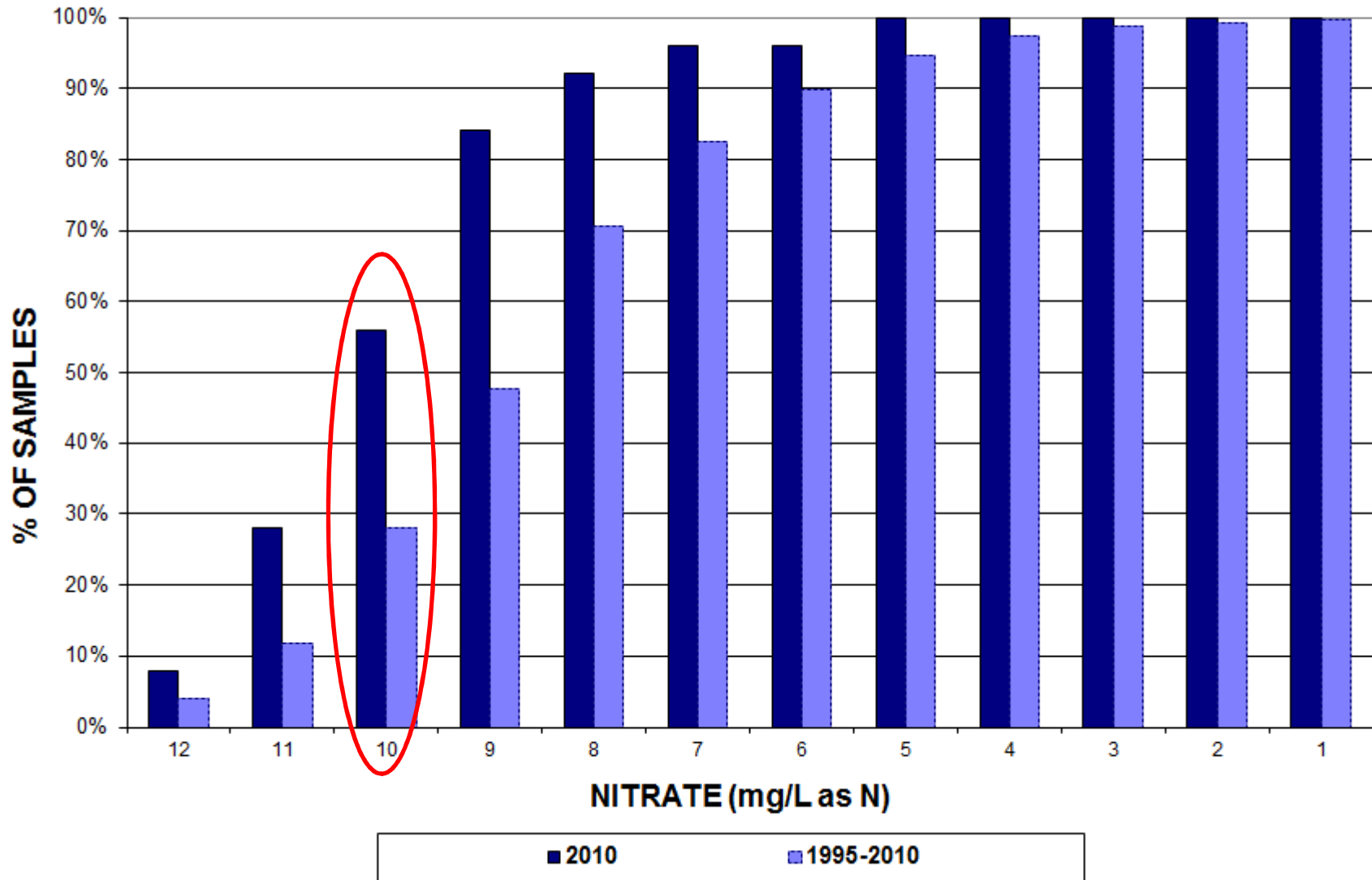


Linear (+): (P < 0.001)

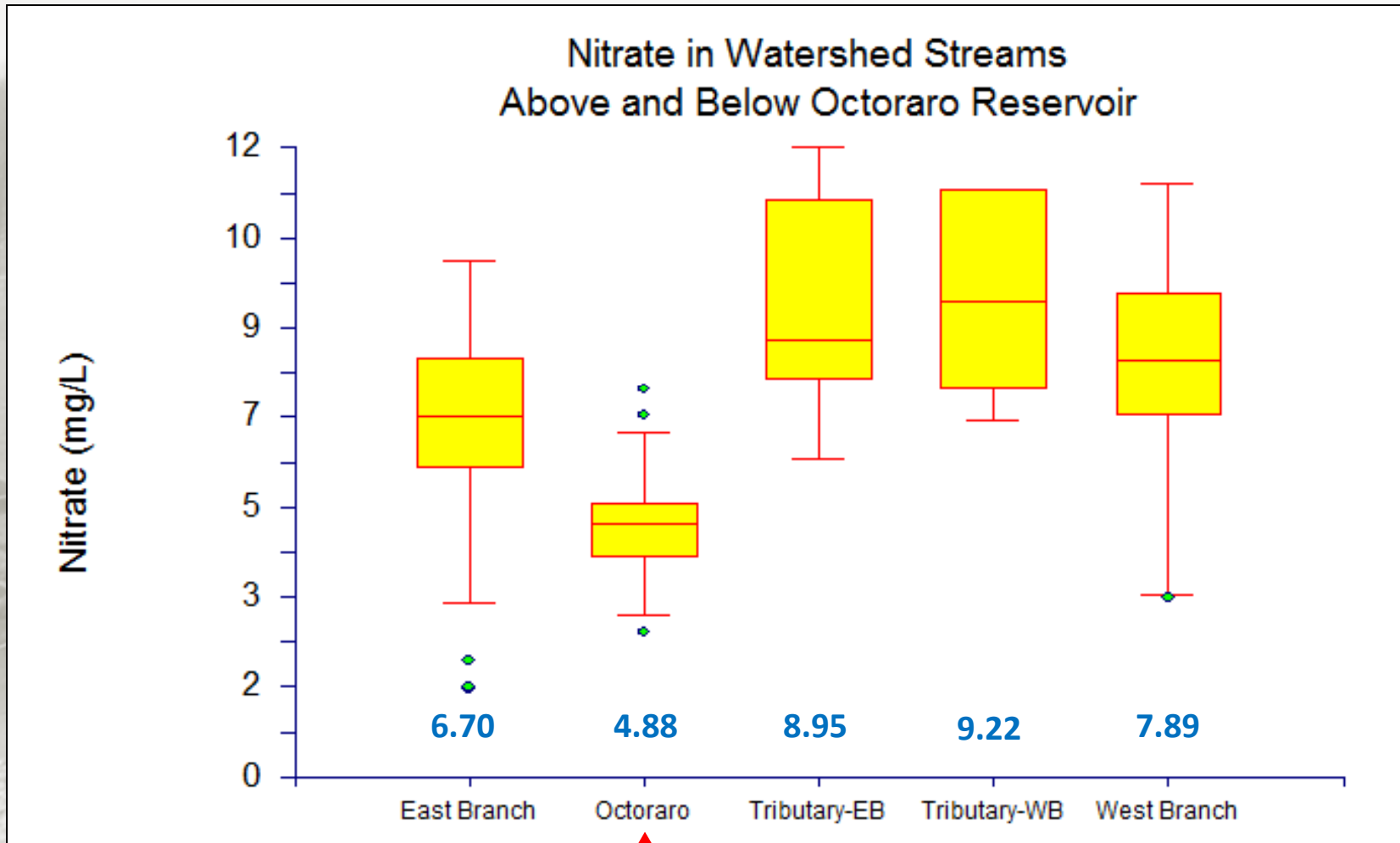
### AVERAGE JANUARY NITRATE LEVELS



### FREQUENCY OF EXCEEDANCE FOR WEST BRANCH OCTORARO CREEK

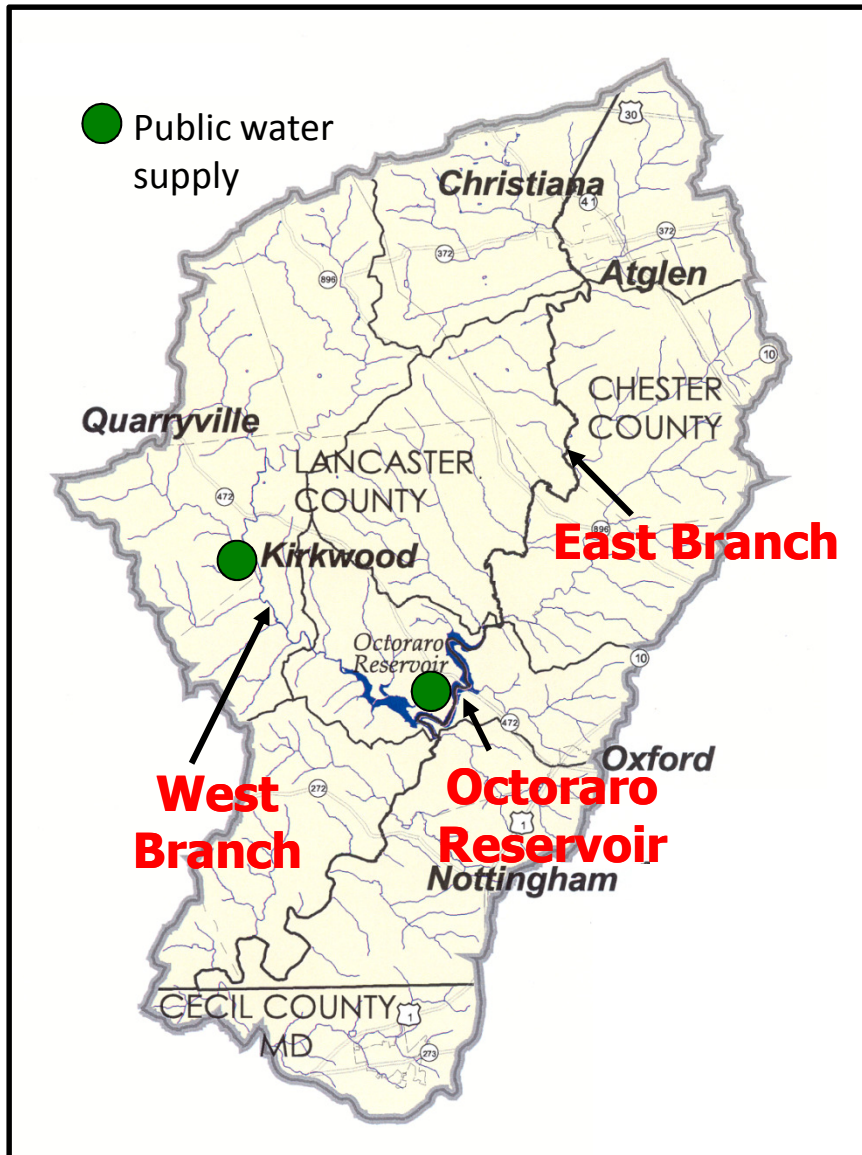


# Nitrate Comparisons Among Streams in Summer



Below Octoraro Reservoir

## Octoraro Watershed: *PUBLIC WATER SUPPLY COMPANIES*



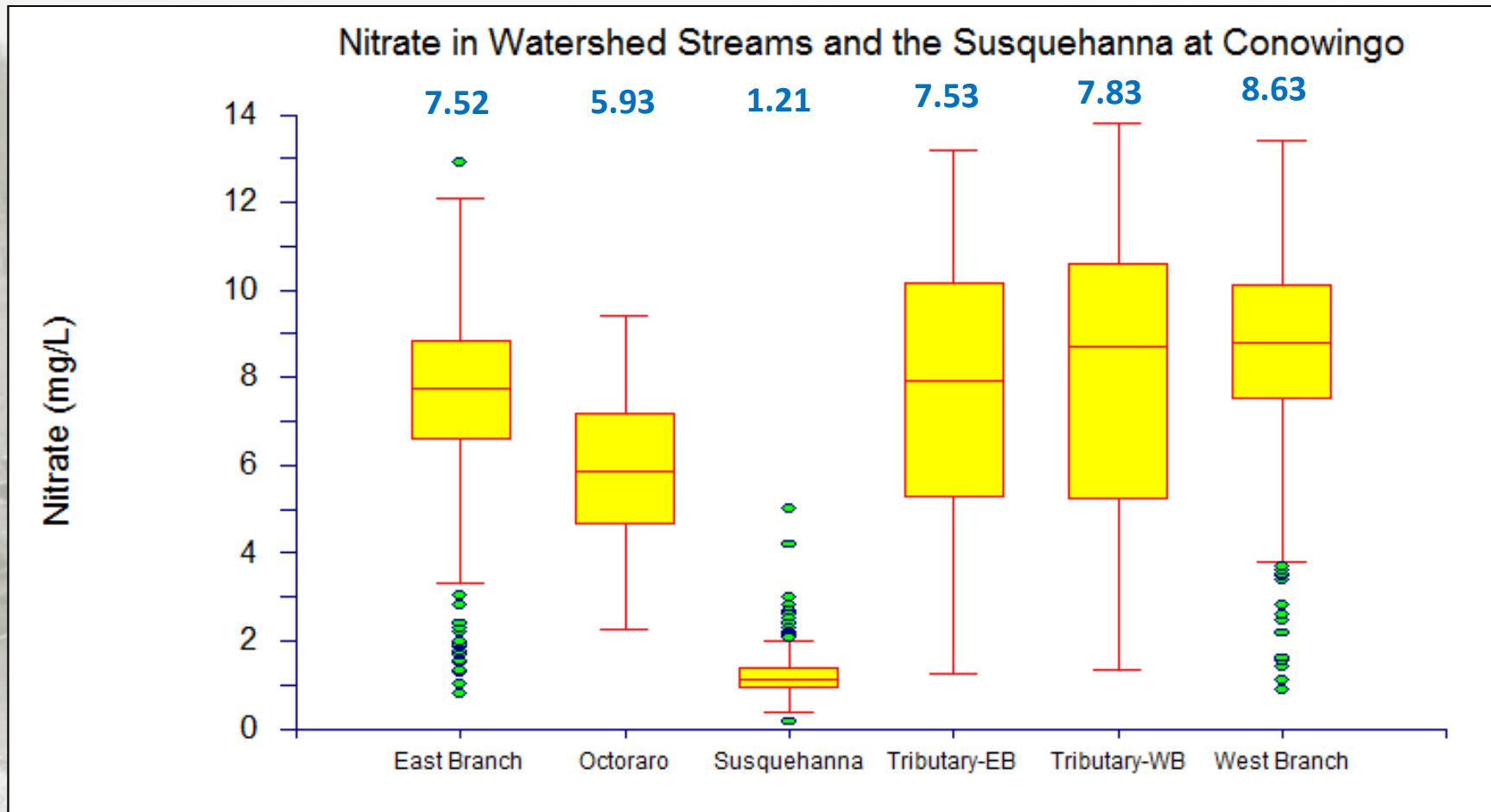
Two public water supply companies utilize Octoraro Creek.

One is not operating because of high nitrates in the West Branch of the Octoraro Creek.

The other utilizes Susquehanna River water when its normal supply, the Octoraro Creek, is high in nitrates.

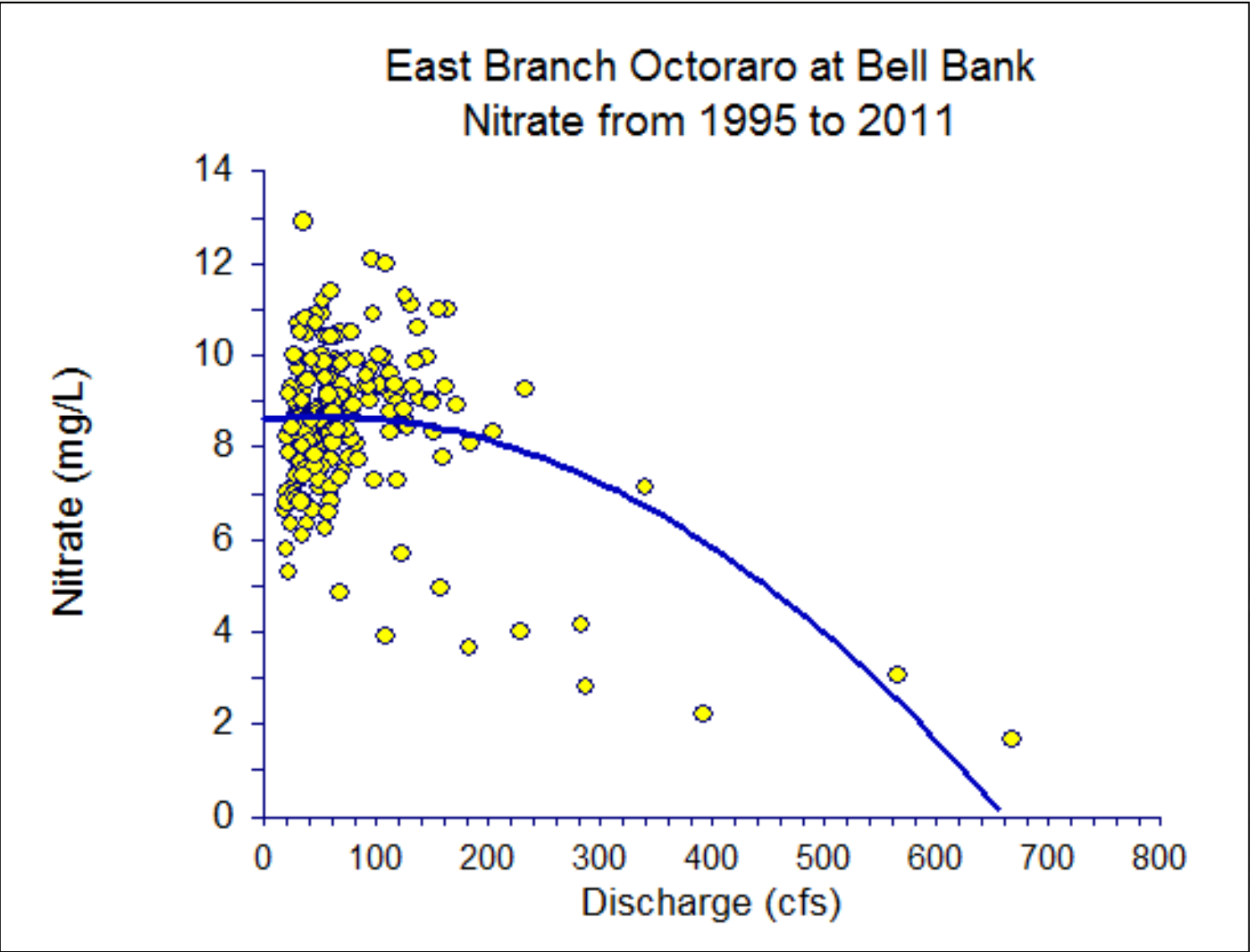
Public water suppliers in the watershed utilize Octoraro Creek water to supply over 200,000 homes.

# Nitrate Comparisons Among Streams



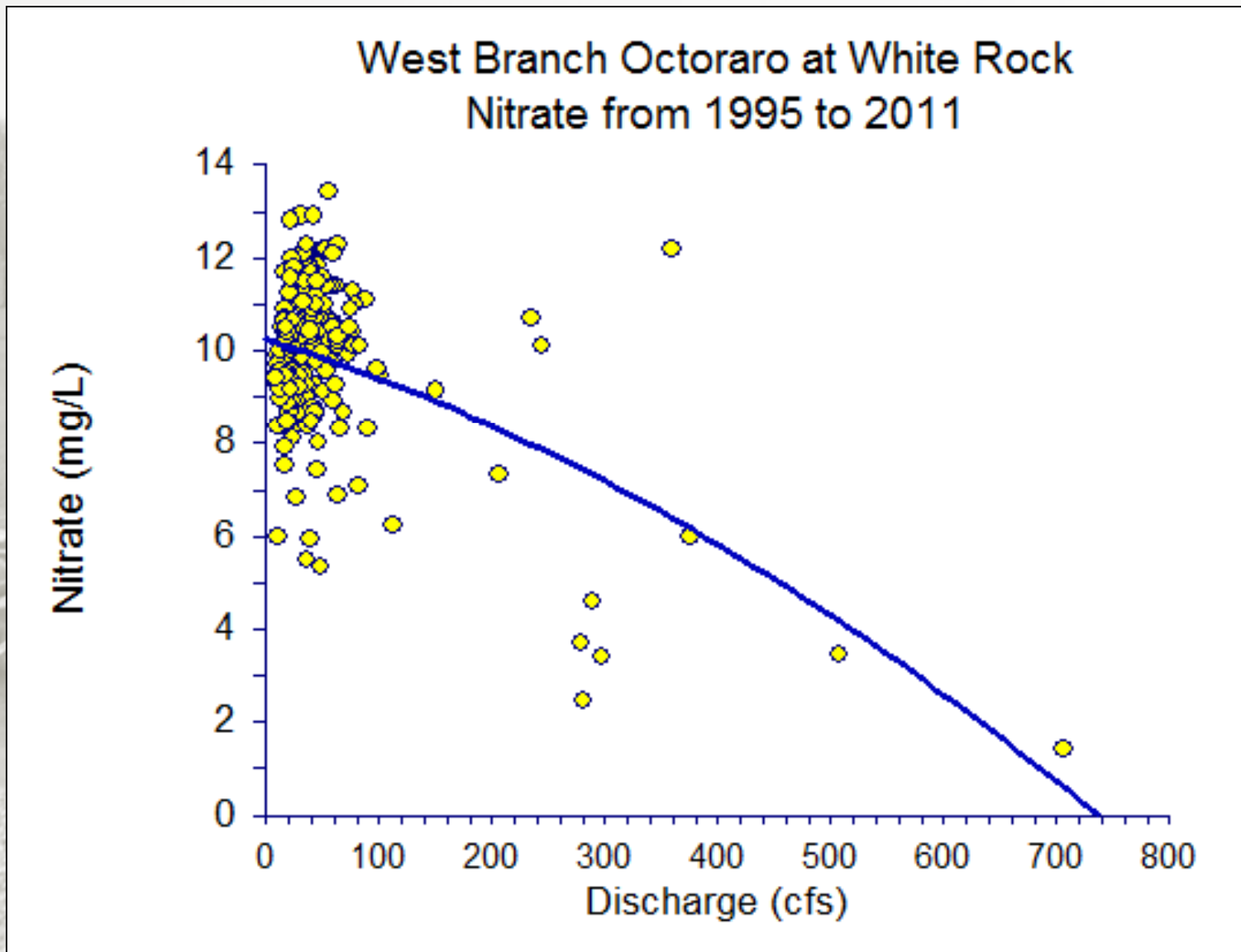


# Nitrate and Discharge from 1995 to 2011



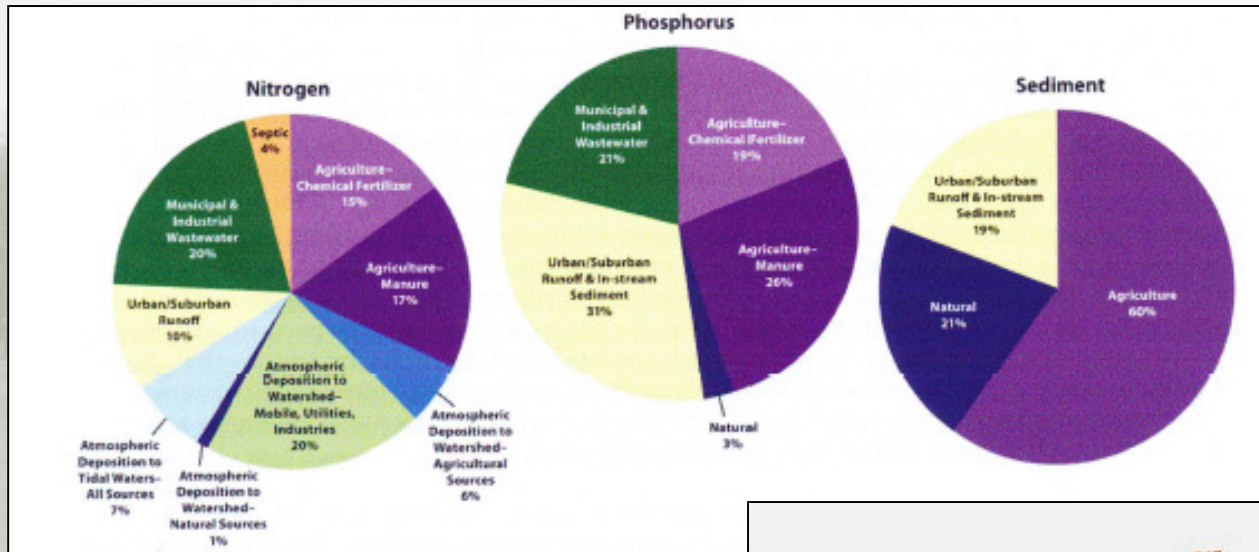
Linear (-): (P < 0.001)

# Nitrate and Discharge from 1995 to 2011



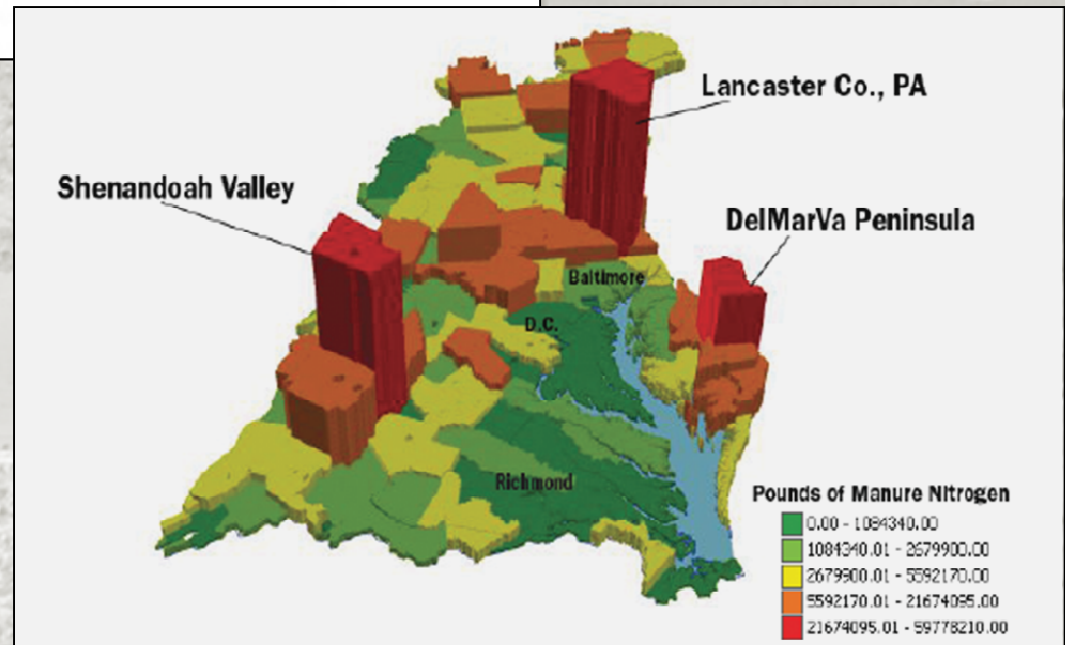
Linear (-): (P < 0.001)

# Chesapeake Bay TMDL



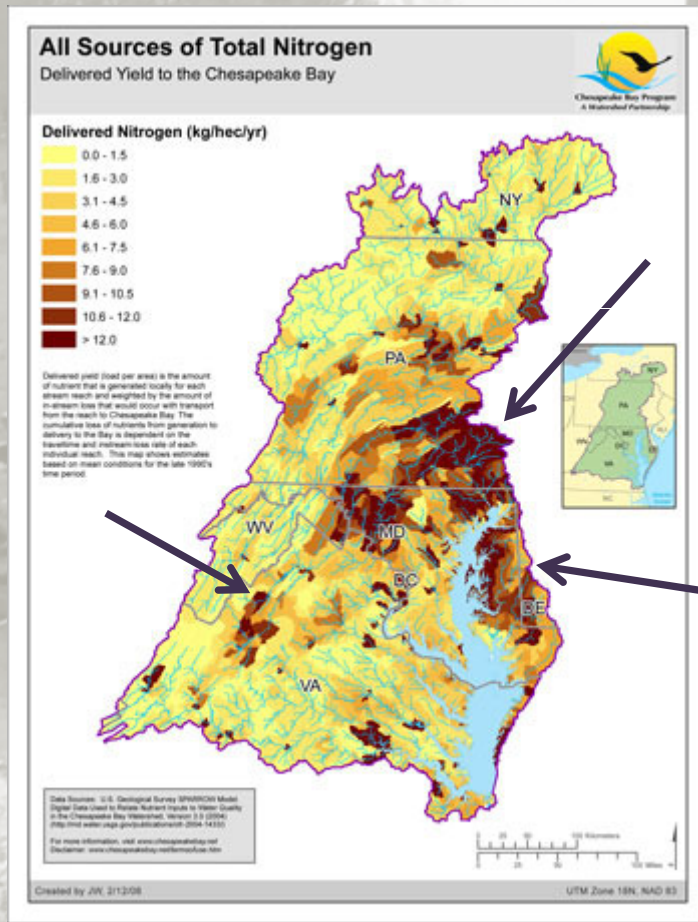
Agriculture is a major contributor of loads

Manure nitrogen targets



# AGRICULTURAL COMPLIANCE EFFORTS

## Meeting Regulatory Compliance Requirements – Implementing BMPs



### • EPA Regulatory Compliance Inspections of Farms in Bay Basin

- Lancaster County, PA
- Shenandoah Valley, VA
- Eastern Shore, MD

### • Current Efforts to Work With Farmers to Meet Compliance Requirements

- Working with Conservation Districts
- Utilizing Liaisons and Watershed Groups
- Working with Underserved Farming Communities
- Utilizing Consultants
- Encouraging Going Beyond with Voluntary BMP Implementations

## Amish Farming Draws Rare Government Scrutiny



Todd Heiser/The New York Times

Matthew Stoltzfus, left, on his farm in Lancaster, Pa., where a government program is working with Amish farmers to try to instill more environmentally sound methods for handling runoff.

By SINDYA N. BHANDU  
Published: June 8, 2010

**LANCASTER, Pa.** — With simplicity as their credo, Amish farmers consume so little that some might consider them model environmental citizens.

### Multimedia



Audio Slide Show

[A Close-Knit Farming Community](#)

### Related

[Green Blog: Propane and Other Amish Compromises \(June 9, 2010\)](#)

“We are supposed to be stewards of the land,” said Matthew Stoltzfus, a 34-year-old dairy farmer and father of seven whose family, like many other Amish, shuns cars in favor of horse and buggy and lives without electricity. “It is our Christian duty.”

But farmers like Mr. Stoltzfus are facing growing scrutiny for agricultural practices that the federal government sees as environmentally destructive. Their cows generate heaps of manure that easily washes into streams and flows onward into the Chesapeake Bay.

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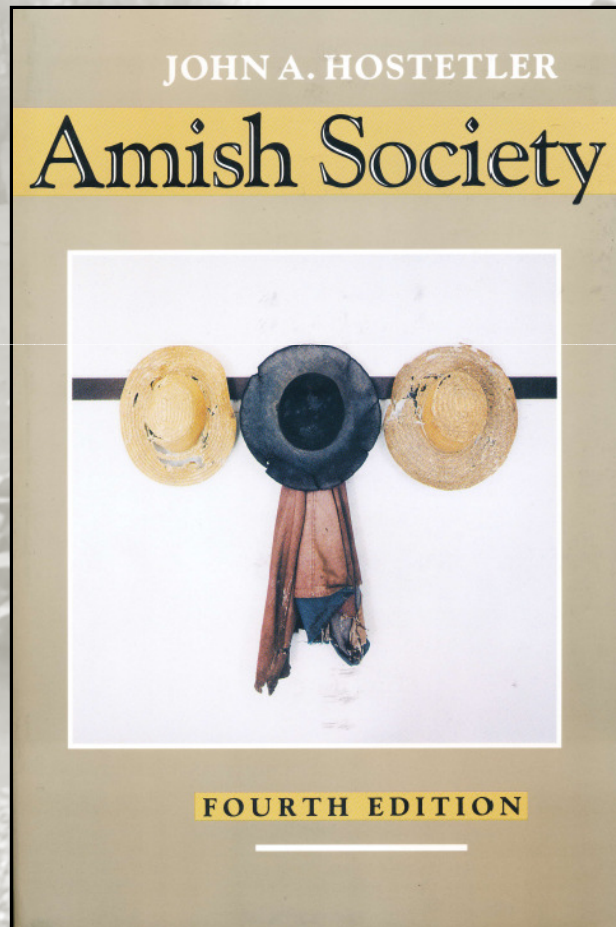
# EPA Targets Watersheds for Farm Inspections

New York Times,  
June 2010

**Octoraro  
Watershed  
Association**



## Cultural Differences: Respect and Understanding



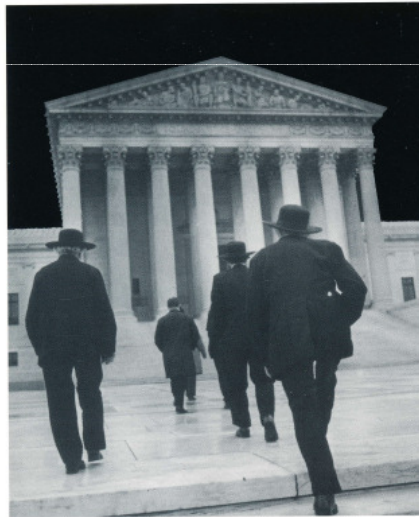
- **The OWA pioneered the approach of using Amish liaisons to work with Amish farmers**
- **Years of effort in building understanding and trust with the Amish community**
- **Respect is paramount to success**
- **Working with the bishops and churches is critical**

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## ↔ The Amish and the State

↔ SECOND EDITION



*Edited by Donald B. Kraybill*

↔ WITH A FOREWORD BY MARTIN E. MARTY

## Working with the Amish Farming Community

- Understand how the Amish interface with government
- Understand how the Amish interface with the legal system and environmental attorneys
- Recognize that the Amish, like most farmers, have been unaware of existing compliance requirements
- Understand how the Amish view farm property visitors
- Working with the County Conservation District is important to success

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Areas lacking vegetation must be addressed

#### MAIN CHANGES:

- ✓ Ch. 102 always stated plowing and tilling needed a conservation plan; now Animal Heavy Use Areas also must be covered by the conservation plan or Ag E&S plan.
- ✓ Areas within 100 ft of a stream must maintain a minimum 25% plant cover/crop residue or implement additional BMPs.



## Agricultural Environmental Regulations:

*Am I In Compliance?*



**Sediment and Erosion  
Control Requirements  
for Agricultural Activities**

January 2011



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- **Focusing on agricultural compliance on farms**
- **Utilizing grant funding to work with the Amish farming community – conservation plans**
- **Emphasizing implementation of BMPs for compliance and beyond – manure management**
- **Submitted NFWF proposal to target sites with most significant impacts (*Strategic Load Reductions in the Octoraro Creek Watershed*)\***
- **Working with Conservation Districts and the EPA for compliance and BMP implementations on farms**
- **Preserve agricultural heritage and respect our cultural diversity**

\* NRCS CEAP (2011): *Assessment of the Effects of Conservation Practices on Cultivated Cropland in the Chesapeake Bay Region*