Citizen Monitoring of Ottawa County Waterways

Sonia Joseph

Michigan Sea Grant/ NOAA Great Lakes Environmental Research Laboratory

Sea Grant Michigan

GLERL Great Lakes Environmental Research Laboratory

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

- Currently there is no requirement to monitor for *Microcystis* in the Great Lakes

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*
- Fish consumption and microcystin
- Drinking water treatment and HABs

Lake Erie 2009

HAB Research

- HAB Event Response
- Regular sampling of four sites
  - Bear Lake, Muskegon Lake, western Lake Erie, Saginaw Bay
- Satellite images (experimental MODIS chlorophyll products) guided sampling
- ELISA technique for microcystin quantification

Coastwatch, August 9, 2009

2009 Volunteer Monitoring

- Weekly 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
- Ottawa County Health Dept
  - Notification Letter

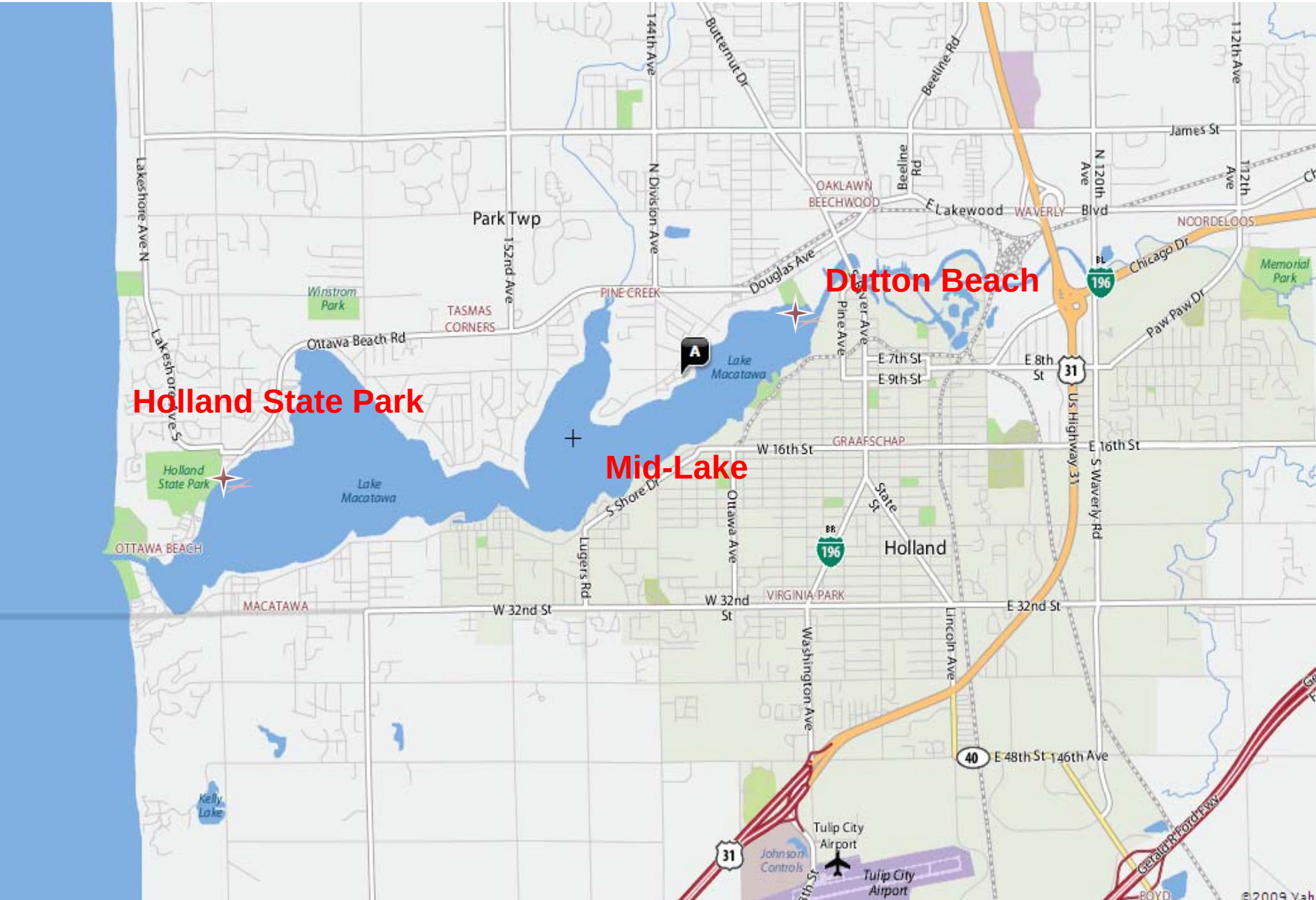
Fruitport

Volunteer Power!

- Weekly sampling in adverse weather conditions
- Taking pictures of blooms, additional samples
- Transporting samples to NOAA Field Station
- Commitment throughout the summer

Norris Creek photos


Black Lake
Fruitport
174th Ave
31
N Fruitport Rd
96
Spring Lake
Middle Spring Lake
Spring Lake Country Club
Ferrysburg
Fruitport Beach
104
Spring Lake
Lakeside Beach
Cleveland St
104
Cleveland Ave
Grand Haven
S Beacon Blvd
Bruce Bayou
Snug Harbor
Pottawatomie Park Beach
Mound
Pottawattomie Bayou
Launch @ 144th St between Grand R and Stearns Bayou
Corners
Stearns Bayou


Holland State Park
Dutton Beach
Mid-Lake
Park Twp
Holland
Lake Macatawa
Ottawa Beach Rd
Douglas Ave
PINE CREEK
TASMAS CORNERS
Winstrom Park
OAKLAWN
BEECHWOOD
WAVERLY
NOORDELOOS
Memorial Park
Chicago Dr
Paw Paw Dr
James St
E Lakewood Blvd
E 7th St
E 8th St
E 9th St
W 16th St
E 16th St
GRAAFSCHAP
S Shore Dr
Ottawa Beach
MACATAWA
W 32nd St
E 32nd St
VIRGINIA PARK
E 48th St
146th Ave
Tulip City Airport
Johnson Controls
Kelly Lake
Lakeshore Ave N
Lakeshore Ave S
144th Ave
152nd Ave
N Division Ave
Butternut Dr
Beeline Rd
Pine Ave
River Ave
Ottawa Ave
Lugers Rd
State St
Washington Ave
Lincoln Ave
N 120th Ave
112th Ave
S Waverly Rd
Us Highway 31
Gerald R Ford Fwy
196
31
40

In a Perfect World

- Samples collected Mon/ Tues**
- Pre-screened Tues/ Wed
- Analyzed in Ann Arbor by Thursday
- Results posted on website by Friday

** Sample collection and drop off was always timely!

- Summer interns trained in sample analysis
  - Weekly sampling in Lake Erie and Saginaw Bay
  - Equipment malfunctions
  - Family emergencies, summer vacations

Center of Excellence for Great Lakes and Human Health

Harmful Algal Bloom Event Response

Spring Lake Microcystin Samples

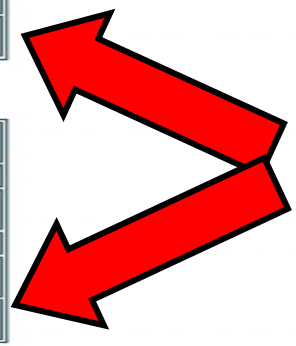
Station Location	Microcystin Concentration µg/L	SECCHI(m)	TEMP
144th Launch	0		66 F
Spring Lake Beach	0	3.28 ft	73 F
Fruitport Beach	3.23503	1.31 ft	75 F
Pottawatomi Park Beach	78.8165		68 F
Lower Spring Lake	144.3988	4.46 ft	77 F

July 13, 2009

Station Location	Microcystin Concentration µg/L	SECCHI(m)	TEMP
144th Launch	0		73 F
Spring Lake Beach	0		81 F
Fruitport Beach	0		79 F
Pottawatomi Park Beach	0		75 F
Lower Spring Lake	0.13566	4.63 ft	82 F

July 6, 2009

Station Location	Microcystin Concentration µg/L	SECCHI(m)	TEMP
144th Launch	0		71 F
Spring Lake Beach	0		79 F
Fruitport Beach	0		79 F
Pottawatomi Park Beach	1.20102		70 F
Lower Spring Lake	0.17678	4.48 ft	75 F



Week to week variability

WHO Recommended Guidelines
Drinking water = 1µg/L
Low risk recreational = 2-4µg/L
Moderate risk recreational - 20µg/L
High risk recreational = avoid visible scums

2009 Volunteer Monitoring

- Overall Microcystis not a major concern in Spring Lake and Lake Macatawa
- Weather
- First year of data collected by NOAA GLERL
- All data from Summer's Sampling available at: www.glerl.noaa.gov/res/Centers/HABS/habs.html
- Pottawatomie and lower Spring Lake high toxin concentration on July 20
  - Both sites had no toxins following week

2010?

- Interested in repeating summer monitoring
- Dependent on funds, staff, and volunteers
- Committed to move forward with a HAB Event Response

Very Special Thank You to…

- Kaye Nedderman
- Sandy and Paul Huber
- Michelle Smith
- Ken Larsen
- Bruce Panse
- Al Walters
- Dennis Kaleugher
- Adam London
- Mary Fales
- Dan O’Keefe
- Giselle Maira
- Alyson Flood
- Lauren Reid

Experimental
Lake Erie Harmful Algal Bloom Bulletin

2009-010
24 September 2009
National Ocean Service
Great Lakes Environmental Research Laboratory
Last bulletin: 17 September 2009

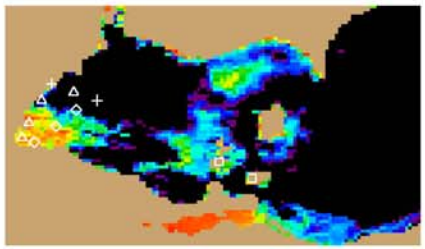


Figure 1. MERIS image from the European Space Agency. Imagery shows the spectral shape at 681 nm from September 18, where colored pixels indicate the likelihood of the last known position of the *Microcystis* spp. bloom (with red being the highest concentration). *Microcystis* spp. abundance data from September 22 shown as white squares (very high), circles (high), diamonds (medium), triangles (low) , + (very low) and X (not present). Please note: Colored pixels in Sandusky Bay are due to a mixed bloom dominated by *Planktothrix* spp.

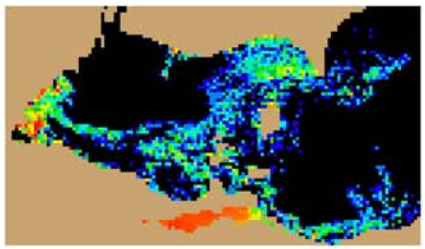


Figure 2. Nowcast position of *Microcystis* spp. bloom for September 24 using GLCFS modeled currents to move the bloom from the September 18 image. Please note: Colored pixels in Sandusky Bay are due to a mixed bloom dominated by *Planktothrix* spp.

Conditions: A *Microcystis* spp. bloom is present in much of the western basin of Lake Erie. A mixed cyanobacterial bloom is also present in Sandusky Bay.

Analysis: Imagery is 6 days old, as recent imagery has been cloudy. The bloom is still present in the western basin of the lake. It is expected to persist until water temperatures drop below 15 degrees C. If there is a better image tomorrow, the forecast will be reissued.

-Wynne, Neff

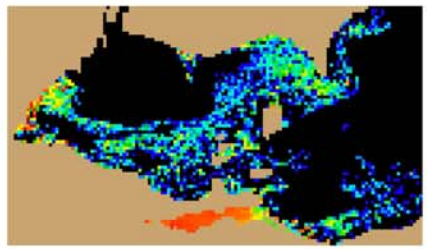


Figure 3. Forecast position of *Microcystis* spp. for September 27 using GLCFS modeled currents to move the bloom from September 18 image. Please note: Colored pixels in Sandusky Bay are due to a mixed bloom dominated by *Planktothrix* spp.

Please note:
- MERIS imagery was distributed by the NOAA CoastWatch Program and provided by the European Space Agency
- Cell counts were collected by the Great Lakes Environmental Research Laboratory
- The wind data is available through the National Data Buoy Center and the National Weather Service
- Modeled currents were provided through the Great Lakes Coastal Forecasting System