The Cyanobacteria Monitoring Collaborative

An Approach to Educating, Monitoring, and Managing Harmful Cyanobacteria

REGION 10

REGIONAL NUTRIENTS TECHNICAL ASSISTANCE GROUP MEETING

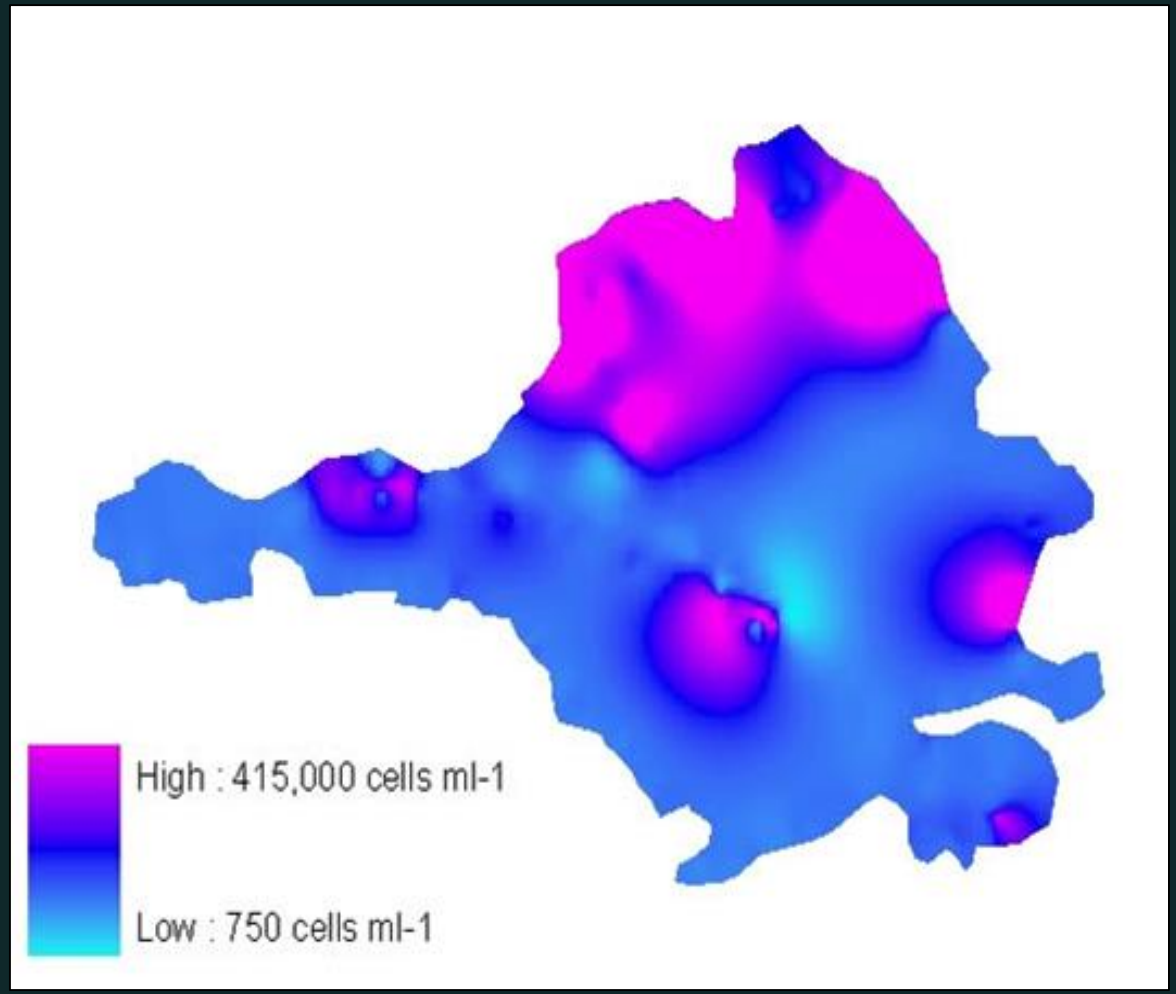
MAY 25, 2017

Today's Talk

- CMC Program Overview
- Three Tiered Approach
  - bloomWatch
  - CyanoScope
  - Cyanomonitoring
  - QA
  - Lessons learned

Why the Need?

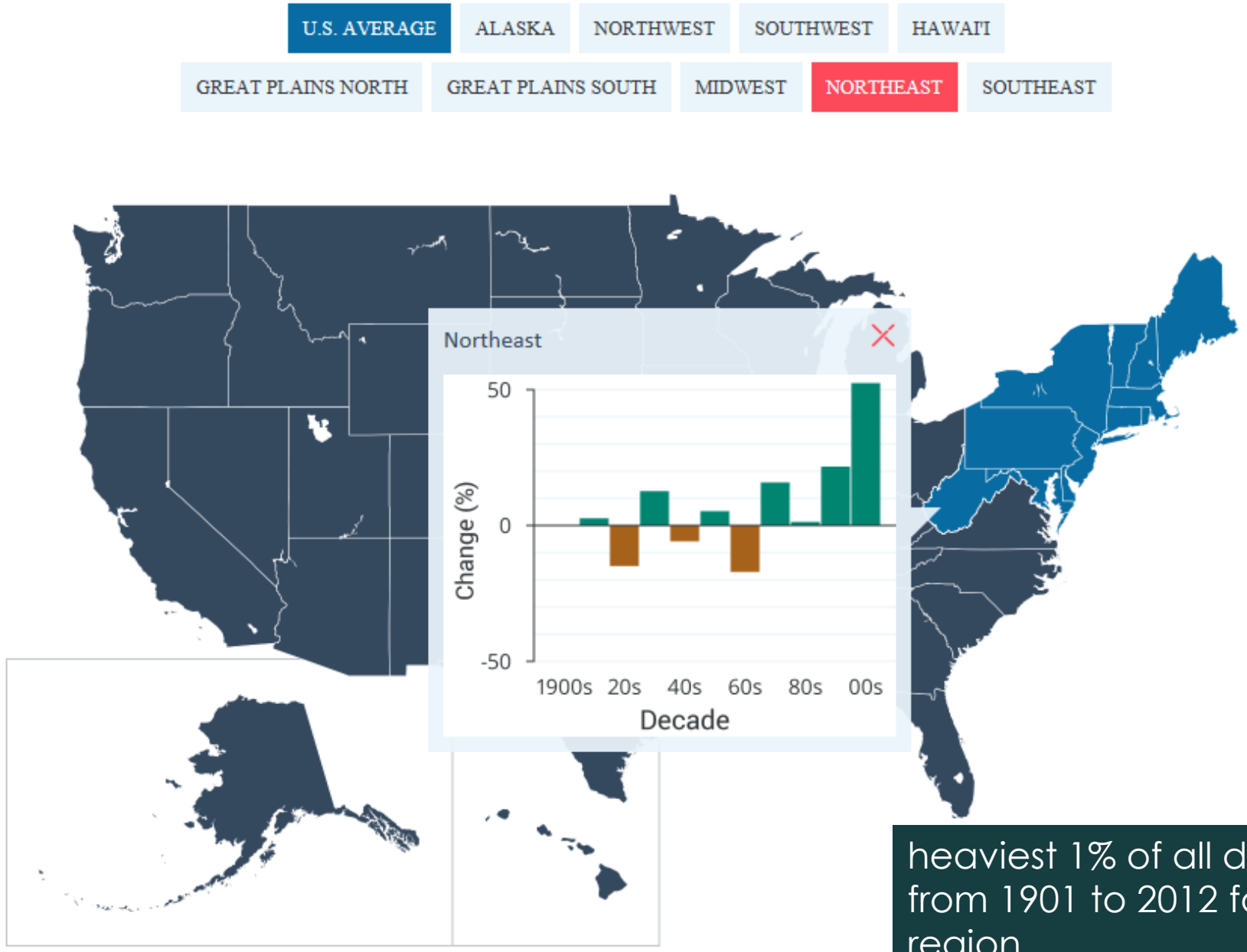
- State & constituents Request
- No clear picture at any spatial scale
- Moving target
- Lack of local knowledge
- Public Lack of knowledge on health risk
- Lack of overall data
  - Risk/vulnerability
  - Toxin associated genera
  - Management applications
    - PWS/Beaches



UNH

What Causes Harmful Algal Blooms (HABs)?

Figu

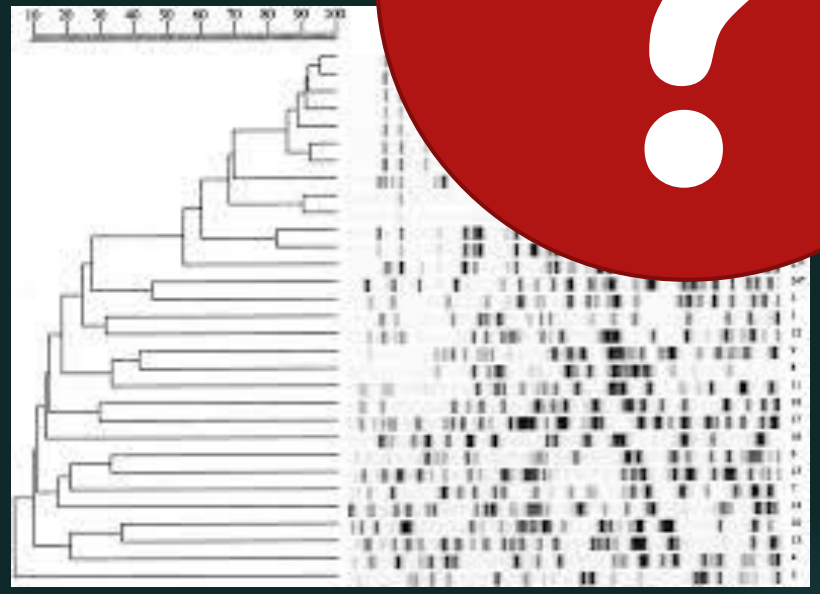


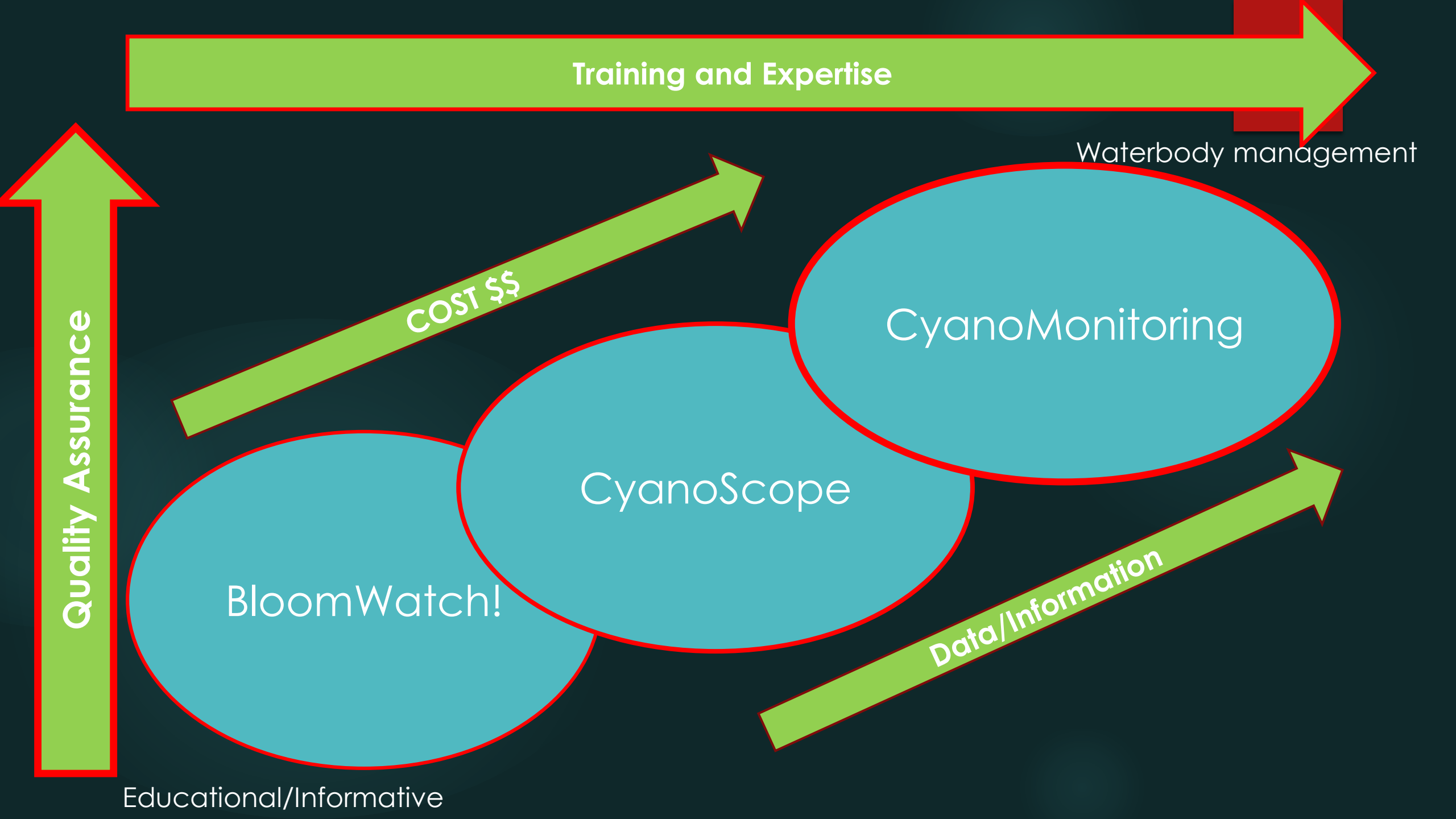
heaviest 1% of all daily events from 1901 to 2012 for each region

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

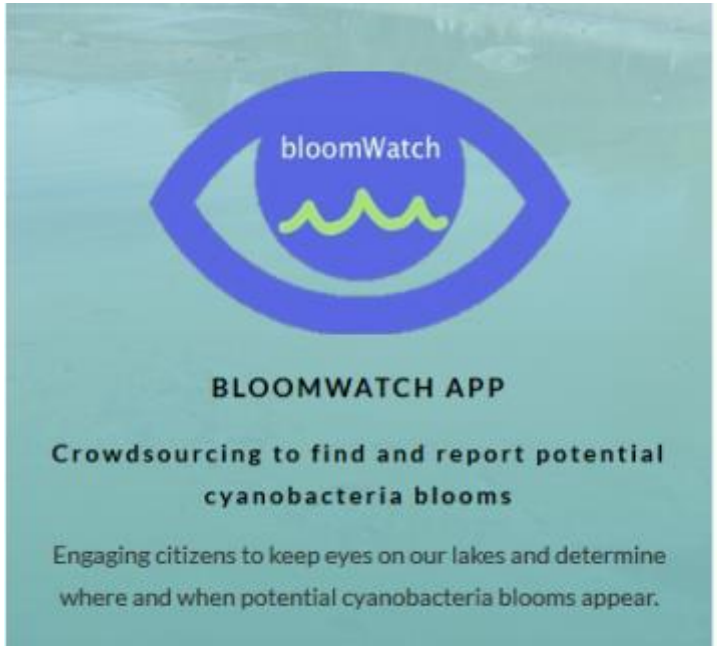
Program Conception

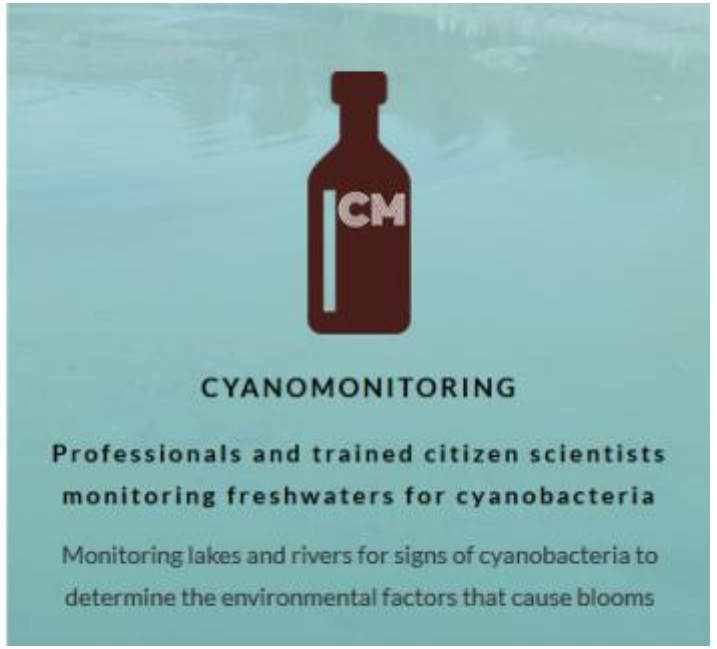
- State Request/Timing
- Open Collaborative Approach
- Architecture
  - Fill a niche
  - Educational
  - Inexpensive
  - Informative
  - Scaleable




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

Cyanobacteria Monitoring Collaborative
www.cyanos.org





Multi-Tiered Approach to Cyanobacteria Monitoring

“Crowdsourcing to find and report blooms”

Use your smartphone to help track cyanoblooms

http://cyanos.org/bloomwatch

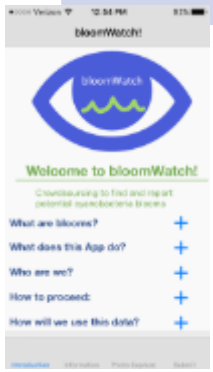
The App: Four Screens

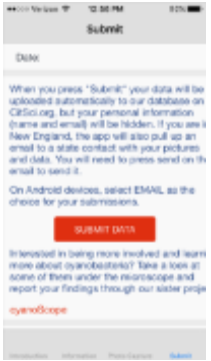
Introduction & Basic Info

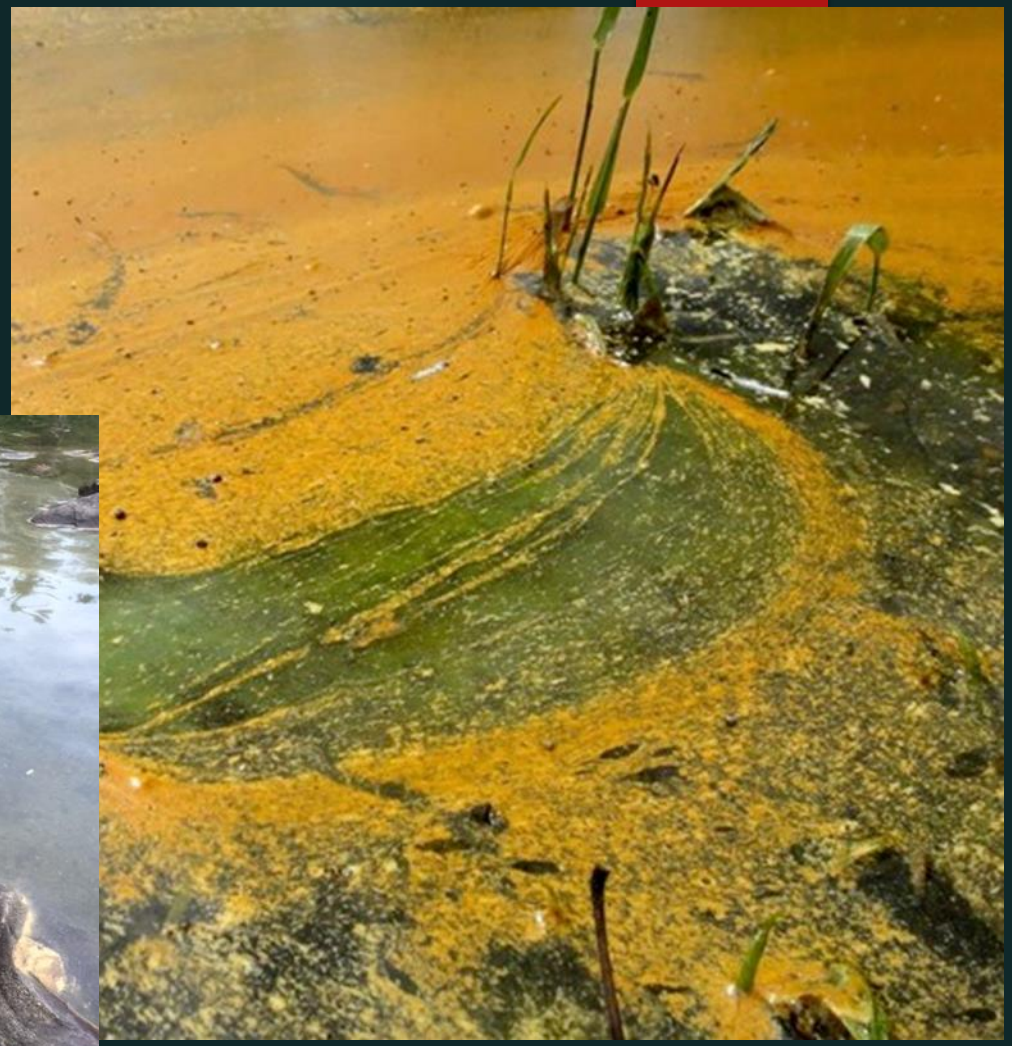
Lake Conditions & Bloom Size

Photos

Submit Data







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bloomWatch

46	11	11	139
members	observations	locations	measurements

OPEN

Project Manager: Jasper Hobbs

Description: Help track

Are you se
pea soup
which has
ecosystem

State and
and your s
understand
causing iss

Submit dat
CitSci.org
http://cyan

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Show 10 entries

Date	Location Name	Latitude	Longitude	Photo
September 10, 2016	Lake Champlain	44.850067138672	-73.282821655273	
September 1, 2016	bloomWatch lake	41.48477895	-73.32497454	
September 1, 2016	bloomWatch lake	41.48478685	-73.32516169	
August 28, 2016	Lake Lillinonah	41.49150672	-73.32369806	
August 19, 2016	Sudbury River	42.42854981	-71.35500919	

Observation Details

To Project Profile

Observation Details

Date:	September 1st, 2016
Recorder:	lilli lover
Location Details:	bloomWatch lake
Latitude:	41.48477895
Longitude:	-73.32497454
Accuracy:	5.0
Survey Type:	Point
Project:	bloomWatch
Data Source:	lilli lover
Comments:	surface scum visible around the dock. algal clumps all through the column in open water.

Photos



cyanoScope

“Mapping cyanobacteria one slide at a time”

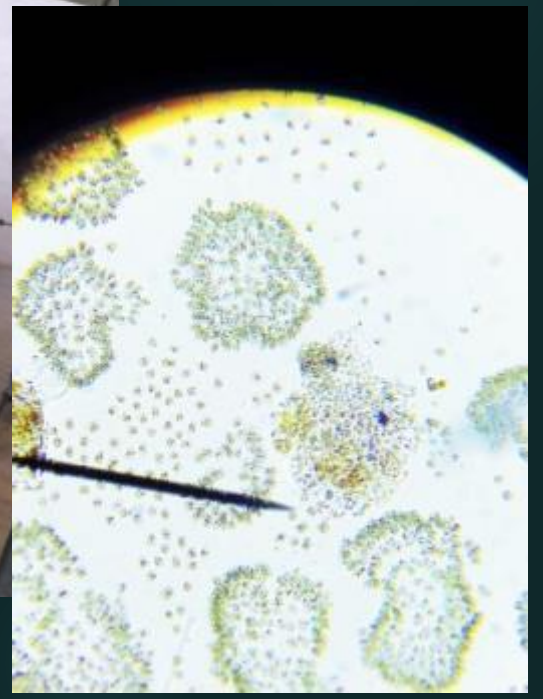
Engaging *trained* citizen scientists, professionals, public to understand where and when cyanobacteria species occur

http://cyanos.org/cyanoscope

1. **Join iNaturalist.org & choose cyanScope project**
2. **Obtain sample collection & microscopy kit**
3. **Get Training**
4. **Get going – collect a water sample, upload microscope photos**
5. **Interact with iNaturalist community to ID your sample**

Cyanoscope Kit

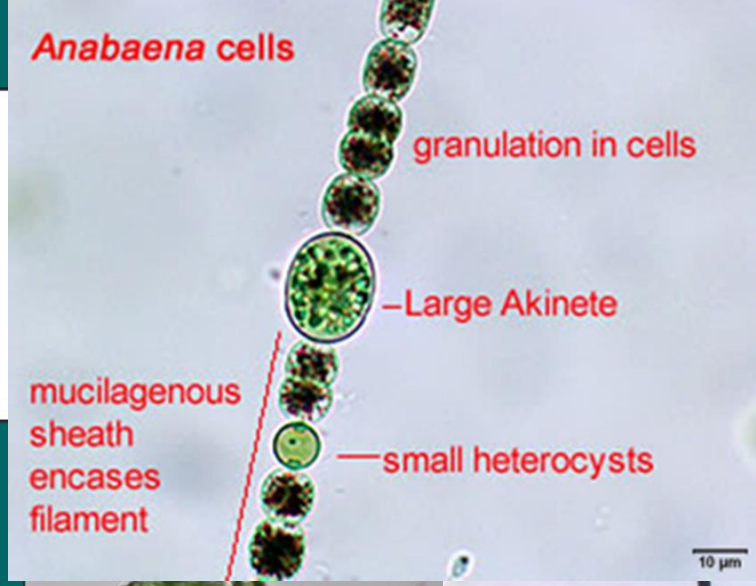
Steps in the Cyanoscope Process

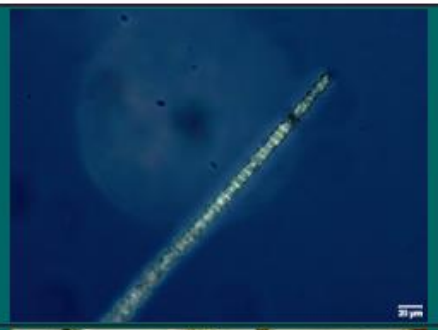


Anabaena / *Anabaenopsis*

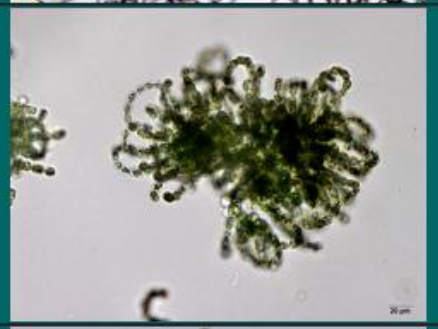
General Description

- *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

www.inaturalist.org/projects/cyanoscope

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cyanoScope

MAPPING CYANOBACTERIA ONE SLIDE AT A TIME

ADD OBSERVATIONS

cyanoScope

Stats

Totals

78
Observations »

14

Most Observations

willbmisled
37 observations

richfdnss
10 observations

Most Species

karolina
4 species

willbmisled
1 species

Most Observed Species

Gloeotrichia
5 observations

Diatoms
2 observations

www.inaturalist.org/observations?place_id=any&project_id=cyanoscope&subview=grid&verifiable=any

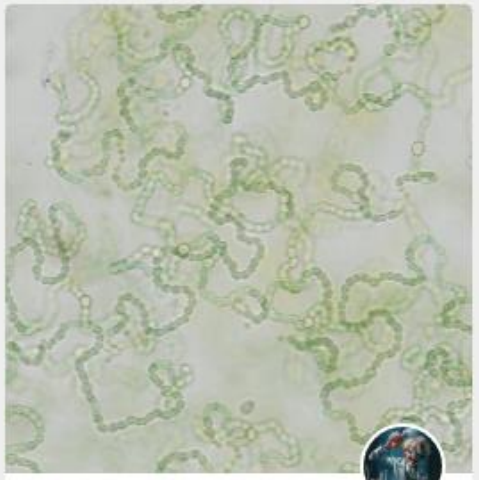
10mo 10mo 9mo 9mo

Unknown

9mo

Unknown

9mo



Unknown

10mo

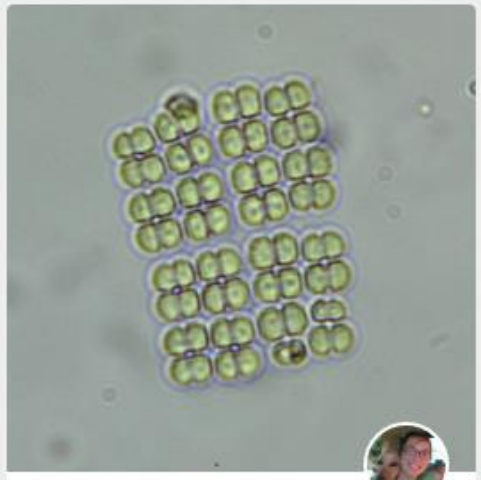
Unknown

10mo

Anabaena inaequalis

Unknown

Chroococcus turgidus



Merismopedia elegans

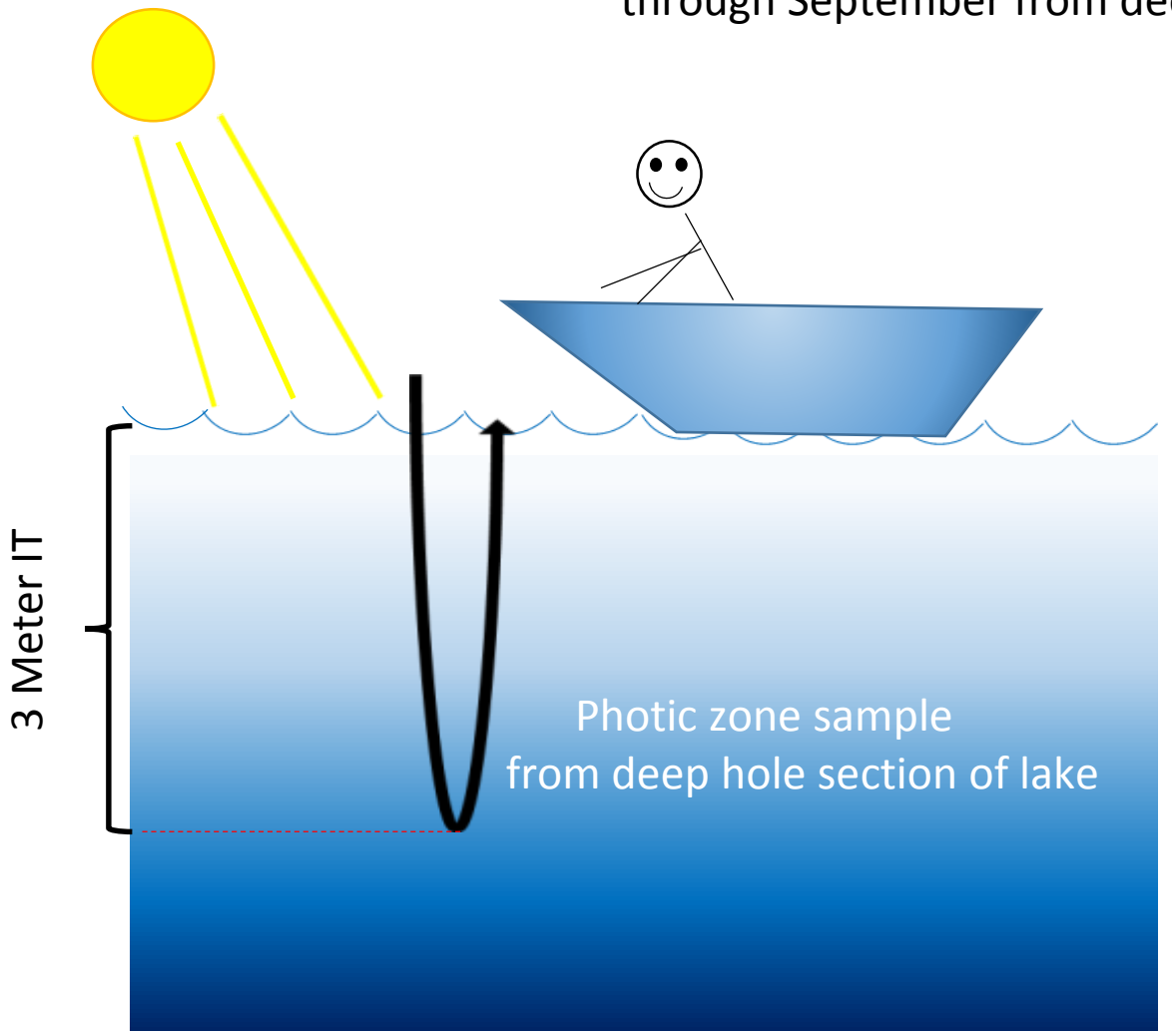
CyanoMonitoring

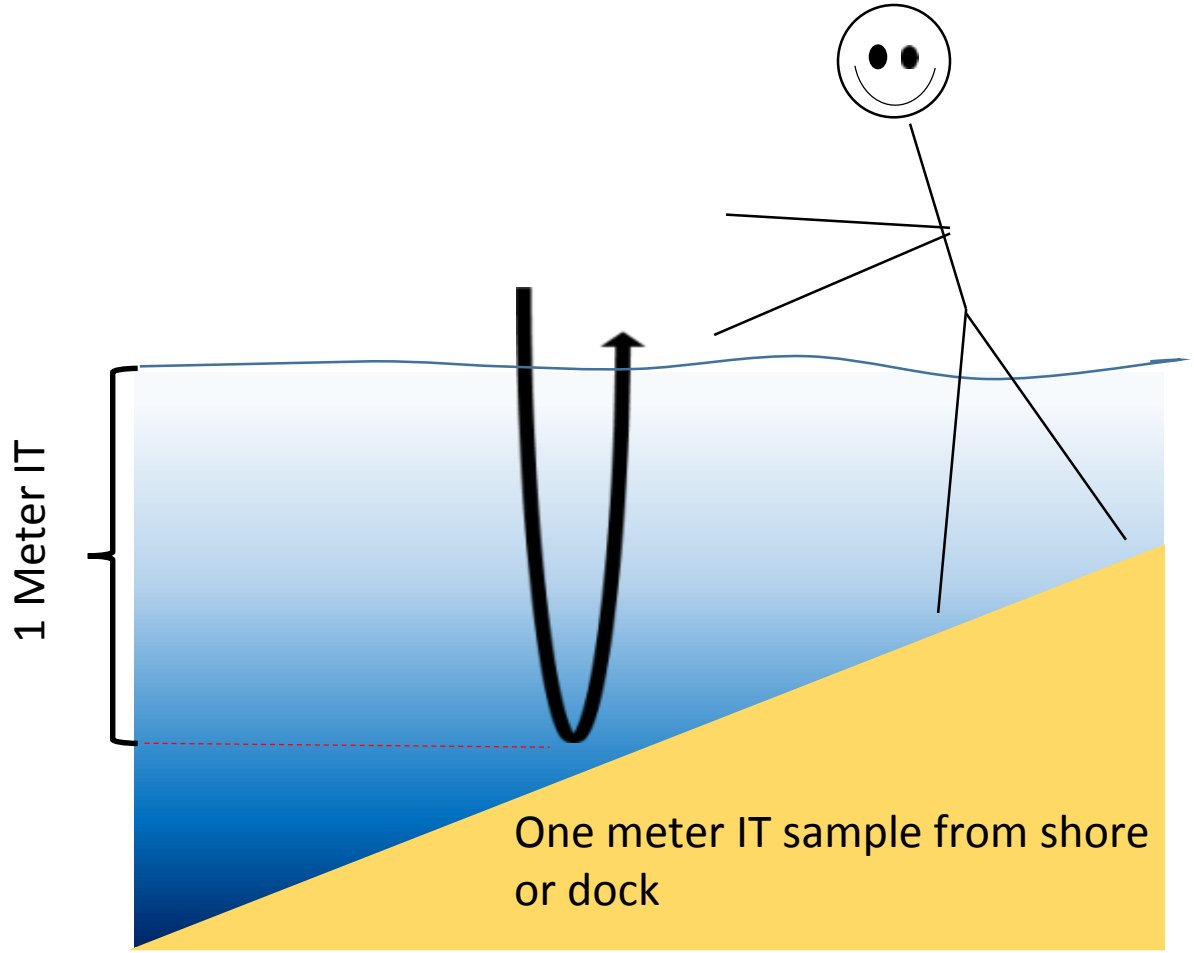
Professionals and Trained Citizen Scientists Monitoring Freshwaters for Cyanobacteria

Monitoring lakes and rivers to understand dynamic characteristics of a waterbody and forecast blooms

Integrated Tube

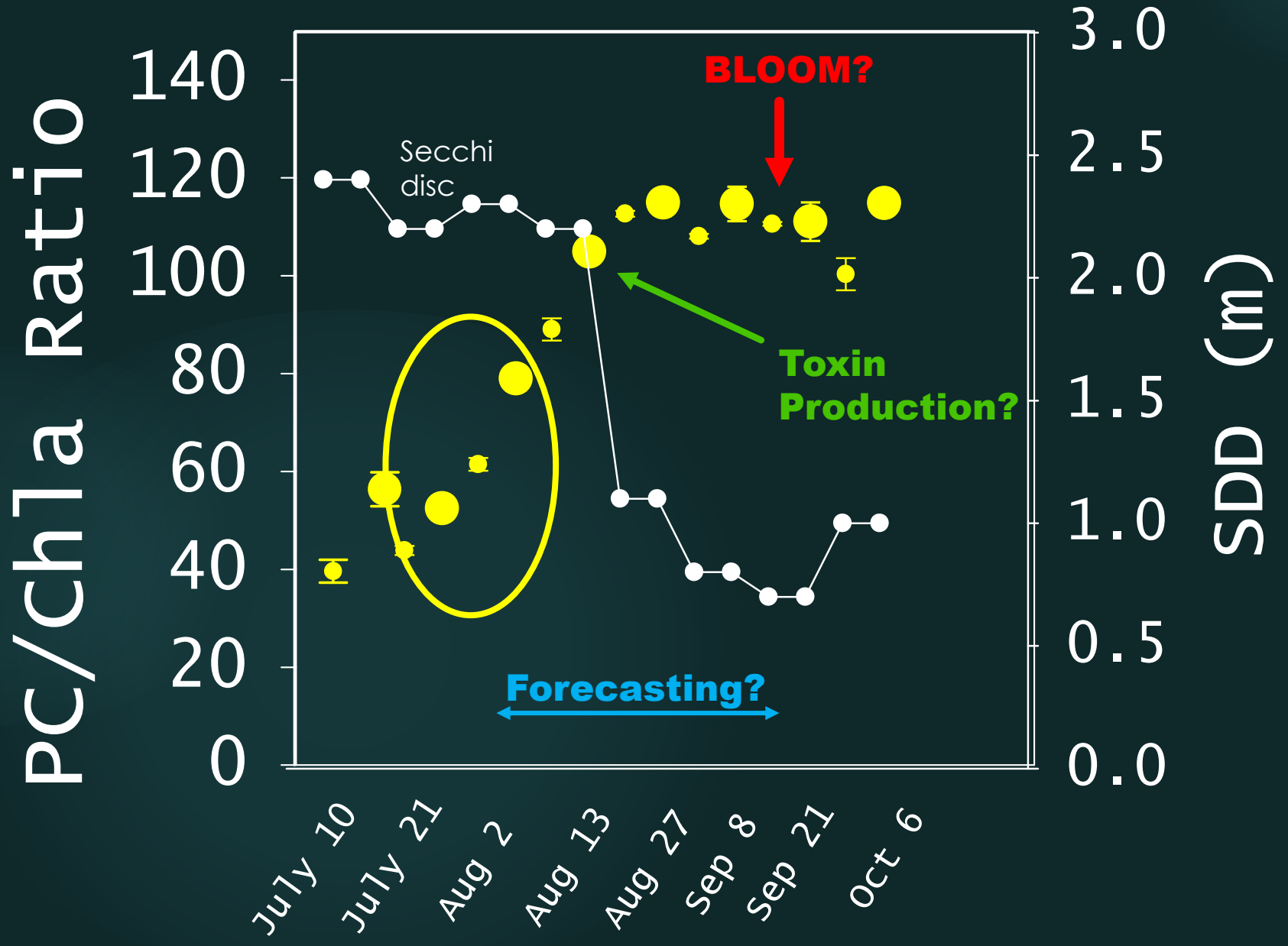
Baseline of at least one sample collected every other week June through September from deep hole or shore location of interest





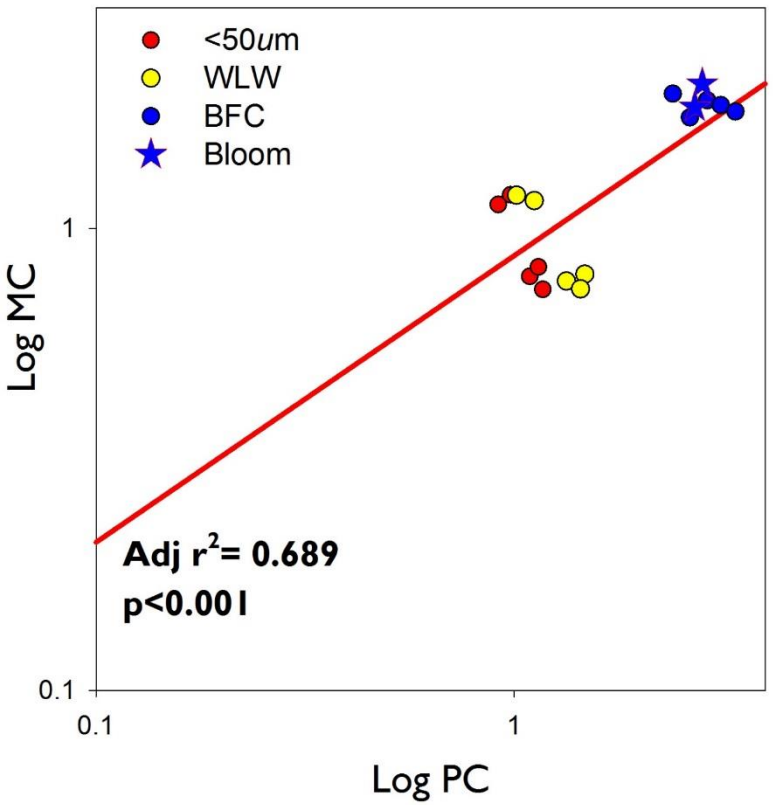
Handheld 2-Channel Flourometer

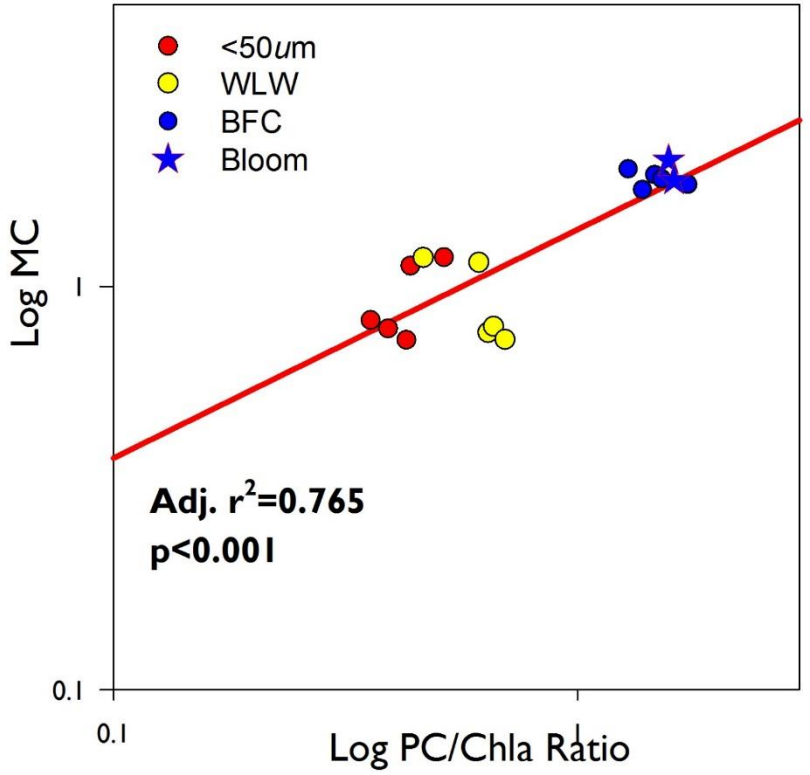
- Chlorophyll
  - .25 - 2,500 ppb
- Phycocyanin
  - 10 - 100,000 ppb
- Other 2-chnl handhelds available
- $1,500 - $2,500
- Stnds approx. $200 each
- Rhodamine solid state standards (2 year shelf)



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

Size distribution of biomass suggests exposure potential

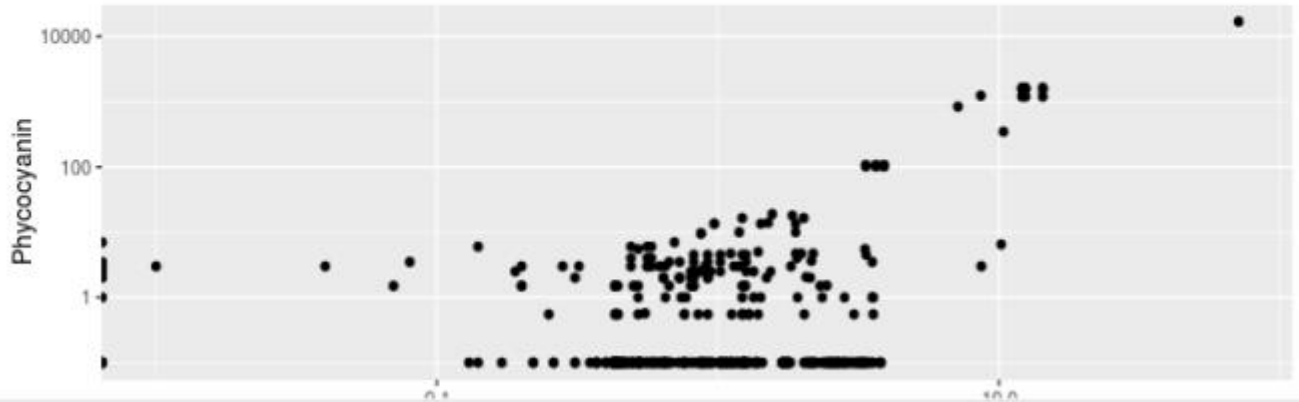




Nancy Leland

Chlorophyll *a* and Phycocyanin Scatterplot

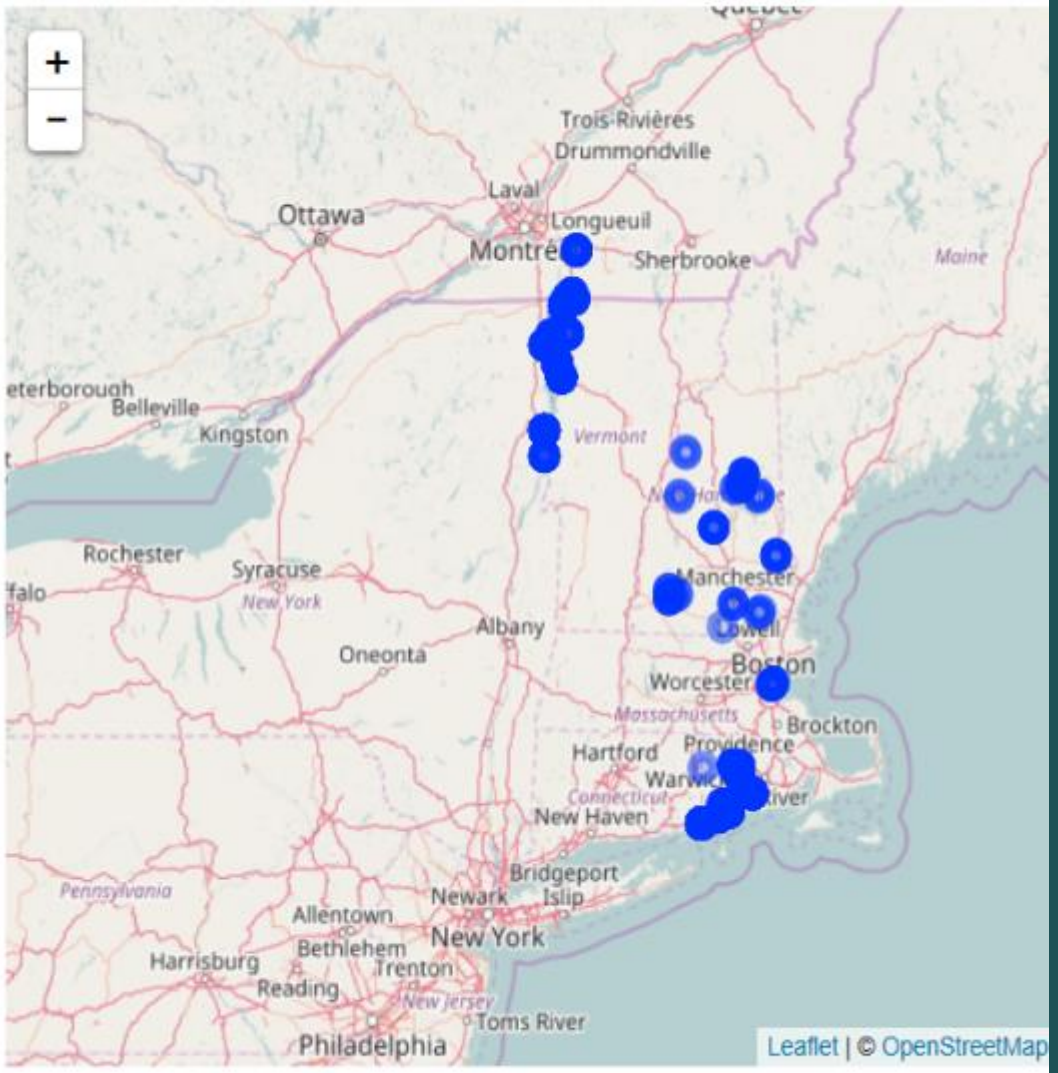
drag to select points



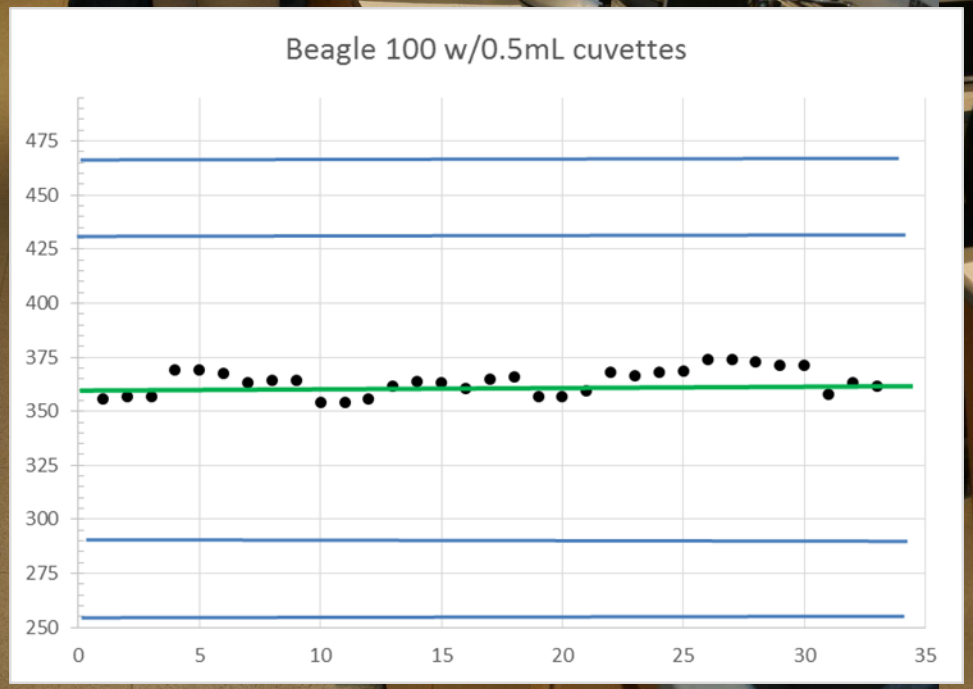
Data

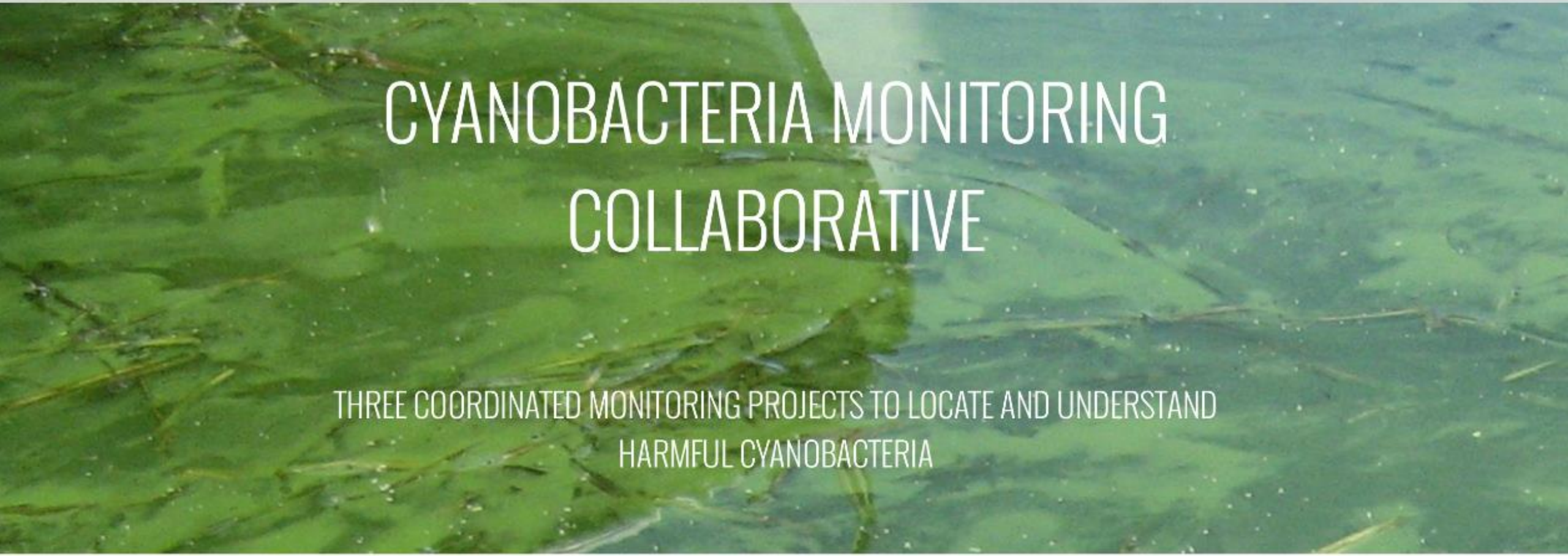
	ID	State	Date	Chlorophyll	Phycocyanin
1	100:2014-09-03:Other	NH	2014-09-03	71.37	16998.17
3	10:2014-07-10:SS1	MA	2014-07-10	2.18	0.10
4	10:2014-07-17:SS1	MA	2014-07-17	2.44	1.52
8	102:2014-08-08:WL1	RI	2014-08-08	3.17	0.10
9	102:2014-08-08:WL2	RI	2014-08-08	3.57	0.10
10	102:2014-08-08:WL3	RI	2014-08-08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

2014 Sampling Locations



Meter Madness!





CYANOBACTERIA MONITORING COLLABORATIVE

THREE COORDINATED MONITORING PROJECTS TO LOCATE AND UNDERSTAND HARMFUL CYANOBACTERIA

GET INFORMED | GET INVOLVED | GET IN TOUCH

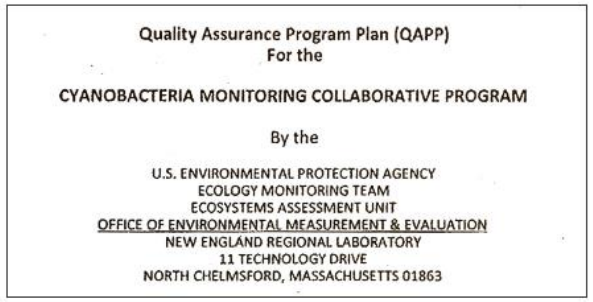
We work with citizen scientists, trained water professionals, and the general public to find and study cyanobacteria in waterbodies.

GET INFORMED

What are cyanobacteria? | What's the problem? | What are the potential impacts? | How can I help?

Cyanobacteria (sometimes referred to as blue-green algae) are tiny organisms that can be found in diverse environments ranging from deserts to oceans.

Read the latest CYANOS NEWS BELOW or check out all cyanos news stories


Quality Assurance Program Plan (QAPP)
For the
CYANOBACTERIA MONITORING COLLABORATIVE PROGRAM
By the
U.S. ENVIRONMENTAL PROTECTION AGENCY
ECOLOGY MONITORING TEAM
ECOSYSTEMS ASSESSMENT UNIT
OFFICE OF ENVIRONMENTAL MEASUREMENT & EVALUATION
NEW ENGLAND REGIONAL LABORATORY
11 TECHNOLOGY DRIVE
NORTH CHELMSFORD, MASSACHUSETTS 01863

27 April | Shane Bradt | bloomwatch cyanomonitoring cyanoscope resources |

Cyanobacteria Monitoring Collaborative Quality Assurance Program Plan (QAPP) released

25 April | Jasper Hobbs | bloomwatch |

bloomWatch Updated to Version 2.8

22 April | Shane Bradt | bloomwatch cyanomonitoring cyanoscope press |

10 Easy Ways You Can Help Scientists Study the Earth

26 January | Jasper Hobbs | bloomwatch |

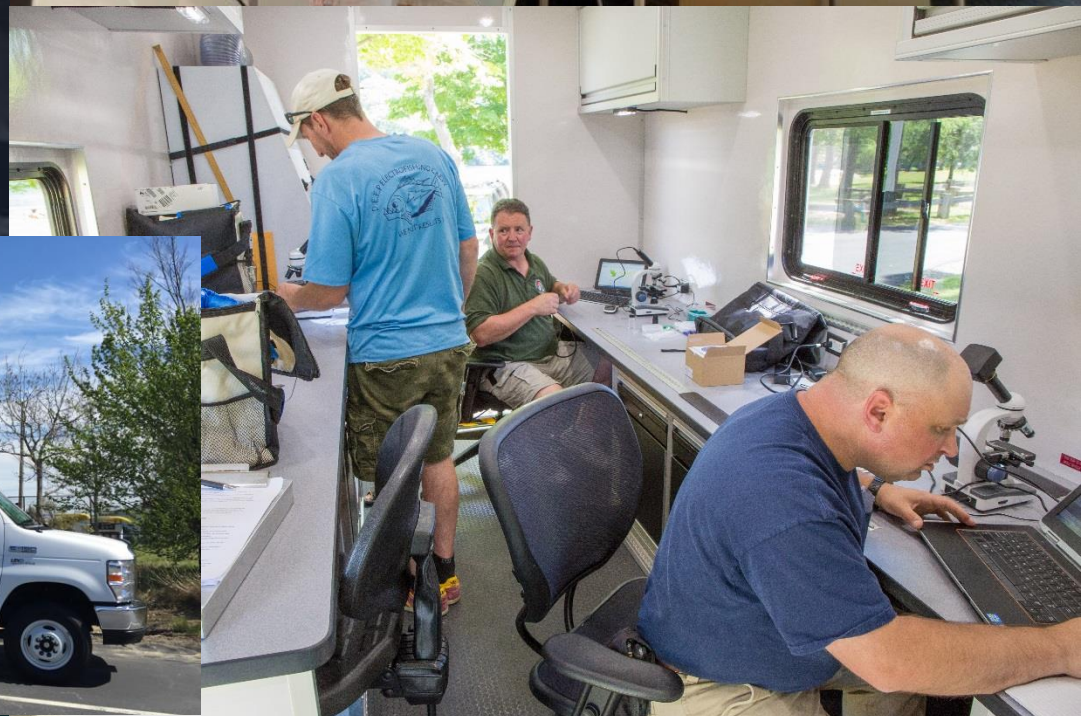
bloomWatch updated to version 2.6

GET INVOLVED


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


HARRIS
MERCURY
MERCURY


NEW ENGLAND REGIONAL LABORATORY



Summary

bloomWatch

General public
Documenting & tracking bloom occurrence
Generating awareness
Crowdsourced data utility
Instantaneous notification

cyanoMonitoring

- Understanding waterbody dynamics, cyano progression, bloom forecasting potential
- Experienced & trained monitors
- Easy to train for sample collection
- Need an organization for processing/analysis
- Useful tool for PWS/Beaches/WQ Managers

cyanoScope

- Interested/dedicated individuals
- Middle School/University education/research
- Agencies, water suppliers

CYANOS.ORG

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

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