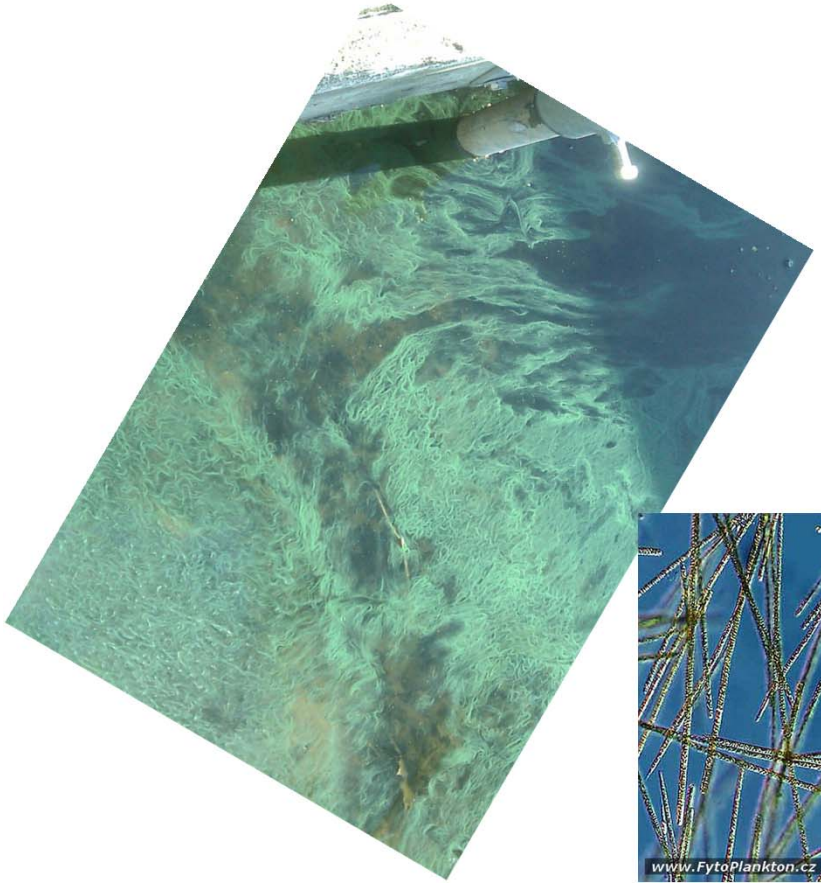
IDEM
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
EST. 1986
We Protect Hoosiers and Our Environment
Water

Indiana's Blue-Green Algae Monitoring Program

Cyndi Wagner, Chief
Targeted Monitoring Section
Watershed Assessment and
Planning Branch

Long Lake
Chain O'Lakes State Park



Blue-Green Algae Monitoring in Indiana

- IU Bloomington
  - Clean Lakes Program
- IUPUI
  - Center for Earth and Environmental Science
- IDEM
  - Watershed Assessment and Planning Branch

IDEM's Pilot Blue-Green Monitoring Program

- Funded by a Supplemental 106 Grant
- Two year funding cycle
- June through late August
  - Five lakes in 2010
  - Eleven in 2011
- Partnered with IUPUI Center for Earth and Environmental Science (CEES)

IDEM's Pilot Blue-Green Monitoring Program

- Desired Outcomes:
  - Identification and development of a ***new*** environmental indicator that provides information necessary to protect human health and the environment
  - To provide specific information to be used by IDEM, other state, federal, and local agencies to assess water quality of Indiana's lakes and reservoirs
  - Incorporation of cyanobacteria and microcystin monitoring into IDEM's Water Quality Monitoring Strategy
  - To build IDEM in-house technical capacity to monitor cyanobacteria and microcystin in public lakes

IDEM's Pilot Blue-Green Monitoring Program

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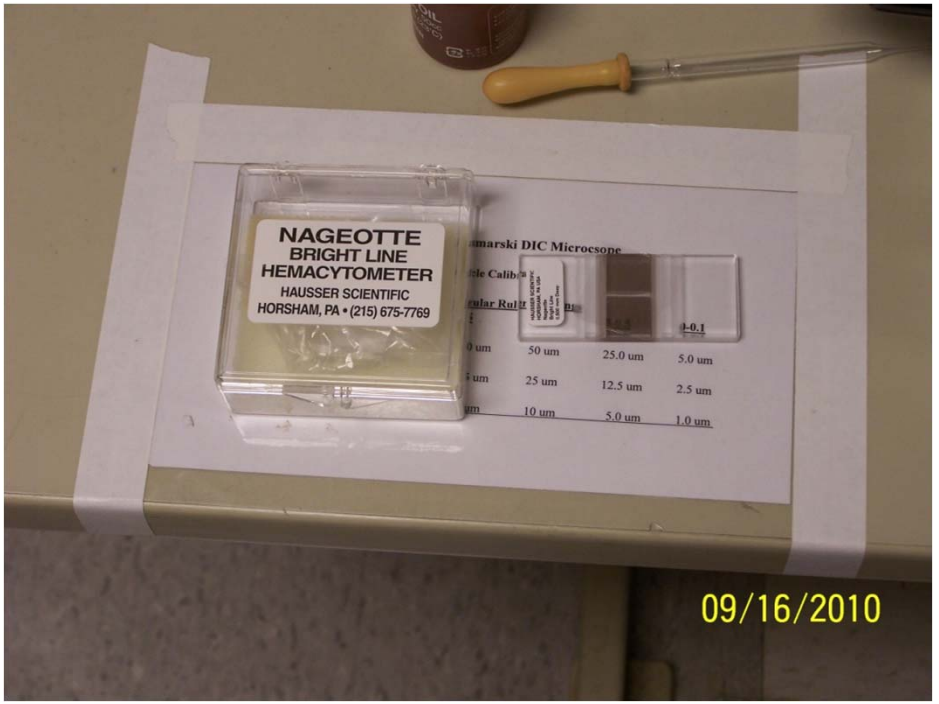
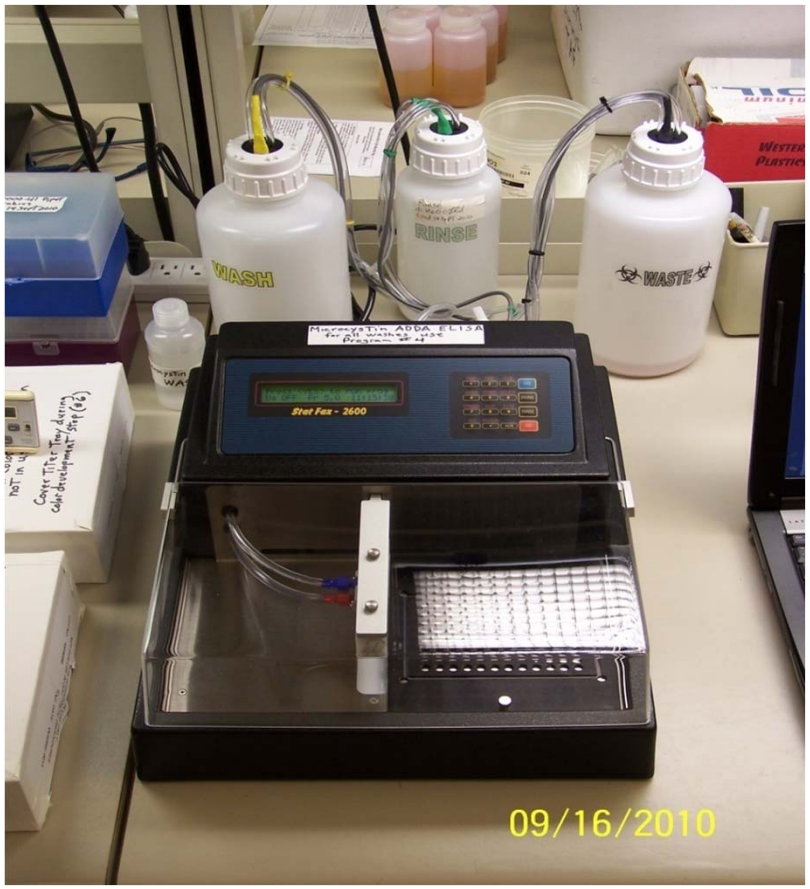
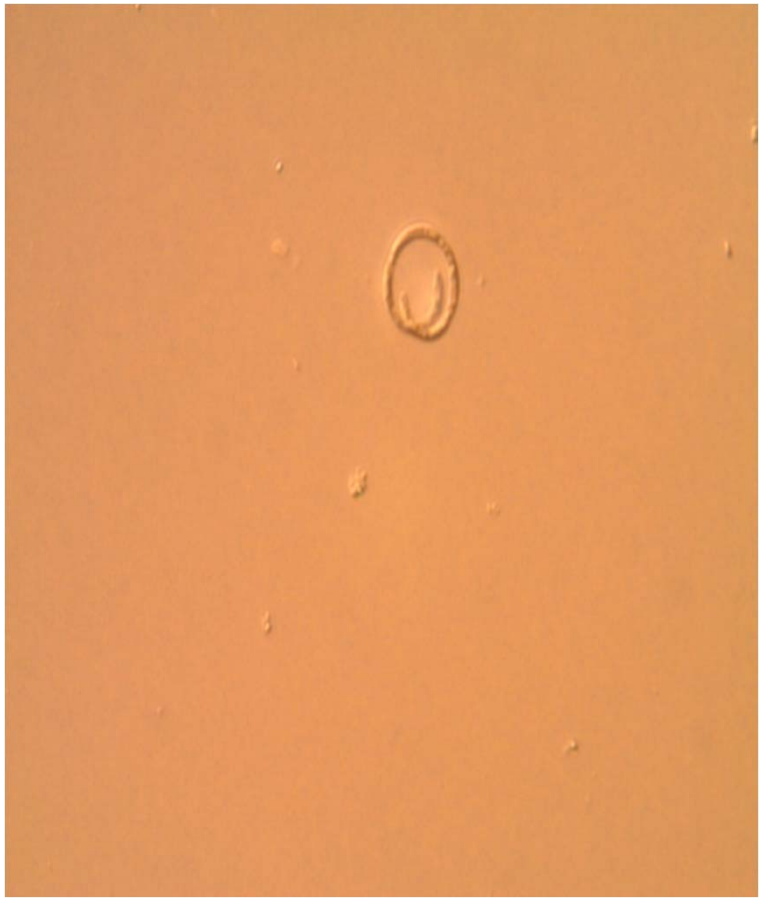


IDEM's Pilot Blue-Green Monitoring Program



Cylindrospermopsis raciborskii
Monroe Reservoir



COMMON CYANOBACTERIA
INDIANA LAKES

ORDER: CHOROOCCOCALES Unicellular to spheroid colonies

GENUS/SPECIES	DERMATOXIN, IRRITANT TOXIN	HEPATOTOXIN	NEUROTOXIN	TASTE/ODOR COMPOUND
Aphanacapsa spp.	Lipopolysaccharide	Microcystins		
Microcystis spp.	Lipopolysaccharide	Microcystins, Nodularin	Anatoxins	
Snowella spp	Lipopolysaccharide	Microcystins		
Synechococcus spp.	Lipopolysaccharide	Microcystins		Methylisoborneol (MIB), Geosmin
Woronichinia spp.	Lipopolysaccharide	Microcystins		
Merismopedia spp.		Microcystins		
Synechocystis spp.		Microcystins		
Aphanothece spp.				

ORDER: OSCILLATORIALES Filamentous, NO Heterocysts or Akinetes

GENUS/SPECIES	DERMATOXIN, IRRITANT TOXIN	HEPATOTOXIN	NEUROTOXIN	TASTE/ODOR COMPOUND
Lyngbya spp.	Lyngbyatoxins		Saxitoxins	MIB
Oscillatoria spp.	Lipopolysaccharide, Aplysiatoxins	Microcystins	Anatoxins, Saxitoxins	MIB, Geosmin
Planktothrix agardhii	Lipopolysaccharide, Aplysiatoxins	Microcystins	Saxitoxins	MIB, Geosmin
Pseudanabaena spp.	Lipopolysaccharide			MIB, Geosmin
Planktolyngbya spp.				

ORDER: NOSTOCALES Filamentous WITH Heterocysts and Akinetes (Nitrogen Fixers), no true branching

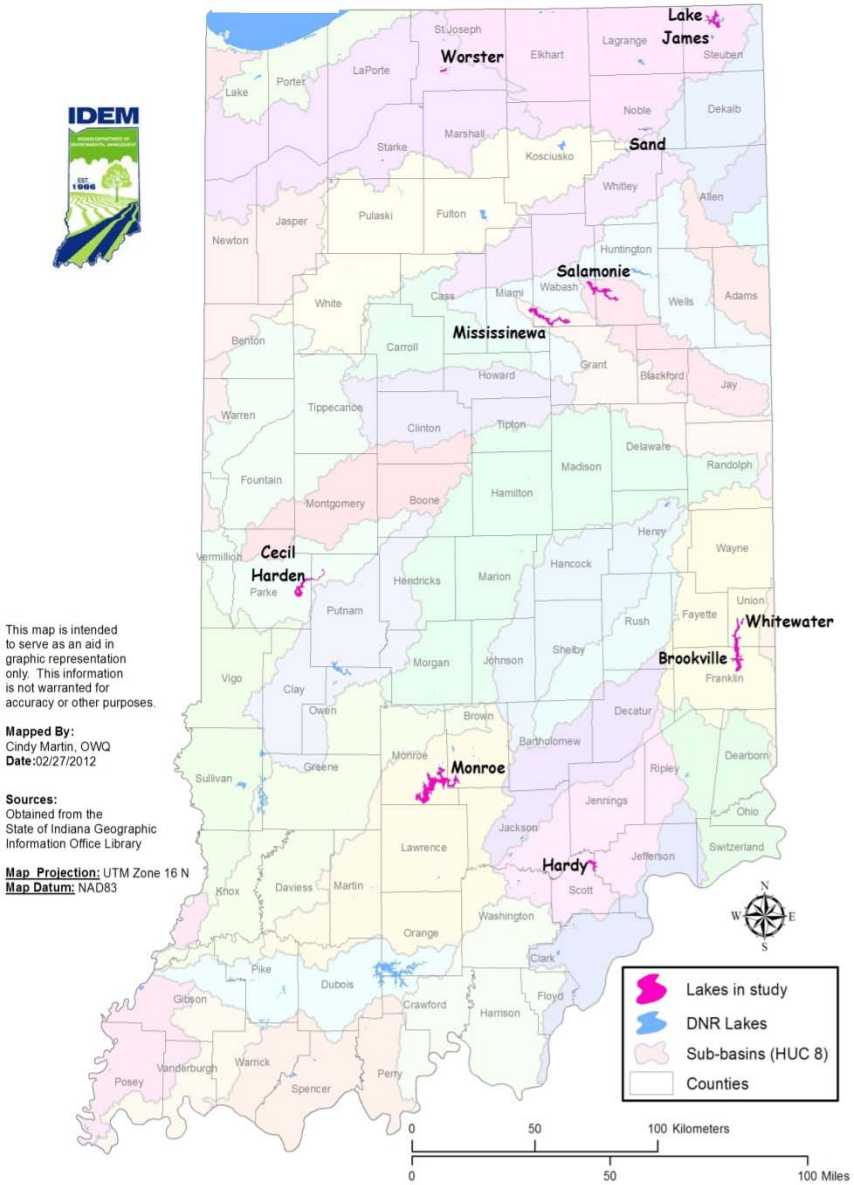
GENUS/SPECIES	DERMATOXIN, IRRITANT TOXIN	HEPATOTOXIN	NEUROTOXIN	TASTE/ODOR COMPOUND
Anabaena spp.	Lipopolysaccharide	Microcystins, Cylindrospermopsin	Anatoxins, Saxitoxins	MIB, Geosmin
Aphanizomenon spp.	Lipopolysaccharide	Microcystins, Cylindrospermopsin	Anatoxins, Saxitoxins	Geosmin
Cylindrospermopsis raciborskii	Lipopolysaccharide	Cylindrospermopsin	Saxitoxins	
Raphidiopsis curvata		Cylindrospermopsin		

World Health Organization Guidance Values for Probability of Acute Health Risks During Recreational Exposure to Microcystins and Cyanobacteria

CENTRAL INDIANA WATER RESOURCES PARTNERSHIP

Relative Probability of Acute Health Effects	Cyanobacteria (cells/mL)	Microcystin – LR (µg/L)	Action
Low	<20,000 cells/ml	<10	Post Advisory Signs
Moderate	20,000 - 100,000 cells/ml	10 - 20	Post Advisory Signs and Restrict Swimming
High	100,000 - 10,000,000	20 - 2,000	Post Advisory Signs, Prohibit Swimming and Other Water-contact Activities
Very High	>10,000,000	>2,000	

IDEM 2012 Lakes



Sampling Summary 2010

- Sampled 5 lakes
  - 18 samples
  - Highest cell count 260,000
  - 28% over 100,000

Sampling Summary 2011

- Sampled 10 lakes
  - 58 samples
  - Highest cell count 798,000
  - 48% over 100,000
- *Cylindrospermopsis* dominated in late summer

Sampling Summary 2012

- Sampled 10 lakes
  - 70 samples
  - Highest cell count 1.8 million
  - 76% over 100,000
  - 16% over 1 million

Video | Photo

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- Toxic algae found in five Indiana lakes

Dogs die after swimming in Salamonie Reservoir

Updated: Friday, 20 Jul 2012, 12:04 PM EDT
Published : Wednesday, 18 Jul 2012, 7:13 PM EDT

Adam Widener

ANDREWS, Ind. (WANE)--What began as playtime with the pets turned fatal at the Salamonie Reservoir Sunday. A couple from Wabash was playing fetch with four dogs in the water. 24-hours later, two of those animals were dead. The couple is blaming high levels of blue-green algae.

Salamonie Reservoir is a place Larry and Marge Young frequently play with their dogs. But Sunday's good time suddenly took a turn for the worse for their three dogs and their daughter's Labrador.

"Within two hours one of them was deathly ill and was dead within 12 or 14 hours," Larry Young said. "The second died within 24 hours."

Friday Update: As of Friday morning, Marge Young said the two other dogs seemed to be doing better and acting as though back to normal. She thinks they may have liver damage but believes they will make a full recovery.

The reason wasn't clear to the Youngs at the time, but they think the killer was a toxic blue-green algae hiding in the water. The Youngs said their vet told them blue-green

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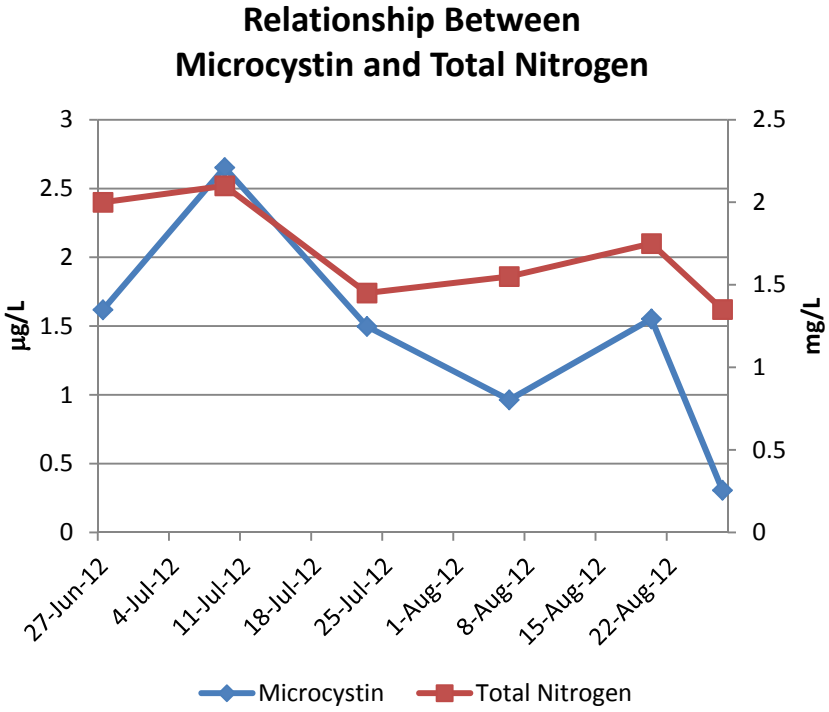
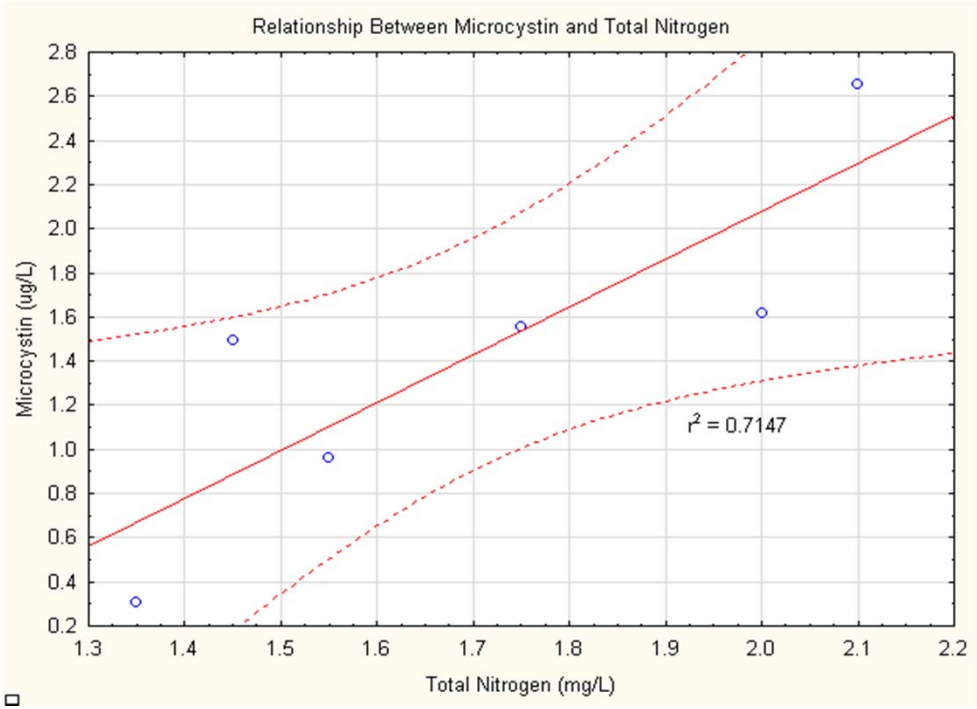
SALAMONIE – LOST BRIDGE WEST

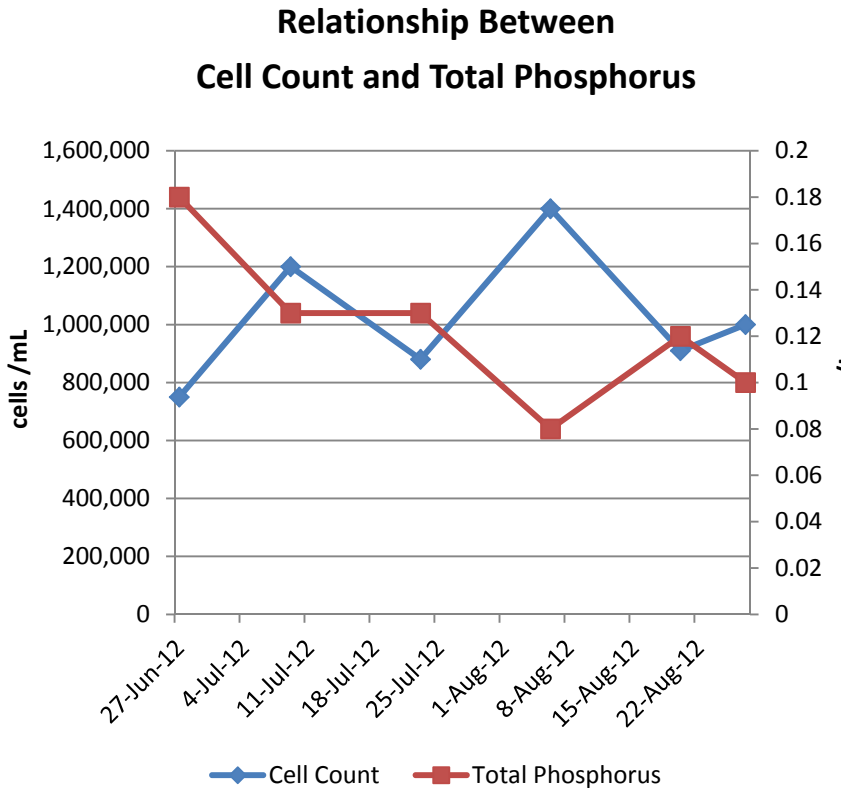
DATE	COUNT Cells/ml	DOMINANT	MICROCYSTIN Ug/l
6/26/12	750,320	*Microcystis* *Planktolyngbya* *Merismopedia*	1.618
7/09/12	1,265,360	*Aphanocapsa* *Planktolyngbya* *Merismopedia*	2.653
7/23/12	877,500	*Planktolyngbya* *Merismopedia* *Synechocystis*	1.497
8/06/12	1,500,000	*Synechocystis* *Merismopedia* *Microcystis*	0.963
8/20/12	910,000	*Synechocystis* *Merismopedia* *Planktolyngbya*	1.553
8/27/12	940,000	*Merismopedia* *Synechocystis* *Microcystis*	0.306

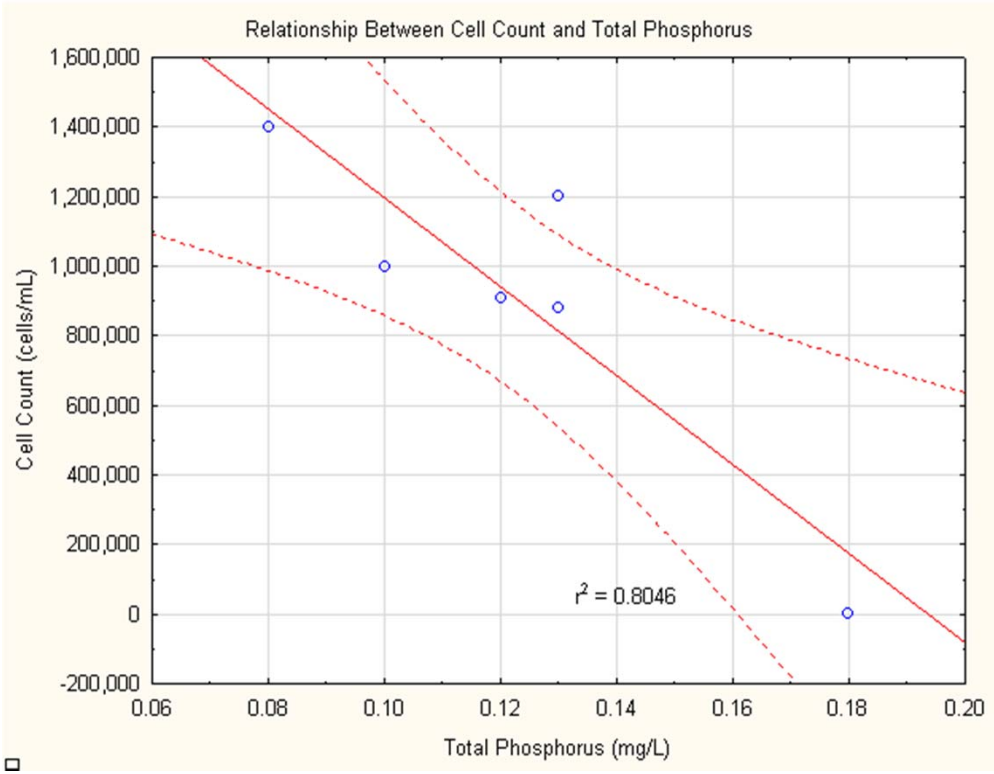
SALAMONIE – LOST BRIDGE WEST
Relationship Between Microcystin and Total Nitrogen





SALAMONIE – LOST BRIDGE WEST
Relationship Between Cell Count and Total Phosphorus





WORSTER LAKE – POTATO CREEK STATE PARK

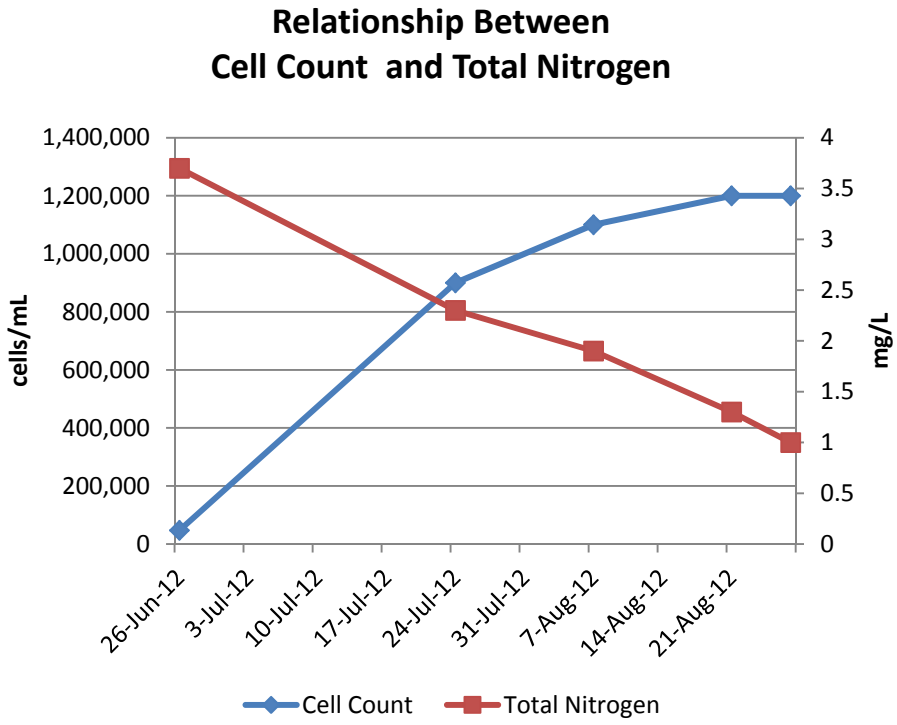
DATE	COUNT Cells/ml	DOMINANT	MICROCYSTIN Ug/l
6/25/12	384,000	*Planktolyngbya* *Raphidiopsis* *Snowella*	0.237
7/09/12	528,000	*Planktolyngbya* *Aphanizomenon* *Raphidiopsis*	0.261
7/24/12	1,480,000	*Cylindrospermopsis* *Raphidiopsis*	0.298
8/07/12	1,100,000	*Cylindrospermopsis* *Raphidiopsis*	0.400
8/21/12	880,000	*Aphanocapsa* *Microcystis* *Raphidiopsis* *Cylindrospermopsis*	0.499
8/28/12	1,000,000	*Cylindrospermopsis* *Microcystis* *Pseudanabaena*	0.799

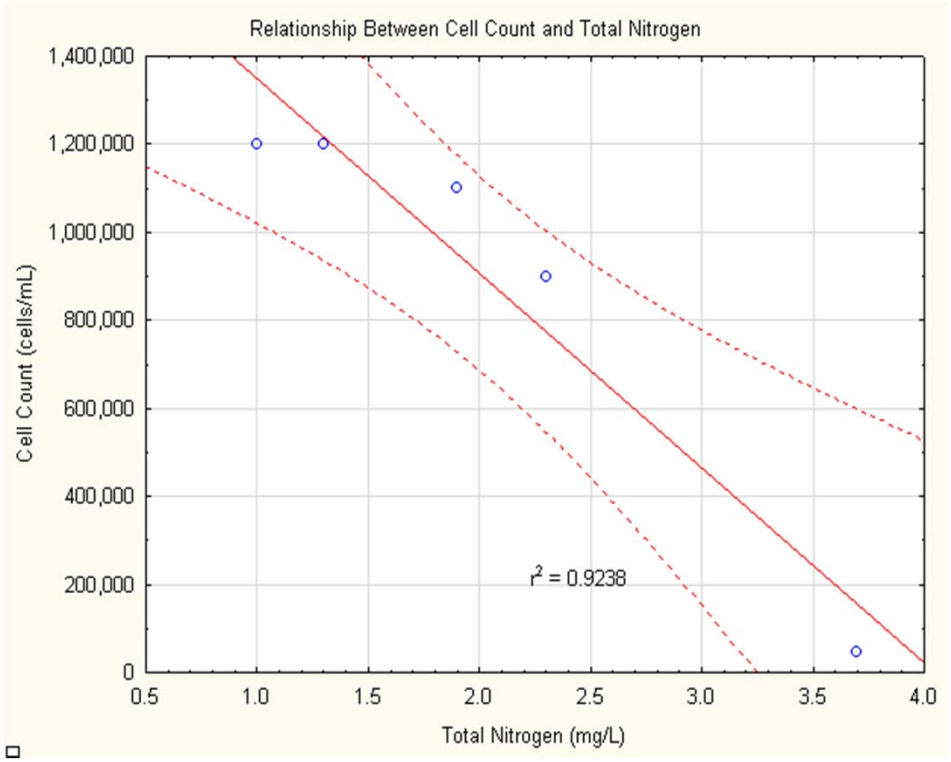
MISSISSINEWA RESERVOIR – MIAMI

DATE	COUNT Cells/ml	DOMINANT	MICROCYSTIN Ug/l
6/26/12	51,000	*Aphanocapsa* *Microcystis* *Merismopedia*	<0.150
7/24/12	913,000	*Planktolyngbya* *Cylindropermopsis* *Aphanocapsa*	0.156
8/07/12	1,100,000	*Planktolyngbya* *Cylindropermopsis*	1.233
8/21/12	1,200,000	*Microcystis* *Aphanocapsa* *Planktolyngbya*	0.190
8/27/12	1,200,000	*Planktolyngbya* *Microcystis* *Aphanocapsa*	0.313

MISSISSINEWA RESERVOIR – MIAMI

Relationship Between Cell Count and Total Nitrogen





WHITEWATER LAKE - WHITEWATER MEMORIAL STATE PARK

DATE	COUNT Cells/ml	DOMINANT	MICROCYSTIN Ug/l
6/19/12	34,000	*Aphanocapsa* *Microcystis*	0.502
7/17/12	305,000	*Aphanocapsa* *Synechocystis* *Planktolyngbya*	4.3
7/30/12	180,000	*Aphanocapsa* *Synechocystis* *Aphanizomenon*	3.605
8/14/12	240,000	*Aphanocapsa* *Synechocystis* *Anabaena*	3.670
8/28/12	610,000	*Aphanocapsa* *Anabaena* *Aphanizomenon*	<0.150

Reporting to the Public

- www.algae.IN.gov
  - Provide public with information about:
    - Weekly lake sampling results
    - Precautionary advisories
    - Toxins from algae
    - Risks associated with toxins
    - Precautions you can take
    - Information from other organizations and states
    - Several links to other websites
  - IUPUI CEES reports cell counts
  - IDEM reports toxin levels

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Indiana State Department of Health

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Addressing Concerns About Blue-Green Algae

Welcome

The Indiana Department of Environmental Management, in coordination with the Center for Earth and Environmental Science at Indiana University-Purdue University Indianapolis, the Indiana State Department of Health and the Indiana Department of Natural Resources are working to provide information about blue-green algae in our waterways.

The effort formed due to concerns over blue-green algae in Indiana and a general lack of understanding regarding the threat they actually pose. Algae are commonly found in Indiana lakes and streams without concern, however the concentrated presence of blue-green algae can be linked to some health effects and has prompted this project. Factors promoting algal growth can include sunlight, warm weather, low turbulence, and nutrient sources, such as phosphorus and nitrogen. Often nutrient inputs come from nonpoint source pollution, but fortunately, there are many ways to reduce or stop nonpoint source pollution, many of which are simple things we can do right in our own backyards.

This website will be updated regularly to provide information about blue-green algae levels in central Indiana, as well as links to other websites such as the World Health Organization, the USGS Kansas Water Science Center, and assorted information available through other states.

Indiana Reservoir and Lake Update

August 10, 2012

The Indiana State Department of Health cautions Hoosiers of possible high levels of blue-green algae, also known as Cyanobacteria, at many of Indiana's reservoirs and lakes. Swimmers and boaters should be careful in all recreational waters during this time of the year. Precautionary measures include avoiding contact with visible algae and swallowing water while swimming. Take a

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2. What are "Pay-as-You-Throw" programs?
3. What should I do with my old computers and electronics?
4. How do I get rid of electronic waste?
5. What is "household hazardous waste"?
6. Where can I recycle?

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Indiana State Department of Health

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Test Results

Test Results

- IDEM Cyanophyte Counts [PDF] (August 10, 2012)

IDEM Toxin Report

- Cylindrospermopsin Report [PDF] (August 6, 2012)
- Cylindrospermopsin Report [PDF] (August 2, 2012)
- Cylindrospermopsin Report [PDF] (July 25, 2012)
- Cylindrospermopsin Report [PDF] (July 12, 2012)
- Cylindrospermopsin Report [PDF] (July 6, 2012)
- Microcystin Report [PDF] (August 8, 2012)
- Microcystin Report [PDF] (August 1, 2012)
- Microcystin Report [PDF] (July 25, 2012)
- Microcystin Report [PDF] (July 12, 2012)
- Microcystin Report [PDF] (July 6, 2012)
- Microcystin Report [PDF] (June 29, 2012)
- Microcystin Report [PDF] (June 22, 2012)

Cell Count and Toxin Guide

Cell Counts:

For protection of human health, the World Health Organization uses a guideline level of greater than 100,000 cells per milliliter (cells/ml) for a high risk health alert in recreational waters.

Toxin Production:

- <4 parts per billion (ppb): Very low/no risk. Corresponds to World Health Organization Level 1 Recreational Water Guideline. Use common sense practices.
- 4-20 parts per billion (ppb): Low to moderate risk of adverse health affects. Corresponds to World Health Organization Level 2 Recreational Water Guideline. Reduce recreational contact with water.
- >20 parts per billion (ppb): Seriously consider avoiding contact with water until levels of toxin decrease.

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Blue-Green Algae

With summer approaching, BOAH veterinarians advise animal owners to learn more about blue-green algae, often called □pond scum.□ The algae is a health concern for both people and animals. The algae grows best on hot, dry, calm days, just like our summers here in Indiana.

What is blue-green algae?

Blue-green algae, also known as cyanobacteria, is microscopic bacteria found in freshwater lakes, streams and ponds where water is warm and stagnant. Most people refer to the algae as □pond scum.□

What□s so bad about blue-green algae?

It□s poisonous. While some types of algae are harmless, the blue-green type produces a natural powerful toxin. Some form toxins that affect the nervous system and others produce toxins that affect the liver.

Livestock, pets and wild animals can be poisoned by the toxins produced by some algal blooms. Lighter weight animals can ingest a toxic dose quickly. Dogs are particularly susceptible to blue-green algae poisoning because the scum can attach to their coats and be swallowed during self-cleaning.

What does the algae look like?

Blooms look like green paint floating on water, foam or scum, or mats on the surface of freshwater lakes and ponds. The blooms can be blue, bright green, brown or red. Some blooms may not affect the appearance of the water but as algae in the bloom dies, the water may smell bad. Blue-green algae is not the type that grows in mats of plant material along shorelines. When you pick it up, the algae disperses in the water and does not hang together in a stringy mass.

How does your animal get poisoned by the algae?

Swimming or drinking from water that has been contaminated with blue-green algae can

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2. What do I need to do to bring my pet to Indiana?
3. How do I report animal abuse or neglect?
4. How do obtain scrapie tags?
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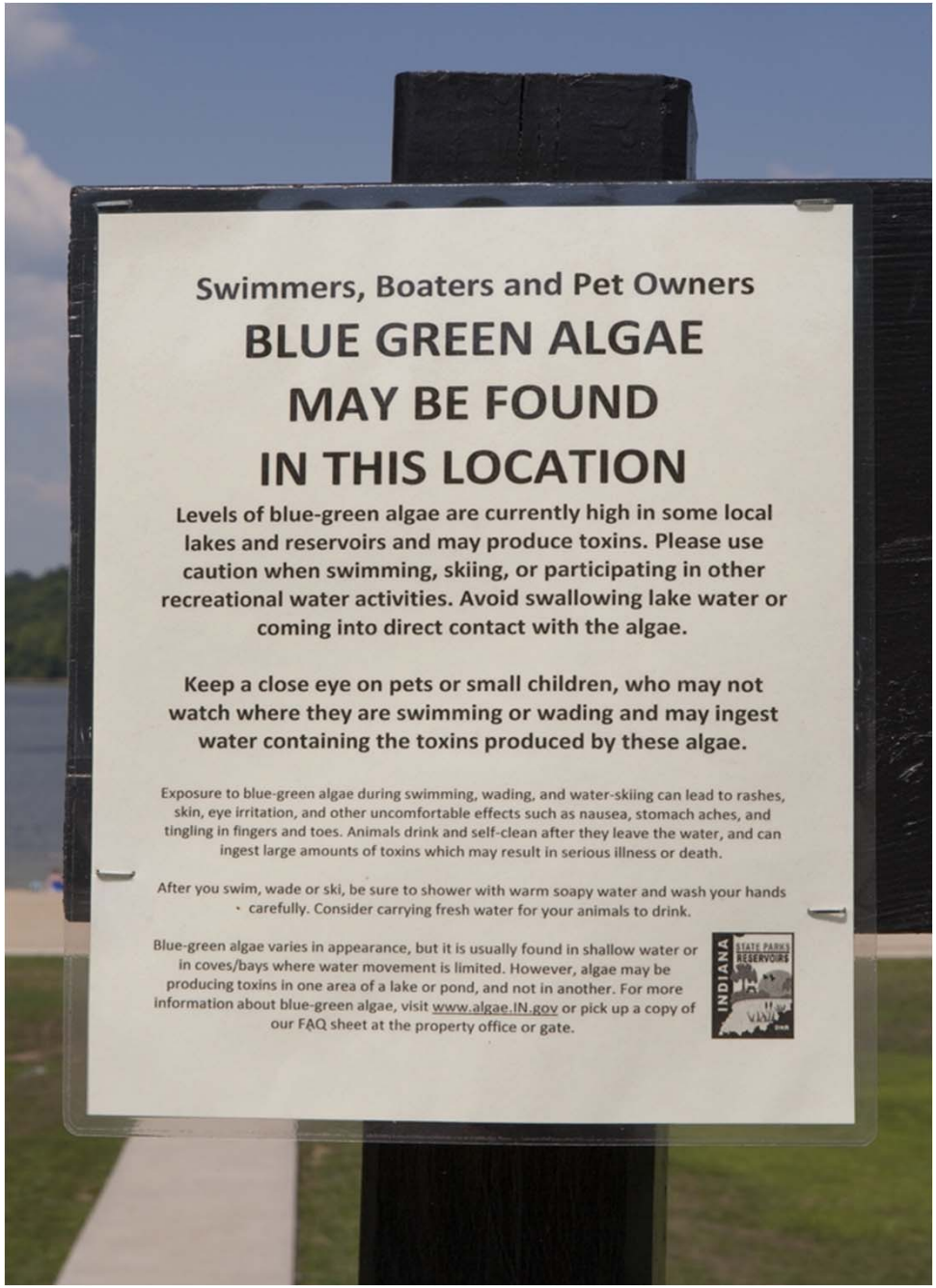
GLOBAL VET LINK
Create electronic health certificates


Swimmers, Boaters and Pet Owners
BLUE GREEN ALGAE
MAY BE FOUND
IN THIS LOCATION
Levels of blue-green algae are currently high in some local lakes and reservoirs and may produce toxins. Please use caution when swimming, skiing, or participating in other recreational water activities. Avoid swallowing lake water or coming into direct contact with the algae.
Keep a close eye on pets or small children, who may not watch where they are swimming or wading and may ingest water containing the toxins produced by these algae.
Exposure to blue-green algae during swimming, wading, and water-skiing can lead to rashes, skin, eye irritation, and other uncomfortable effects such as nausea, stomach aches, and tingling in fingers and toes. Animals drink and self-clean after they leave the water, and can ingest large amounts of toxins which may result in serious illness or death.
After you swim, wade or ski, be sure to shower with warm soapy water and wash your hands carefully. Consider carrying fresh water for your animals to drink.
Blue-green algae varies in appearance, but it is usually found in shallow water or in coves/bays where water movement is limited. However, algae may be producing toxins in one area of a lake or pond, and not in another. For more information about blue-green algae, visit www.algae.IN.gov or pick up a copy of our FAQ sheet at the property office or gate.
INDIANA
STATE PARKS
RESERVOIRS

Contact

- Cyndi Wagner

  cwagner@idem.IN.gov

  (317) 308-3381