

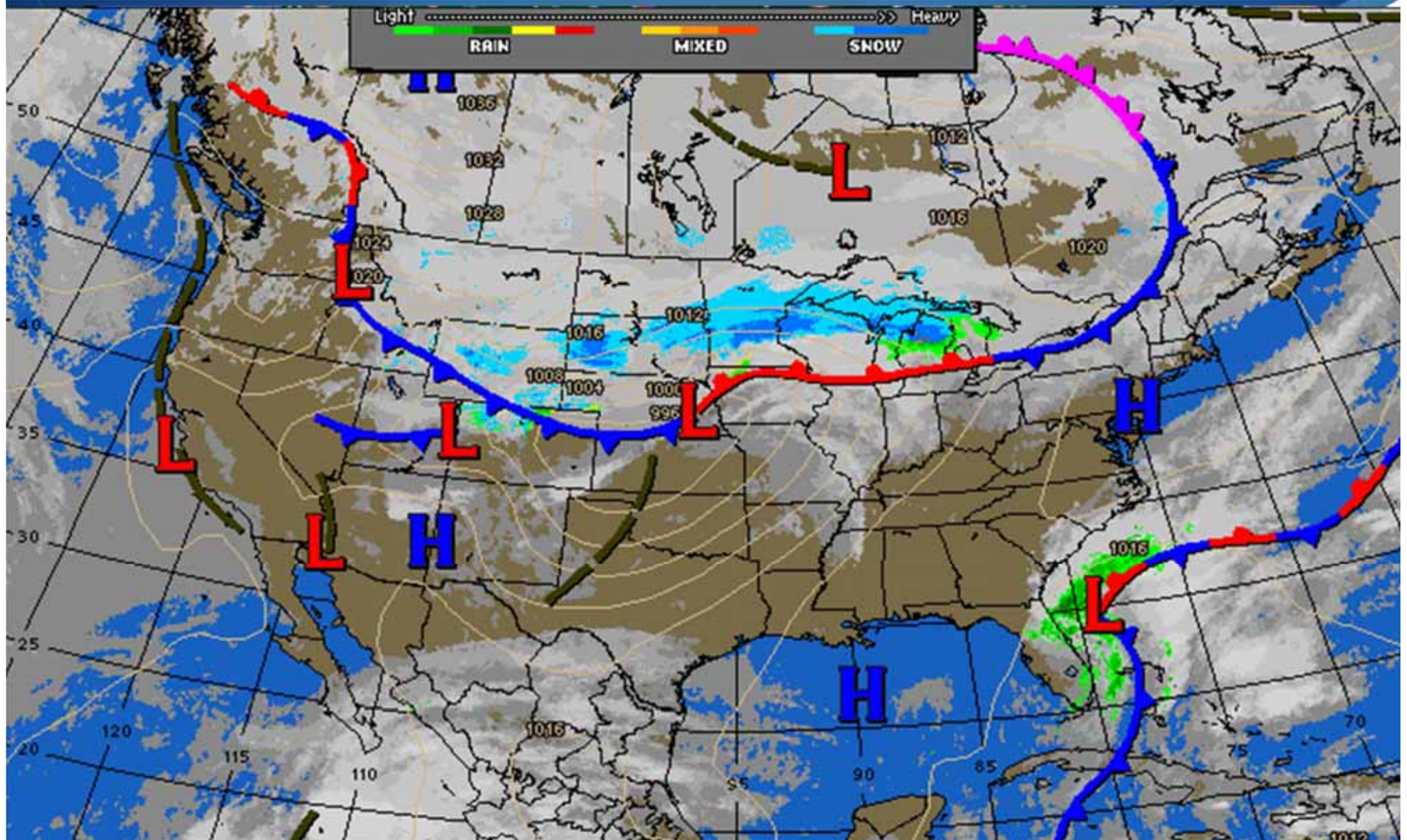
# Using Citizen Monitoring and Crowdsourcing to Track and Forecast Near-shore Lake Conditions



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

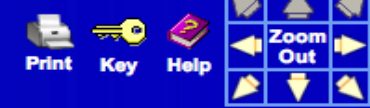


# Reporting and Awareness



# Reporting and Awareness

## Air Quality Forecast Guidance - Upper Mississippi Valley



[Daily View](#) | 
 [Loops](#) | 
 [Point Data](#)

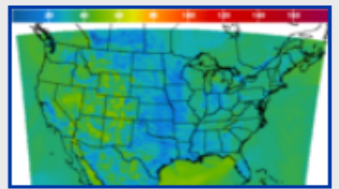
[Page Help](#)

Mouse over or click on the table below to change the guidance image.

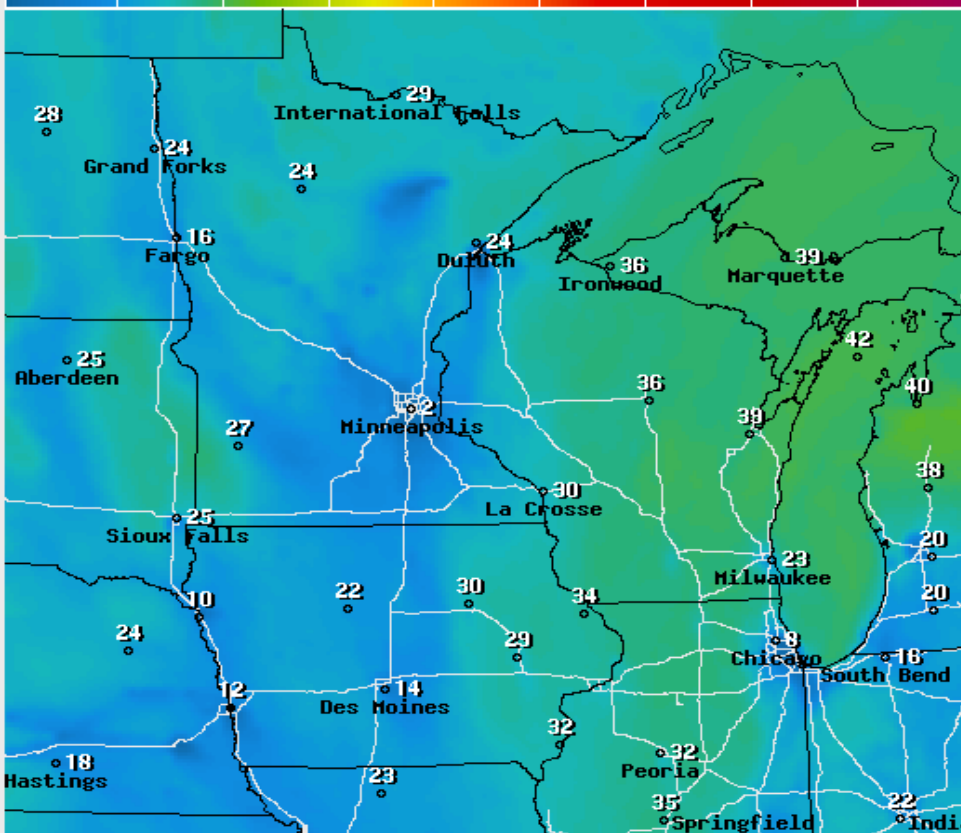
▶ Today															+12Hrs <span>▶</span>
Valid Hour (EDT):	-- AM --												-- PM --		
	8	9	10	11	12	1	2	3	4	5	6	7			
1Hr Average Ozone Concentration	—	—	■	■	■	■	■	■	■	■	■	■	■	■	
Daily 1Hr Ozone Max	■														
8Hr Average Ozone Concentration	—	—	■	■	■	■	■	■	■	■	■	■	■	■	
Daily 8Hr Ozone Max	■														
1Hr Average Surface Smoke	—	—	■	■	■	■	■	■	■	■	■	■	■	■	
1Hr Average Vertical Smoke Integration	—	—	■	■	■	■	■	■	■	■	■	■	■	■	
Surface Dust Concentration	—	—	■	■	■	■	■	■	■	■	■	■	■	■	
Column Dust Concentration	—	—	■	■	■	■	■	■	■	■	■	■	■	■	

Table MouseOver Effect On ▼

Overview



[Go to Region](#) | 
 Click On Map To Zoom In



1Hr Avg Ozone Concentration(PPB) Ending Wed Oct 15 2014 10AM EDT  
(Wed Oct 15 2014 14Z)



**National Digital Guidance Database**  
 06z model run    Graphic created-Oct 15 6:13AM EDT



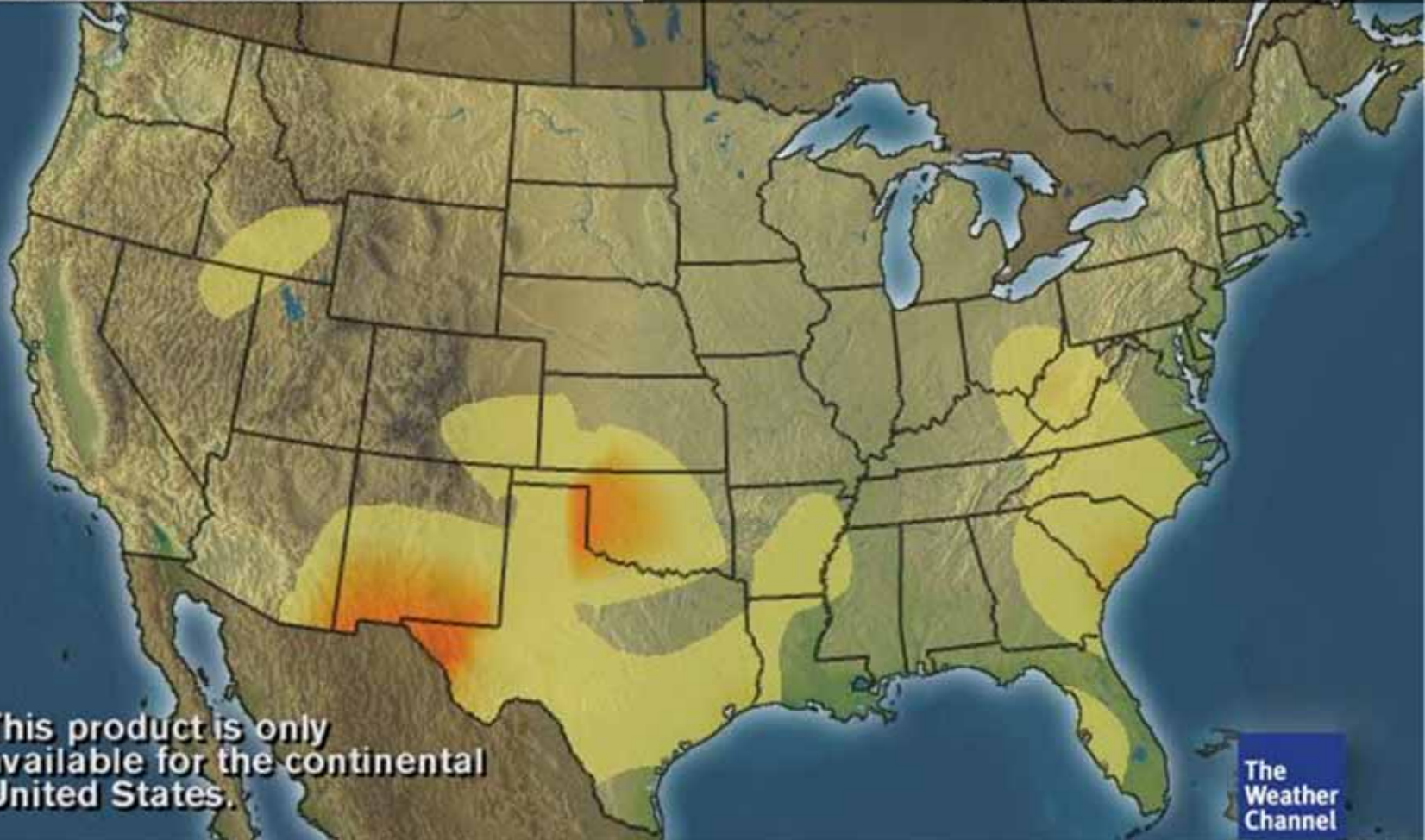
# Reporting and Awareness

## Grass Pollen

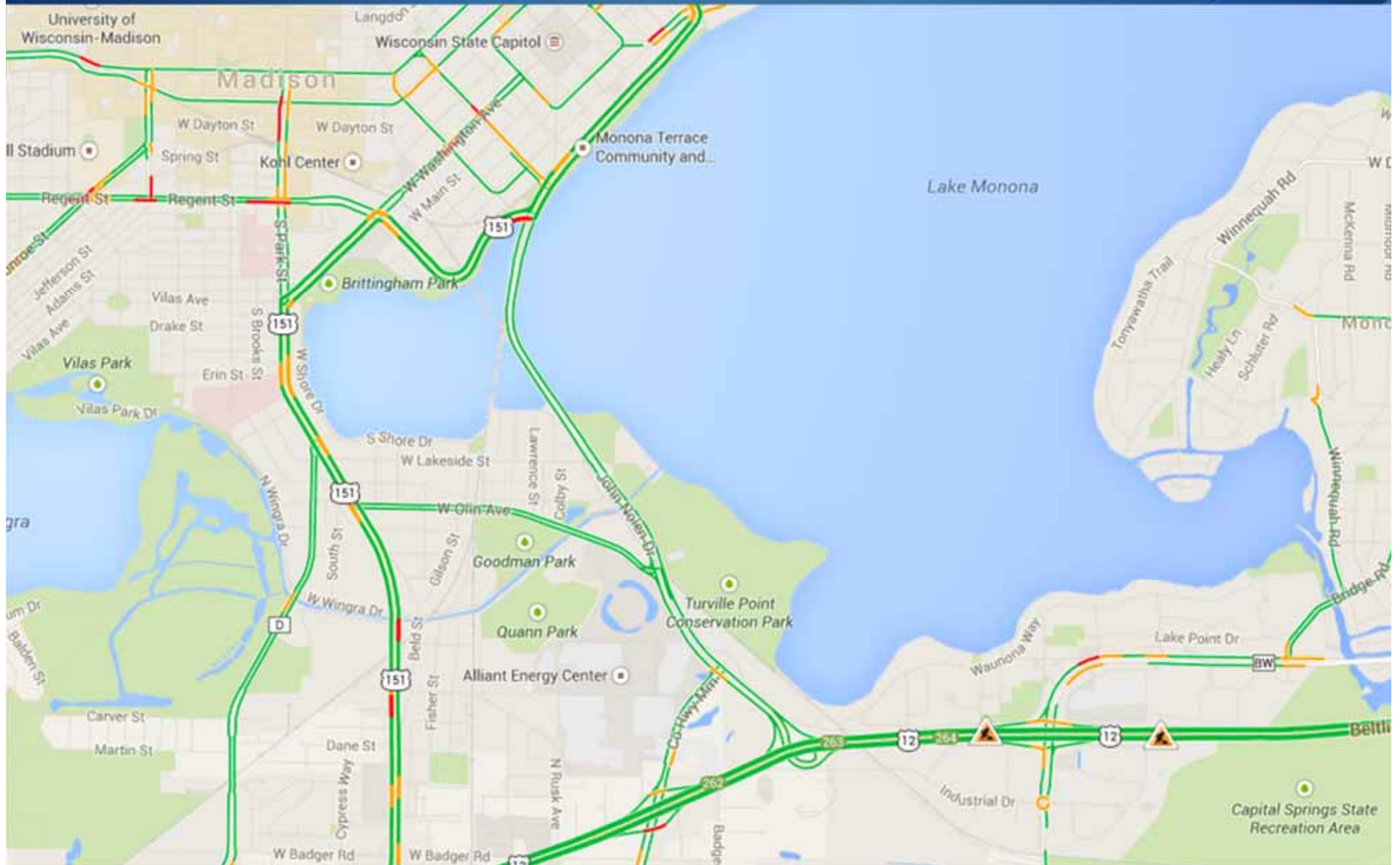
Allergen Report: **Live By It**

LOW  VERY HIGH

AS OF October 10



# Reporting and Awareness

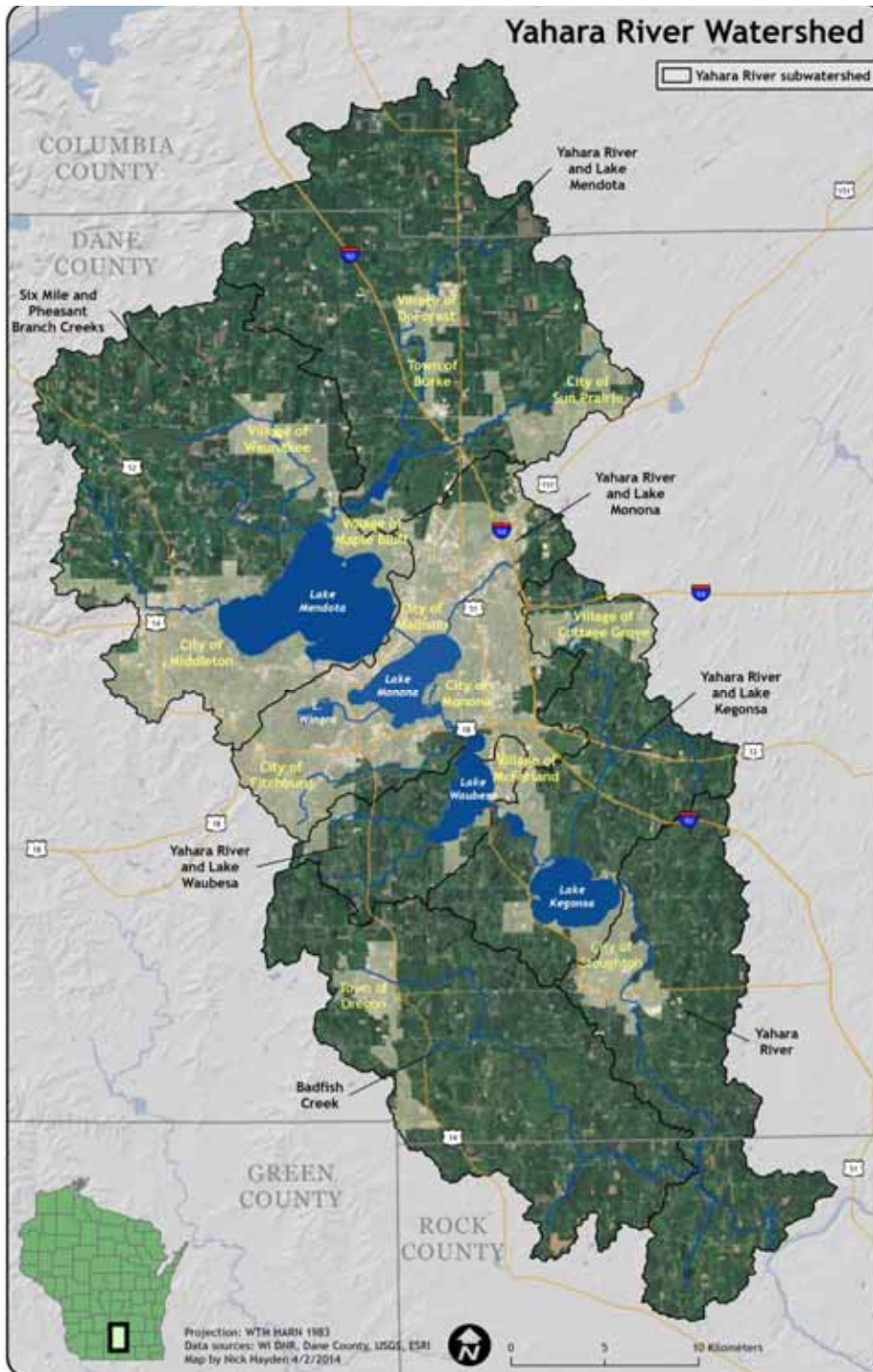


# Vision

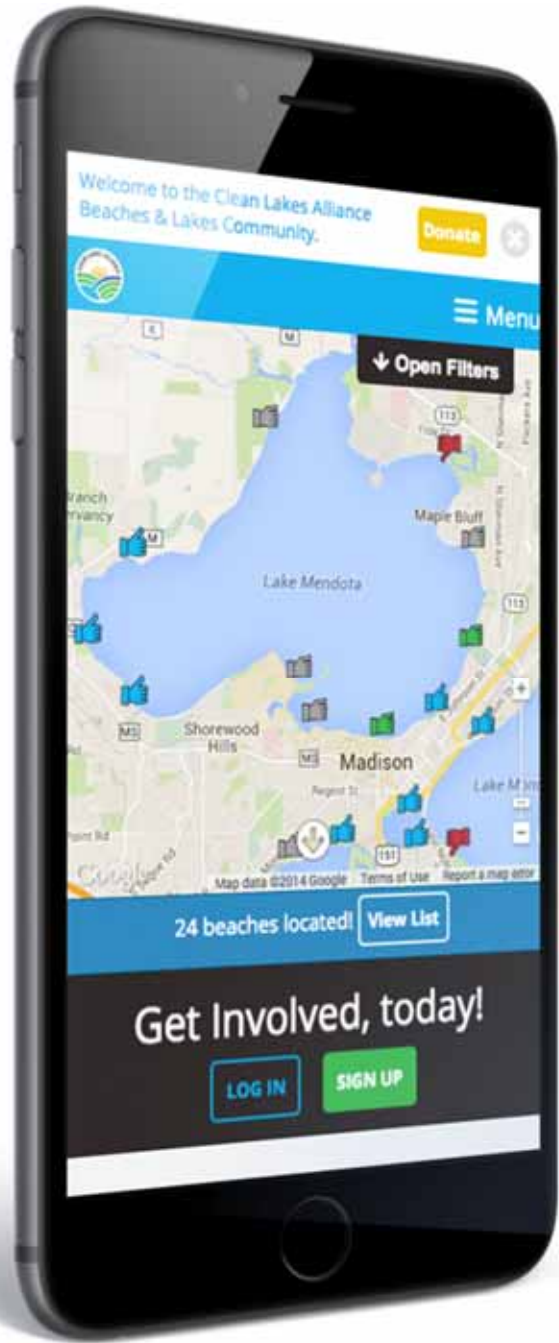
We see a future in which everyone realizes that our lakes are the center of our community.

An aerial photograph showing a city built on a peninsula or island, surrounded by water. The city features a prominent white domed capitol building. The foreground is dominated by a large, dense forest with trees in various shades of green and yellow, suggesting an autumn setting. A small boat is visible on the water in the lower left, leaving a white wake.

*Healthy Lakes. Healthy Community.*



- 💧 359 mi<sup>2</sup> watershed
- 💧 28 municipalities
- 💧 370,000 people
- 💧 29 mi<sup>2</sup> 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!”*

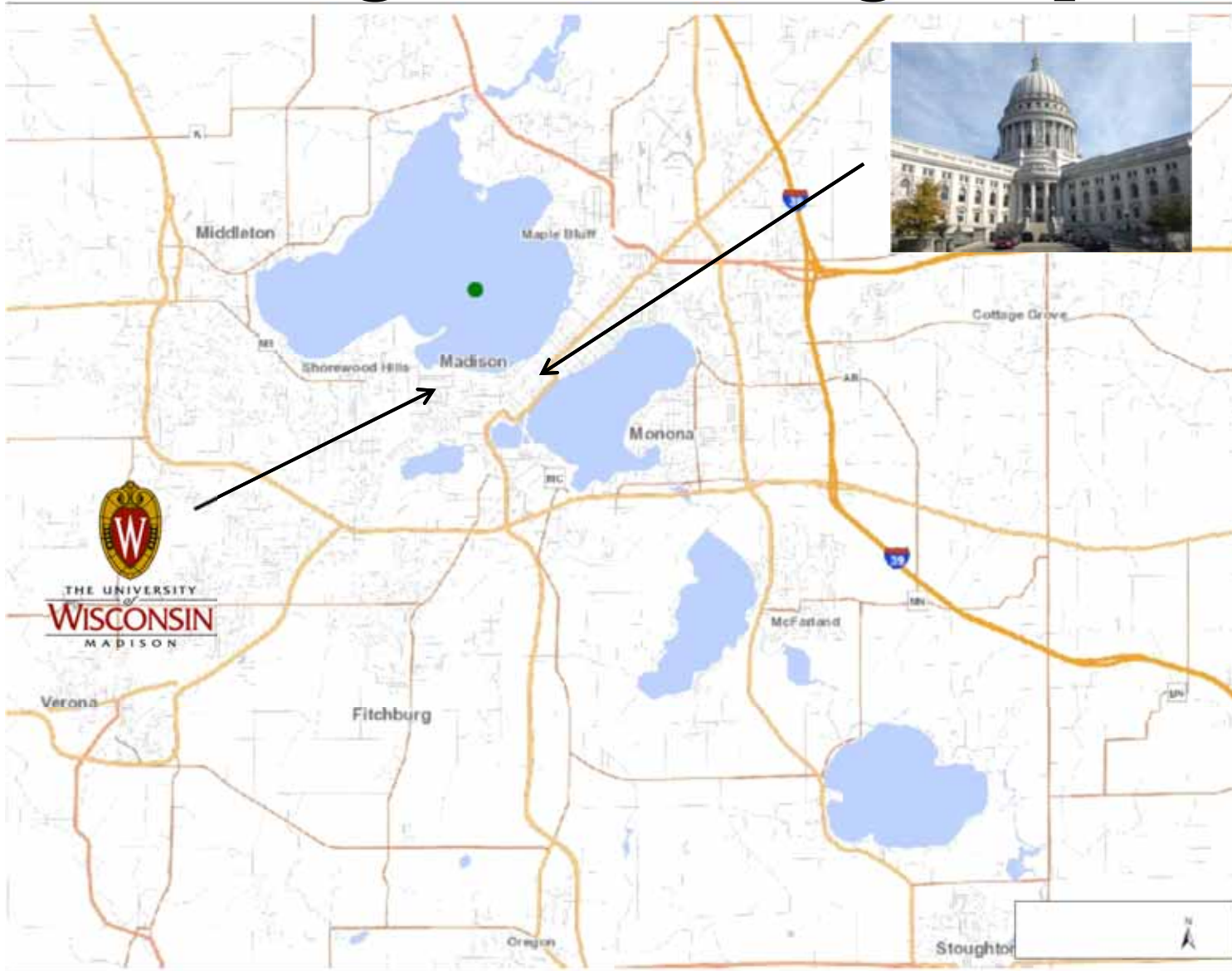


*“ Water quality is the WORST it’s ever been!”*

# Perceptions vs. Reality

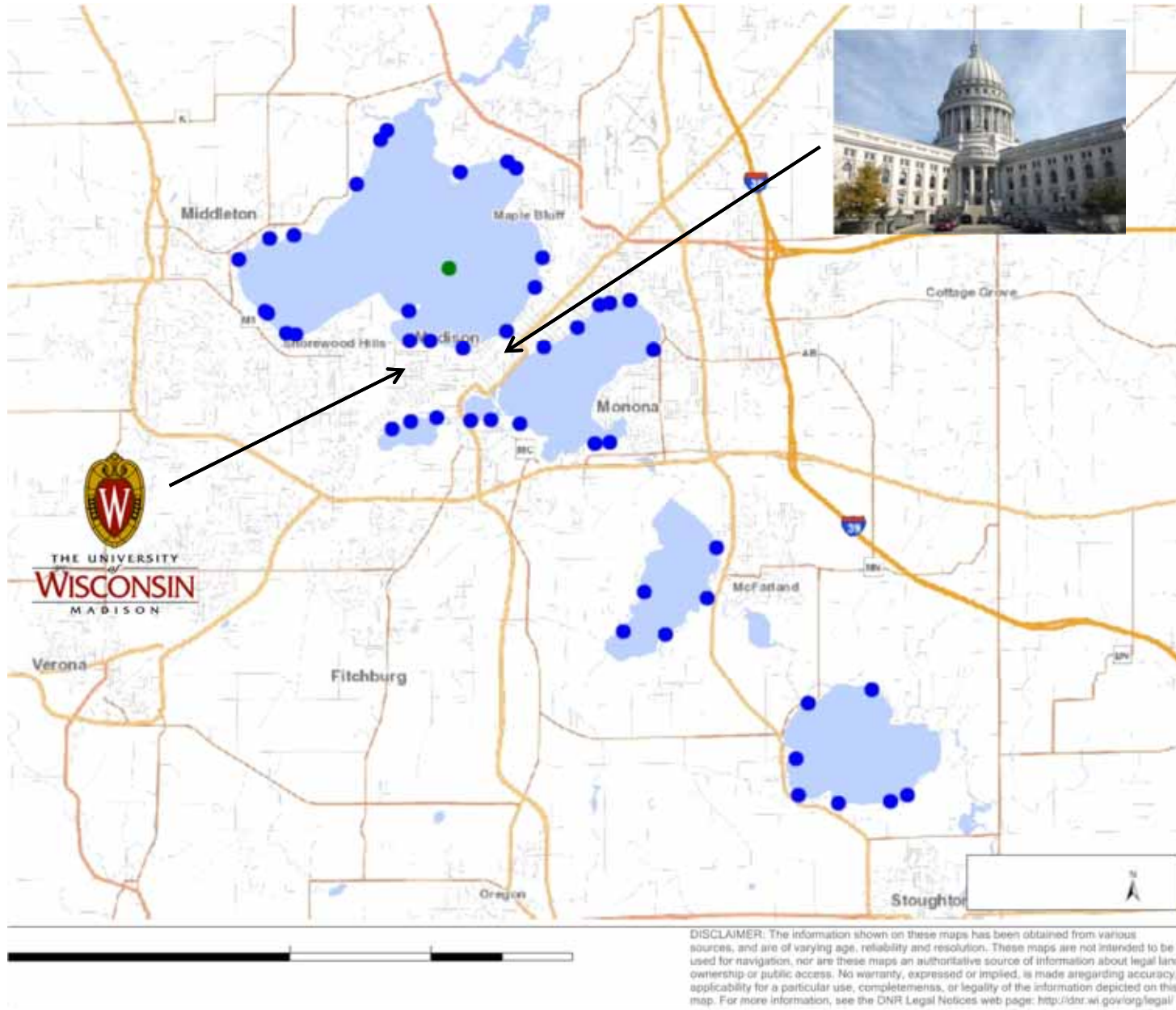


# Filling Monitoring Gaps




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# Filling Monitoring Gaps

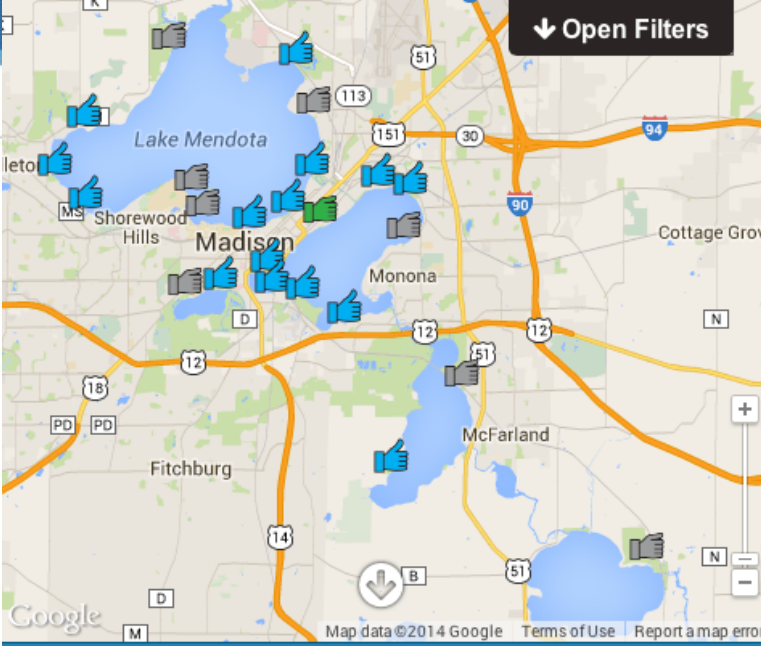


# Beaches

Welcome to the Clean Lakes Alliance Beaches & Lakes Community. [Donate](#) ✕

 [Menu](#)

↓ Open Filters



24 beaches located! [View List](#)

Map data ©2014 Google Terms of Use Report a map error

Find the best beach every day!

[LOG IN](#)

[SIGN UP](#)

# Beaches



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

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

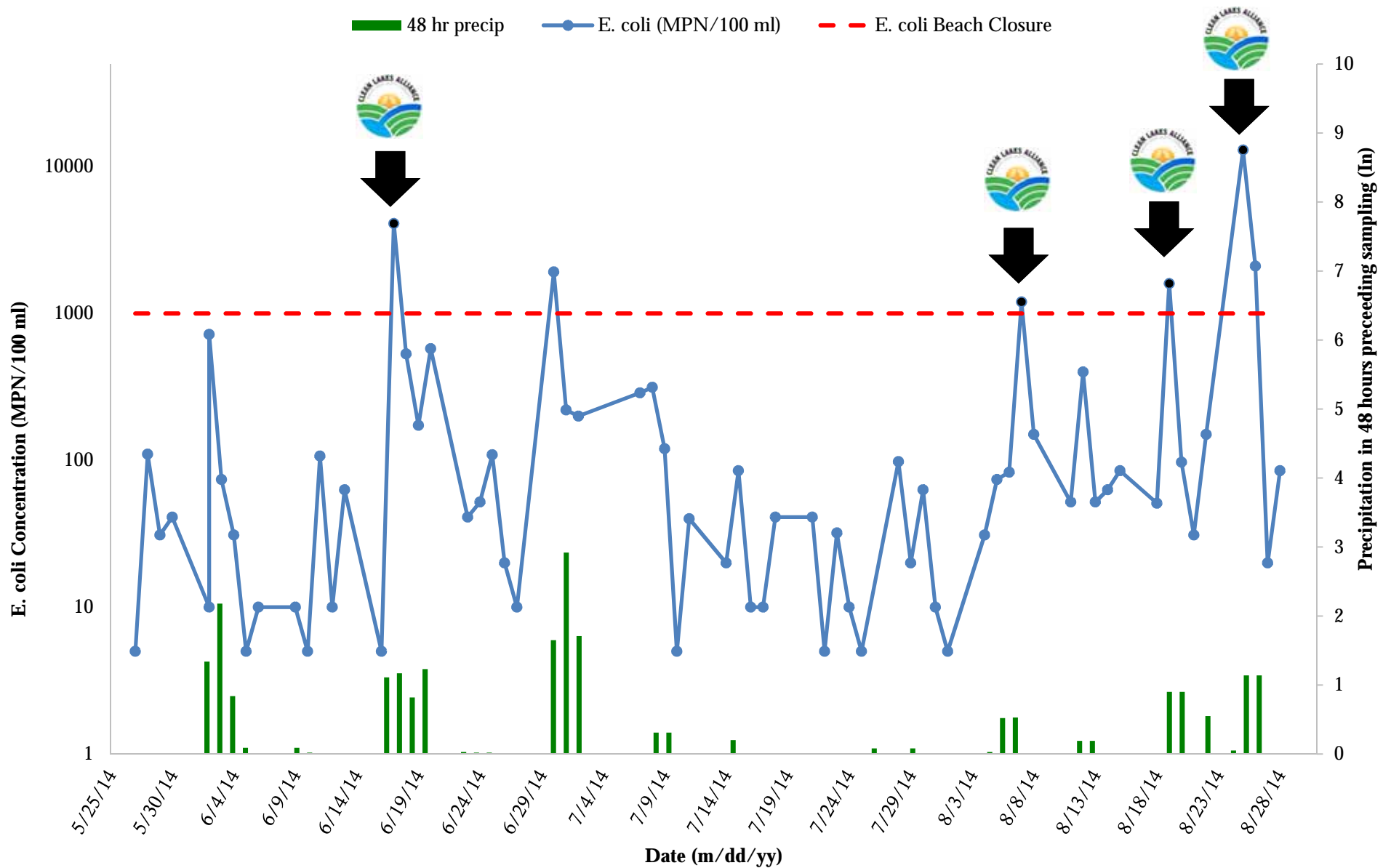
# Beaches

- ◆ 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


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 Menu

I'm looking for... at...  
Collection Sites All Lakes

Site Filters  
 Fair  Good  Murky  Unknown

[Close Filters](#)




46 sites located! [View List](#)

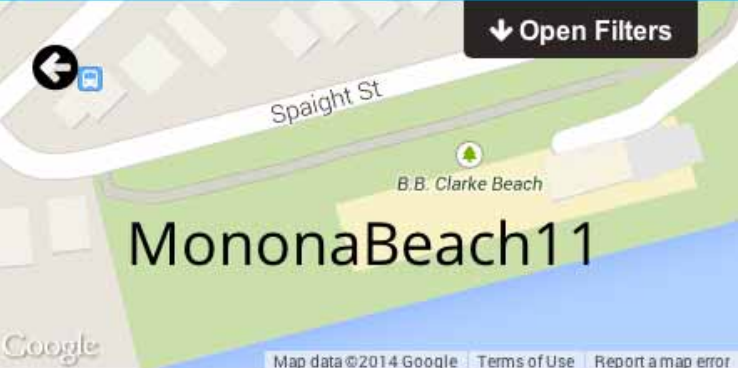
Get Involved, today!

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Welcome to the Clean Lakes Alliance Beaches & Lakes Community. [Donate](#)

 Menu





[Open Filters](#)



MononaBeach11


Last Sampled: 9/04/14

Real Time Site Data [SIGN UP](#)

Murky 19.6 Empty

Historical Data

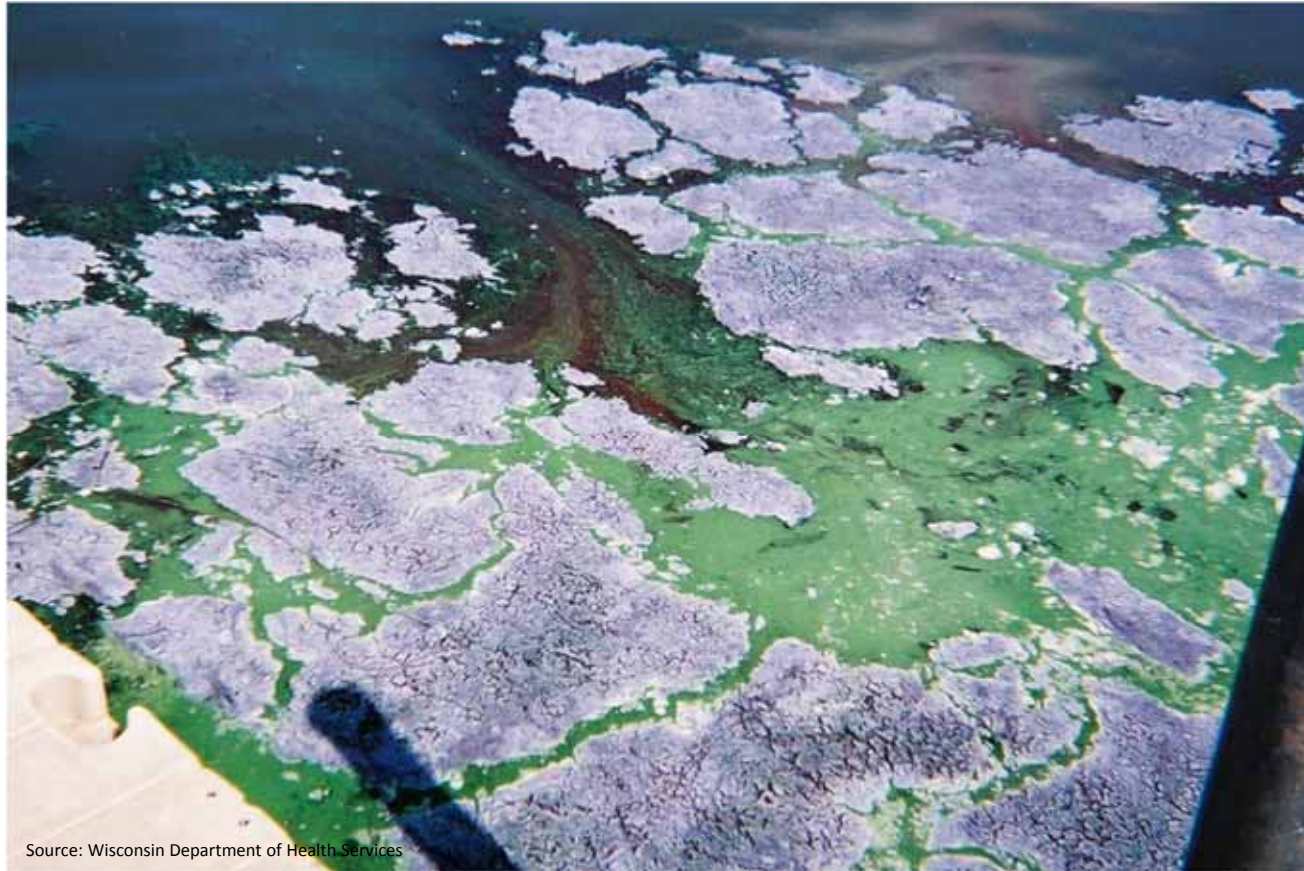


Date	Murky	Empty
May 11	~15	~85
May 16	~15	~85
May 20	~15	~85
Jun 18	~15	~85
Jul 15	~15	~85
Jul 20	~15	~85
Jul 25	~15	~85
Jul 30	~15	~85
Aug 5	~15	~85
Aug 10	~15	~85
Aug 15	~15	~85
Aug 20	~15	~85
Aug 25	~15	~85
Aug 30	~15	~85
Sep 5	~15	~85
Sep 10	~15	~85
Sep 15	~15	~85
Sep 20	~15	~85
Sep 25	~15	~85
Oct 1	~15	~85

# 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**



Source: New York Department of Environmental Conservation

**A. Green**

**B. Blue-Green**



Source: New York Department of Environmental Conservation

**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



None

2



Some clear evidence

3



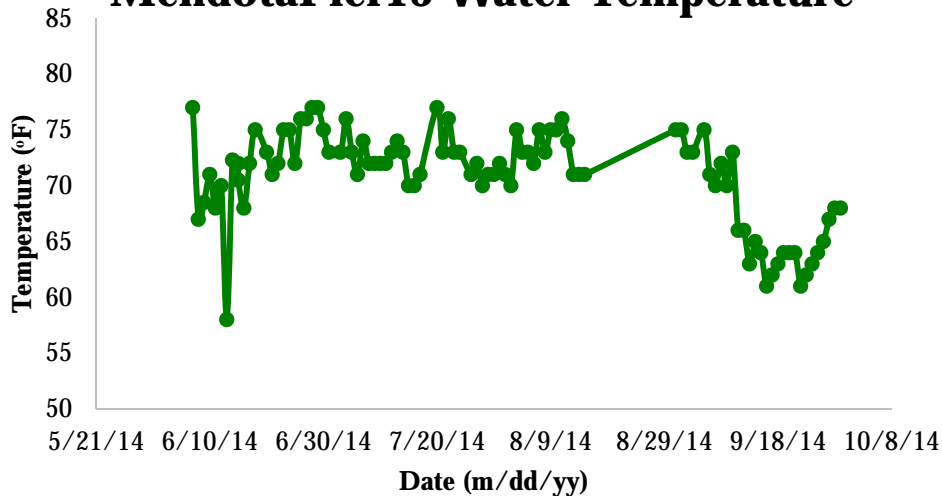
Strong extensive  
evidence



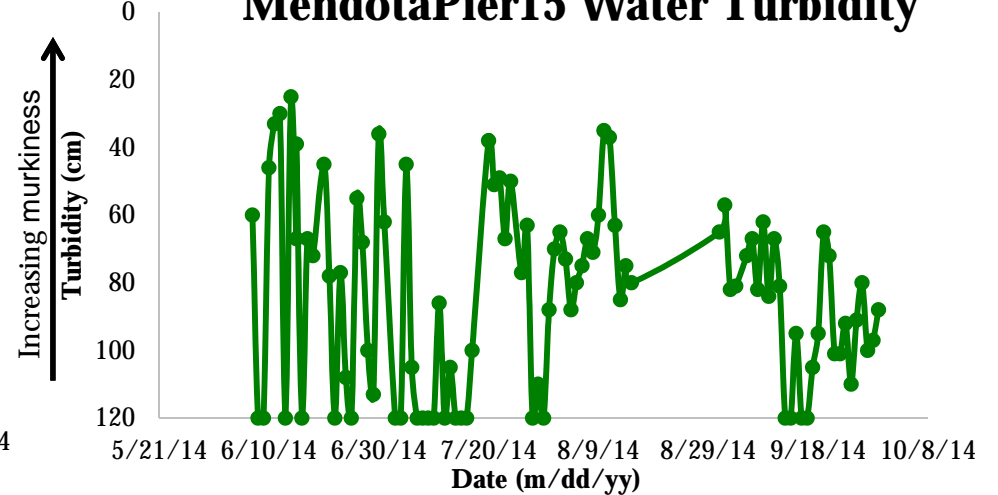
# MendotaPier15 Results



## MendotaPier15 Water Temperature



## MendotaPier15 Water Turbidity



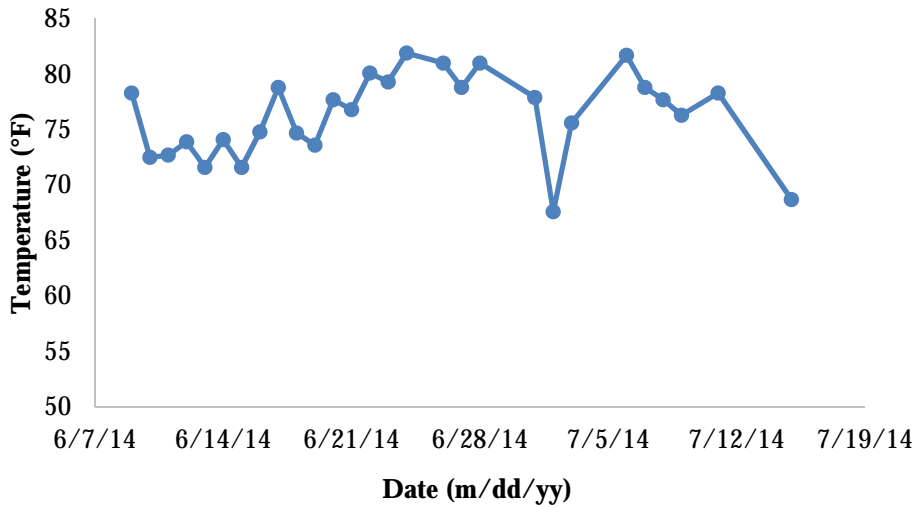
Data Summary	MendotaPier15	Lake Mendota
Number of Observations	95	455
% of Observations When Algae Present	6.3%	13%
Average Water Turbidity	83.9 cm	87 cm
Average Water Temperature	70.8 °F	73.5 °F
Average Total Phosphorus	0.059 mg/L	0.064 mg/L



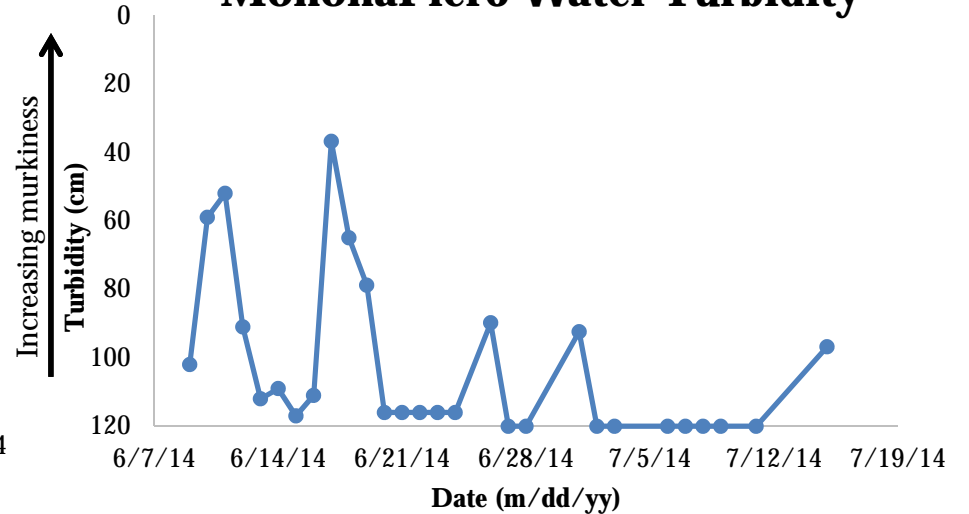
# MononaPier6 Results



### MononaPier6 Water Temperature



### MononaPier6 Water Turbidity



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

## Contributors

Aaron Larson  
Barb Tiedje  
Barb Woehrl  
Brian Parks  
Chin Wu  
Craig Barabas  
David Webb  
Doug Voegeli  
Emily Stanley  
Eric Janquart  
Heather Becker  
Jake Vander Zanden  
Jennifer Lavender Braun  
Joe Sweeney  
John Reimer  
Jordan Barrette  
Josh Herritz  
Kathleen Dax-Klister  
Ken Potter  
Kerry Martin  
Kirsti Sorsa  
Lisa Mertins  
Molli MacDonald

Pat Gorski

Shawn Marsh

Steve Carpenter

## Partners

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

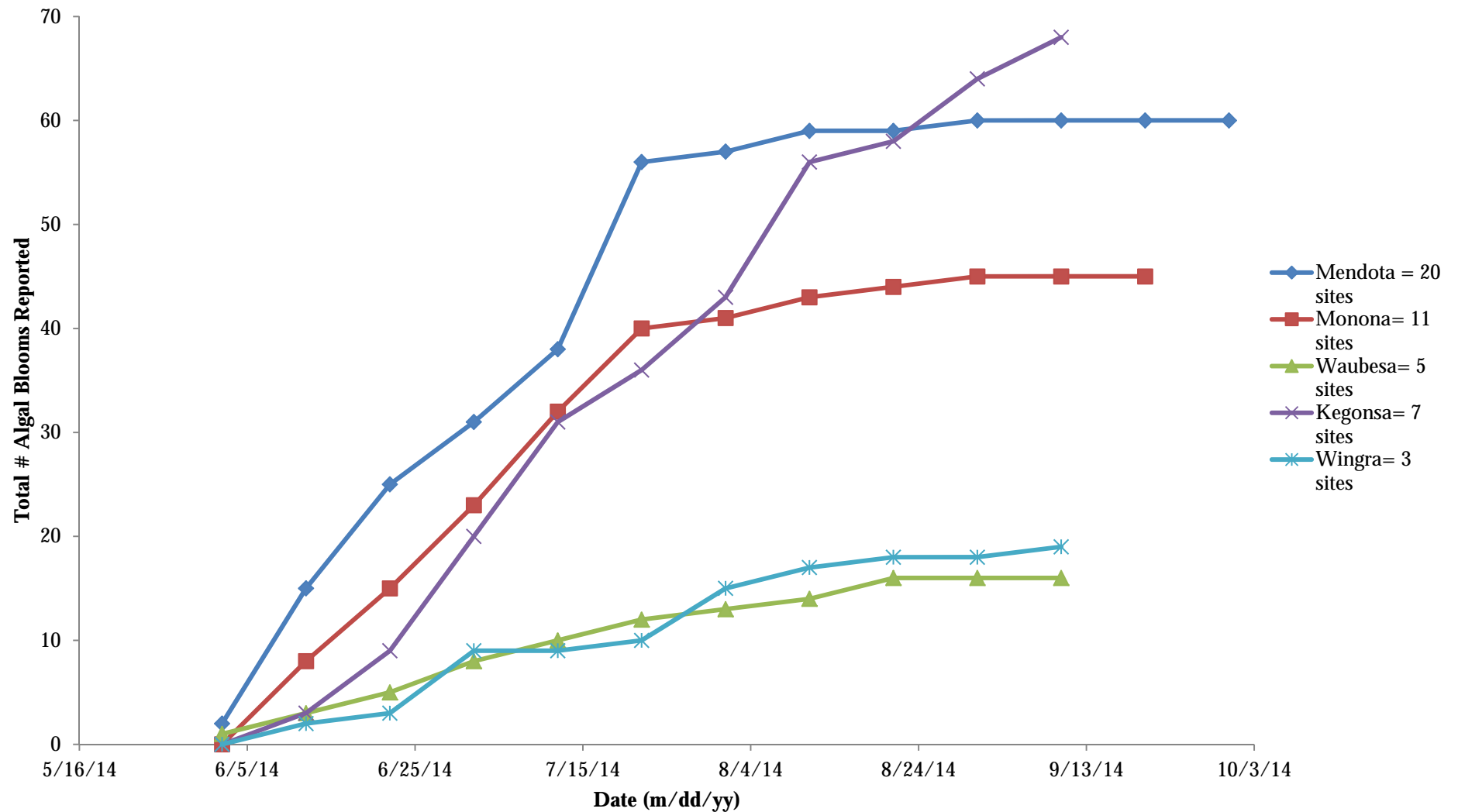
Paul Webb



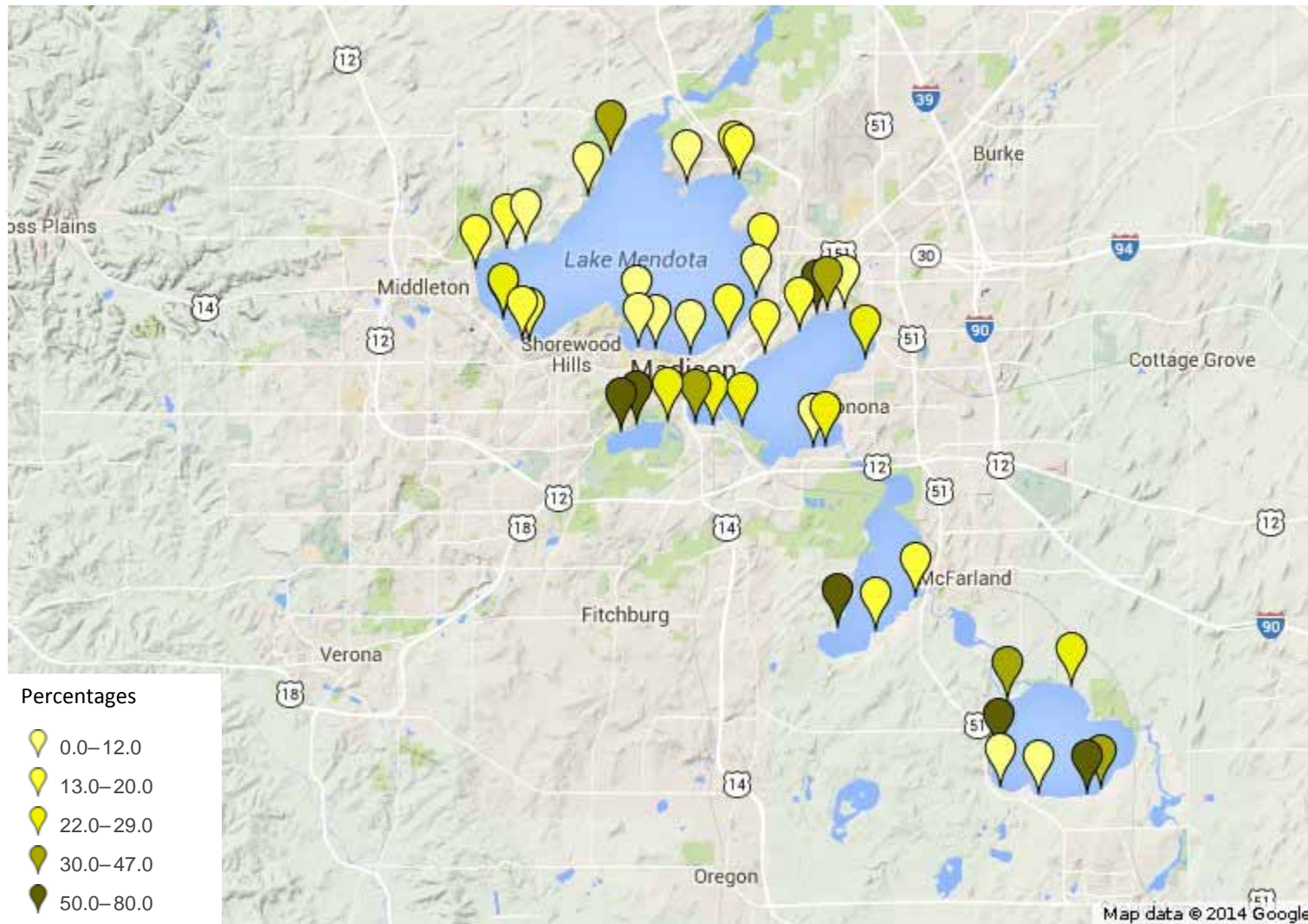
Center for Limnology  
University of Wisconsin-Madison

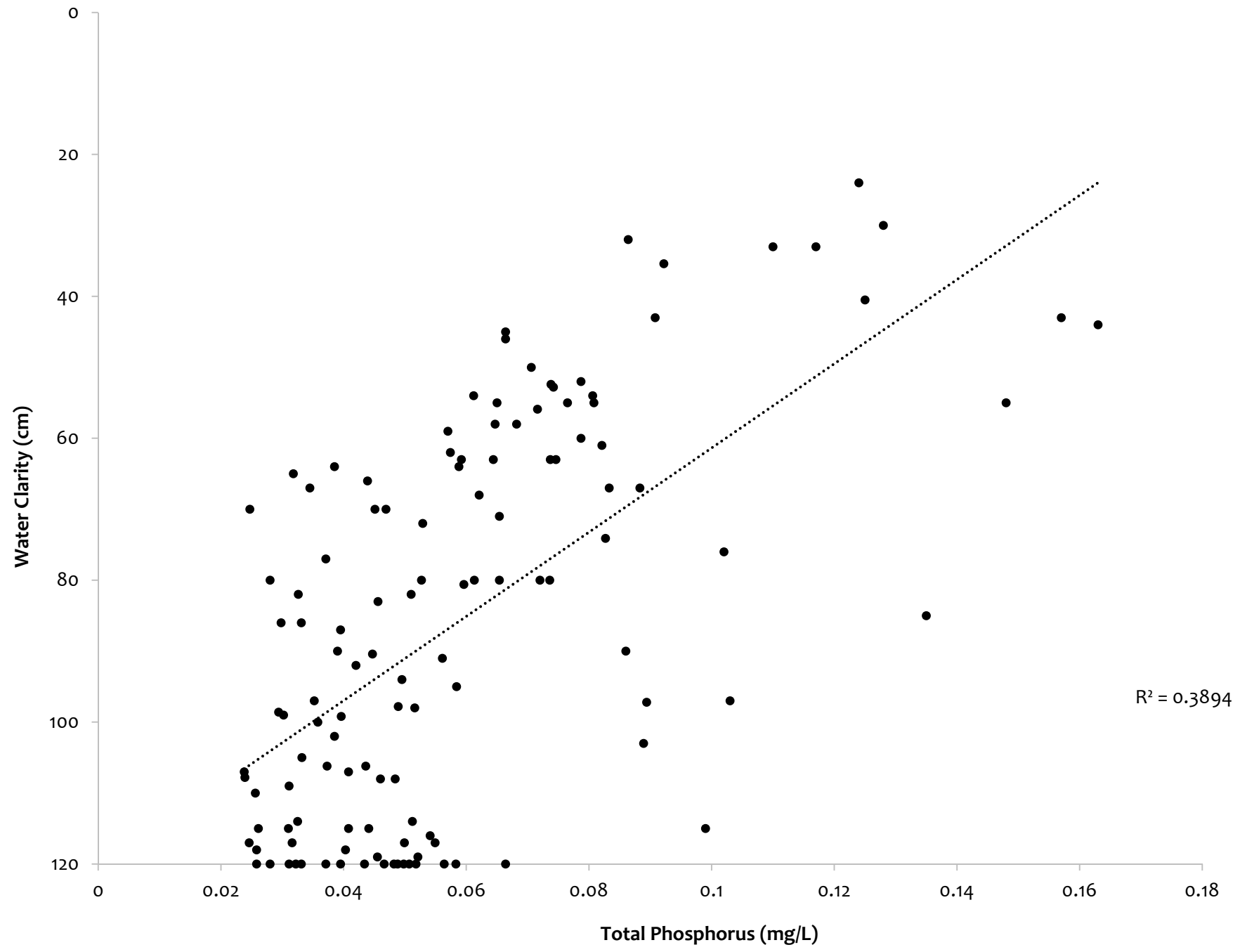


# Algal Blooms Reported By Lake in 2014 (May 27 – September 30)



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





# Future Plans

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

**2014 → 2015 → 2016**