

# The Water Bulletin

## Community Science Institute Newsletter - Special Maps Issue



Did you know that the headwaters of the west branch of the Cayuga Inlet and the headwaters of Pony Hollow Creek in Newfield are only a half a mile apart but the first flows to the Great Lakes and the second flows to the Chesapeake Bay? Wow, what a divide!



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|  |   |
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Our Winter 2017-2018 Water Bulletin uses maps to report on our stream monitoring partnerships with some 50 groups of volunteers in the rural Finger Lakes and Upper Susquehanna River regions of New York State. CSI's volunteer partnerships reveal the condition of small watersheds that are studied rarely, if at all, by short-staffed government agencies and grant-driven academic institutions.

CSI is immensely fortunate to enjoy support from a dozen stakeholders in Tompkins County, including county government and most municipal governments, the Tompkins County Soil and Water Conservation District and Cornell University. Together they make it possible to assemble uniquely long-term, comprehensive water quality data sets on southern Cayuga Lake tributaries. From our core territory of Tompkins County, CSI has reached out to partner with volunteer groups in neighboring areas: In the Upper Susquehanna River region to establish baselines for small streams before fracking could take place; in the Seneca Lake watershed to support the Seneca Lake Pure Waters Association's stream monitoring initiatives; and in Cayuga and Seneca Counties to assess the impacts of agricultural land use on Cayuga Lake. The outbreak of harmful algal blooms (HABs) this past summer has reinforced CSI's Cayuga Lake-wide focus as we join with the Cayuga Lake Watershed Network, the Floating Classroom, NYSDEC and other stakeholders to develop strategies for coping with the HABs threat.

The maps presented in the following pages illustrate the diversity of CSI's monitoring programs in terms of geography, land use and types of data. Our partnerships in the Cayuga and Seneca Lake watersheds are characterized by **Synoptic Sampling** where volunteer groups recruited, trained and

supported by CSI organize themselves into teams and sample fixed locations from the headwaters of a tributary stream to its mouth at the lake. Sampling events are conducted one to five times a year under a range of flow conditions, from base flow to stormwater. Volunteers transport samples to our lab in Ithaca where CSI staff perform certified analyses of a dozen indicators including nutrients, E. coli, sediment and salt. Results are entered in CSI's one-of-a-kind free, public, online database ([database.communityscience.org](http://database.communityscience.org)), which incorporates interactive maps and dynamic tables and graphs to assist the public in interpreting results.

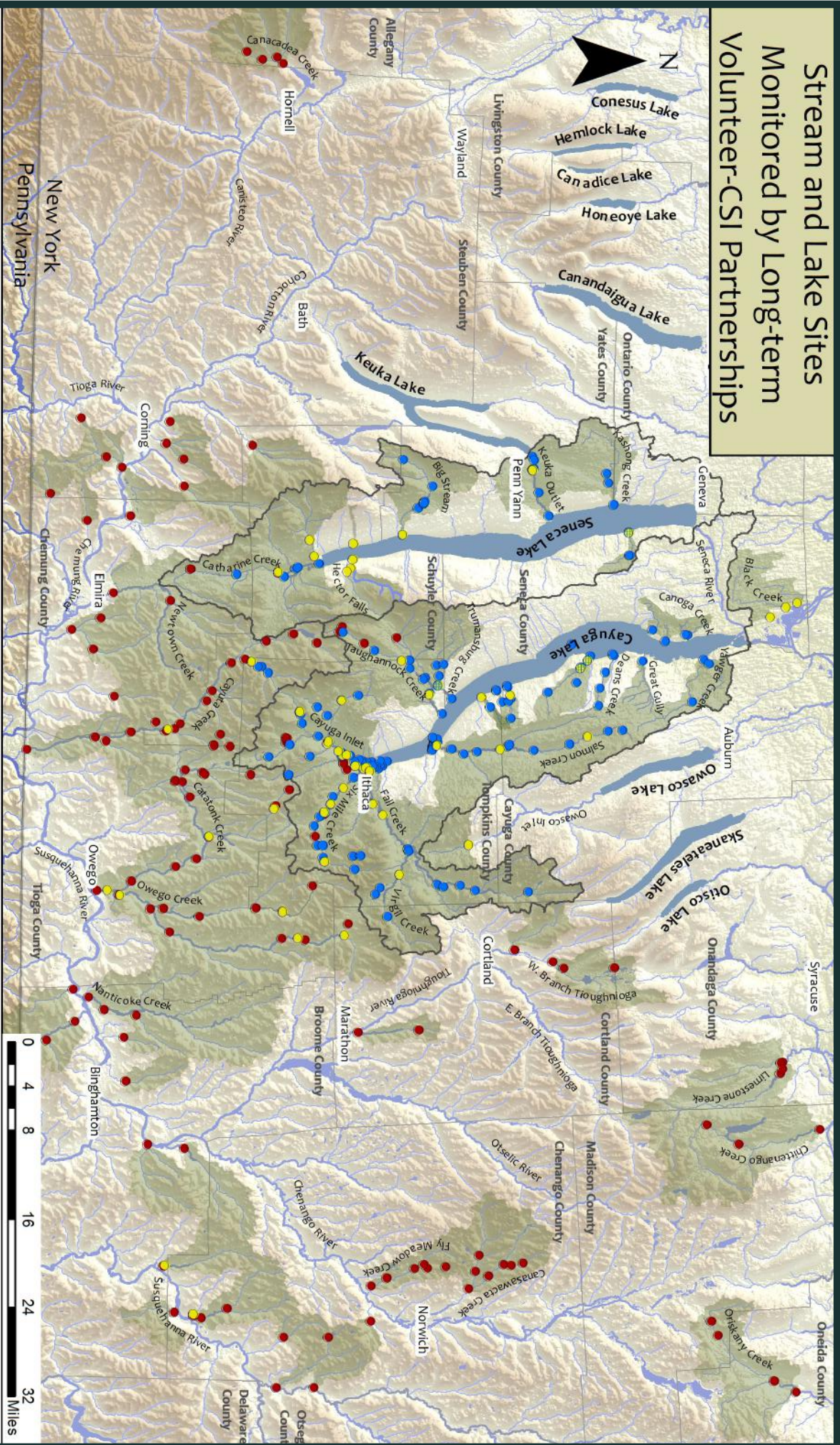


Our **Red Flag Monitoring** program predominates in the Upper Susquehanna River watershed. Volunteer teams perform quality-assured field measurements of five basic water quality indicators once a month and mail their field data sheets to CSI, where staff enter results in our database. Red Flag teams also submit samples twice a year for analyses of phosphorus and nitrogen nutrients.

**Biomonitoring** Partnerships collect benthic macroinvertebrates (BMI, aka "bugs" or "critters") from stream bottoms and identify them under the microscope. Their abundance and diversity translate into an assessment of the overall health of a stream as an environment for aquatic life. Biomonitoring's bird's-eye view complements the snapshots provided by chemical monitoring to provide a more complete understanding of watershed integrity.



# Stream and Lake Sites Monitored by Long-term Volunteer-CSI Partnerships

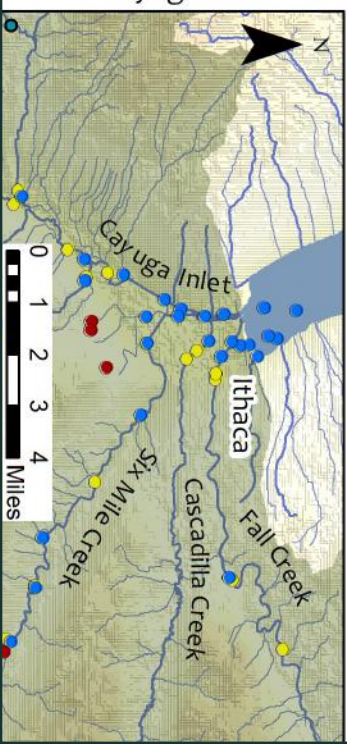


## Sites

- Synoptic Monitoring Partnerships
- Certified laboratory analyses
- Red Flag Monitoring Partnerships
- Quality-assured field measurements
- Biomonitoring Partnerships
- Benthic macroinvertebrates
- Cayuga and Seneca Lake
- Watersheds
- Catchment areas upstream of monitoring sites
- Lakes
- Streams and Rivers

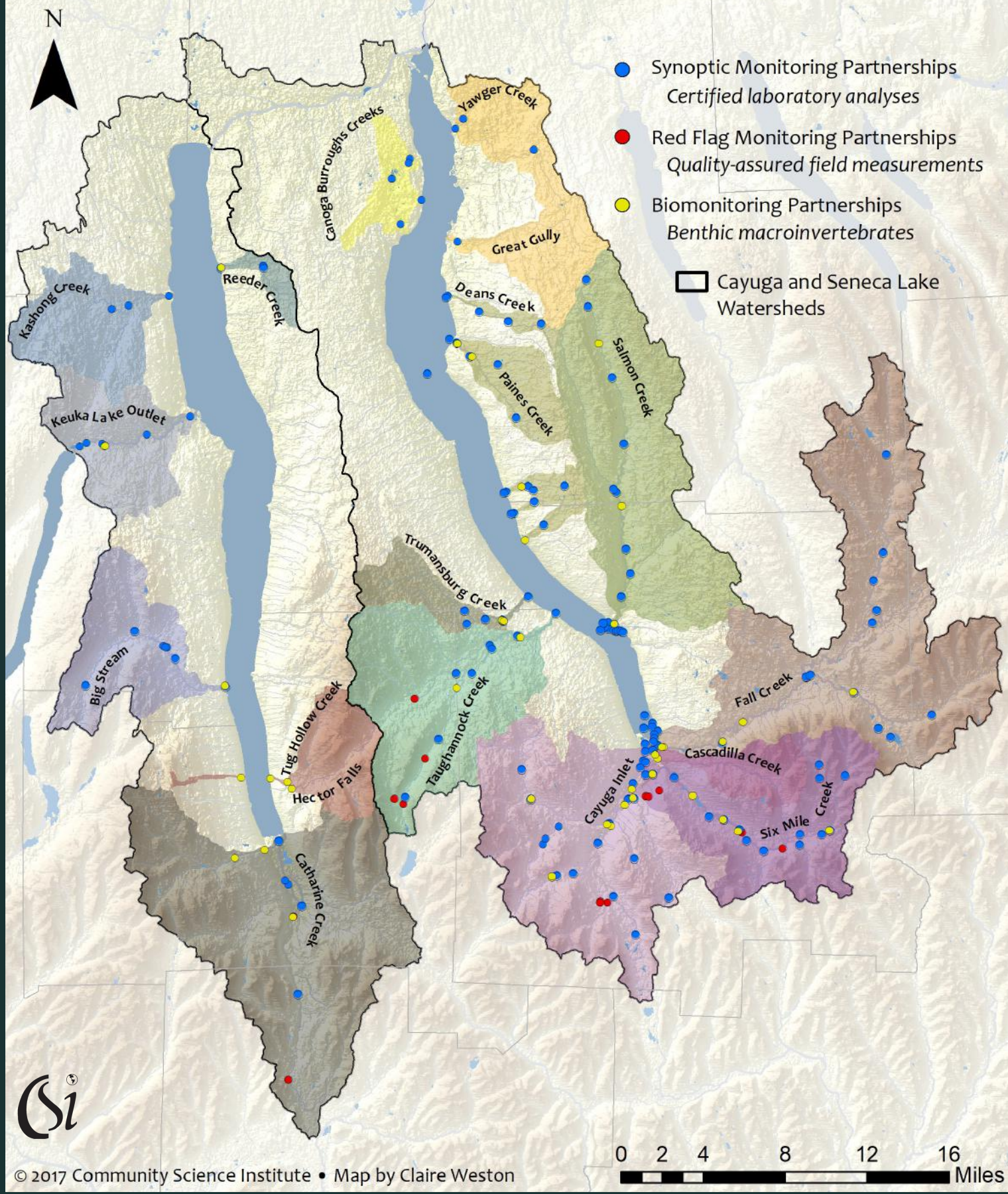


Sites near South End  
of Cayuga Lake





# Sites in Cayuga and Seneca Lake sub-watersheds monitored by long-term volunteer-CSI partnerships





# Cayuga Lake Watershed Land Use Map

N

## NLCD Landcover Classification Legend (2011)

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

## Legend

- Monitored
- Sub-watersheds
- Major Tributaries

## 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)     |

Over a dozen volunteer groups partner with the Community Science Institute to monitor labeled streams at 171 locations draining 532 square miles (67%) of the Cayuga Lake Watershed.

- 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

Trumansburg Creek

Taughannock Creek

Cayuga Inlet

Salmon Creek

Fall Creek

Cascadilla Creek

Six Mile Creek



Source: NLCD 2011

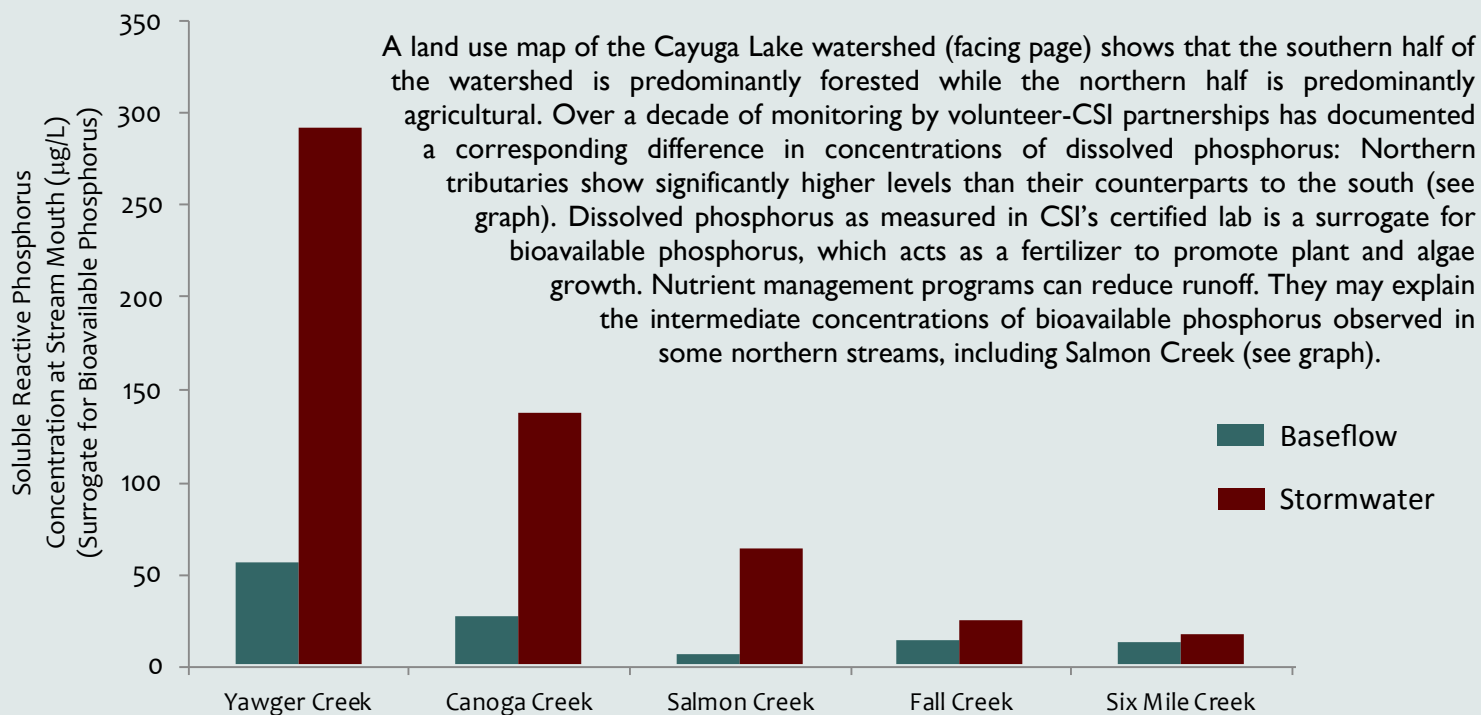
© 2017 Community Science Institute • Map by Claire Weston

0 2 4 8 12 16 Miles

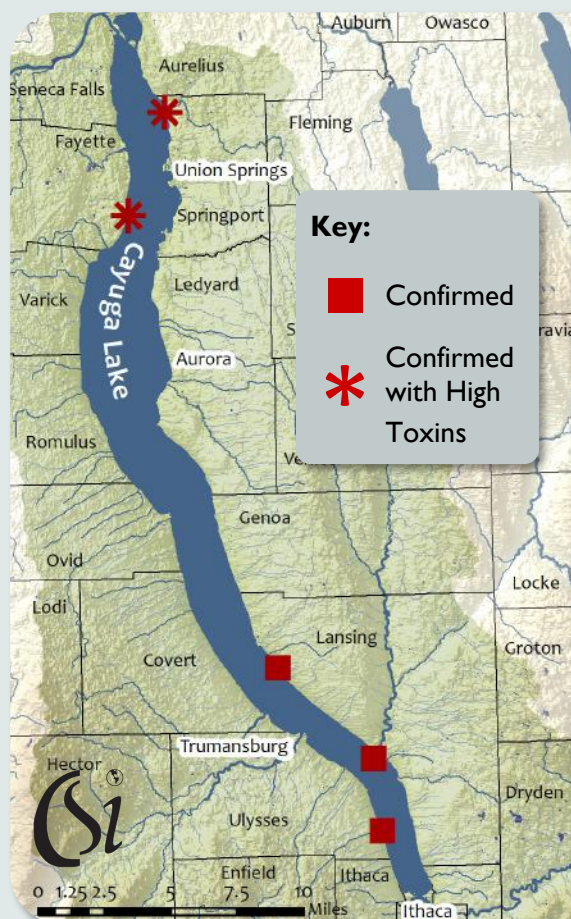




## Land Use and Bioavailable Phosphorus in Cayuga Lake Tributary Streams



## Cayuga Lake: HABs and the Summer of 2017



Cyanobacteria, or “blue-green algae,” have been around for over 3 billion years. The ancestors of higher plants, they were the first to evolve water-based photosynthesis, and over the course of 2 billion years, the oxygen “waste” they generated set the planetary stage for higher life forms to evolve.

Present virtually everywhere, they can proliferate into “blooms” if conditions are right. Temperature, light and nutrients play a role, but the exact factors that trigger blooms are poorly understood. The inability of scientists to predict blooms and their toxins means that agencies have to respond to any bloom as if it were potentially harmful. Indeed, NYSDEC and NYSDOH refer to all blooms of cyanobacteria as “Harmful Algal Blooms,” a potentially confusing term because not all blooms produce toxins.

While Cayuga Lake has remained largely free of HABs in the past, the summer of 2017 saw citizens reporting dozens of suspicious blooms. DEC confirmed five as HABs, two with high toxin levels (see map). CSI organized a HABs forum on Sept. 30, which may be found on our website under *HABs Forum*. We are teaming up with other stakeholders to launch a Cayuga Lake HABs surveillance network of volunteers in 2018 who will collect samples of suspicious algal blooms and submit them to DEC. Contact Hilary Lambert at [stewart@cayugalake.org](mailto:stewart@cayugalake.org) or Claire Weston at [claire.weston@communityscience.org](mailto:claire.weston@communityscience.org) if you're interested in becoming a HABs Harrier!





# Seneca Lake Watershed Land Use Map

## 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
- 41 Deciduous Forest
- 42 Evergreen Forest
- 43 Mixed Forest
- 81 Pasture Hay
- 82 Cultivated Crops
- 90 Woody Wetlands
- 95 Emergent Herbaceous Wetlands
- 12, 51, 52, 71, 72, 74 Other

## Legend

-  Monitored Sub-watersheds
-  Major Tributaries

## Areas and Land Use Percentages

Seneca Lake Watershed -- 467 square miles

8% Developed (21, 22, 23, 24)

32% Forest (41, 42, 43)

49% Agriculture (81, 82)

11% Other (11, 31, 52, 71, 90, 95)

\*65% of the Reeder Creek sub-watershed lies within the Seneca Army Depot where the dominant land use types are shrubland (52) and herbaceous grassland (71).

Five teams of volunteers from the Seneca Lake Pure Waters Association partner with the Community Science Institute to monitor labeled streams at 24 sampling sites draining 226 square miles (48%) of the Seneca Lake Watershed

Kashong Creek

Keuka Lake Outlet

Big Stream

Catharine Creek

\*Reeder Creek



Source: NLCD 2011

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0 2.5 5 10 15 20 Miles

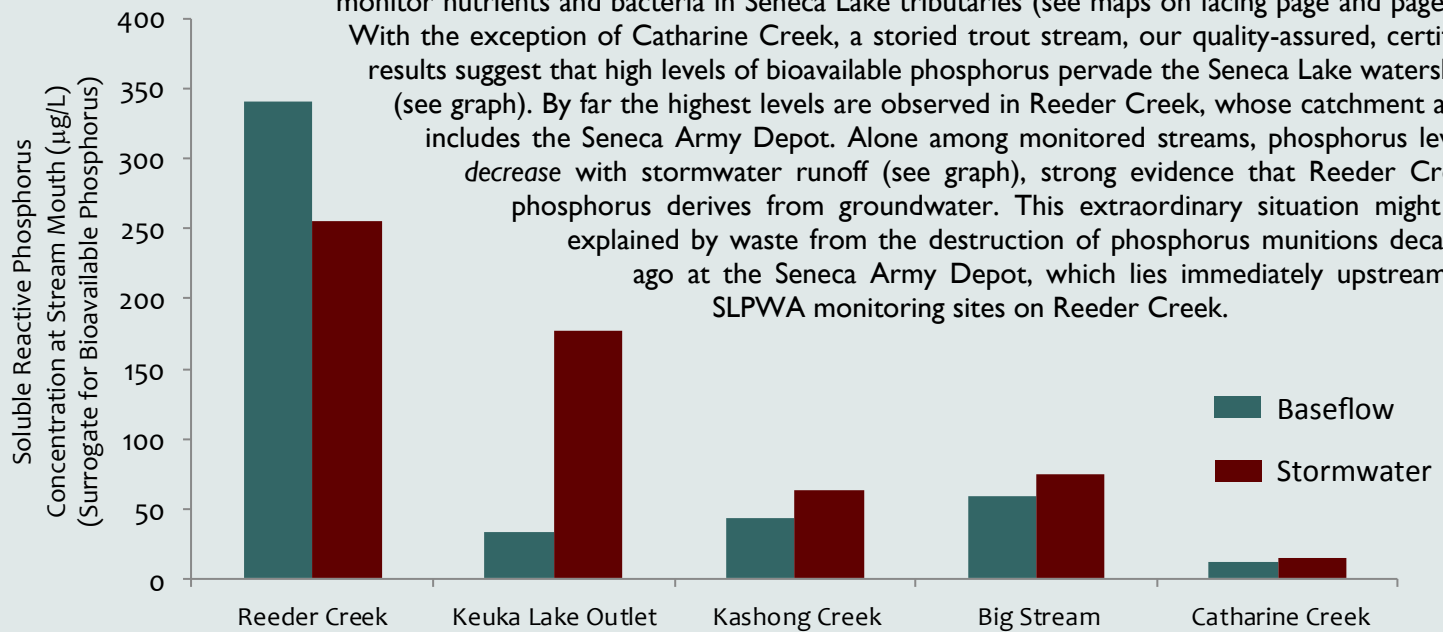




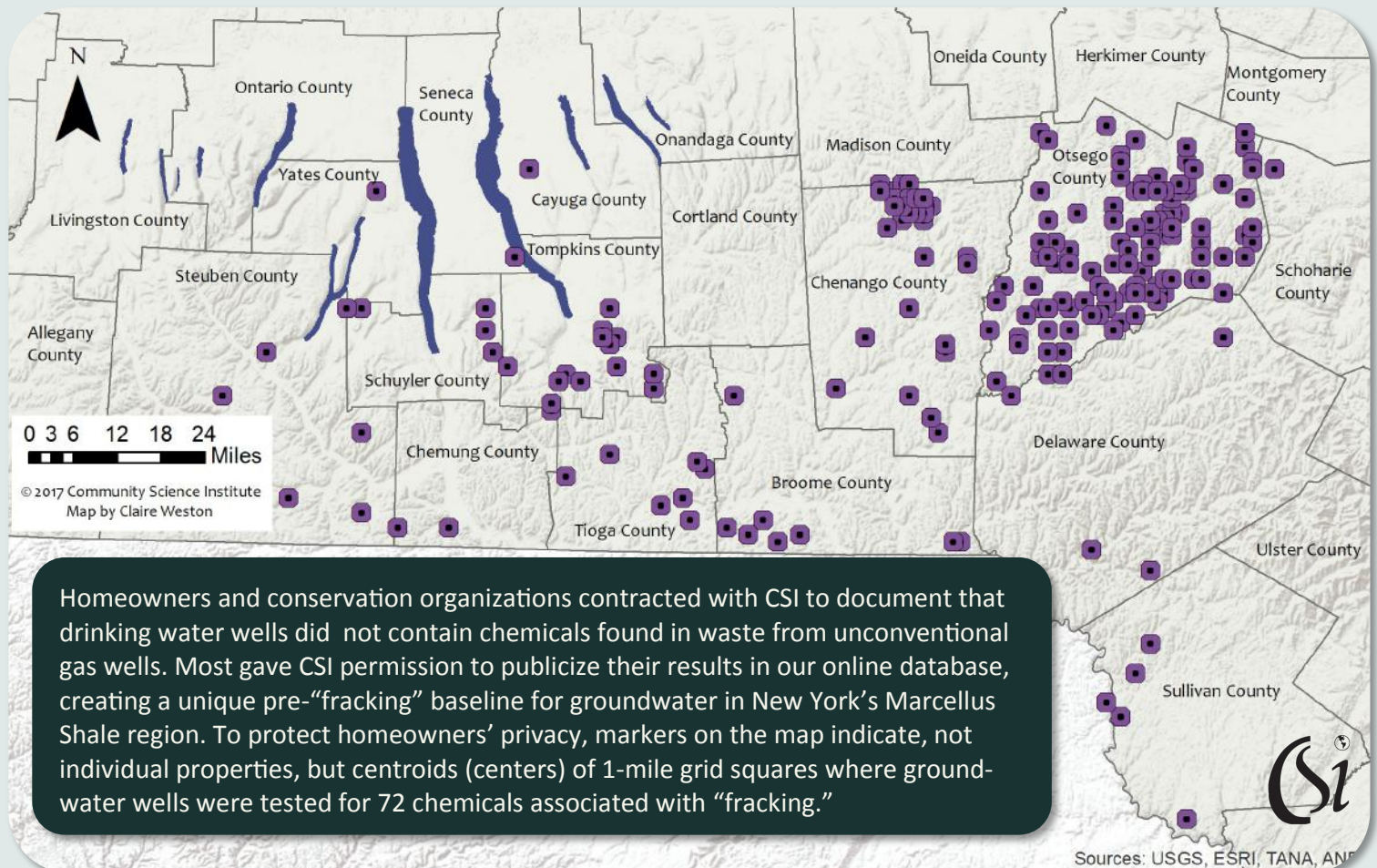
# Land Use, Bioavailable Phosphorus and the Seneca Army Depot

Since 2014, CSI has partnered with the Seneca Lake Pure Waters Association (SLPWA) to monitor nutrients and bacteria in Seneca Lake tributaries (see maps on facing page and page 3).

With the exception of Catharine Creek, a storied trout stream, our quality-assured, certified results suggest that high levels of bioavailable phosphorus pervade the Seneca Lake watershed (see graph). By far the highest levels are observed in Reeder Creek, whose catchment area includes the Seneca Army Depot. Alone among monitored streams, phosphorus levels decrease with stormwater runoff (see graph), strong evidence that Reeder Creek phosphorus derives from groundwater. This extraordinary situation might be explained by waste from the destruction of phosphorus munitions decades ago at the Seneca Army Depot, which lies immediately upstream of SLPWA monitoring sites on Reeder Creek.



# Regional Baseline of Hydrofracking “Signature Chemicals” in Groundwater





## Community Science Institute

### Water Bulletin - Maps Edition

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EPA Lab Code NY01518

*Partnering with communities to protect water since 2002*

This special issue of the Water Bulletin illustrates the programmatic diversity and geographic breadth of CSI's volunteer water quality monitoring partnerships in the Cayuga Lake, Seneca Lake, and Upper Susquehanna River watersheds. Citizens need data that is transparent and reliable in order to separate fact from fiction and devise, in concert with local, state and federal government, effective strategies for managing threats to the water quality. By gathering data through our volunteer partnerships and our independent certified lab and disseminating results at [database.communityscience.org](http://database.communityscience.org), CSI plays an essential role in documenting and protecting local and regional water quality.

In 2017, in addition to tracking water quality across an area spanning 12 counties, CSI initiated monitoring of Yawger Creek and Great Gully in the Cayuga Lake watershed, held successful public forums on drinking water testing and harmful algal blooms, and began planning for HABs surveillance in 2018 and beyond.

Clean water is a finite and irreplaceable resource. You can support our efforts to understand and protect the streams and lakes in our region by renewing your Community Science Institute membership today! Together, we can take steps to ensure that our surface and groundwater resources support life—now and in the future.

#### Membership Levels

- ☐ \$25 (Creek)
- ☐ \$50 (Stream)
- ☐ \$100 (River)
- ☐ \$250 (Lake)
- ☐ \$500 (Estuary)
- ☐ \$1000 (Watershed)
- ☐ >\$1000 (Ocean)
- ☐ Other \$\_\_\_\_\_

A handwritten signature in dark ink, reading 'Claire Weston'.

With sincere thanks,

Claire Weston  
Outreach Coordinator

*Get your feet wet and make an impact!*

## DONATE TODAY!

Send contributions to Community Science Institute, 283 Langmuir Lab, 95 Brown Rd/Box 1044, Ithaca, NY 14850  
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