MDPH Mystic River Watershed Cyanobacteria Sampling 2010

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Overview

- Harmful Algae Blooms
- MDPH Harmful Algae Bloom Project
- Spy Pond and Ell Pond 2010 Data Review
- Next Steps

What are Harmful Algae Blooms (HABs)?

- In fresh water, cyanobacteria (blue-green algae) under certain environmental conditions, can grow at a rapid rate, resulting in an algae bloom.
- In New England's marine waters, the marine plankton *Alexandrium* is responsible for algae blooms commonly known as red tide.
- Some types of these organisms can produce toxins harmful to people and animals. Blue-green algae can also be a skin irritant.
- When they become concentrated in the water, we call them Harmful Algae Blooms.

Pictures of Freshwater HABs

Horn Pond- 2009

Spy Pond- 2010

CDC Cooperative Agreement

- In 2008, MA was one of 10 states awarded funding from CDC to conduct HAB monitoring.
- MA is the only New England state.
- The primary goal is to evaluate potential health impacts from HABs by collecting and analyzing environmental and health data.
- CDC is interested in both human and animal health data (e.g., fish kills, pet poisonings).

What are Health Effects of HABs? Freshwater

- Contact with freshwater HABs may cause skin and eye irritation; incidental ingestion while recreating may cause gastrointestinal symptoms.
- In freshwater, different genera of cyanobacteria are capable of producing toxins.
  - Microcystin – exposure to high levels can cause liver damage.
  - Anatoxin – exposure to high levels can cause neurological damage.

Toxins

Toxin group[1]	Primary target organ in mammals	Cyanobacterial genera[2]
Cyclic peptides		
Microcystins	Liver	*Microcystis, Anabaena, Planktothrix (Oscillatoria), Nostoc, Hapalosiphon, Anabaenopsis*
Nodularin	Liver	*Nodularia*
Alkaloids		
Anatoxin-a	Nerve synapse	*Anabaena, Planktothrix (Oscillatoria), Aphanizomenon*
Anatoxin-a(S)	Nerve synapse	*Anabaena*
Aplysiatoxins	Skin	*Lyngbya, Schizothrix, Planktothrix (Oscillatoria)*
Cylindrospermopsins	Liver[3]	*Cylindrospermopsis, Aphanizomenon, Umezakia*
Lyngbyatoxin-a	Skin, gastro-intestinal tract	*Lyngbya*
Saxitoxins	Nerve axons	*Anabaena, Aphanizomenon, Lyngbya, Cylindrospermopsis*
Lipopolysaccharides (LPS)	Potential irritant; affects any exposed tissue	All

World Health Organization, 1999

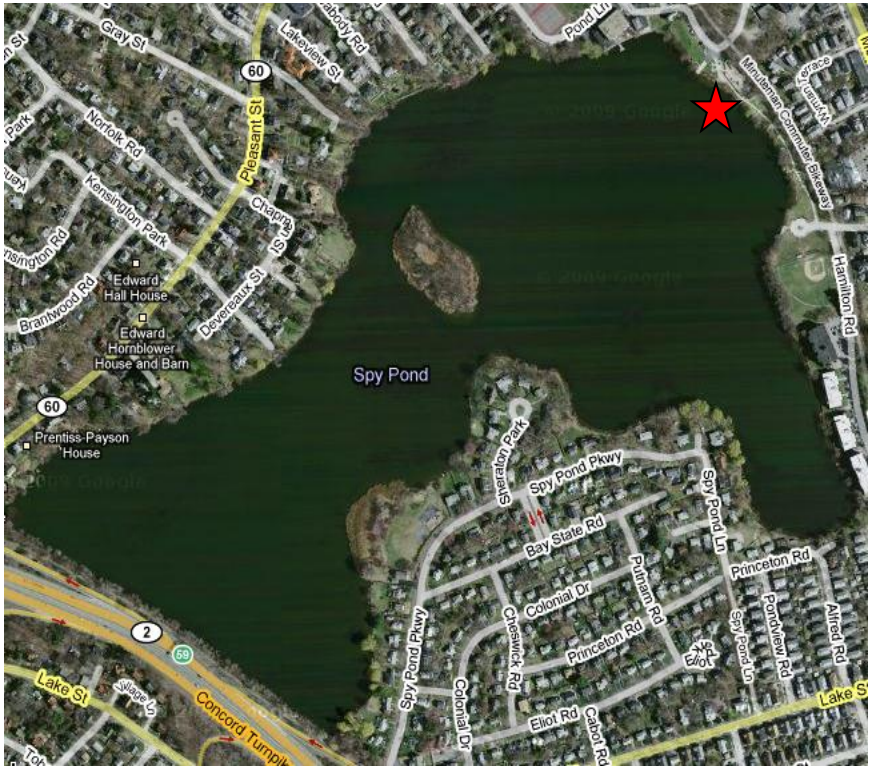
MDPH Guidelines for Freshwater

- MDPH developed a protocol with guidelines for issuing advisories in response to HABs (www.mass.gov/dph/environmental_health)
- Advisories are recommended when:
  - A visible cyanobacteria scum or mat is present;
  - A cell count exceeds 70,000 cells/mL; or
  - A microcystin toxin level exceeds 14 ppb

Overall Goals of MDPH Algae Project

- Monitor selected water bodies with a history of blooms (e.g. Spy Pond in Arlington)
- Respond to reports of blooms and collect samples as necessary (e.g. Ell Pond in Melrose)
- Conduct health surveillance for individuals exposed to cyanobacteria
- Limit exposures to humans and animals by recommending advisories as warranted

Spy Pond, Arlington

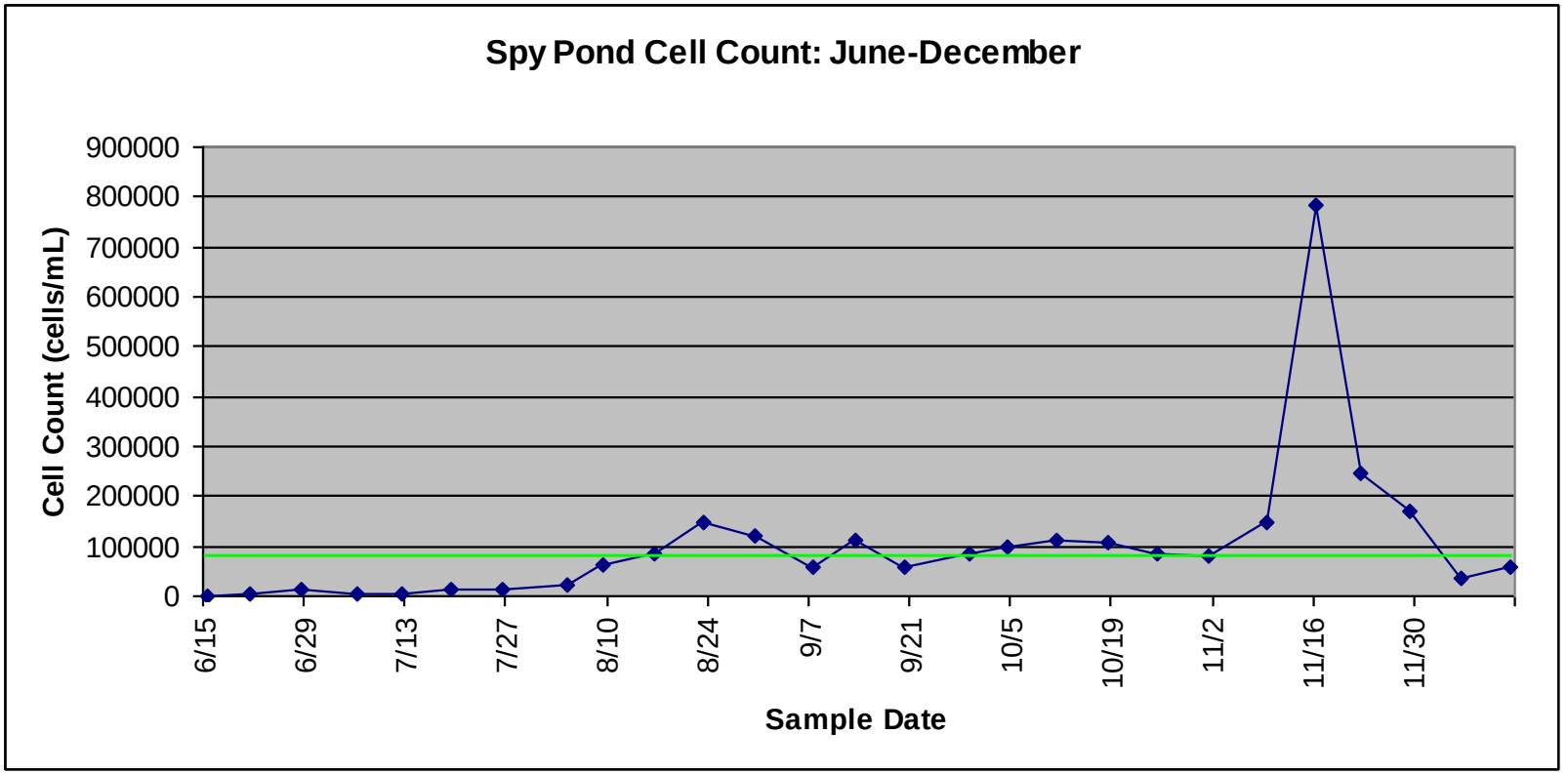


- Sample was collected near a public boat ramp
- No swimming is allowed in the pond, but anecdotal reports suggest it takes place
- The Boys and Girls Club conducts boating lessons

MDPH Spy Pond Routine Data Collection

- Routine Collection Locations
  - Collected a water sample on a weekly basis during summer
  - Collection continues into fall if a bloom exists
- Analyzed for:
  - Cyanobacteria ID and cell count
  - Microcystin toxin analysis
  - Water quality nutrients

Spy Pond Cell Counts

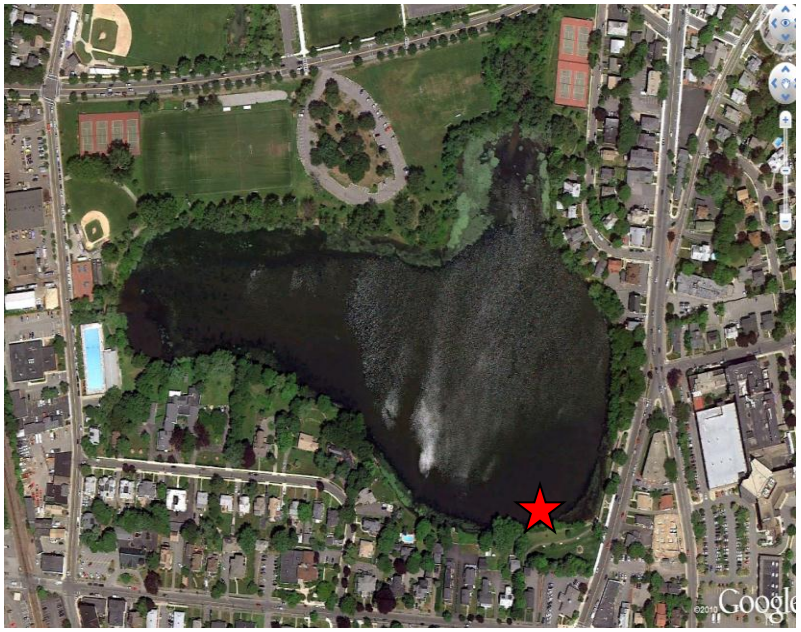


•Advisory issued August 17th and rescinded December 14th.

Cyanobacteria Diversity & Dominance at Spy Pond

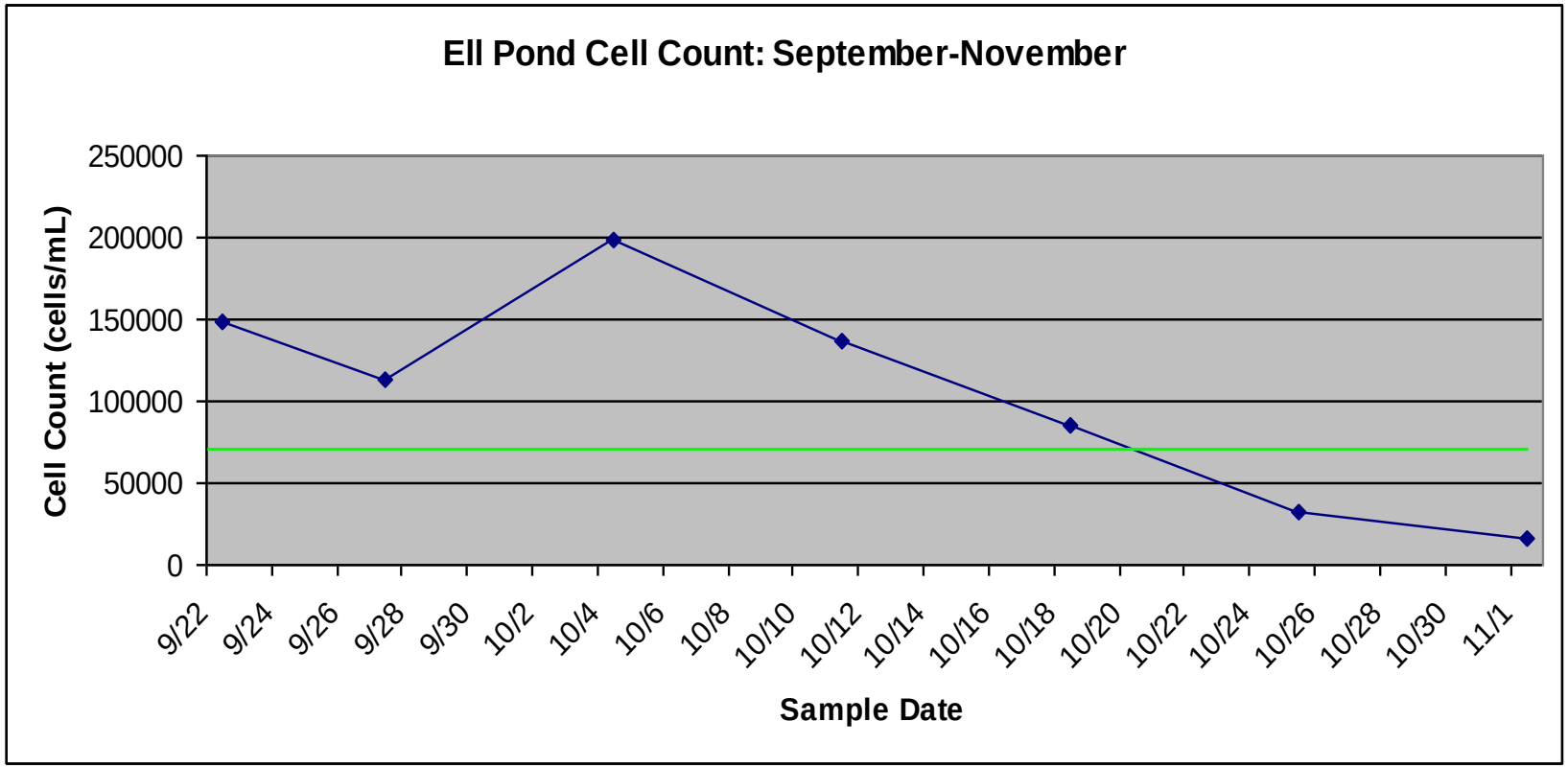
- Diversity
  - 60% of samples contained 3 or more genera
- Example of sample diversity
  - Sample collected 10/11
  - Total cell count: 113,000
  - 53,000 Aphanizomenon
  - 47,000 Microcystis
  - 6,000 Coelosphaerium
  - 3,900 Aphanocapsa
  - 3,100 Anabaena
- Weeks of Dominance
  - Microcystis (13)
  - Aphanizomenon (10)
  - Gleocapsa (1)
  - Gomphosphaeria (1)
  - Aphanothece (1)
  - Coelosphaerium (1)
- Microcystis dominant July-September
- Aphanizomenon dominant October-November

Ell Pond, Melrose



- Sample was collected at Ell Pond Park
- No swimming is allowed in the pond

Ell Pond Cell Counts



•Advisory issued September 23rd and rescinded November 2nd.

Health Surveillance

- Visited Spy Pond, spoke with BOH, and provided literature on HABs and potential health concerns
- Mailed information on bloom and potential health concerns to area hospitals and veterinarians; provided veterinarians with poster

Next Steps

- Further evaluate 2009 and 2010 data
- Plan for 2011 sampling

MDPH Contact Information

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