

Understanding and Implementing TMDLs: Role of Volunteer Monitoring



What is a TMDL?

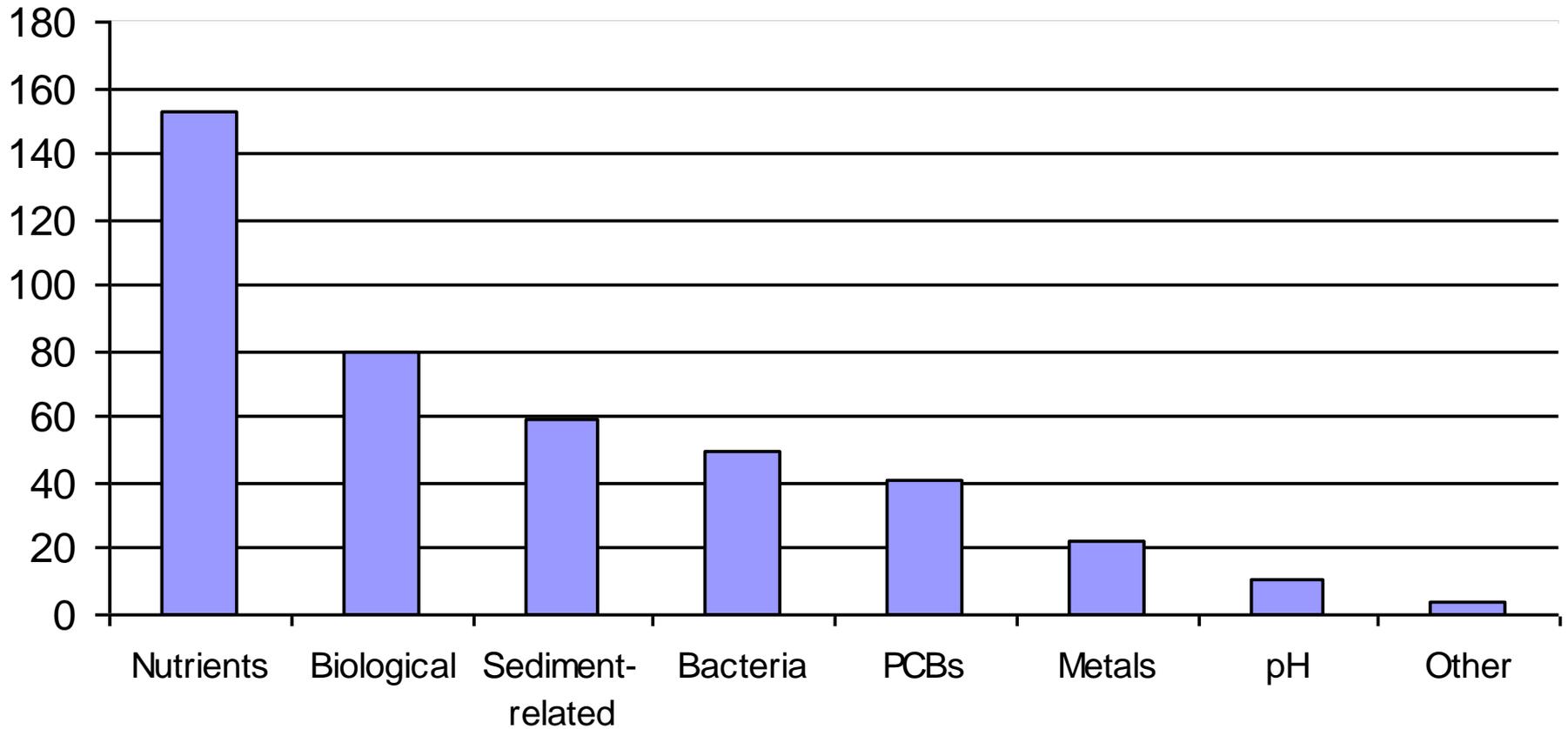
- **Total Maximum Daily Load**
- **Requirement under the federal Clean Water Act**
- **Establishes the maximum amount of an impairing substance or a stressor that a waterbody can assimilate and still meet water quality standards**
- **Allocates load among pollution contributors (i.e., point and non-point sources)**

Sequential Management Process Under Federal Clean Water Act

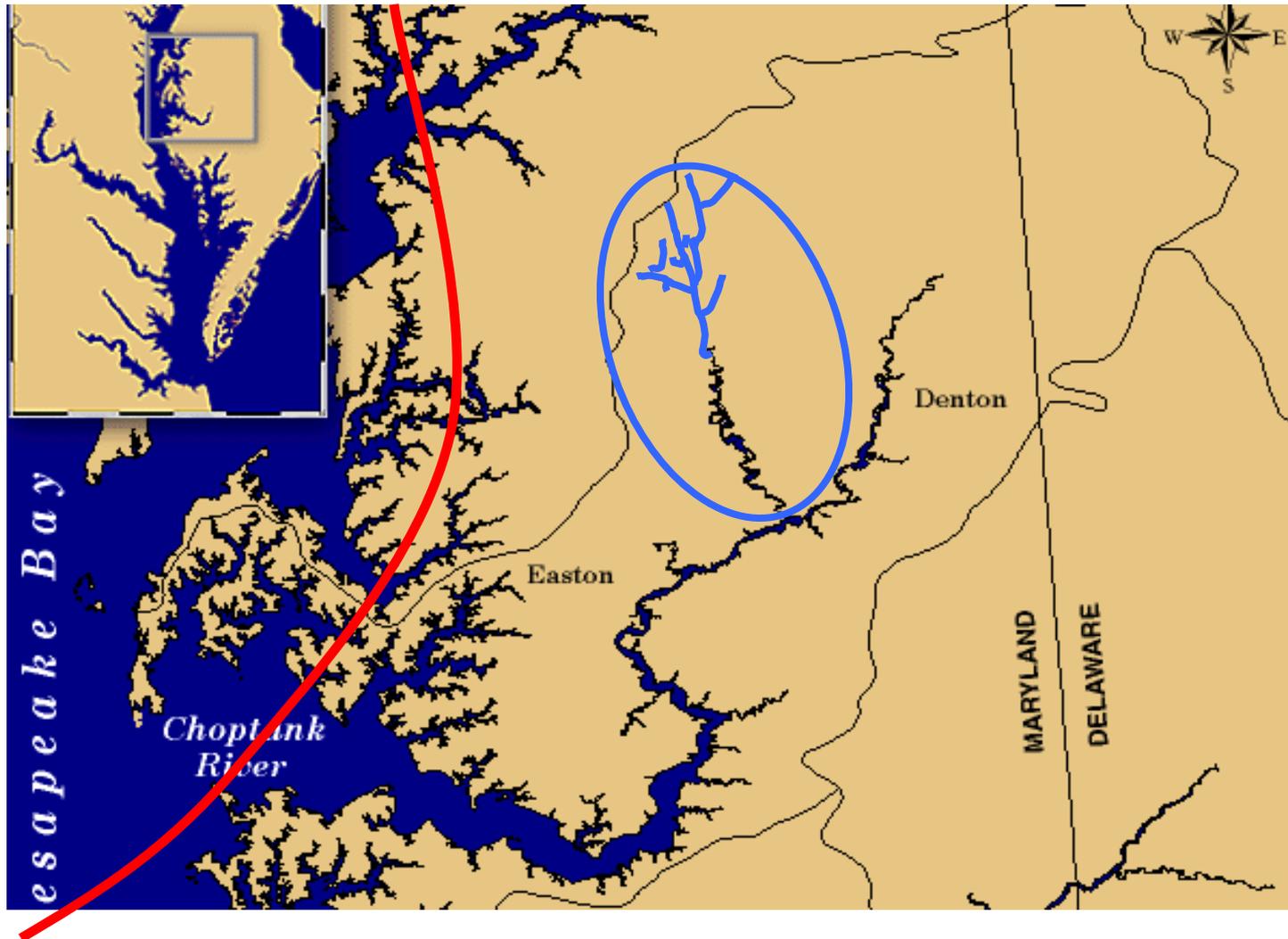
- **Set Water Quality Standards**
- **Monitor Waters & Manage Data**
- **Assess Waters: Compare with Standards**
- **Identify Impaired Waters on 303d List**
- **Develop TMDLs**
- **Implement TMDLs**

Different Types of Impairments

Number of Listings on Part 5 of the Integrated Report



Different Geographic Scales



Two Key Classes of Impairments

Near-field:

- Physical Stream Degradation**
- “Biological” Impairment**



Two Classes of Impairments (Con't)

Far-field:

- **Downstream Effects of Nutrients & Sediments**



Purposes for Monitoring

Restoration:

- To Identify Problems, e.g, 303(d) Listing
- To Support Model Development
- To Identify Sources/Causes of Problems
- To Assess Improvements in Water Quality
 - Monitor to Determine a Baseline Prior to Improvements
 - Monitor to Evaluate Effect of Improvements

Purposes for Monitoring (Con't)

Protection:

- To Identify High Quality Waters
- To Assess Whether Protection Policies are Preserving High Quality Waters

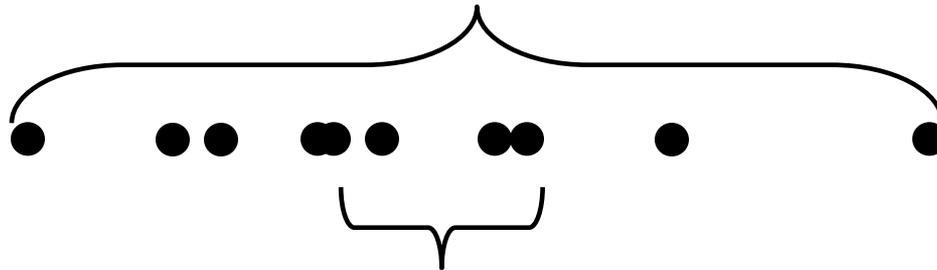
Research:

- Setting Water Quality Standards
- Evaluating Best Management Practices
- Etc.

Education: Community and Government

Observing Changes in Highly Variable Data

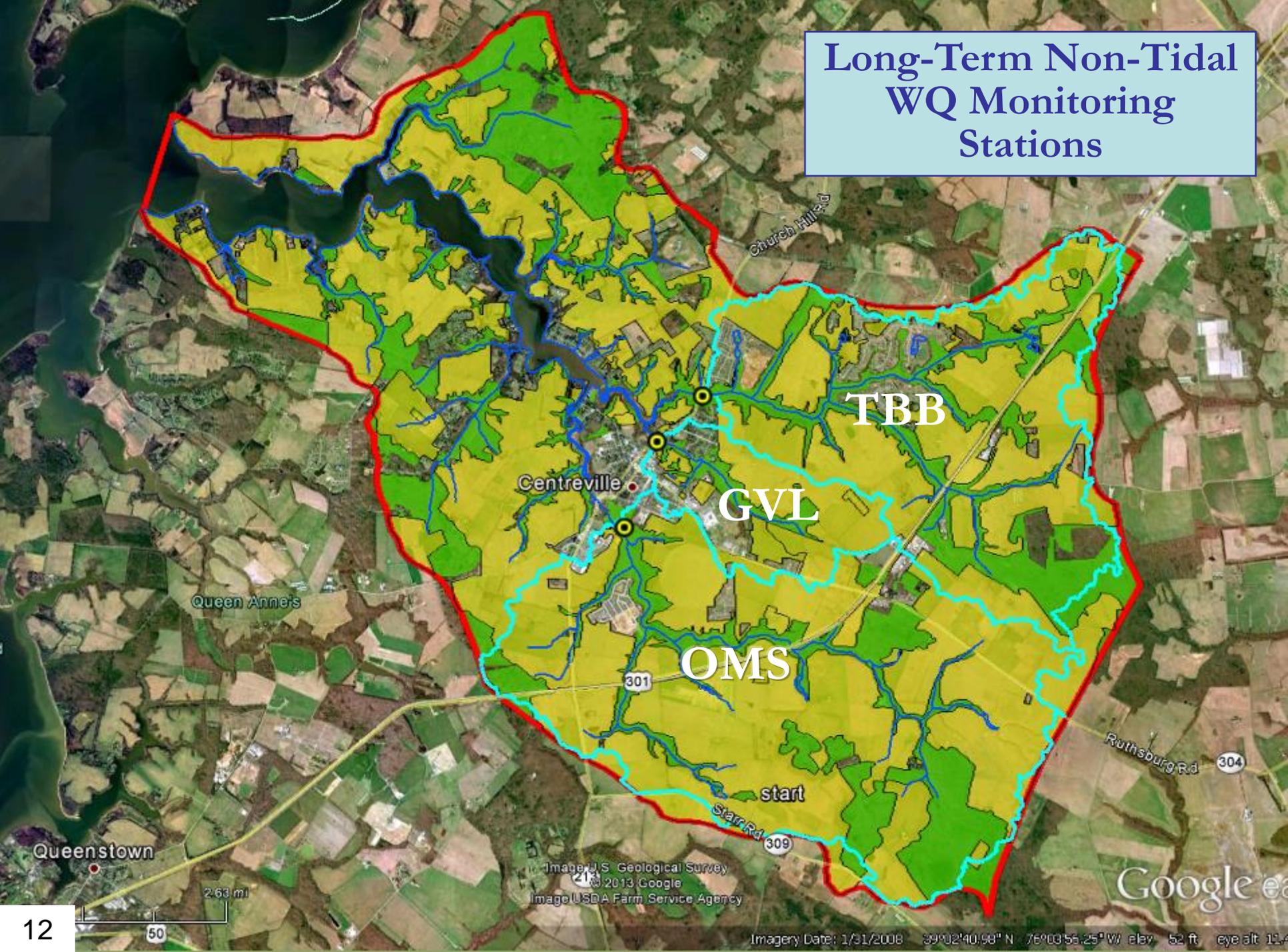
If Natural Variability is This Much,
on the Scale Below...



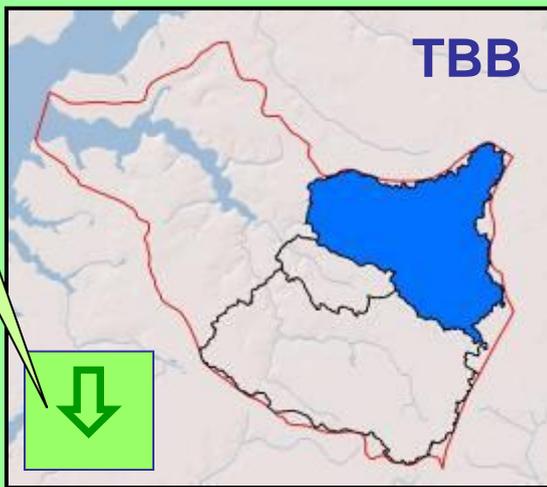
Then it is hard to see
a small change
of This Much



Long-Term Non-Tidal WQ Monitoring Stations



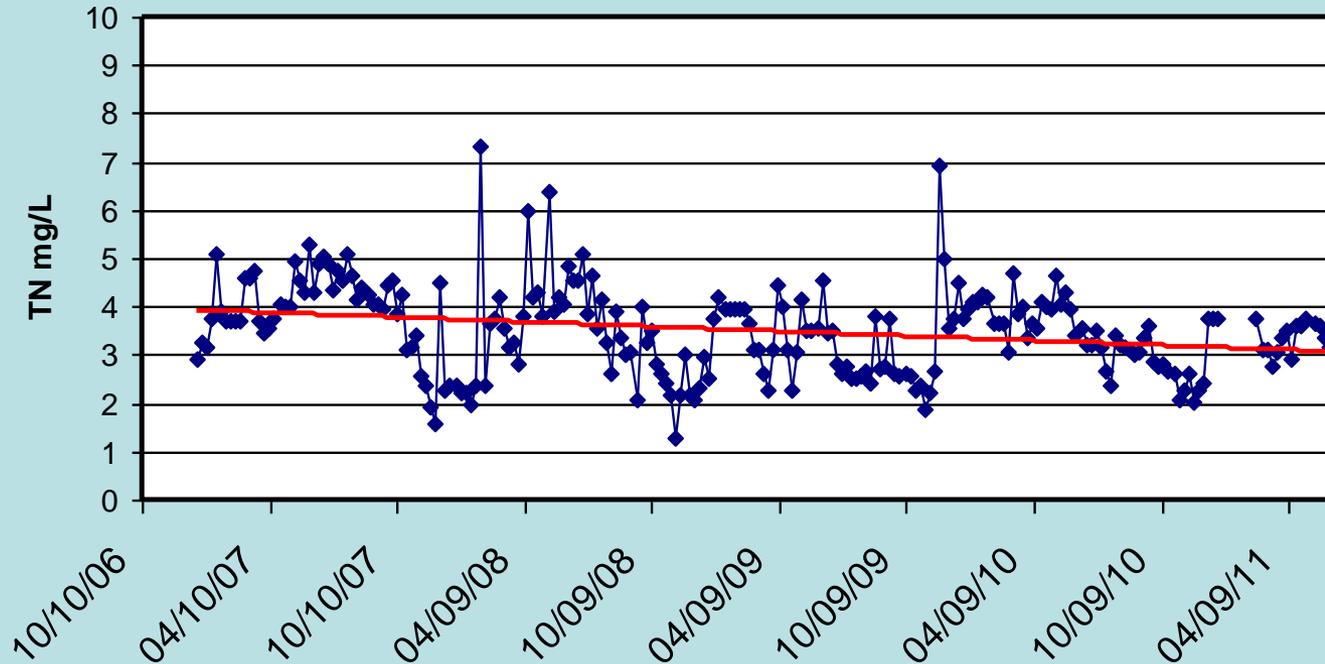
Statistically significant Decline... Includes Statistical Analysis by Jean Spooner, PhD



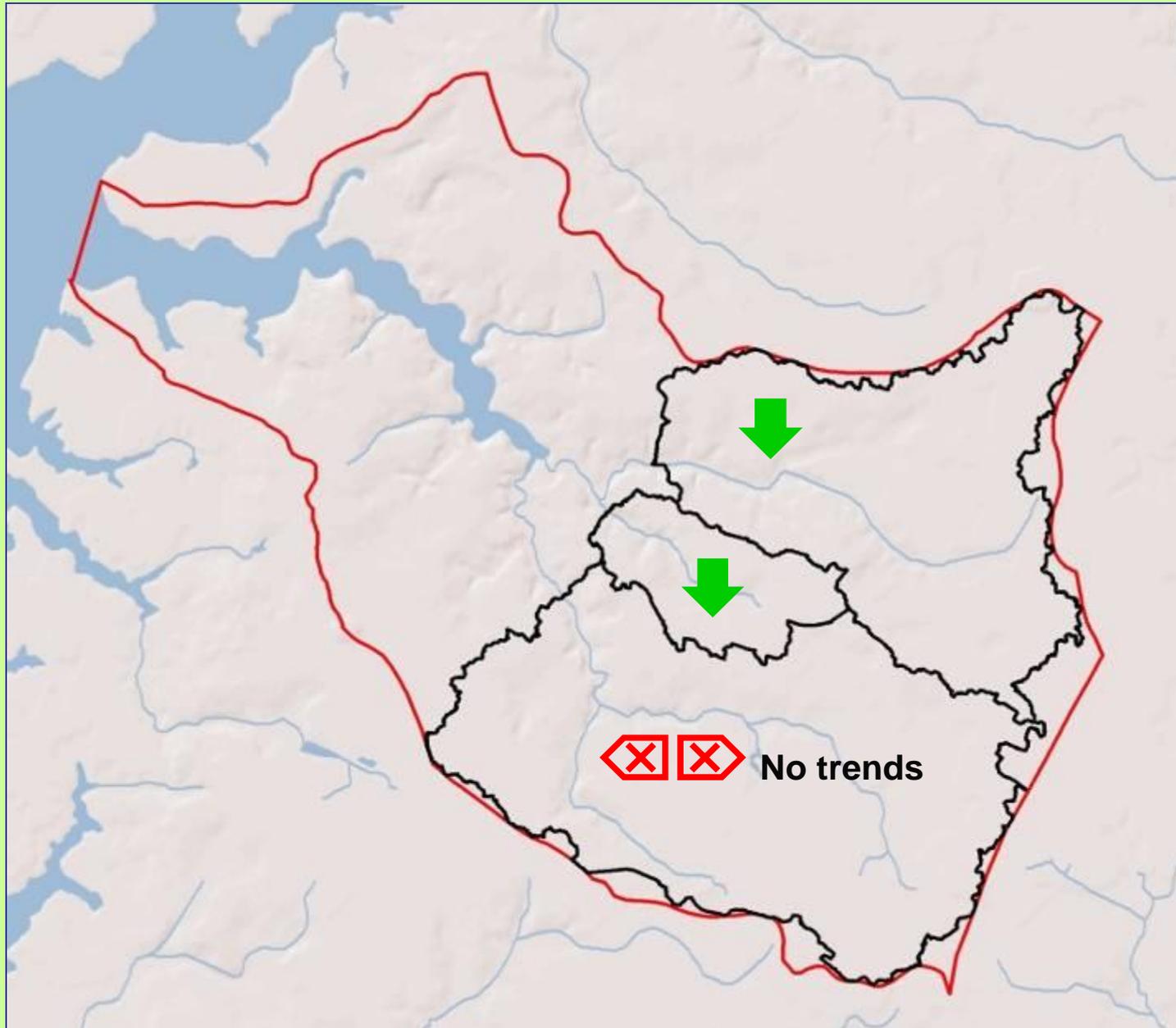
Total Nitrogen

Statistic	TN mg/L
Minimum	1.3
Maximum	7.3
Mean	3.5
Approximate Reduction	1.0

Three Bridges Branch Weekly Composite (TN mg/L)



TN & TP Concentration Trends Summary



Synoptic Monitoring Sites & Sub-Watersheds
Average NO₂3 mg/l (Spring 2005 to 2011)

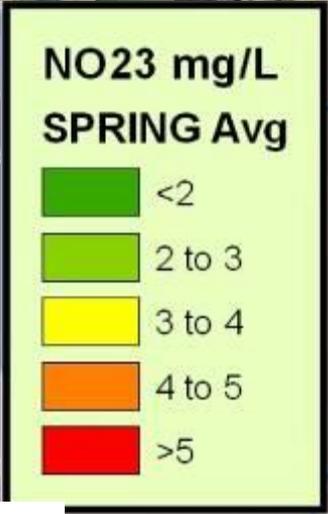
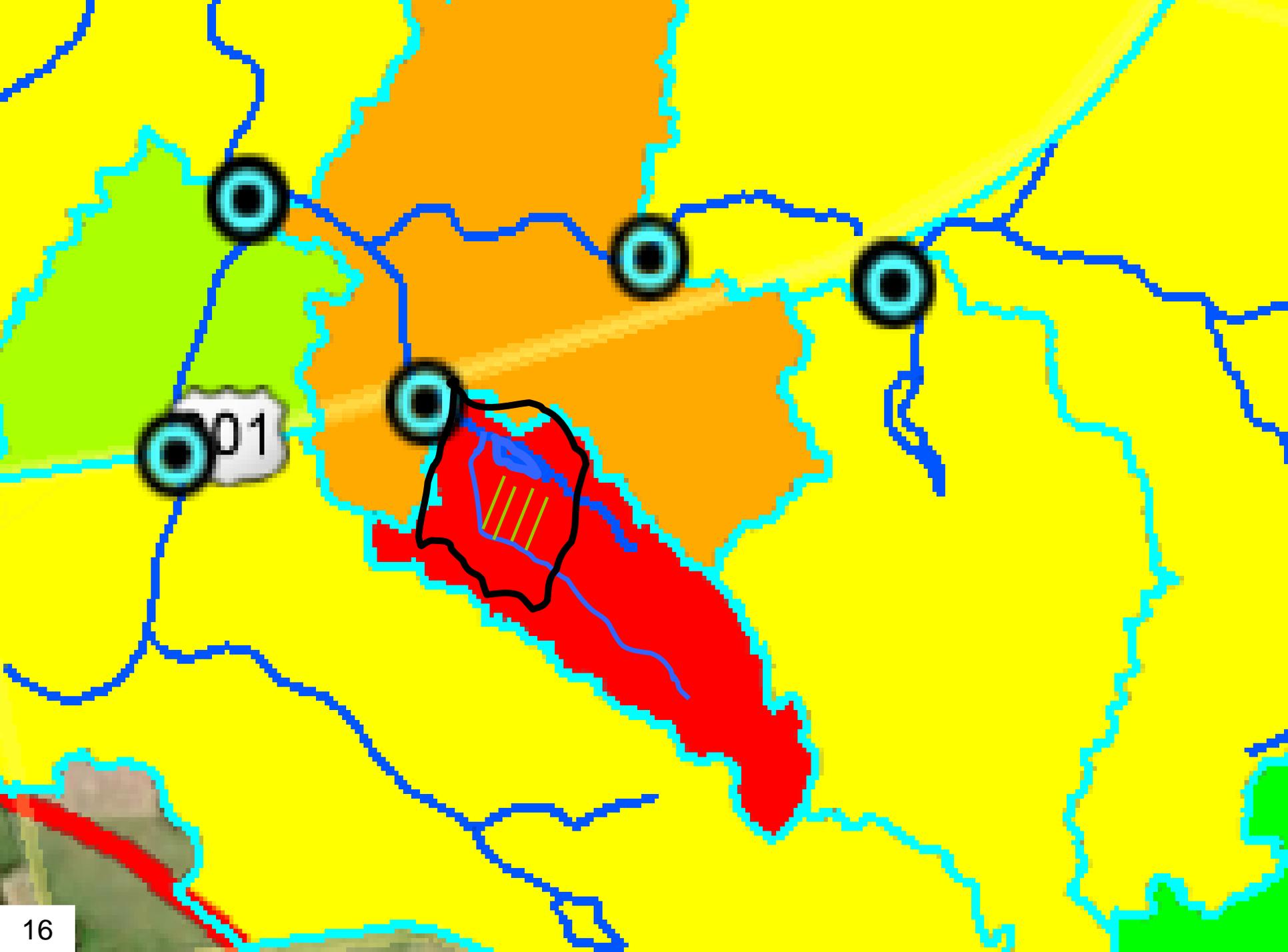


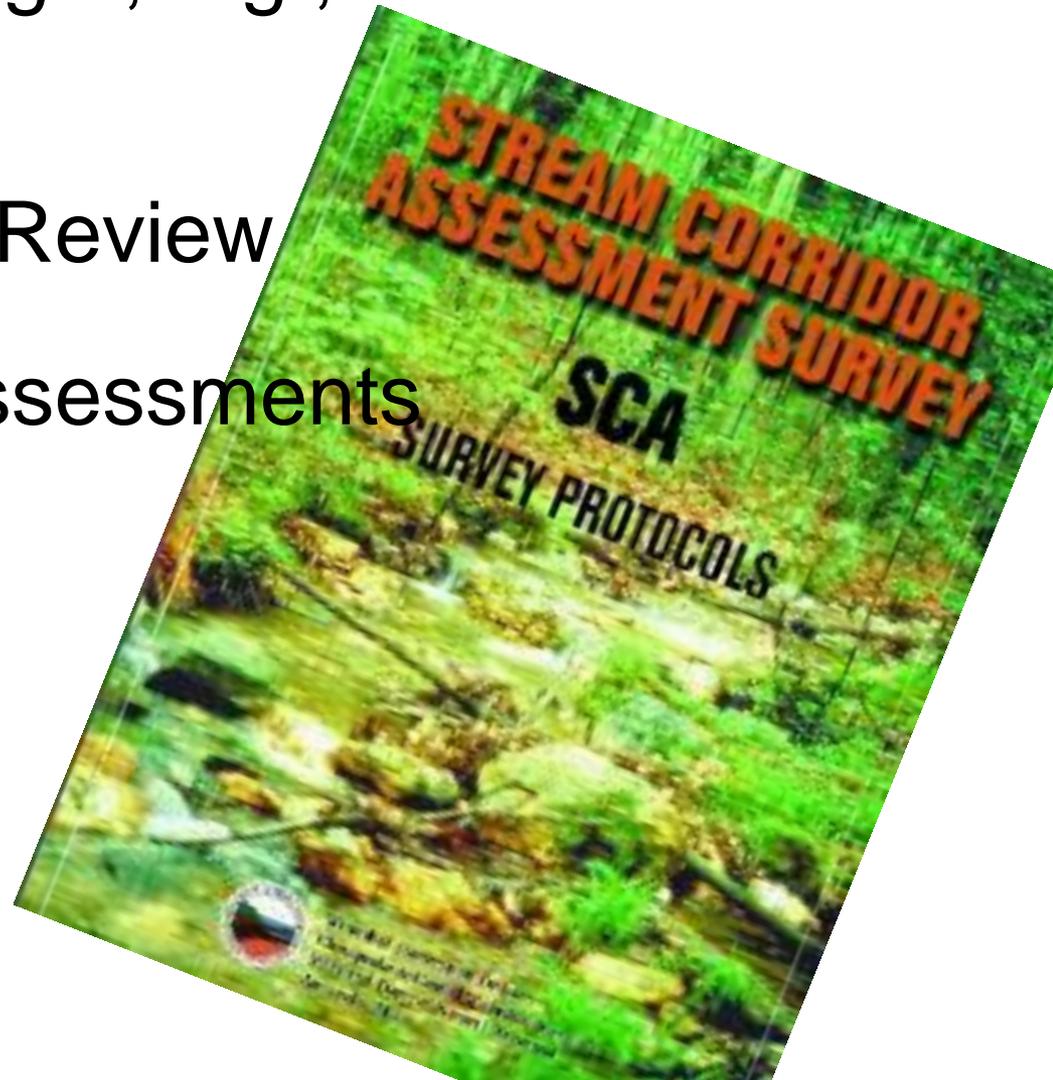
Image U.S. Geological Survey
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Image USDA Farm Service Agency

Google earth



Alternative “Monitoring”

- Compliance Oversight, e.g., Construction Site “Mud Busters”
- Records and Data Review
- Stream Corridor Assessments



Discussion



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