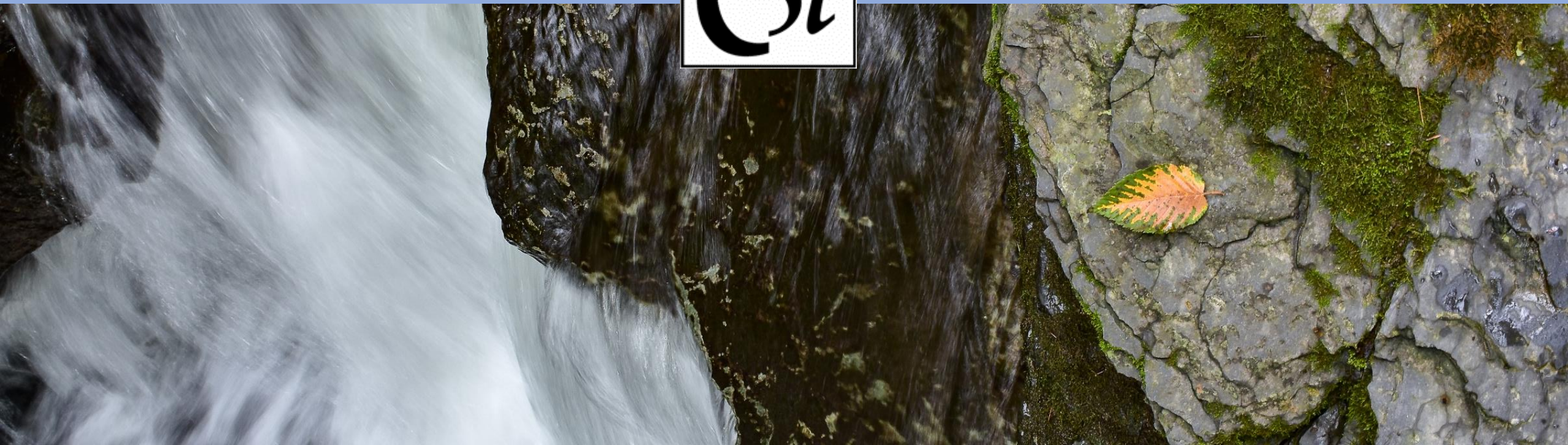
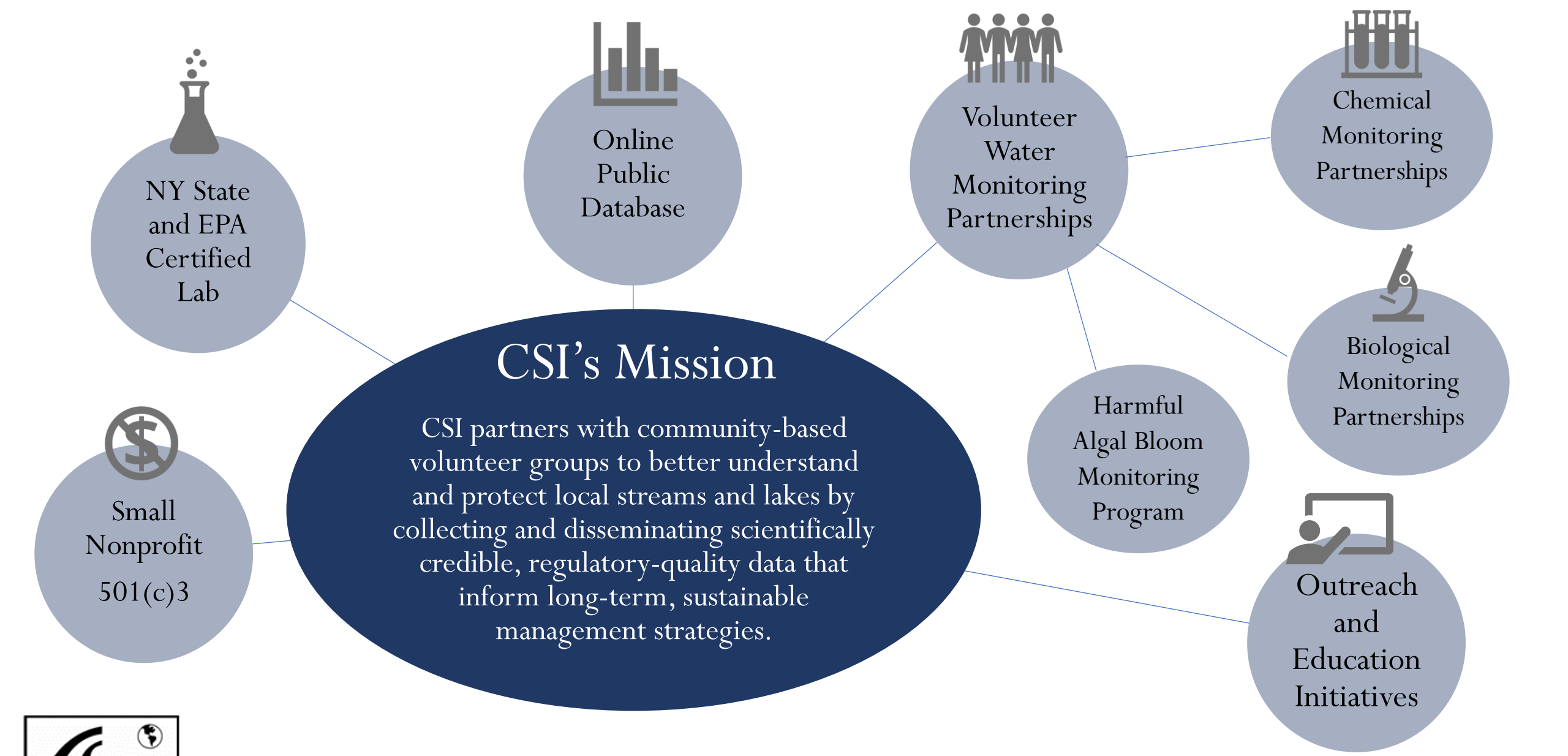
# Monitoring Regional Water Quality with Community Partnerships

By Nathaniel Launer, *Outreach Coordinator, Cayuga Lake HABs Monitoring Program Coordinator*






# The Community Science Institute

# Our Certified Lab

Community Science Institute lab is certified by the New York State Department of Health-Environmental Laboratory Approval Program (NYSDOH-ELAP) under National Environmental Laboratory Accreditation Conference (NELAC) guidelines.

The lab is certified in potable and non-potable methods to test for chemical and microbiological parameters of water quality.

Our community monitoring partnership programs are guided by a Quality Assurance Project Plan.

Maintaining a certified lab is hard work!

- Quality assurance and quality control measures are extensive
- Inspections are rigorous
- Quality Assurance Project Plans must be updated regularly

**So why make the effort?**

1. Certified data can be used for regulatory purposes and to help guide and inform management decisions.

2. Certification allows CSI to address the communitie's potable water testing needs.

# Online Public Database

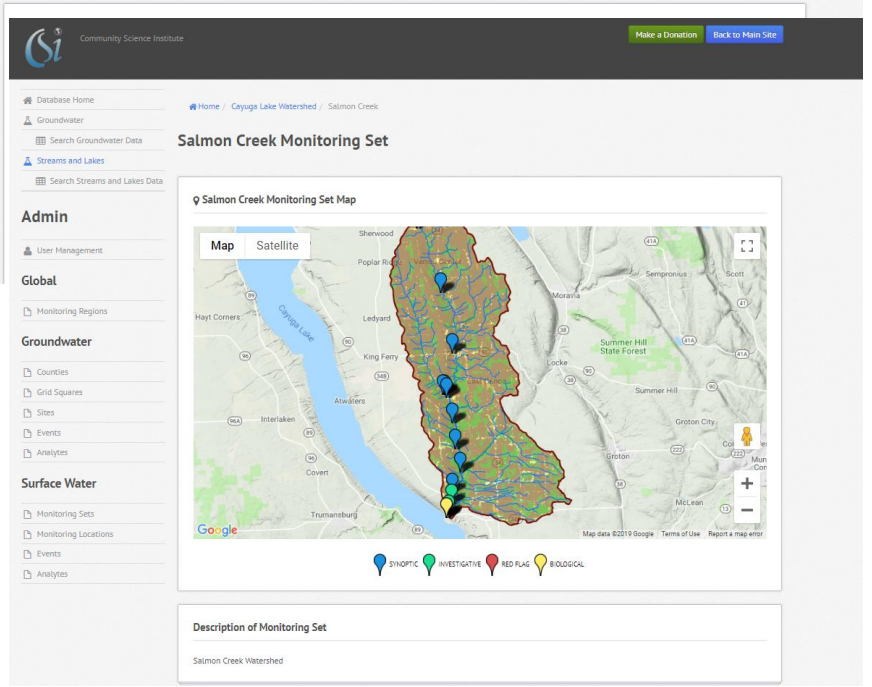
All of the data that we collect with our volunteer partnerships is archived in CSI's online public database. It can be accessed free of charge at **database.communityscience.org**

- The data can be easily viewed or downloaded

The database currently has over 60,000 regulatory quality measurements of water quality.

The purpose of the public database is to disseminate scientifically credible results to the public, to local and regional stakeholders, and to government agencies in order to improve water resource understanding and management.





# Where do we monitor?

## Watersheds

Cayuga Lake Watershed
- 16 sub-watersheds

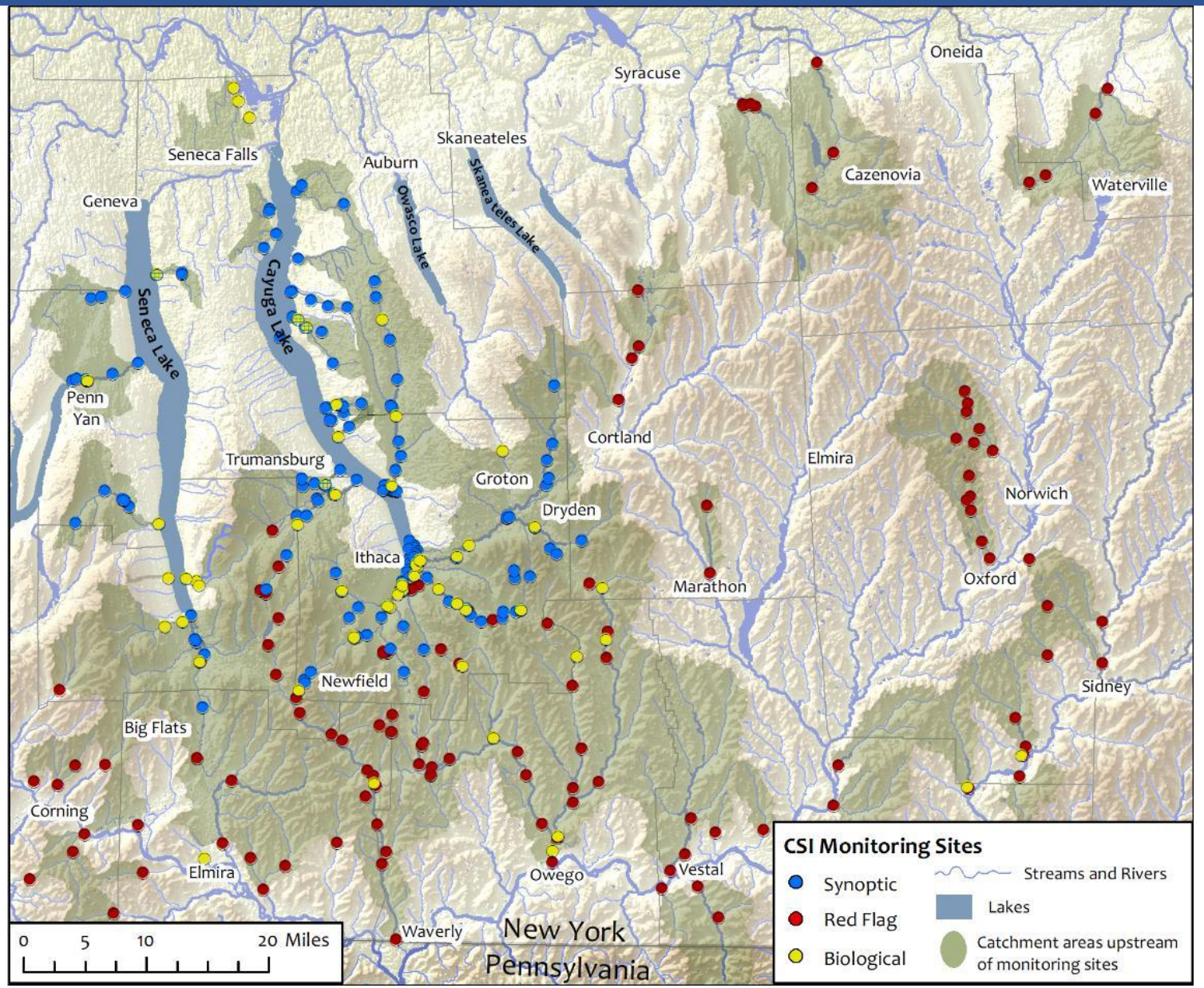
Seneca Lake Watershed
- 5 sub-watersheds

Upper Susquehanna River Watershed
- 18 sub-watersheds

## Lakes

Cayuga Lake

Keuka Lake



# Synoptic Stream Monitoring - Since 2003

Synoptic Sampling partnerships produce continuous long-term data sets that inform ongoing water resource management by local and regional governments while simultaneously empowering citizens to become stewards of their local streams.

## Synoptic Sampling Process

**Sample**

Water samples are collected by teams of volunteers three to four times a year including once under storm water conditions. Sampling of a single stream occurs in a single day to get a "snap-shot" of water quality.

**Transport to CSI Lab**

Volunteers bring samples to CSI's certified lab and complete a chain of custody.

**Certified Lab Analysis**

Samples are analyzed by CSI staff using certified methods.

**Online Database**

Test results are entered into CSI's online public database.

**www.database.communityscience.org**

The primary focus of the program is to monitor nutrients, sediment, and pathogenic bacteria to build long-term datasets of regulatory quality data for each sub-watershed and to identify sub-watersheds and catchment areas that may be contributing disproportionately to pollutant loading.

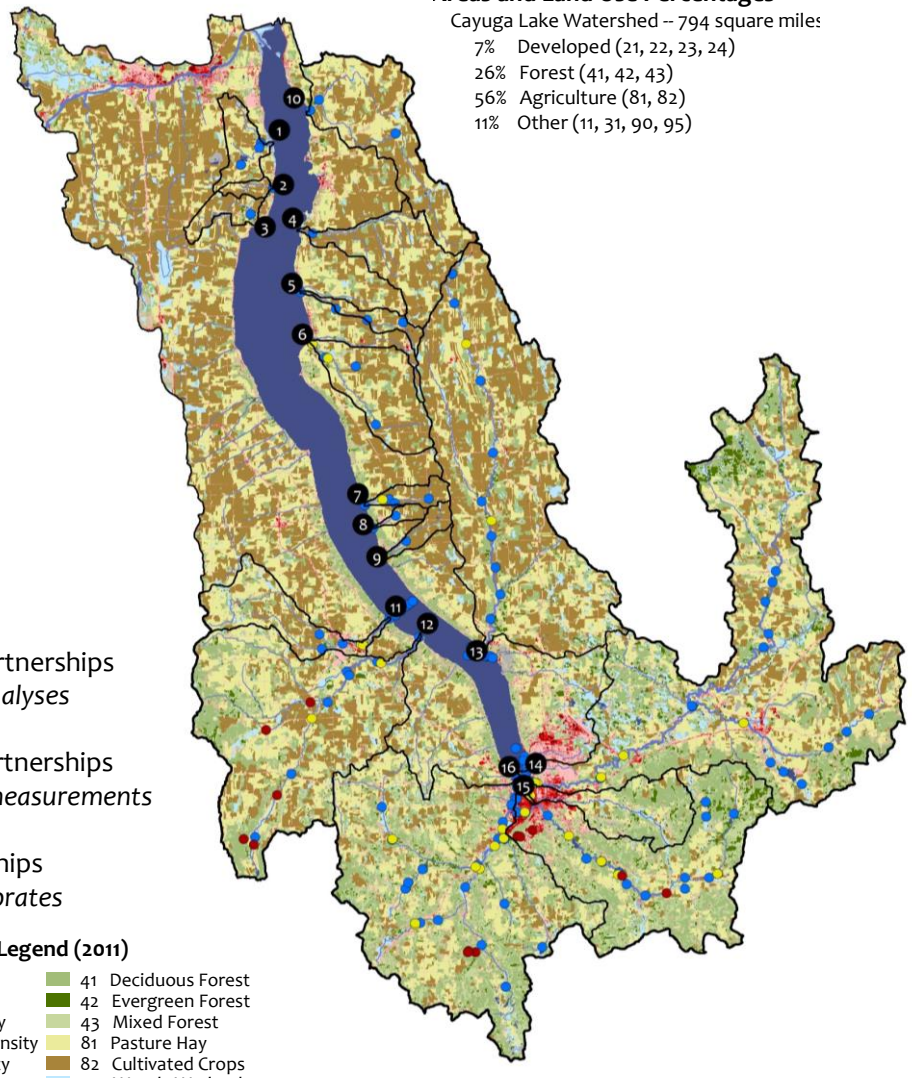
Certified laboratory analysis of the following analytes:

- Total Phosphorus
- Soluble Reactive Phosphorus
- TC/ E.coli
- Total Nitrogen
- Total Suspended Solids
- Turbidity
- pH
- Temperature
- Total Kjeldahl nitrogen,
- Alkalinity
- Chloride
- Conductivity
- Total hardness
- Sulfate

# Monitoring Nutrients - Cayuga Lake watershed

Monitored Sub-Watersheds

1. Canoga Creek
2. Williamson Creek
3. Burroughs Creek
4. Great Gully
5. Deans Creek
6. Paines Creek
7. Mills Creek
8. Town Line Creek
9. Lake Ridge Creek
   Milliken Creek
10. Yawger Creek
11. Trumansburg Creek
12. Taughannock Creek
13. Salmon Creek
14. Fall and Virgil Creek
15. Six Mile Creek
16. Cayuga Inlet



**Areas and Land Use Percentages**

Cayuga Lake Watershed -- 794 square miles

- 7% Developed (21, 22, 23, 24)
- 26% Forest (41, 42, 43)
- 56% Agriculture (81, 82)
- 11% Other (11, 31, 90, 95)

Synoptic Monitoring Partnerships
*Certified laboratory analyses*

Red Flag Monitoring Partnerships
*Quality-assured field measurements*

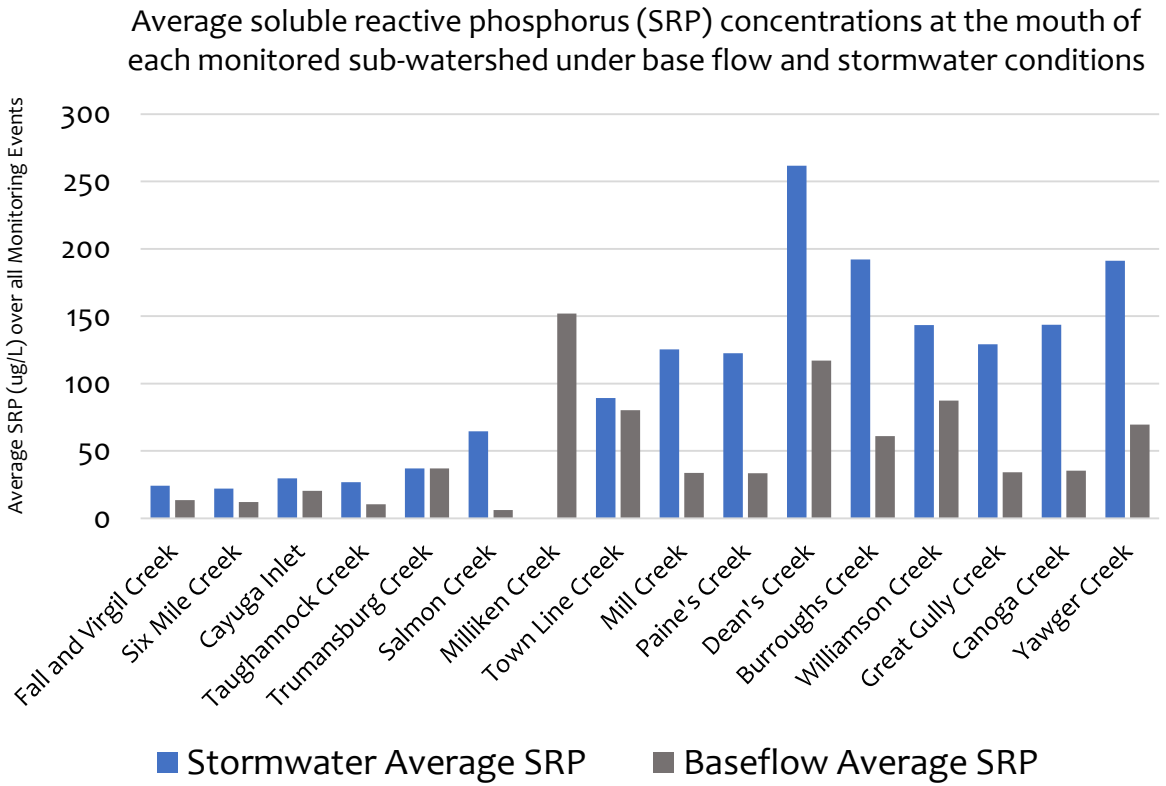
Biomonitoring Partnerships
*Benthic macroinvertebrates*

**NLCD Landcover Classification Legend (2011)**

- 11 Open Water
- 21 Developed, Open Space
- 22 Developed, Low Intensity
- 23 Developed, Medium Intensity
- 24 Developed, High Intensity
- 31 Barren Land
- 12, 51, 52, 71, 72, 74 Other
- 41 Deciduous Forest
- 42 Evergreen Forest
- 43 Mixed Forest
- 81 Pasture Hay
- 82 Cultivated Crops
- 90 Woody Wetlands
- 95 Emergent Herbaceous Wetlands

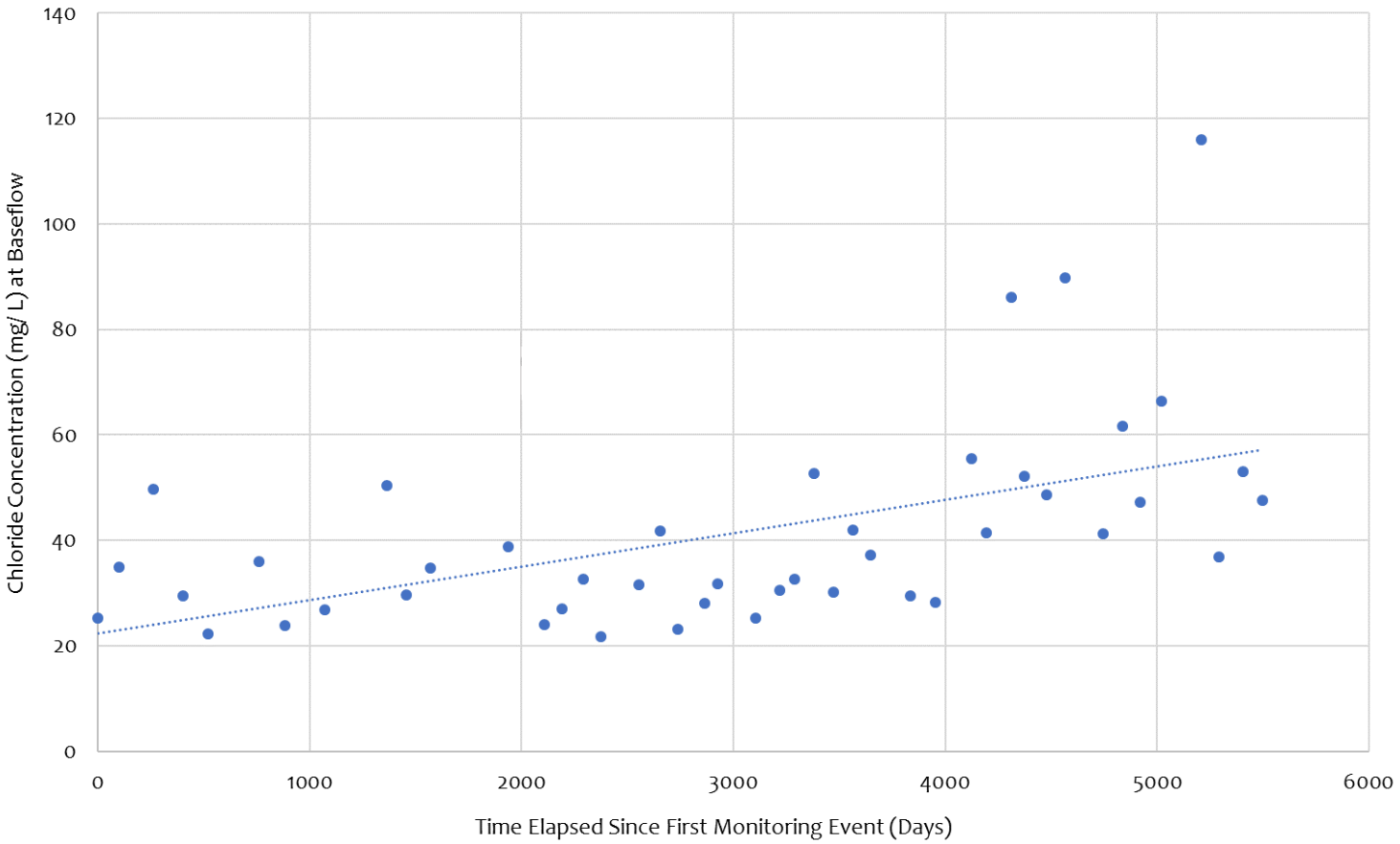
Identify sub-watersheds and catchment areas that may be contributing disproportionately to pollutant loading.

Obtain nutrient loading estimates that are sufficient to focus and inform watershed management efforts.



# Monitoring Chloride - Strengths of Long-Term Datasets

Upward Trend of Base Flow Chloride Concentrations at the mouth of Fall Creek, 2003-2018, is 2.34 mg/L/year




Long-term datasets of Chloride concentrations indicate and upward trend in multiple sub-watersheds.

Emphasizes the importance of long-term datasets to help reveal non-point source pollution and document long-term water quality trends.

# Red Flag Monitoring - Since 2009

Red Flag monitoring groups collect long-term data sets that establish baseline water quality in small streams for which little or no data exists. Water quality measurements are performed monthly in the field using kits and meters.

Red Flag Monitoring Process

**Sample** — Water samples are collected by teams of volunteers once a month.

**Analyze** — Volunteers analyze samples in the field and record results on field data sheets.

**Review** — Volunteers mail or deliver their field data sheets to the CSI lab where results and quality controls are reviewed by CSI staff.

**Online Database** — After review, results are entered into CSI's online public database by CSI staff, provided data quality objectives are met.

**www.database.communityscience.org**

Primary focus is to establish baseline water quality and monitor for possible impacts.

Stream samples are tested in the field for five analytes monthly using portable kits and meters by trained volunteers.

- Temperature
- pH
- Conductivity
- Total Hardness
- Dissolved Oxygen

Trained volunteers also collect nutrient samples twice a year and send them to the CSI lab for certified analyses of

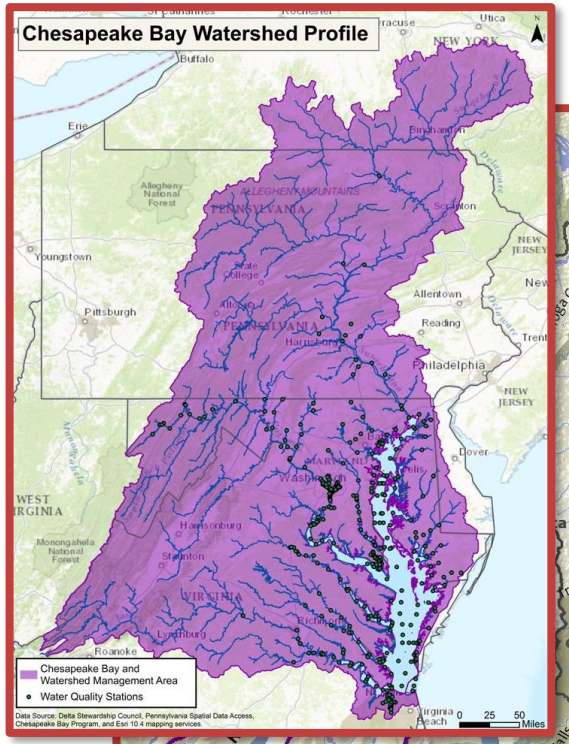
- Total Phosphorus
- Nitrate + Nitrite Nitrogen
- Ammonia

# Red Flag Monitoring - Large Geographic Extent

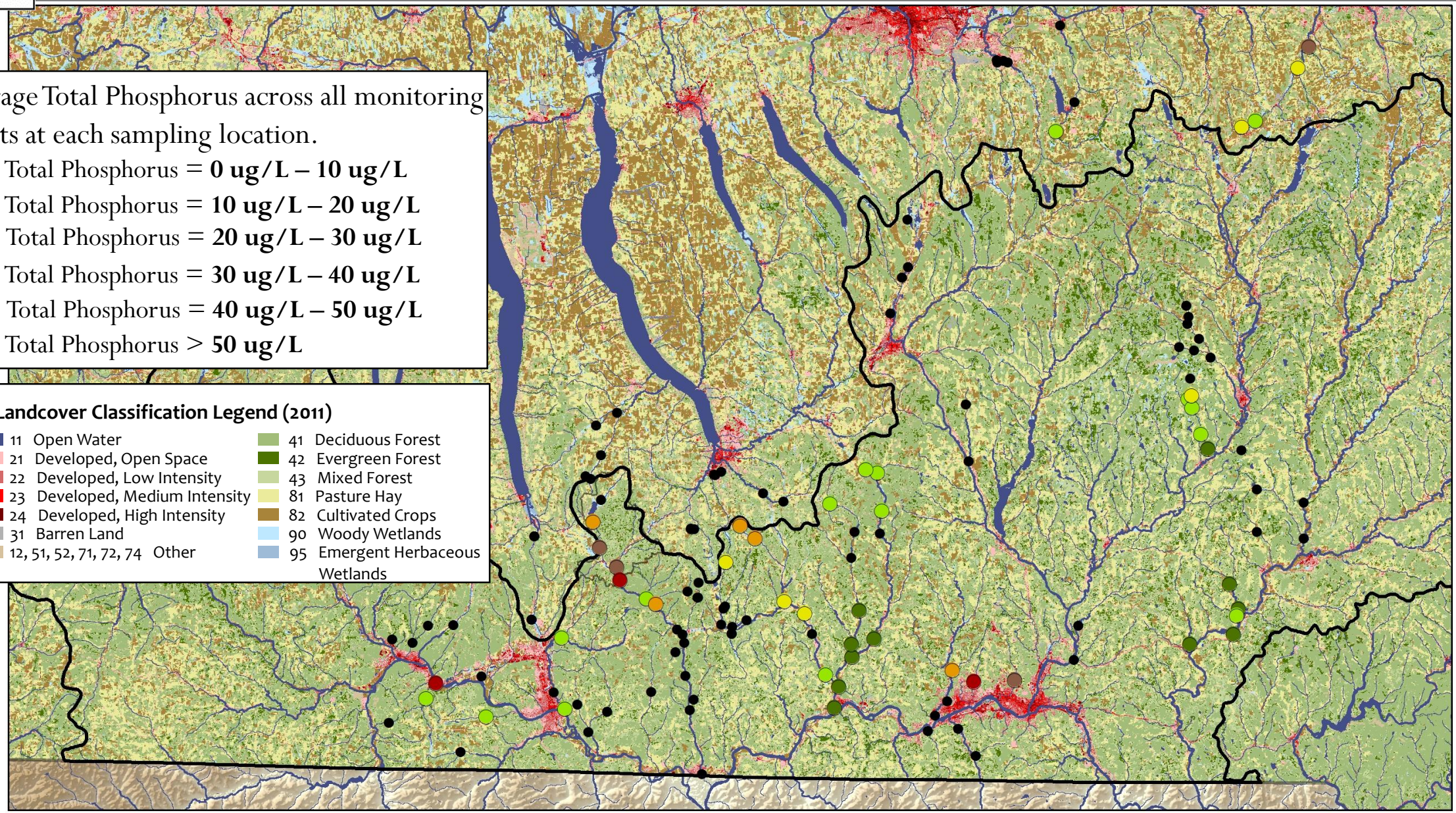
Most of the Red Flag monitoring locations are within the Upper Susquehanna River watershed of the larger Chesapeake Bay watershed.
- 18 sub-watersheds monitored in the Upper Susquehanna River watershed

This regional monitoring program helps to compile long-term datasets which characterize local water quality and show temporal and spatial variation in water quality across many sub-watersheds.

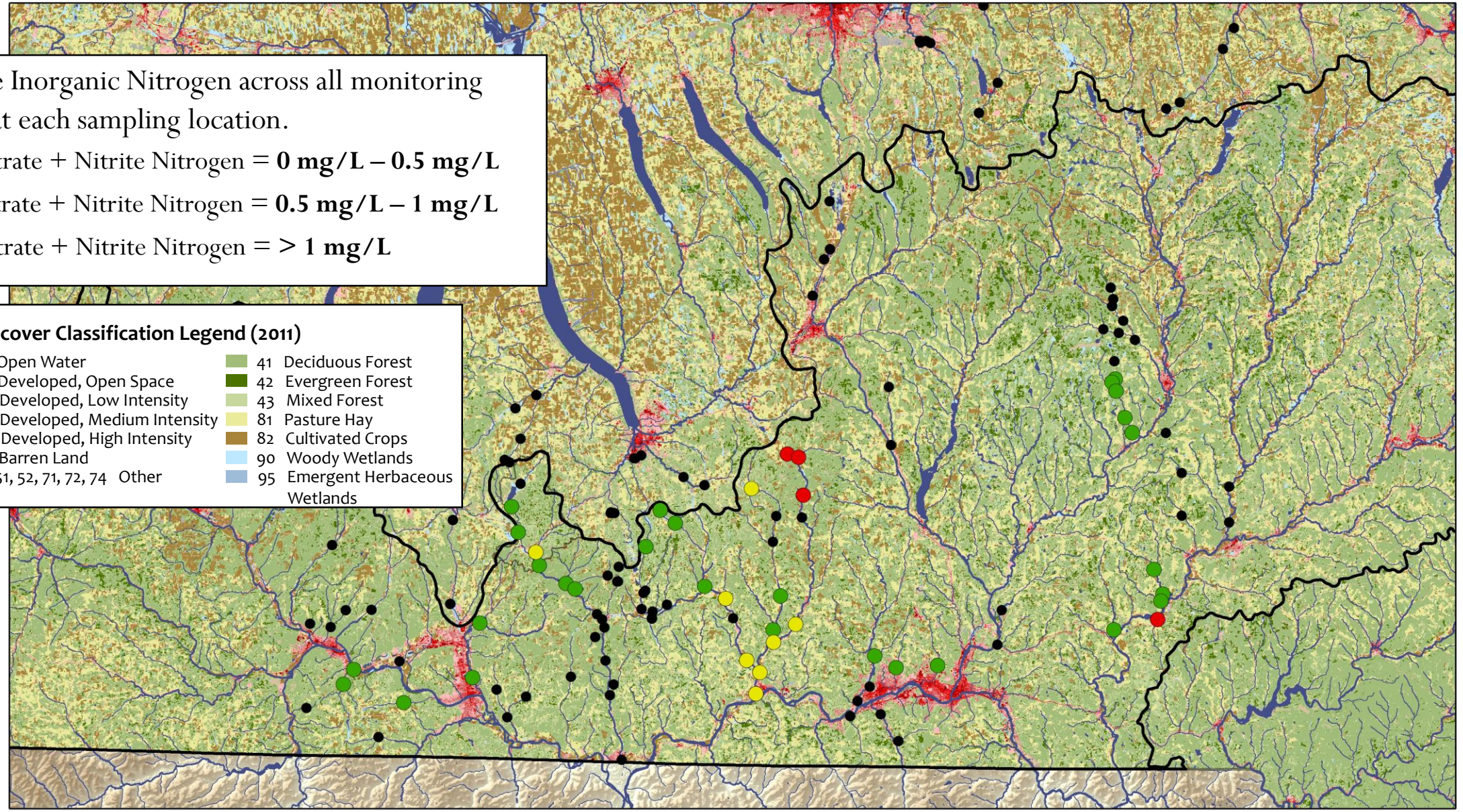
The data can also help identify non-point source pollution within sub-watersheds and catchment areas to help inform targeted remediation efforts.



# Red Flag Monitoring - Phosphorus

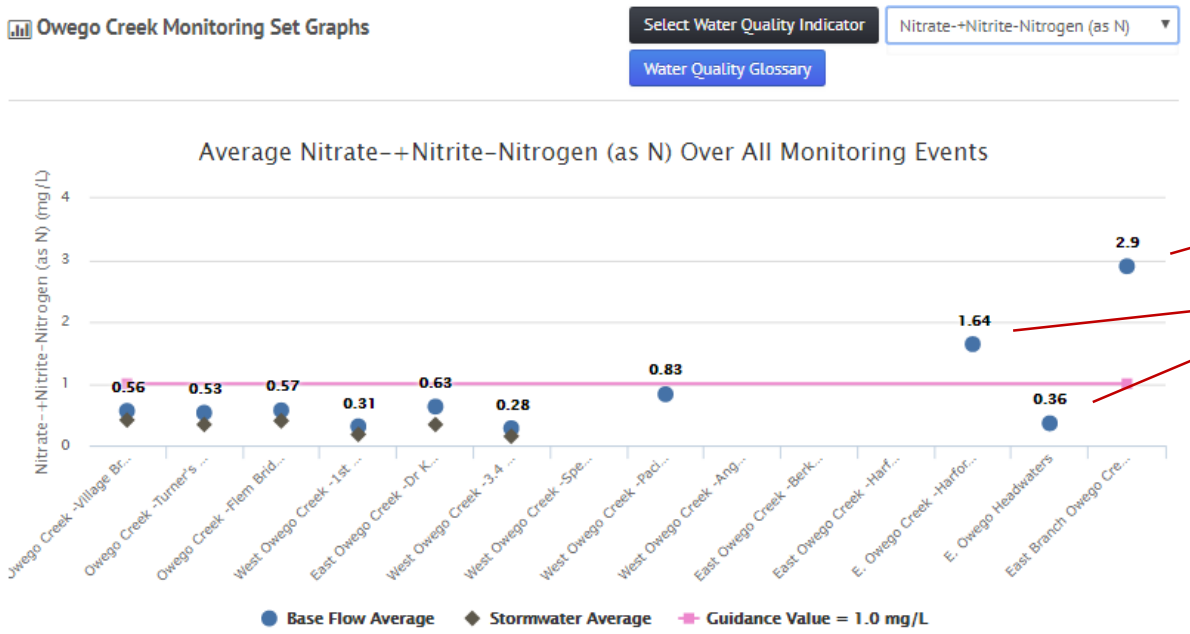


# Red Flag Monitoring - Nitrogen

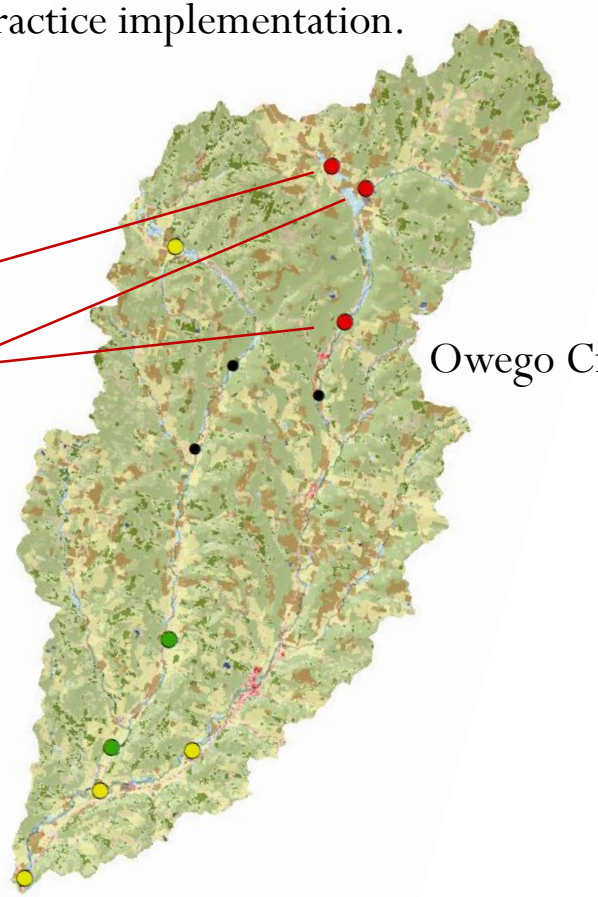


# Monitoring - Upper Susquehanna River watershed

Data could be used to inform and focus remediation efforts and best management practice implementation.




This graph can be found on our online water quality database at **www.database.communityscience.org**



Owego Creek

Long-term datasets could document the effectiveness of management actions.

- Actual measurements

# Thank You

*Contact Us*

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