



CENTER OF EXCELLENCE FOR GREAT LAKES AND HUMAN HEALTH



Blue Green Algae Citizen Monitoring

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and Human Health



NOAA Center of Excellence for Great Lakes and Human Health

- Develop forecasting tools to minimize risk to human health in coastal environments
- Identify sources and causes

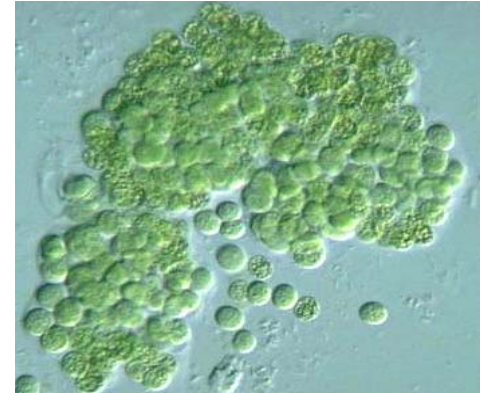


- Water Quality
- Beach closures
- Harmful Algal Blooms



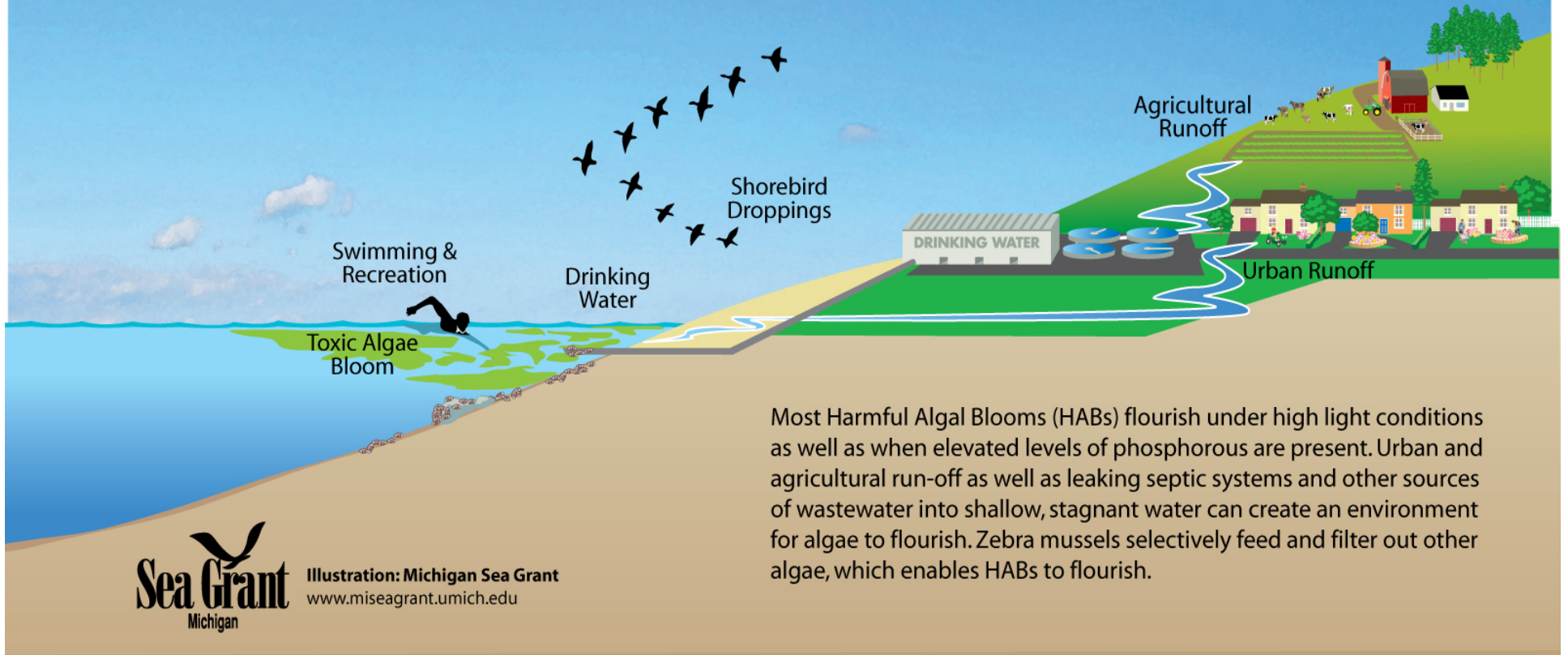
What are Harmful Algal Blooms (HABs)?

- Algal blooms are common
 - Dense population of cells
- Cyanobacteria or algae that produce toxins
 - Released as bacteria or algae dies
 - Harmful to aquatic life and humans
- Most algal blooms do not produce toxins





Factors Influencing the Growth of **HARMFUL ALGAL BLOOMS**



What causes an Algae Bloom?

- ❑ Zebra Mussels may increase amount of light in lakes
- ❑ Zebra mussels may eat certain types of algae
- ❑ Zebra mussels may change the nutrient composition in the water, altering the advantages of certain species.



Microcystis

- ❖ Degrade water quality
 - Taste/odor issues; aesthetics; hypoxia
- ❖ Toxin production: hepatotoxin microcystin
 - Human health effects (OHH)
 - Ecosystem effects
 - ◆ reduced grazing
 - ◆ altered food web
 - ◆ bioaccumulation





Harmful Algal Blooms Research

- Determine ecosystem factors which control production of toxics by *cyanobacteria*
- HAB Event Response
- Regular sampling of four sites
 - Bear Lake, Muskegon Lake, western Lake Erie, Saginaw Bay



The screenshot shows a website page with a blue header containing the NOAA logo and the text 'CENTER OF EXCELLENCE FOR GREAT LAKES AND HUMAN HEALTH'. Below the header is a navigation bar with links: 'Home | About | Research | Sampling Data | FAQs | Photo Gallery | Links | Public Health Directory | CEGLHH'. The main content area is titled 'Harmful Algal Bloom Event Response' and includes a 'Sampling Data' section. This section contains a paragraph explaining the research program's purpose and a list of six sampling sites with corresponding satellite images and location descriptions: Bear Lake, Muskegon Lake, Saginaw Bay, W. Lake Erie, Lake Macatawa, and Spring Lake. A 'Sampling Protocol' link is visible at the bottom of the page.

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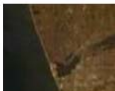
Harmful Algal Bloom Event Response

[Home](#) | [About](#) | [Research](#) | [Sampling Data](#) | [FAQs](#) | [Photo Gallery](#) | [Links](#) | [Public Health Directory](#) | CEGLHH

Sampling Data

The data appearing on these pages is generated based on an event response research program. The project was not designed to monitor waters for potential human health impacts - it was designed to answer research questions relating to the community dynamics of algal blooms in the Great Lakes. However, the project leaders and the Center of Excellence for Great Lakes and Human Health feel strongly that when research reveals human health implications, the responsible course of action is to make that data as publicly available as possible.

Click on photos to link to microcystin concentrations.

Bear Lake  Located just east of Lake Michigan	Muskegon Lake  Located just east of Lake Michigan	Saginaw Bay  Located just west of Lake Huron	W. Lake Erie 
Lake Macatawa 	Spring Lake 		

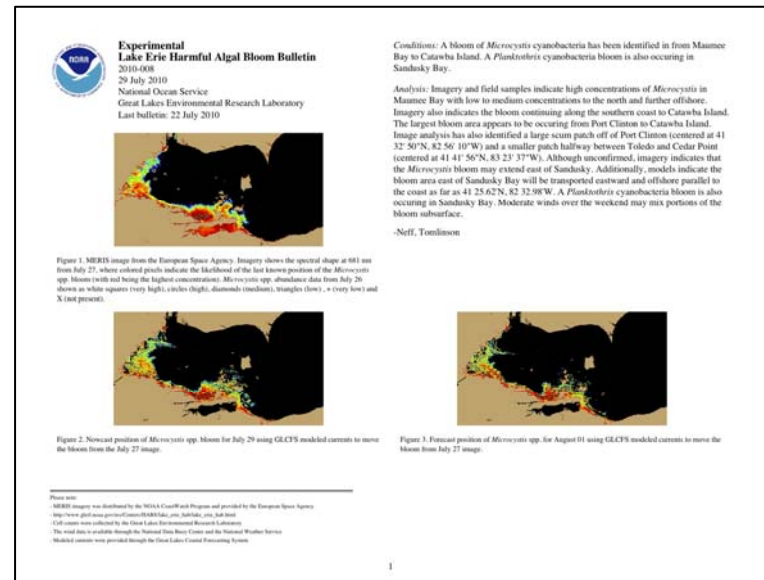
[Sampling Protocol](#)

HAB Prediction

- Satellite images (MERIS) guided sampling
- ELISA technique for microcystin quantification
- Weekly distribution of HAB Forecast



Coastwatch, August 9, 2009

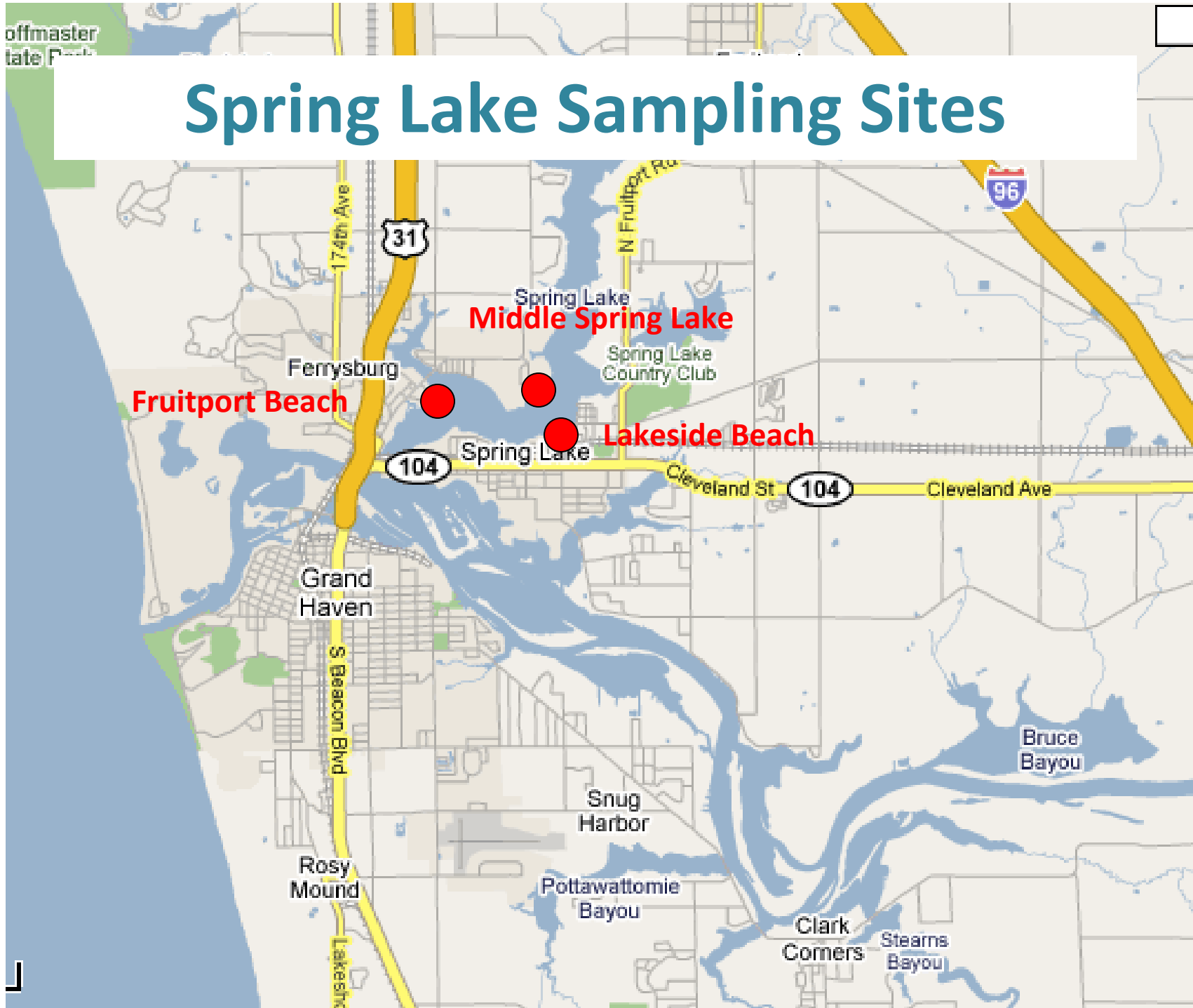


2010 Volunteer Monitoring

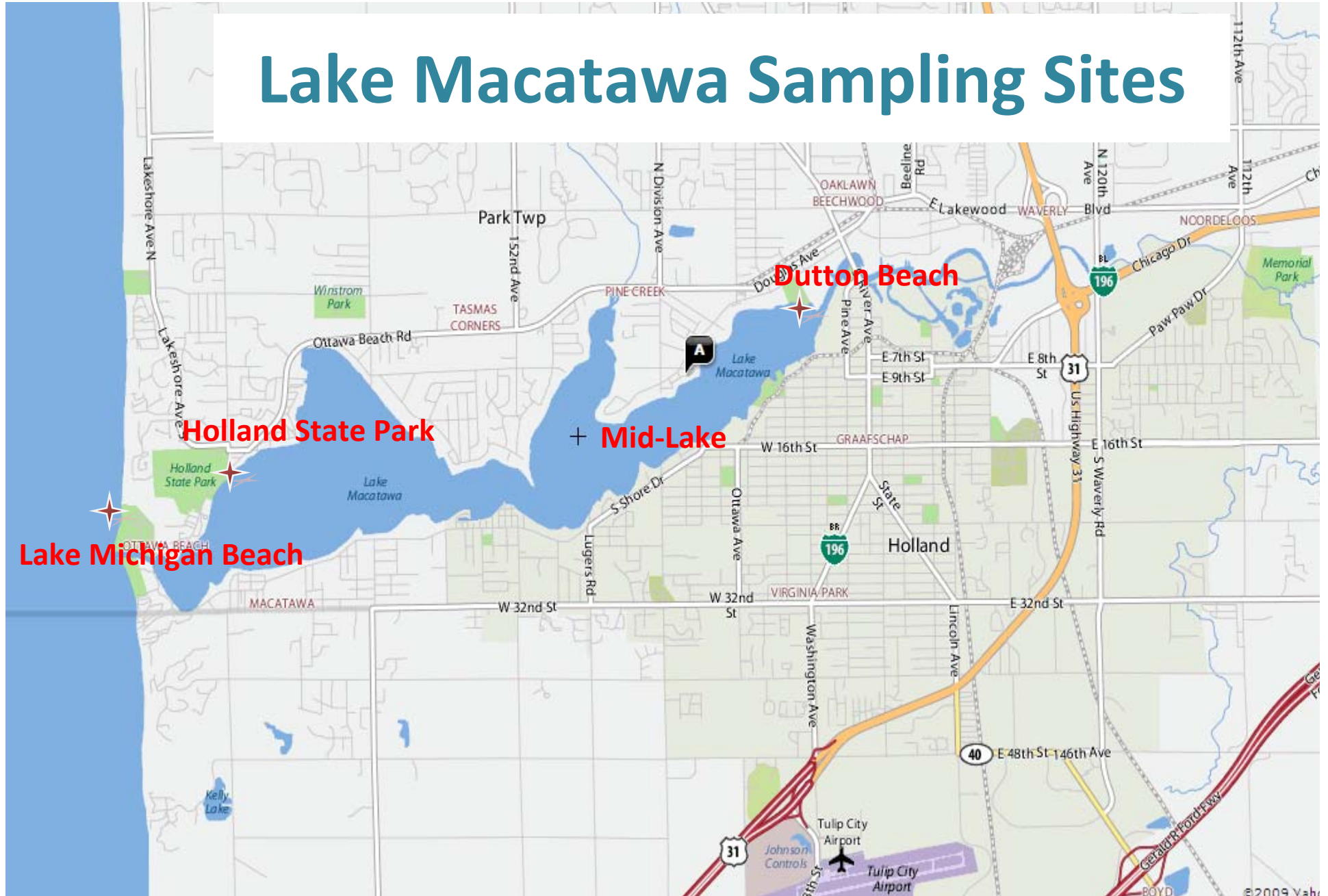
- Volunteer sampling
 - Lake Macatawa- MACC volunteers
 - Spring Lake- CORE volunteers
- Sample pre-screening done at NOAA Lake Michigan Field Station
- Samples with blue-greens analyzed at NOAA Great Lakes lab in Ann Arbor
- Results posted on HAB Event Response Website



Spring Lake Sampling Sites



Lake Macatawa Sampling Sites





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[Home](#) | [About](#) | [Research](#) | [Sampling Data](#) | [FAQs](#) | [Photo Gallery](#) | [Links](#) | [Public Health Directory](#) |
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Lake Macatawa Microcystin Samples

August 16, 2010

Station Location	Microcystin Concentration $\mu\text{g/L}$	SECCHI(m)	TEMP ($^{\circ}\text{C}$)
Dutton Beach, Lake Macatawa	0.22	0.5	28.7
Lake Macatawa Beach, Holland State Park	0.02	1.2	24.5

August 09, 2010

Station Location	Microcystin Concentration $\mu\text{g/L}$	SECCHI(m)	TEMP ($^{\circ}\text{C}$)
Dutton Beach, Lake Macatawa	0.44	0.4	28.8
Lake Macatawa Beach, Holland State Park	0.02	1.5	26.4



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[Home](#) | [About](#) | [Research](#) | [Sampling Data](#) | [FAQs](#) | [Photo Gallery](#) | [Links](#) | [Public Health Directory](#) |
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Spring Lake Microcystin Samples

August 30, 2010

Station Location	Microcystin Concentration $\mu\text{g/L}$	SECCHI(m)	TEMP ($^{\circ}\text{C}$)
Spring Lake Beach, Lakeshore	0.19		26.4
Lower Spring Lake	0.18		25.4

August 16, 2010

Station Location	Microcystin Concentration $\mu\text{g/L}$	SECCHI(m)	TEMP ($^{\circ}\text{C}$)
Fruitport Beach/Boat Launch	00.8		26.2
Fruitport Beach/Norris Creek	00.6		26.2
Spring Lake Beach, Lakeshore	0.28		23.8

Results

- Microcystin concentrations below WHO guidelines
- Blooms were occurring
 - Not predominantly blue-green algae
- Less toxins than last year
- Consistent with HAB sampling in Lake Erie

WHO Recommended Guidelines

Drinking water = $1\mu\text{g/L}$

Low risk recreational = $2\text{-}4\mu\text{g/L}$

Moderate risk recreational = $20\mu\text{g/L}$

High risk recreational = avoid visible scums



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Thank you

Questions?

