



Welcome to MiCorps Cooperative Lakes Monitoring Program's Annual Training.

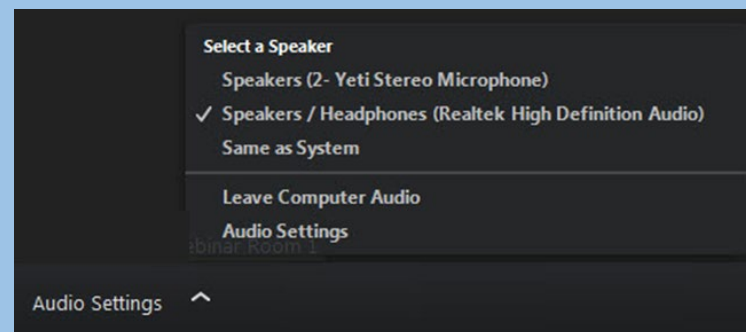
- For CLMP procedures and data forms please visit: micorps.net/lake-monitoring/clmp-documents/ and then click on the name of the parameter.

Today's Agenda:

9:00 AM – 9:15 AM	Welcome and CLMP Review
9:15 AM – 10:15 AM	<u>Secchi Disk & Phosphorus</u>
10:15 AM-10:30 AM	BREAK
10:30 AM – 12:00 PM	Chlorophyll-a (algae indicator)
12:00 PM – 1:00 PM	Lunch
1:00 PM – 2:00 PM	Dissolved Oxygen and Temperature
2:00 PM – 3:00 PM	Score the Shore
3:00 PM – 3:15 PM	BREAK
3:15 PM – 4:30 PM	Exotic Aquatic Plant Watch

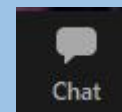
Getting Started

- Audio is through your computer speakers or headset: **You may not hear sound until training begins.**
- Use the **Audio Settings** option to do a sound check.
- During the webinar if you do not hear audio, make sure your sound is turned on then contact the **Help Desk**.



How to Ask Questions

- Click on the Chat Icon to submit a question to the presenters.



Help Desk

Call the Distance Learning Help Desk (800) 500-1554 for technical support.

Cooperative Lakes Monitoring Program



Secchi Disk Transparency and Total Phosphorus

Erick Elgin

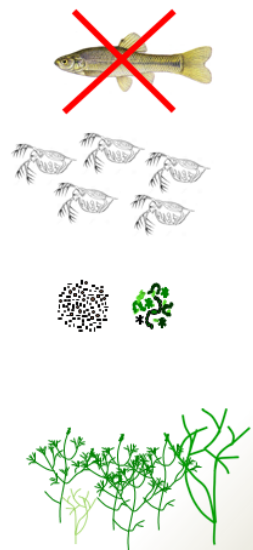
CLMP Lake Program Manager



Michigan State University
Extension

218-340-5731

elgineri@msu.edu



Planktivores

↓ (-)

Large-bodied
zooplankton

↓ (-)

Phytoplankton
& **Resuspended
sediments**

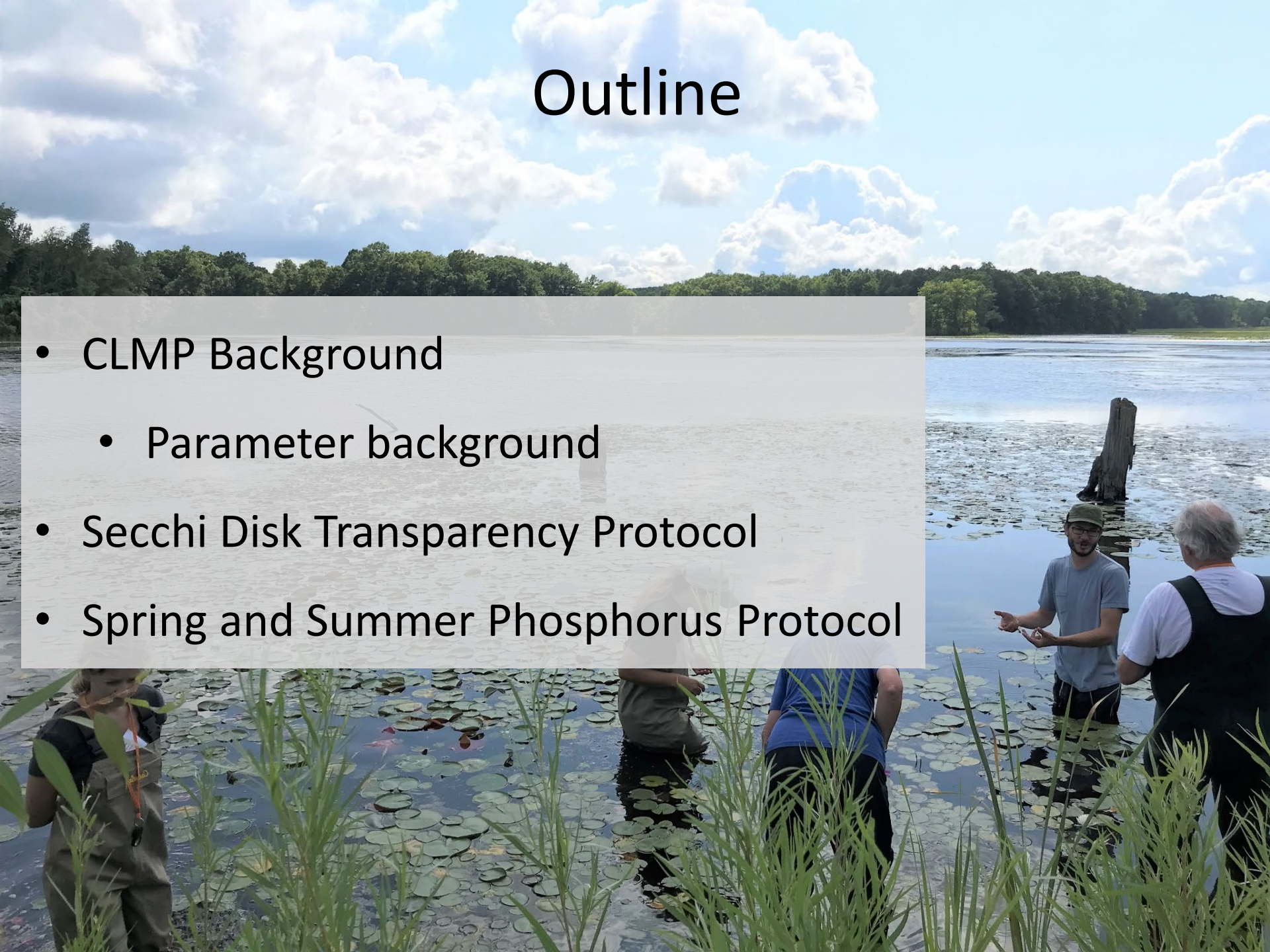
↑ (-)
↓ (-)

Macrophytes



Outline

- CLMP Background
 - Parameter background
- Secchi Disk Transparency Protocol
- Spring and Summer Phosphorus Protocol



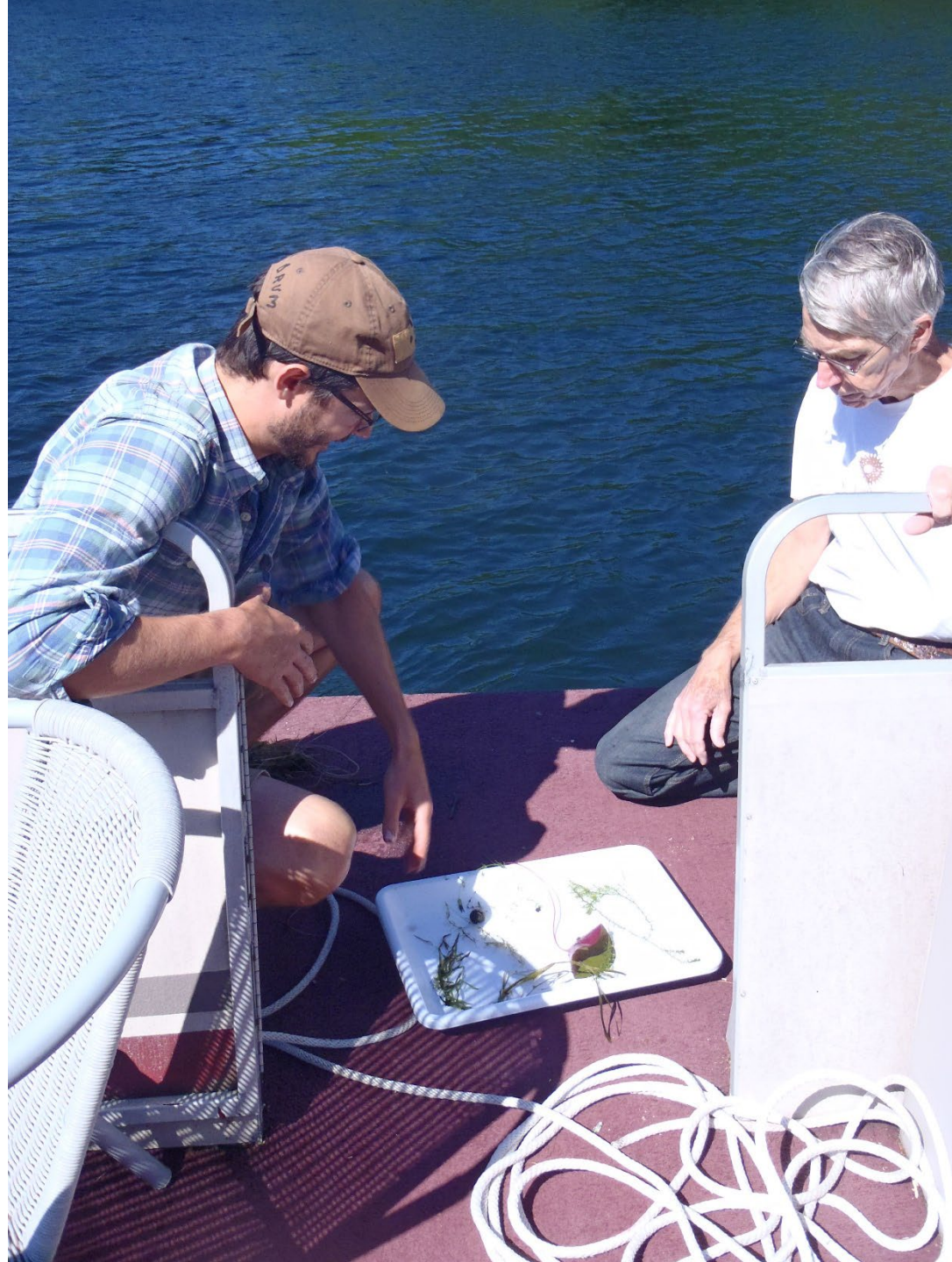
The Self-Help Program Legacy



- ❑ **1974:** Secchi disk - second oldest program in country
- ❑ **1993-1998:** added spring and summer total phosphorus and summer chlorophyll
- ❑ **2000:** added dissolved oxygen/temperature
- ❑ **2001:** added aquatic plant surveys
- ❑ **2011:** added Exotic Aquatic Plant Watch
- ❑ **2016:** added Score the Shore

CLMP Goals

- A cost effective volunteer framework for: **reliable, long-term, baseline data** collection
- Helps improve the understanding and management of your lake
- Online database that stores your lake data
- Training opportunities

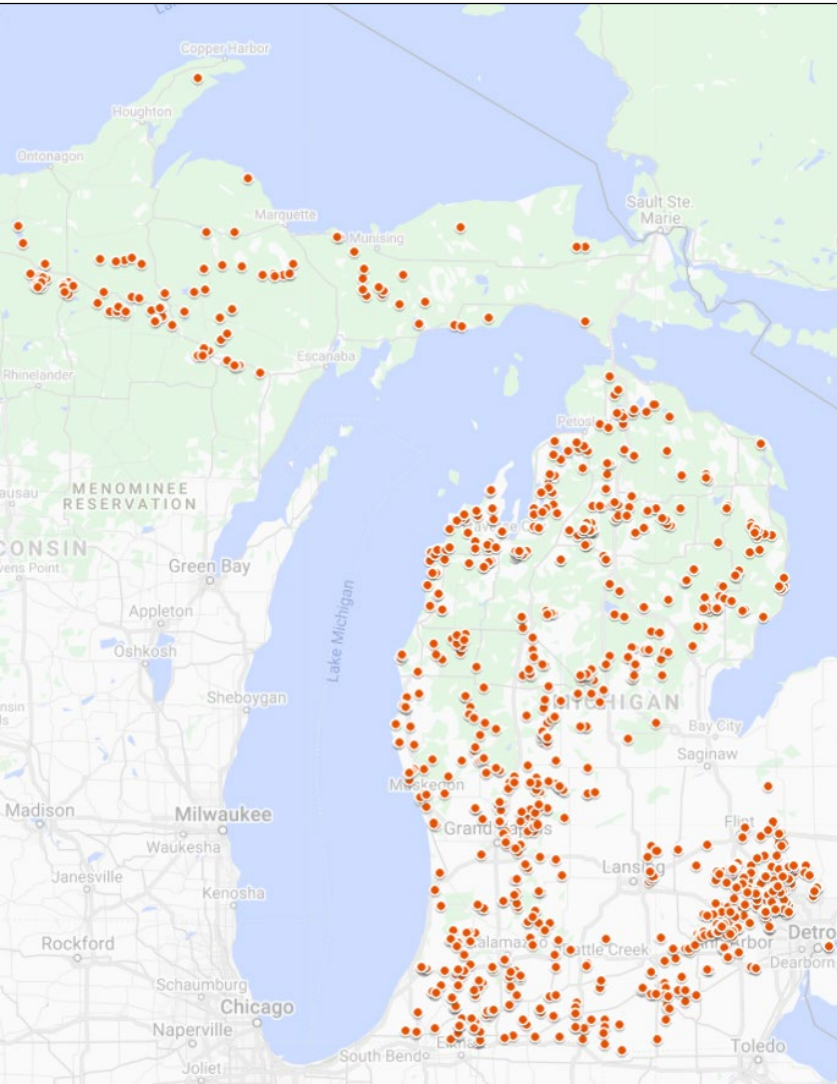


CLMP – Monitoring First



- The CLMP focuses on baseline, long-term lake monitoring.
- This doesn't mean we aren't interested in management, but lake management is a different discussion.
- Today we are focused on monitoring.

We collect a lot of wonderful data



Michigan Clean Water Corps

Search...

About Lake Monitoring Stream Monitoring Data Exchange Resources

MiCorps Data Exchange Search Results

Download in Excel New Search

Searched by:county:Oakland

From:January, 01 1970 toNovember, 12 2021

Sort by: County Watershed

Page 1 of 29

5, 10, 25 sites per page

County HUC and Watershed	Lake Name	STORETID
Oakland 4090005Huron	Angela	631121

Secchi

Date	Time	Depth	Weather
Sep 17, 2019	13:30:00	6 ft	Windy
Sep 13, 2019	14:30:00	5 ft	Windy
Sep 7, 2019	16:15:00	6 ft	Windy
Aug 29, 2019	12:20:00	5 ft	Windy
Aug 19, 2019	15:30:00	4 ft	

[View Graph](#)

[View Graph](#)

[View Graph](#)

[View Graph](#)

[View Graph](#)

Resources

Resources on MiCorps.net

- Fact sheets for each CLMP parameter
- **Protocol manual**
- Historical CLMP Reports
- All data forms, schedules, and **quick protocols**
- Training videos

micorps.net → Lake Monitoring →
CLMP Documents



Chlorophyll a

What do chlorophyll measurements tell us about a lake?

What is chlorophyll a ?

Chlorophyll is the pigment that allows plants (including algae) to use sunlight to convert simple molecules into organic compounds via the process of photosynthesis. Of the several kinds of chlorophyll, chlorophyll a is the predominant type of found in green plants and algae. Measuring chlorophyll a concentrations in water is a surrogate for an actual measurement of algae biomass, which is far more expensive and time consuming.

Why is chlorophyll important to a lake?

Some amount of algae is naturally present in lakes. By measuring chlorophyll a , we are determining the amount of food available to fuel the lake's food web. Too little chlorophyll a indicates that there may not be enough food to support an abundant biological community. On the other hand, too much chlorophyll a indicates that nutrient levels in the lake may be artificially

high. This is a problem because unconsumed algae sink to the bottom and decays, a process that depletes deeper water of oxygen. In severe cases, all of the lake's oxygen can become depleted, resulting in fish kills. In addition, a nutrient enriched lake is less appealing for recreational activities like boating and swimming.

What affects chlorophyll?

Algae growth, and thus chlorophyll a levels, is directly affected by the amount of phosphorus in a lake. Phosphorus is naturally occurring element in the sediment, water, and biology of a lake. Some lakes naturally have more phosphorus than others. However, humans often introduce extra phosphorus into a lake through poorly maintained septic systems and lawn fertilizer, among other sources.

How is it measured?

The amount of chlorophyll in an algal cell varies among algae species as well as with changing light conditions at different depths within the lake. Changing seasons also create different light conditions that, in turn, affect chlorophyll production. To account for some of this variability, in the Cooperative Lake Monitoring Program (CLMP), volunteers monitor chlorophyll a during five mid-month sampling events over the summer season (May through September) using a water column composite sampling

technique. The sample is taken by rapidly dropping the sampler down and then slowly and methodically pulling it up so the bottle collects water throughout the photic zone. The photic zone of the lake is the upper portion of the water column where sunlight penetrates and supports growth and reproduction of free-floating algae. The CLMP program defines the photic zone as twice the Secchi disk depth up to the lakes surface.



Once the water sample is obtained, CLMP volunteers push a known volume of water through a filter, which collects the algal cells. The filter is frozen and sent to a water lab for analysis. The amount of chlorophyll a is reported as $\mu\text{g/L}$.



Bruce Lichliter, CLMP volunteer from Big Glen Lake, prepares to lower the water column composite sampler into the water.



The CLMP is the lake monitoring program of the Michigan Clean Water Corps (MiCorps). MiCorps was created through an executive order by Governor Jennifer M. Granholm to assist the Department of Natural Resources and Environment in collecting and sharing water quality data for use in water resources management and protection programs. For more information about the MiCorps program, please visit www.micorps.net.

Monitoring Parameters

- Water Clarity
- Total Phosphorus
- Chlorophyll a
- Dissolved Oxygen
- Temperature
- Aquatic Plants
- Aquatic invasive plants
- Shoreline surveys

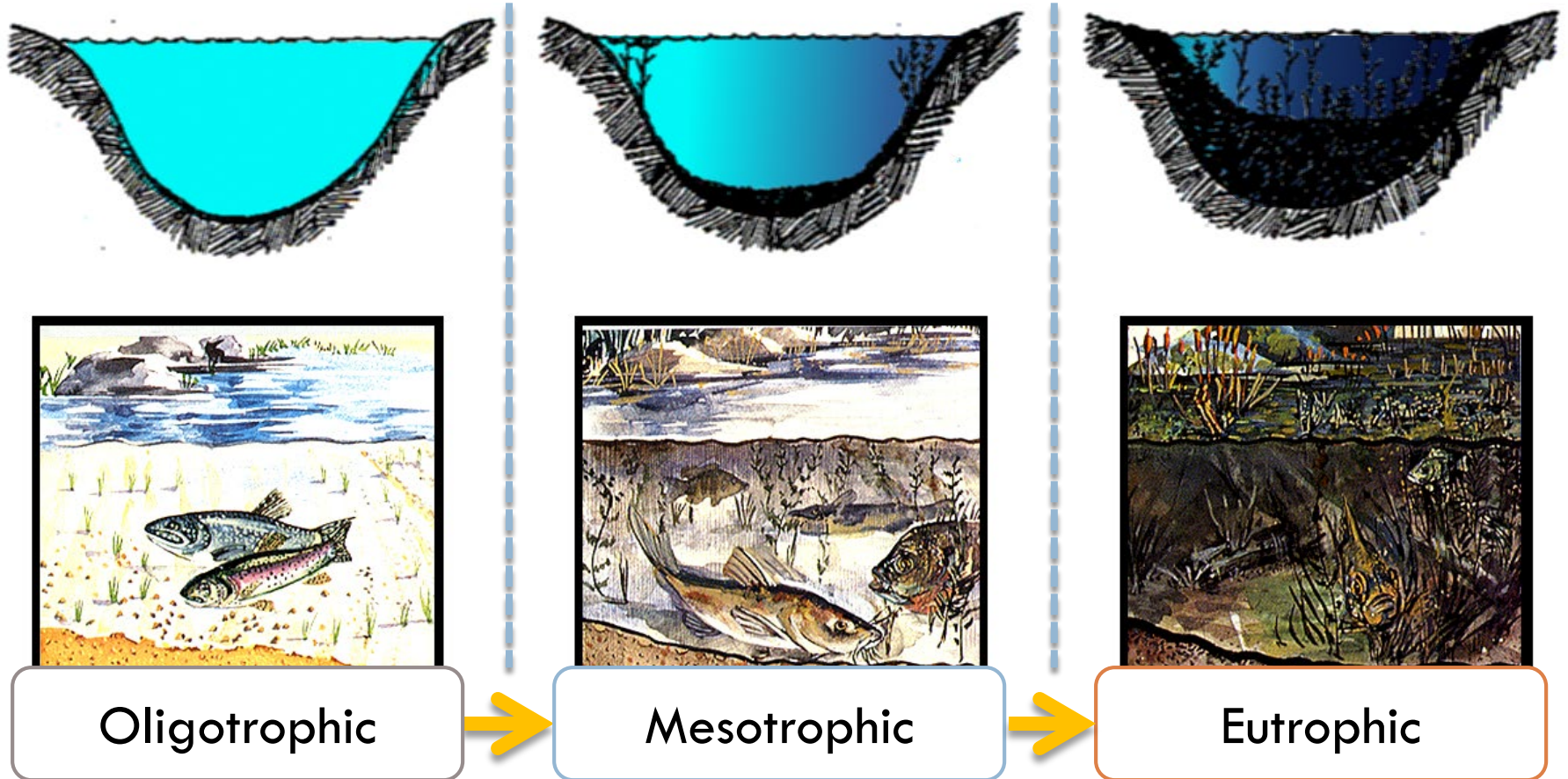


TROPHIC STATUS

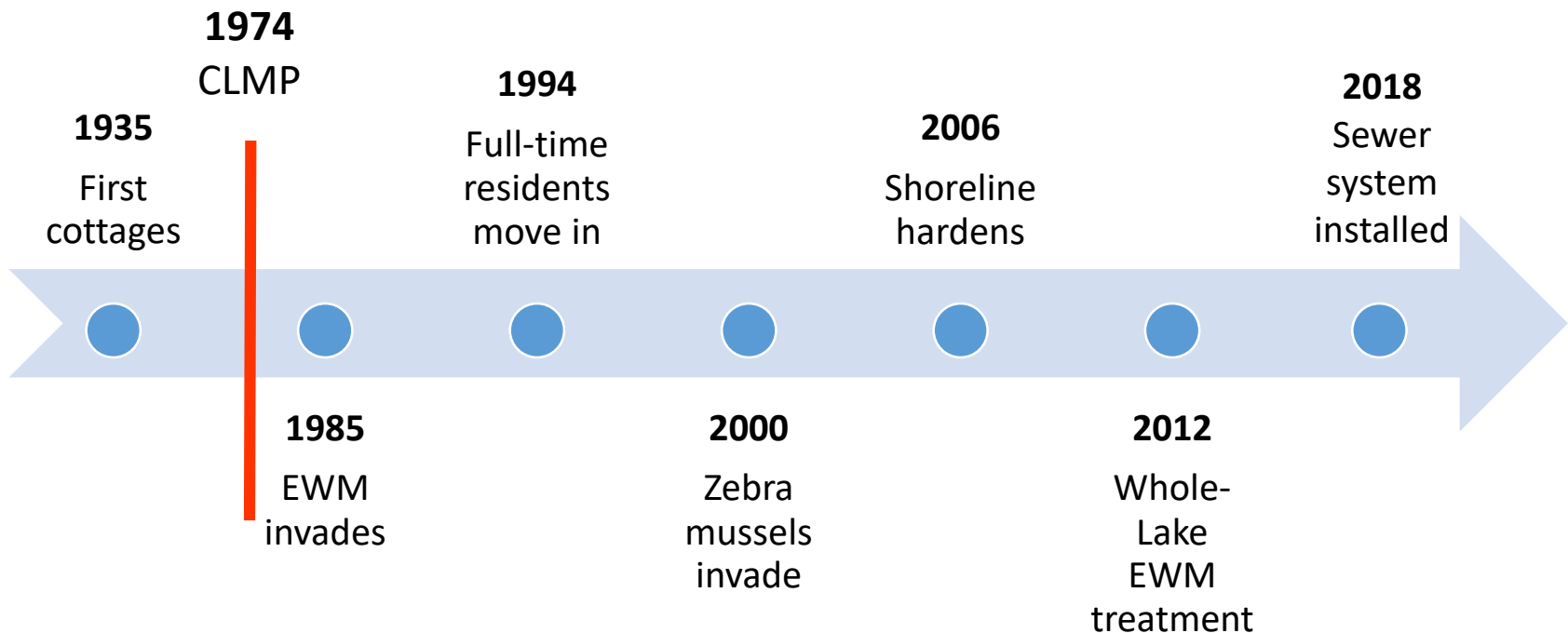
- **Trophic Status**: description of how productive a lake is.
- **Productivity**: the amount of plant or animal life that a lake can support
- **Indicators**: Transparency, Total phosphorus, and Chlorophyll a



TROPHIC STATUS



Benefit of long-term monitoring: You capture the history of your lake



Secchi Water Transparency Protocol

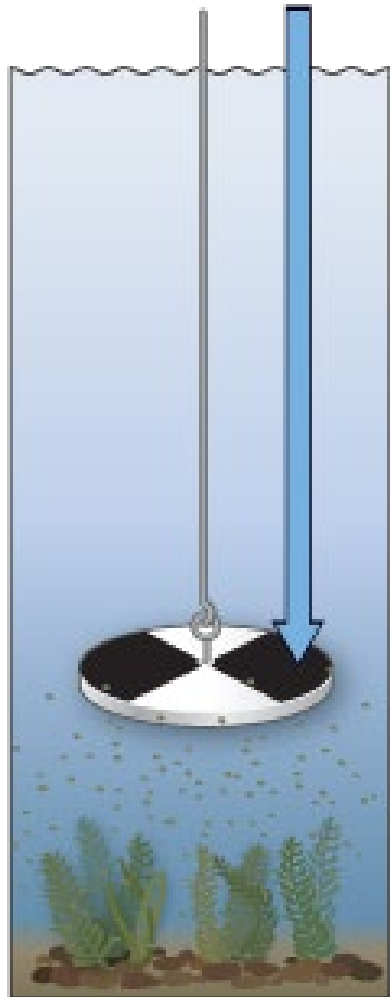


What is a Secchi Disk?

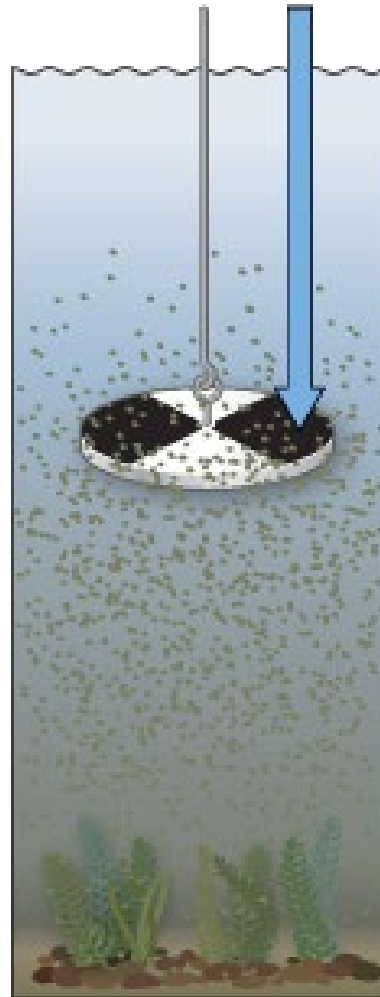


How does it work?

Secchi disk



clear water



cloudy water

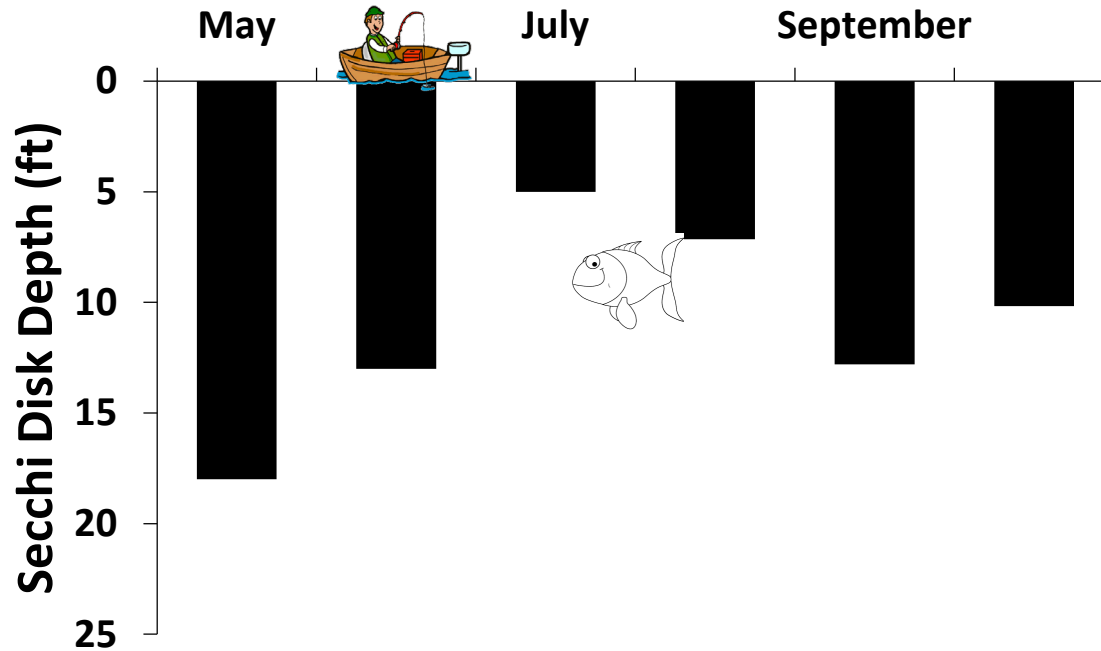
- Water clarity is affected by
 - Water color
 - Algae
 - Suspended solids (organic, sediment, etc...)

What does Secchi transparency tell us?

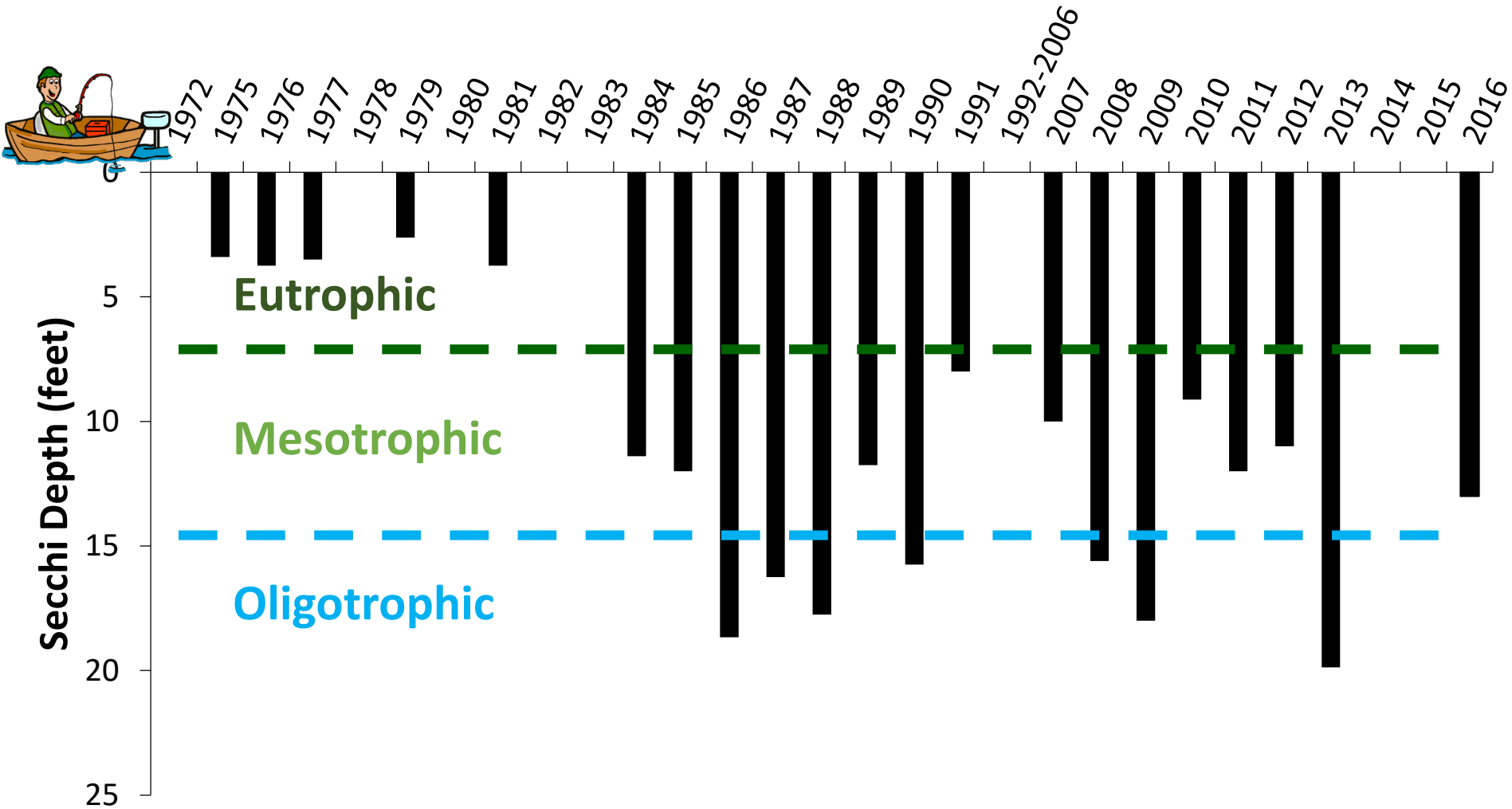
- Indicator of natural processes and human changes
 - Pulse of your lake
 - An early warning that activities on the land are having an effect on a lake.
- Through the season and annual measurements are important:
 - Eutrophication, Re-oligotrophication, and Browning



Monitoring Water Clarity through a Season



Monitoring Water Clarity: Historical Trends



CLMP Secchi Sampling Requirements



- Evenly spaced monitoring through middle of May to middle of September
- ***At least 8 measurements***
- One a week or every other week

Step 1. Drift your boat approximately over the deepest part of the lake

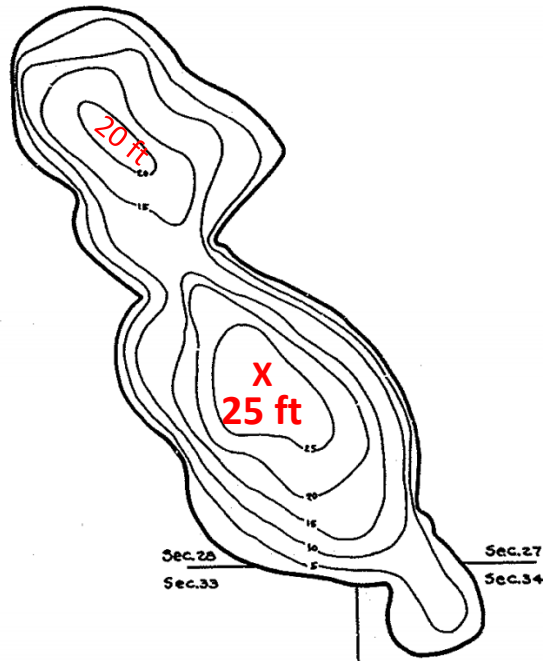


Where to monitor – Find the deepest basin

Lake Sampling Site (Field ID) Number

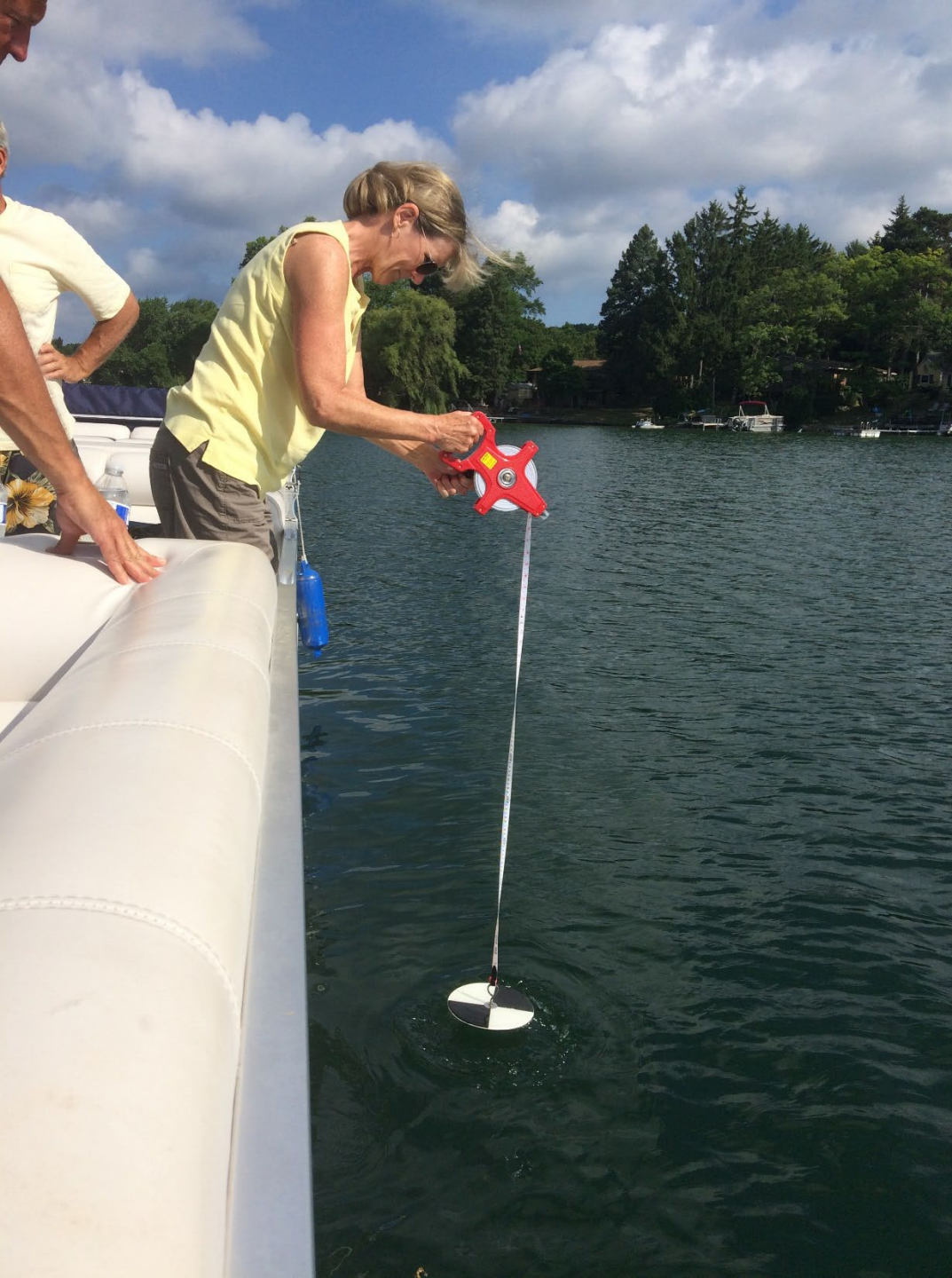
Listing at

micorps.net → Lake
Monitoring → CLMP
Documents



Mi DNR Lake Maps

010017 Cedar	Alcona	44.52751	-83.33195
010101 Hubbard (1)	Alcona	44.77224	-83.55287
010102 Hubbard (2)	Alcona	44.80941	-83.5468
010103 Hubbard (3)	Alcona	44.83379	-83.58163
010104 Hubbard (4)	Alcona	44.8483	-83.59922
010105 Hubbard (5)	Alcona	44.83168	-83.60152
010106 Hubbard (6)	Alcona	44.81146	-83.56633
010107 Hubbard (7)	Alcona	44.7943	-83.57416
020127 Deer	Alger	46.48016	-86.98277
030203 Hutchins	Allegan	42.58316	-86.13441
030259 Eagle	Allegan	42.425559	-85.930559
030263 Osterhout	Allegan	42.439448	-86.038892
050052 Bellaire	Antrim	44.95333	-85.21889
050055 Torch (North)	Antrim	45.027781	-85.31556
050101 Clam	Antrim	44.93612	-85.27334
050240 Torch (South)	Antrim	44.9159	-85.3028
080071 Crooked (Upper)	Barry	42.490281	-85.431392
080092 Bristol	Barry	42.484449	-85.248892
080096 Duncan	Barry	42.749448	-85.534448
080103 Payne	Barry	42.749448	-85.521115
080176 Barlow	Barry	42.670559	-85.52042
080259 Cobb	Barry	42.6525	-85.537626
080279 Long (Little)	Barry	42.6525	-85.537626
080294 Wall	Barry	42.5215	-85.3862
100066 Crystal	Benzie	44.668615	-86.186115
100082 Ann	Benzie	44.721	-85.8512
100085 Herring (Lower)	Benzie	44.56226	-86.21056
100086 Platte (Big)	Benzie	44.69228	-86.09589



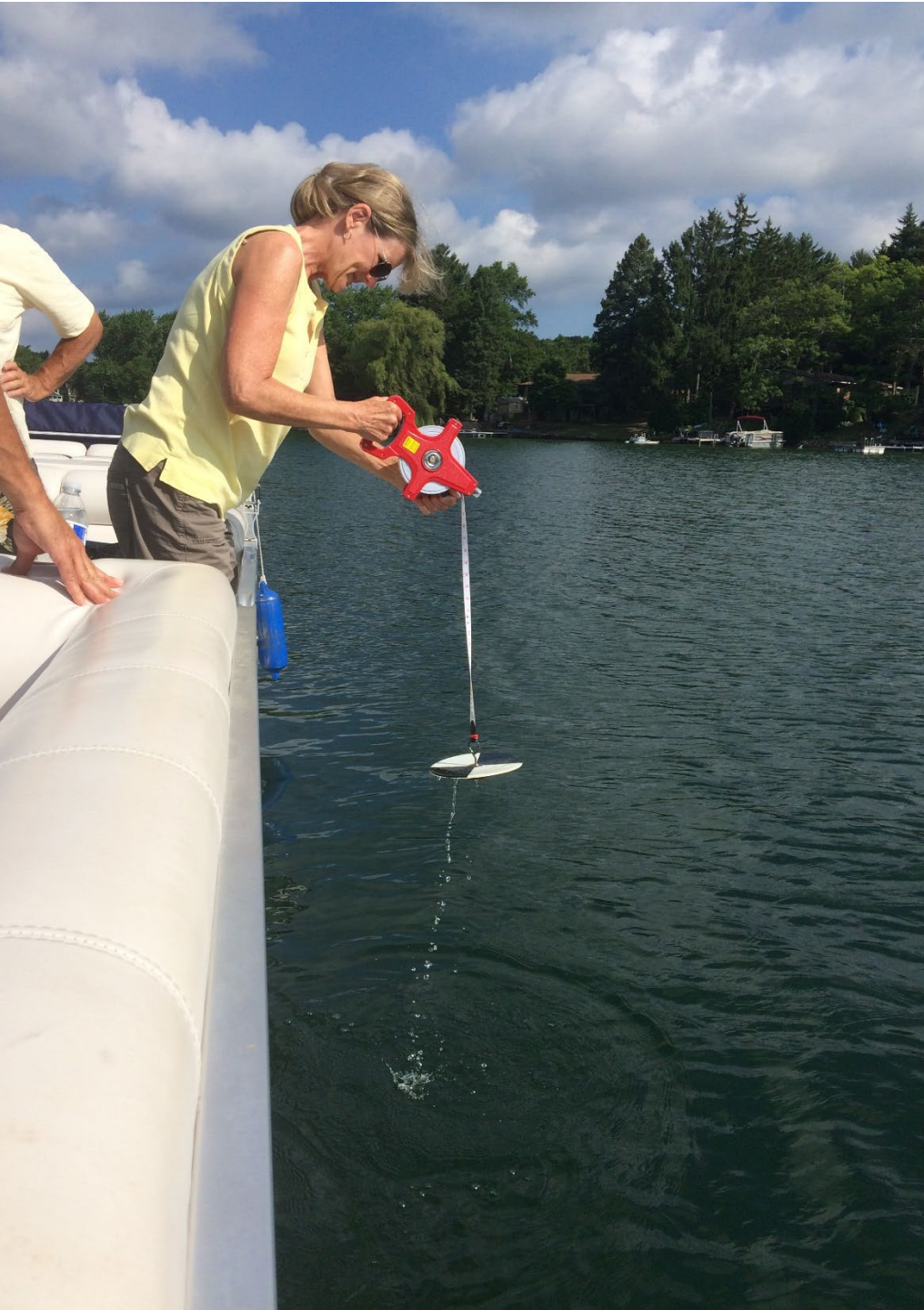
Step 2. Slowly lower disk until it disappears from view.

- Note the depth of the water at which the disk disappears.



Step 3. Slowly raise disk until it reappears

- Note this depth also.



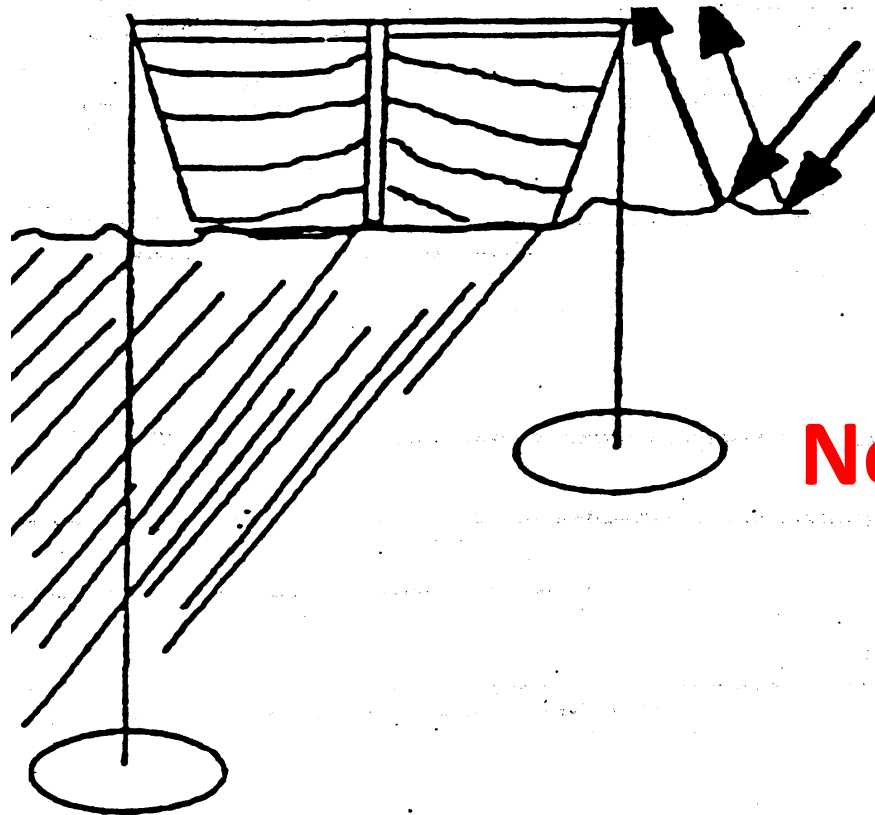
Step 4. The official measurement is the average of the 2 depths.

- Please record that number on our datasheet.
- Round to the nearest half-foot

A couple things to remember:
1. Don't use sunglasses!



2. Pick the Shadow!



Yes!

No!

3. Be consistent in weather and timing!

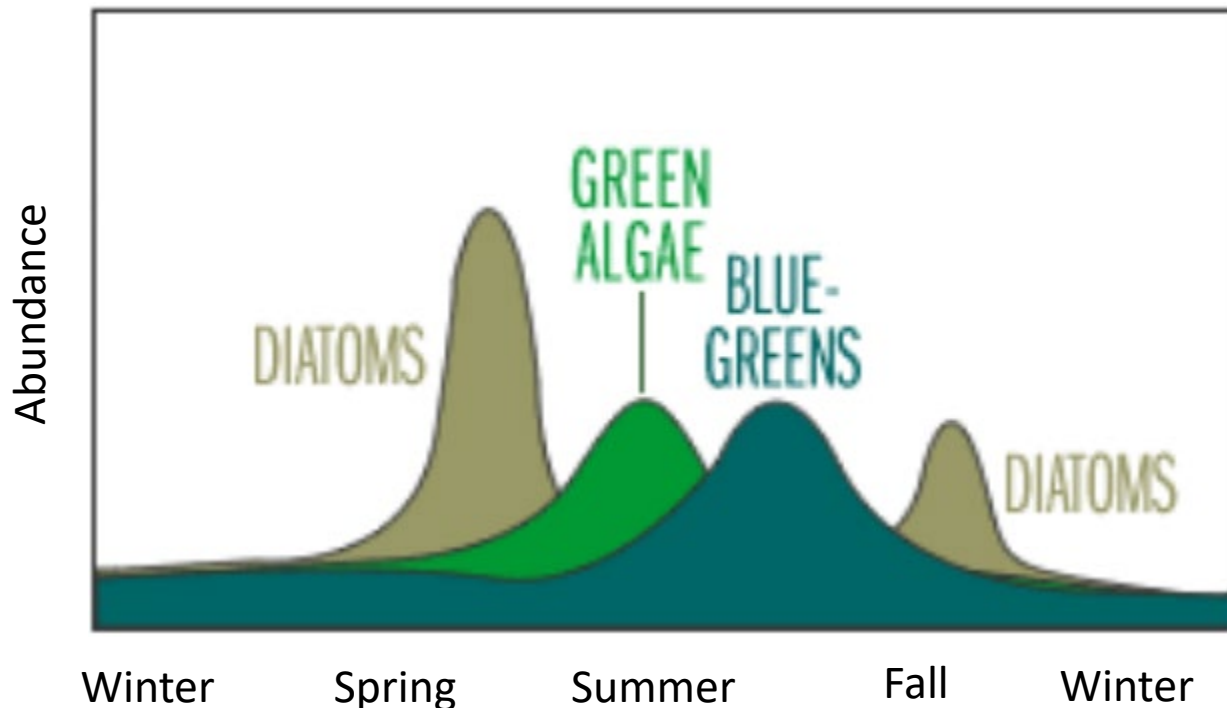
- Measure between 10 am – 4 pm (try and be consistent)
- Sunny calm days are best
- Do not measure during heavy boating



A minimum of 8 measurements required across whole summer Lakes Change Through Time!

Evenly space monitoring through middle of May – middle of Sept

Seasonal Succession of Lake Algae in a Mesotrophic Lake





SECCHI DISK TRANSPARENCY 2022 Data Form



Lake Name: _____ County: _____ Township: _____

Lake Sampling Site (Field ID) Number: _____ (see reverse and mark location on map)

Latitude: _____ Longitude: _____

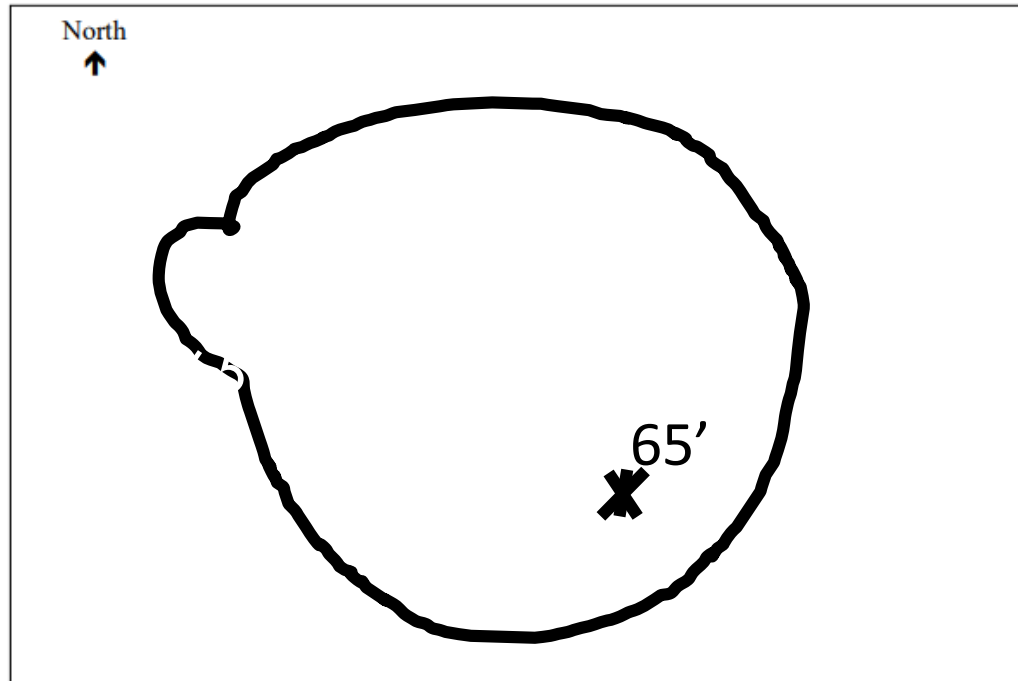
Volunteer Monitor Name(s): _____

Note if secchi is
on bottom of lake

WEEKLY SAMPLING INTERVAL	DATE SAMPLED	TIME OF DAY	SECCHI DEPTH (to nearest ½ foot)	WEATHER CONDITIONS (sunny, cloudy, windy)	UNUSUAL CONDITIONS (Secchi disk on bottom of lake, heavy rain, boating, etc.)
May 15-21					
May 22-28					
May 29-June 4					
June 5-11					
June 12-18					
June 19-25					
June 26-July 2					
July 3-9					
July 10-16					

Dates

- ❖ In the box below draw an outline of your lake (i.e. lake map). Or attach a copy of a lake map.
- ❖ On the lake map, mark your Secchi disk sampling location (this should be at the deepest location in your lake) and write the LAKE DEPTH at this location (not Secchi depth).
- ❖ Surface Area of Lake (if known): _____ (acres)



DATA ENTRY

If you can, please enter your data into the MiCorps Data Exchange by October 31st.

DATA SHEET TURN IN Protocol

Please do the following:

- (1) Make a copy of your field data sheets to keep for your records,
- (2) Mail one copy by October 31st to: **MLSA, P.O. Box 303, Long Lake, MI 48743**
 - a. For electronic submission, send to: MiCorps@msu.edu

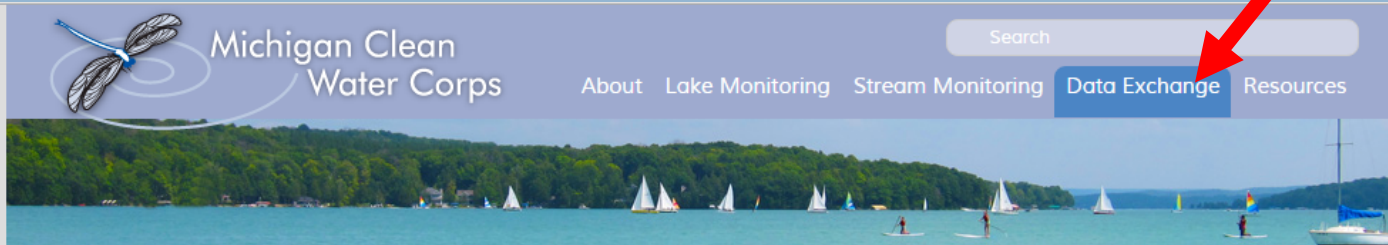
Data Entry



- All volunteers are encouraged to use the online data entry system
- Follow the instructions for data submission on our website, www.micorps.net.

MiCorps Data Exchange Entry Point

<https://micorps.net>



MiCorps Data Exchange

One of the key components of the MiCorps program is the MiCorps Data Exchange (MDE) platform, which provides online access to volunteer monitoring data through a searchable database. This system fulfills a critical role by allowing volunteers to gather and exchange reliable and meaningful water quality data for water resources management and protection programs at the state and local level.

Prior to 2015, the MDE was comprised of monitoring data collected by MiCorps member organizations and others who have completed the necessary trainings with MiCorps staff. To submit data to the MDE, monitors must demonstrate their capacity and willingness to adhere to specific MiCorps quality assurance and operating procedure criteria.

Now in its second decade, the MDE has been expanded to accept data based on a three-tiered data classification system:

- **Tier 1:** Data generated under the MiCorps (or equivalent) Quality Assurance Project Plan (QAPP)
(Includes current and former VSMP grant recipients with a MiCorps-approved QAPP and current CLMP participants collecting data under the approved CLMP monitoring procedures)
- **Tier 2:** Data generated under another acceptable QAPP
- **Tier 3:** Data generated with acceptable Standard Operating Procedures (SOPs), but no QAPP
(May include school programs)

Due to resource limitations under the program, monitoring data will only be accepted from entities willing to comply with the MiCorps data entry protocols, which may require entities to reformat their datasets. The MDE will also only accept data for the monitoring parameters currently supported under the MiCorps program for lake and

Inside this section:

[View data](#)
[Enter data](#)

Upcoming events

[Spring 2016 Stream
Macroinvertebrate Monitoring](#)

04/09/2016 - 05/31/2016

[2016 Michigan Inland Lakes
Convention](#)

04/28/2016 - 04/30/2016

Boyne Falls, MI

[2016 Cooperative Lakes
Monitoring Program \(CLMP\)
Training](#)

04/28/2016

Boyne Falls, MI

[Protecting Your Shoreline
Workshop \(Clare County\)](#)

04/28/2016

Harrison, MI

Receive a
data report
in early
2023



**2017 Data Report
for
Deer Lake, Alger County**

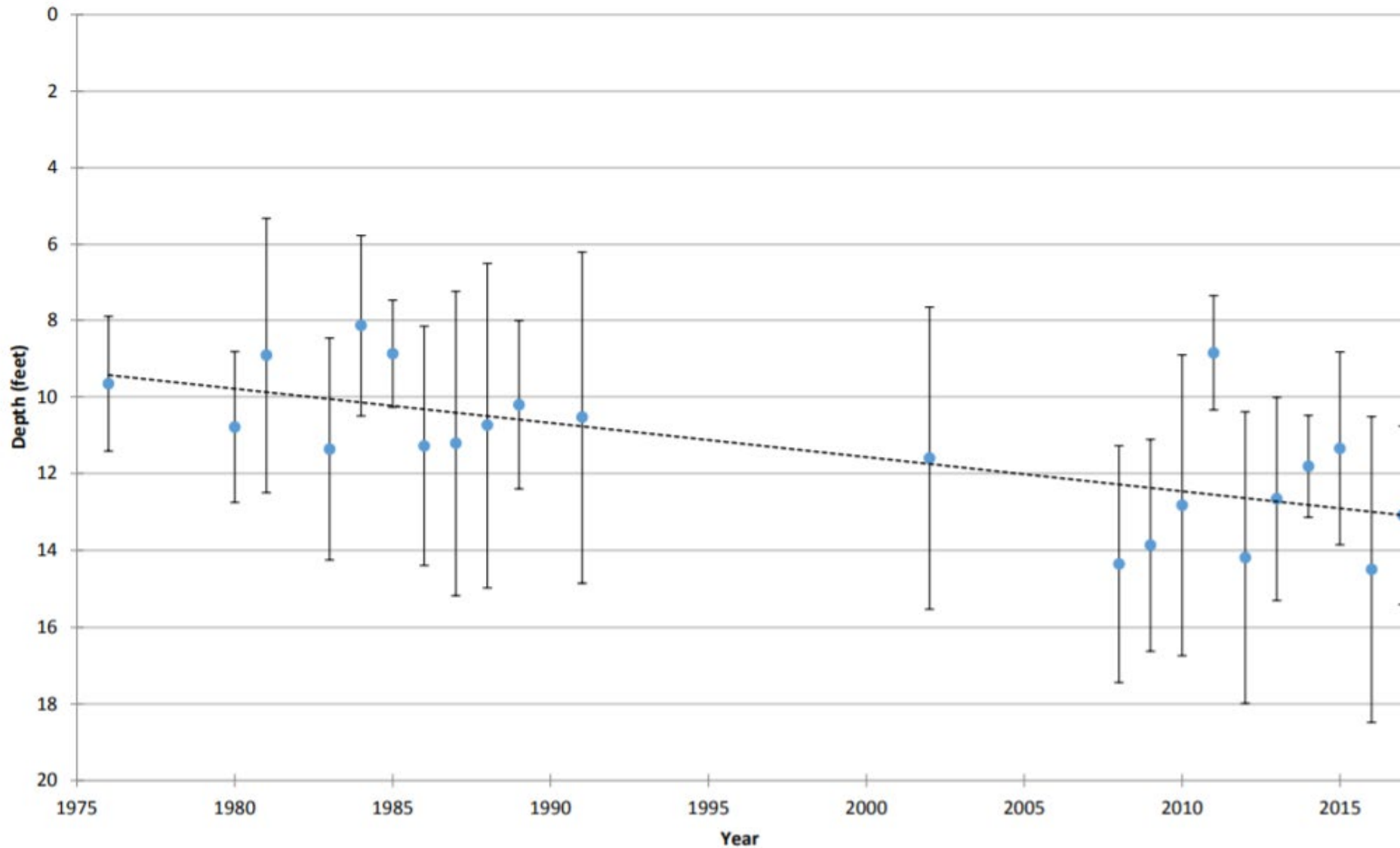
Site ID: 020127

46.48016°N, 86.98277°W

The CLMP is brought to you by:

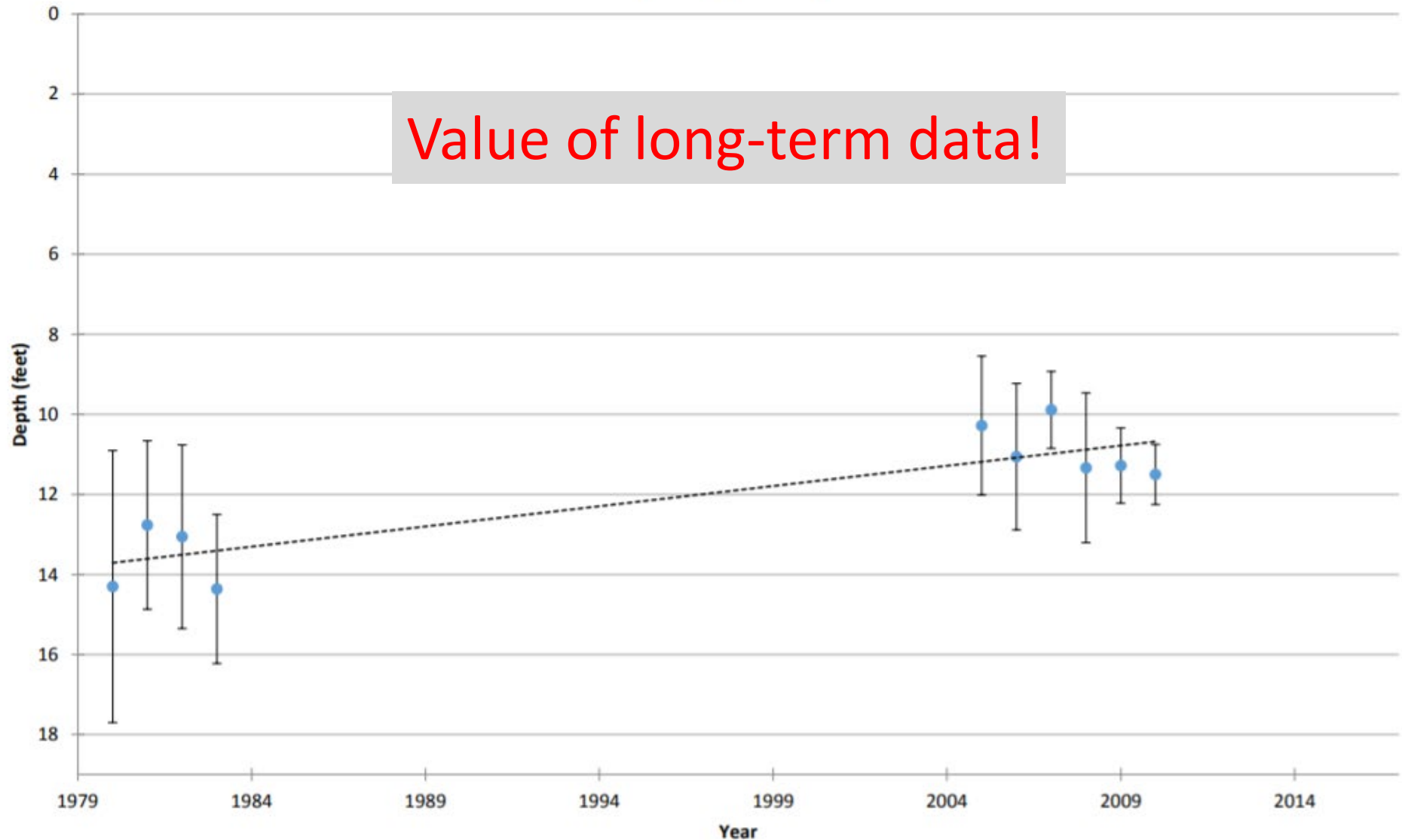


Portage Lake (Washtenaw Co.), 810248



Perch Lake, Otsego County

Perch Lake (Otsego Co.), 690150



Questions?



COOPERATIVE LAKES MONITORING PROGRAM

Spring and Summer Total Phosphorus

Phosphorus is an essential nutrient, but can cause issues

CULTURAL EUTROPHICATION IMPACTS

- Higher algal biomass and possible HABS
 - Reduced aesthetics
 - Increased anoxia
 - Reduced economic value
-



A satellite image showing a large, irregularly shaped green algal bloom in a coastal area. The bloom is a vibrant green color, contrasting with the darker blue of the surrounding water. The coastline is visible on the left and bottom edges of the image. The text "Harmful and Nuisance Algal Blooms" is overlaid in white, bold, sans-serif font in the center-right of the image.

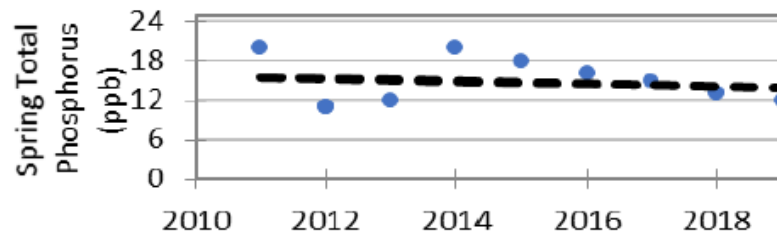
Harmful and Nuisance Algal Blooms

- Can Produce Toxins
- Potential Health Risk to People and Animals

Measurements through time

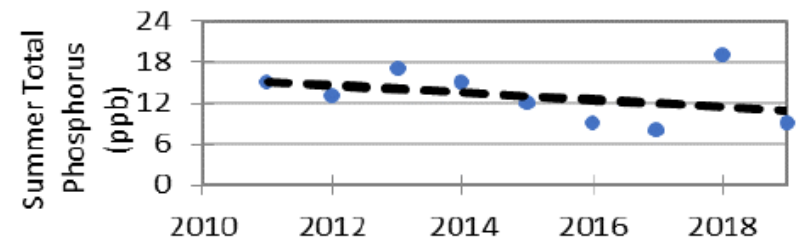
Spring Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev
2019	1	12.0	12.0	12.0	NA
2014-2018	5	13.0	20.0	16.4	2.7
2011-2013	4	11.0	20.0	13.5	4.4
2019 All CLMP Lakes	220	<= 3	100.0	14.9	11.0



Summer Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev	Carlson TSI
2019	1	9.0	9.0	9.0	NA	36
2014-2018	5	8.0	19.0	12.6	4.5	40
2011-2013	3	13.0	17.0	15.0	2.0	43
2019 All CLMP Lakes	281	<= 3	65.0	12.8	9.3	38



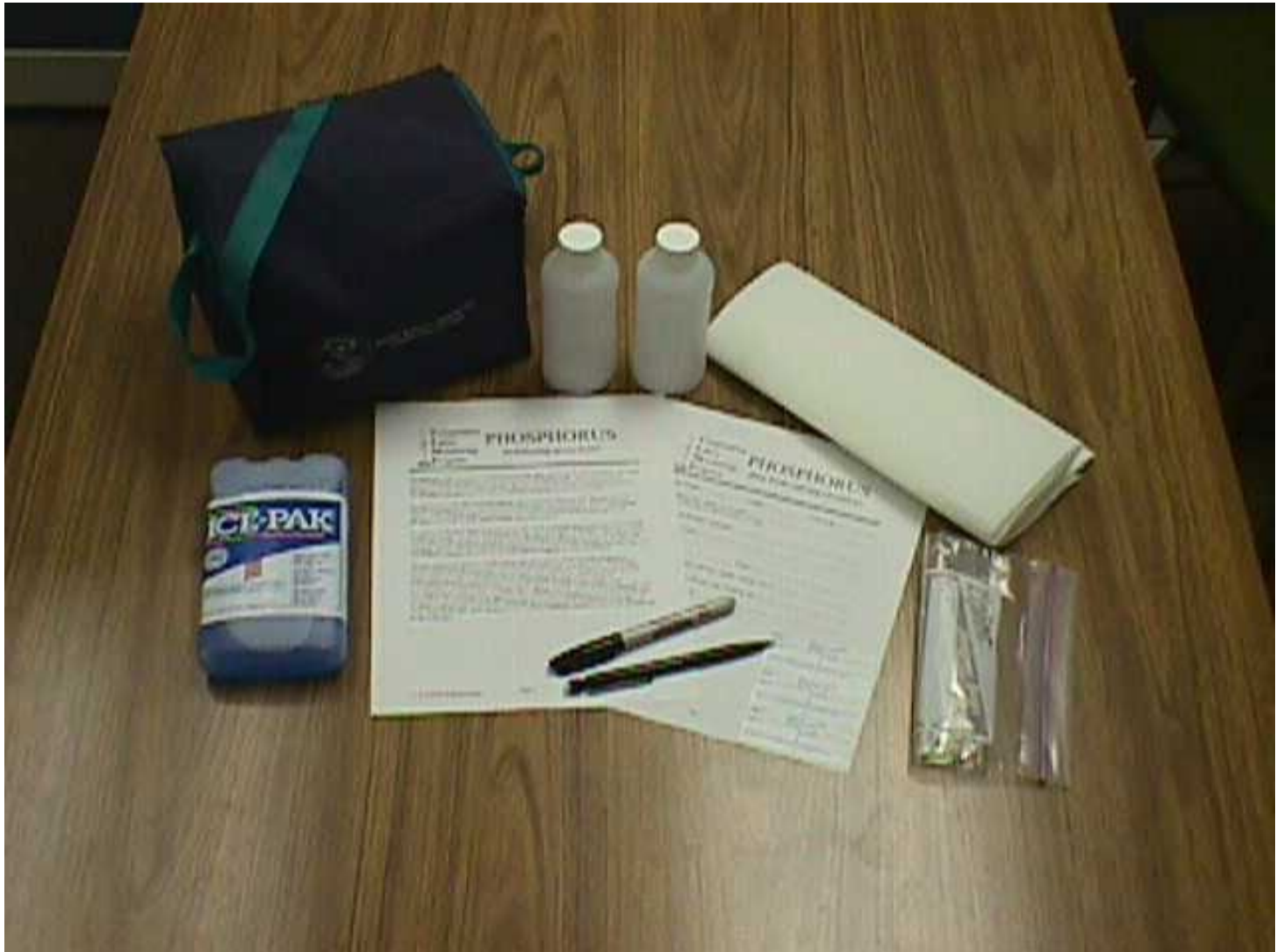
Phosphorus Protocol



What you get in the mail

- Monitoring instructions
- Sampling and sample turn-in schedule and locations
- Data form
- Bottle labels (3)
- Two 250ml sampling bottles with caps on
 - ▣ One is the actual sample and the other is a replicate

Other materials needed: Cooler bag, ice pack, zip lock baggies of different sizes, a pencil/Sharpee



When: Spring Overturn

- Within 14 days after ice-out (March/April/May)
- Volunteer determines ice-out
- Surface grab sample
- Representative of whole lake
- Shows nutrient enrichment trends

When: Summer Stratification

- Late summer - early fall (Aug. - Sept.)
 - ▣ Depends on latitude
- Surface grab sample
- Indicates the phosphorus available to plants/algae in the growing season.
- Used to calculate trophic state

When: Phosphorus Schedule

Spring P: Turn in June 21st

Summer P: Sampling and drop off dates depends on your location

- UP lakes sample in August; southern counties: end of September



SUMMER PHOSPHORUS 2022 Sample Collection and Turn-in Schedule



COUNTY	TURN-IN ADDRESS (EGLE unless noted otherwise)	SAMPLING DATES	TURN-IN DATES
Allegan, Kalamazoo, Barry, Van Buren, Berrien, Cass, St. Joseph	EGLE Kalamazoo District Office 7953 Adobe Road Kalamazoo, MI 48909 Deana Mercs: 269-330-8571	Sept 22-26	8 am-Noon September 27
Calhoun, Jackson, Washtenaw, Branch, Hillsdale, Lenawee	EGLE Jackson District Office 301 E. Louis B. Glick Hwy. Jackson, MI 49201 Kathy David: 517-257-0251	Sept 22-26	8 am-Noon September 27
St. Clair, Macomb, Oakland, Wayne, Monroe	EGLE Warren District Office 27700 Donald Court Warren, MI 48092 Jack Cotrone: 248-763-1994	Sept 22-26	8 am-Noon September 27
Ottawa, Kent, Montcalm, Ionia, Muskegon, Oceana, Newaygo, Mecosta	EGLE Grand Rapids District Office 350 Ottawa St. NW, Unit 10, 5th Floor Grand Rapids, MI 49503 Lucy Robinson or Mercedes Alvarado: 616-250-7915	Sept 15-19	8 am-Noon September 20

Phosphorus Labels.. Pencil or sharpee

Step 1: Fill out labels

- Fill out and place before the bottle goes in the water
- Use pencil or permanent marker

Collector's Initials TP	DEQ	Date 4-20-2013
Field ID 555432	Location DEAD SNEEDER LAKE	
Analysis or Parameter Code GA	Chemicals Added	

Collector's Initials TP	DEQ	Date 4-20-2013
Field ID 555432	Location REP DEAD SNEEDER LAKE	
Analysis or Parameter Code GA	Chemicals Added	

NOTE: On second label for replicate sample, include all above plus "REP" in the Location box along with the Lake Name.

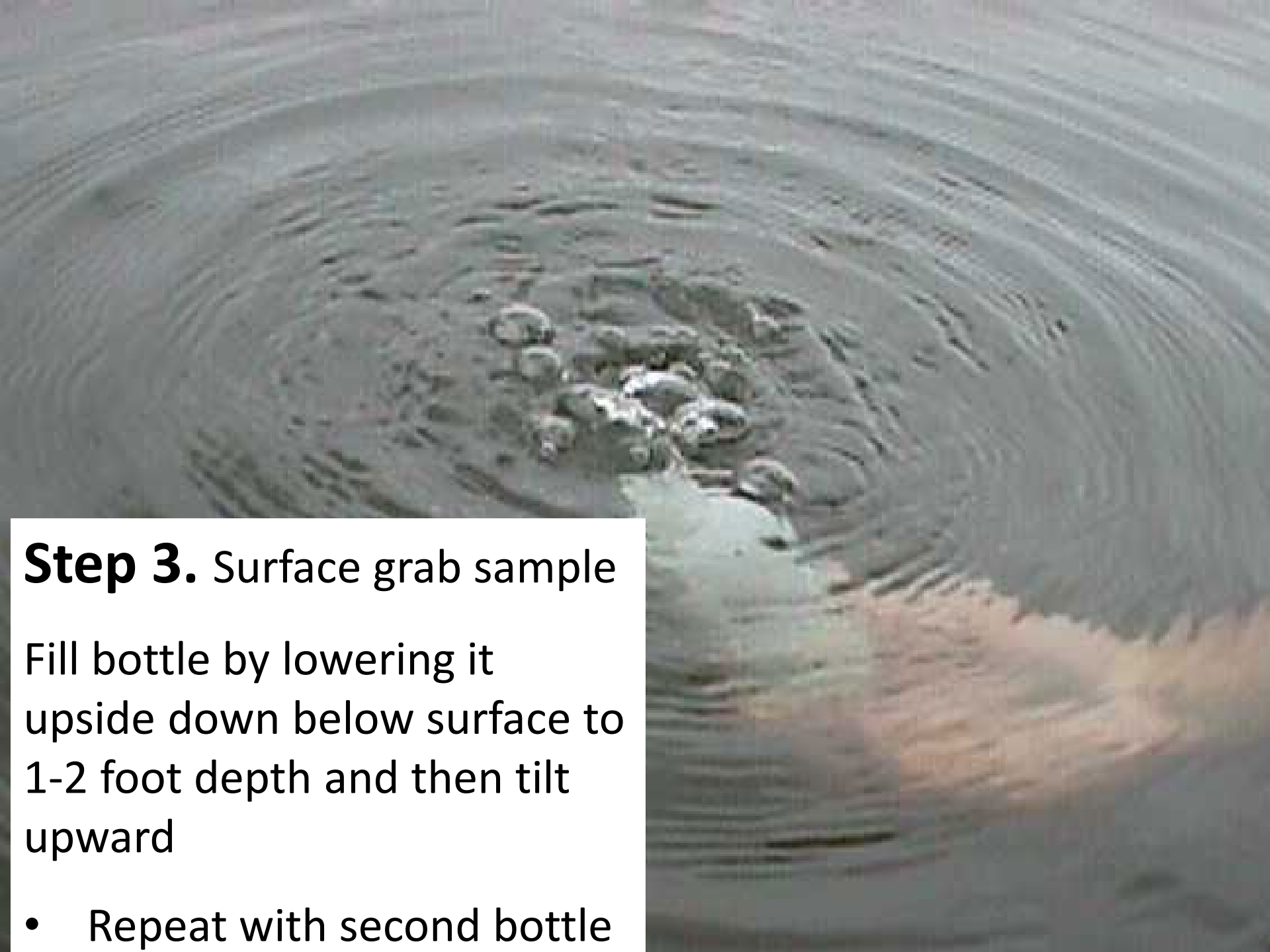
Step 2. Drift your boat over the deepest part of the lake

- Remove cap and rinse the bottle twice

NOTE

- only use the bottle we provided
- Make sure not to contaminate bottle or cap





Step 3. Surface grab sample

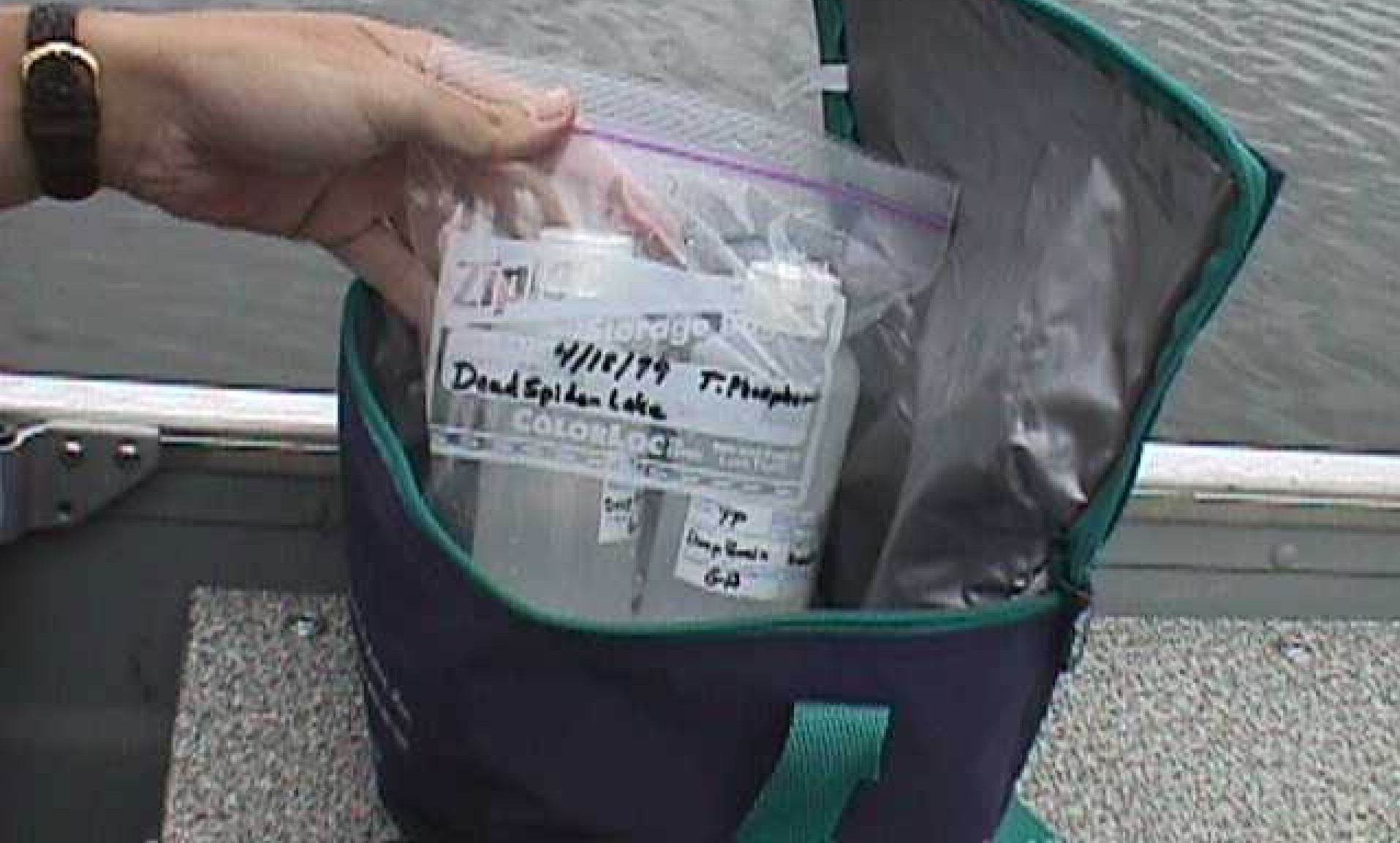
Fill bottle by lowering it upside down below surface to 1-2 foot depth and then tilt upward

- Repeat with second bottle



Step 4. Pour water out until bottle is filled to here to avoid cracking the bottle when frozen.

Step 5. Place in labeled baggie and place in cooler.



Step 6: Fill out datasheets

NOTE: Datasheet goes into its own baggie and then into the baggie with the samples.

PHOSPHORUS
Monitoring Procedures

Comprehensive Label Monitoring Program

Date/Time: 10/20/20

Location: 10/20/20

Depth: 10/20/20

Sample ID: 10/20/20

Notes: 10/20/20



SPRING OVERTURN PHOSPHORUS



Lake Name: _____ County: _____ Township: _____

Lake Sampling Site (Field ID) Number: _____ (see reverse and mark location on map)

Latitude: _____ Longitude: _____ GPS / Map
Circle

Volunteer Monitor Name(s): _____

Date of Ice-Out: _____

Date Sampled: _____ Time: _____

Weather Conditions (sunny, cloudy, windy, etc.): _____

Unusual Conditions (heavy rain, boating, etc.): _____

Date of Sample Turn-In: _____

Comments:

- ❖ In the box below draw an outline of your lake (i.e. lake map)
- ❖ On the lake map outline, mark your total phosphorus sampling location (this should be at the deepest basin in the lake) and write in the total LAKE DEPTH at this location. (**Note:** If you sample at more than one location in the lake, use a separate data form for each location.)
- ❖ Surface Area of Lake (if known): _____ (acres)



DATA ENTRY

Check **ONE** box:

- ☐ The field notes **have** been entered into the MiCorps Data Exchange (before October 30!)
Date entered _____.
- ☐ The field notes **have not** been entered into the MiCorps Data Exchange.

DATA SHEET TURN IN

No matter what box you check above, please do the following:

Make a copy for your records, put the data sheet in a baggie, and turn in the frozen sample and data sheet as directed by your procedures sheet.

Step 7: Store in freezer until Turn-in Date





Step 8. Turn in:

Turn in your **frozen bottles** with your data forms to the designated location.

Drop off location and time in Phosphorus Schedule

Common Reasons for Sample Rejection

- Sample collected at the wrong time
 - ▣ Spring P— samples collected >2 weeks after ice-out will be flagged for error, >4 weeks will be rejected.
 - ▣ Summer P – samples collected more than a week outside the assigned interval will be rejected
- Incorrect delivery
 - ▣ If you forget or can't turn your samples to the drop-off location on the assigned date, that can cause problems. CONTACT US for instructions on safe shipping. Unexpected shipments will thaw and be rejected.
- Cracked bottles/caps
 - ▣ Be sure to leave headroom in the bottle for expansion

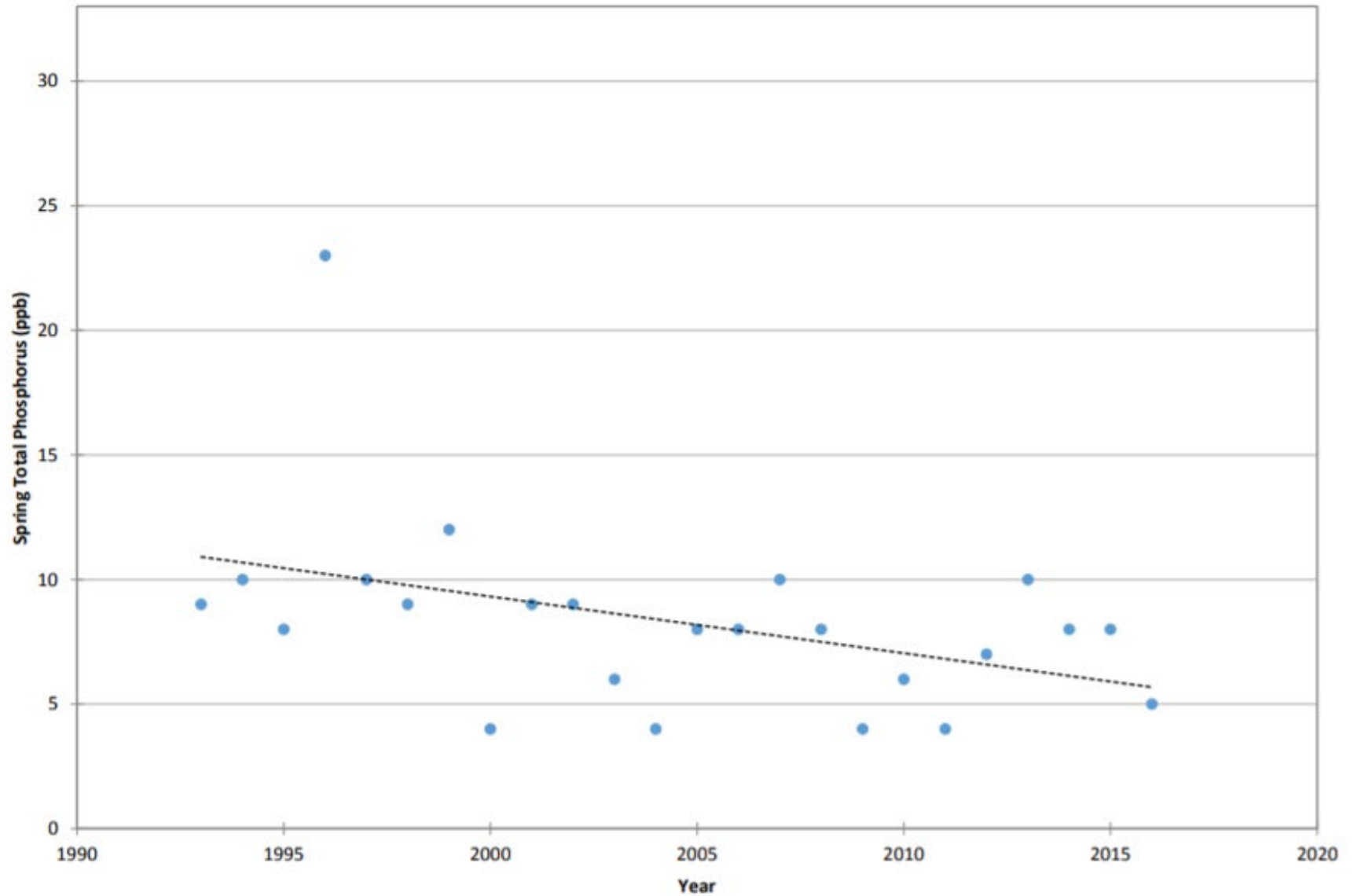
Common Reasons for Sample Rejection

- ❑ Wrong bottles used
 - ▣ We ONLY accept samples in the sterile bottles we send you



COOPERATIVE LAKES MONITORING PROGRAM
SPRING TOTAL PHOSPHORUS

Corey Lake (St. Joseph Co.), 750142



Aquatic Invasive Species- Decontaminate!



- Following any removal of your watercraft from a water body:
 - Clean
 - Drain
 - Dry
- Clean Boats, Clean Waters
- Let's not contribute to the very problem we are trying to stop!

Working together to protect lakes!



Questions?