Harmful Algal Blooms (HABs) in NJ's Freshwaters

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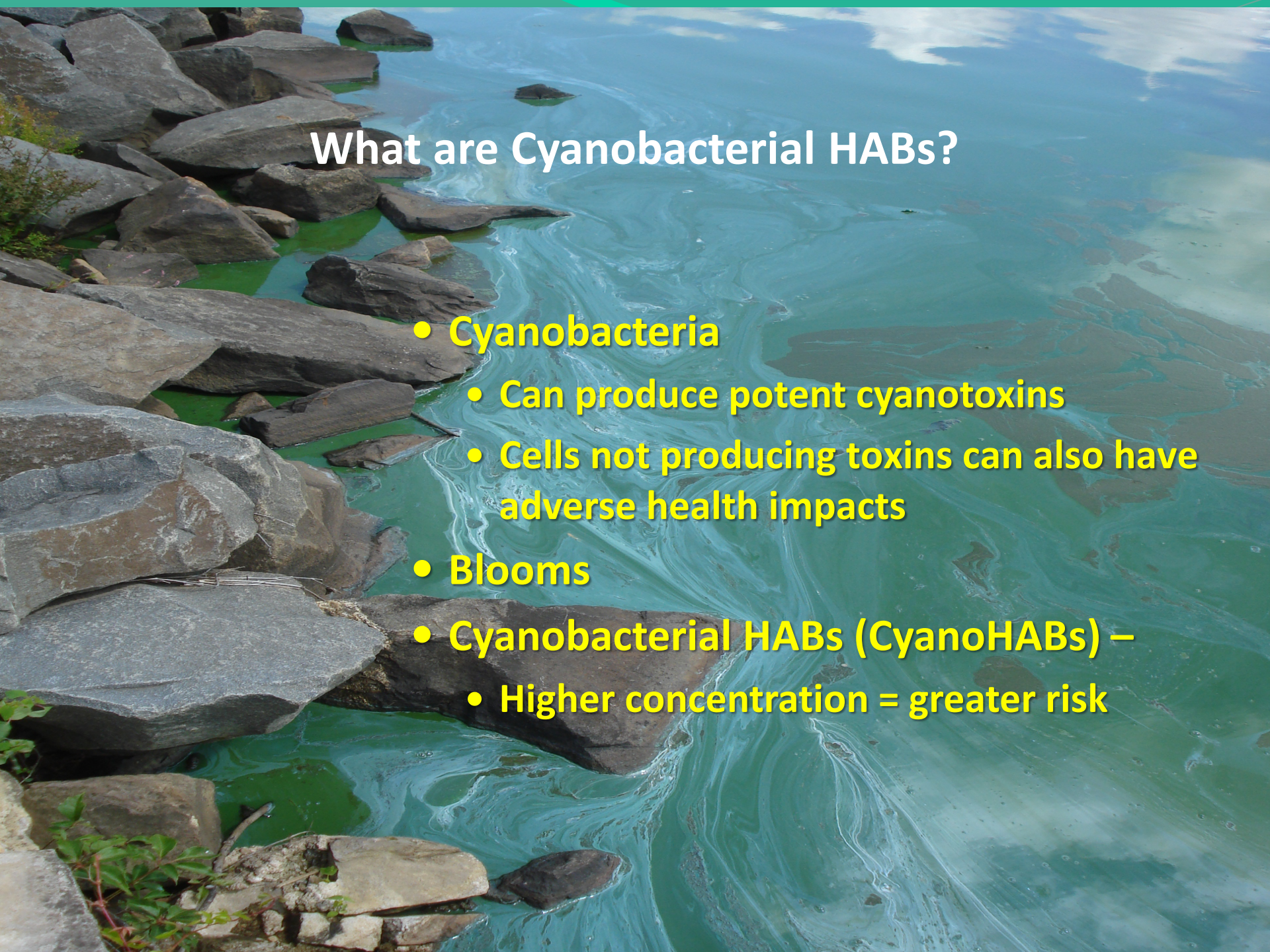
Bureau of Freshwater & Biological Monitoring (BFBM)
Division of Water Monitoring & Standards
Department of Environmental Protection

Raritan Headwaters Association
Seminar: Addressing Stormwater Pollution & Harmful Algal Blooms in Your Municipality

January 9, 2020

Overview

- HAB Basics
- DEP HAB Recreational Response Strategy
- DEP HAB Website
- 2017 - 2019 HAB Responses
- Advanced Technology
- overnor's HAB Initiative



What are Cyanobacterial HABs?

- Cyanobacteria
  - Can produce potent cyanotoxins
  - Cells not producing toxins can also have adverse health impacts
- Blooms
- Cyanobacterial HABs (CyanoHABs) –
  - Higher concentration = greater risk

What are the Risks?

Humans:

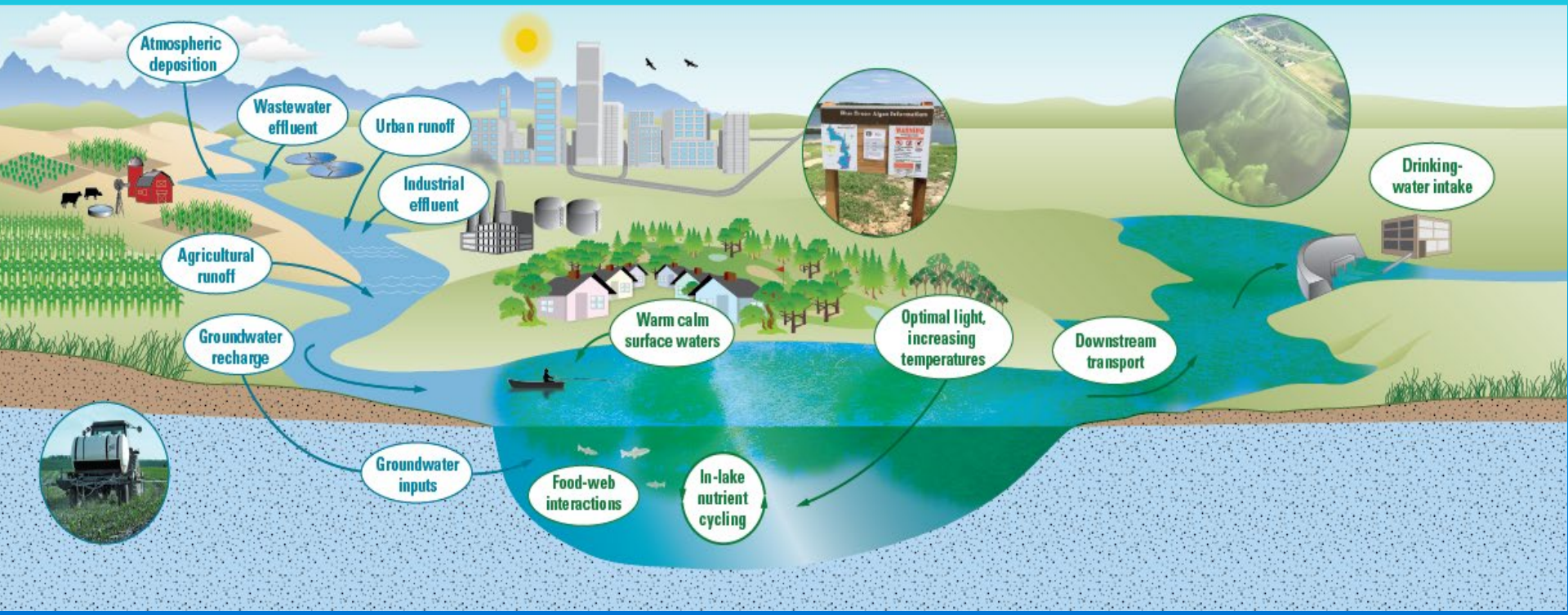
Adverse effects can include: Flu-like symptoms, rash, allergic reactions, or more serious liver, kidney or nervous system impacts.

Animals:

Many national and worldwide cases of wildlife, pets, and livestock sickness and death.

What Causes Cyanobacteria Blooms?

Many environmental factors influence the occurrence of algal blooms. In general, an algal bloom indicates an ecosystem imbalance.



USGS
science for a changing world

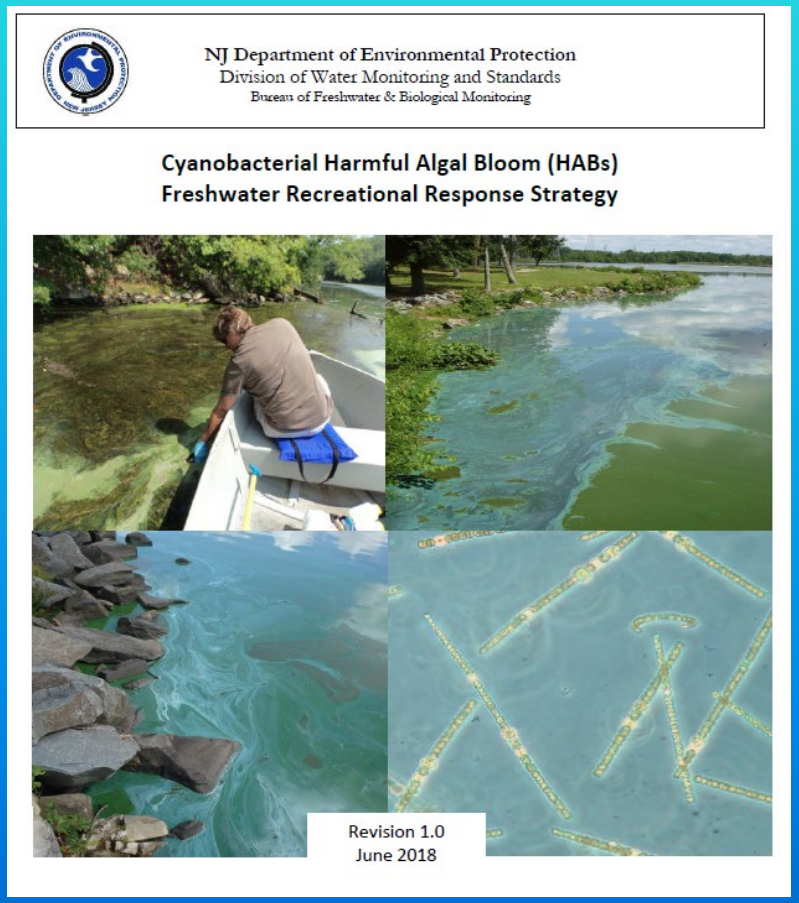
After Graham and others, 2016, USGS OFR 2016-1174
http://dx.doi.org/10.3133/ofr20161174

Cyanobacterial Harmful Algal Blooms (HABs) Freshwater Recreational Response Strategy

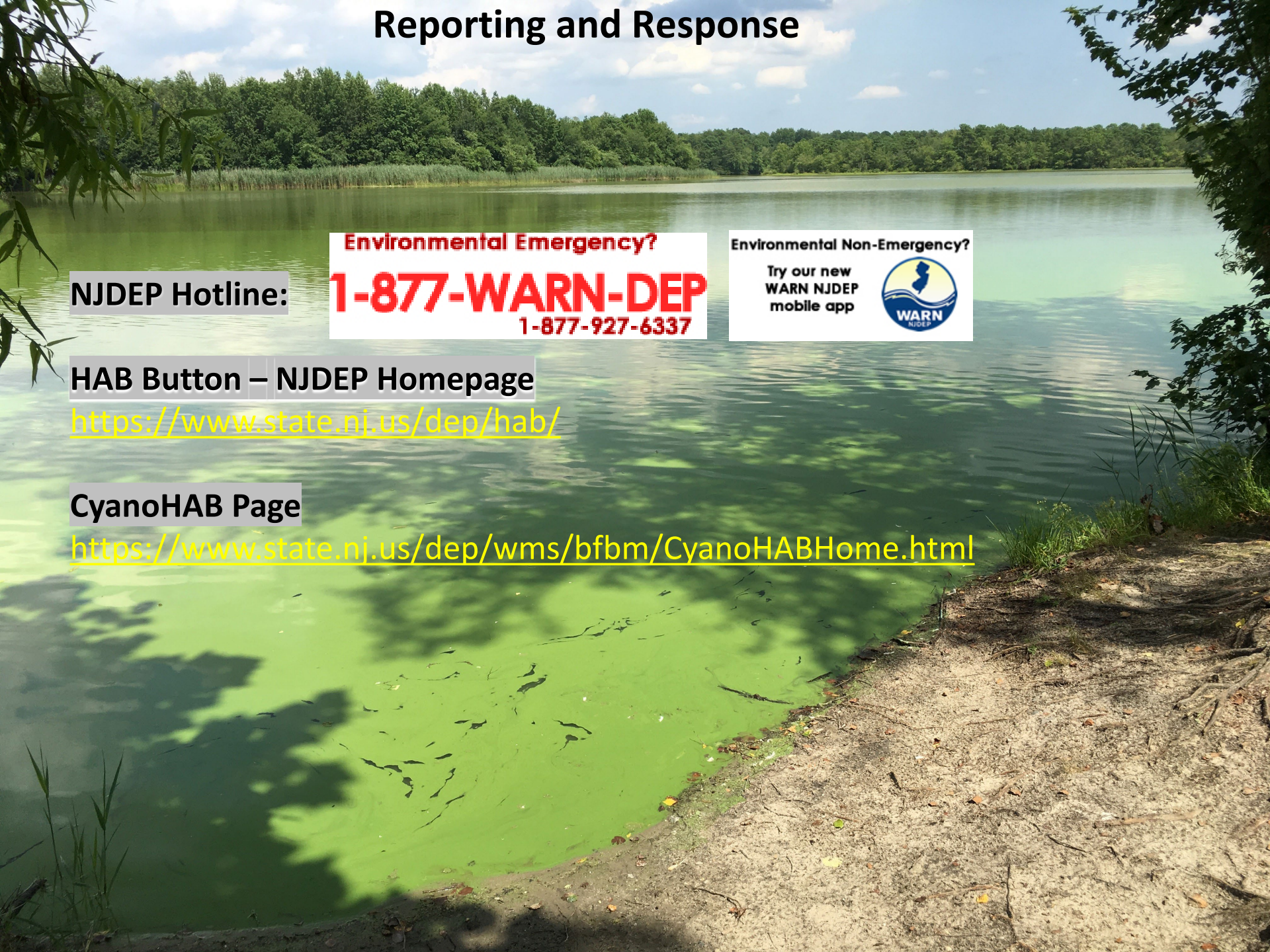
- Unified approach, developed by several State agencies, for HAB response in recreational waters & sources of drinking water.
- Defines response actions of Departments and programs
  - DEP, DOH (Licensed bathing beaches) and Dept Ag
  - DEP programs include: BMWM, DSR, DWSG, DPF & DFW
  - Coordinated by DEP's Bureau of Freshwater & Biological Monitoring

NJ Cyanobacterial Harmful Algal Blooms (HABs) Freshwater Recreational Response Strategy - Released 2017

- RECREATIONAL THRESHOLDS – Cell density and 3 toxins (NJ DEP Division of Science and Research and World Health Organization recommendations)
- HAB MONITORING & RESPONSE
- ADVISORIES
- OUTREACH & COMMUNICATION
- RESEARCH



Reporting and Response



NJDEP Hotline:

Environmental Emergency?

1-877-WARN-DEP

1-877-927-6337

Environmental Non-Emergency?

Try our new WARN NJDEP mobile app

HAB Button – NJDEP Homepage

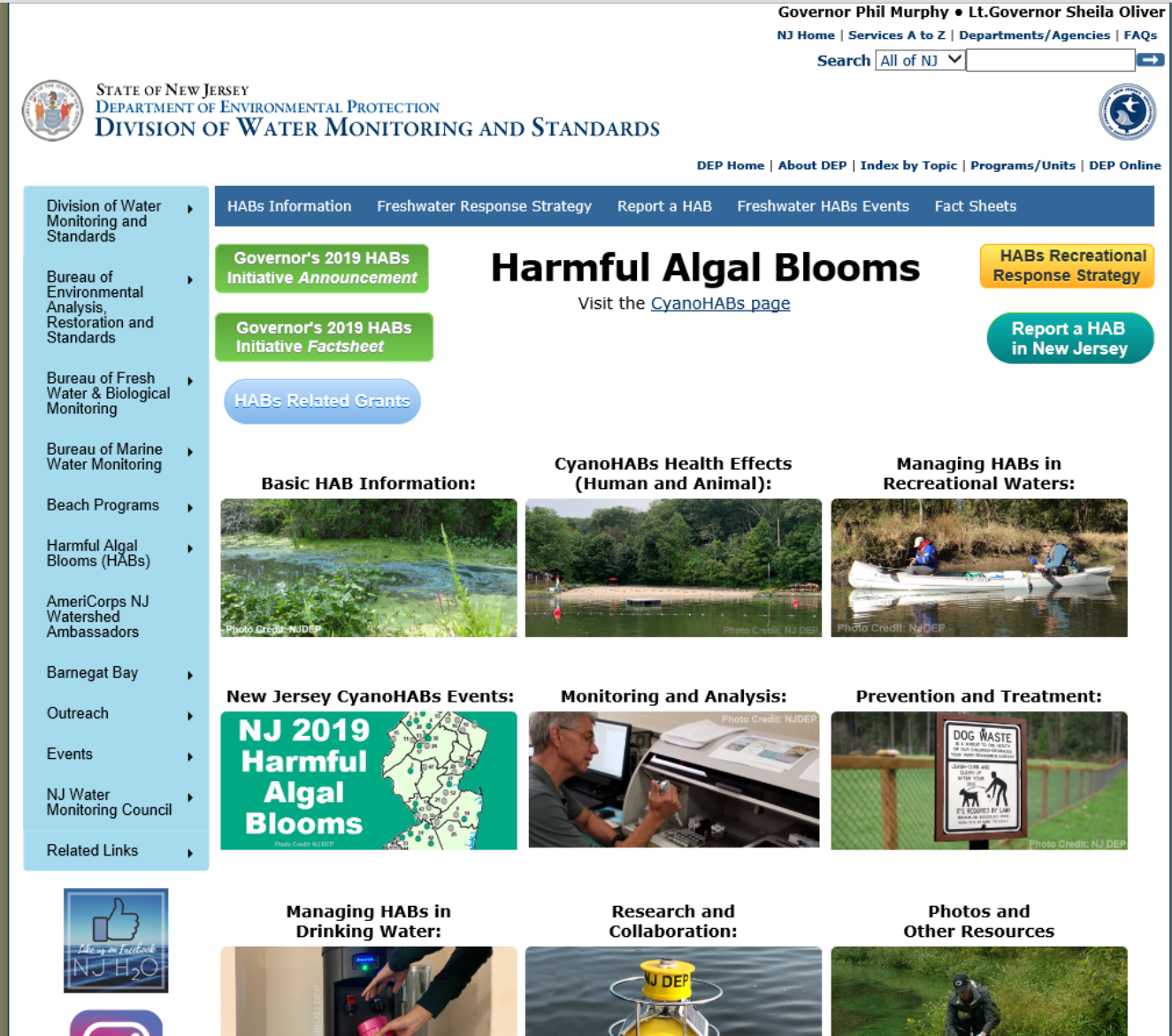
https://www.state.nj.us/dep/hab/

CyanoHAB Page

https://www.state.nj.us/dep/wms/bfbm/CyanoHABHome.html

HABs Website

https://www.state.nj.us/dep/hab/



CyanoHABs Website

://www.state.nj.us/dep/wms//bfbm/CyanoHABHome

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER MONITORING AND STANDARDS

Water Monitoring and Standards Home
Bureau of Freshwater & Biological Monitoring Home
AMNET Benthic Macroinvertebrate Sampling
Fish Monitoring
CyanoHABs
Lake Monitoring
Rivers & Streams Chemical Monitoring
Groundwater Quality Monitoring
Index by Topic

NJ HAB Response Strategy Document

Bureau of Freshwater & Biological Monitoring

CyanoHABs Home | Response Strategy | Monitoring | Analysis Capabilities | Report a HAB | HAB Events | Advisory Guidance | Outreach Materials

Governor's 2019 HABs Initiative *Announcement*

Governor's 2019 HABs Initiative *Factsheet*

Cyanobacterial Harmful Algal Blooms (CyanoHABs)

Visit the HABs Main Page.

Report a HAB in NJ

CyanoHAB Photos

Photo Credit: NJDEP

Cyanobacteria

Also known as blue-green algae, but are not true algae.
Naturally present in lakes and streams in low numbers.
Can form dense blooms under suitable environmental conditions - sunlight, high nutrients, warm temperatures and calm water

Cyanobacterial Harmful Algal Blooms (CyanoHABs) Blooms:

Can discolor the water or produce floating mats or "scums" on surface.
Dissolved oxygen rises when algae or cyanobacteria are in the growth state and respiring, and decreases when algae continue to respire at night. During significant blooms, extreme depletion of oxygen may be detrimental to fish and other aquatic organisms.

Cyanotoxins

- Cyanobacteria can produce toxins that are dangerous for humans, pets, livestock and wildlife.
- The toxins produced by the cyanobacteria are referred to as cyanotoxins.
- Cyanotoxins can be produced by a wide variety cyanobacteria.

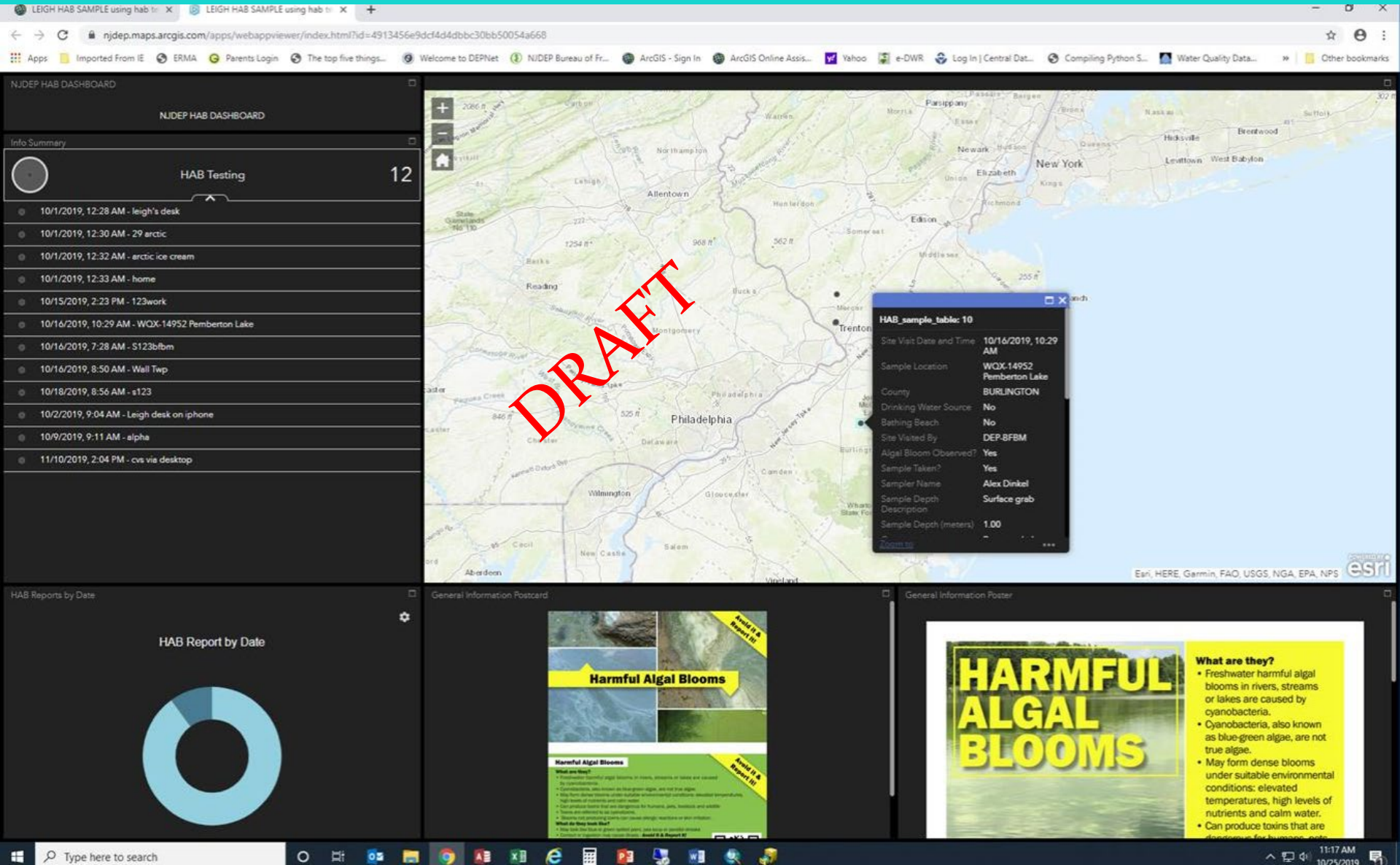
Most common toxin producing taxa

- Microcystis and Anabaena.
- Degree of toxicity varies with species and concentrations.
- **Microcystis**: resemble a greenish, thick, paint-like (sometimes granular) material that accumulates along shores. Scums that dry on the shores of lakes may contain high concentrations of microcystin for several months, allowing toxins to dissolve in the water even when the cells are no longer alive or after a recently collapsed bloom.
- **Anabaena**: slimy blooms on the surface. Anabaena blooms may develop quickly and also resemble green or blue-green paint. Some species also form colonies, which are seen as large dark dots in water samples.

Most common cyanotoxins

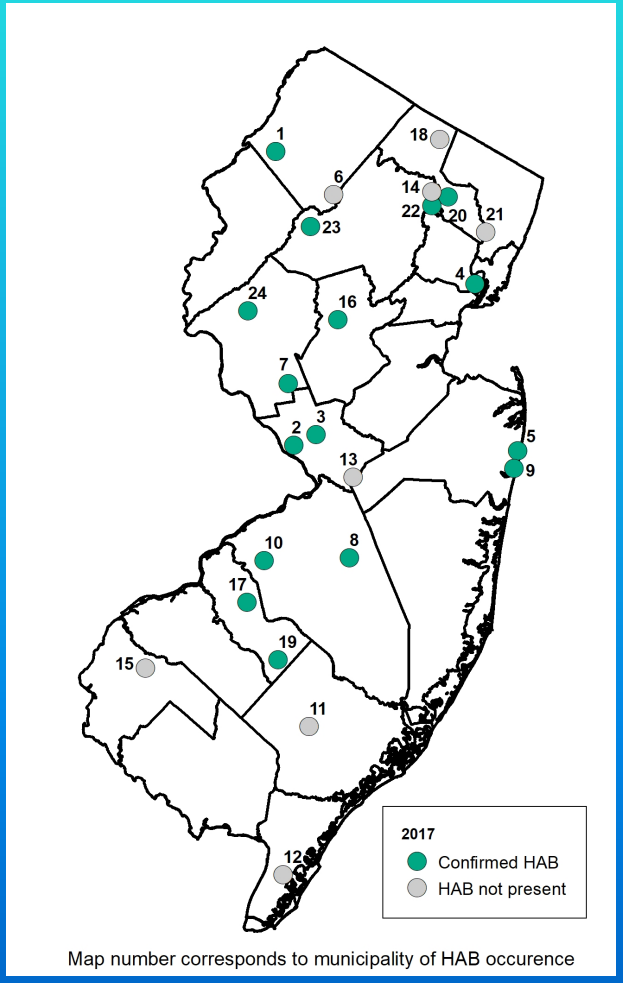
Based on the surveys that have been carried out to date in U.S. waters, the most commonly identified cyanotoxins are microcystins, cylindrospermopsins, anatoxins and saxitoxins. Additional information on CyanoHABs, including other states' activities, is available on the EPA CyanoHABs website.

Advanced Website with Interactive Map

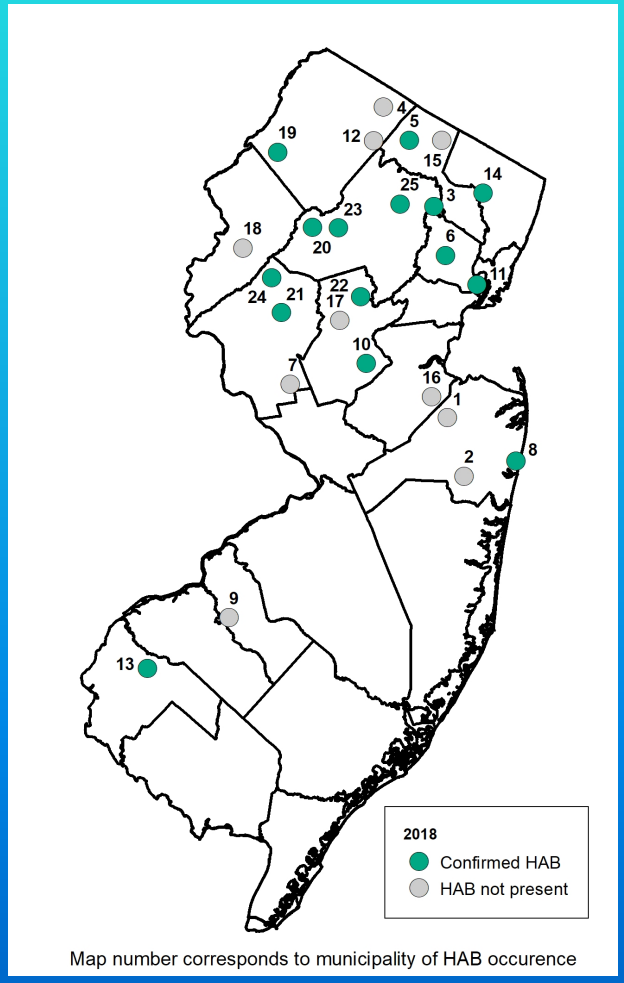


2019 HAB RESPONSE SUMMARY

HAB Responses As of Nov 2019 (by Municipality)



Map number corresponds to municipality of HAB occurence



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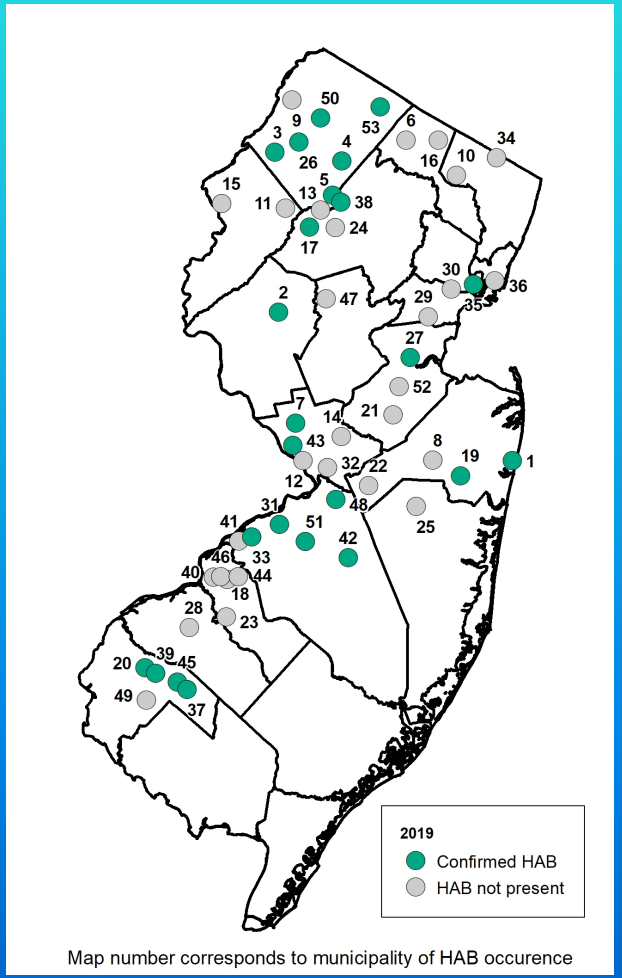
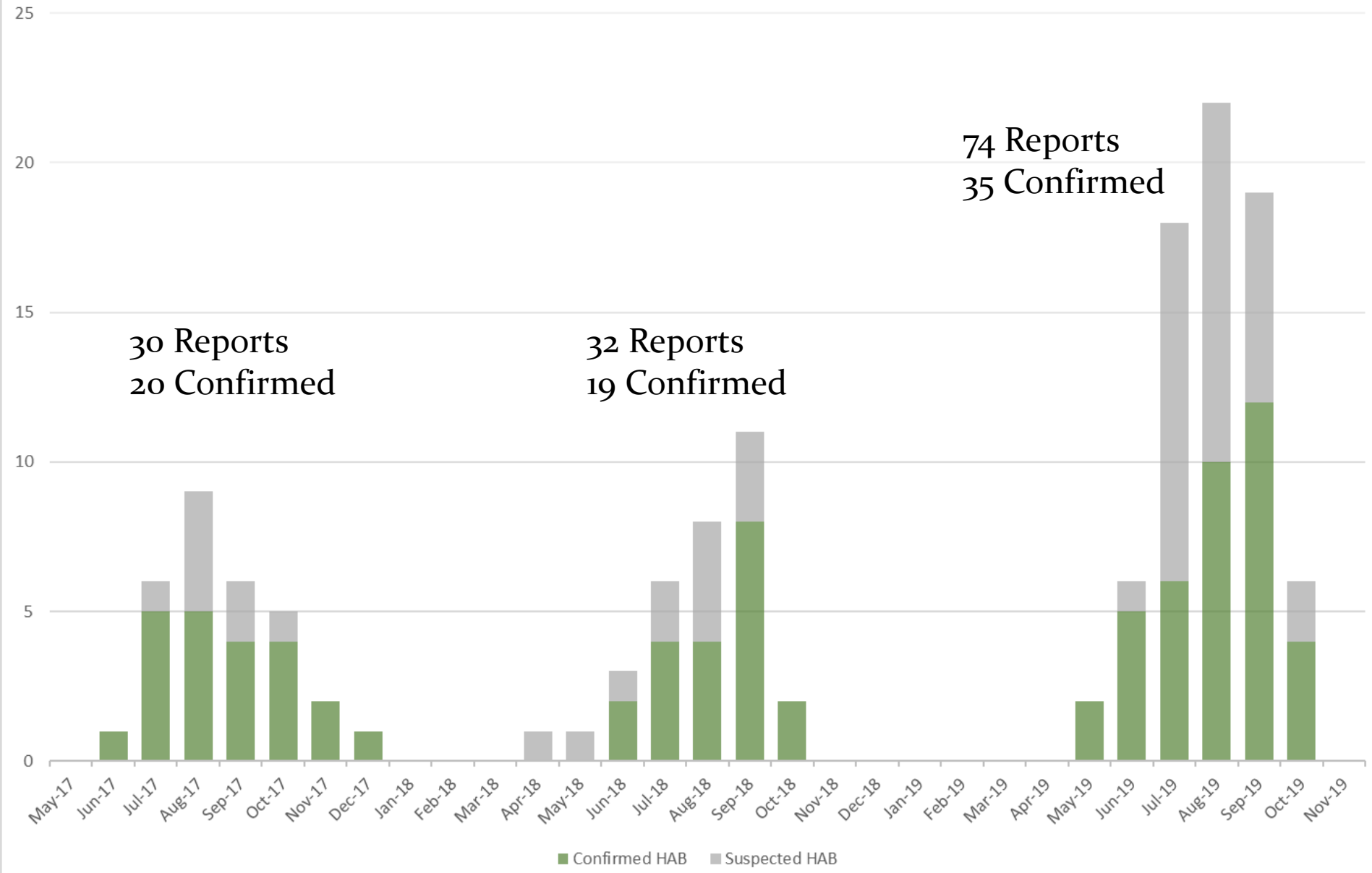
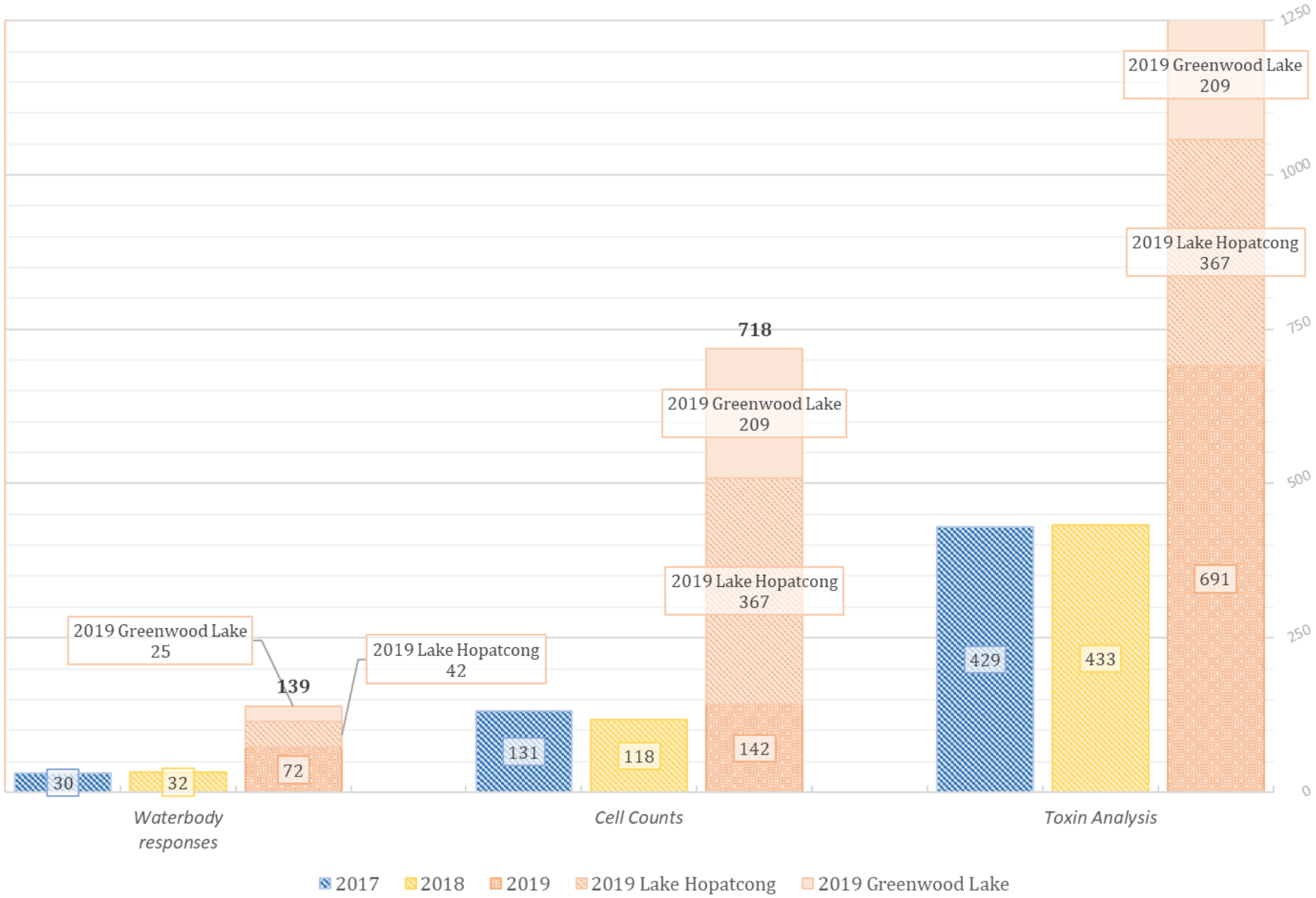


Map number corresponds to municipality of HAB occurence

WATERBODIES WITH SUSPECTED HAB REPORTS CONFIRMED 2017-2019



2017-2019 BFBM Response and Analysis



Summary 2019

- 35 water bodies with confirmed HABs/ 74 responses to suspected HABs reports
- 25 -Bathing Beaches (in season) at 6 waterbodies
  - 18 at Lake Hopatcong
  - 3 at Greenwood Lake
  - 4 other lakes
  - 17% of waterbodies w/ confirmed HABs
- 4 - Drinking Water Sources
- 11% of waterbodies w/ confirmed HABs

Summary (By Waterbody Event) 2019

~100% confirmed events above threshold for cell count

Maximum Cell Count Per Event(Confirmed w/ advisory)

- 73% > 100,000 cells/ml (Highest 56,300,000)
- 8% 50,000 – 100,000 cells/ml
- 16% 30,000 – 50,000 cells/ml
- 3% 20,000 – 30,000 cells/ml

Maximum Toxin Per Event(Confirmed w/ advisory)

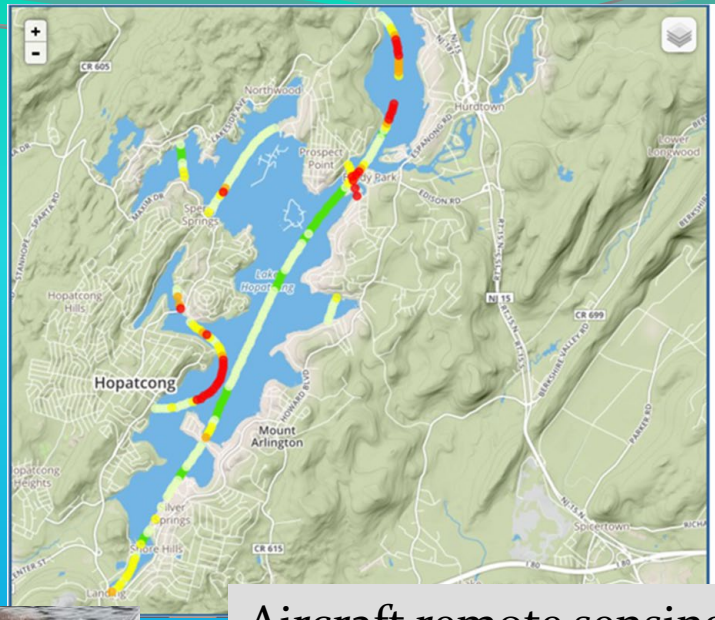
- 51 % of water bodies also had microcystins toxin levels above the 3 µg/l guidance threshold
- 19% 3 to 8 µg/l
- 32% > 8 µg/l (highest >1000)
- 68% microcystsis dominant when toxins > 3µg/l.

Summary 2019

- 49 % increase in confirmed HAB events
- 59 % increase in waterbody responses to reported suspected HABs
- ~500% increase in-lake sites.
- 1267 toxin analyses performed; ~190% increase
- 718 cell count analyses performed;~500% increase
- 30% of all water monitoring network samples.

DEP Use of Advanced Technology for HABs

Hand-held phycocyanin meters

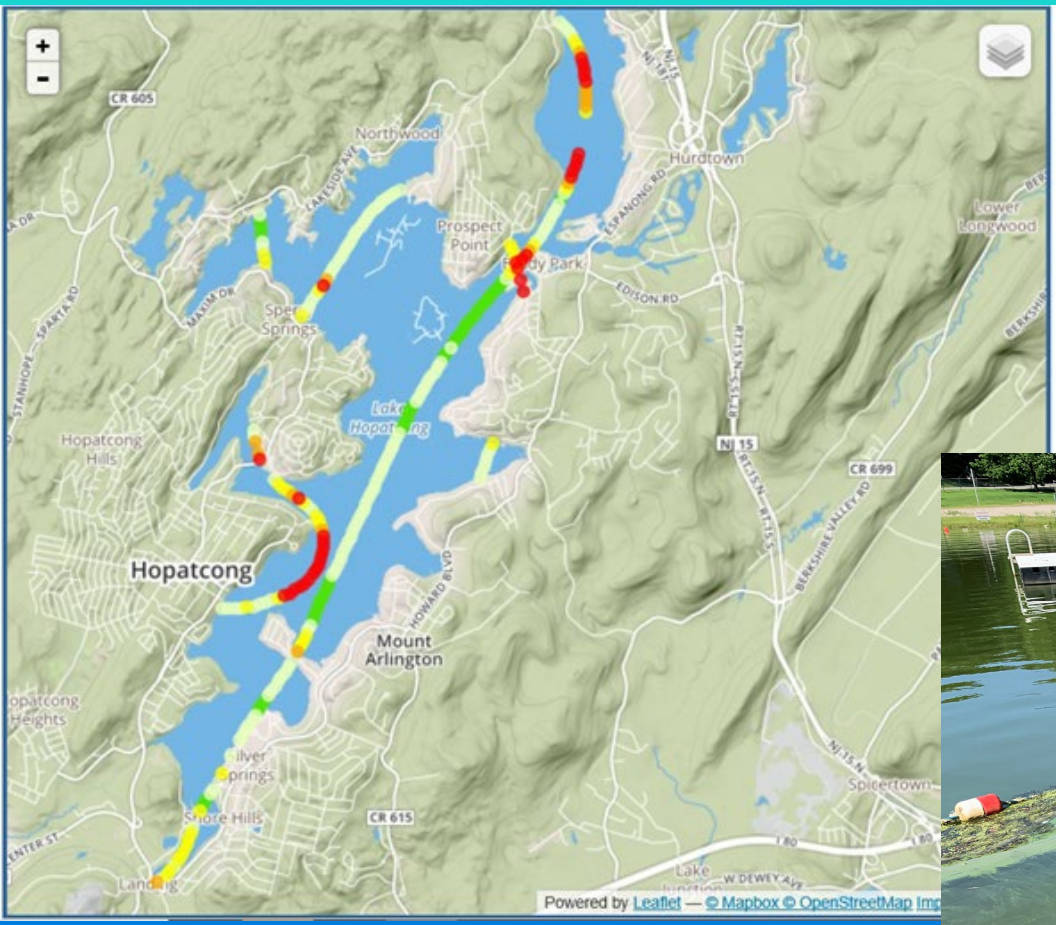


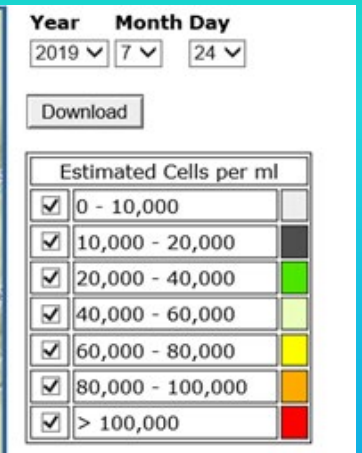
Aircraft remote sensing

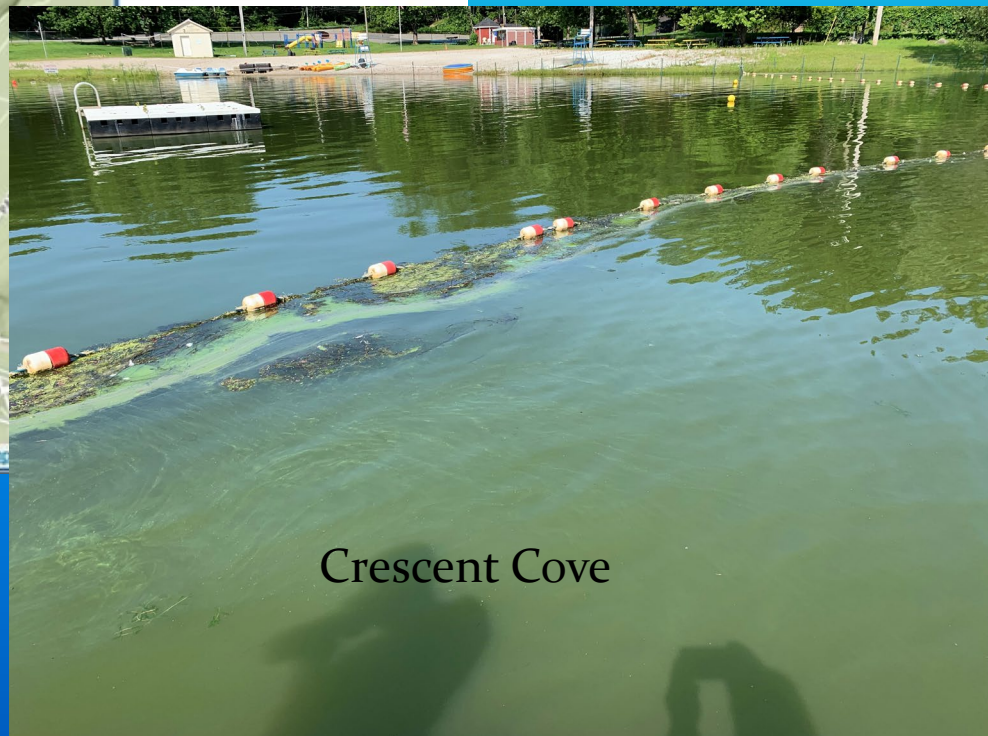
Continuous monitoring buoys

Flight Results

Aircraft Surveillance once/week. Lake Hopatcong



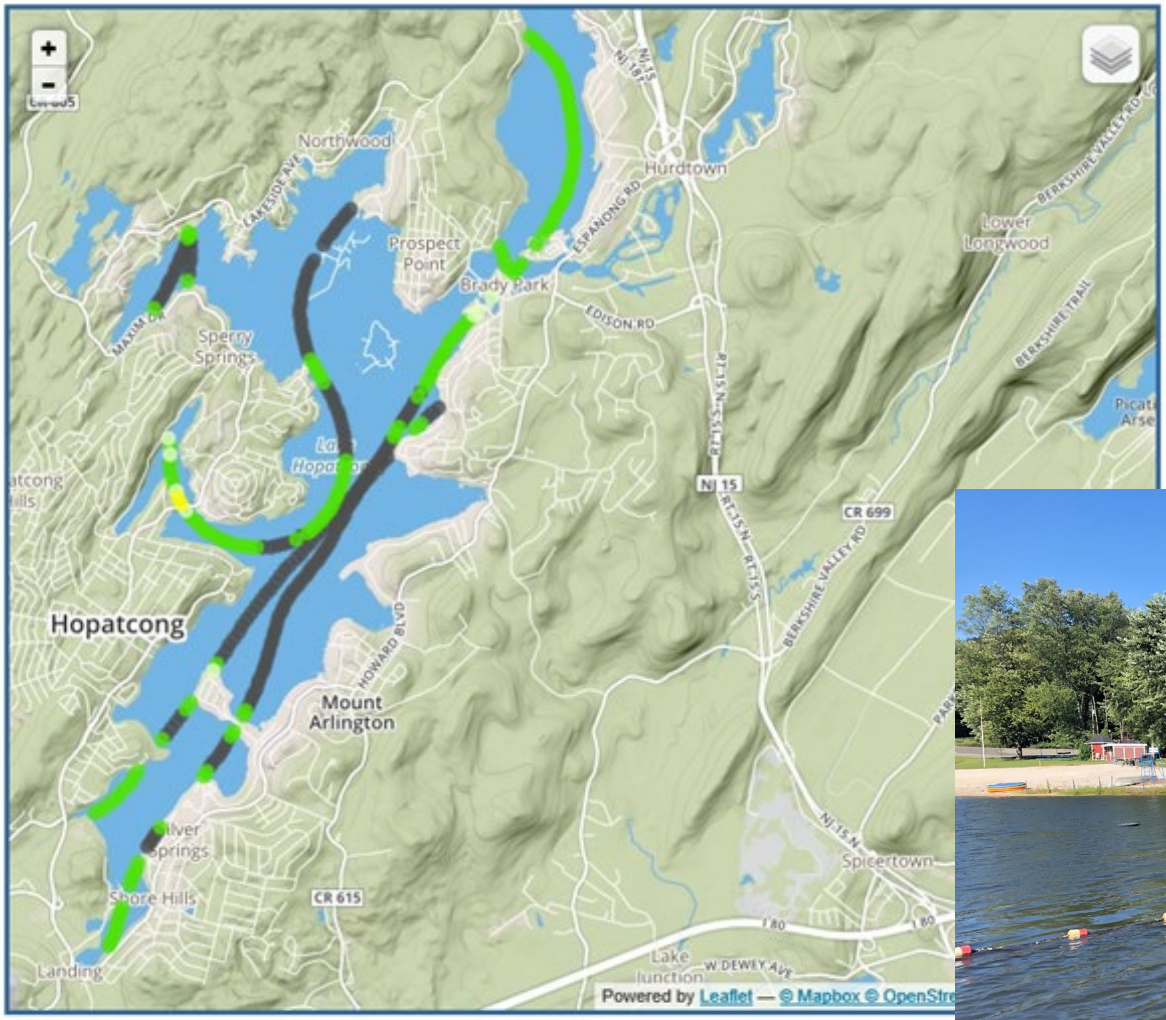


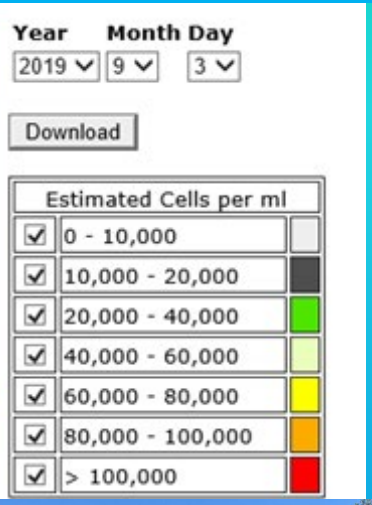


Crescent Cove

Flight Results

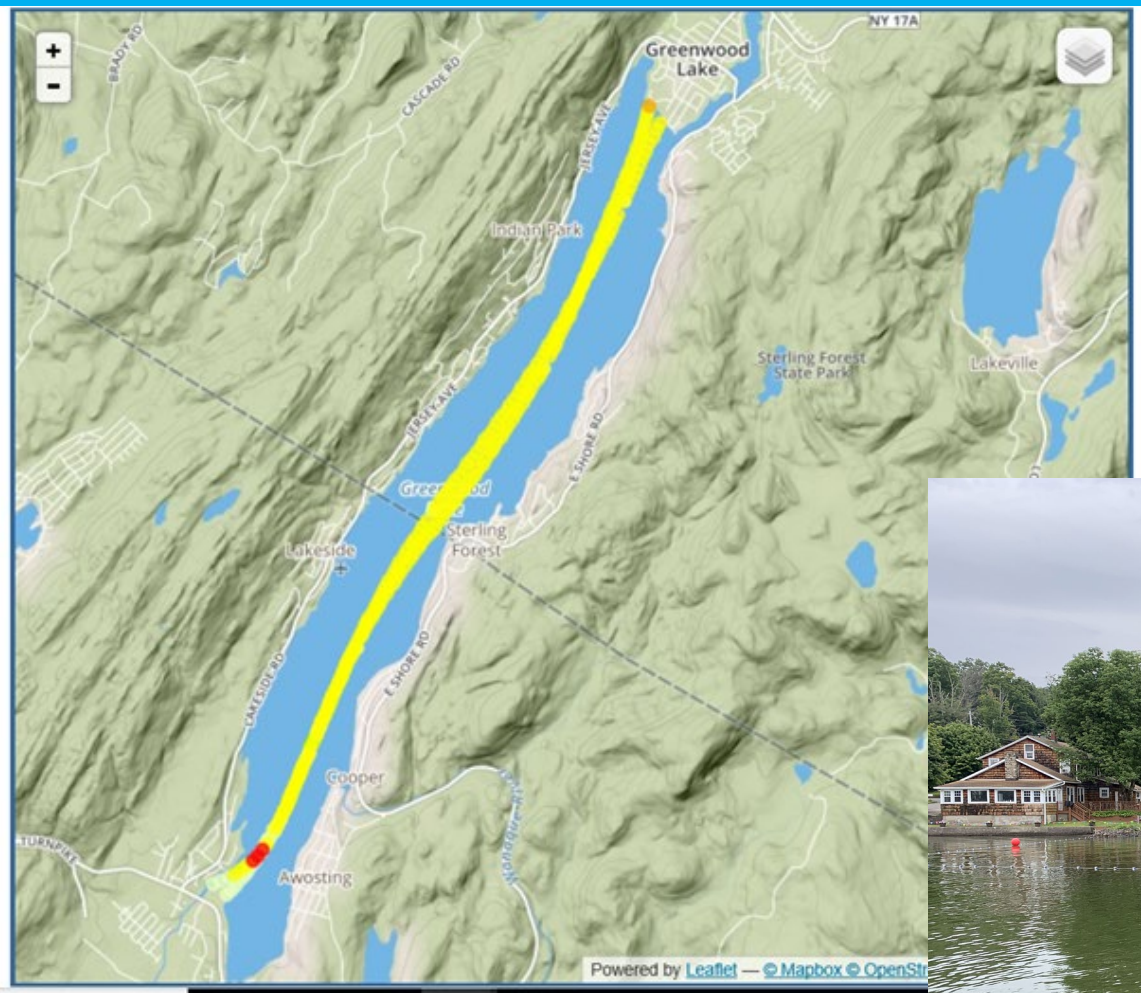
- Aircraft Surveillance once/week

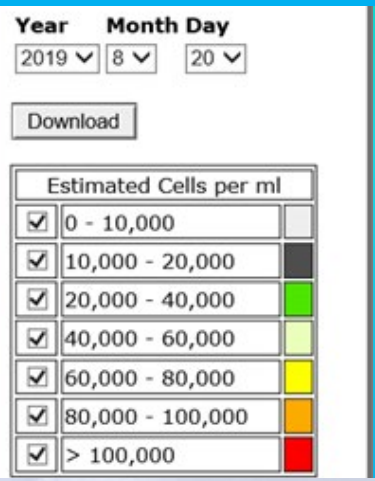




Flight Results

Aircraft Surveillance once/week. Greenwood Lake

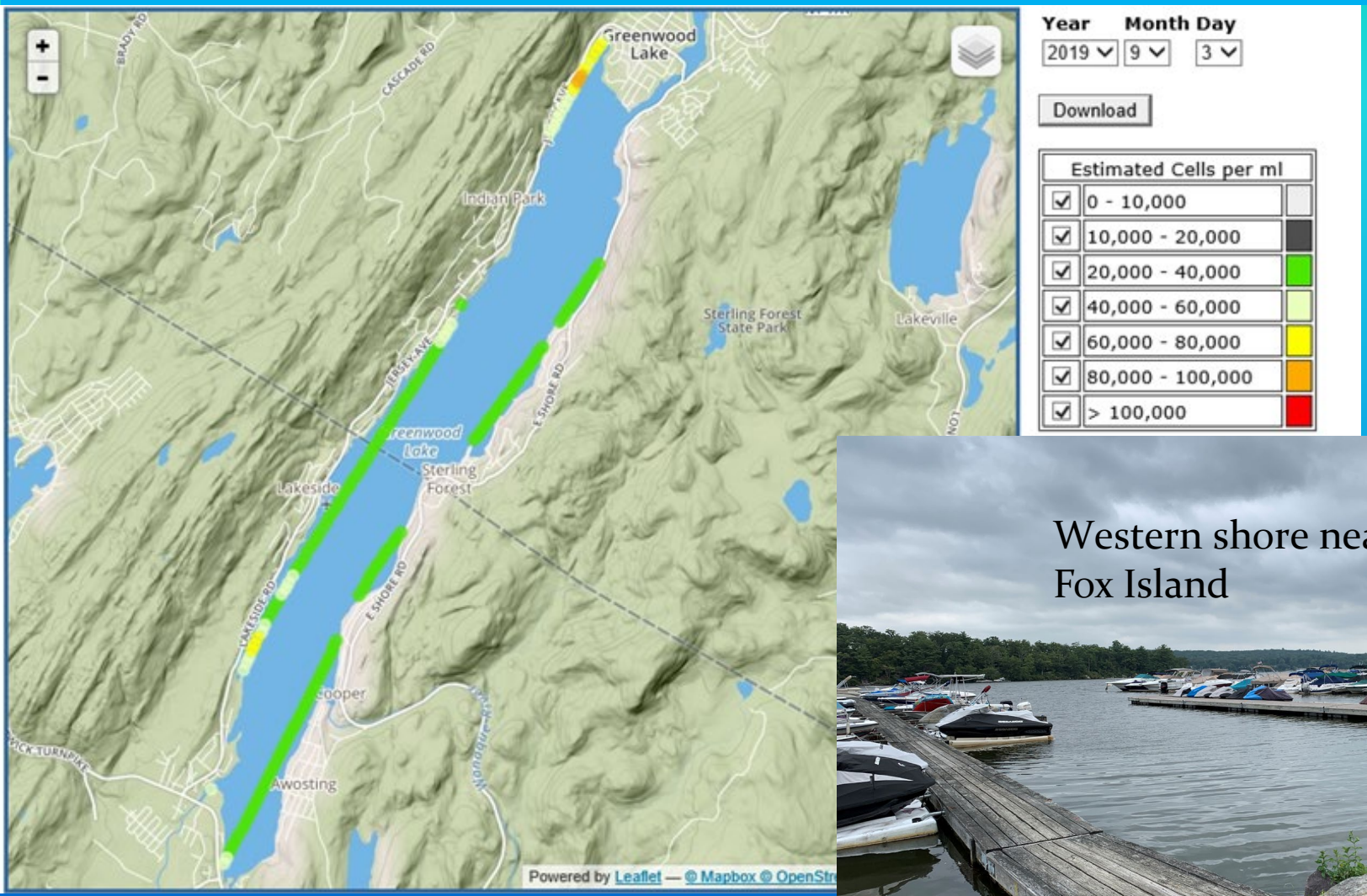




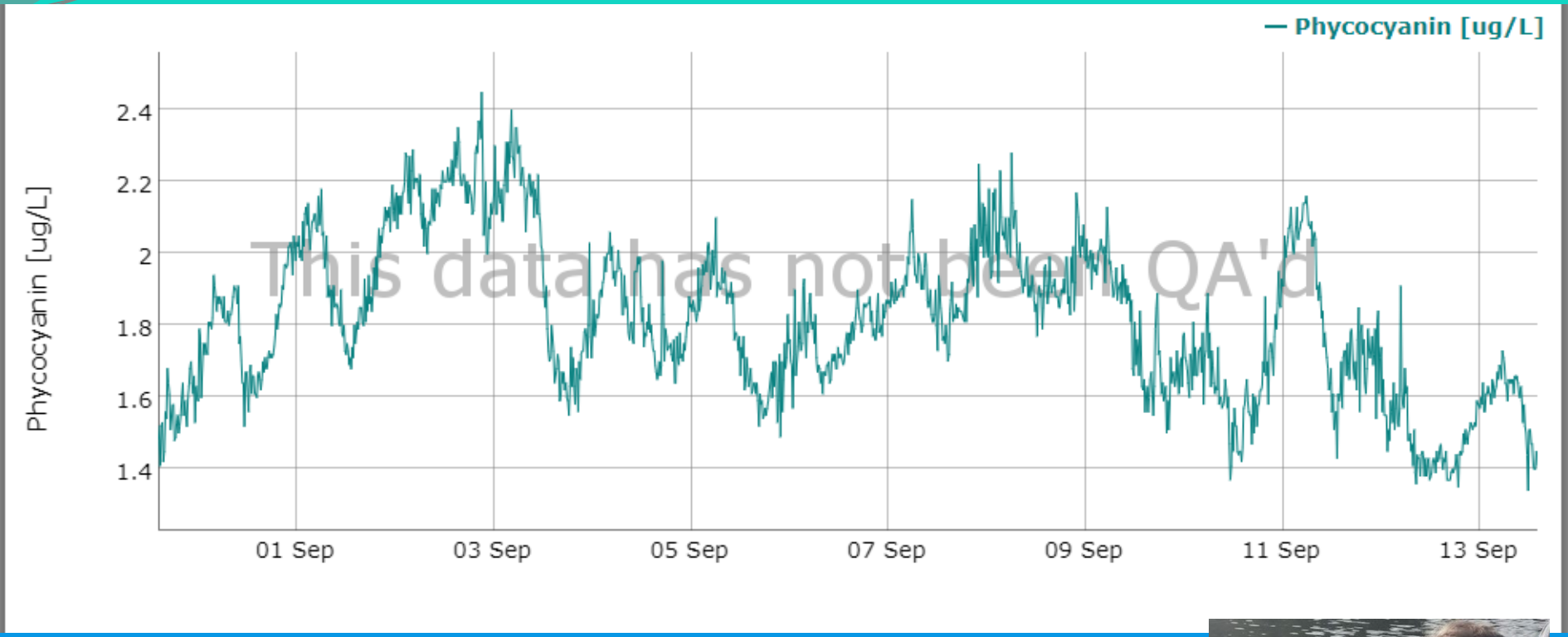
Lakeside Community Beach

Flight Results

- Aircraft Surveillance once/week



DEP Use of Advanced Technology for HABs



Lake Hopatcong Continuous Phycocyanin Levels 9/1 – 9/13/2019
Readings every 5 min
Hourly data will be available:
http://njdep.rutgers.edu/continuous/

Harmful Algal Blooms (HABs) Initiative

Harmful Algal Blooms are a global phenomenon and have impacted lakes and beaches nationwide. New Jersey is taking proactive approaches to prevent HABs, develop treatments, enhance science and communicate risks.

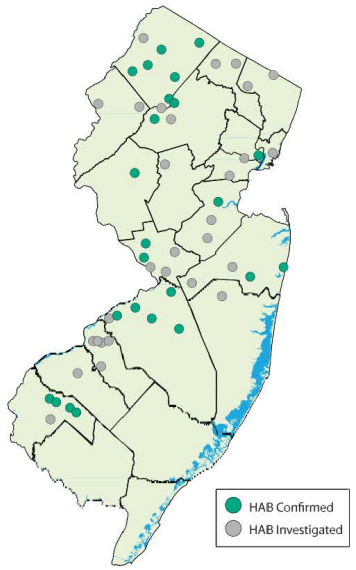
Take Action to Prevent and Mitigate HABs

$2.5 M in HAB/Lakes Management Grants
As an element of its nonpoint pollution grant funding, the New Jersey Department of Environmental Protection will issue a request for proposals for $2.5 million in Lakes/HAB management matching grants, including for treatment and prevention projects. Grantees will be asked to match the State's investment resulting in $5 million in new projects.

$1 M in Watershed Planning Grants
The DEP will make up to $1 million of Watershed Nonpoint Source Grant funding available for planning and projects that reduce the nonpoint source pollution, including nutrients, that contribute to HABs in surface waters. A match will not be required but will improve the project ranking.

$10 M in Principal Forgiveness
The DEP will offer $10 million in principal forgiveness grants from Clean Water State Revolving Fund for half of the cost (up to $2 million) per project of major infrastructure upgrades to reduce nutrient loading to waterbodies, including sewering and stormwater projects.

2019 | Confirmed and Investigated HAB Events by Municipality



Enhance Science and Build Capacity to Respond

Build an Expert Team
The DEP will establish an expert HAB and lakes management team to:
- Evaluate and address prevention and mitigation strategies;
- Develop New Jersey HABs and Lakes Management Guidance Materials; and
- Provide local partners with technical assistance for development of local HAB action plans.

Science Agenda
- DEP will evaluate thresholds for different exposure pathways to cyanobacteria and toxins for humans and animals and establish guidance values for new toxins as needed.
- DEP will research HABs and prepare to use new monitoring and lab testing tools.
- DEP, in consultation with the expert panel, will build on existing efforts to develop a database of treatment technologies.

Build Statewide HAB Monitoring Program Capacity
DEP will pursue additional monitoring, laboratory testing and data management capacity both internally and with external partners to assess water quality conditions and sources that contribute to HABs and to inform HAB event response, prevention and treatment.

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Governor's HABs Initiative

- Announced 11/18/19
- 3 Major Components

1. Prevent & Mitigate HABs
- Lake Management Grants ($2.5M)
- Watershed Planning Grants ($1M)
- Principal Forgiveness Grants – infrastructure upgrades ($10M)

2. Enhance Science/Build Capacity
- Build Expert Team –Lakes Mgt, Prevention & Treatment
- Develop Science Agenda – guidelines, research
- Build Monitoring/Lab/Data Mgt Capacity

Improve Communication

Regional HAB Summits

DEP will host two regional summits (north and central/south) for the purpose of sharing and gathering information where experts, governmental officials, businesses and members of the public will gather to share information and expertise on treatment and mitigation of HABs.

Enhance Web Tools

- A new and improved HAB website, including updated scientific information.
- A new interactive HAB mapping app.

Assist Local Governments

- Provide municipalities with compliance assistance to help with stormwater and septic discharges compliance.
- Investigate facilities surrounding waterbodies to ensure compliance with discharge permits and identify facilities that are not permitted.
- Work with local government to map and maintain essential stormwater infrastructure.
- Assist locals to develop and implement long-term capital improvement plans to upgrade storm and sewer infrastructure.
- Help municipalities and local health agencies regarding risk communication and protection of ground water sources of potable water supply.

While at Lake Hopatcong, the DEP's Johannus Franken (Bureau of Freshwater and Biological Monitoring) and Commissioner Catherine R. McCabe discuss HAB sampling procedures.

As part of the HAB monitoring process, microbiologist Robert Newby, Ph.D., (Division of Science and Reseach) counts cells at a DEP lab.

Report a HAB

To report what could be a HAB in a lake, pond, river, or stream, call the NJDEP Hotline at 1-877-WARNDEP (927-6337) or download the free WARN NJDEP *mobile app* from iTunes, Google Play or Windows Phone.

For more information, please visit the NJDEP Harmful Algal Blooms website: www.nj.gov/dep/hab/

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Governor's Initiative (cont)

3. Improve Communication

- Regional Summits (2) –Jan/Feb
- Enhance Web Tools
  - Improved website
  - New interactive map
- Local Government Assistance – e.g., Stormwater/septic compliance assistance, map and maintain stormwater outfalls, assist locals with risk communication

RFPs for HABs and NPS Mitigation

- 12/12/19 - 2 RFPs to address Harmful Algal Blooms and ongoing Nonpoint Source Mitigation efforts.

- RFP #1 - up to $2.5 million to fund the implementation of innovative or proven methods to prevent, mitigate and/or control freshwater HABs.
- **Proposal Submission Deadline – Monday January 13, 2020**

- RFP #2 - up to $3.5 million for watershed restoration, enhancement, and protection strategies that address NPS pollution.

  Proposal Submission Deadline – Monday February 10, 2020

RFPs for HABs and NPS Mitigation

Entities that are eligible to apply for funding include:

- Municipal/ County planning departments or boards, health departments
- Designated water quality management planning agencies
- Local government within New Jersey
- Universities and colleges
- Interstate agencies of which New Jersey is a member
- Watershed and water resource associations and other local nonprofit 501(c)(3)

Contact Information

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Phone – 609-292-0427

BFBM Website - https://www.state.nj.us/dep/wms//bfbm

HAB website – https://www.nj.gov/dep/HAB

BFBM CyanoHABs website – https://www.state.nj.us/dep/wms//bfbm/CyanoHABHome.html