Comparison of Currently Recognized CyanoHAB Detection Programs

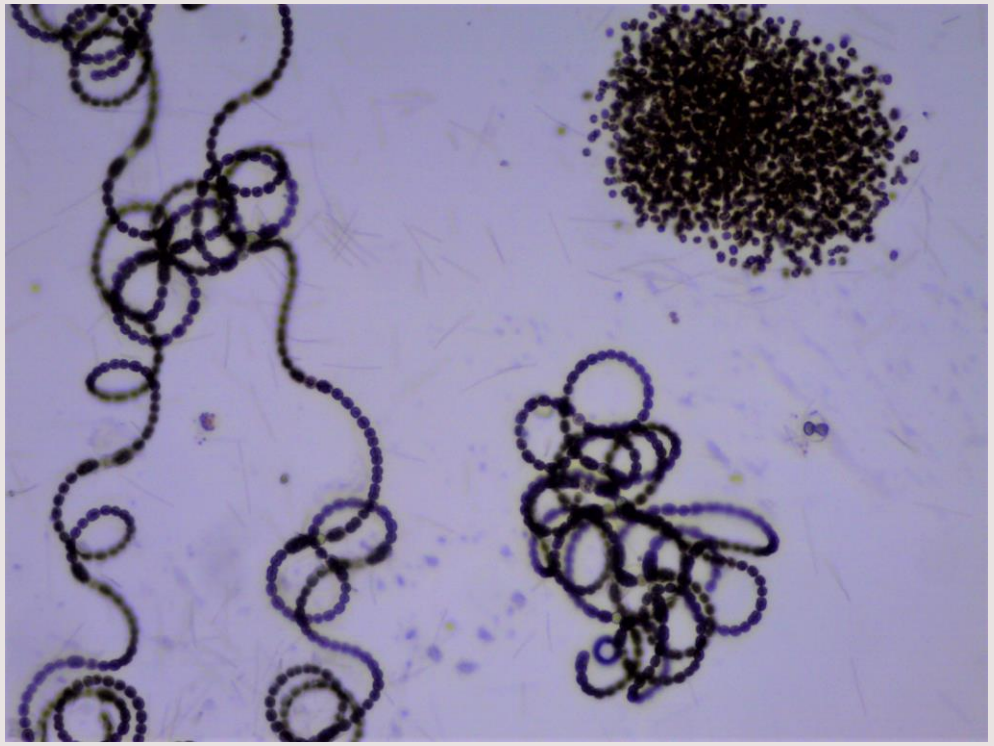
CNY REGIONAL NYSFOLA CONFERENCE

AUGUST 11, 2023

- *Intended as a guide ONLY.*
- *This is NOT a comprehensive list.*
- *Individual Lakes must choose based on their needs and resources.*
- *Products are not endorsed by NYSFOLA.*

What is the need?

-Harmful algal blooms are prolific across NYS lakes.
- They are not easily understood.
- Not all lakes experience the same blooms.
- There are currently few mechanism available to test for HABs
- Lab testing is expensive.



Organizations were chosen based on reliability of the source and availability of the product.

Dolichospermum and microsystis, Song Lake, Tarki Heath

What we looked at

- Does the organization provide scientifically sound, evidence-based services?
- What skills does the sampler need?
- What information do they provide?
  - Genus/species identification?
  - Toxin analysis?
  - Density estimates?
- How long will it take for results?
- Are there/ what are the equipment costs?
- Is there a sample analysis cost and what is it?
- How many samples can be evaluated?

This is not intended to be a comprehensive list.

There are other sources out there connected to universities, commercial labs and other institutions, but may not be available to all lakes.

CyanoHab on Song Lake, 2016 Tarki Heath

Organizations

- **EPA Cyanoscope Monitoring Collaborative**
  www.cyanos.org
- **Upstate Freshwater Institute (UFI)**
  www.upstatefreshwater.org
- **BloomOptix**
  www. bloomoptix.com
- **Gold Standard Diagnostics**
  www.goldstandarddiagnostics.us
- **Turner Fluorometer**
  www.docs.turnerdesigns.com

Each of these assessments will require a certain level of skill or knowledge on the part of the person performing the analysis.

EPA Cyanoscope Monitoring Collaborative
Tier 1 - bloomWatch App – Public Crowdsourcing.
Tier 2 - cyanoScope – Trained citizen scientists and professional water quality managers using microscopes, camera uploads, and sampling equipment.
Tier 3- cyanoMonitoring - Professionals and trained citizen scientists.

Upstate Freshwater Institute (UFI) - Citizen Scientists or Professionals using sampling kits.

BloomOptix - Citizen Scientists using ioscope field microscopes and a smartphone.

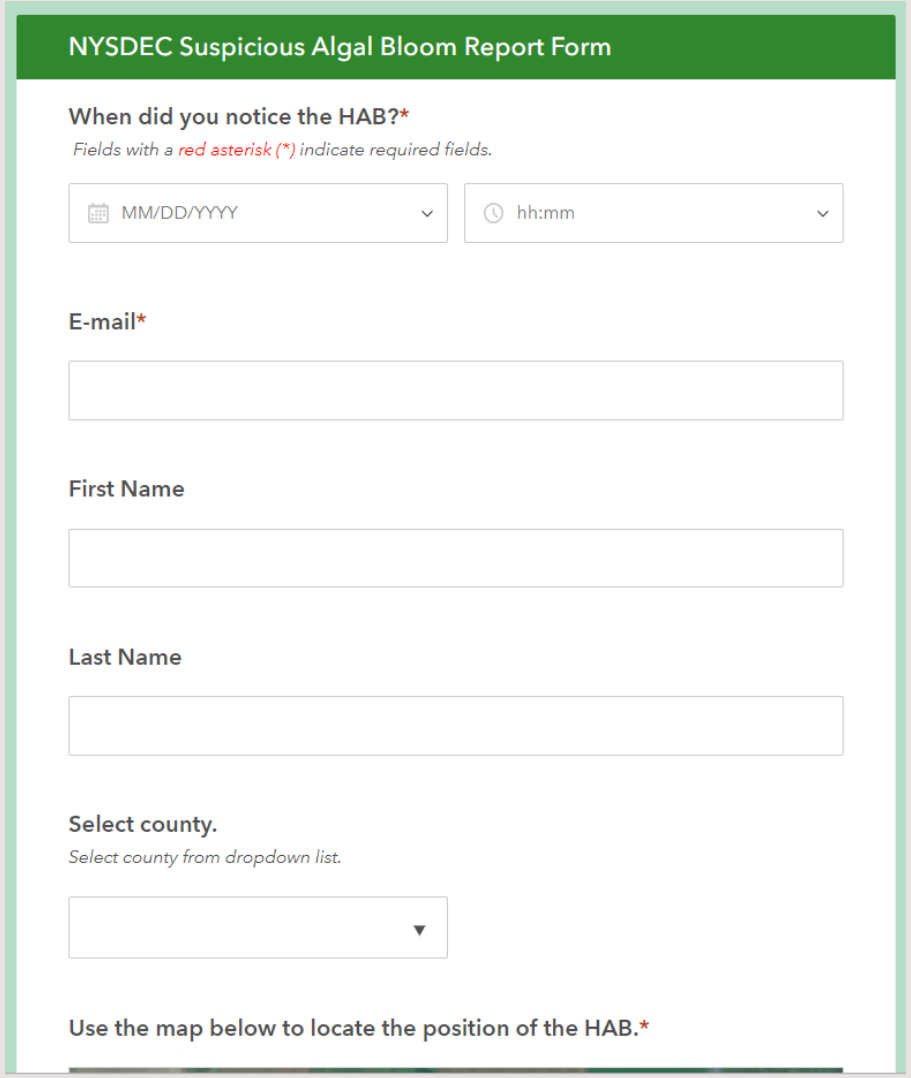
Gold Standard Diagnostics - Citizen Scientists or Professionals using test strips.

Turner Fluorometer - Professionals and trained citizen scientists.

Each lake must evaluate their individual needs and resources available to determine best course of action.

- ***This information is intended as a guide ONLY.***
- ***Individual lakes must choose based on their needs and resources.***
- ***These products are not endorsed by NYSFOLA.***
- **Continue to report all suspected blooms to the NYS DEC HABs Monitoring website.**

Keep in touch with updates at:
www.nysfola.org



Disclaimer

The products and services offered by commercial vendors are not necessarily endorsed by the NYSFOLA Board of Directors or staff.

Members are urged to seek references and check with permit-ting agencies (if required) before purchasing products or entering a contract for services.

Comparison of Some Currently Recognized Cyano-HABs Programs

Organization	Sample Evaluation and Services	Expected Return Results	Equipment Cost	Sample Analysis Cost	Number of Samples	Toxin Analysis	Genus/ Species Identification	Enumeration - Density Estimate
BloomOptix www.bloomoptix.com	This program works with an artificial intelligence (AI)-powered microscopy tool that enables clients to monitor their waterways for HAB-causing cyanobacteria. A mobile app provides the means to automatically identify and count cyanobacterial cells belonging to six of the most common HAB producing genera: *Microcystis Dolichospermum Aphanizomenon Woronichinia Limnoraphis Gloeotrichia*	BloomOptix has been able to provide results back to the sampler within minutes.	New participants will need to purchase the digital iolight microscope. Volunteers need a smart phone.	There will be an annual subscription for users who already own an ioLight 2mm microscope $1,500.	No Limit at this time.	No	Yes	Yes
EPA Cyanoscope Monitoring Collaborative www.cyanos.org	**Tier 1** Bloom watch aids observers in the identification of bloom conditions based on use of typical bloom condition photographs. **Tier 2** Cyanoscope volunteers are instructed in microscope use and learn to identify typical HABS cyanobacteria. **Tier 3** Cyanomonitoring adds the use of two channel fluorometer to estimate cyanobacteria density. Information collected is uploaded to I-naturalist.	Samples are concentrated and require microscope examination and uploading to iNaturalist. An evaluation is completed by an onsite volunteer.	$ 300.00 for sample preparation kit and $500.00 for microscope kit. Volunteer needs a computer to upload data.		No specific limit at this time.	No	Yes, depending on volunteer skill.	Yes, depending on volunteer skill – will take a few hours.

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Upstate Freshwater Institute (UFI) www.upstatefreshwater.org/HABLab.html (315)431-4962 ext. 115	Volunteers will collect samples that meet typical HABS visual characteristics. Samples will be sent to UFI's New York State certified lab for cyanobacteria identification, Microcystin toxin testing and cyanobacteria concentration.	1-2 days for Cyanobacteria identification and concentration. 5-10 days for Microcystin toxin results. Data accessed through web portal.		$250/ Sample	No Limit	Yes	Yes	Yes (µg/L)
Turner Handheld Fluorometer www.turnerdesigns.com/fluorosense-handheld-fluorometer	Turner Designs manufactures handheld devices that detect light wavelengths for chlorophyll and phycocyanin (PC) associated with cyanobacteria. The devices are factory calibrated and no extraction is needed.	Immediate	Around $1,600.00 for a single channel meter		No limit	No	No	Yes, 0 – 199 µg/L
Gold Standard Diagnostics www.goldstandarddiagnostics.us/home/products/rapid-test-kits/algal-toxins/algaltoxin-test-strip-kits/	Gold Standards produce ELISA immunoassay kits to detect contaminates including HABS kits. The Recreational HABS detection kit uses test strips that change color if water contains toxins above 4ppb. Kits have a shelf life.	Testing takes about an hour		Approx. $590.00 for twenty or $185.00 for five.	5 or 20	Yes >2.5ppb	No	No

What is provided

Genus/species identification

- **Upstate Freshwater Institute** - Microscopic analysis
- **BloomOptix -** For AI trained species: *Microcystis, Dolichospermum, Aphanizomenon, Woronichinia, Limnoraphis, Gloeotrichia*
- **Cyanoscope Monitoring Collaborative -** Dependent on skill of monitor and Tier chosen.

Toxin analysis

- **Upstate Freshwater Institute -** *microsistin*
- **Gold Standard Diagnostics -** *microsistin*

Density estimates

- **BloomOptix -** Available for AI trained species
- **Upstate Freshwater Institute** - Flouroprobe
- **Cyanoscope Monitoring Collaborative** - Dependent on skill of monitor and Tier chosen.
- **Turner Fluorometer** - 0 – 199 µg/L

UFI's laboratory is divided into four areas:
1.Chemistry Laboratory
2.Harmful Algal Bloom Laboratory
3.Biology Laboratory
4.Field Operations

What is provided

Number of samples

There is no limit on the number of samples for any of these products.

Turnaround time

Turner Flourometer and BloomOptix

Immediate to within minutes

Gold Standard Diagnostics

About an hour

Cyanoscope Monitoring Collaborative

Depends on the Tier chosen

1-2 days for Cyanobacteria identification and concentration

5-10 days for Microcystin toxin results

Upper: https://www.turnerdesigns.com/

Lower: www.goldstandarddiagnostics.us

What is provided

Equipment costs

- BloomOptix

Digital iolight 2mm microscope ($1,500).
Users must have a smart phone.

- Cyanoscope Monitoring Collaborative

To be determined on Tier selected and need for a microscope: $ 300.00 for sample preparation kit and $500.00 for microscope kit. Volunteer needs a computer to upload data.

Sample analysis cost

- BloomOptix

Annual subscription $1,500 for unlimited samples.

- Upstate Freshwater Institute

$250/sample

- **Gold Standard Diagnostics**

Kits range from $ for five to $ for 20

Upper: https://cyanos.org/cyanoscope-details/

Lower: Iolight photo from https://iolight.co.uk/

Thank you all for attending this conference.

Have a wonderful rest of your summer.

NYSFOLA

www.NYSFOLA.org