



Rhode Island's Cyanobacteria Bloom Response and Routine Monitoring Program

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Overview

- Historic Observed Blooms
- Bloom Response Program
- HAB Advisory Criteria
- Routine Monitoring/Screening Program
- Plans for 2013 Season
- Lessons Learned
- Phosphorus Reduction Efforts



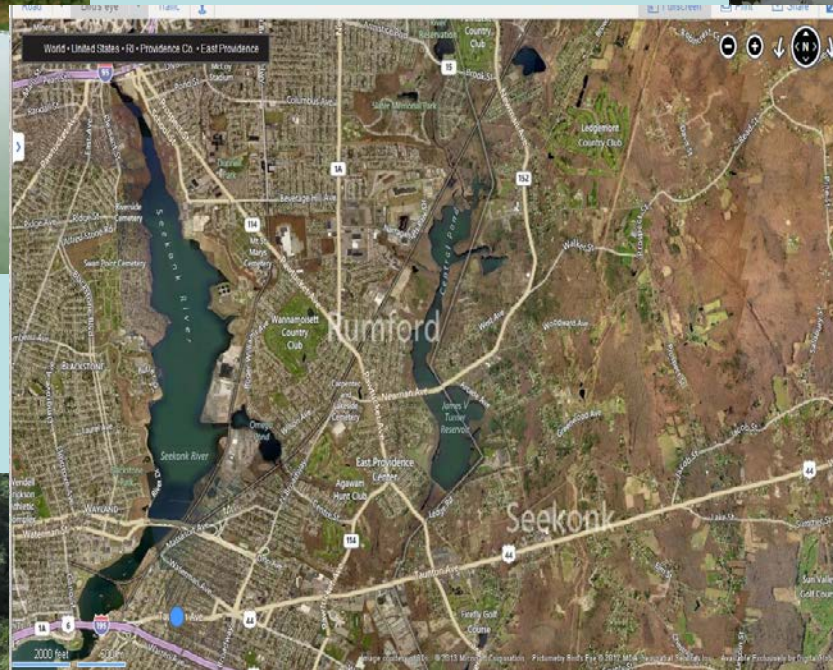


Historic Cyanobacteria Blooms





Central Pond HAB (2007)





- 2008 and 2009
 - No reported HAB's
- 2010
 - Set Advisory Criteria
 - 3 HABs reported
 - Secured funds to begin cyanobacteria screening program and continue response monitoring





Bloom Response Program

- RIDEM staff respond to all reports of blooms that are received.
- Ask individuals reporting the bloom to email photos of the bloom before DEM staff are deployed.
- DEM staff conduct visual inspection of waterbody and collect samples from representative locations.
- Scum or mat present = Advisory
- Microscopic analysis conducted at RIDEM.
- Sample(s) sent to Laboratory for microcystin analysis.



Fig. 5 *Anabaena* sp. 400X (scale bar = 20 μ m)



HAB Advisory Criteria



News Release

RI Department of Environmental Management
235 Promenade St., Providence, RI 02908
(401) 222-2771 www.dem.ri.gov

For Release: August 24, 2010

Contact: Gail Mastrati 222-4700 ext. 2402

DEM, HEALTH ISSUE ADVISORY FOR TEN MILE RIVER, CENTRAL POND, TURNER RESERVOIR, AND OMEGA POND

Dogs are Particularly Susceptible to Effects from Toxin in Green Algae Bloom

PROVIDENCE - The Department of Environmental Management and the Department of Health (HEALTH) advise people that a recent algae bloom in the Ten Mile River, Central Pond, Turner Reservoir, and Omega Pond may form a naturally occurring algal toxin. People should avoid recreational activities (like swimming, boating, or fishing) in these areas until further notice. In addition, people should not drink water or eat fish from any of these areas.

During a recent sampling event, DEM observed a dense algae bloom turning the waters of Turner Reservoir a bright green color. DEM has confirmed the presence and predominance of the blue-green algae, *Microcystis*. These algae also referred to as cyanobacteria have the potential to form the naturally occurring algal toxin, Microcystin.

Symptoms of exposure to Microcystin in humans include stomach cramps, vomiting, diarrhea, fever, muscle and joint pain, and irritation of the skin, eyes and throat. People who have been drinking from, swimming, or fishing in these areas and experience those symptoms should contact their healthcare provider. People are advised to avoid contact with water if they see similar conditions (dense algae blooms, bright green colored waters) in other lakes and ponds.

According to Rhode Island State Veterinarian Scott Marshall, DVM, pets can also be affected by exposure to Microcystin. Pet owners should not allow pets to drink this water or swim in the water. Symptoms of exposure to Microcystin in dogs can include rapid onset of lethargy, difficulty breathing, vomiting, diarrhea, muscle rigidity or convulsions.

DEM advises that the algae bloom and the natural production of the toxin will likely resolve itself. This week's rainfall reduced some of the toxin-producing algae. DEM will re-sample the waters and will inform the public when algae levels are low. At that time, it will be safe to resume recreational activities in these areas.

Microcystis is a type of blue algae that grows naturally in many water bodies. Under certain conditions, such as warm weather and an abundance of nutrients in the water, the algae

- Advisory warning against water contact issued based on three criteria:
 - Visible Scum Present
 - Total Cyanobacteria Cell Count > 70,000 cells/ml
 - Microcystin toxin concentration > 14 ppb



If Advisory Criteria Are Exceeded:

1. DEM/HEALTH issue joint press release.
2. Letters are sent to municipalities
3. Advisory is posted at public access sites
4. Make contact with individuals/lake association/watershed group



Rescinding Advisories

- Municipality, lake association or watershed group, interested individuals are responsible for continued sampling
- 2 Consecutive Samples (2 weeks apart)
 - Total cyanobacteria cell count < 70,000 cells/ml
 - Microcystin levels < 14 ppb
- If no additional sampling then advisory is rescinded on Nov 1





Routine Monitoring/Screening Program

2011-2012

Developed to screen for and characterize cyanobacteria blooms in the State's freshwaters.

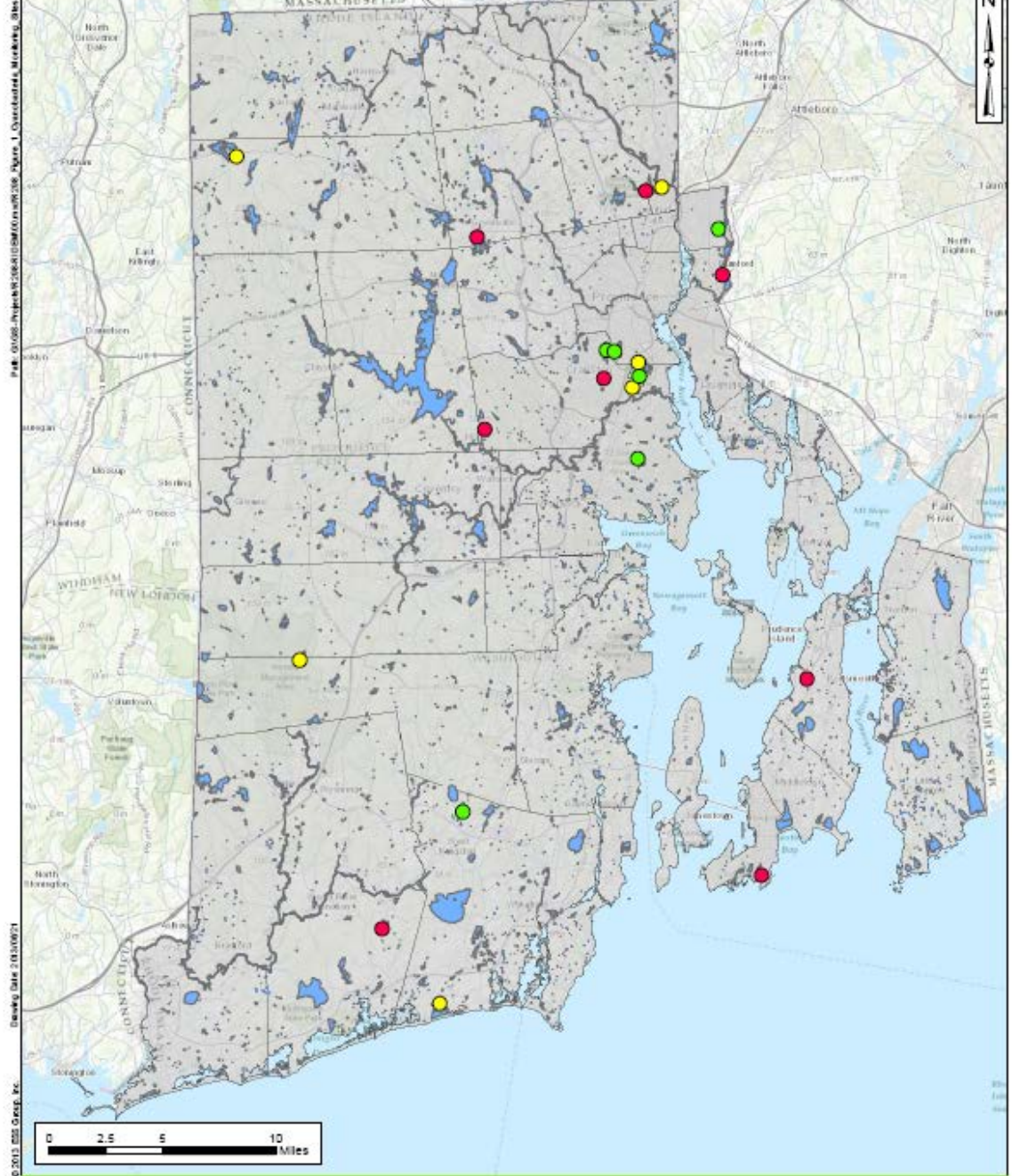
- 11 Sites (per year) chosen based on anecdotal historical presence of algal blooms and chl-a and TP data collected by URIWW
- Samples collected mid-late September at recreational/public access points
- Samples analyzed for cyanobacteria ID/enumeration and toxicity (Microcystins)
- Temperature, Dissolved Oxygen, Spec. cond, Secchi (where applicable)
- Turnaround Time < 2 weeks for both cyano cell count and toxicity results
- Samples from HAB Response were submitted to ESS for shipment to Greenwater Lab

Monitoring Key:

Yellow
2011

Red
2012

Green
Both Years



RIDEM CYANOBACTERIA MONITORING

Rhode Island

1 inch = 6 miles

Source: 1) RIGIS, Rhode Island Towns, 1989

2011 & 2012 Cyanobacteria
Screening Level Monitoring Sites



Routine Monitoring/Screening Program

2011 Results

- Total Cyanobacteria cell densities ranged from 2,500 – 15 million cells/ml
- Total Cyanobacteria cell count of >70,000 cells/ml in 6 of 11 waterbodies.
- Microcystin levels ranged from 0.5 to 15 ug/l
- Resulted in 6 advisories issued.

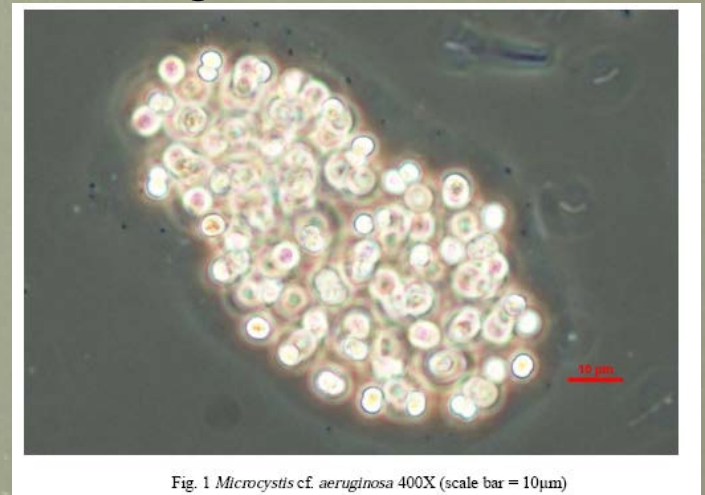


Fig. 1 *Microcystis* cf. *aeruginosa* 400X (scale bar = 10 μ m)



Routine Monitoring/Screening Program

2012 Results

- Total Cyanobacteria cell densities ranged from 94 – 5 million cells/ml
- Total Cyanobacteria cell count of >70,000 cells/ml in 7 of 11 waterbodies.
- Microcystin levels ranged from 0.2 to 4.8 ug/l
- Resulted in 7 advisories issued.



Fig. 1 *Woronichinia naegeliana* 400X (scale bar = 20 μ m)





DEM HAB Response Results

2011

2 Response-based Advisories Issued

Spring Lake Reservoir

> 13 million total cyano cells/ml
Microcystin levels 35 ug/l



Slack Reservoir

>3 million total cyano cells/ml
Microcystin levels 82 ug/l





DEM HAB Response Results

2012

2 Response-based Advisories Issued

Mashapaug Pond

> 311,000 total cyano cells/ml
Microcystin levels 7 ug/l



Slack Reservoir

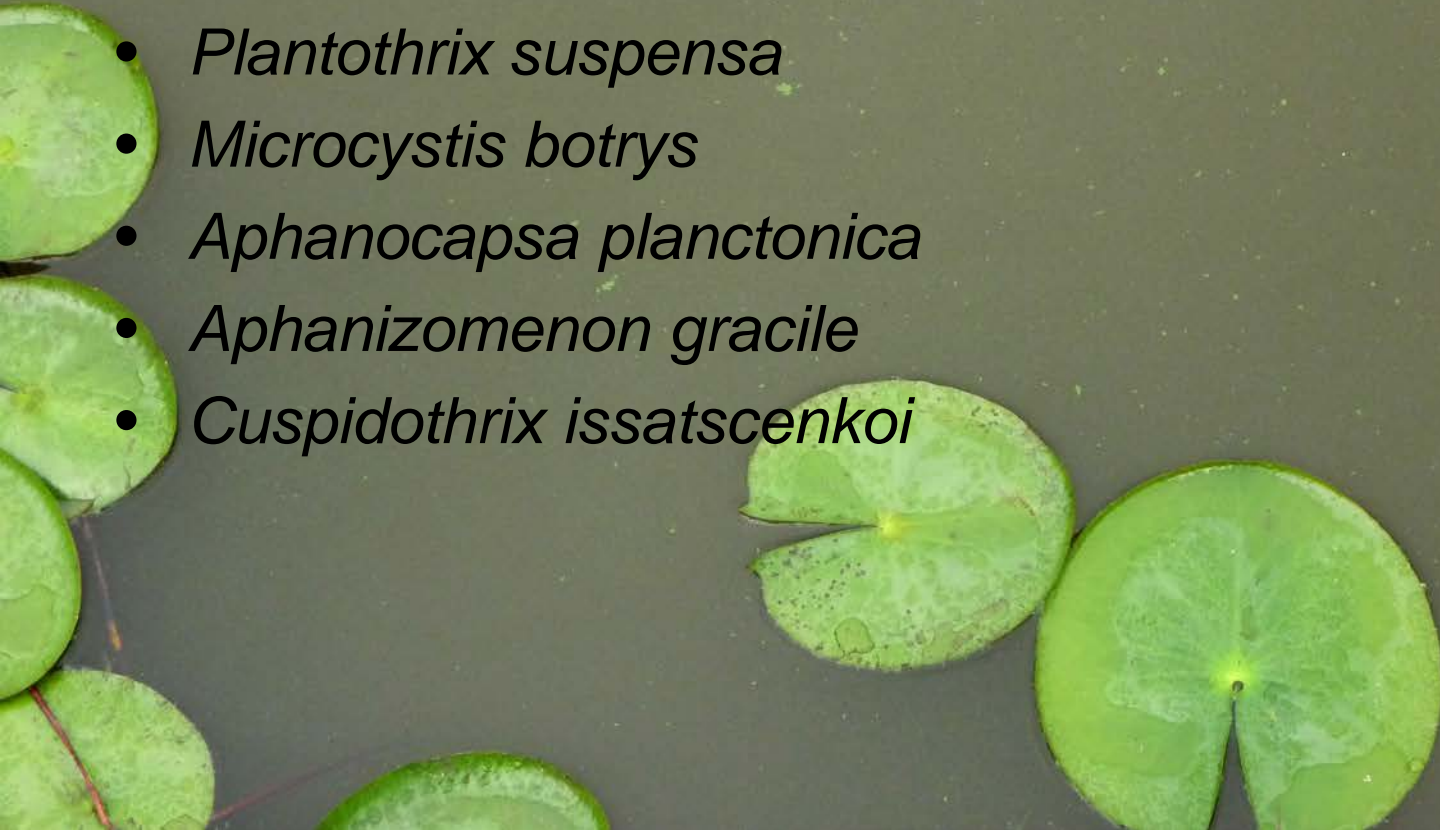
>902,000 total cyano cells/ml
Microcystin levels 48 ug/l





Dominant Cyanobacteria Species

- *Woronichinia naegeliana*
- *Anabaena* sp.
- *Anabaena planctonica*
- *Plantothrix suspensa*
- *Microcystis botrys*
- *Aphanocapsa planctonica*
- *Aphanizomenon gracile*
- *Cuspidothrix issatscenkoi*





Cyanobacteria cell density and Microcystin Levels (2011-2012)

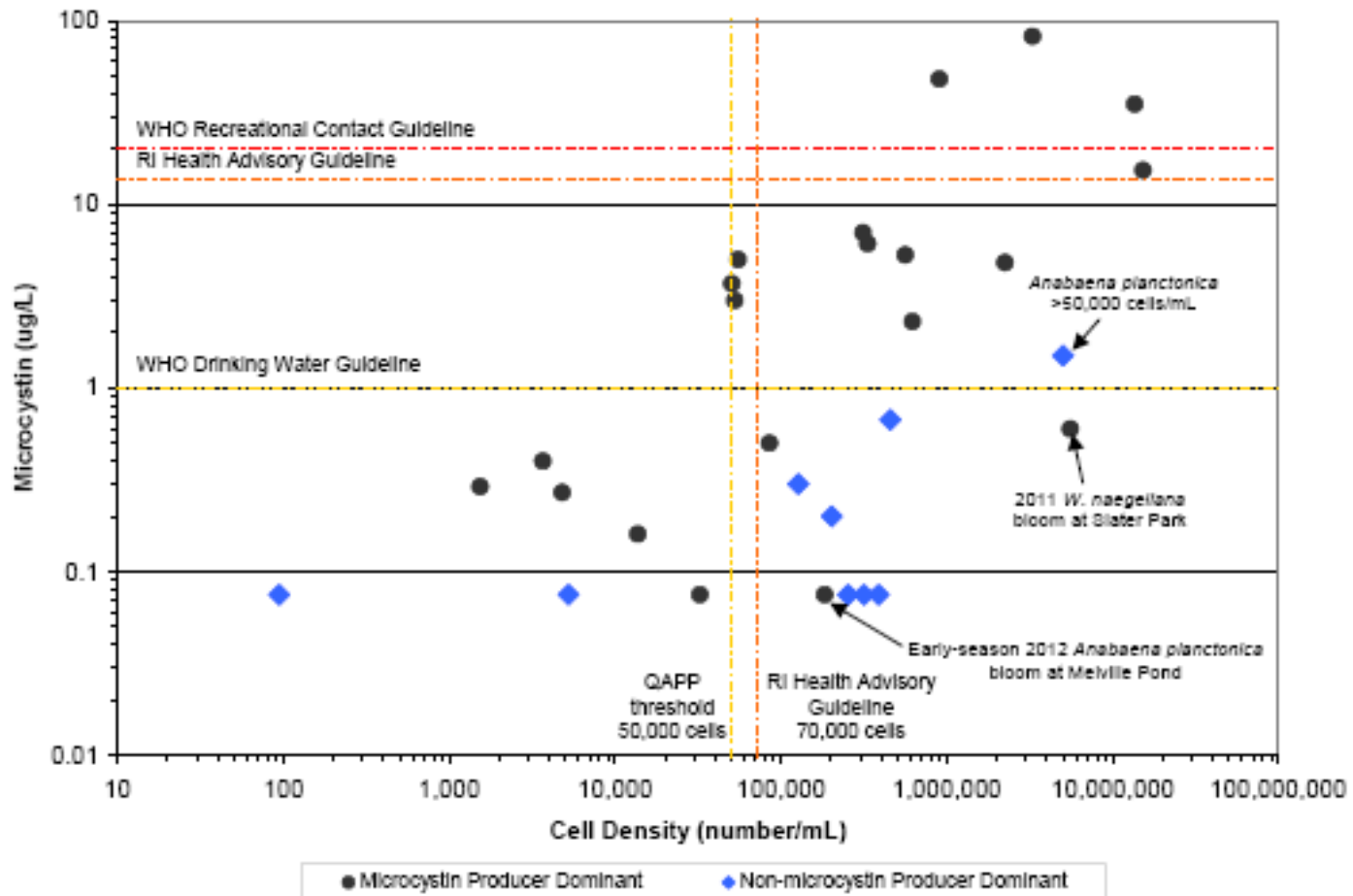
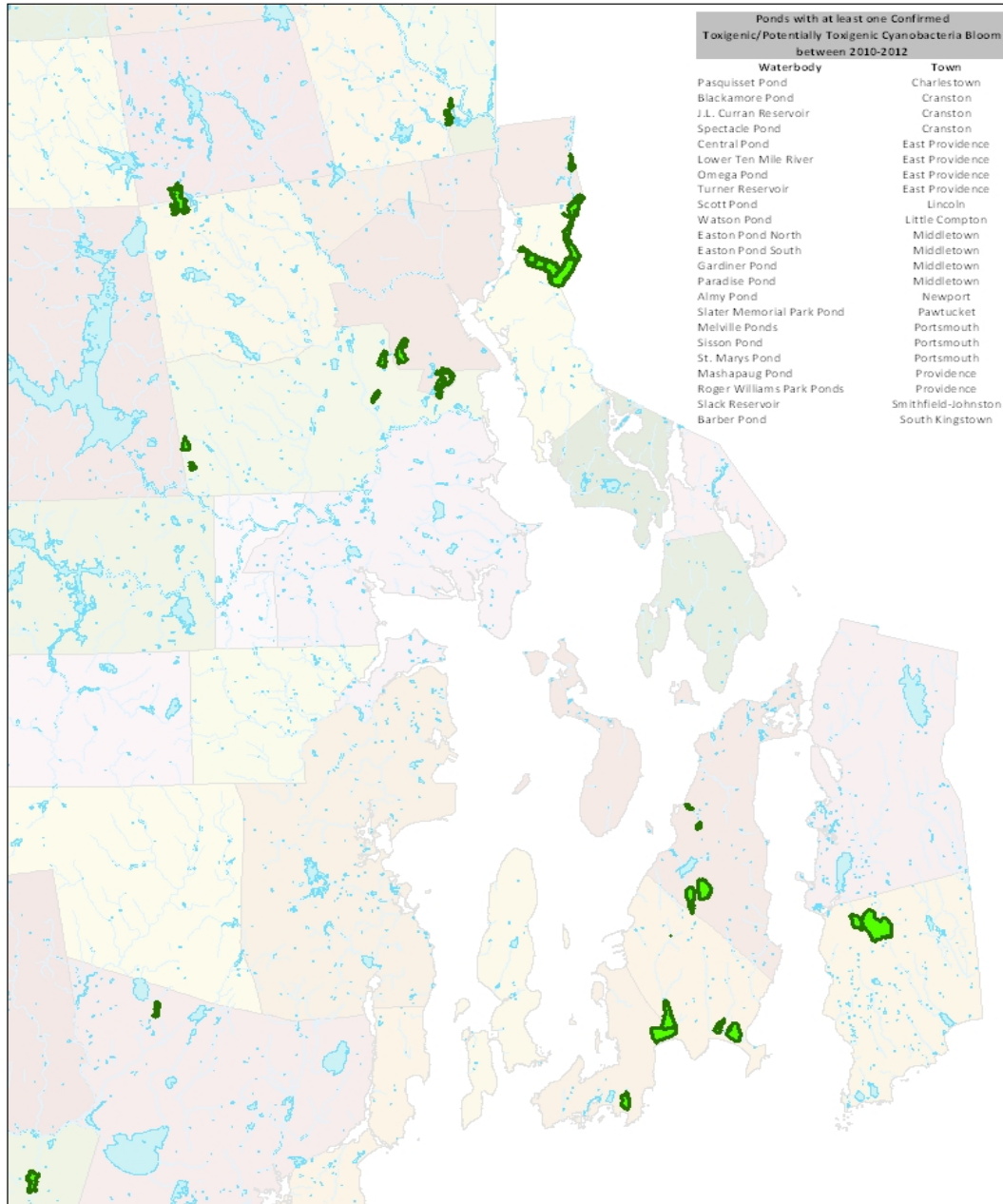


Figure 1. Cyanobacteria Cell Density and Microcystin Levels (Pooled 2011 and 2012 Data)



Confirmed HAB's 2007-2013



Communications/Outreach

- Pre-Season meetings
- RIDEM and HEALTH websites
- Fact Sheet
- Outreach to Veterinarians
- URI Watershed Watch
- Increased Public Awareness

Animal Safety Alert

BLUE-GREEN ALGAE BLOOMS

When in doubt, it's best to keep out!



What is a blue-green algae bloom?

- Cyanobacteria, sometimes called blue-green algae, are microscopic organisms found naturally in all types of water.
- Blue-green algae grow quickly, or bloom, when the water is warm, stagnant, and full of nutrients.
 - Algae blooms usually occur during the summer and fall. However, they can occur anytime during the year.
 - When a bloom occurs, scum might float on the water's surface.
 - Blooms come in different colors, from green or blue to red or brown.
 - As the bloom dies off, you may smell an odor like rotting plants.

What is a toxic bloom?

- Sometimes, blue-green algae produce toxins.
- The toxins can be present in the algae or in the water.
 - Swallowing water with algae that are producing toxins can cause serious illness.

Health and Safety Tips for Pets and Livestock

1. Do not let your pets or livestock graze near, drink, or swim in water where you see blue-green algae blooms, foam, or scum on the surface.
2. If your animal gets in water with a bloom, immediately wash it off with clean water. Do not let the animal lick algae off of its fur.
3. Call a veterinarian if your animal shows any of these symptoms of blue-green algae poisoning: loss of energy, loss of appetite, vomiting, stumbling and falling, foaming at the mouth, diarrhea, convulsions, excessive drooling, tremors and seizures, or any unexplained sickness that occurs within a day or so after being in contact with water.

You can help protect your pets and livestock from blue-green algae blooms by taking the following actions:

- Visit <http://www.cdc.gov/hab> to learn more about blue-green algae.
- Know what a bloom looks like and avoid contact.
- Keep pets and livestock away from the water if you see signs of blue-green algae.
- Call your veterinarian if your animals are sick.
- Call your state or local health department to report pets or livestock made sick by blue-green algae.

To report a blue-green algae bloom or a related health event:

- Call the Centers for Disease Control and Prevention, National Center for Environmental Health Harmful Algal Blooms program (HABSS) at: 866-556-0544.
- Call your local or state health department.

You cannot tell if a bloom is toxic just by looking at it!



Centers for Disease
Control and Prevention
National Center for
Environmental Health

Plans for 2013

- Continue routine monitoring of 11-12 waterbodies.
- Continue to respond to HAB reports
- Work on developing a HAB webpage
- Continue outreach/communications
- Workshops/Presentations to Lake Associations, Watershed Groups, etc.

Lessons Learned/Issues Encountered

- HAB's not 'new' in the state
- Some ponds experience consistent blooms (year after year) others do not.
- Algal conditions can change rapidly.
- Communication and coordination of responsibilities among agencies was successful.
- Dissemination of advisory to pond (no public access) residents is challenging.
- Towns have limited capacity to sample
- Learning from other State's experiences very valuable.
- Budget/staff constraints are a huge issue.
- Most Blooms reported on Friday afternoons between 3-4pm.

Phosphorus Reduction Efforts

- Emphasizing Watershed Planning
- Developing new Nutrients criteria for lakes
 - Wadeable rivers/streams
- 15 Total Phosphorus TMDL's completed to date
 - 2 projects being funded under non-point program in watersheds with documented HAB's
 - MS4's are required to incorporate TMDL requirements into their permits
- New Stormwater Manual with more stringent nutrient reduction requirements
- WWTF TP reductions



Questions?

- Elizabeth Scott, Deputy Chief (401.222.4700 ext. 7300)
- Jane Sawyers (401.222.4700 ext. 2032)
- Brian Zalewsky (401.222.4700 ext. 7145)