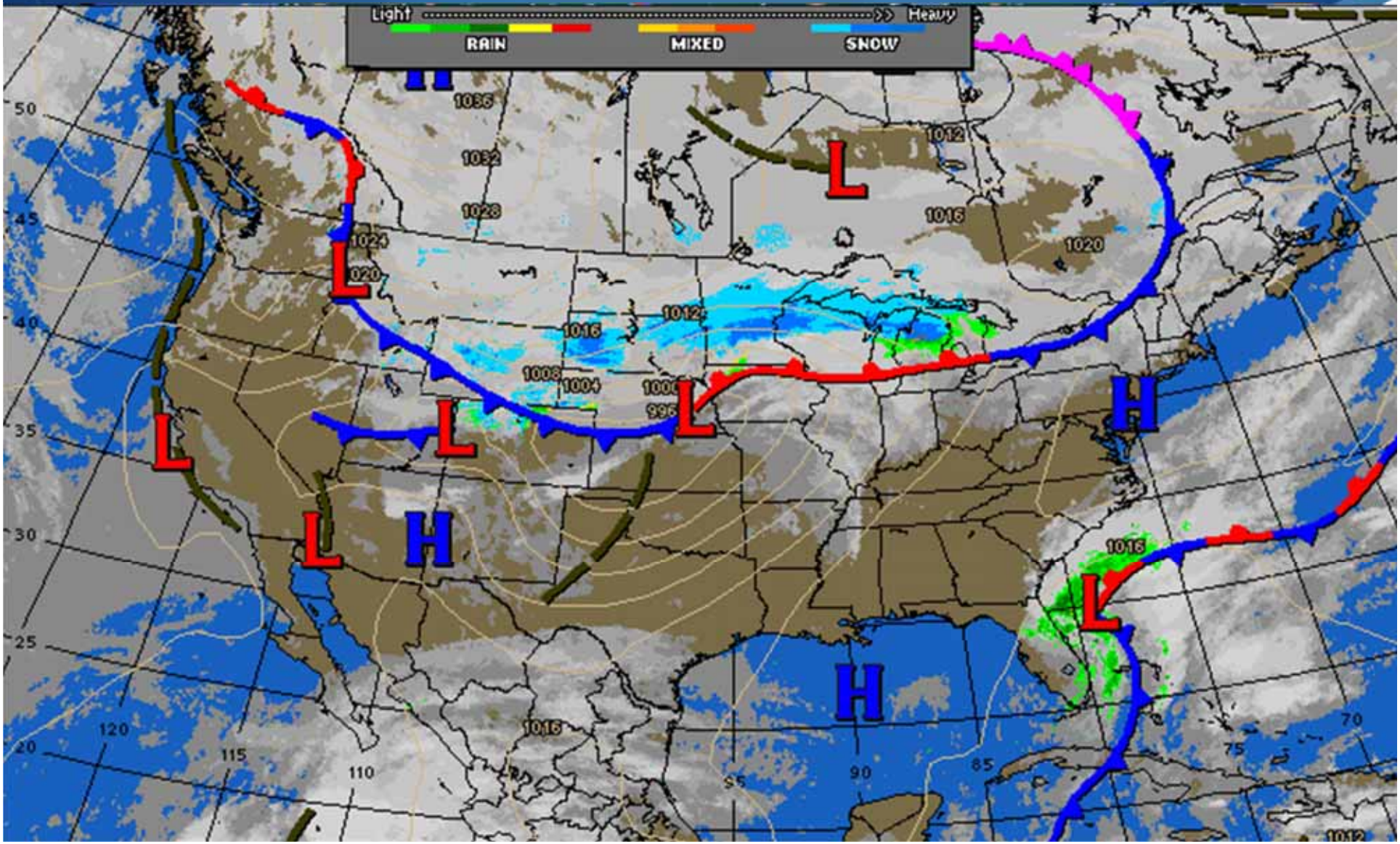
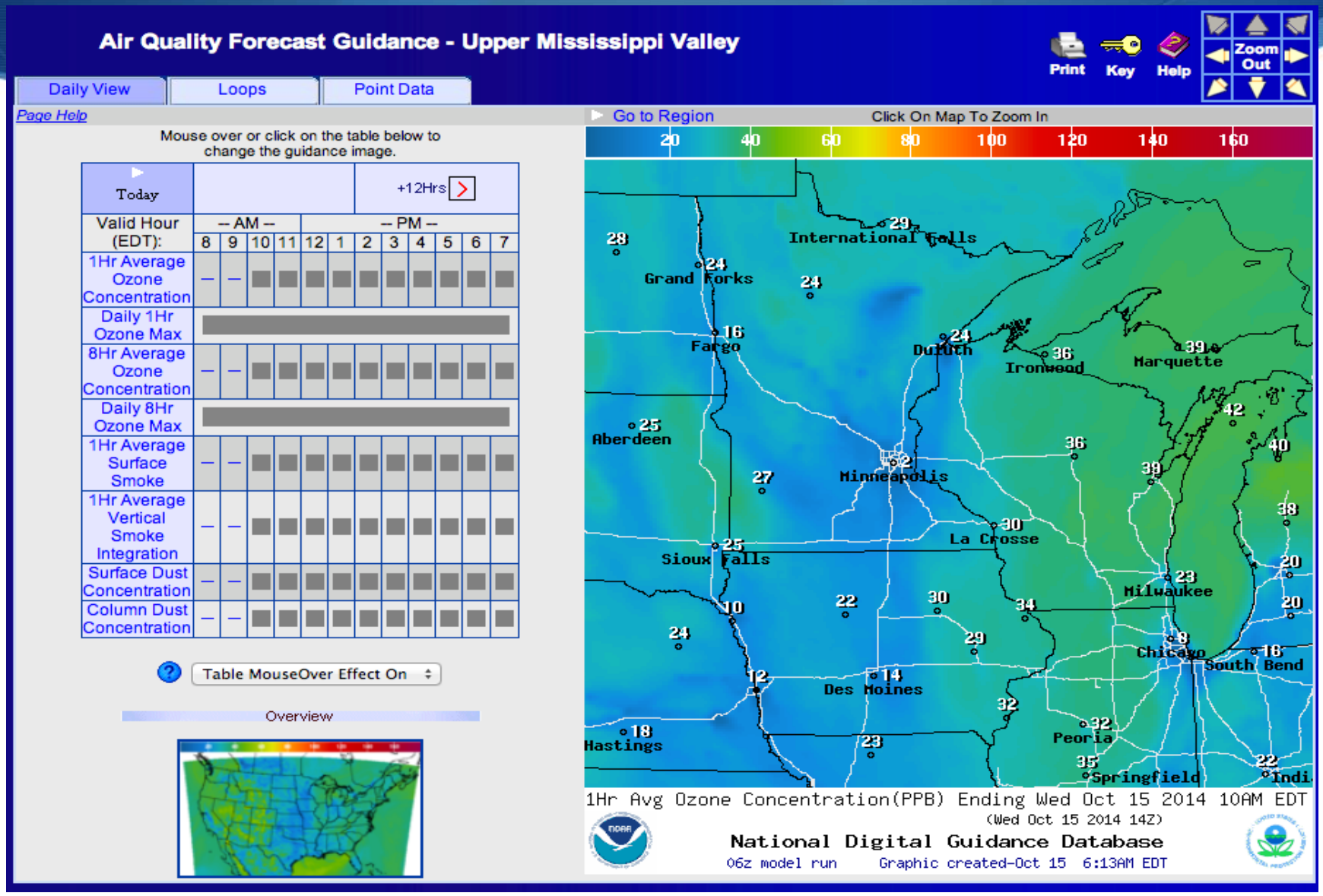
Using Citizen Monitoring and Crowdsourcing to Track and Forecast Near-shore Lake Conditions

Paul Dearlove- Watershed Program Manager
Katie Van Gheem- Watershed Coordinator

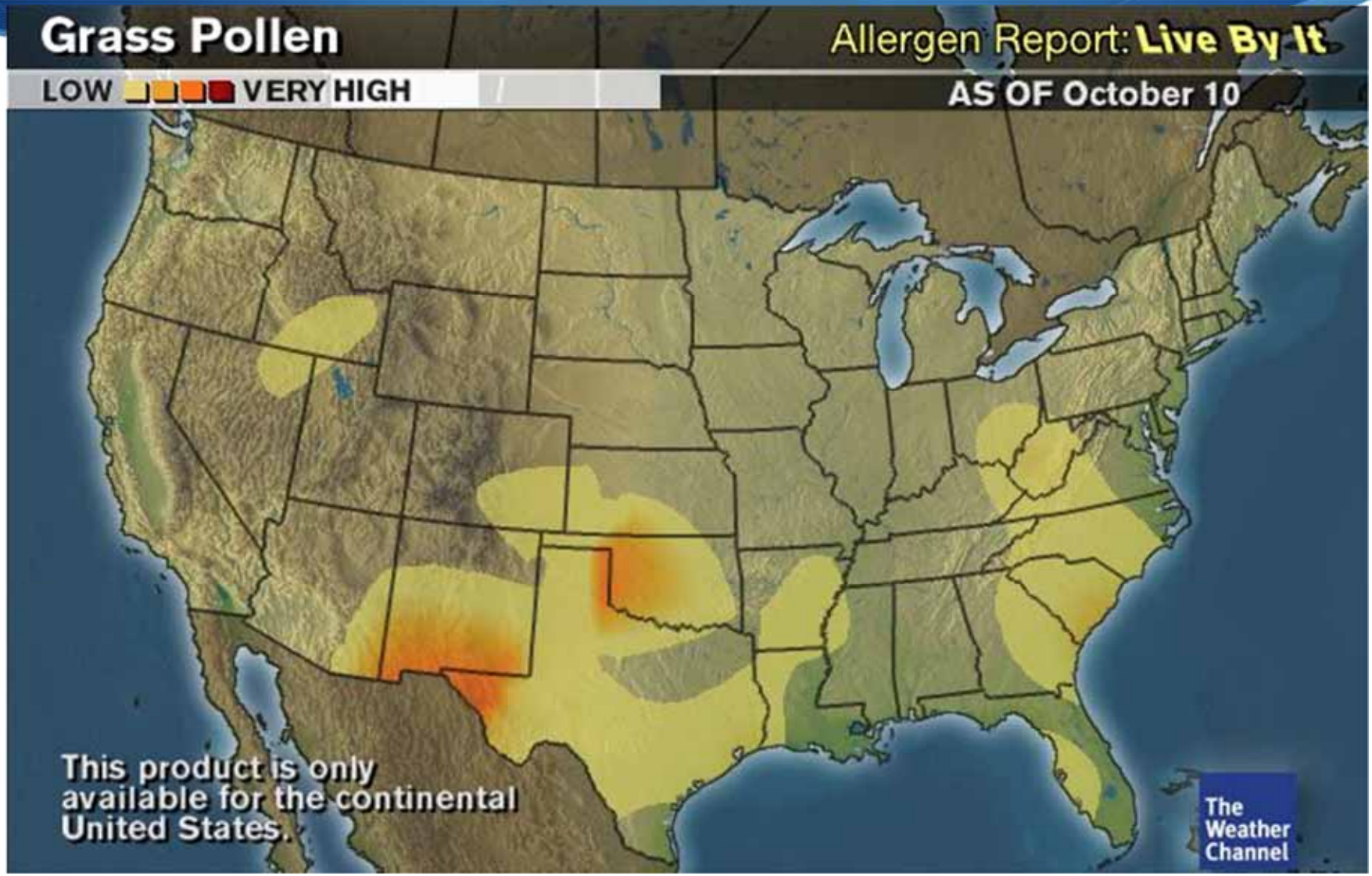
Reporting and Awareness



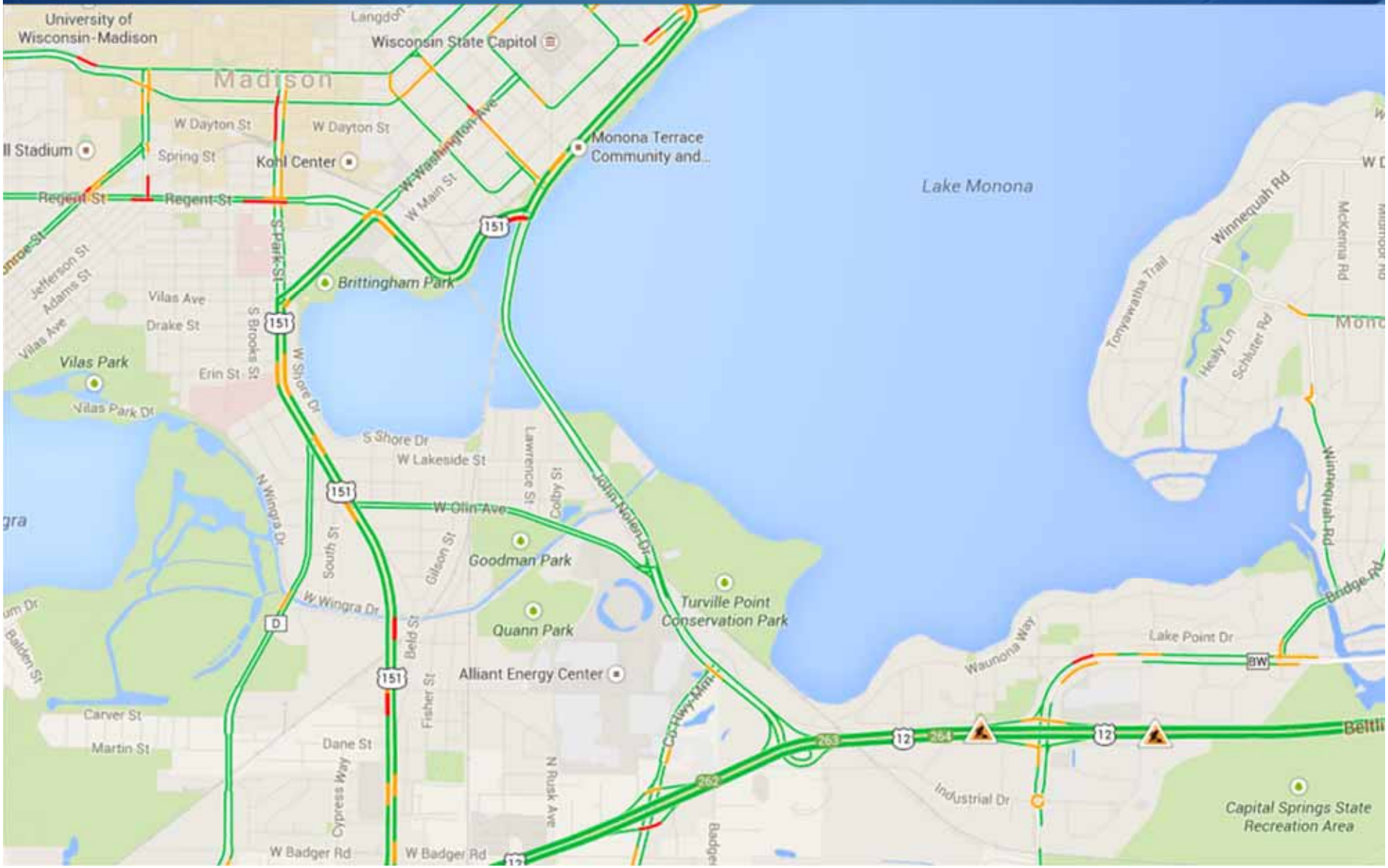
Reporting and Awareness



Reporting and Awareness

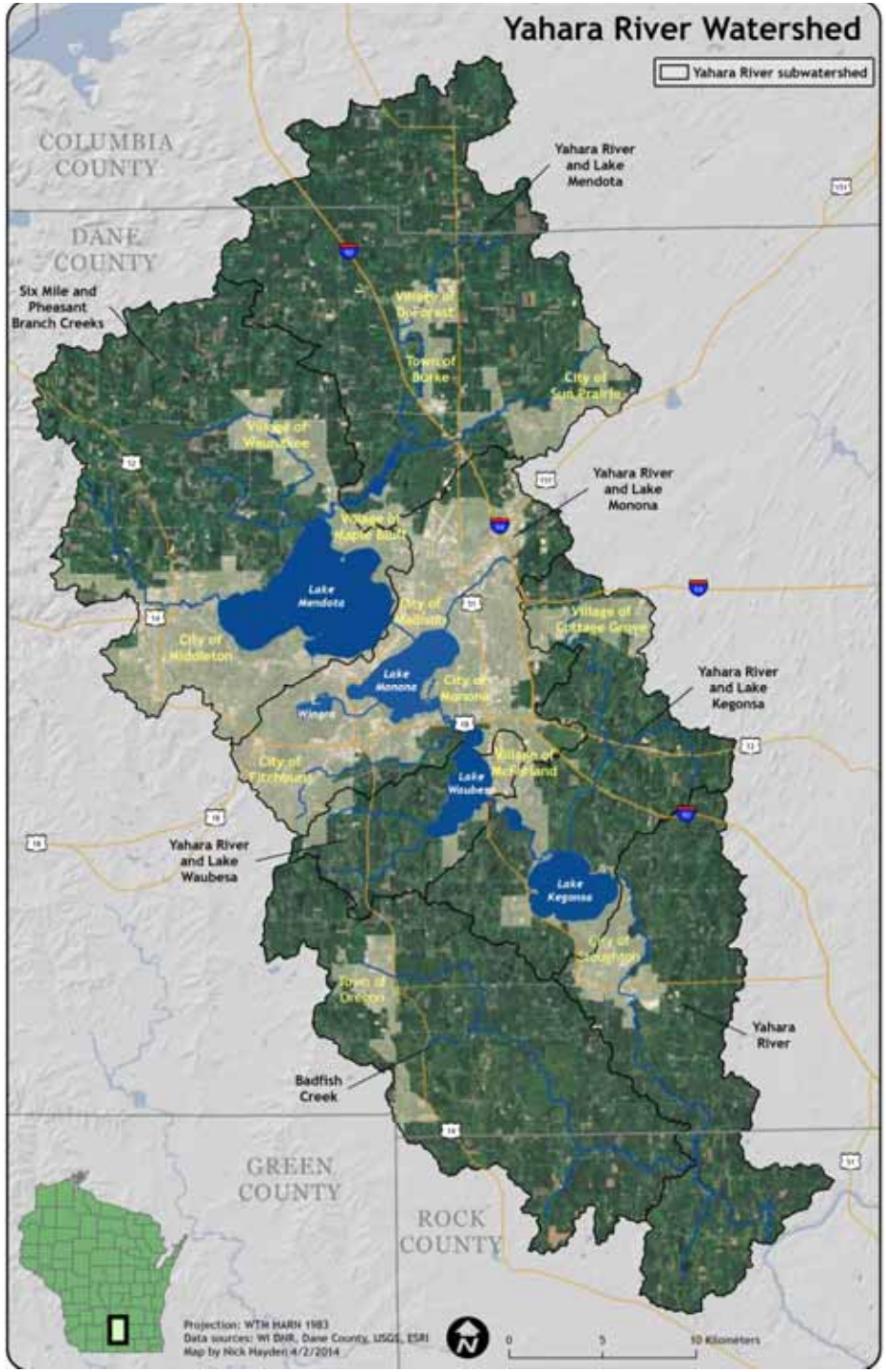


Reporting and Awareness

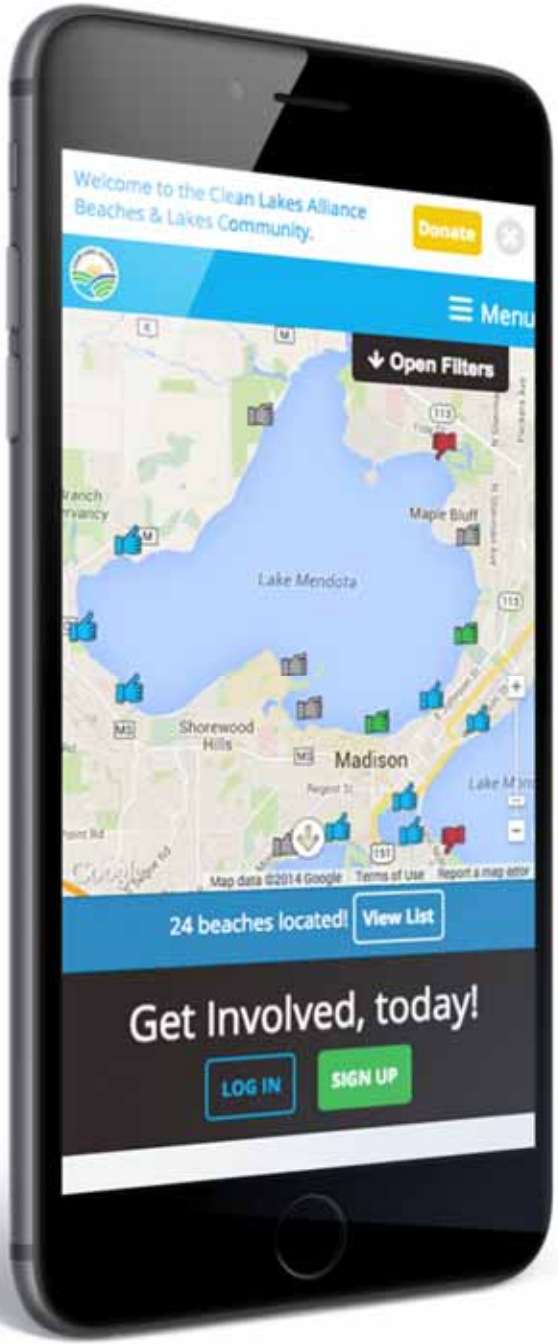


Vision

We see a future in which everyone realizes that our lakes are the center of our community.



- 359 mi^2 watershed
- 28 municipalities
- 370,000 people
- 29 mi^2 of lake area
- 58 miles of shoreline
- 22 public beaches
- >3,200 lakefront property owners



Passive Citizen

Volunteer Monitor

Informed / Engaged Advocate

Lake User Risks

- *E. coli* Bacteria
- Blue-green Algae (Cyanobacteria)

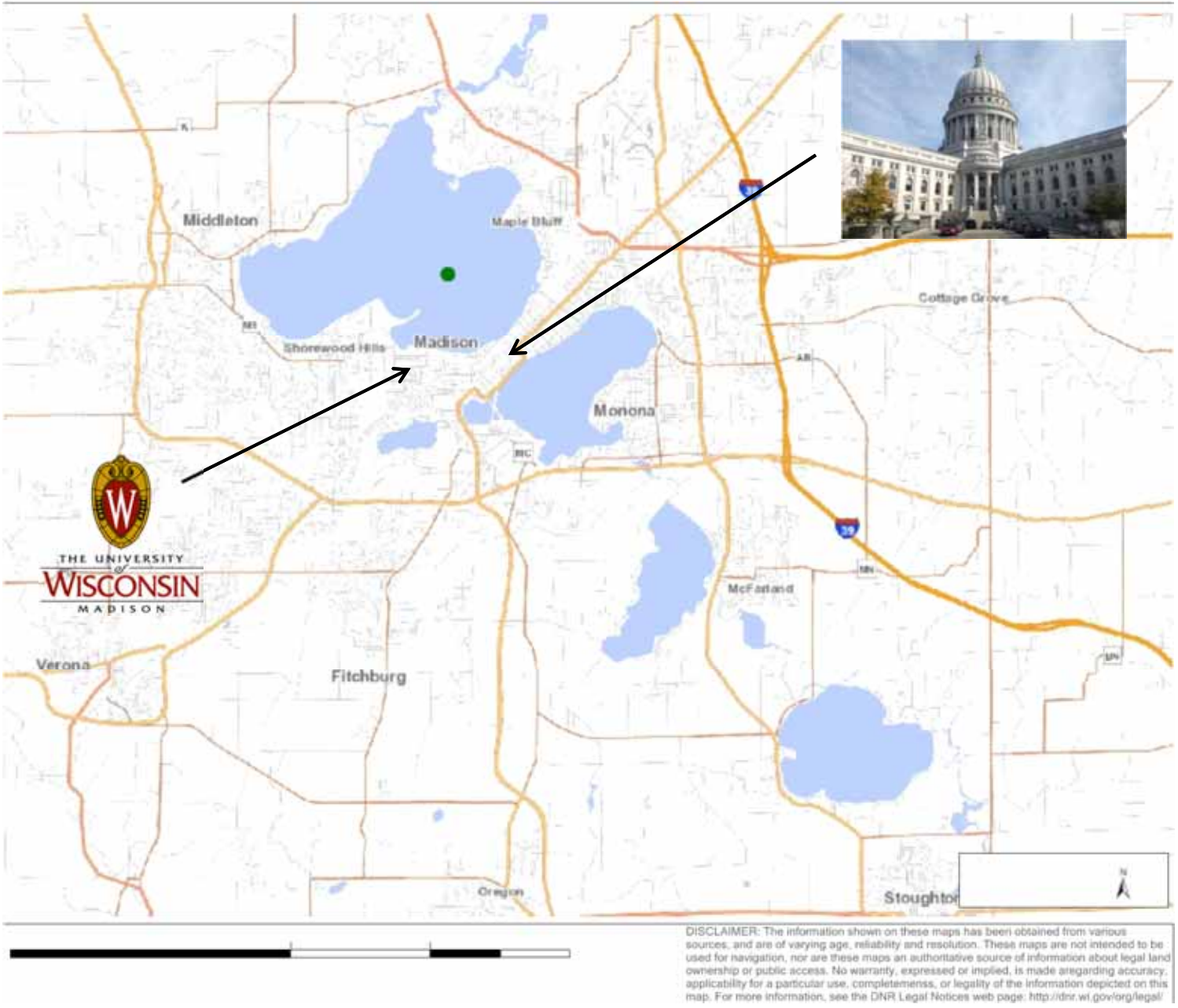
Perceptions vs. Reality

"Water quality is the BEST it's ever been!"

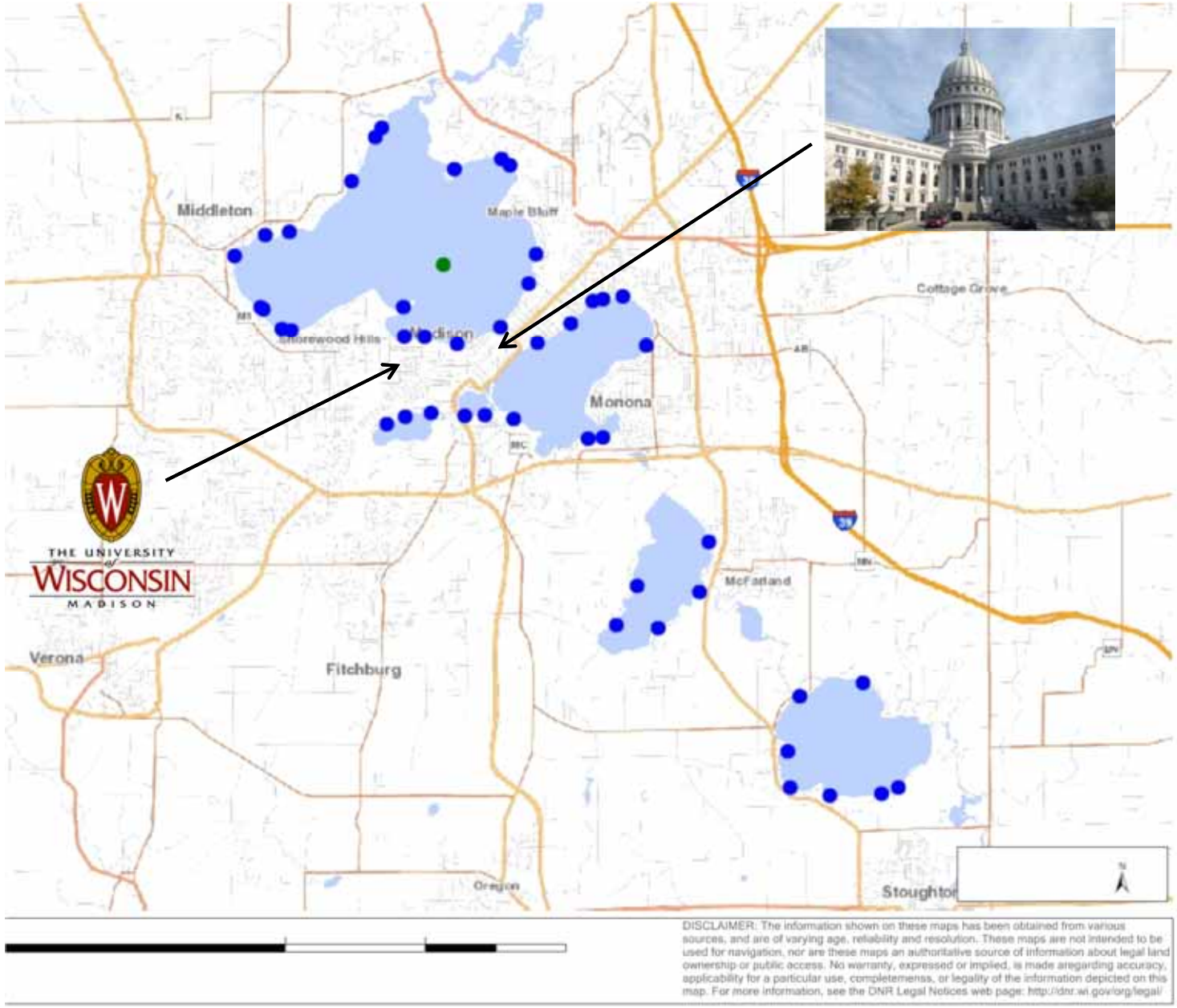
"Water quality is the WORST it's ever been!"

Perceptions vs. Reality

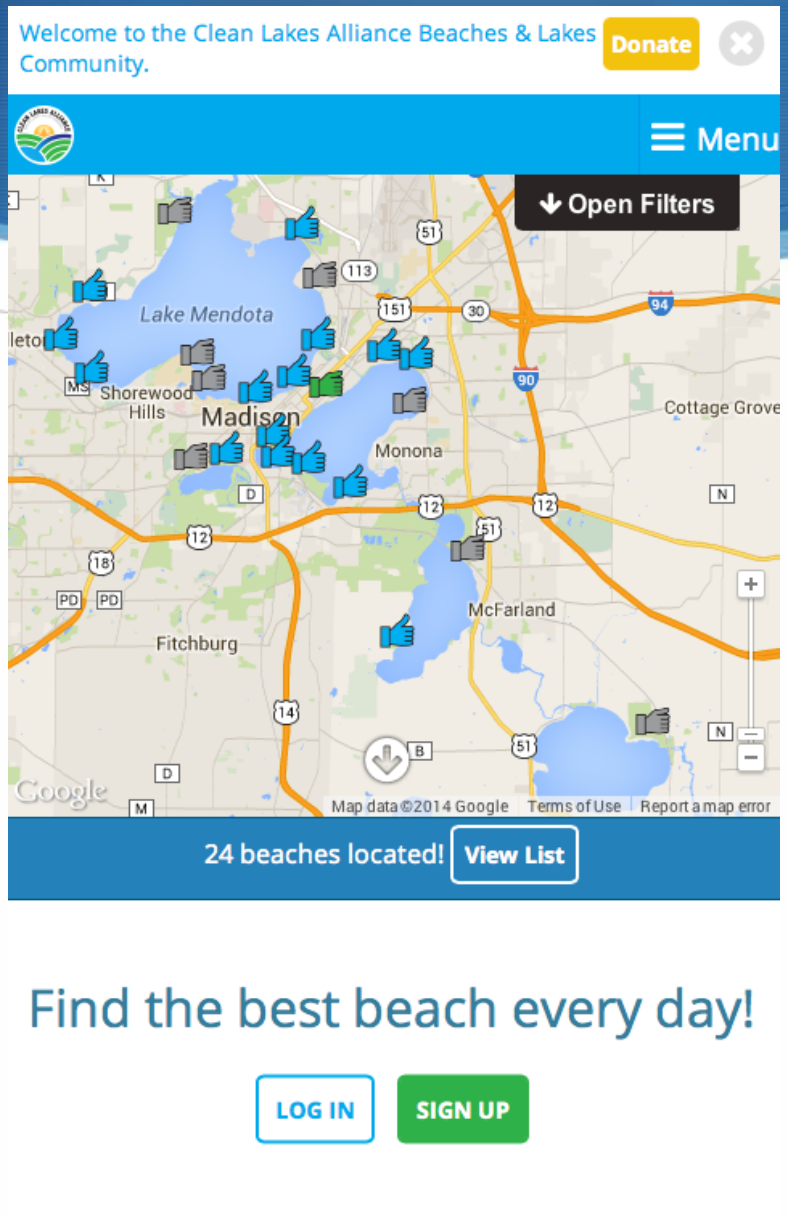
Filling Monitoring Gaps



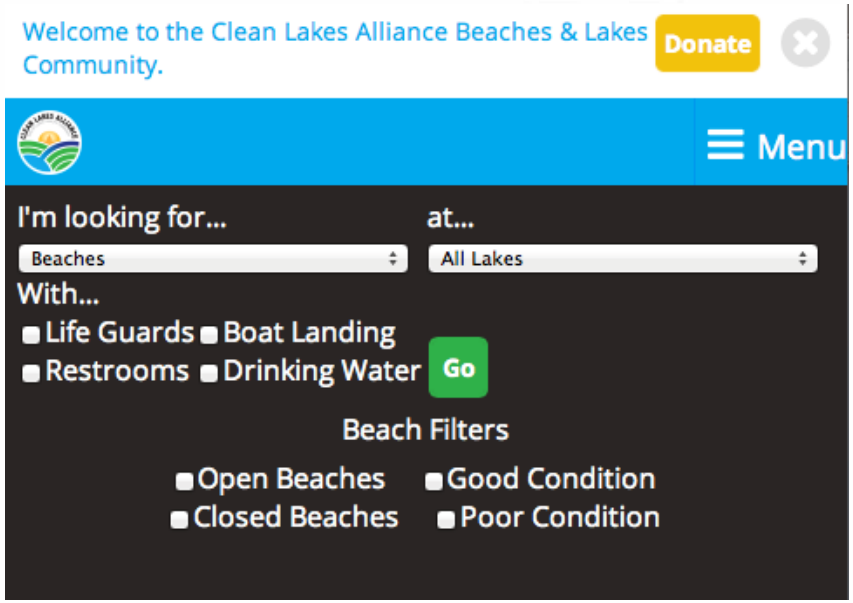
Filling Monitoring Gaps

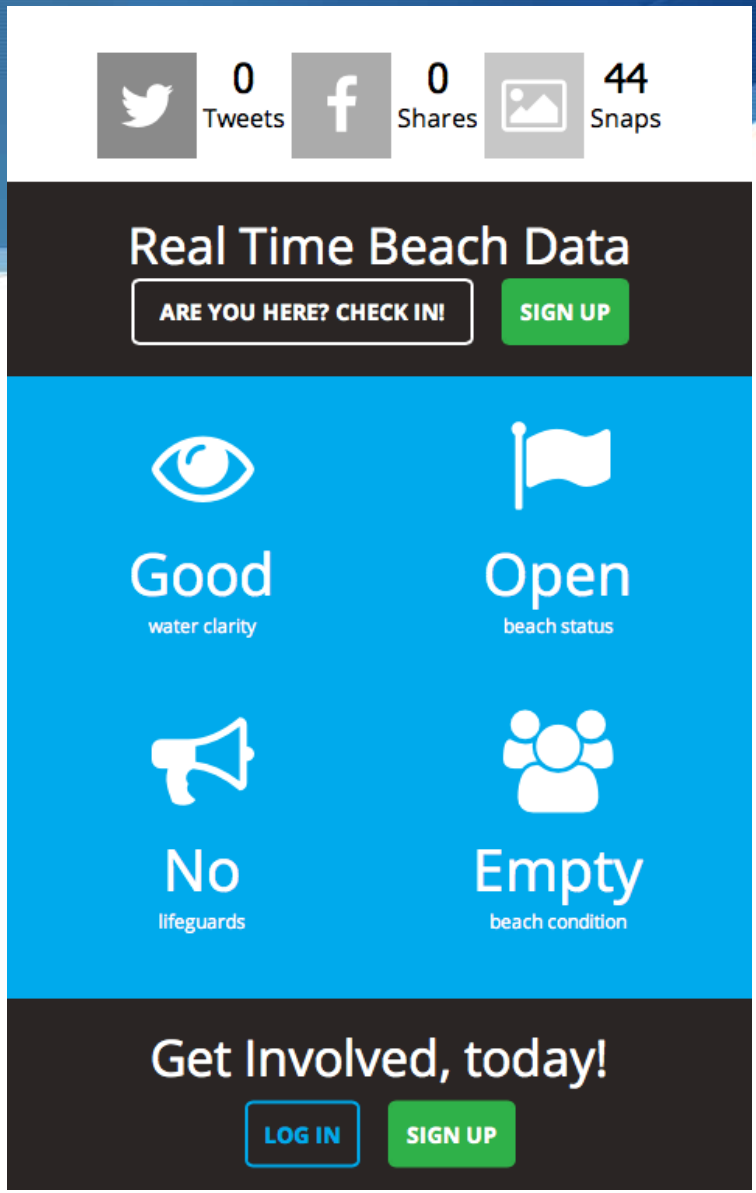


Beaches


Welcome to the Clean Lakes Alliance Beaches & Lakes Community.
Donate
Menu
Open Filters
Lake Mendota
Madison
Shorewood Hills
Monona
Cottage Grove
McFarland
Fitchburg
Map data ©2014 Google
Terms of Use
Report a map error
24 beaches located!
View List
Find the best beach every day!
LOG IN
SIGN UP

Beaches

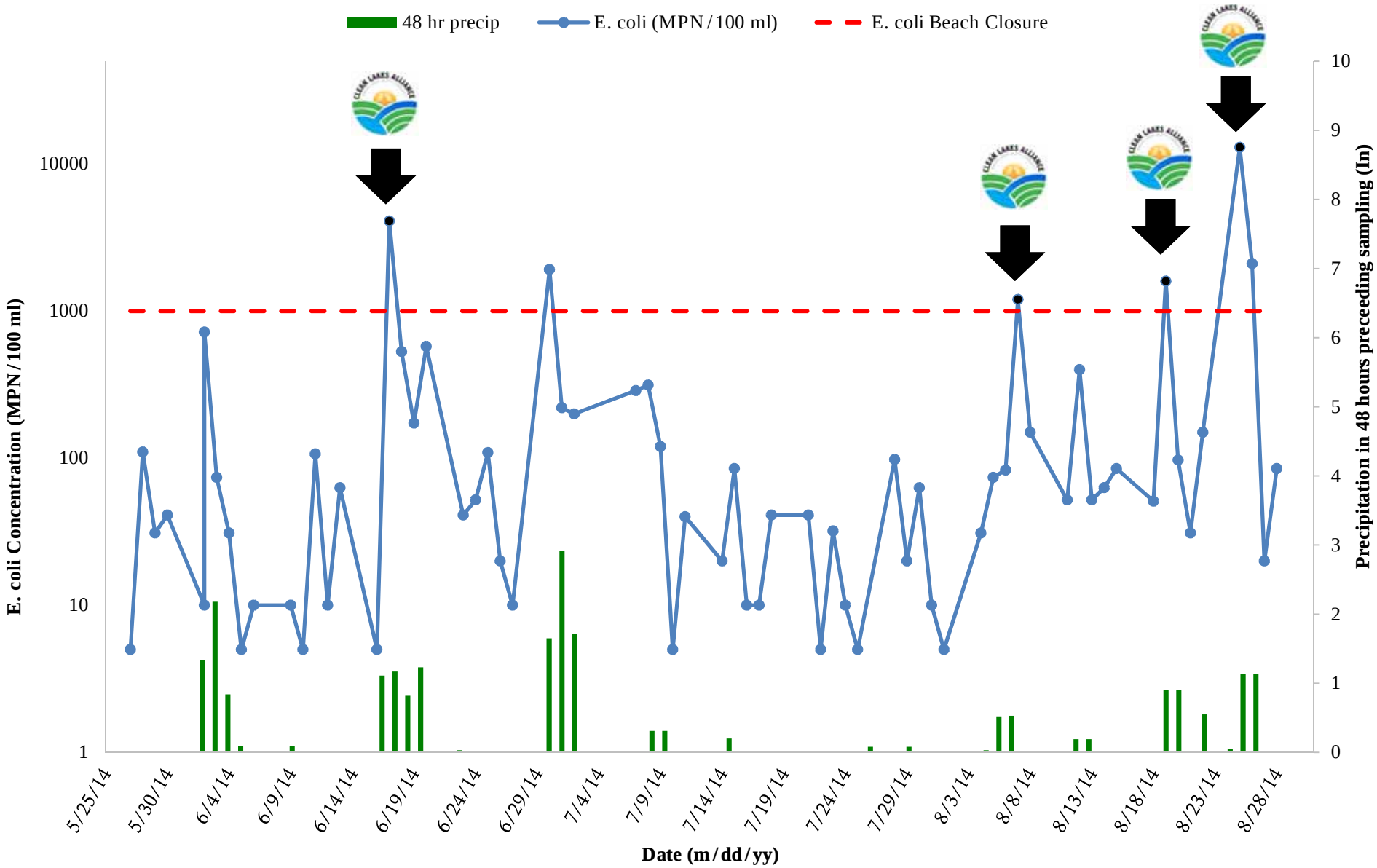

Welcome to the Clean Lakes Alliance Beaches & Lakes Community.
Donate
Menu
I'm looking for...
at...
Beaches
All Lakes
With...
Life Guards
Boat Landing
Restrooms
Drinking Water
Go
Beach Filters
Open Beaches
Good Condition
Closed Beaches
Poor Condition


0
Tweets
0
Shares
44
Snaps
Real Time Beach Data
ARE YOU HERE? CHECK IN!
SIGN UP
Good
water clarity
Open
beach status
No
lifeguards
Empty
beach condition
Get Involved, today!
LOG IN
SIGN UP

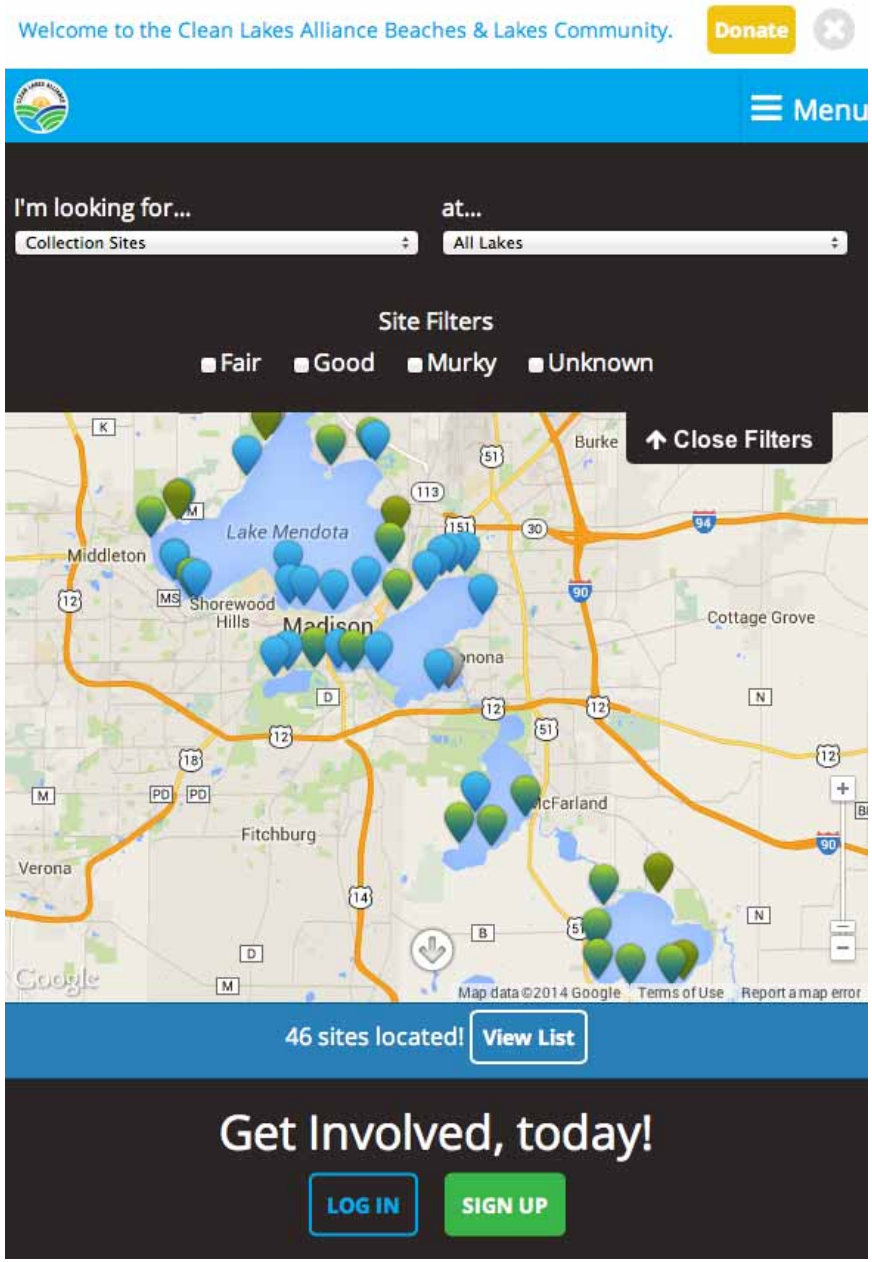
Beaches

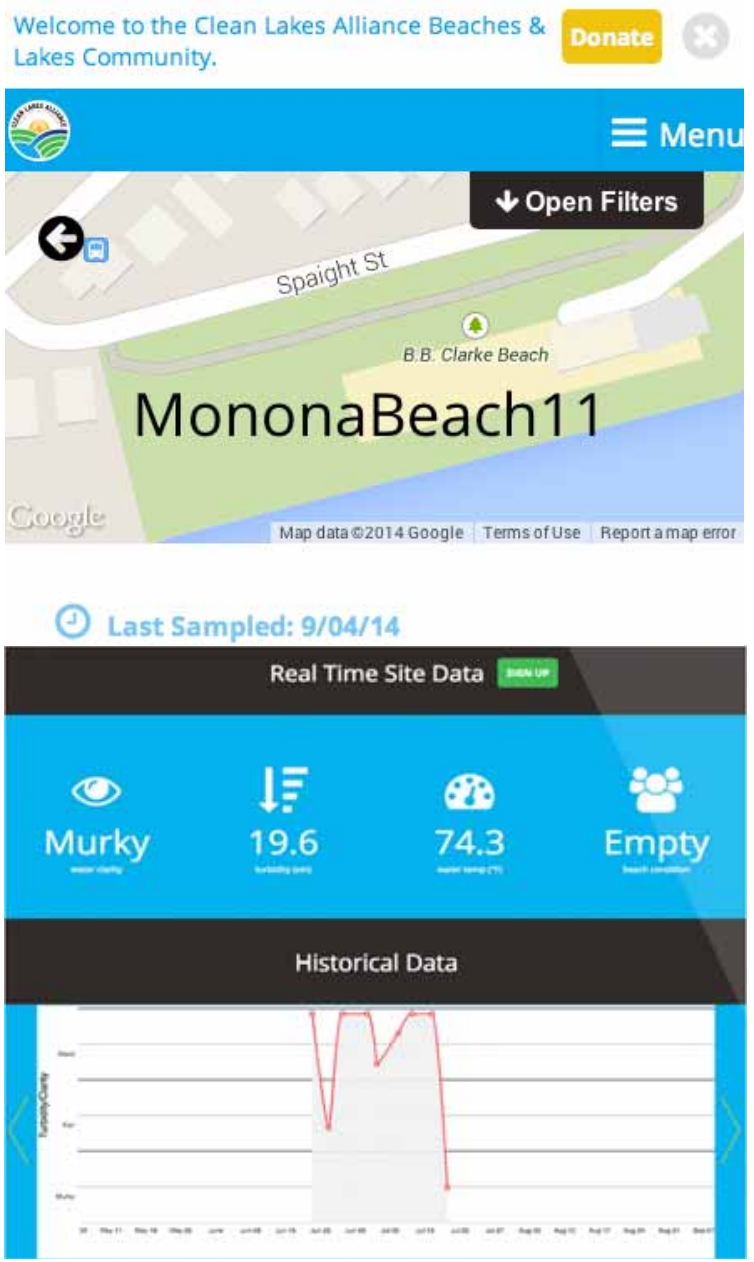
- Purpose
  - Increase confidence in beach safety through *E. coli* bacteria monitoring
- Parameters
  - Daily (M – F)
    - *E. coli* concentration
    - Water and air temperature
    - Turbidity
    - Visual observations
  - Monthly
    - Total phosphorus

James Madison Beach 2014 *E. coli* Data



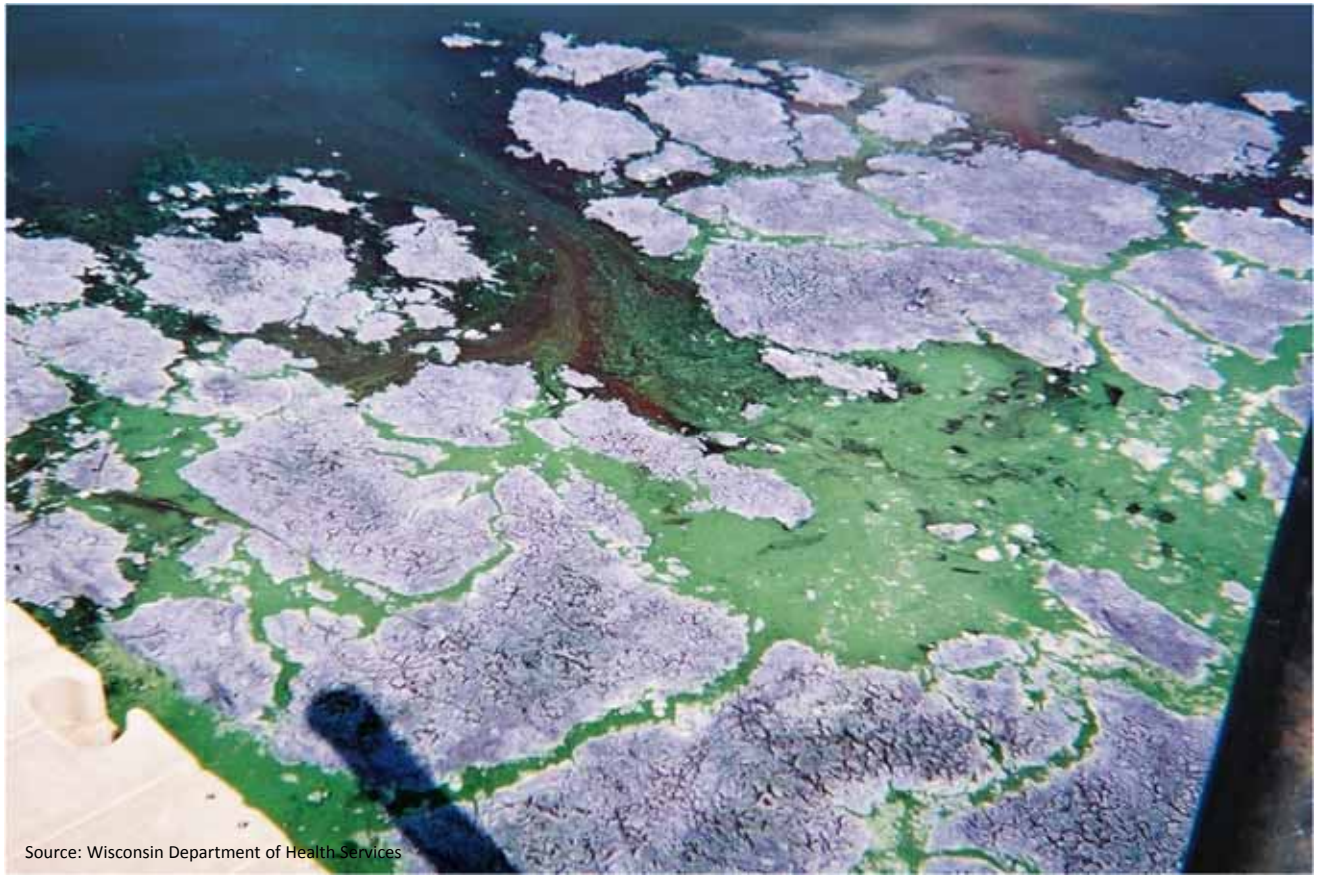
End-of-Pier


Welcome to the Clean Lakes Alliance Beaches & Lakes Community.
Donate
Menu
I'm looking for...
Collection Sites
at...
All Lakes
Site Filters
Fair
Good
Murky
Unknown
Close Filters
Lake Mendota
Middleton
Shorewood Hills
Madison
Burke
Cottage Grove
Fitchburg
Verona
Google
Map data ©2014 Google
Terms of Use
Report a map error
46 sites located!
View List
Get Involved, today!
LOG IN
SIGN UP


Welcome to the Clean Lakes Alliance Beaches & Lakes Community.
Donate
Menu
Open Filters
Spaight St
B.B. Clarke Beach
MononaBeach11
Google
Map data ©2014 Google
Terms of Use
Report a map error
Last Sampled: 9/04/14
Real Time Site Data
Murky
19.6
74.3
Empty
Historical Data

End-of-Pier

- Purpose
  - Collect data that may be useful in modeling and forecasting blue-green algal blooms
- Parameters
  - Weekly
    - Water and air temperature
    - Turbidity
    - Visual observations
  - Monthly
    - Total phosphorus



A. Green B. Blue-Green

A. Green B. Blue-Green

A. Green B. Blue-Green

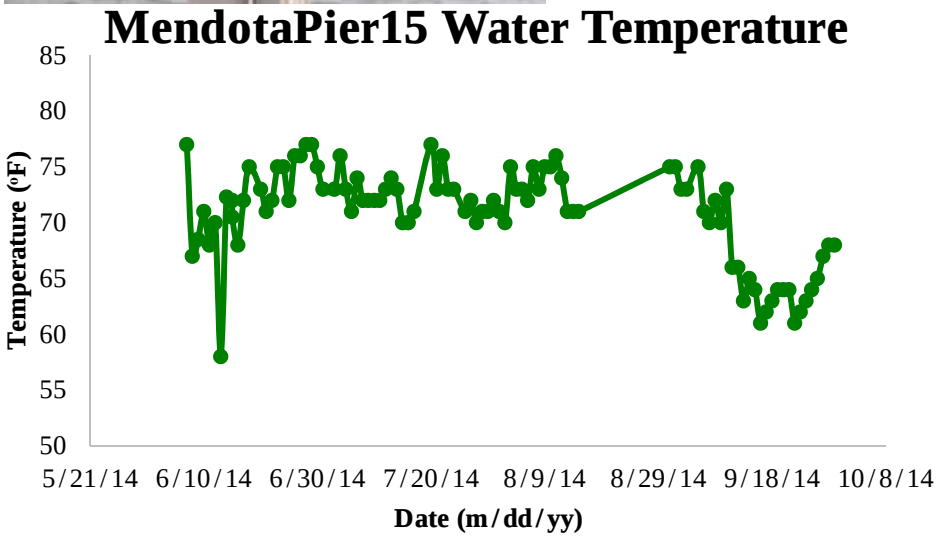
A. Green B. Blue-Green

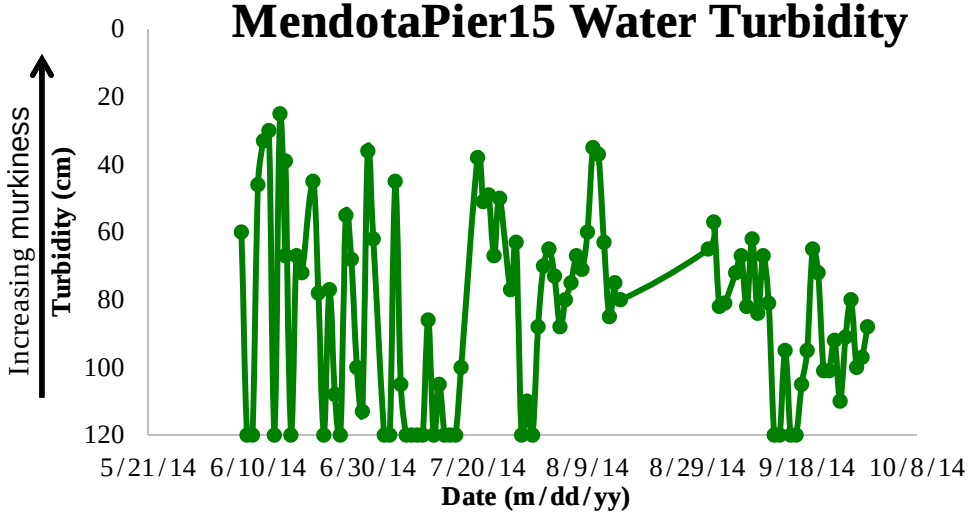
Visual Observations

Algal Surface Bloom- the estimated amount of algal growth observed on the surface of a sampling site.

1	2	3
		
None	Some clear evidence	Strong extensive evidence

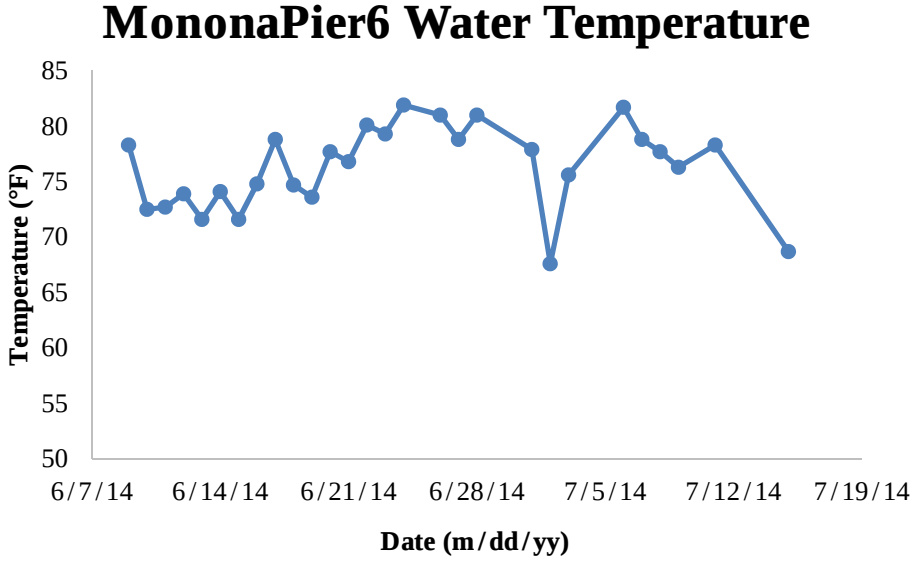
MendotaPier15 Results

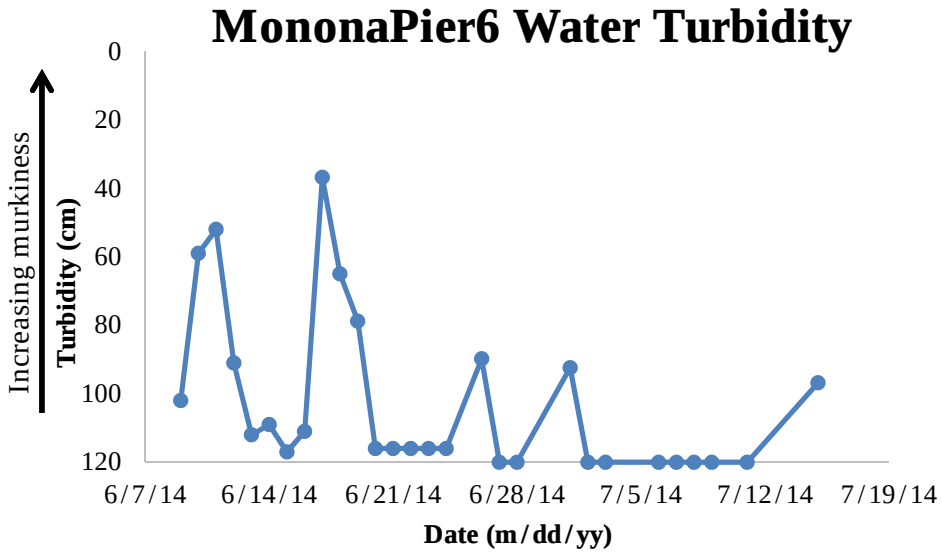




Data Summary	MendotaPier15	Lake Mendota
Number of Observations	95	455
% of Observations When Algae Present	6.3%	13%
Average Water Turbidity	83.9 cm	87 cm
Average Water Temperature	70.8 °F	73.5 °F
Average Total Phosphorus	0.059 mg/L	0.064 mg/L

MononaPier6 Results





Data Summary	MononaPier6	Lake Monona
Number of Observations	28	189
% of Observations Algae Present	25%	24%
Average Water Turbidity	103 (cm)	85 cm
Average Water Temperature	76.3 °F	71.2 °F
Average Total Phosphorus	0.046 mg/L	0.060 mg/L

Crowdsourcing

- Purpose
  - Increase public's understanding of local water quality issues
  - Increase public lake involvement
  - Strengthen dataset

Thank You!

We would like to specially thank Jon Standridge and Dr. Richard Lathrop

Monitors

Alan Ausel
Allen & Claire Arntsen
Amy Wencel
Bill Lamm
Carla Schubert
Carol Gillen
Caroline Hoffman
Carolyn Betz
Cathie Taylor
Craig Ostrom
David Schroder
Dea Larsen Converse
Deanna Letts
Debbie & Eli Durcan
Dick Pearson
Eric Christenson
Harmon & Nell Ray
Jacob Stampen
Jacqui Guthrie
Jeff Schraml
Jerry Jendrisak
Jim Cordray
Jim Wilcox
John Reinders
John Tye
Josie & Peter Cyffka
Juliette Schick
Karen Faller
Kirk & Betsy Swenson
Leigh & Maddie Meier
Mel McCartney
Mike Horn
Nick Hayden
Rhonda Arries
Robert Gilbert
Roy Carter
Sarah Balz
Sasha Kerlow
Silke Schmidt & Dan Phaneuf
Tom Smith
Theresa Vander Woude
Woody Kneppreth

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Josh Herritz
Kathleen Dax-Klister
Ken Potter
Kerry Martin
Kirsti Sorsa
Lisa Mertins
Molli MacDonald
Pat Gorski
Shawn Marsh
Steve Carpenter

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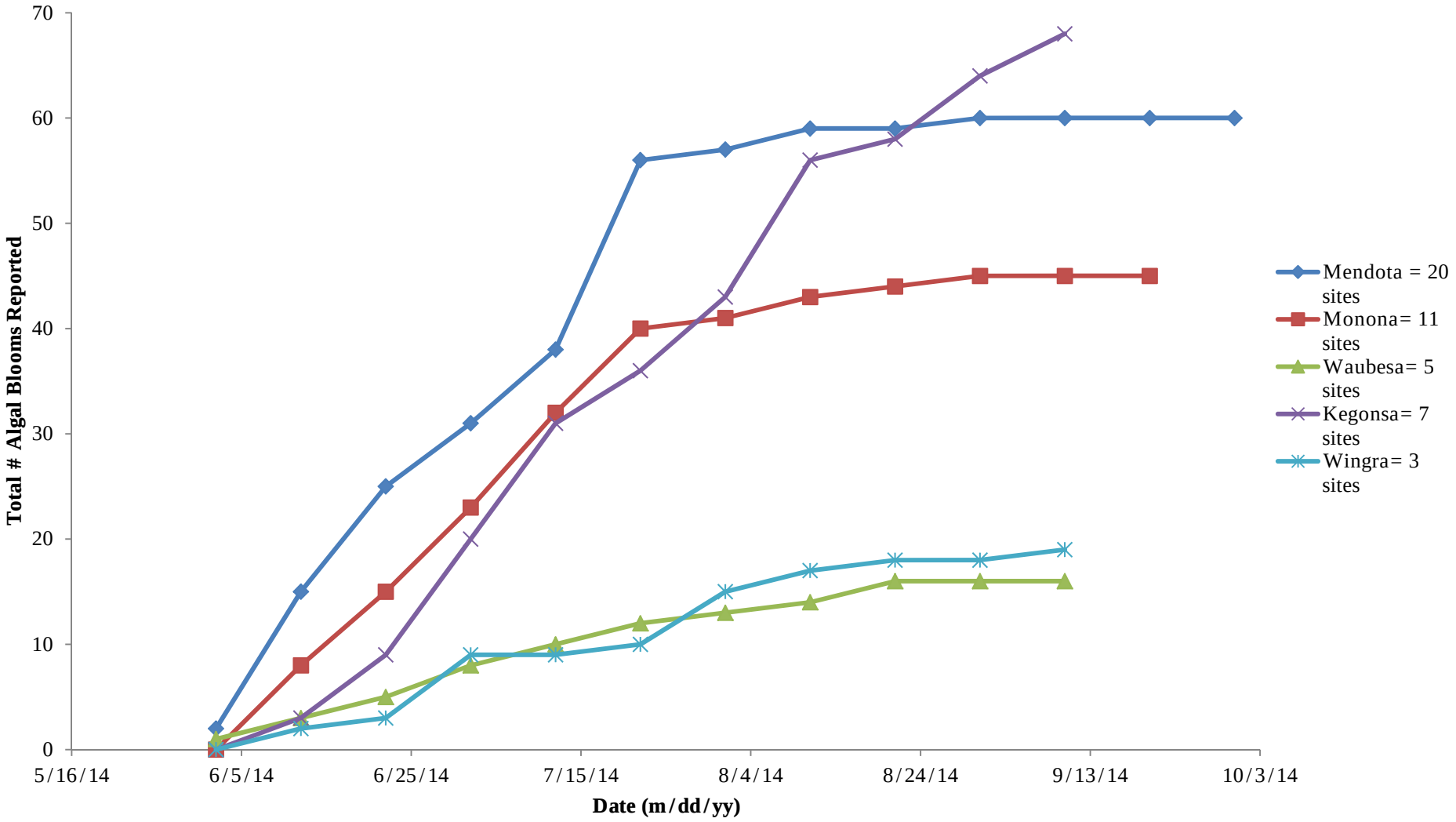
City of Madison
City of Monona
Dane County
MIOsoft
Public Health Madison & Dane County
Thermo Fisher Scientific
UW-Madison Center for Limnology
Wisconsin Department of Natural Resources
Wisconsin State Laboratory of Hygiene
100state

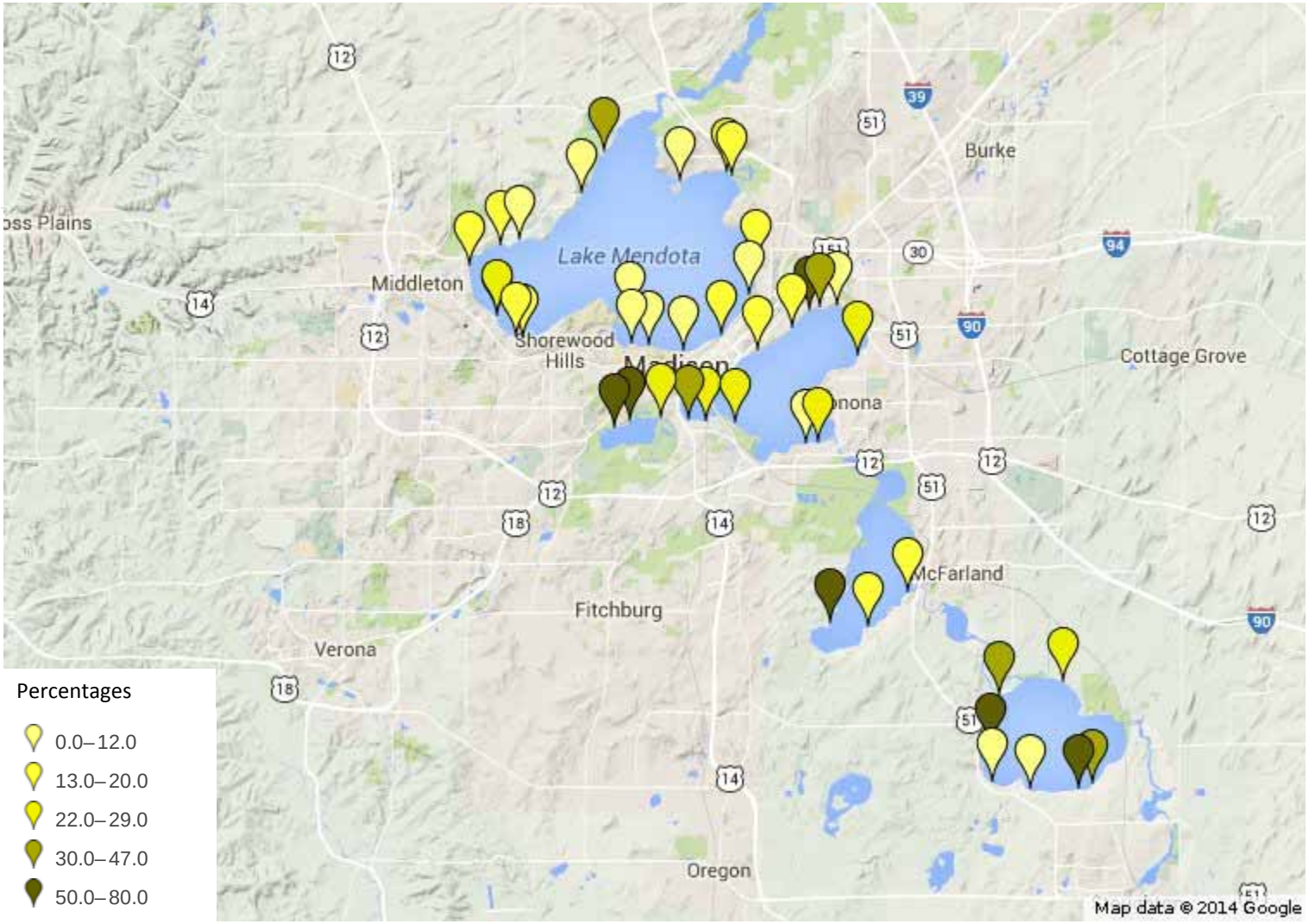
This program wouldn't be possible without the help of our interns:

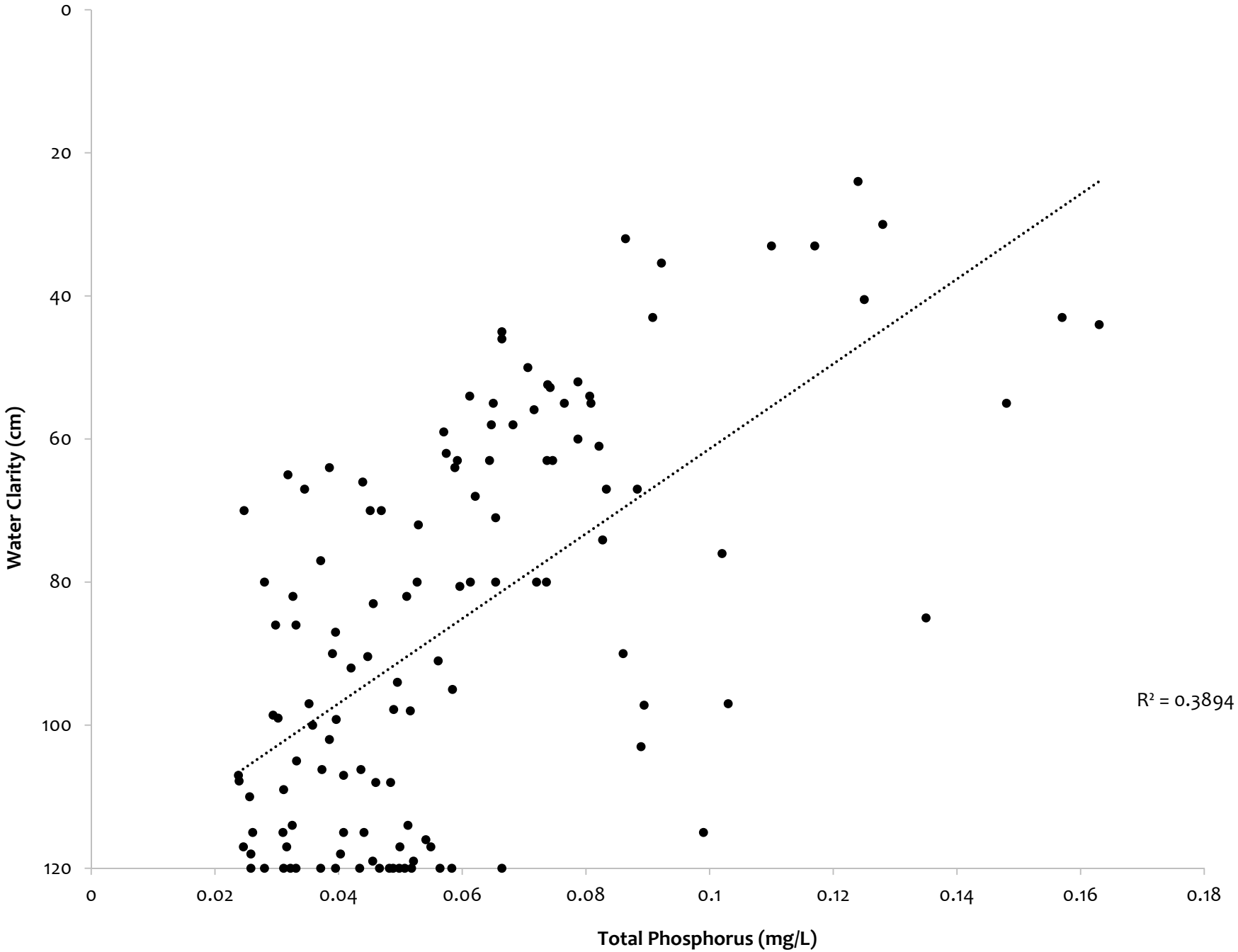
Eric Krejcarek
Justin Chenevert
Paul Webb

Algal Blooms Reported By Lake in 2014 (May 27 – September 30)



% Algal Bloom Presence Results for Summer 2014 (May 27 – September 30)




0
20
40
60
80
100
120
Water Clarity (cm)
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0.18
Total Phosphorus (mg/L)
R² = 0.3894

Future Plans

- Increase number of end-of-pier and beach monitors
- Use data for research
  - Modeling
  - Reporting and awareness
- Incorporate crowdsourcing

2014 → 2015 → 2016