The Cyanobacteria Monitoring Collaborative

An Approach to Educating, Monitoring, and Managing Harmful Cyanobacteria

MAINE SUSTAINABILITY & WATER CONFERENCE

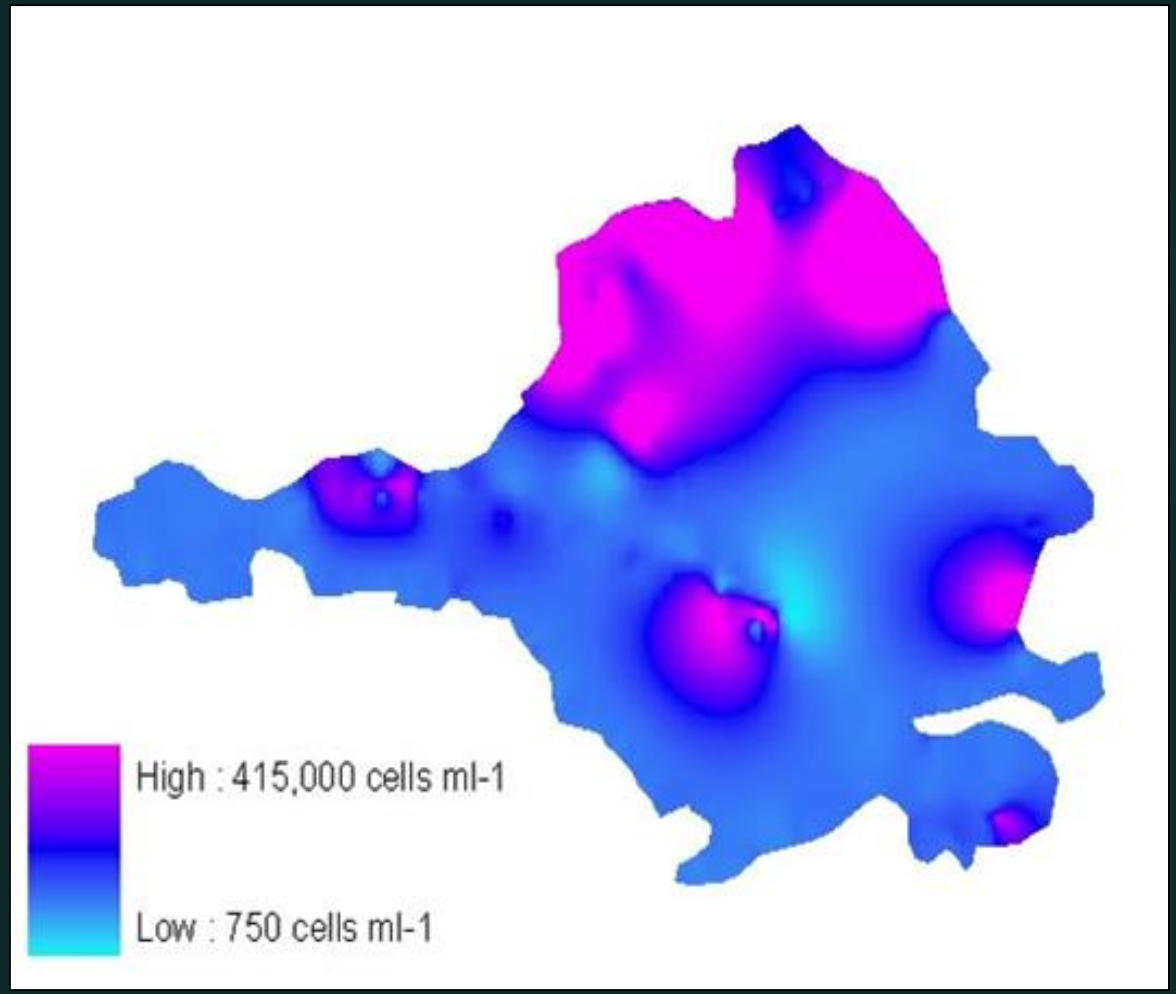
MARCH 30, 2017

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



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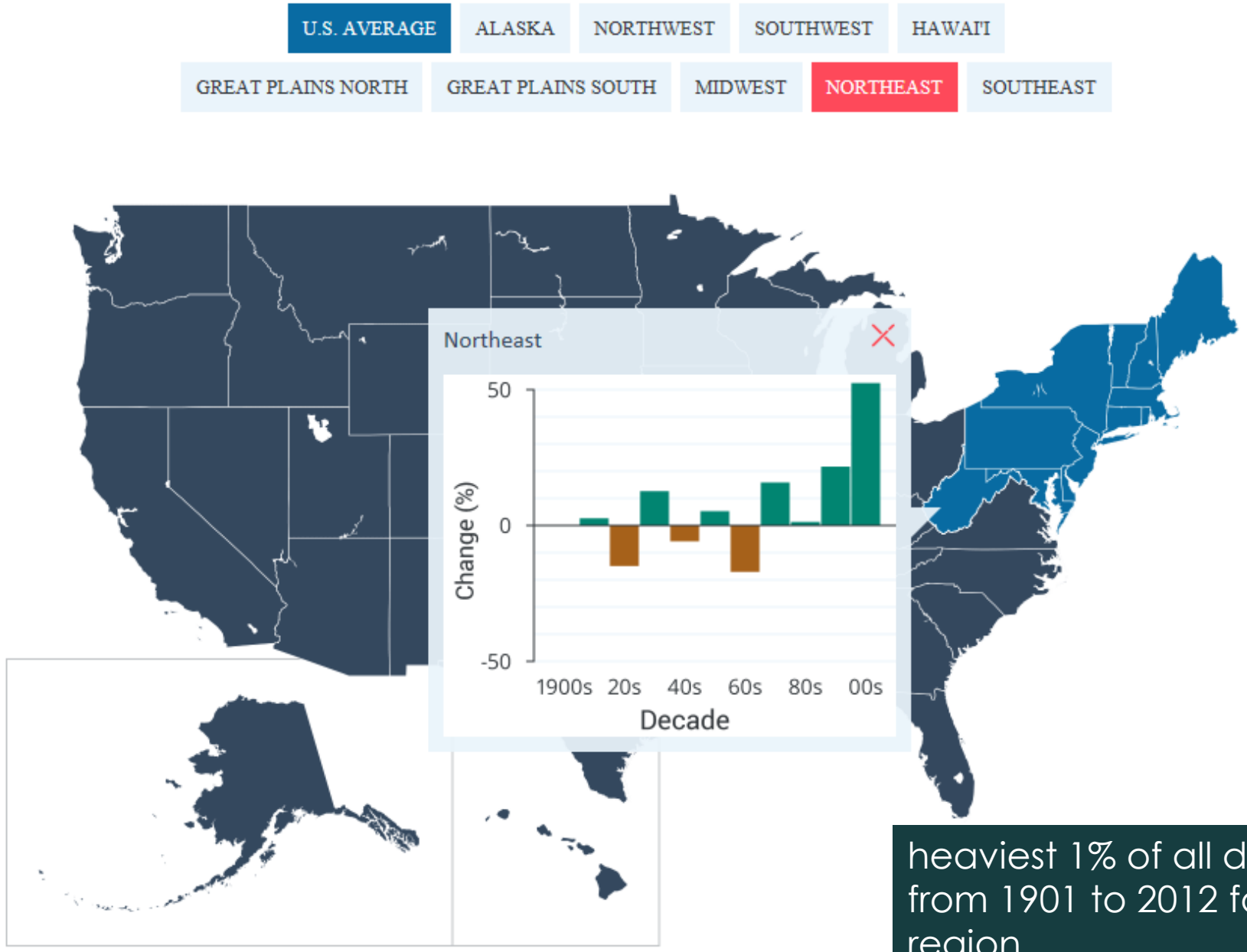
Figu

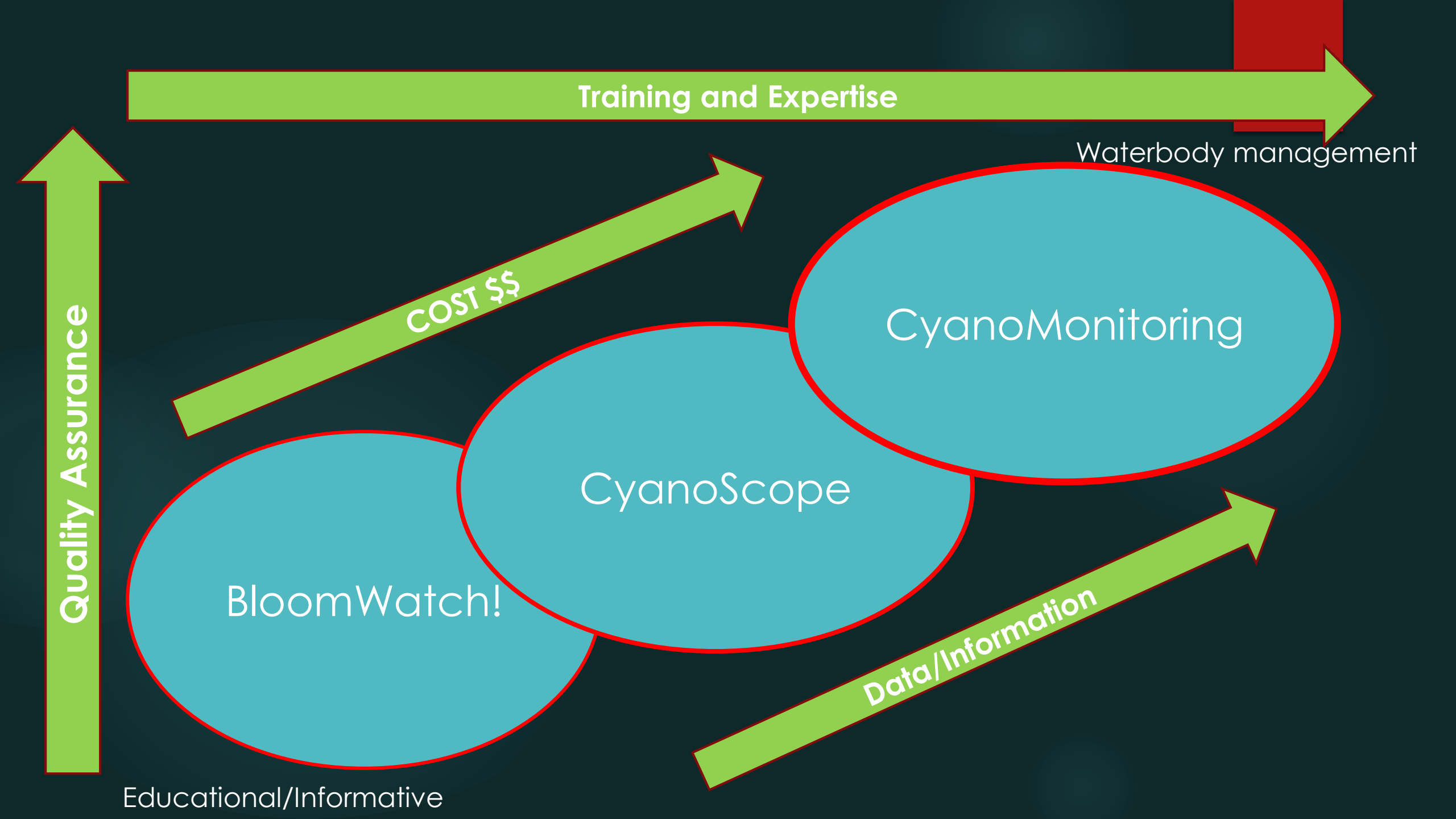


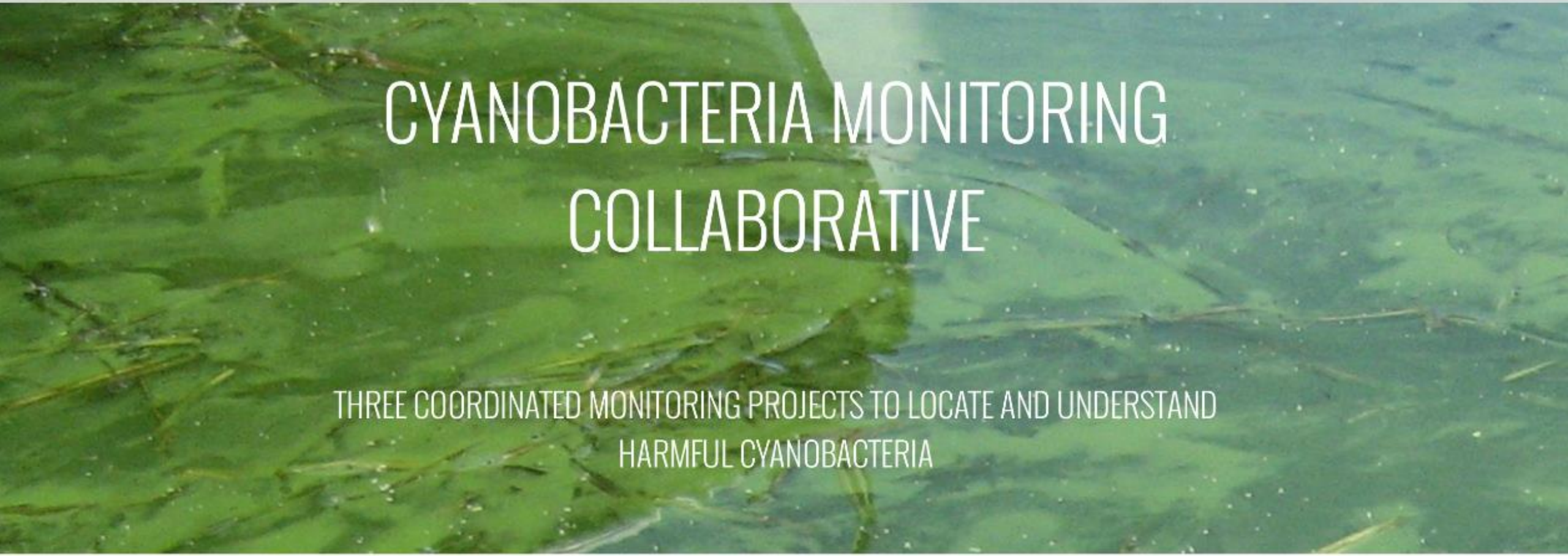
heaviest 1% of all daily events from 1901 to 2012 for each region

http://nca2014.globalchange.gov/highlights/report-findings/extreme-weather

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


Training and Expertise
Waterbody management
Quality Assurance
COST $$
CyanoMonitoring
CyanoScope
BloomWatch!
Data/Information
Educational/Informative



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!

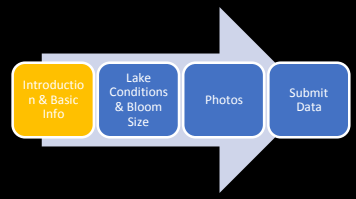
To determine the spatial and temporal patterns of bloom occurrence anywhere

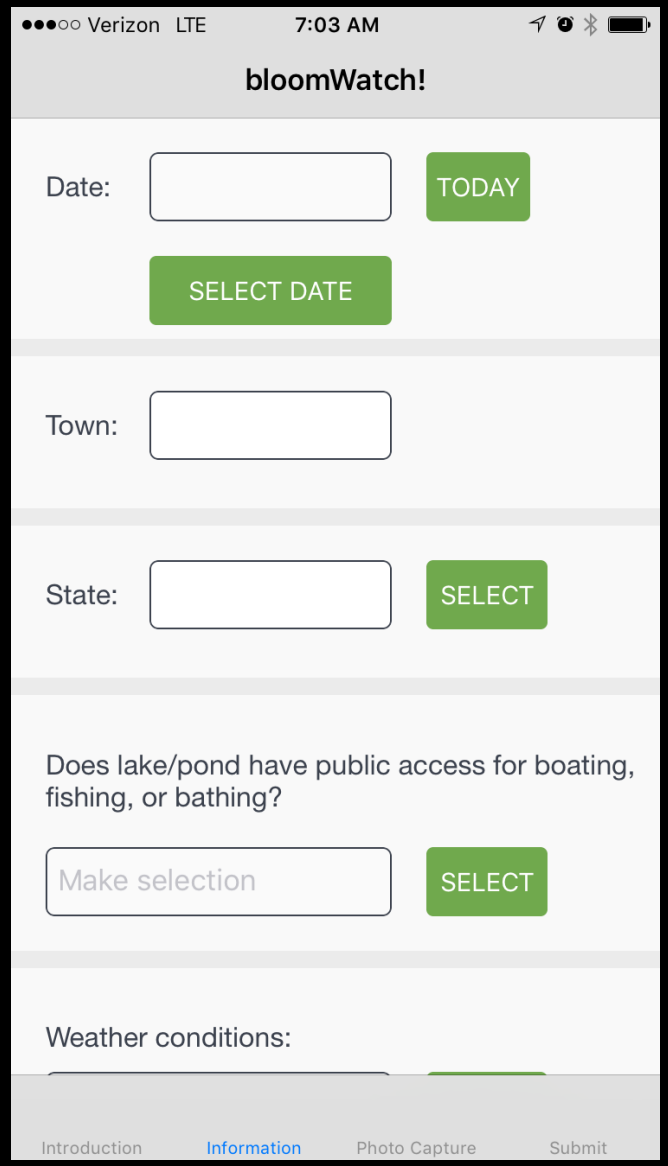
- Bare bones
- Smartphone App
- Embedded QA
- Educational & Informative
- Crowdsourced information
- Data Visualization – public domain

BLOOMWATCH APP

CROWDSOURCING TO FIND AND REPORT POTENTIAL CYANOBACTERIA BLOOMS

Lake Conditions & Bloom Size Screen





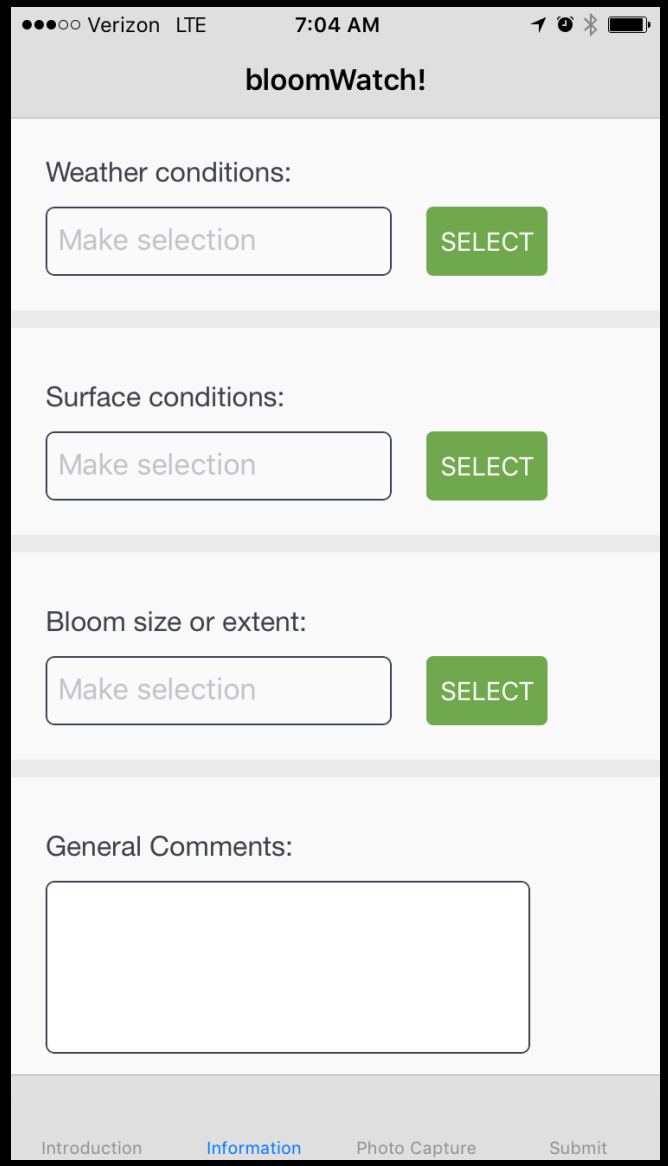
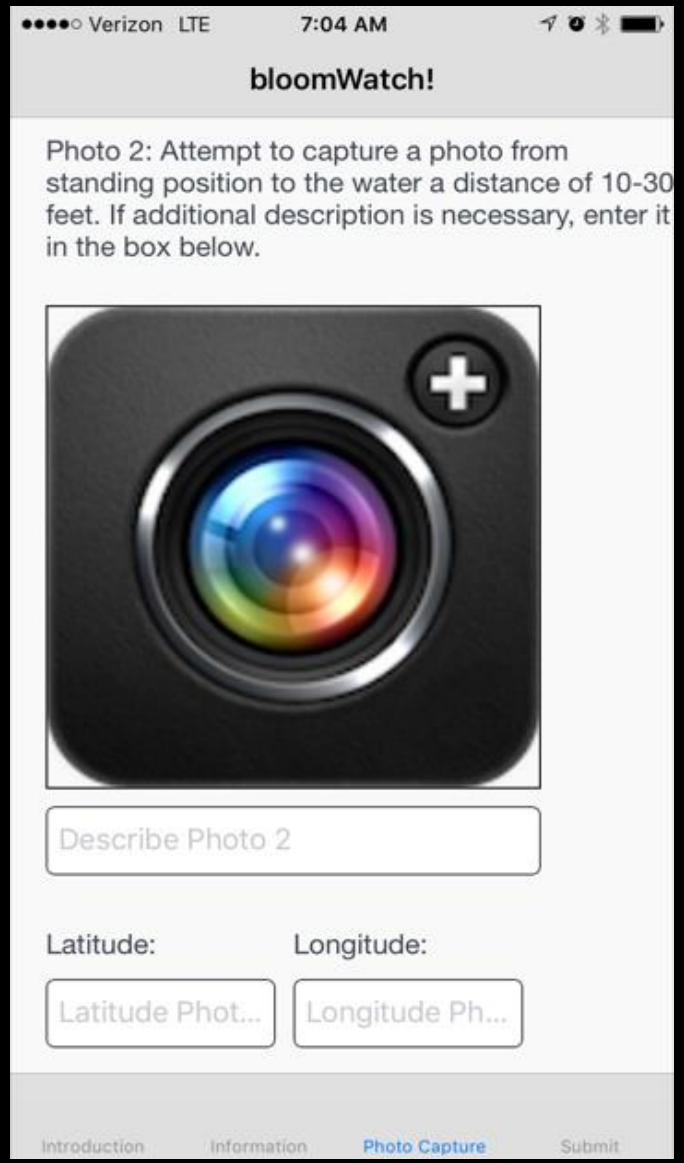
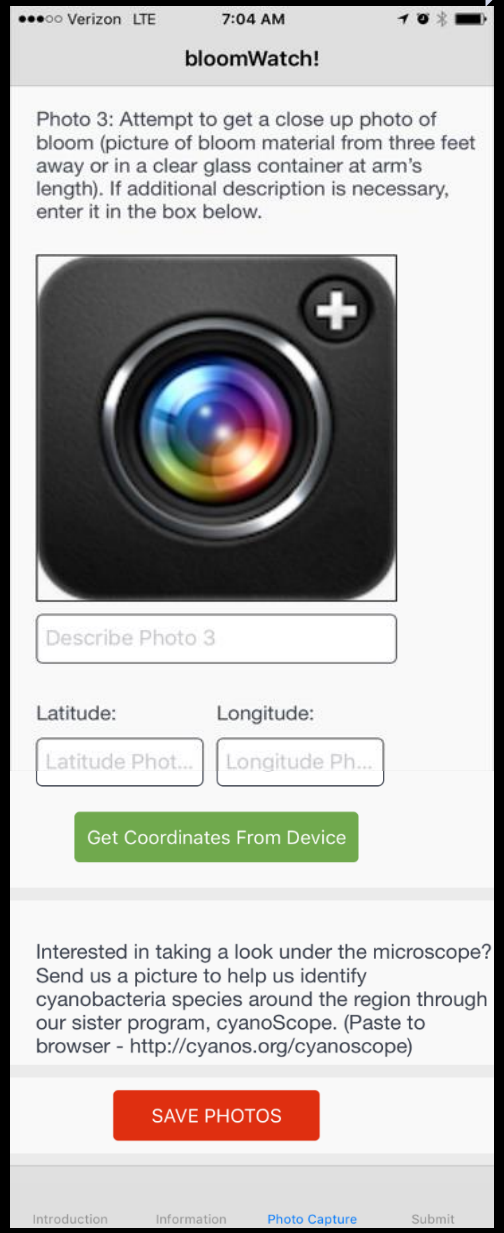
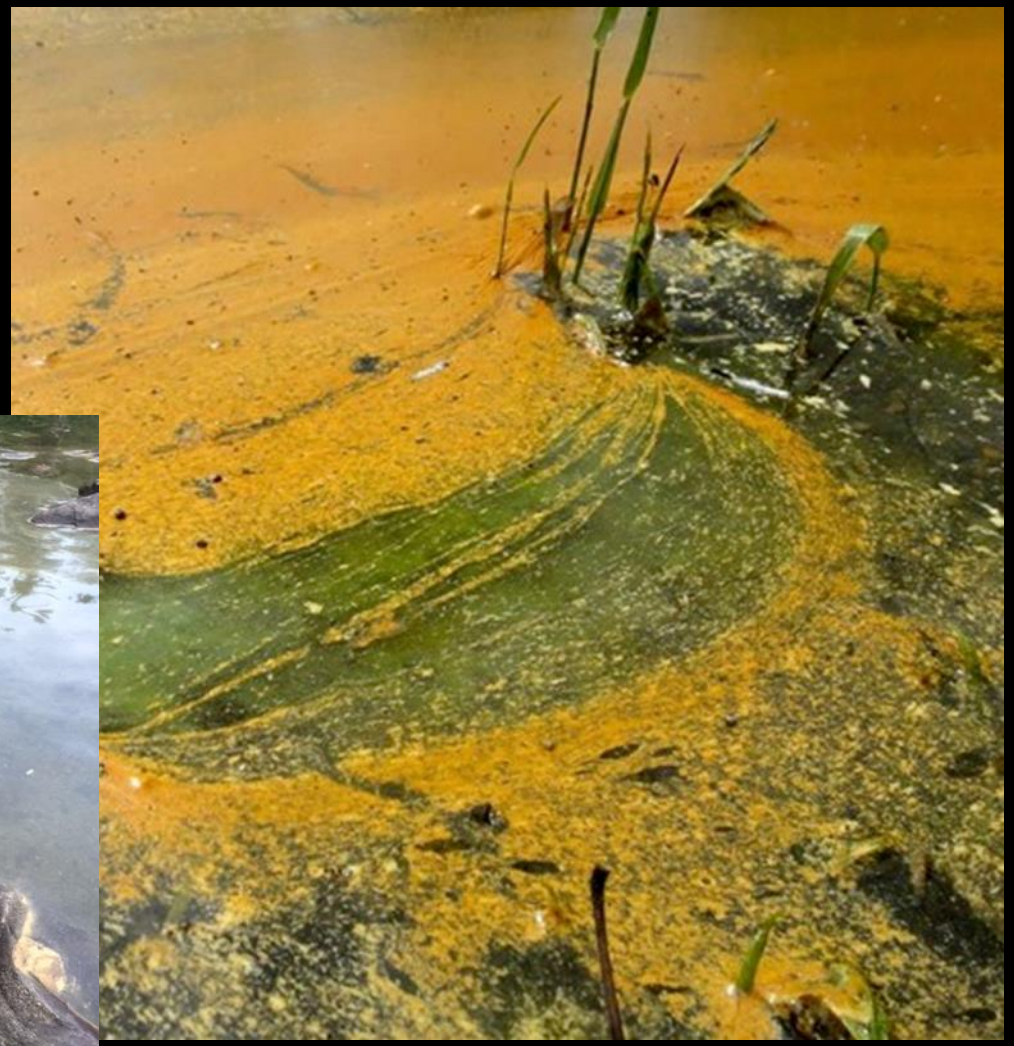


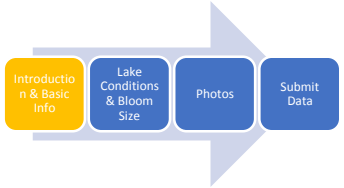
Photo Screen

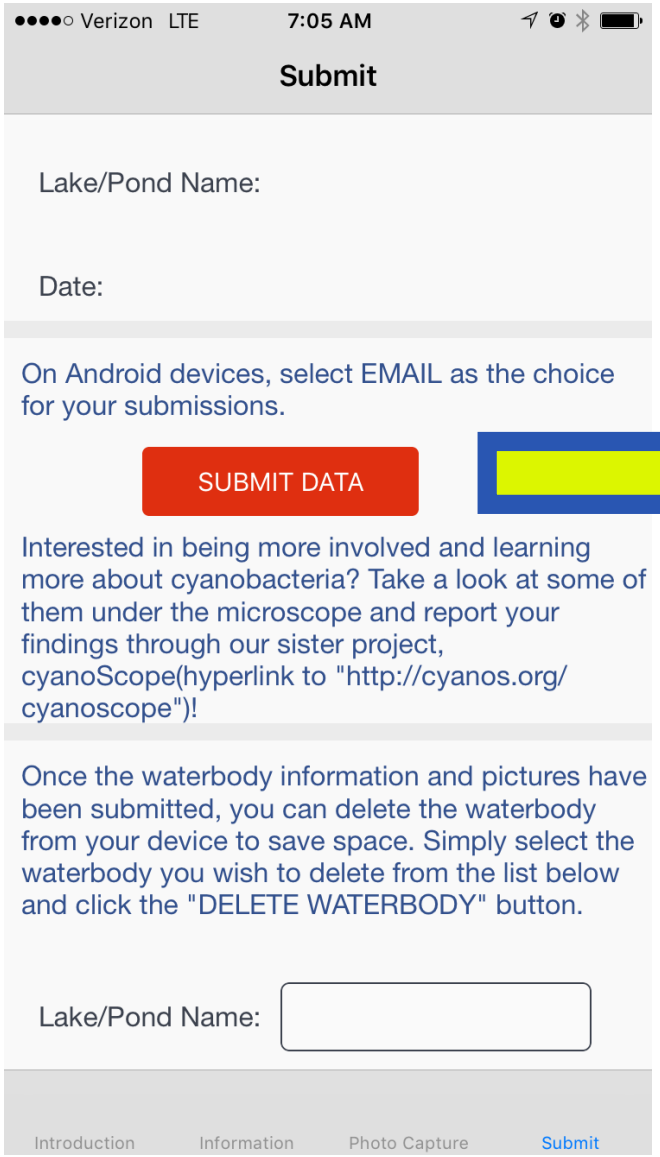




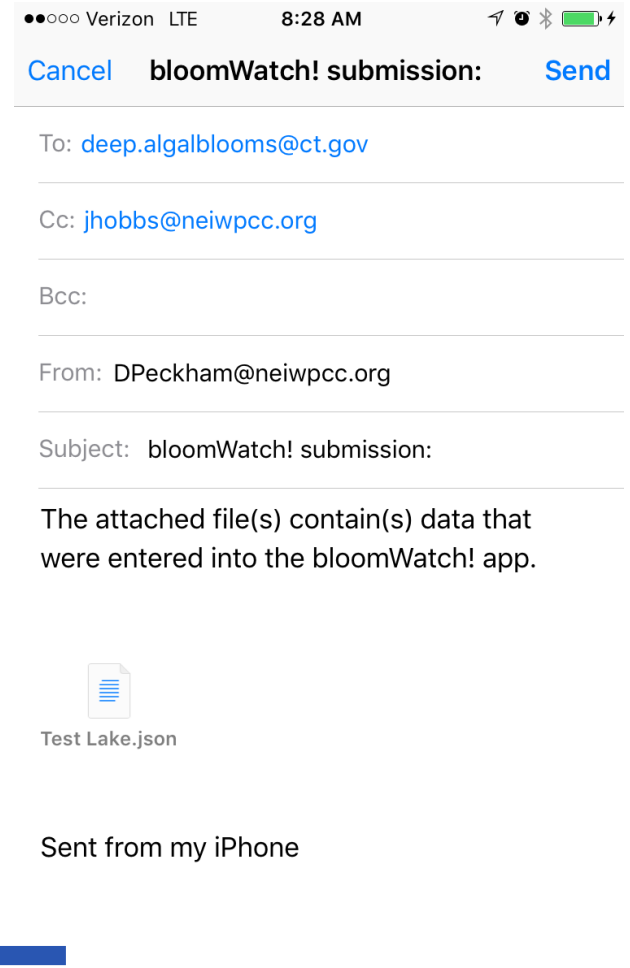


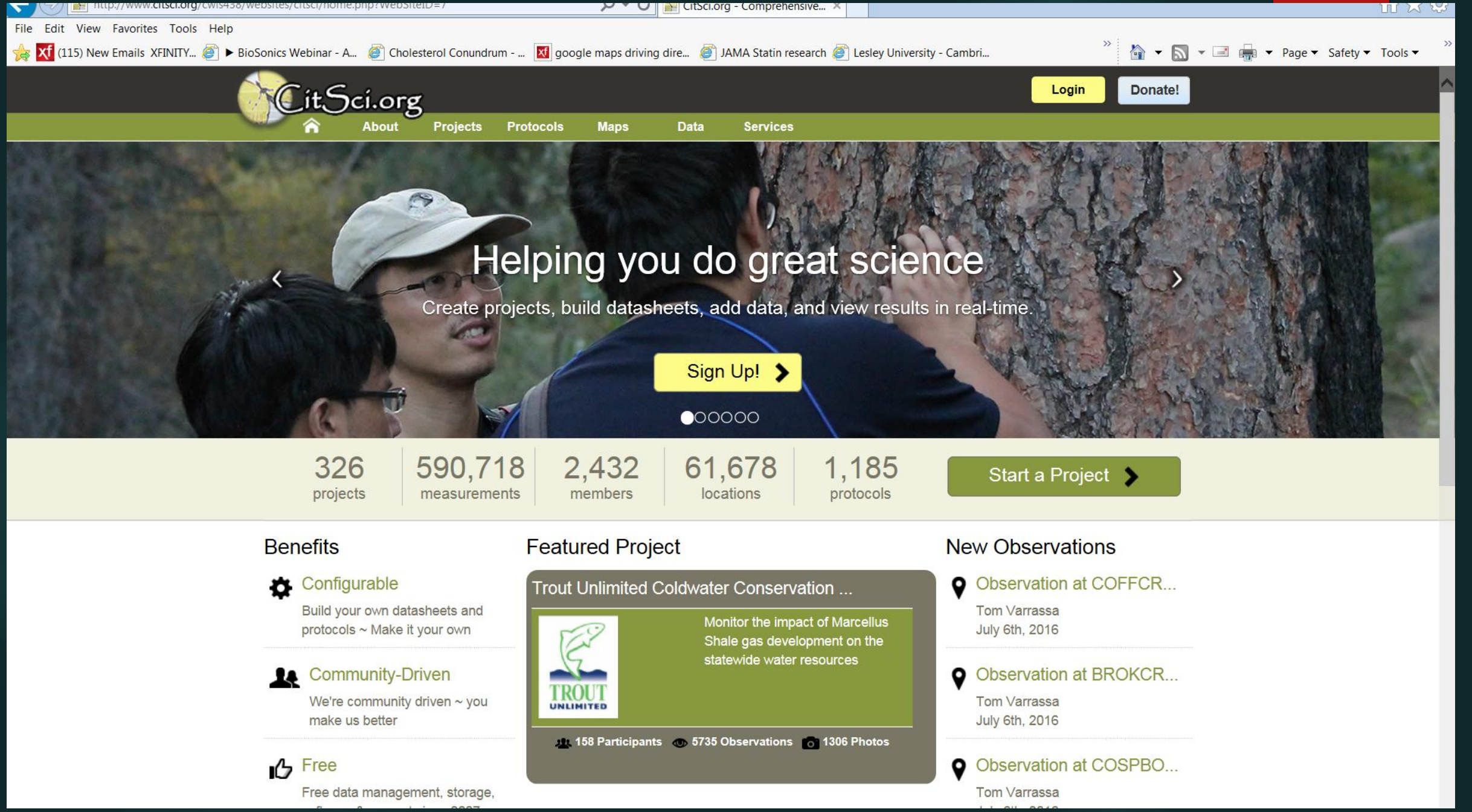
Submit Data Screen





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.

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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 ...
TROUT UNLIMITED
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

bloomWatch

47	11	11	139
members	observations	locations	measurements

OPEN

Manager Jasper Hobbs

Description 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.

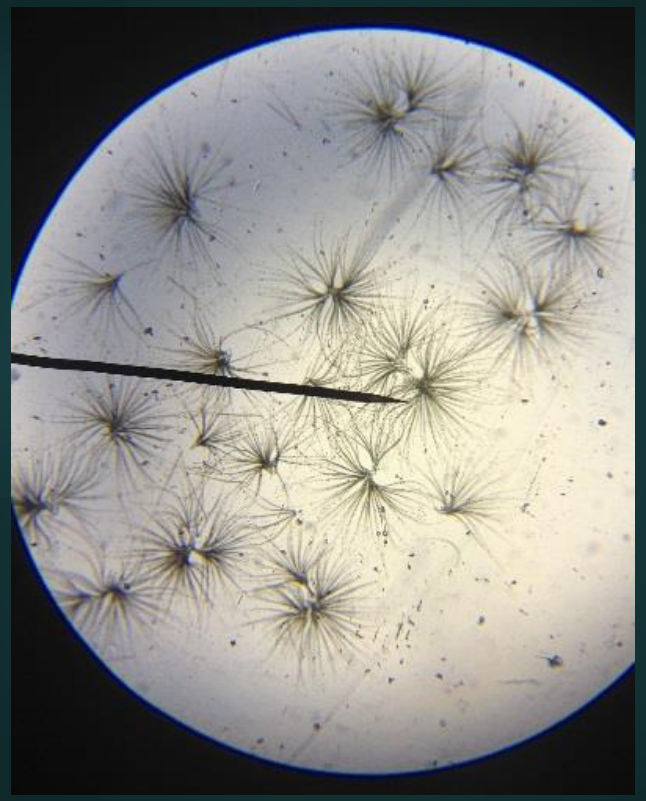
State and local officials can't be watching every lake at all times. With you and your smartphone helping us out, we want to improve our ability to understand where, how, and when these blooms are appearing and are causing issues.

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)




Center for
UNH
Freshwater Biology
LIM-TEX
06/10/2015

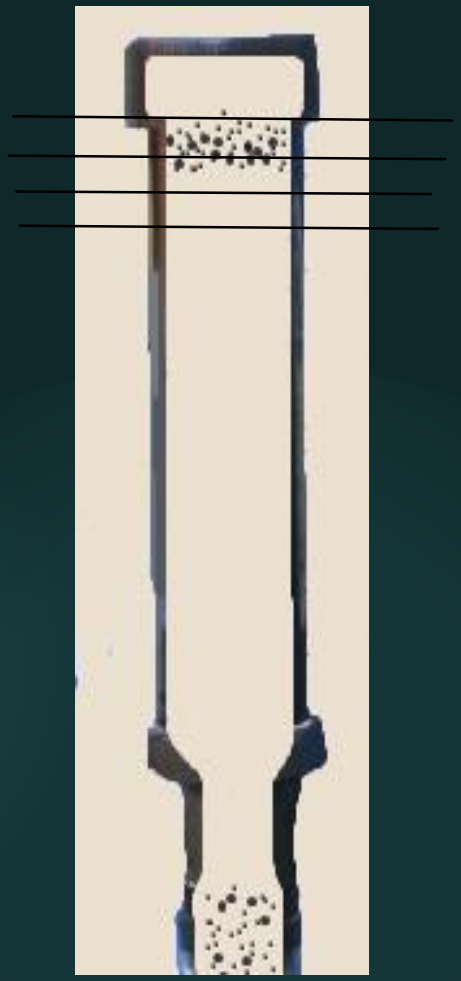

06/10/2015

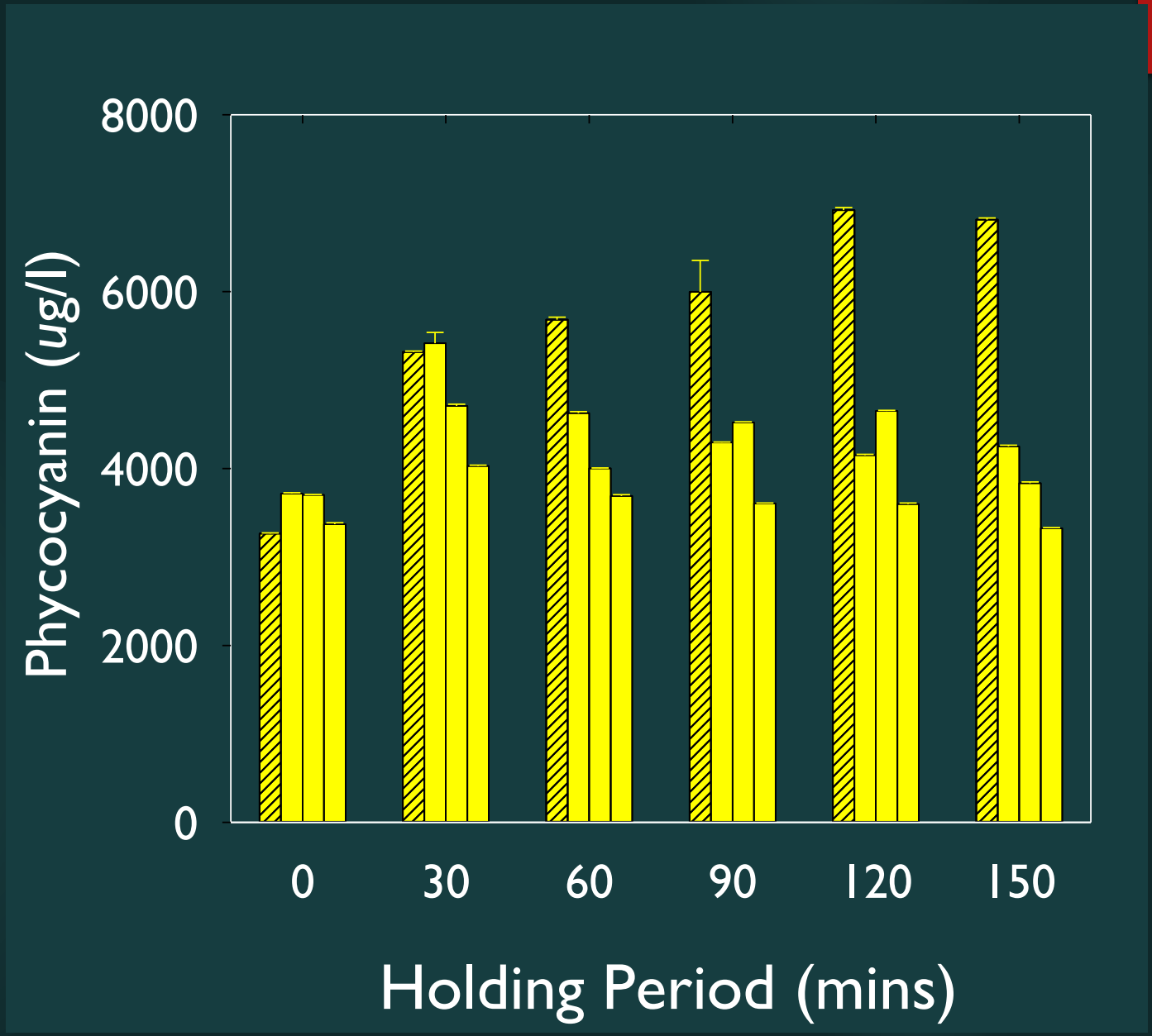

06/10/2015


06/10/2015

Leland

Process of Respiration/Buoyancy





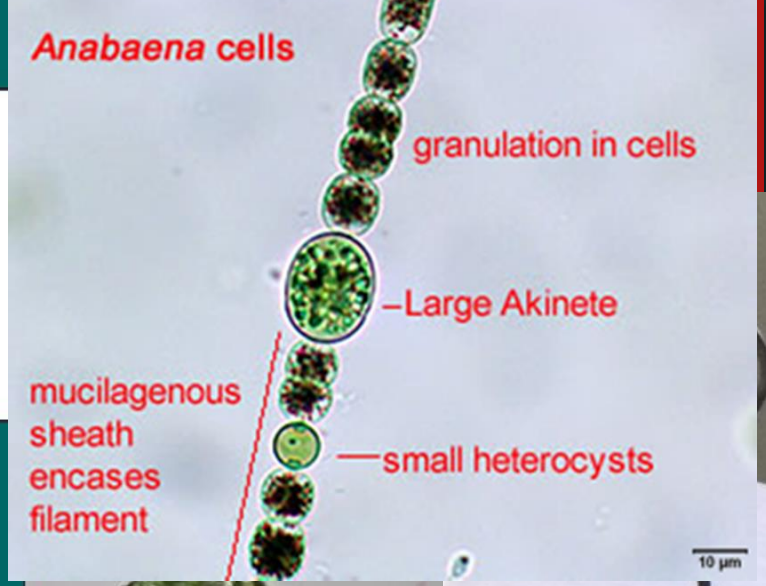
Patent Pending

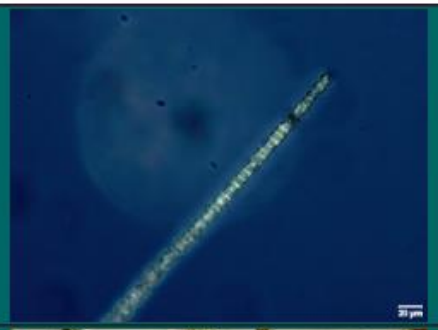

HDR
VIDEO
PHOTO
SQUARE

Anabaena / *Anabaenopsis*

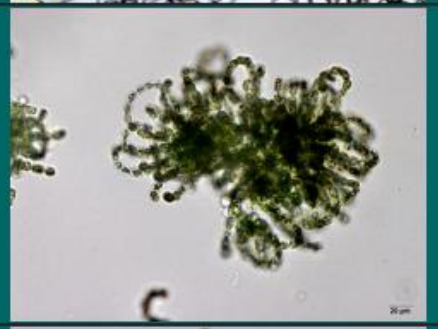
General Description

- *Anabaena* cells are usually arranged in filaments or chains and can be straight, spiralled, coiled or spring-like and often dscribed as "beaded"
- Filaments also have specialized cells called heterocysts and akinetes, used for fixing nitrogen and regenerating cells for future colonies
- A mucilagenous sheath surrounds the cells of the filament











Home

iNaturalist.org

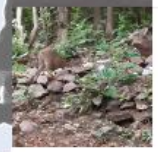
Observations Species Projects Places Guides People

Observations

Species Location

The World | 2,500,490 OBSERVATIONS | 89,001 SPECIES | 11,199 IDENTIFIERS

Map Grid List Places of Interest



cyanoScope

MAPPING CYANOBACTERIA ONE SLIDE AT A TIME

ADD OBSERVATIONS

cyanoScope

Stats

Totals

102 Observations »

17 Species »

19 People »

Most Observations

Most Species

Most Observed Species

» Members

» Export observations

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
Something...
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

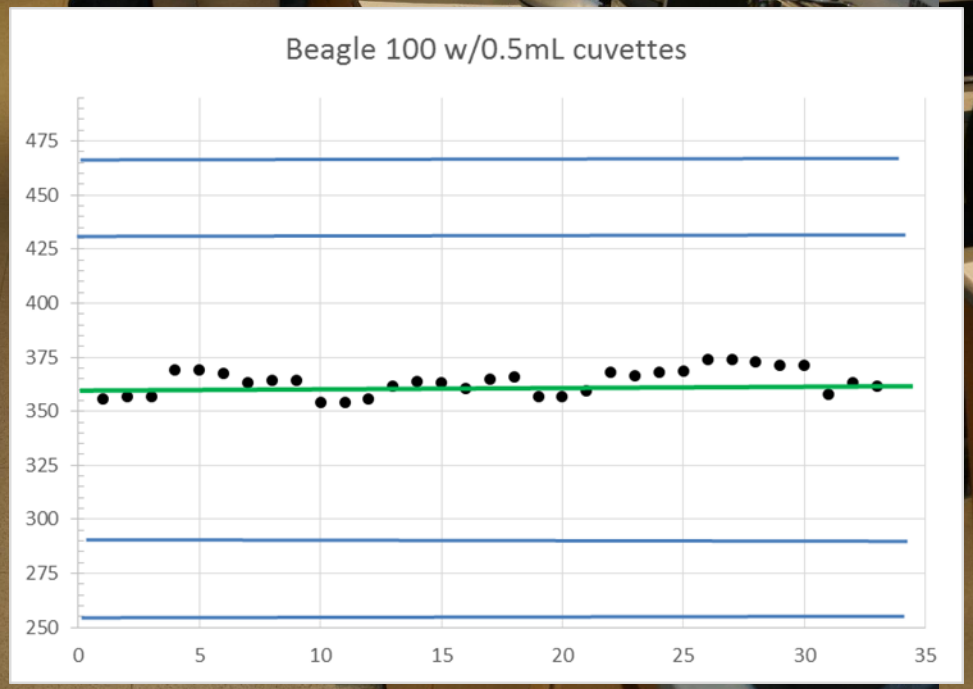
- BOH/Beach Programs, Lake associations, state WQ folks
- 1 meter IT sample & net tow
- 3 meter IT sample & net tow
- CyanoMonitoring Kit
- JUN-SEP minimum
- Sample every other week
- 1 fixed site per waterbody minimum

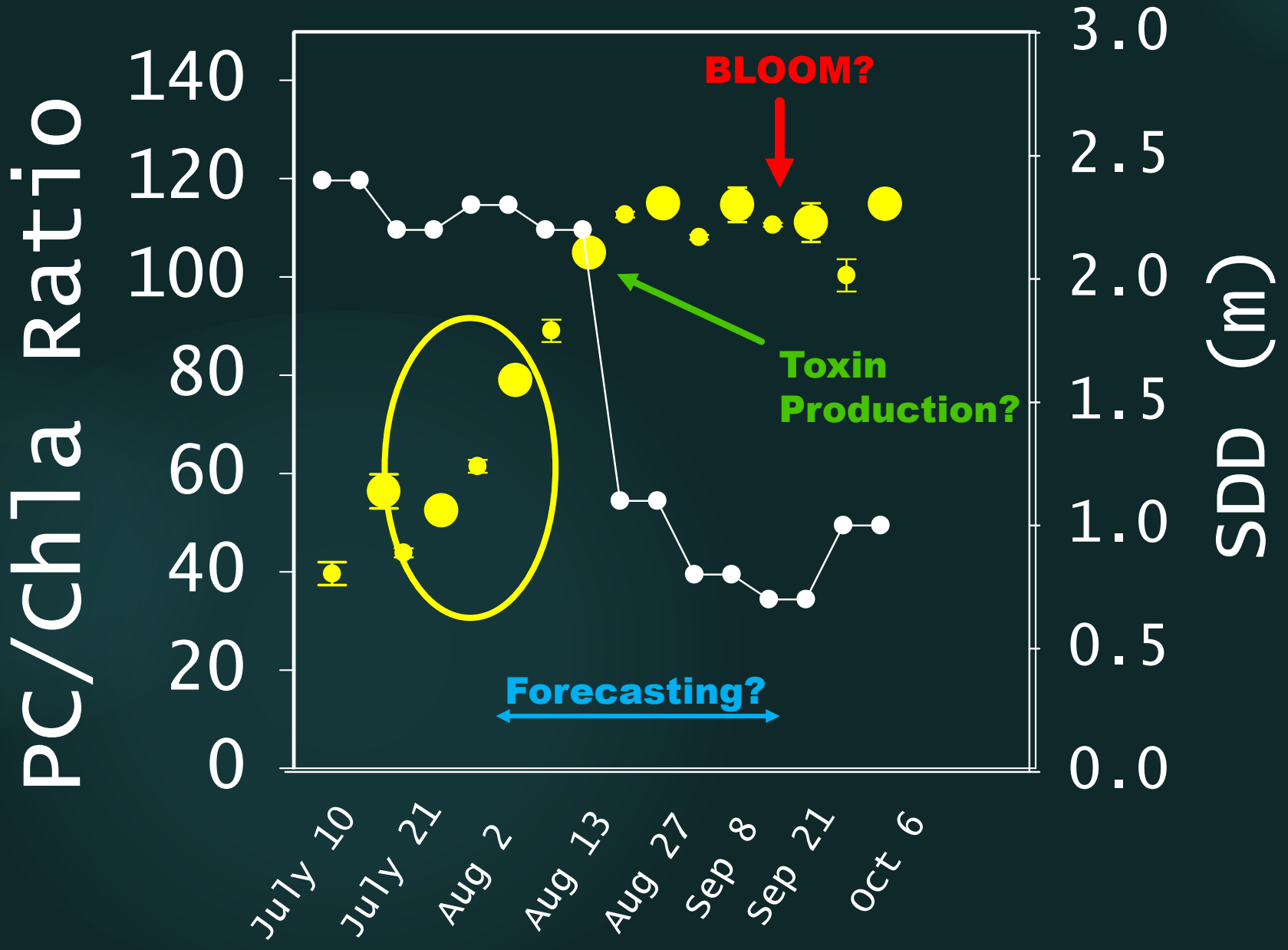
Designed to complement currently existing programs

Handheld 2-Channel Flourometer

- 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!

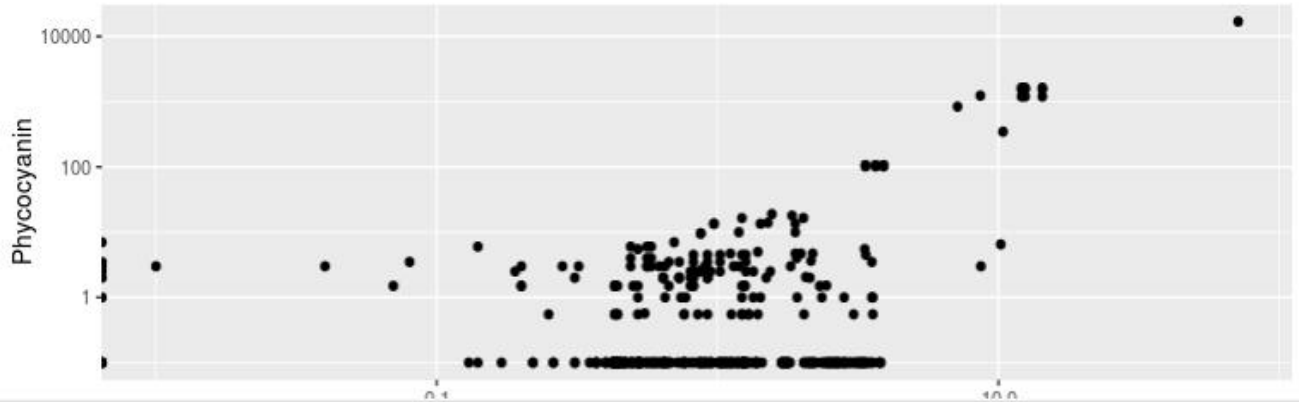




PC/Chla Ratio precedes Secchi Disk depth and is most sensitive metric

Chlorophyll *a* and Phycocyanin Scatterplot

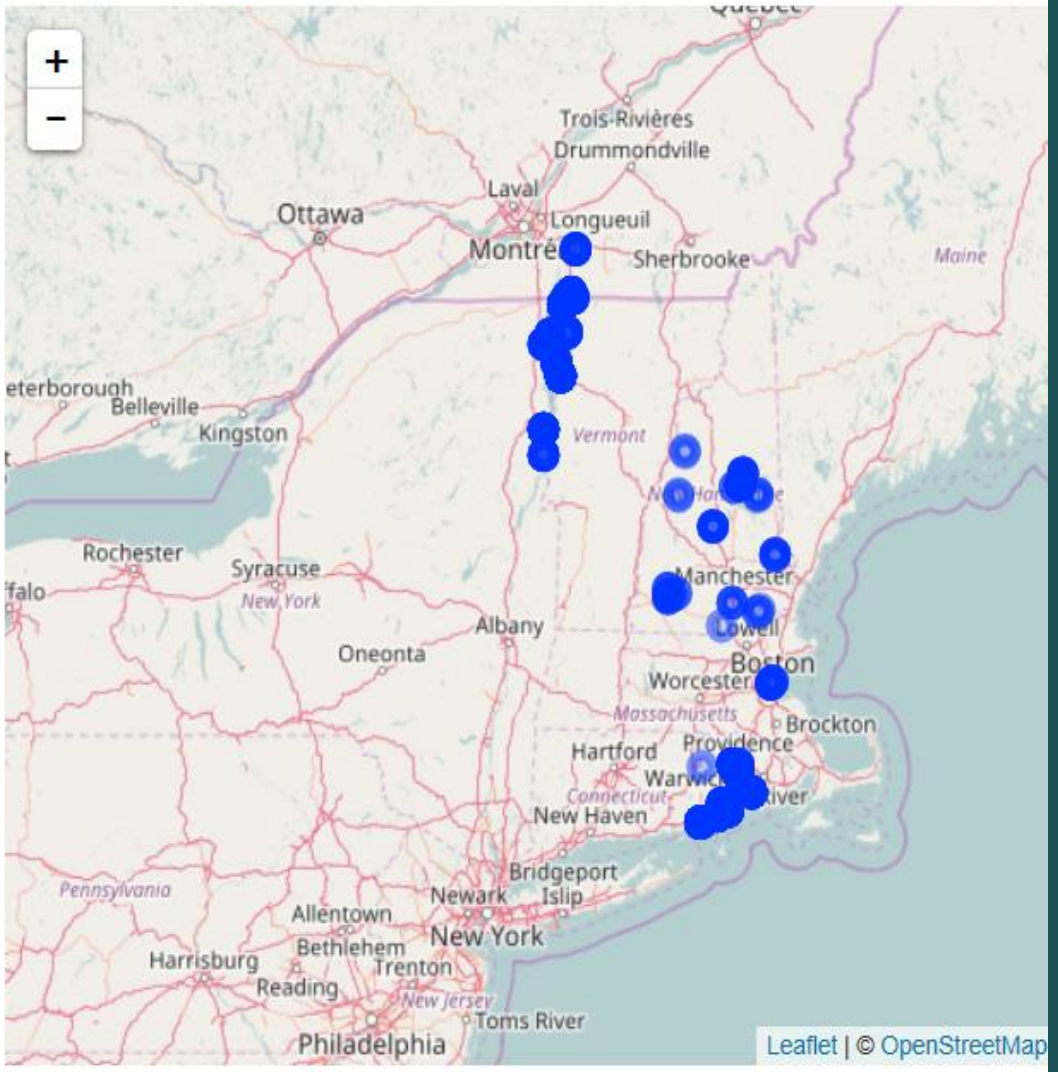
drag to select points



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

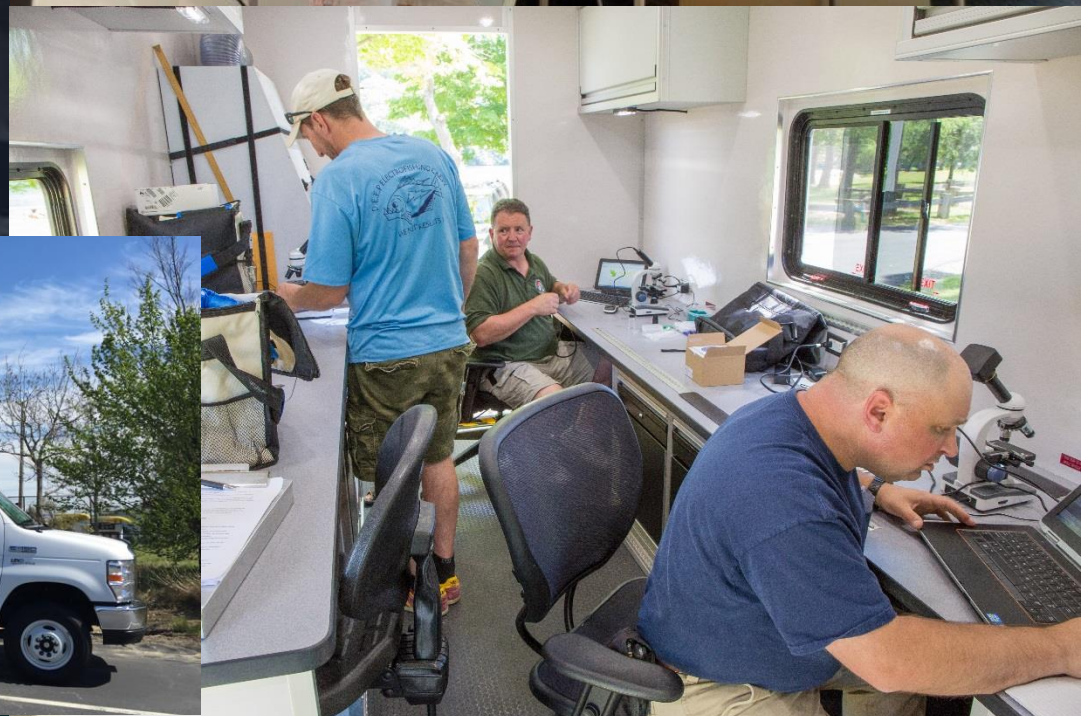
2014 Sampling Locations




UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
NEW ENG
LAND REGI
LABORA
bloomWatch
SunBr


HARRIS
MERCURY
MERCURY


NEW ENGLAND REGIONAL LABORATORY



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

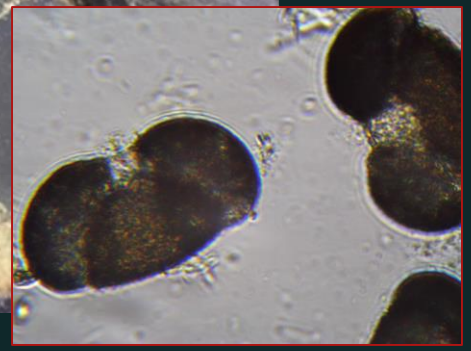
??????

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

Additional Slides


OFF
HDR
VIDEO
PHOTO
SQUARE


?



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

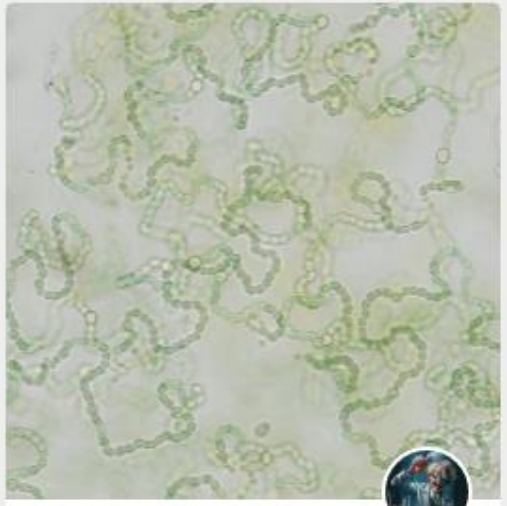
10mo 10mo 9mo 9mo

Unknown

9mo

Unknown

9mo



Unknown

10mo

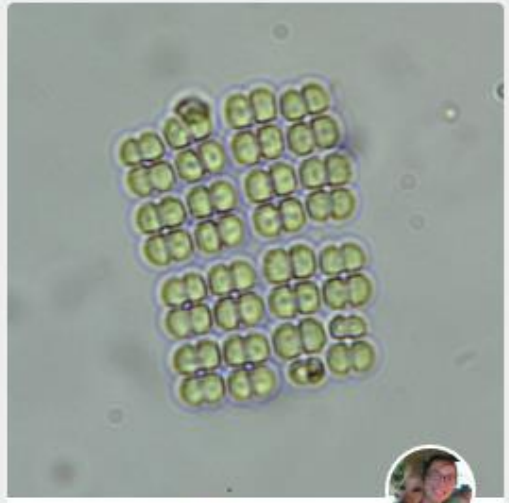
Unknown

10mo

Anabaena inaequalis

Unknown

Chroococcus turgidus

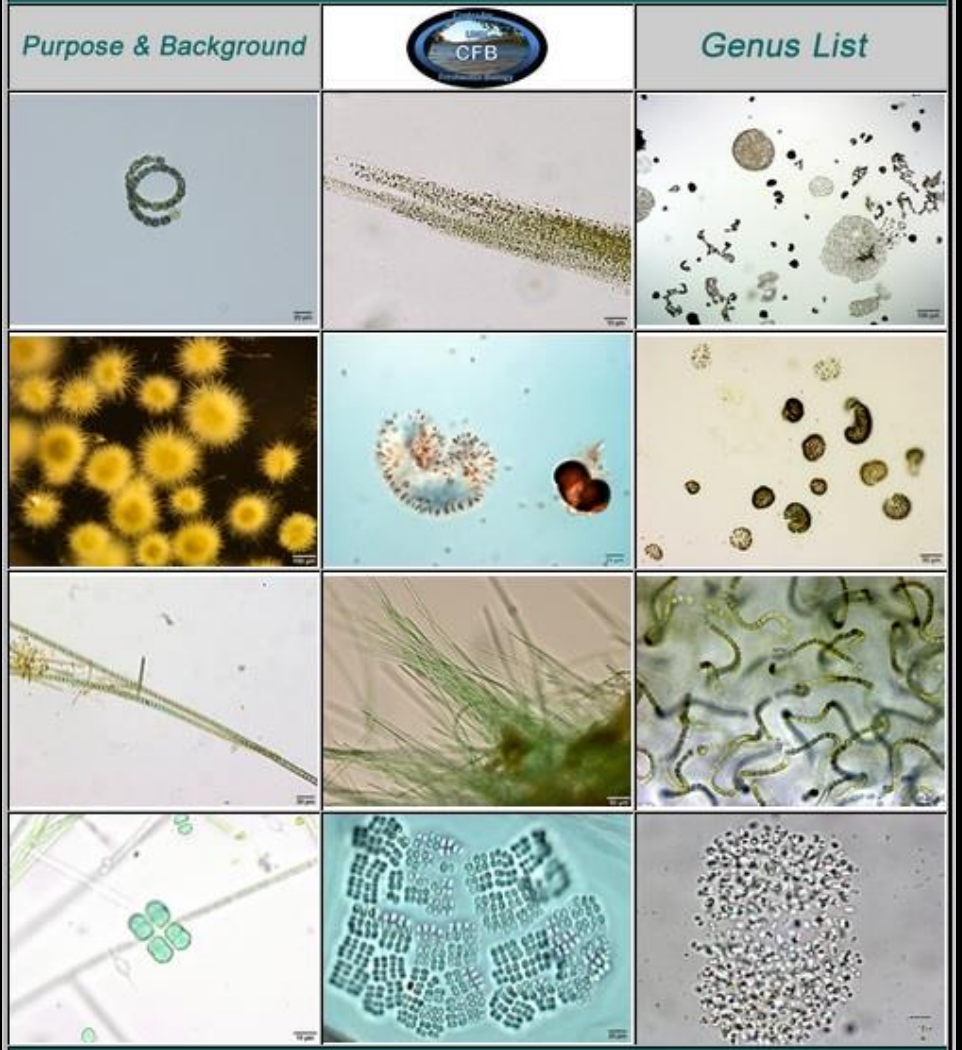


Merismopedia elegans

Toxic Cyanobacteria of New England

"The Dirty Dozen"

Purpose & Background | CFB | Genus List



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

Please contact Amanda Murby for questions or comments