



# Wisconsin and the Secchi Dip-In, 2010-2015

**Lauren Salvato, North American Lake  
Management Society  
Wisconsin Lakes Partnership Convention  
April 1, 2016**





## Mission Statement:

To involve citizen scientists in monitoring the water quality of North America's lakes and their watersheds

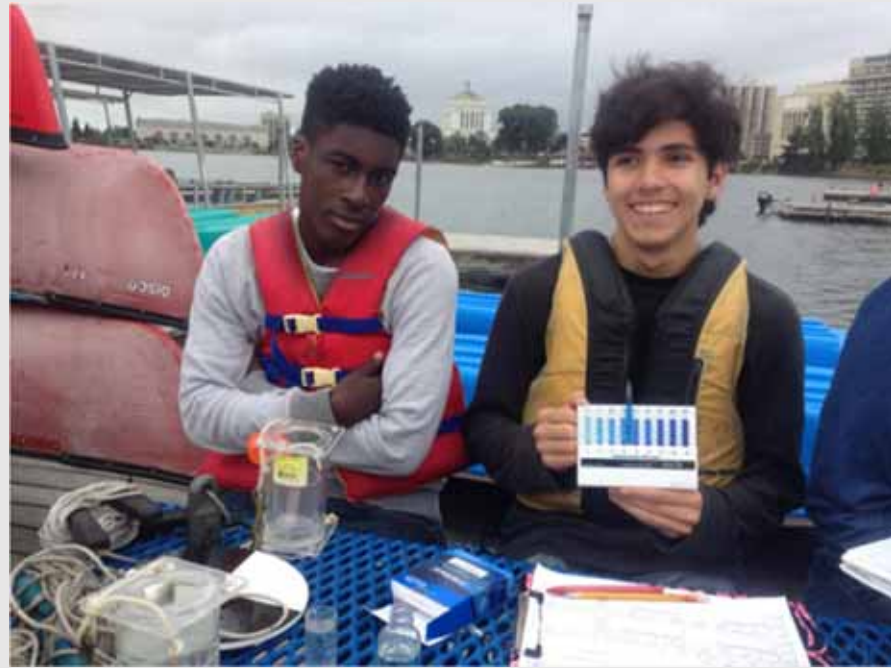
## What we do:

- Organize an annual data-gathering event during Lakes Appreciation month for North American lakes, reservoirs, and other waterbodies



Photo Credit: Brad Hufhines

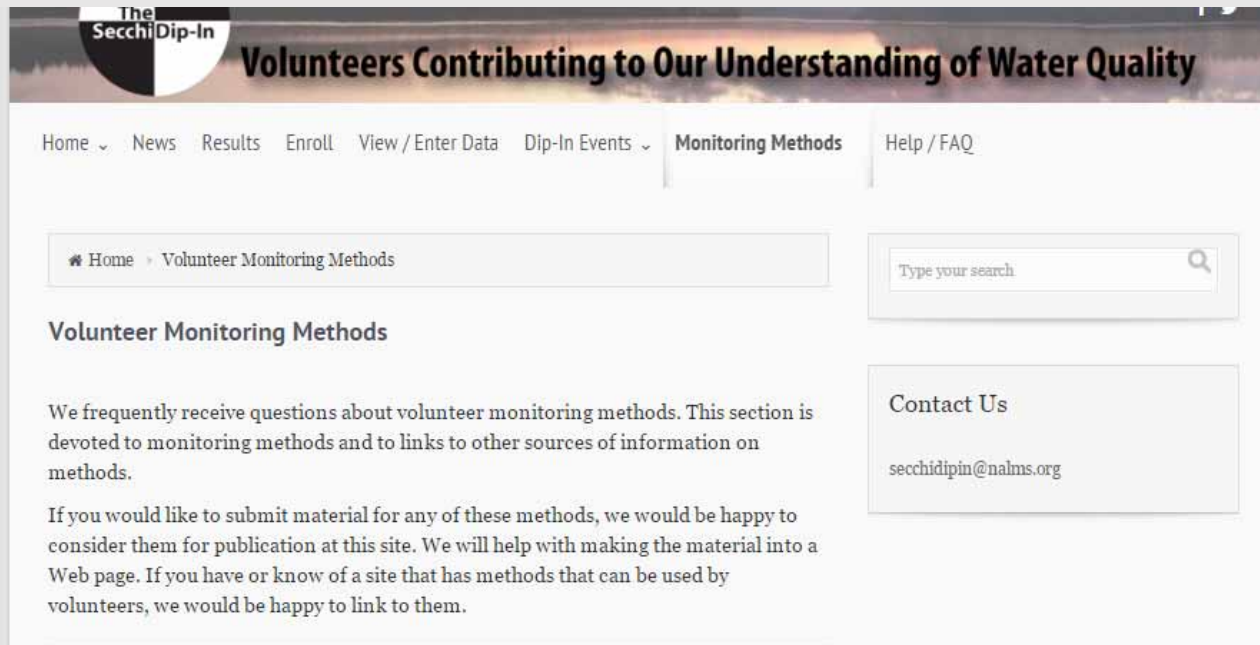
Beaver Lake Secchi Day August 2015



Oakland High School July 2015

# What we do

- Provide educational materials and training for anyone engaged in managing lakes and their watersheds



The screenshot shows the website for 'The Secchi Dip-In'. The header features the organization's logo and the tagline 'Volunteers Contributing to Our Understanding of Water Quality'. The navigation menu includes links for Home, News, Results, Enroll, View / Enter Data, Dip-In Events, Monitoring Methods, and Help / FAQ. The main content area is titled 'Volunteer Monitoring Methods' and contains a breadcrumb trail (Home > Volunteer Monitoring Methods), a search box, and a 'Contact Us' section with the email address secchidipin@nslms.org. The text explains that the site frequently receives questions about volunteer monitoring methods and offers to help with publication and linking to other sources of information.



## What we do

- Promote public awareness and stewardship of lakes and watersheds

Northern Indiana Lakes  
Festival June 2015

# What we do

- Maintain long-term transparency monitoring data for use in research on aquatic systems and the discovery of trends

[Return to Secchi Dip-In Home Page](#)

Welcome [Manage Profile](#)

Country:\*    
State/Province:\*    
Counties:   Lake Name:

View/Edit Lake Details	Add Lake	Enter New Data	View/Edit Data	Report	Fact Sheet	Graphs
Country	State	County	Lake Name			
USA	IN	Monroe	University Lake			

Lake: University Lake  
Country: USA  
State: IN  
County: Monroe  
Lake Type: reservoir  
Lake Size: <5 acres

# What we do

## THE 2015 SECCHI DIP-IN REPORT



- Prepare annual reports analyzing Secchi Dip-In data and make data available for all interested stakeholders



luntee

## Collinwood Lake July 2015



Photo Credit: Lake  
George Association and  
Doreen Nowak



# The First Great American Secchi Dip-In



Drs. Bob Carlson, Dave Waller and Jay Lee

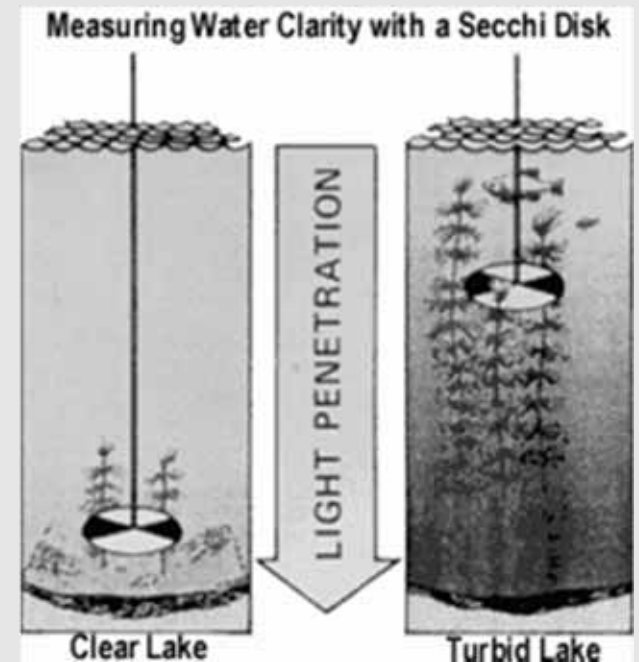
Photo: <http://www.secchidipin.org/index.php/about/about-us/>

- Kent State University, 1994
- Indiana, Illinois, Michigan, Minnesota, Ohio, and Wisconsin
- 800 volunteers
- 40% response rate from data solicitation



# The Secchi Disk

- The Secchi disk is utilized by volunteers to take disk transparency measurements on their waterbodies.
- Named after Father Pietro Angel Secchi, scientific adviser to the Pope
- A typical disk is a 20 cm with alternating black and white quadrants
- This basic tool is one of the oldest used by limnologists



Images: <https://www.pca.state.mn.us/water/citizen-lake-monitoring-program>  
<http://www.secchidipin.org/wordpress/wp-content/uploads/2015/04/secchi6.gif>

# Other transparency measurements

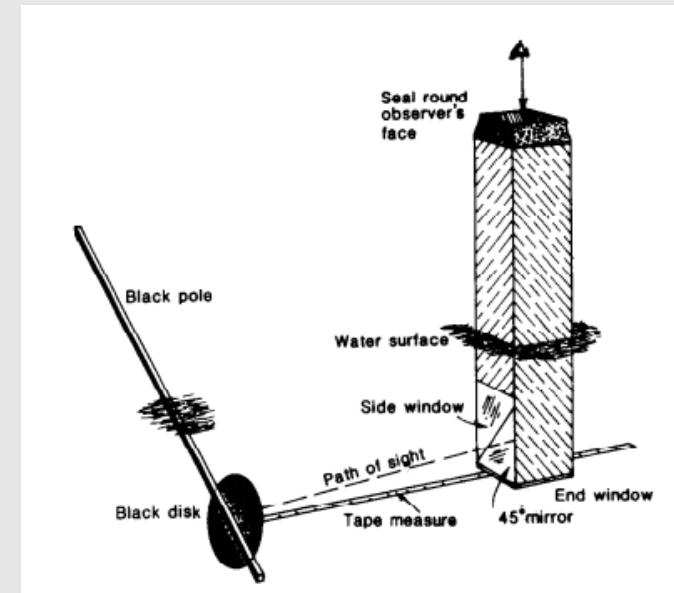
## Turbidity Tube



## Turbidity Meter



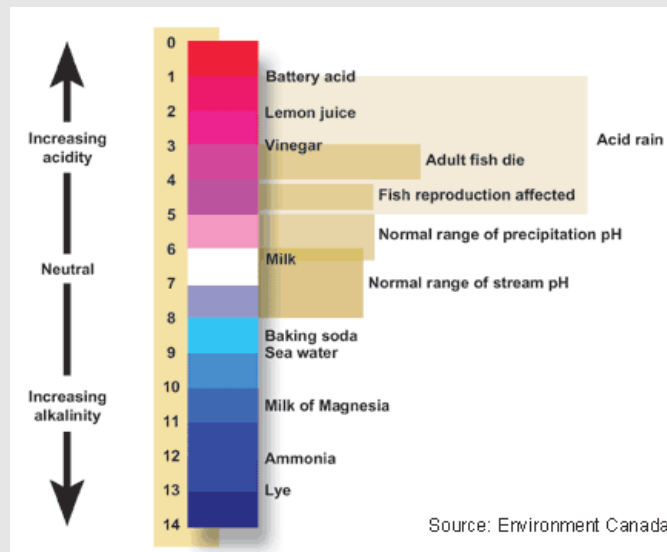
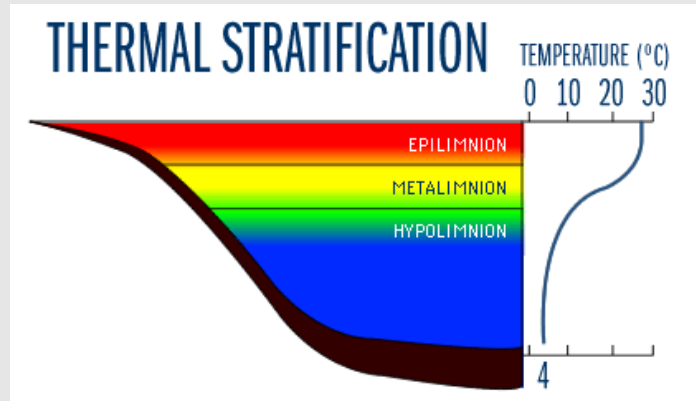
## Horizontal Black Disk



Images: <https://extension.usu.edu/utahwaterwatch/htm/tier-1/turbidity/>  
<http://www.instrumentchoice.com.au/instrument-choice/environment-meters/turbidity-meters>  
<http://www.horizons.govt.nz/assets/managing-our-environment/publications-consents/NZ-Energy/Council-evidence/Black-disc-protocol.pdf>

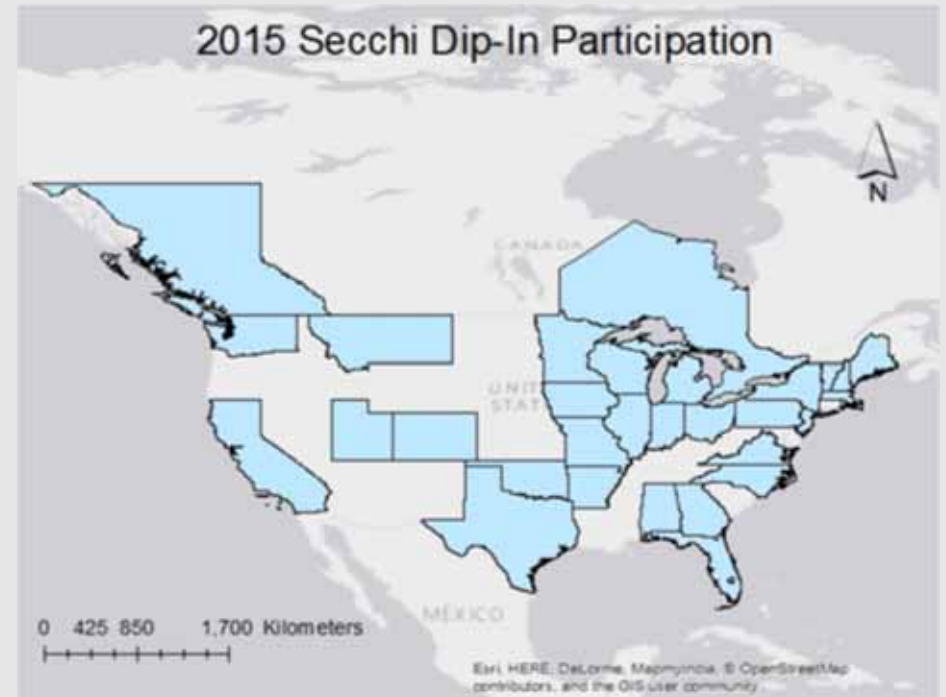
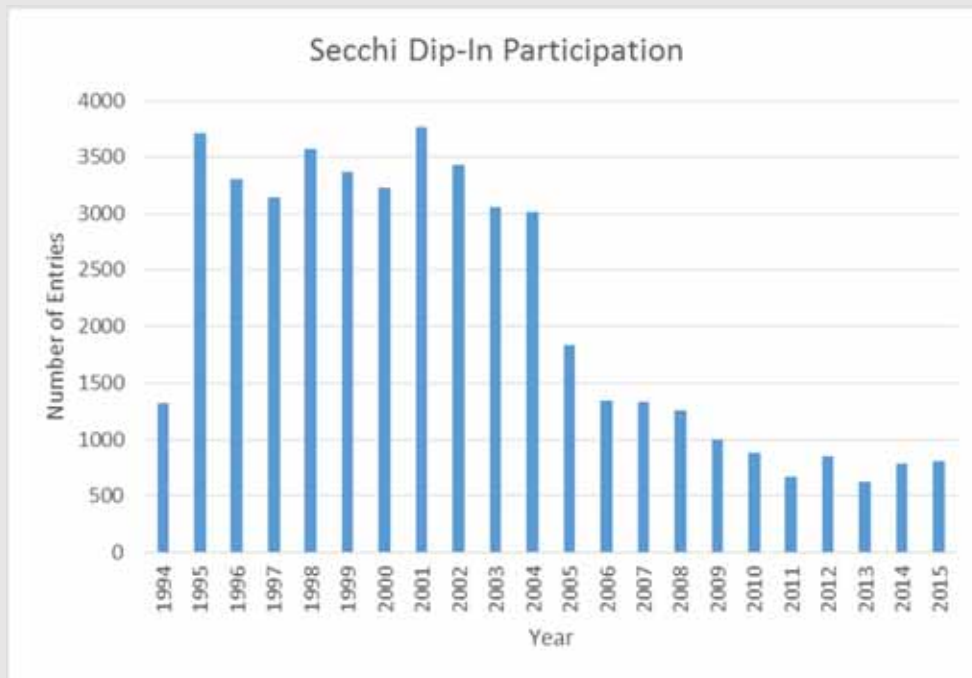
# Additional water quality parameters

- Temperature
- Dissolved Oxygen
- pH





# Secchi Dip-In Program Participation

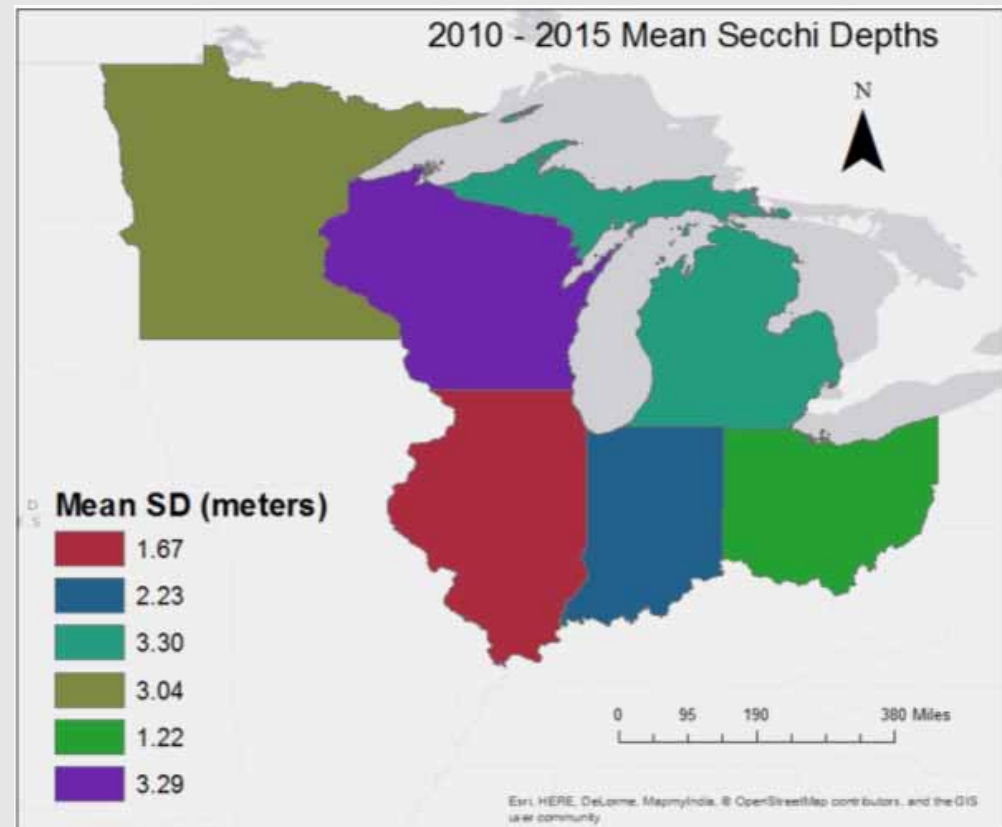


At its peak, the 2001 Dip-In had nearly 200 programs and 45 provinces and states participating

# Results

## Descriptive statistics, 2010 - 2015

State	Entries	Mean (meters)	Minimum	Maximum	Variance
Illinois	88	1.67	0.23	10.50	2.98
Indiana	227	2.23	0.43	7.35	1.55
Michigan	243	3.30	0.30	10.50	3.63
Minnesota	594	3.04	0.30	19.36	5.05
Ohio	22	1.22	0.23	2.93	0.39
Wisconsin	158	3.29	0.46	14.02	4.69



# Lake Classifications and Carlson Trophic State Index (TSI)

Classification	Oligotrophic	Mesotrophic	Eutrophic	Hypereutrophic
Transparency	Clear	Less clear	Transparency <2 meters	Transparency <1 meter
Nutrients	Low TP < 6 µg/L	Moderate TP 10-30 µg/L	High TP > 35 µg/L	Extremely high TP > 80 µg/L
Algae	Few algae	Healthy populations of algae	Abundant algae and weeds	Thick algal scum Dense weeds
D.O.	Hypo has D.O.	Less D.O. in hypo	No D.O. in the hypo during the summer	No D.O. in the hypo during the summer
Fish	Can support salmonids (trout and salmon)	Lack of salmonids, Walleye may predominate	Warm-water fisheries only. Bass may dominate	Rough fish dominate, summer fish kills possible May discourage swimming and boating
<b>TSI(Chl) = TSI(TP) = TSI(SD)</b>				

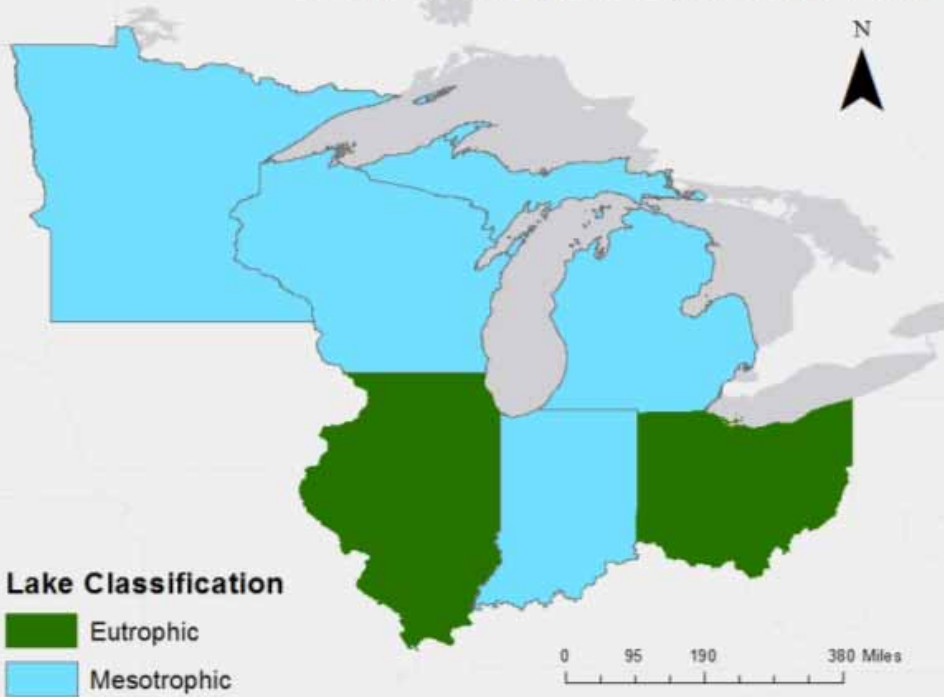
A numeric method for comparing lake data using Secchi depth, chlorophyll-a, total phosphorous and total nitrogen.

$$\text{TSI (SD)} = 10(6 - (\ln\text{SD}/\ln 2))$$



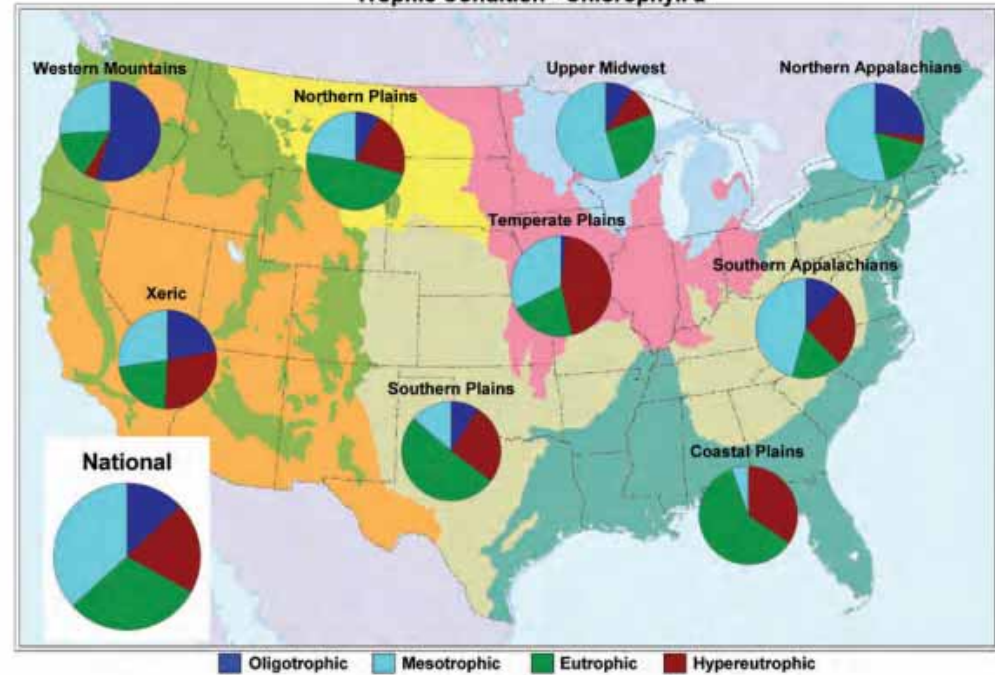
# Results

Secchi depth trophic states 2010 - 2015



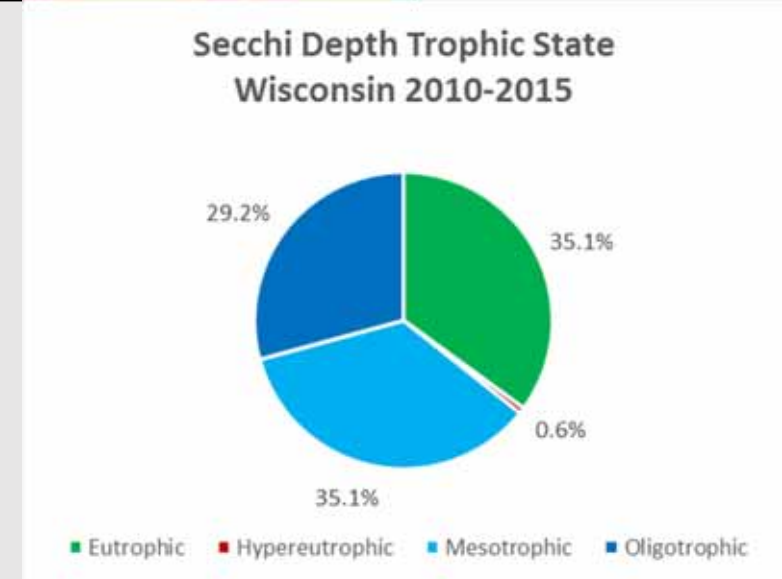
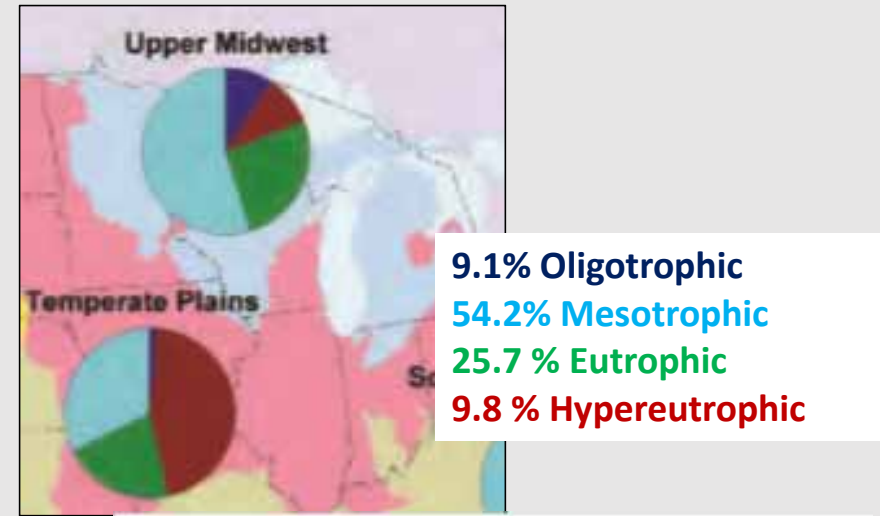
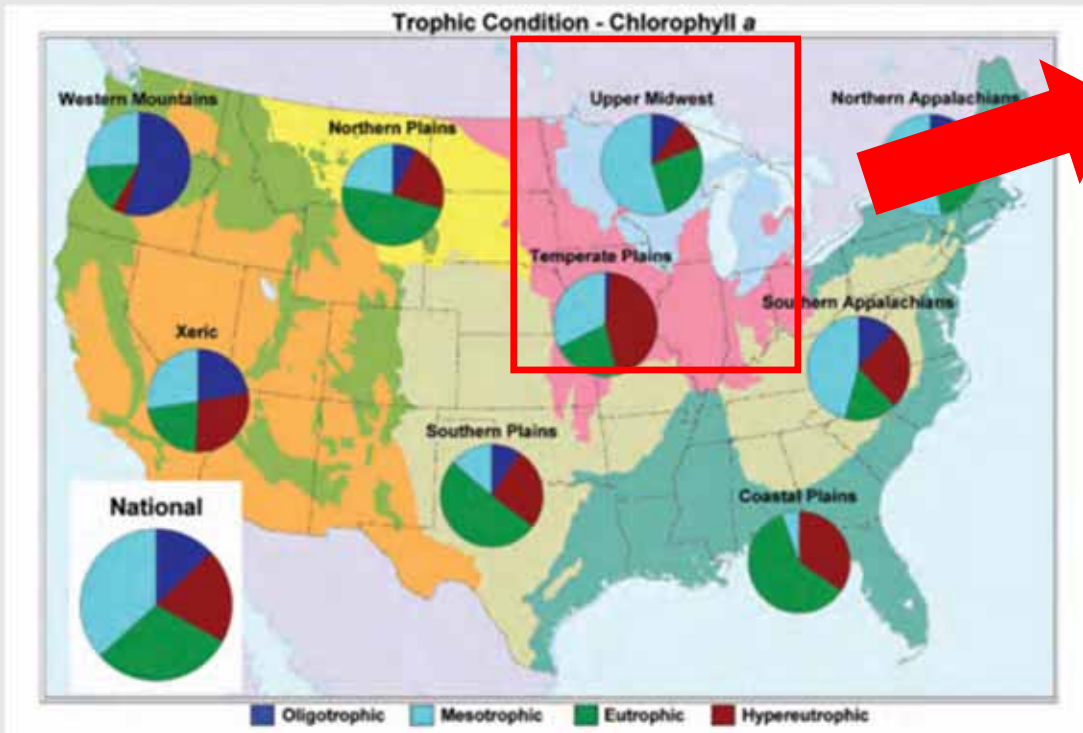
Env. HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

Trophic Condition - Chlorophyll a



From 2007 Chlorophyll-a trophic state across nine ecoregions (Level III) National Lakes Assessment

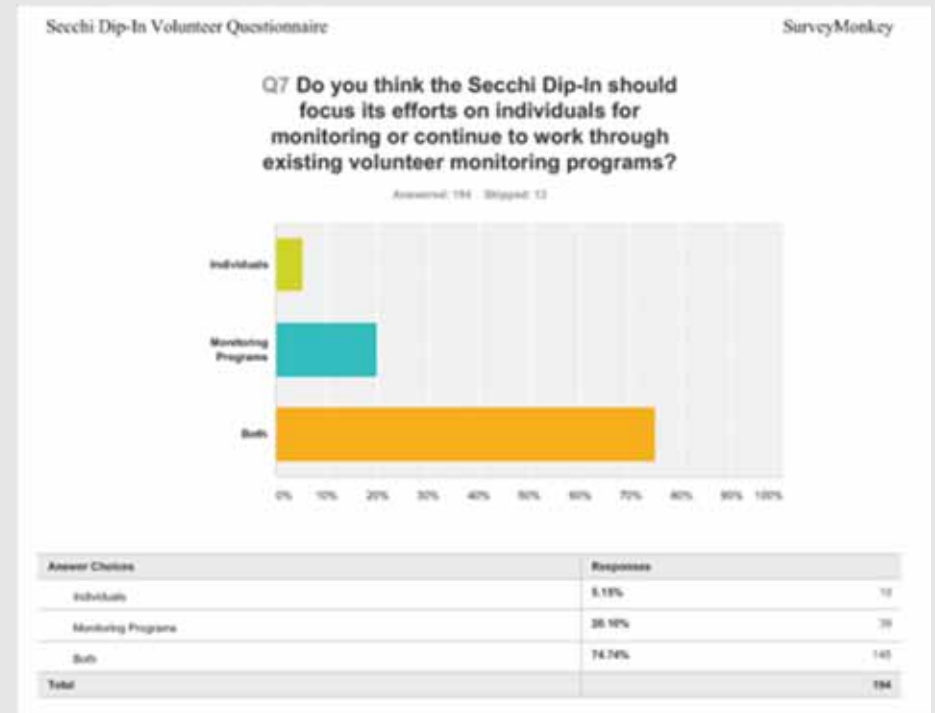
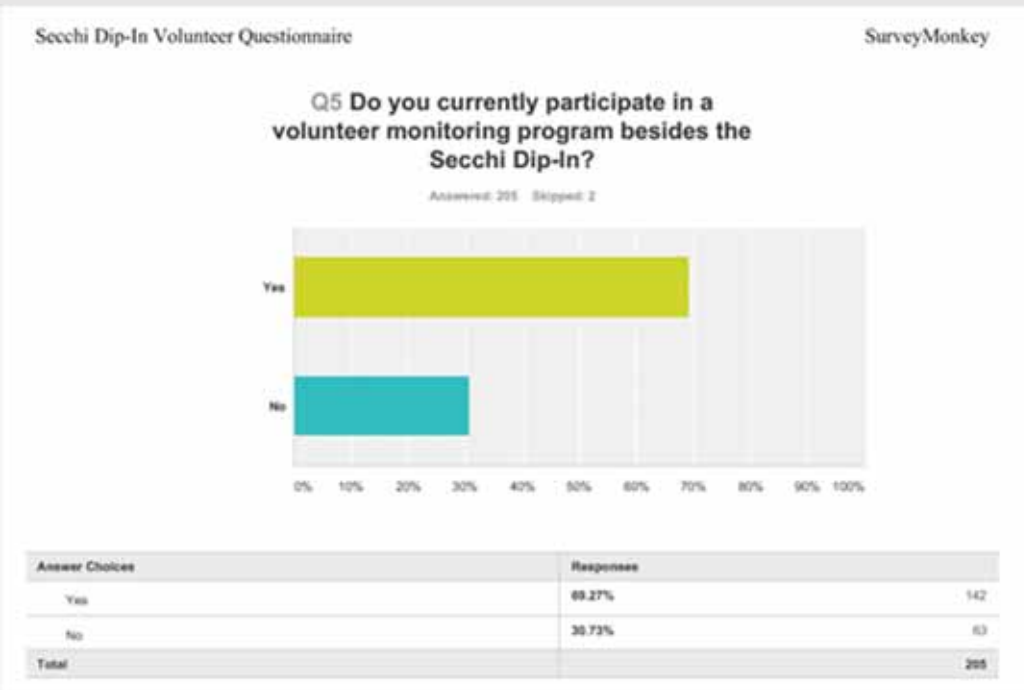
# Results



From 2007 Chlorophyll-a trophic state across nine ecoregions (Level III) National Lakes Assessment

# Lessons Learned from 2015 Dip-In

- Survey conducted in September 2015



# Lessons Learned

- Creative Outreach Campaign



## The 22<sup>nd</sup> Annual Secchi Dip- In begins July 1<sup>st</sup>!

Your participation gathering water transparency measurements is an invaluable part of the effort to monitor lakes around the world.

### Participate in the 2015 Secchi Dip-In!

(It's the whole month of July!)

2015 marks the 22<sup>nd</sup> anniversary of the Dip-In and the 150<sup>th</sup> anniversary of the very first Secchi dip by Father Pietro Angelo Secchi. Each summer Dip-In participants add their water transparency measurements to a unique effort and thus demonstrate that they are an invaluable part of the effort to monitor lakes around the world. We invite you to participate in this year's effort.

### Changes at Dip-In HQ

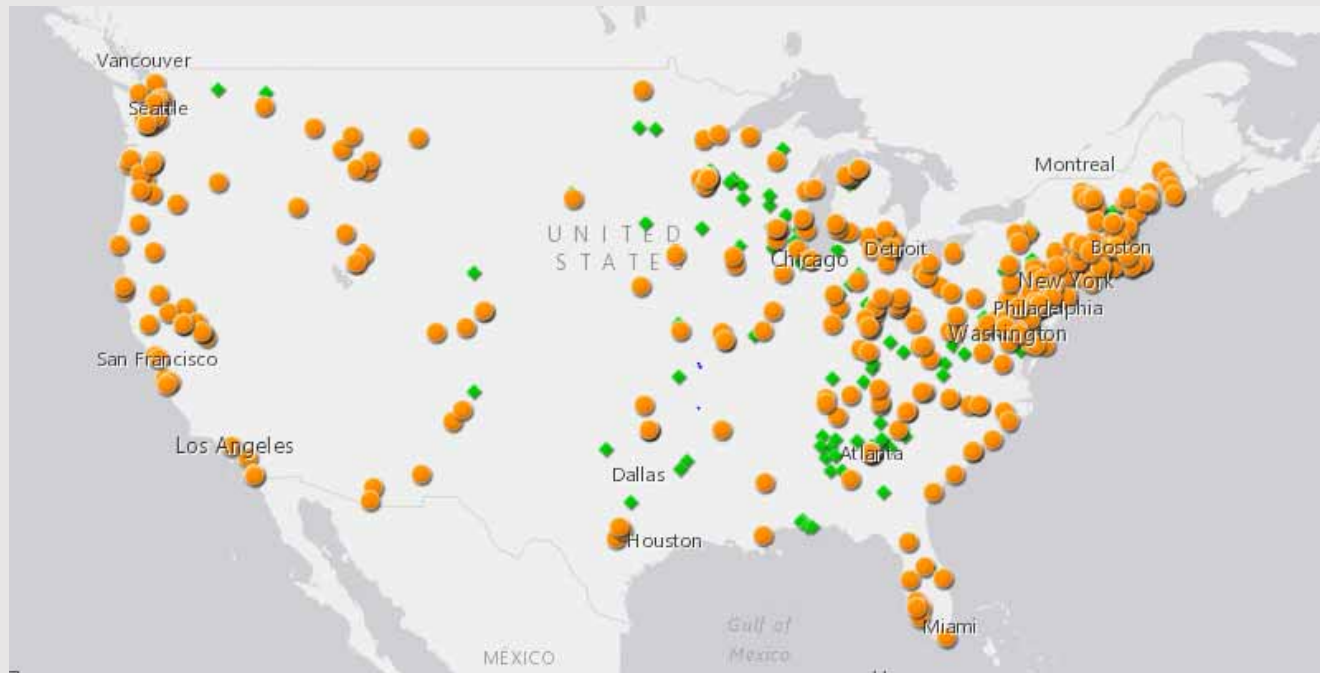
Dr. Robert Carlson, eminent limnologist and founder of the Secchi Dip-In program, has transferred its management to the North American Lake Management Society (NALMS). Over the years, NALMS has been a stalwart supporter of the Dip-In.

It was important to Dr. Carlson that the Dip-In endure after he retired from Kent State University, the longtime home of the Dip-In. NALMS was a natural choice to carry on that legacy given our long history together and how well the Dip-In fits with the mission of NALMS, "to forge partnerships among citizens, scientists, and professionals to foster the management and protection of lakes and reservoirs for today and tomorrow."



# Goals for the 2016 Dip-In

## Volunteer Water Quality Monitoring Directory of the US



- Incorporate individuals in addition to volunteer monitoring programs to expand citizen science across North America

Green represents monitoring subprograms

Orange represents monitoring programs



## Lake Observer App

Through a collaboration with the US Environmental Protection Agency, the North American Lake Management Society and Global Lake Ecological Observatory Network (GLEON) invited members to test the Lake Observer mobile app during the 2015 Secchi Dip-in.

<https://www.lakeobserver.org/>



# 2011 Report: Volunteer Water Monitoring Programs



## Program Affiliations

Thirty-six percent of programs reported an affiliation with Cooperative Extension (CE), the component of each state's Land Grant University that brings university knowledge and resources from the campus to local communities. There were between one and ten program responses per state.

Types of responding programs

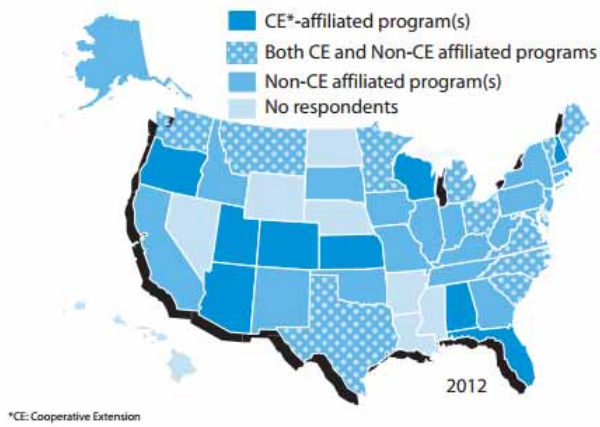
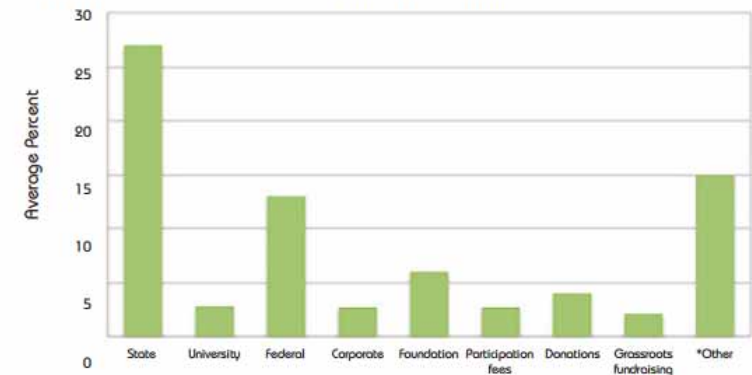


Figure 2.

## Top Program Concerns

### Program Budgets & Sources of Funding

Volunteer monitoring programs are quite cost-effective. Half of responding programs' annual budgets are less than \$50,000. Program budgets support between 0 and 15 full time equivalent (FTE) staff persons, with an average of 1.4 paid staff per program. The vast majority of programs rely on multiple sources of funding, which provide a measure of stability when one source ends. In general, state sources of funding are relied upon more often than other funding sources to support these volunteer monitoring programs.



\*"Other" sources of funding mentioned by respondents include grants and various fees assessed to local municipalities.

Figure 8.





Thank you

Lauren Salvato, Secchi Dip-In Program Coordinator  
[lsalvato@nalms.org](mailto:lsalvato@nalms.org)



# Volunteers Contributing to Our Understanding of Water Quality



Nancy Long, Ed.



Nancy B. Coon



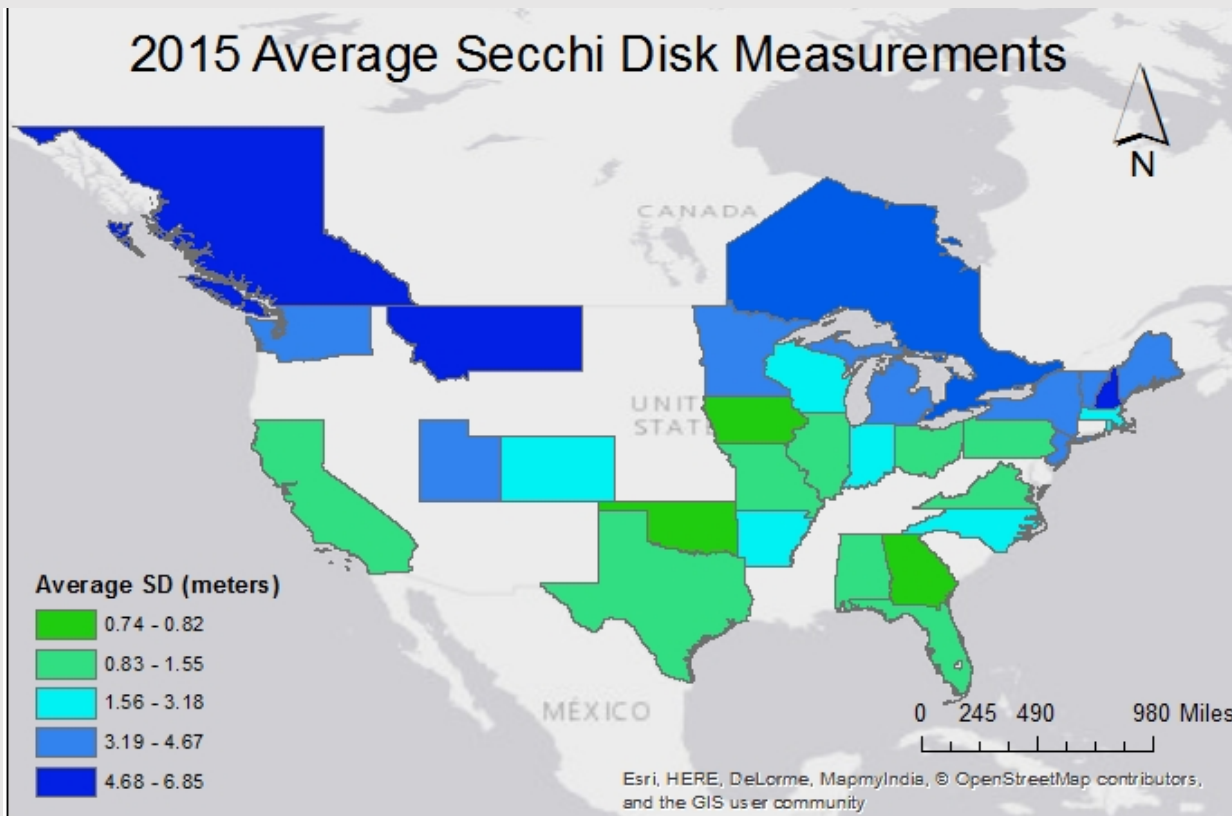
Nancy B. Coon

[www.secchidipin.org](http://www.secchidipin.org) | @SecchiDipIn

A Program of the North American Lake Management Society



# Results

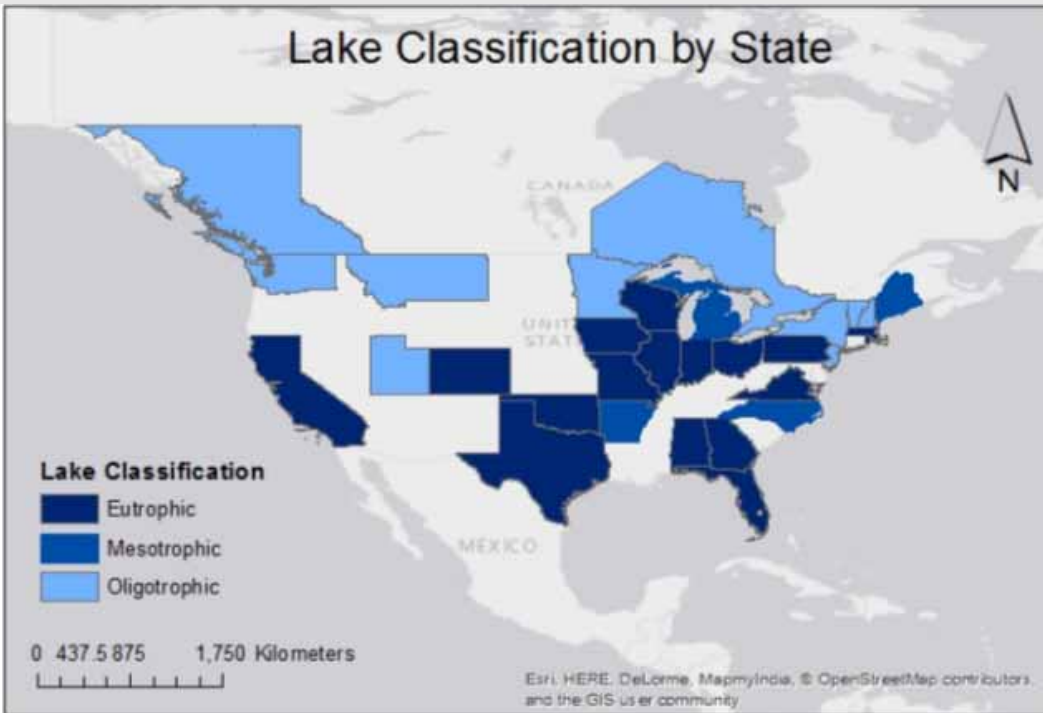


State	Observations	Mean (meters)	Minimum	Maximum	Variance
AL	3	1.47	0.60	3.01	1.79
AR	38	2.69	0.50	5.00	1.26
BC	48	6.85	1.24	22.00	26.94
CA	16	6.85	0.62	2.50	0.24
CO	10	1.34	0.76	6.30	3.21
FL	33	1.95	0.20	5.33	0.89
GA	9	0.78	0.28	1.08	0.07
IA	5	0.82	0.20	1.24	0.23
IL	21	1.35	0.43	3.81	0.81
IN	70	2.11	0.43	6.46	1.81
MA	13	2.16	0.40	4.50	1.46
ME	5	4.67	2.50	7.70	5.98
MI	25	4.24	1.68	7.93	3.66
MN	171	3.59	0.22	19.36	5.43
MO	2	1.30	1.09	1.50	0.08
MT	3	6.59	5.64	8.38	2.40
NC	2	2.68	2.00	3.35	0.92
NH	23	6.38	2.30	12.00	7.86
NJ	31	3.82	2.13	5.94	1.51
NY	32	4.42	0.40	11.00	5.74
OH	13	1.14	0.84	1.60	0.07
OK	71	0.74	0.08	1.90	0.14
ON	12	4.74	2.50	6.00	1.29
PA	36	1.55	0.40	4.30	0.54
RI	7	1.97	0.40	6.45	4.58
TX	5	1.09	1.04	1.15	0.001
UT	14	4.39	0.27	8.25	10.55
VA	21	1.14	0.30	2.42	0.32
VT	67	4.41	1.40	12.00	4.80
WA	10	4.15	1.00	7.60	8.33
WI	31	3.18	0.69	8.75	4.08

\*SD depth in meters

\*\* BC and ON are provinces in Canada

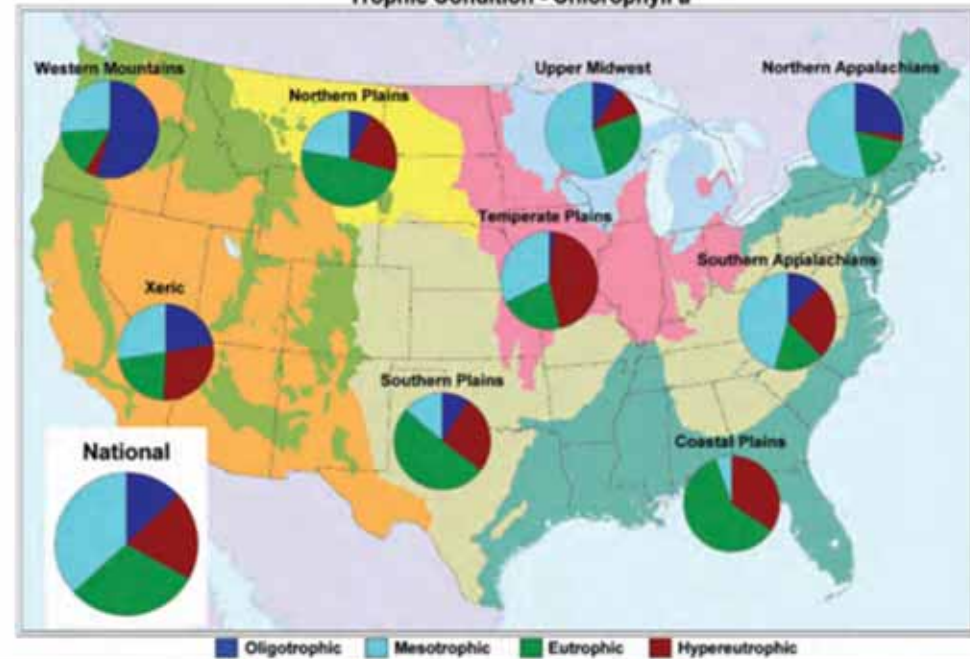
## Lake Classification by State



$$TSI (SD) = 10(6 - (\ln SD / \ln 2))$$

$$TSI(CHL) = 9.81 \ln(CHL) + 30.6$$

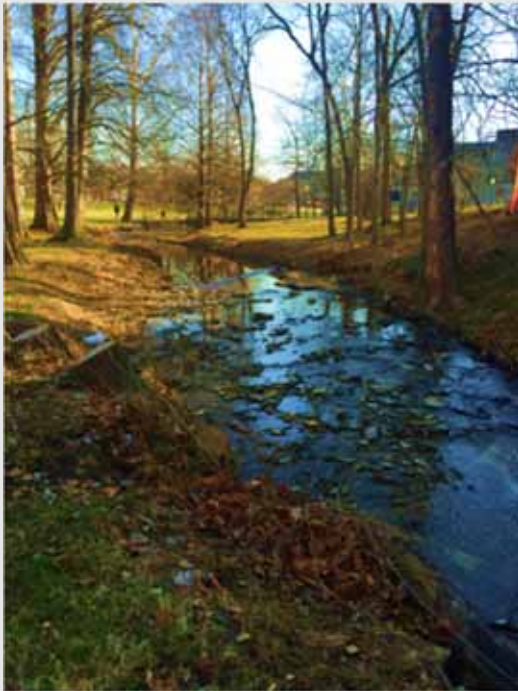
## Trophic Condition - Chlorophyll a



Chlorophyll-a trophic state across nine ecoregions (Level III)  
From 2007 National Lakes Assessment

# April 16, 2016

Citizen Science Day event at the Jordan River, Indiana University Bloomington campus



the WHITE HOUSE PRESIDENT BARACK OBAMA

Contact Us Get Email Updates

BRIEFING ROOM ISSUES THE ADMINISTRATION PARTICIPATE 1600 PENN

HOME - BLOG

## Accelerating Citizen Science and Crowdsourcing to Address Societal and Scientific Challenges

SEPTEMBER 30, 2015 AT 6:00 AM ET BY TOM KALIL AND DAVE WILKINSON

Twitter Facebook Email

Summary: Today, the White House is hosting a forum on citizen science and crowdsourcing.

While only a fraction of Americans are formally trained as professional scientists and engineers, everyone can contribute to science, engineering, and technology through open science and innovation approaches, such as citizen science and crowdsourcing projects.

Photo Credit: Lauren Salvato

Links: <http://staging.citizenscience.org/2016/02/22/downloadable-logos-for-citizen-science-day/>