



The Cyanobacteria Monitoring Collaborative

An Approach to Educating, Monitoring, and Managing Harmful Cyanobacteria Blooms

INLAND HABS DISCUSSION GROUP WEBINAR

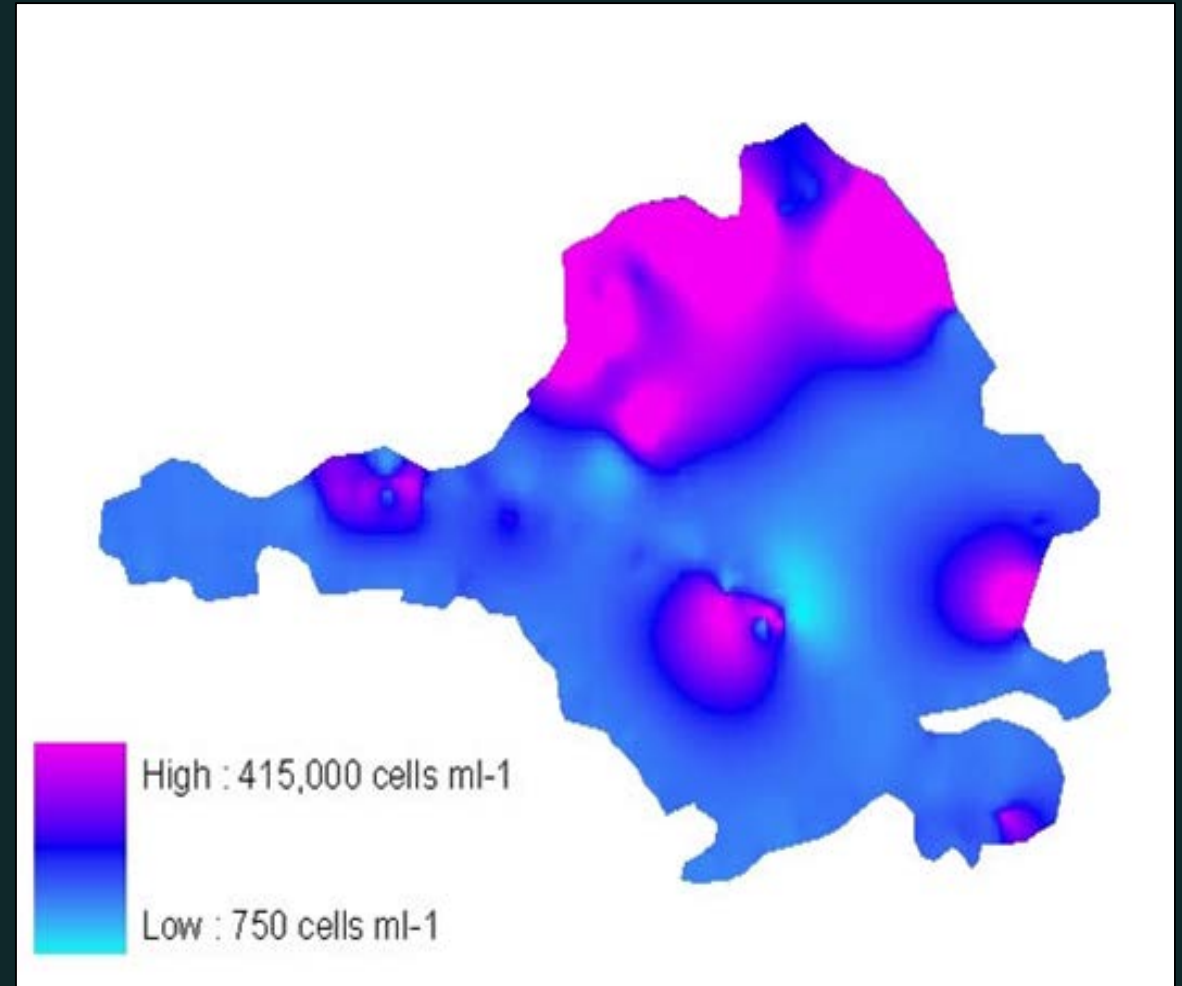
FEBRUARY 14, 2017

Today's Talk

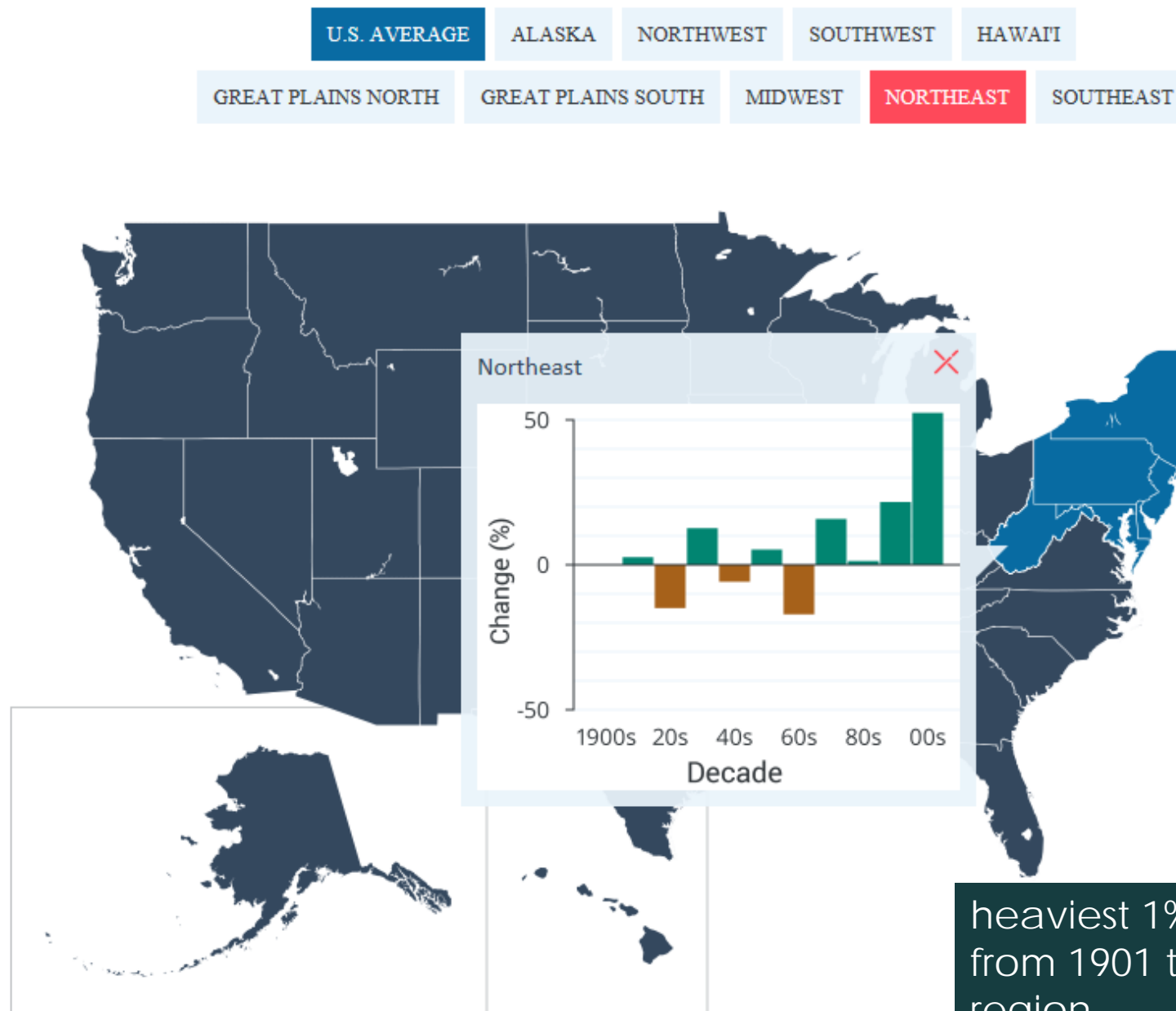
- ▶ Program Background
- ▶ Overview of Methods and tools
- ▶ Data

Why the Need?

- ▶ A request from states & constituents
- ▶ No clear picture at any spatial scale
- ▶ A moving target
- ▶ Lack of local knowledge
- ▶ Public Lack of knowledge on health risk
- ▶ Lack of overall data
 - ▶ Risk/vulnerability
 - ▶ Toxin associated genera
 - ▶ Management applications



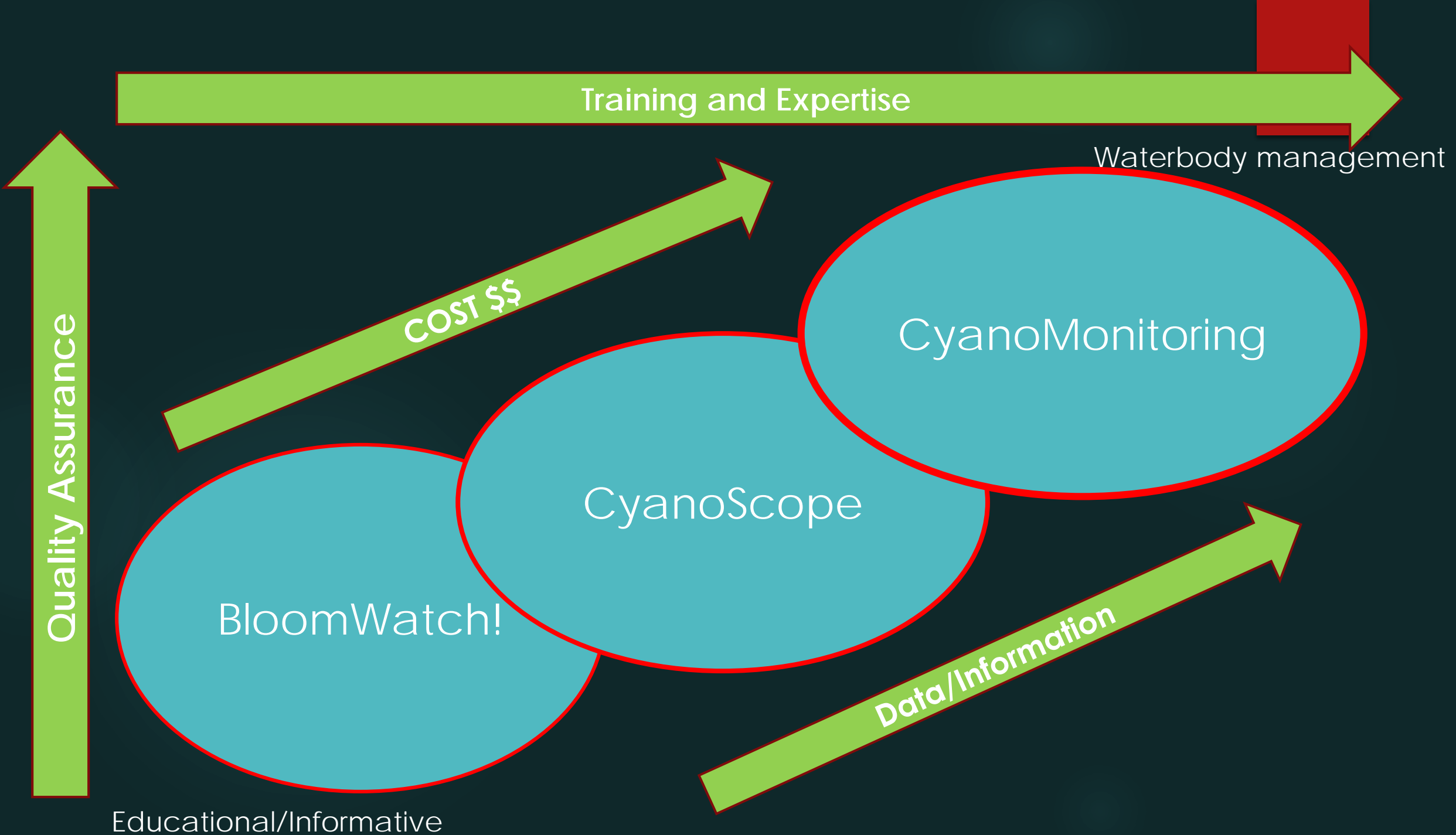
Figur



heaviest 1% of all daily events
from 1901 to 2012 for each
region

What Must it Encompass?

- ▶ Low cost
- ▶ Easy implementation
- ▶ Established baseline (standardized methods/consistency)
- ▶ New **useful** information & connectivity to existing programs
 - ▶ Educational/Informative
 - ▶ Utility for resource management applications (PWS/beach programs)
- ▶ Address ambient waters (preemptive) and bloom conditions
- ▶ Commensurate QA



CYANOBACTERIA MONITORING COLLABORATIVE

THREE COORDINATED MONITORING PROJECTS TO LOCATE AND UNDERSTAND
HARMFUL CYANOBACTERIA

[GET INFORMED](#)

[GET INVOLVED](#)

[GET IN TOUCH](#)

We work with citizen scientists, trained water professionals, and the general public to find and study cyanobacteria in waterbodies.

BloomWatch!

To determine the spatial and temporal patterns of bloom occurrence anywhere

- Bare bones
- Smartphone App
- Embedded QA
- Educational & Informative
- Crowdsourced information
- Data Visualization – public domain



CYANOS OVERVIEW

BLOOMWATCH APP

CYANOSCOPE

CYANOMONITORING

PROJECT OVERVIEW

HOW IT WORKS

DATA AND RESULTS

WAYS TO GET MORE INVOLVED

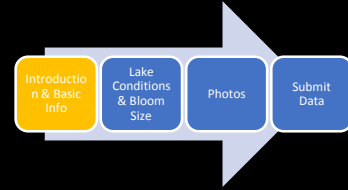


BLOOMWATCH APP

CROWDSOURCING TO FIND AND REPORT POTENTIAL CYANOBACTERIA BLOOMS



Lake Conditions & Bloom Size Screen



Verizon LTE 7:03 AM

bloomWatch!

Date:

Town:

State:

Does lake/pond have public access for boating, fishing, or bathing?

Weather conditions:

Introduction Information Photo Capture Submit

Verizon LTE 7:04 AM

bloomWatch!

Weather conditions:

Surface conditions:

Bloom size or extent:

General Comments:

Introduction Information Photo Capture Submit



Photo Screen

Verizon LTE 7:04 AM

bloomWatch!

Up to three photographs may be taken per site

Photo 1: Attempt to capture the areal extent of the bloom, (lake/pond wide, along the shoreline, etc.). If additional description is necessary, enter it in the box below.



Describe Photo 1

Latitude: Longitude:

Introduction Information **Photo Capture** Submit

Verizon LTE 7:04 AM

bloomWatch!

Photo 2: Attempt to capture a photo from standing position to the water a distance of 10-30 feet. If additional description is necessary, enter it in the box below.



Describe Photo 2

Latitude: Longitude:


Latitude Phot... Longitude Ph...

Introduction Information **Photo Capture** Submit

Verizon LTE 7:04 AM

bloomWatch!

Photo 3: Attempt to get a close up photo of bloom (picture of bloom material from three feet away or in a clear glass container at arm's length). If additional description is necessary, enter it in the box below.



Describe Photo 3

Latitude: Longitude:

Latitude Phot... Longitude Ph...

Get Coordinates From Device

Interested in taking a look under the microscope? Send us a picture to help us identify cyanobacteria species around the region through our sister program, cyanoScope. (Paste to browser - <http://cyanos.org/cyanoscope>)

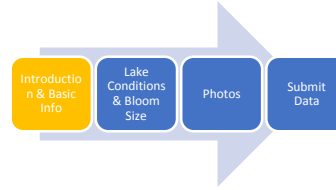
SAVE PHOTOS

Introduction Information **Photo Capture** Submit





Submit Data Screen



Verizon LTE 7:05 AM

Submit

Lake/Pond Name:

Date:

On Android devices, select EMAIL as the choice for your submissions.

SUBMIT DATA

Interested in being more involved and learning more about cyanobacteria? Take a look at some of them under the microscope and report your findings through our sister project, cyanoScope(hyperlink to "http://cyanos.org/cyanoscope")!

Once the waterbody information and pictures have been submitted, you can delete the waterbody from your device to save space. Simply select the waterbody you wish to delete from the list below and click the "DELETE WATERBODY" button.

Lake/Pond Name:

Introduction Information Photo Capture **Submit**



Pressing *Submit Data* will send data directly to CitSci.org, and will also open an email to send data to your state and regional cyanobacteria experts.

Verizon LTE 8:28 AM

Cancel bloomWatch! submission: **Send**

To: deep.algalblooms@ct.gov

Cc: jhobbs@neiwpcc.org

Bcc:

From: DPeckham@neiwpcc.org

Subject: bloomWatch! submission:

The attached file(s) contain(s) data that were entered into the bloomWatch! app.

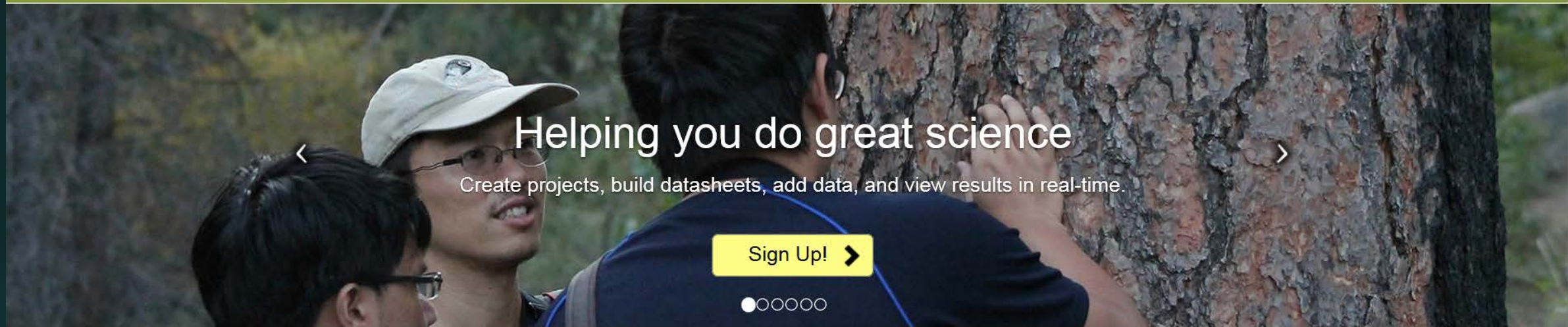
Test Lake.json

Sent from my iPhone



Login Donate!

About Projects Protocols Maps Data Services



Helping you do great science

Create projects, build datasheets, add data, and view results in real-time.

Sign Up! >

● ○ ○ ○ ○ ○

326
projects

590,718
measurements

2,432
members

61,678
locations

1,185
protocols


Start a Project >

Benefits

- Configurable**
Build your own datasheets and protocols ~ Make it your own
- Community-Driven**
We're community driven ~ you make us better
- Free**
Free data management, storage,

Featured Project

Trout Unlimited Coldwater Conservation ...



Monitor the impact of Marcellus Shale gas development on the statewide water resources

158 Participants 5735 Observations 1306 Photos

New Observations

- Observation at COFFCR...**
Tom Varrassa
July 6th, 2016
- Observation at BROKCR...**
Tom Varrassa
July 6th, 2016
- Observation at COSPBO...**
Tom Varrassa

[Login](#)[Donate!](#)[About](#)[Projects](#)[Protocols](#)[Maps](#)[Data](#)[Services](#)[Blog](#)

bloomWatch

47

members

11

observations

11

locations

139

measurements



Manager Description

Jasper Hobbs

Help track cyanobacteria blooms using your smartphone!

Are you seeing a normally-clear lake that has suddenly turned the color of pea soup or a blue-green paint spill? It may be a bloom of cyanobacteria, which has the potential to produce toxins that affect humans, pets, and our ecosystems.

State and local officials can't be watching every lake at all times. With you and your smartphone helping us out, we want to improve our ability to understand where, how, and when these blooms are appearing and are causing issues.

Submit data for bloomWatch using our app, which connects directly to this CitSci.org webpage! Download the app from our project website:

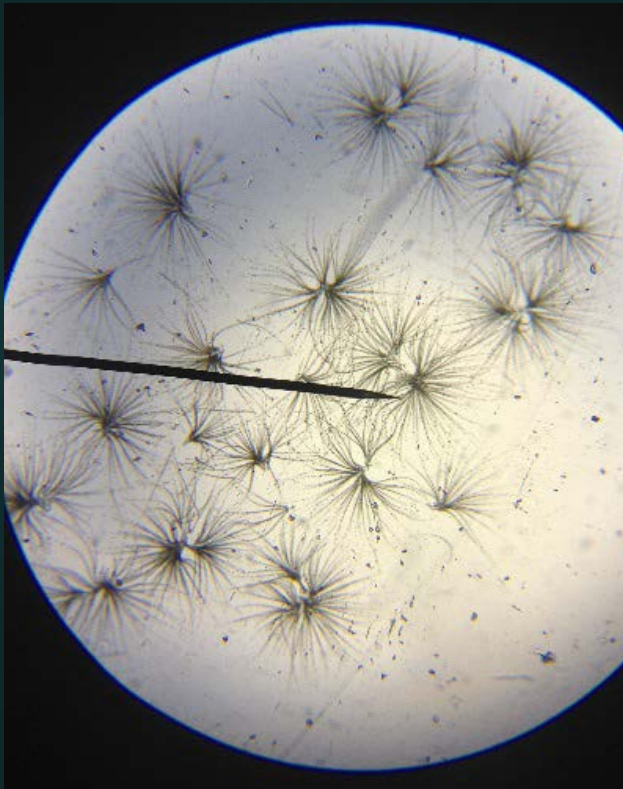
<http://cyanos.org/bloomwatch#Project-Overview>.

Goals



CyanoScope




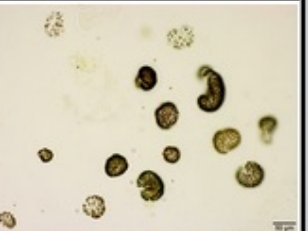

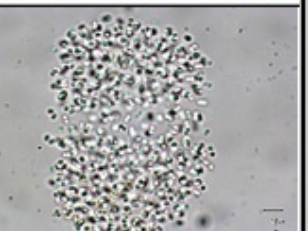
Established to determine the occurrence and distribution of cyanobacteria genus/species (mapping of potentially toxin producing waterbodies)





Toxic Cyanobacteria of New England

“The Dirty Dozen”

Purpose & Background		Genus List
		
		
		
		

University of New Hampshire, Center for Freshwater Biology: cfb.unh.edu

Please contact [Alexandra Merzky](mailto:Alexandra.Merzky@unh.edu) for questions or comments

Observations

Species

Location

The World

2,500,490
OBSERVATIONS89,001
SPECIES11,199
IDENTIFIERS

Map

Grid

List

Places of Interest

North
Pacific
OceanNorth
Atlantic
OceanSouth
Pacific
OceanSouth
Atlantic
OceanIndian
Ocean

cyanoScope

MAPPING CYANOBACTERIA ONE SLIDE AT A TIME

ADD
OBSERVATIONS






cyanoScope

Stats




Totals

102
Observations »17
Species »19
People »






Most Observations

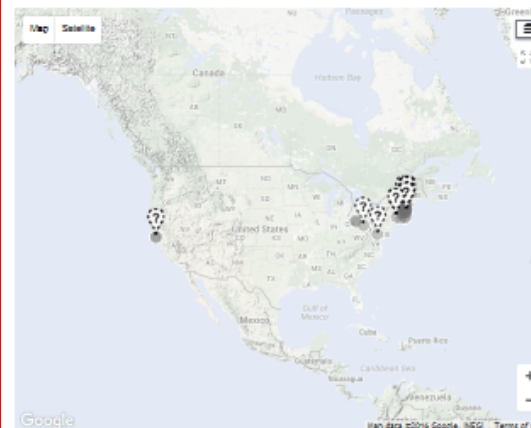
-  willmised
37 observations
-  richfms
10 observations
-  karolina
9 observations
-  wmcrescarch
9 observations
-  nanje
7 observations

Most Species

-  karolina
4 species
-  willmised
1 species
-  richfms
1 species

Most Observed Species

-  Gloeotrichia
6 observations
-  Microcystis
3 observations
-  Oscillatoria
3 observations
-  Dictyota
2 observations
-  Cocconeis
2 observations



Members

View all members -

Export observations

Atom KML CSV

About

What is cyanoScope?

cyanoScope uses modern technologies and social media platforms to learn more about cyanobacteria.

By participating you will be helping scientists and water resource managers gain information on the occurrence and timing of cyanobacteria in lakes, ponds, and reservoirs.

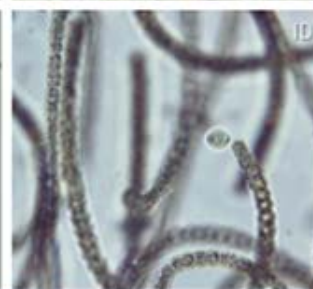
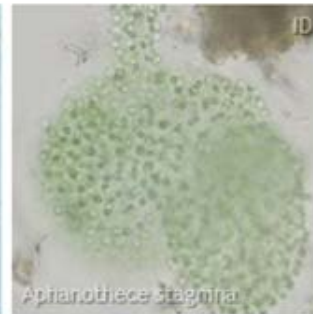
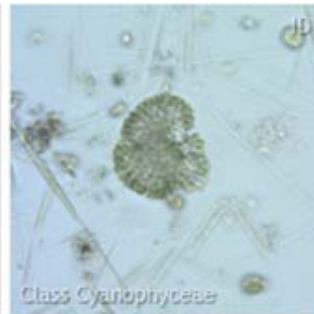
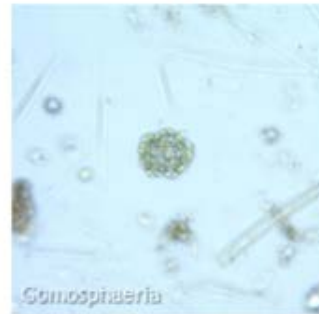
The Process:

Collect

- Collect a water sample from your favorite lake or pond as ...more

Recent observations [View all »](#)

Grid List



Identithon!

CyanoMonitoring

GOAL: Tracking of cyanobacteria concentrations within waterbodies in combination with efforts to forecast bloom occurrences, determine risk, and assess waterbody/human health vulnerability to toxic cyanobacteria.



- Consistent methods/QA
- Consistent tools (Cyano Kit)
- Temporal component
- Centralized Data Control
- Data Visualization tools

Baseline Sampling Design

On-Shore and/or On-Lake

- ▶ BOH/Beach Programs, Lake associations, state WQ folks
- ▶ 1 meter IT sample & net tow
- ▶ 3 meter IT sample & net tow
- ▶ CyanoMonitoring Kit
- ▶ JUN-SEP minimum
- ▶ Sample every other week
- ▶ 1 fixed site per waterbody minimum

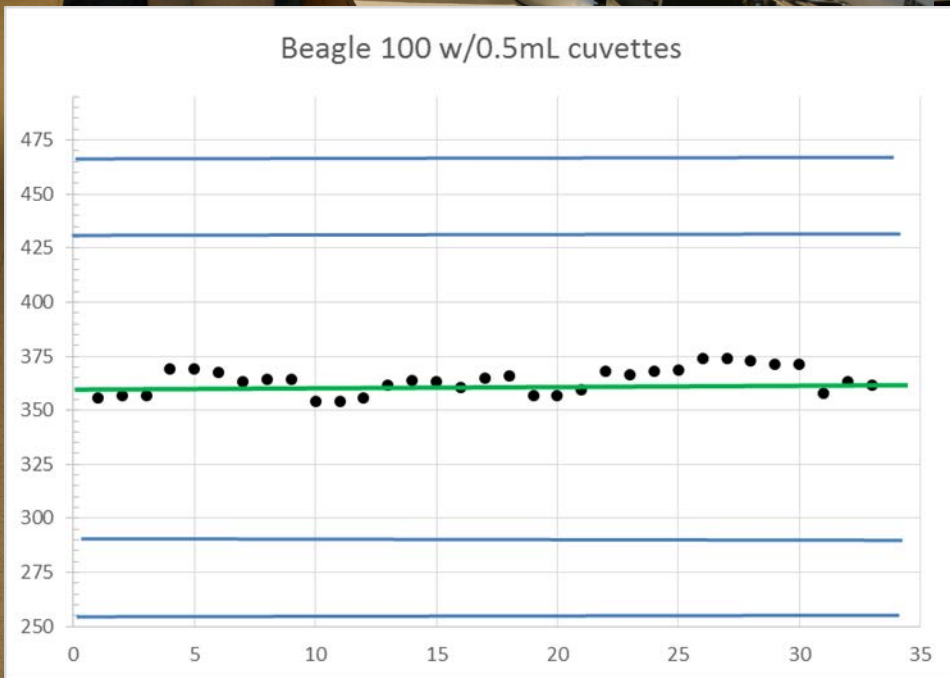
Designed to complement currently existing programs

Handheld 2-Channel Fluorometer

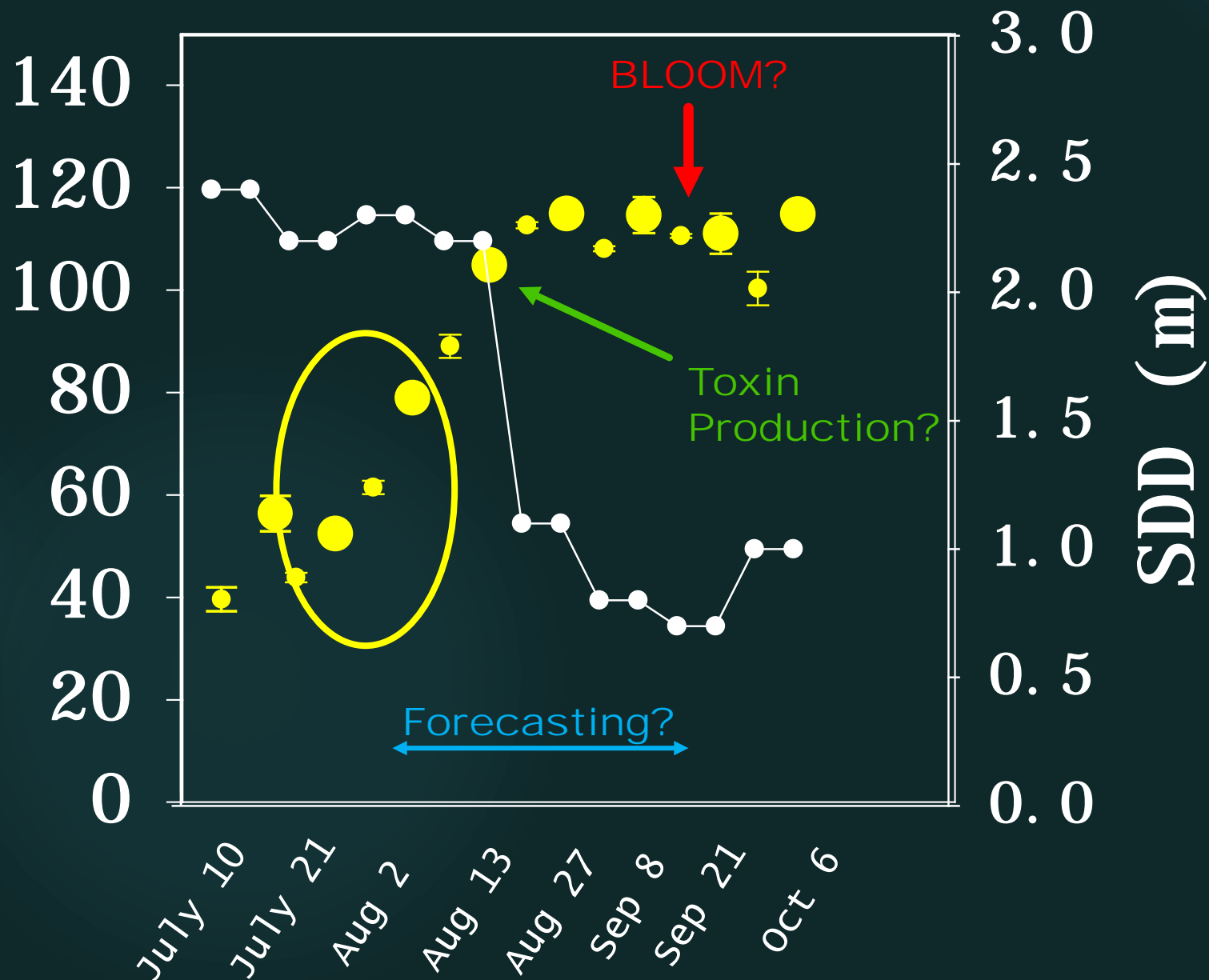


- ▶ Chlorophyll
 - ▶ .25 - 2,500 ppb
- ▶ Phycocyanin
 - ▶ 10 - 100,000 ppb
- ▶ Other 2-chnl handhelds available
- ▶ \$1,500 - \$2,500
- ▶ Stnds approx. \$200 each
- ▶ Rhodamine solid state standards (2 year shelf)

Meter Madness!



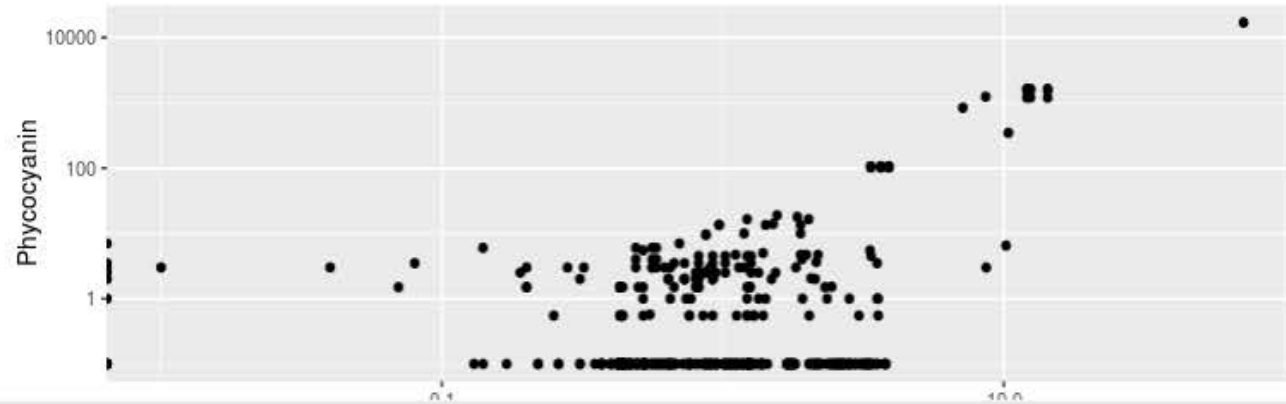
PC/Chl a Ratio



**PC/Chl a Ratio
precedes
Secchi Disk
depth and is
most sensitive
metric**

Chlorophyll *a* and Phycocyanin Scatterplot

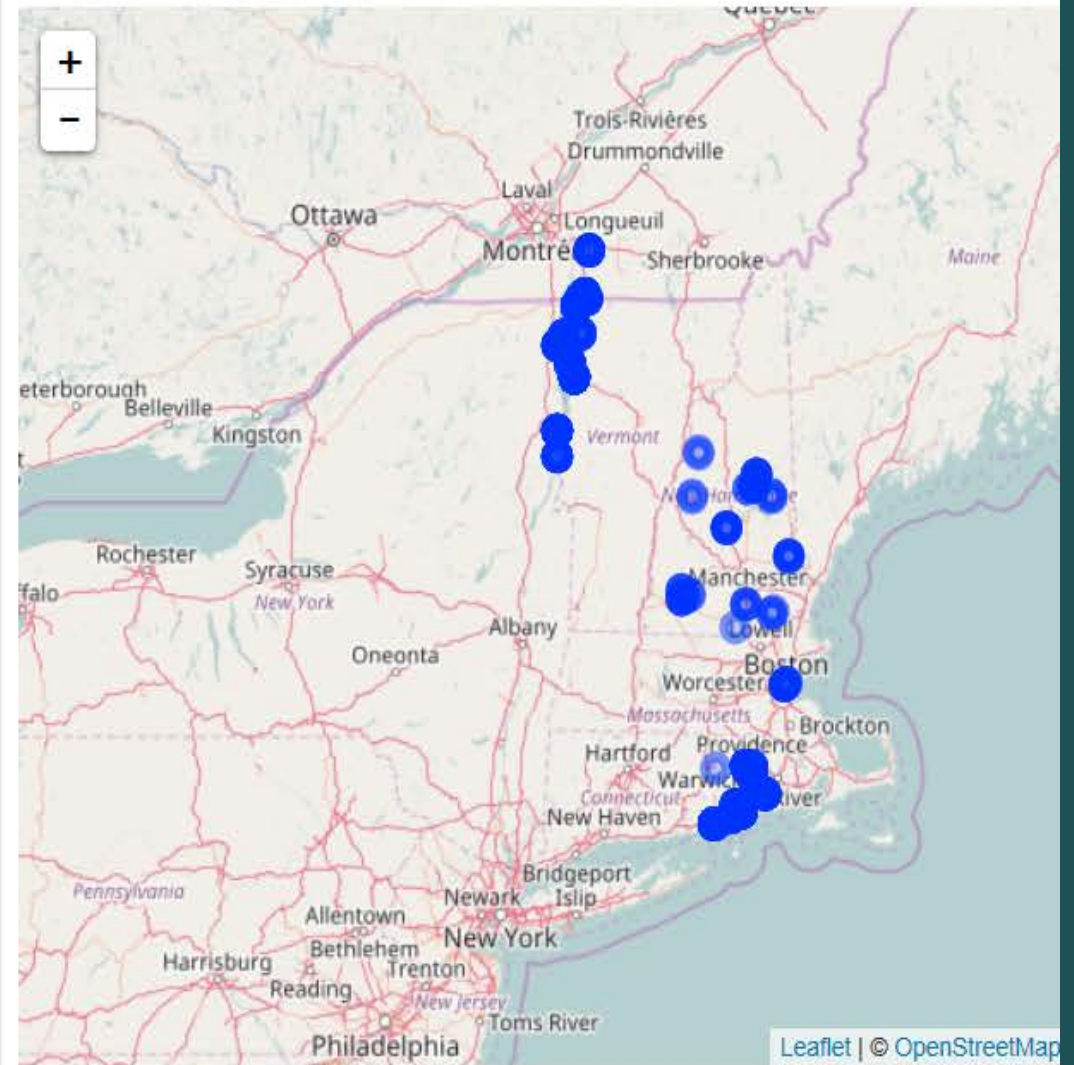
drag to select points



Data

	ID	State	Date	Chlorophyll	Phycocyanin
1	100:2014-09-03:Other	NH	2014-09-03	71.37	16998.17
3	10:2014-07-10:SS1	MA	2014-07-10	2.18	0.10
4	10:2014-07-17:SS1	MA	2014-07-17	2.44	1.52
8	102:2014-08-08:WL1	RI	2014-08-08	3.17	0.10
9	102:2014-08-08:WL2	RI	2014-08-08	3.57	0.10
10	102:2014-08-08:WL3	RI	2014-08-08	3.22	0.10

2014 Sampling Locations









CYANOS.ORG

<http://cfb.unh.edu/CyanoKey/indexCyanoQuickGuide.html>

http://listserv.uri.edu/cgi-bin/wa?SUBED1=CYANO_COLLAB

Snook.Hilary@epa.gov

617-918-8670



Snook.Hilary@epa.gov
617-918-8670



Additional Slides



Cyanoscope Kit



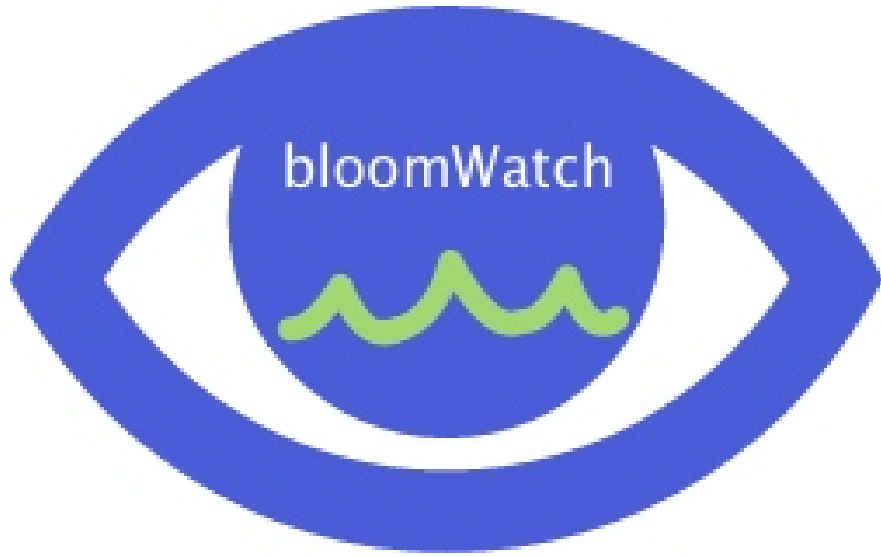


cyanoScope

cyanoScope uses modern technologies and social media platforms to learn more about the occurrences and timing of cyanobacteria in our waters

Goals:

- ***Public Outreach:*** Increase awareness about cyanobacteria
- ***Crowdsourcing Identification:*** Use social media to identify the cyanobacteria in lakes, ponds, and other surface water bodies
- ***Scientific:*** Map the spatial distribution and seasonal occurrence of potentially toxin producing cyanobacteria



A smartphone app-based project to determine the spatial and temporal patterns of bloom occurrences

<http://cyanos.org/bloomwatch>

Users: General public, trained citizen scientists, water quality professionals

Goal: Engage public (increase awareness about cyanobacteria), collect basic surveillance bloom data

Data Collected: Macro-level photo(s), geolocation, contact information, qualitative questions, notes

Considerations: Distribution, simplicity, responding to submissions (state capacity to respond), photo storage