



Lake Hopatcong Cyanobacterial Harmful Algal Bloom (HAB)

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Division of Water Monitoring & Standards
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*Lake Hopatcong Commission Meeting
Hopatcong High School
July 8, 2019*

Overview

- Cyanobacterial Harmful Algal Blooms (HABs)
- HAB Recreational Response Strategy - 2017
- HAB Outreach & Website
- Lake Hopatcong 2019 HAB Response
 - HAB reports, field monitoring & aircraft flights
 - Advisories & beach closures
 - Current status

What are Cyanobacterial HABs?

- Cyanobacteria
- Blooms
- Cyanobacterial HABs (CyanoHABs)
 - Can produce cyanotoxins
 - Blooms not producing toxins can also have adverse impacts
 - Blooms not producing toxins at one time can subsequently produce toxins

What are the Risks?



Humans:

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

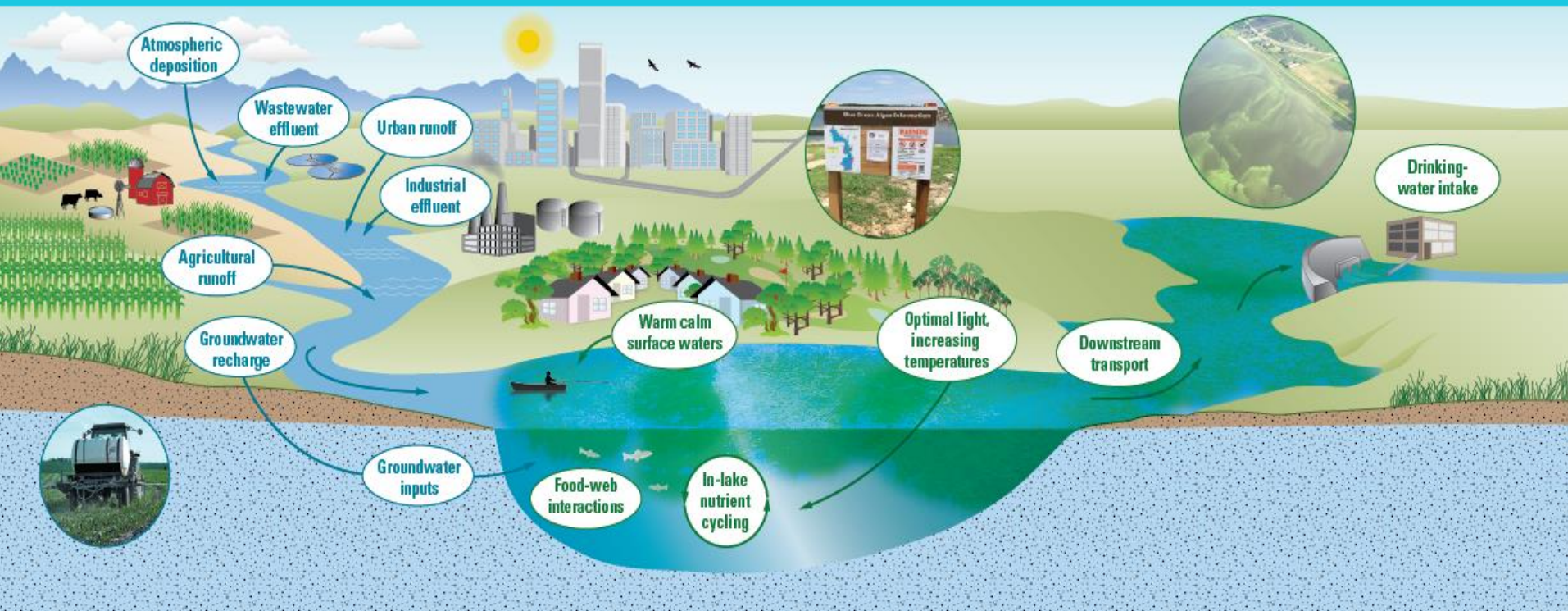
Animals:

Effects on wildlife, pets, and livestock can include sickness and death.

Background

What Causes Algal Blooms?

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



Need For State Capacity Building & Preparedness for Freshwater Cyanobacterial HABs

- Increasing global incidence & concern
- Primary concerns – recreational & drinking water exposure
- High profile blooms (e.g., Toledo, Ohio River, & Lake Okeechobee)
- Impacts - human & animal health, ecosystem & economic
- Need for NJ to develop HAB lab testing, monitoring & response strategy (2016 Interagency Workgroup)

Cyanobacterial Harmful Algal Blooms (HABs) Freshwater Recreational Response Strategy

- BACKGROUND
- RECREATIONAL THRESHOLDS
- HAB MONITORING & RESPONSE
- ADVISORIES
- RESEARCH
- OUTREACH & COMMUNICATION



NJ Department of Environmental Protection
Division of Water Monitoring and Standards
Bureau of Freshwater & Biological Monitoring

Cyanobacterial Harmful Bloom (HABs) Freshwater Recreational Response Strategy



Revision 1.0
June 2018

<https://www.nj.gov/dep/wms/bfbm/CyanoHABhome.html>

Cyanobacterial Harmful Algal Blooms (HABs) Freshwater Recreational Response Strategy and Guidance

PURPOSE

- Provide unified statewide approach for responding to HABs in freshwater recreational waters and sources of drinking water.
- Identify programs and define actions for appropriate response.
 - Coordinated by DEP Bureau of Freshwater & Biological Monitoring



HAB Reporting

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/index.html>

General HAB Website

<https://www.nj.gov/dep/HAB>

BFBM HAB Page

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

A screenshot of the NJDEP website's Cyanobacterial Harmful Algal Blooms (CyanoHABs) reporting page. The page header includes the State of New Jersey logo and the Department of Environmental Protection, Division of Water Monitoring and Standards. The main heading is "Cyanobacterial Harmful Algal Blooms (CyanoHABs)". Below the heading, there are two buttons: "Report a HAB" (green) and "CyanoHAB Photos" (yellow). The "Report a HAB" button is circled in purple. The page also contains a sidebar with navigation links and a section titled "Cyanobacteria" with a small image of a person in a boat.

HAB RESPONSE

Bathing beach or youth camp - DEP/BFBM directs sampling and analysis. DEP notifies local HD and State DOH.

Parks waterbody or drinking water source –

DEP/BFBM directs sampling and analysis. Notifies Parks or Division of Water Supply and Geosciences.

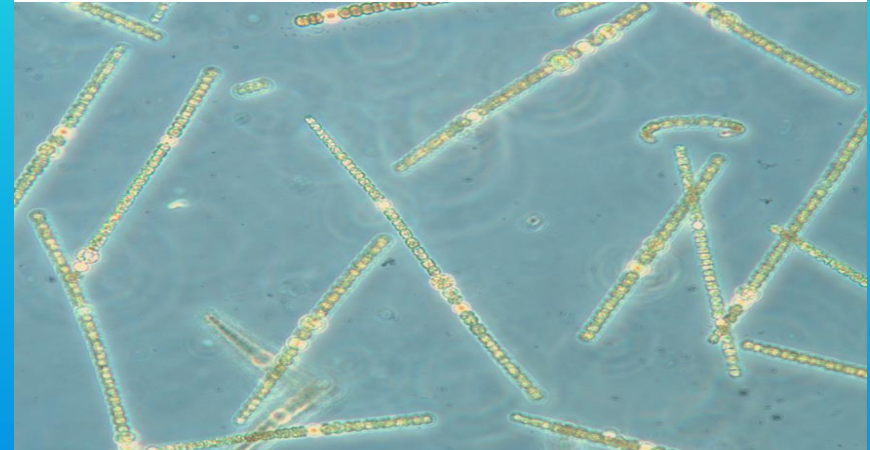
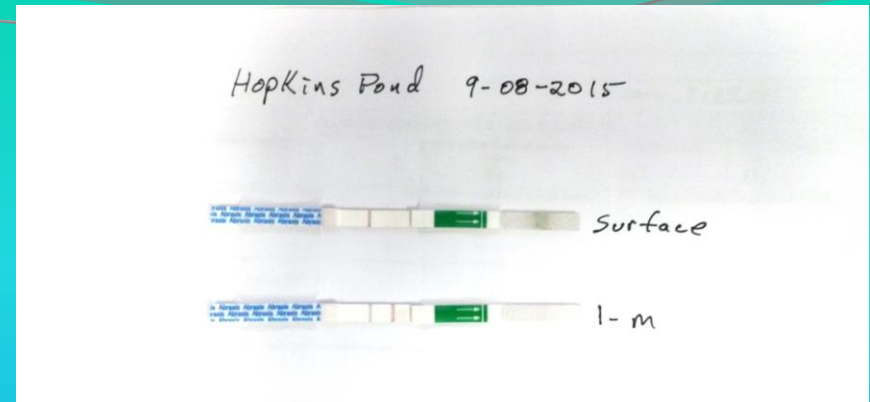
If other public or private water body - DEP notifies & coordinates with appropriate local government agency

Note: licensed bathing beaches are under NJDOH regulation. New Jersey State Sanitary Code Chapter IX Public Recreational Bathing N.J.A.C. 8:26



HAB MONITORING AND RESPONSE

- Field screening and visual surveillance (strip test, phycocyanin)
- Lab - species ID and cell counts
- Toxin lab analysis - ELISA
 - CAAS - Cyanotoxin Automated Assay System



Thresholds Used For Advisories and Beach Closures

HUMAN HEALTH RECREATIONAL THRESHOLDS

Developed by DEP Division of Science and Research

Cell counts > 20,000 cells/ ml
Or toxins;

- **Microcystins: $\geq 3 \mu\text{g/L}$**
- **Cylindrospermopsin: $\geq 8 \mu\text{g/L}$**
- **Anatoxin-a: $\geq 27 \mu\text{g/L}$**

EPA's "*Recommended Human Health Recreational Ambient Water Quality Criteria or Swimming Advisories for Microcystins and Cylindrospermopsin*" released May 2019 - will be assessed by DEP. (Anatoxin not included)

HARMFUL ALGAL BLOOM ADVISORIES

WATERBODY:

<http://www.nj.gov/dep/wms/HABS.html>



WARNING

SUSPECTED HARMFUL ALGAE BLOOM (HAB) PRESENT

WARNING - Avoid Contact or Ingestion (Humans and Animals)

A Harmful Algal Bloom is suspected which can be harmful to humans and animals.

People, pets, and livestock should avoid contact and drinking the water.

Avoid swimming, wading, and watersports.

Fish caught in this waterbody should not be eaten.



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WATERBODY:

www.nj.gov/dep/wms/HABS.html



DANGER

HARMFUL ALGAE BLOOM (HAB) PRESENT HIGH RISK-NO Contact or Ingestion (Humans and Animals)

A confirmed Harmful Algal Bloom is present with levels quantified at or above the NJ Health Advisory Guidance.

Do not drink or have contact with the water including, but not limited to, swimming, wading and watersports.

Fish caught in this waterbody should not be eaten.

Pets and livestock should not contact or drink the water.



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CyanoHABs Website

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



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



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NJ HAB Response Strategy Document

Bureau of Freshwater & Biological Monitoring

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Cyanobacterial Harmful Algal Blooms (CyanoHABs)

[Report a HAB](#)

[CyanoHAB Photos](#)

[Return to the main HABs Home Page.](#)



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](#).

Information on how NJ handles cyanobacterial harmful algal blooms can be found in the [Cyanobacterial Harmful Algal Blooms \(HABs\) Response Strategy document](#).

Lake Hopatcong HAB - 2019



Chronology of Events

- 6/18/19 – Initial report -Byram Bay area (Pebble Bay Beach and Sand Harbor Beach)
 - BFBM initiated response and coordinated with local health departments
- 6/20/19 - Additional reports in Byram Bay Area
 - Lake Hopatcong Commission informed local municipalities of advisory; advisories posted on Commission web and Facebook pages



Byram Bay Area 6/20/19

The screenshot shows the Lake Hopatcong Commission website. The header includes the LHC logo and the text 'LAKE HOPATCONG COMMISSION'. Below the header is a navigation bar with 'HOME' and 'ABOUT' links. A dark blue banner contains the mission statement: 'The Lake Hopatcong Commission is an independent State agency overseen by an 11-member board of Commissioners. The Commission is responsible for conducting, managing and coordinating activities for the preservation, restoration and enhancement of Lake Hopatcong and its watershed. Members of the Commission work as volunteer representatives of the larger lake community, and are dedicated to permanently preserving the natural, historical and recreational resources of the watershed for this generation and beyond.'

The main content area is divided into two columns. The left column is titled 'WHAT'S HAPPENING' and lists three items:

- State Update - July 3, 2019 (July 3, 2019)
- State Update - July 2, 2019 (July 2, 2019)
- NJ DEP Issues Advisory for Lake Hopatcong** (June 27, 2019) - This item is circled in blue.

The right column is titled 'UPCOMING EVENTS' and lists three events:

- 7:00 pm Regular Monthly Meeting @ Hopatcong High School Cafeteria (8th Nov)
- 7:00 pm Regular Monthly Meeting @ Hopatcong High School Cafeteria (12th Nov)
- 7:00 pm Regular Monthly Meeting @ Lake Hopatcong Foundation Offices (9th Nov)

A 'View Calendar' link is located at the bottom right of the events list.

Chronology of Events (cont)

6/20/19 - 6/26/2019

- Numerous reports of suspected HABs
- BFBM performed sampling and lab analysis at targeted beaches
- Targeted beaches closed as result of lab testing



6/26/19

- Flight reconnaissance commenced
- Advisory recommended to close all beaches due to extent of HAB



Chronology of Events (cont)

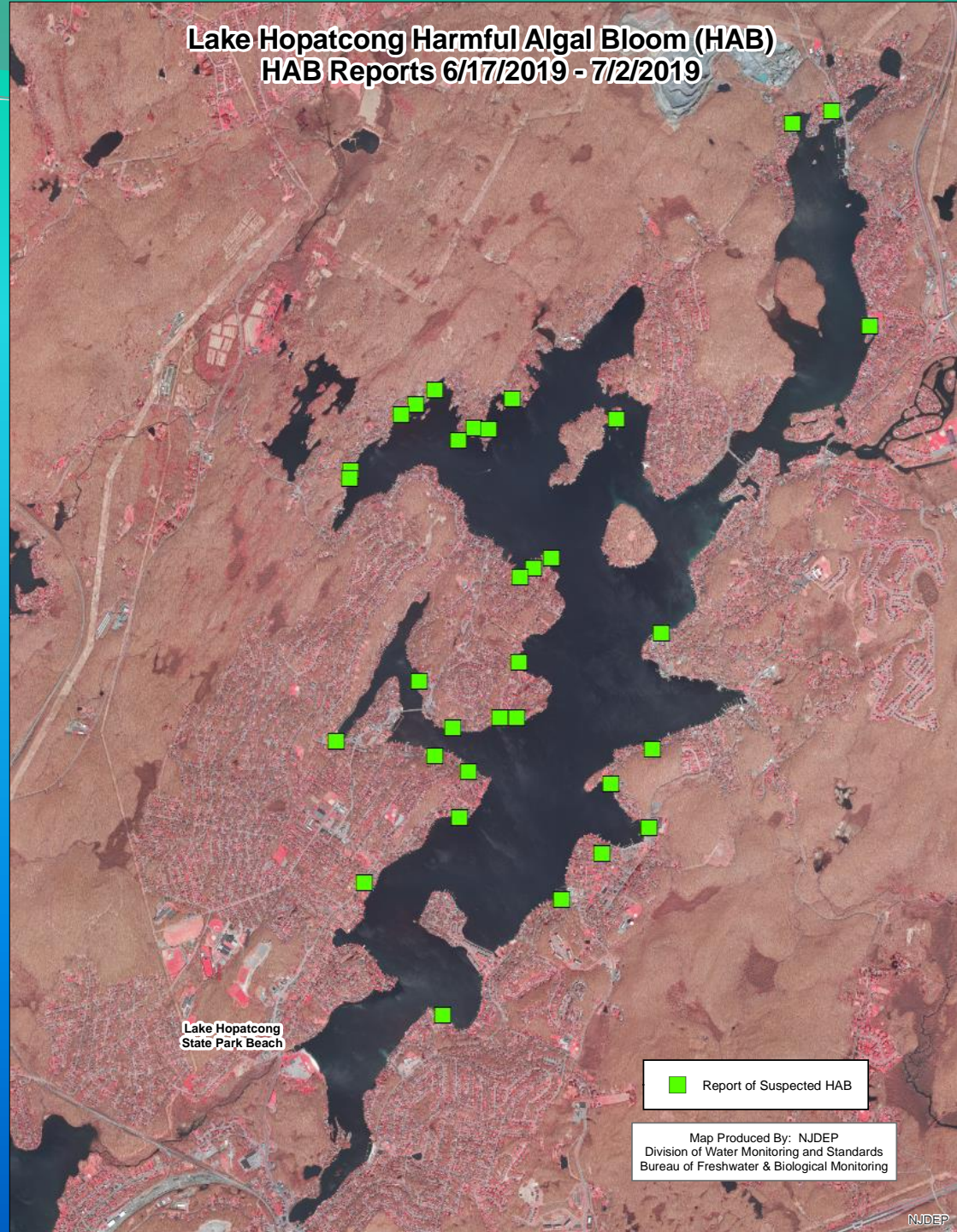
6/27/19 – present

- DEP **Press Releases** (6/27, 7/3) with advisory for entire lake

*“DEP is recommending that local health authorities close all public swimming beaches along the lake due to the widespread nature of the bloom...**avoid all contact with water from Lake Hopatcong until further notice. People also should not eat fish caught in the lake or allow pets to come in contact with lake water or drink the water.**”*

- DEP continues **aircraft surveillance** (6/28, 6/30, 7/2, 7/5), **sampling** (6/28, 7/1, 7/2, 7/5), and **analysis**

Lake Hopatcong 2019 HAB Reports (6/17-7/2/19)



DEP Use of Advanced Technology for HABs

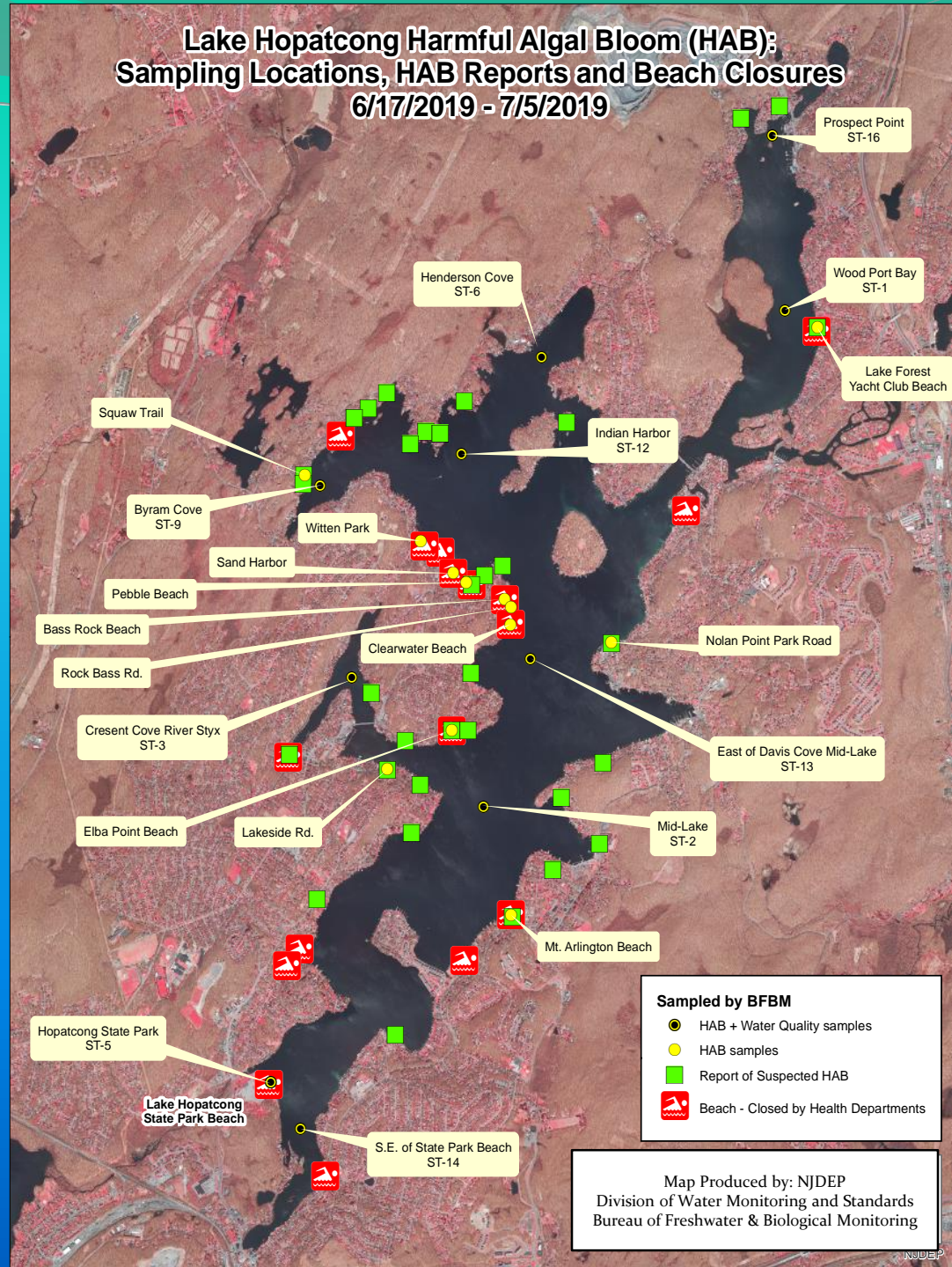
- Hand-held Phycocyanin Meters (e.g. Aquaflor)
- Aircraft Remote Sensing
 - Fixed Wing Phycocyanin sensor
- Continuous monitoring buoys (DEP and USGS)
 - Temperature, Specific Conductance, Dissolved Oxygen, pH, Turbidity, and Phycocyanin
 - Readings every 15 min
 - Hourly data will be available:
<http://njdep.rutgers.edu/continuous/>



Photo courtesy of YSI

Sampling Locations, HAB Reports and Beach Closures

Lake Hopatcong Harmful Algal Bloom (HAB): Sampling Locations, HAB Reports and Beach Closures 6/17/2019 - 7/5/2019



Bathing Beach Cell Count Results

Collected as of 7/2/2019

Site name	Station# (where applicable)	Cyanobacteria Counts cells/mL*						
		Date Sampled						
		6/18/2019	6/21/2019	6/26/2019	6/27/2019	6/28/2019	7/1/2019	7/2/2019
Bathing Beach Sites								
Pebble Beach		57,000					95,000	16,850
Sand Harbor		51,375					9,250	27,800
Clearwater Beach			8,750				21,000	13,000
Bass Rock Beach			35,812				33,030	53,450
Lake Forest Yacht Club Beach				9,750			115,000	4,400
Elba Point Beach				37,125			18,500	29,090
Mt. Arlington Beach					179,000		12,750	14,125
Hopatcong State Park	ST-5					24,250	7,750	0
SE. of State Park Beach	ST-14					34,000		21,100
		*NJ Health Advisory Guidance Levels Cell Count \geq 20,000 cells/ml;						
		Indicates > than advisory levels						

Other Lake Site Results as of 7/3/2019

Site name	Station# (where applicable)	Cyanobacteria Counts cells/mL*							
		Date Sampled							
		6/18/2019	6/21/2019	6/26/2019	6/27/2019	6/28/2019	7/1/2019	7/2/2019	7/5/2019
Other Lake Sites									
Nolan Point Park Road		12,500					12,500	11,900	
Rock Bass Rd.			9,750						
Squaw Trail			11,875						
Lakeside Rd.			10,281						
Witten Park					14,500				
Wood Port Bay	ST-1					34,000		8,000	Pending
Mid-Lake**	ST-2					36,000		65,750	Pending
Crescent Cove River Styx	ST-3					34,500		2,000	Pending
Henderson Cove	ST-6					28,280		19,000	Pending
Byram Cove	ST-9					10,250		28,000	Pending
Indian Harbor	ST-12					22,000		39,750	Pending
East of Davis Cove Mid-Lake	ST-13					18,500		19,000	Pending
Prospect Point	ST-16							5,150	Pending
** Collected from surface 0.5, 1.0 and 2.0 meters. Highest results listed (1 meter)		*NJ Health Advisory Guidance Levels							
		Cell Count ≥ 20,000 cells/ml; Microcystins ≥ 3µg/L				Level > advisory levels			

Microcystin Results for All Samples Collected as of 7/5/2019

- **48** Samples Collected at **22** Sites (beaches & other waters)
- All results below Health Advisory Level (≥ 3 ug/L)
- Measurable Levels in 31 samples: **< 0.15 – 1.35** ug/L
- **17** Results Below Reporting Level

Actions

- Continued response and reporting according to the HAB Strategy
- Continued field monitoring and lab analyses until results below NJ Health Advisory Guidance levels (for beaches – 2 consecutive samples below thresholds required to open)
- Continued flight monitoring of the lake
- Water quality continuous monitoring buoys to understand and predict blooms

Thanks to DWMS & DSR Personnel

- *DWMS*
 - **Bureau of Freshwater & Biological Monitoring**
 - Vic Poretti, Dean Bryson, Tom Miller, Johannus Franken, Brian Taylor, John Abatemarco, Briana Morgan, Briana King, Jenna Krug, Dari Logan
 - **Bureau of Marine Water Monitoring**
 - Bob Schuster, Rodney Sloan, Carrie Lloyd
 - **Director's Office**
 - Bruce Friedman, Alena Baldwin-Brown, Paul Morton
 - **Bureau of Environmental Analysis, Restoration & Standards**
 - Sheri Shifren, Emmalee Carr
- *DSR* – Rob Newby

Thanks to our Partners:

- DEP Division of Parks and Forestry
- DEP Division of Fish and Wildlife
- NJ Department of Health
- Sussex County Health Department
- Mt. Arlington Health Department
- Roxbury Health Department
- Jefferson Twp. Health Department
- Mt. Olive Health Department
- Lake Hopatcong Commission
- Lake Hopatcong Foundation
- Princeton Hydro
- United States Geological Survey

Contact Information

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Monitoring

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BFBM Website -

<https://www.state.nj.us/dep/wms//bfbm>

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

