Coming up…

- Chlorophyll-a, an algae indicator
- 10:30 am -- 11:45 am

COOPERATIVE LAKES MONITORING PROGRAM TRAINING FOR

Chlorophyll-a

Michigan Clean Water Corps

EGLE

MICHIGAN STATE UNIVERSITY

MICHIGAN LAKES AND STREAMS ASSOCIATION

Paul Steen

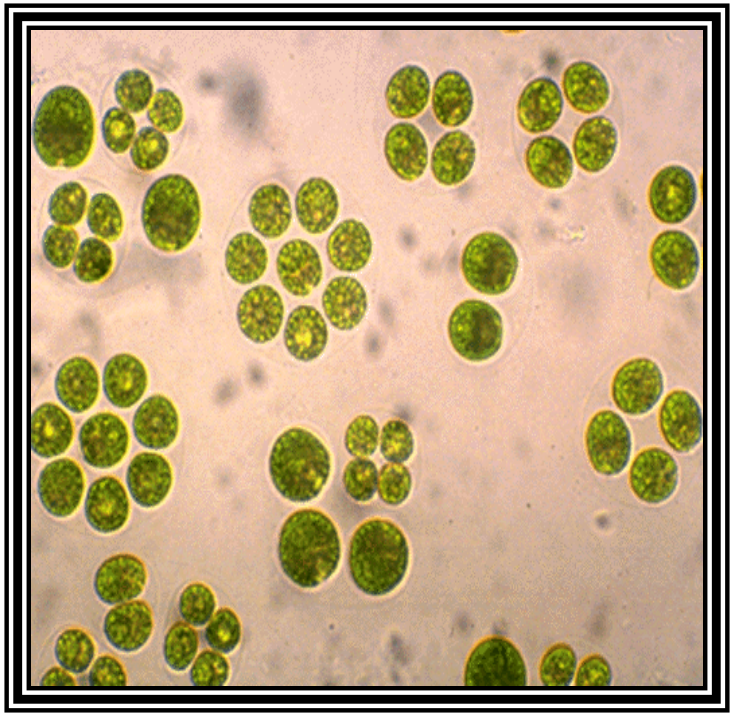
Huron River Watershed Council

1100 N. Main Street
Ann Arbor, MI 48104

psteen@hrwc.org

Chlorophyll *a* Training Outline

- What is chlorophyll?
- Schedule
- Water Collection
- Sample filtering and turn in
- End of the year data report



CHLOROPHYLL-A

What is Chlorophyll-a?

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Great Lakes Commission des Grands Lacs

Huron River Watershed Council

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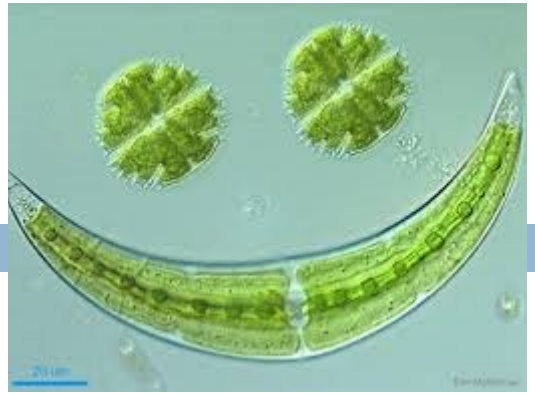
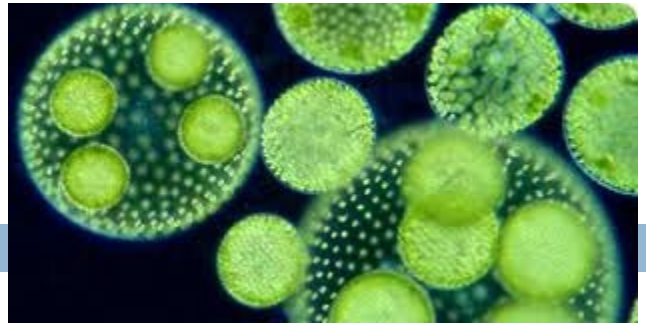
Trophic State Indicators

- Transparency
- Total Phosphorus
- Chlorophyll *a*
- Dissolved Oxygen and Temperature





CHLOROPHYLL-A

Sampling Schedule

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micorps.net → Lakes→ CLMP documents

Michigan Clean Water Corps

CHLOROPHYLL
2021 Sample Collection and Turn-in

Cooperative Lakes Monitoring Program

Due to complications with COVID-19, we are still finalizing the turn-in locations and spring turn-in date. Please keep your samples frozen and we will notify you when the locations and dates have been determined.

*Important: Note that the sampling dates for Sample #5 differ from those of Samples #1 - #4. Add these dates to your calendar for easy reference.

COUNTY	*TURN-IN ADDRESS (EGLE unless noted otherwise)*	*SAMPLING DATES*	*TURN-IN DATES*
Allegan, Kalamazoo, Barry, Van Buren, Berrien, Cass, St. Joseph	To Be Determined	Sample #1 May 10-20 Sample #2 June 10-20 ..... Sample #3 July 10-20 Sample #4 Aug 10-20 Sample #5 Sept 23-27	To Be Determined ..... 8 am-Noon September 28
Calhoun, Jackson, Washtenaw, Branch, Hillsdale, Lenawee	To Be Determined	Sample #1 May 10-20 Sample #2 June 10-20 ..... Sample #3 July 10-20 Sample #4 Aug 10-20 Sample #5 Sept 23-27	To Be Determined ..... 8 am-Noon September 28
St. Clair, Macomb, Oakland, Wayne, Monroe	To Be Determined	Sample #1 May 10-20 Sample #2 June 10-20 ..... Sample #3 July 10-20 Sample #4 Aug 10-20 Sample #5 Sept 23-27	To Be Determined ..... 8 am-Noon September 28

Michigan Clean Water Corps

CHLOROPHYLL

2021 Data Form 1

Cooperative Lakes Monitoring Program

Lake Name: _____ County: _____ Township: _____

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

Latitude: _____ Longitude: _____ Circle GPS / Map

Volunteer Monitor Name(s):_____

Sampling Event #1 (May) Date Sampled: _____ Time: _____

Secchi Depth :_____(feet) Composite Sample Depth:_____(feet)

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

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

Filtering Sample (if 50 cc could not be filtered for this sample, indicate amount filtered):

Sample 1: _____ (cc) Sample 2: _____ (cc)

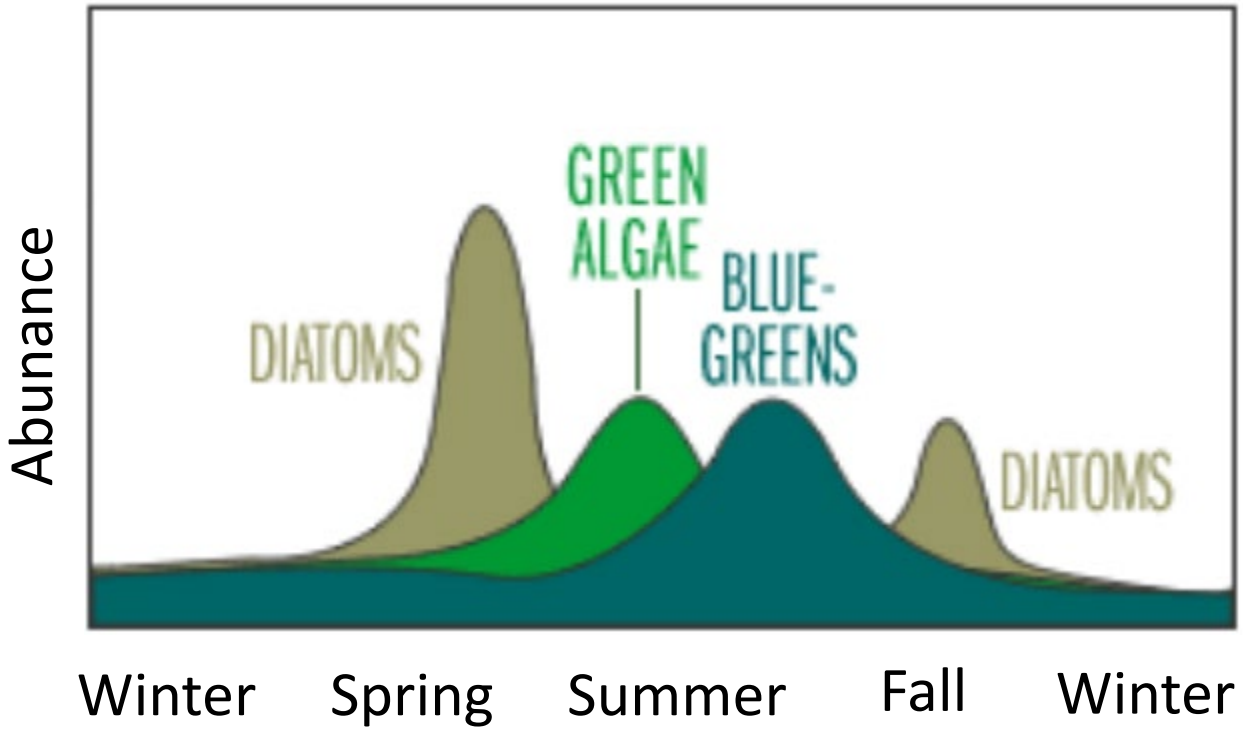
.....

Sampling Event #2 (June) Date Sampled: _____ Time: _____

Secchi Depth : (feet) Composite Sample Depth: (feet)

Data Requirement: At least 4/5 months sampled per year. Lakes change over time!

Seasonal Succession of Lake Algae in a Mesotrophic Lake

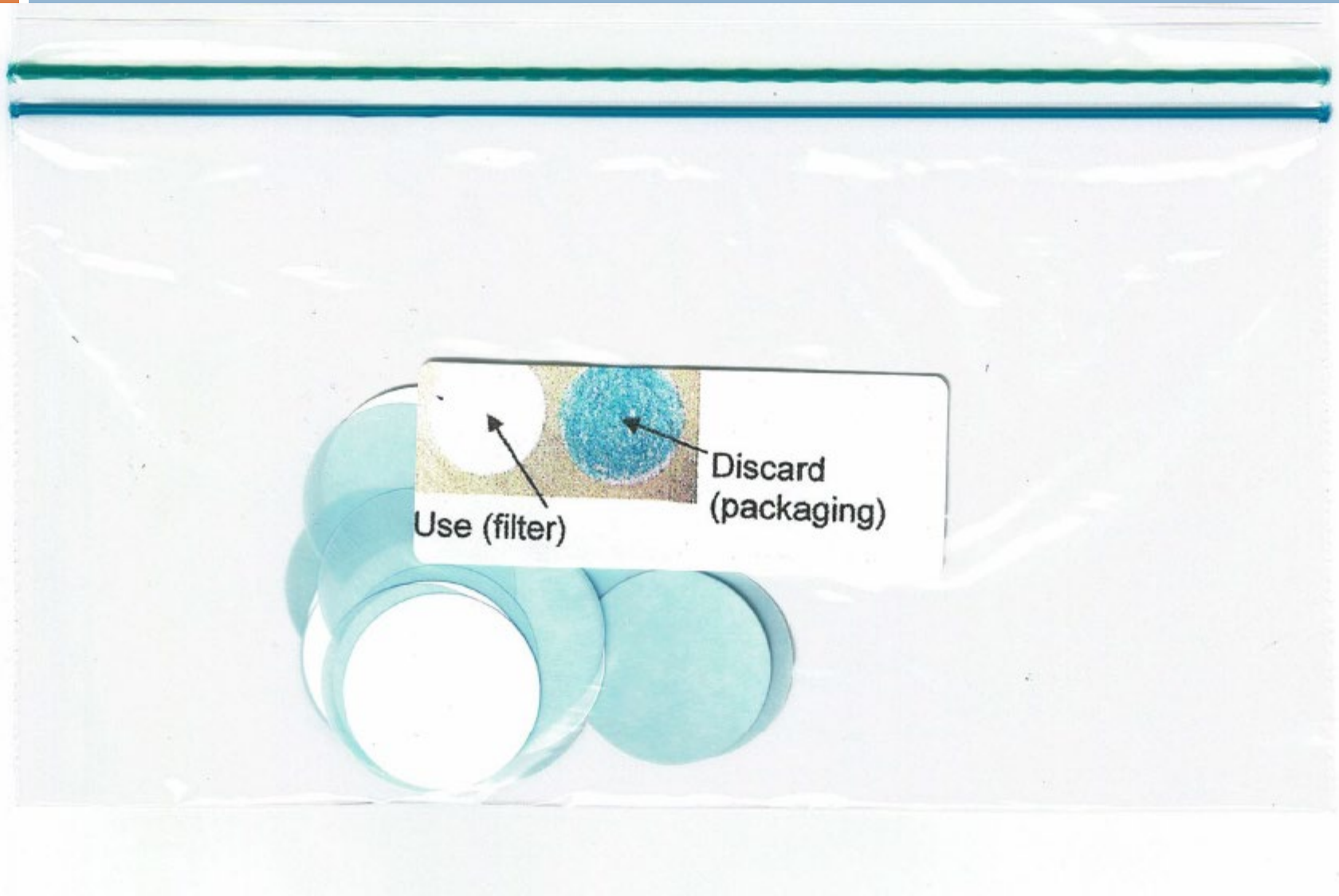


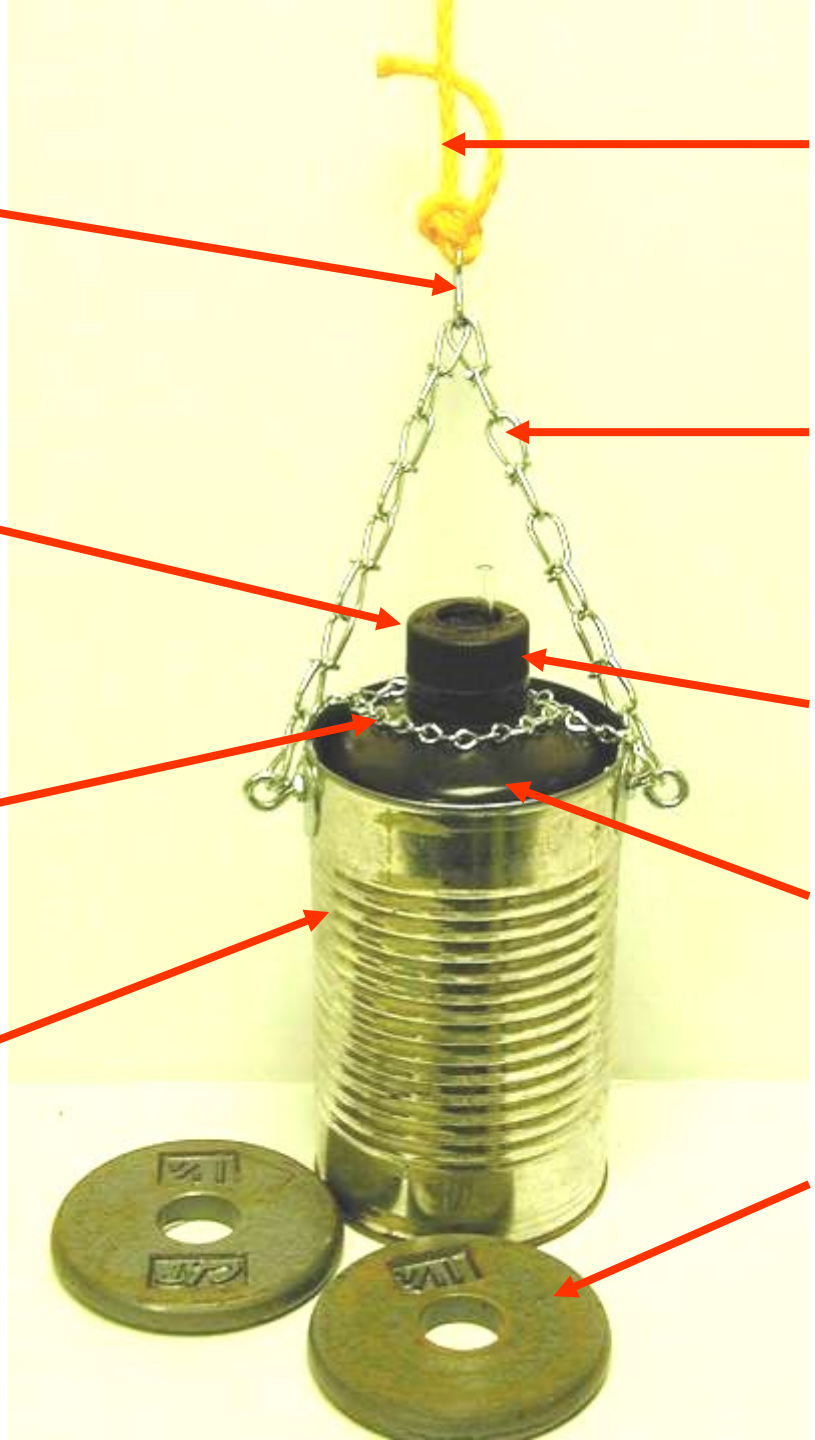
Credit: Water on the Web

Chlorophyll Equipment

- Bag of equipment contains
  - -60 cc (ml) syringe
  - -filter holder
  - -filters (12-13) (in a baggy)
  - -tygon tube
  - -vials with caps (11)
  - -tweezers
  - -amber bottles (2)
  - -dropper bottle with $MgCO_3$ (labeled)
  - -zip-lock bags
  - -labels (11)
  - -clothes pin
- Weighted composite sampler (you provide the marked rope)

Blue = BAD




Connecting ring
Measured line
Rubber stopper with 2 glass tubes
Suspension chain
Bottle cap
Retaining chain
One liter amber bottle
Juice can
2 dumbbell weights

What is a re-supply kit?

- Filters (11- 12) with warning label (in envelope). [Returning volunteers: Throw all old filters away]
- Vials with caps (11)
- Dropper bottle with $MgCO_3$ (labeled)
- Zip-lock bags
- Labels (11)

Chlorophyll Sampling Equipment

Provided by volunteer:

- boating safety equipment
- anchor
- pencil or indelible ink pen
- measured line for sampler
- freezer ice pack

CHLOROPHYLL-A

Step 1.
Getting a depth integrated water sample

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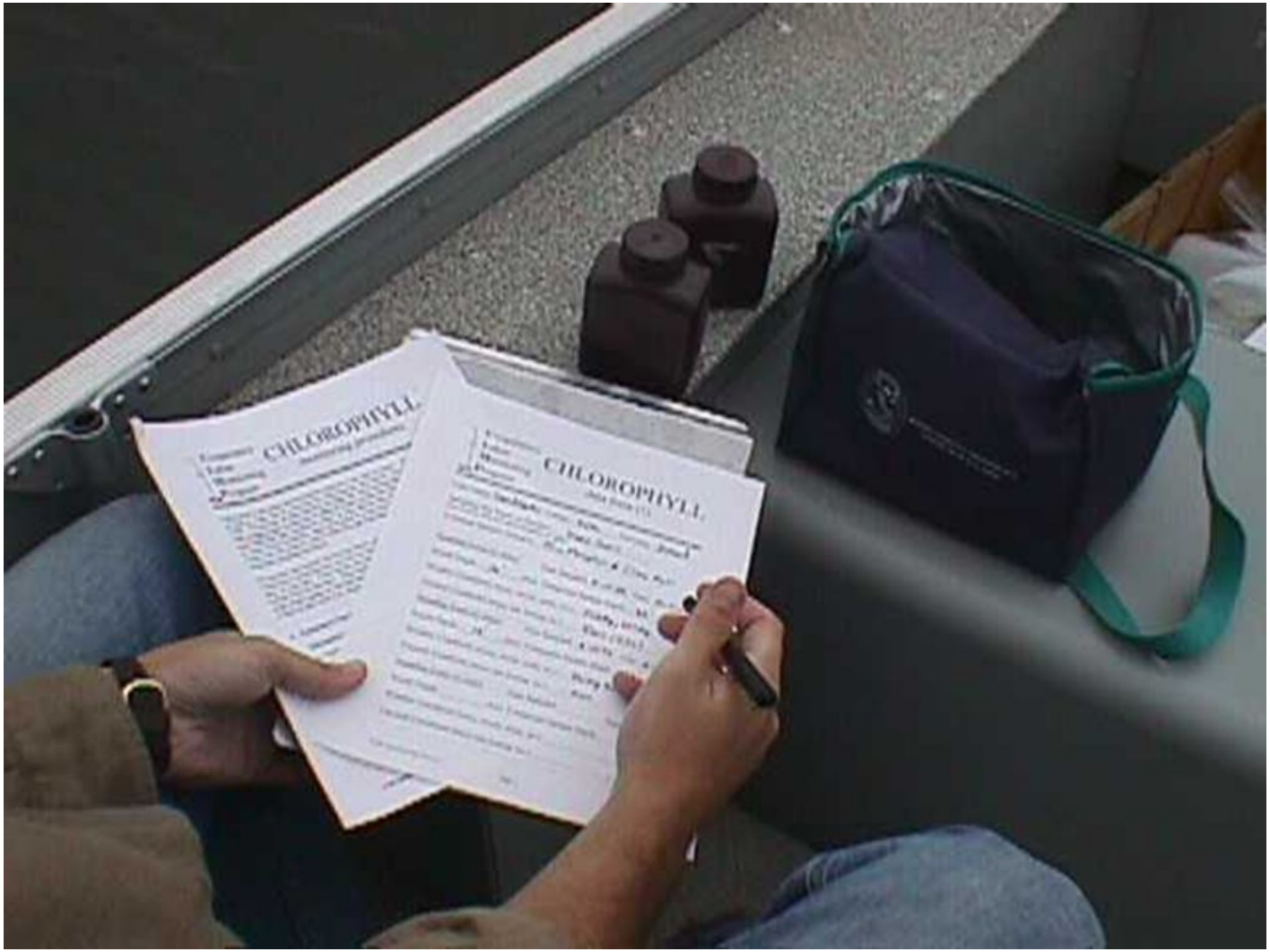
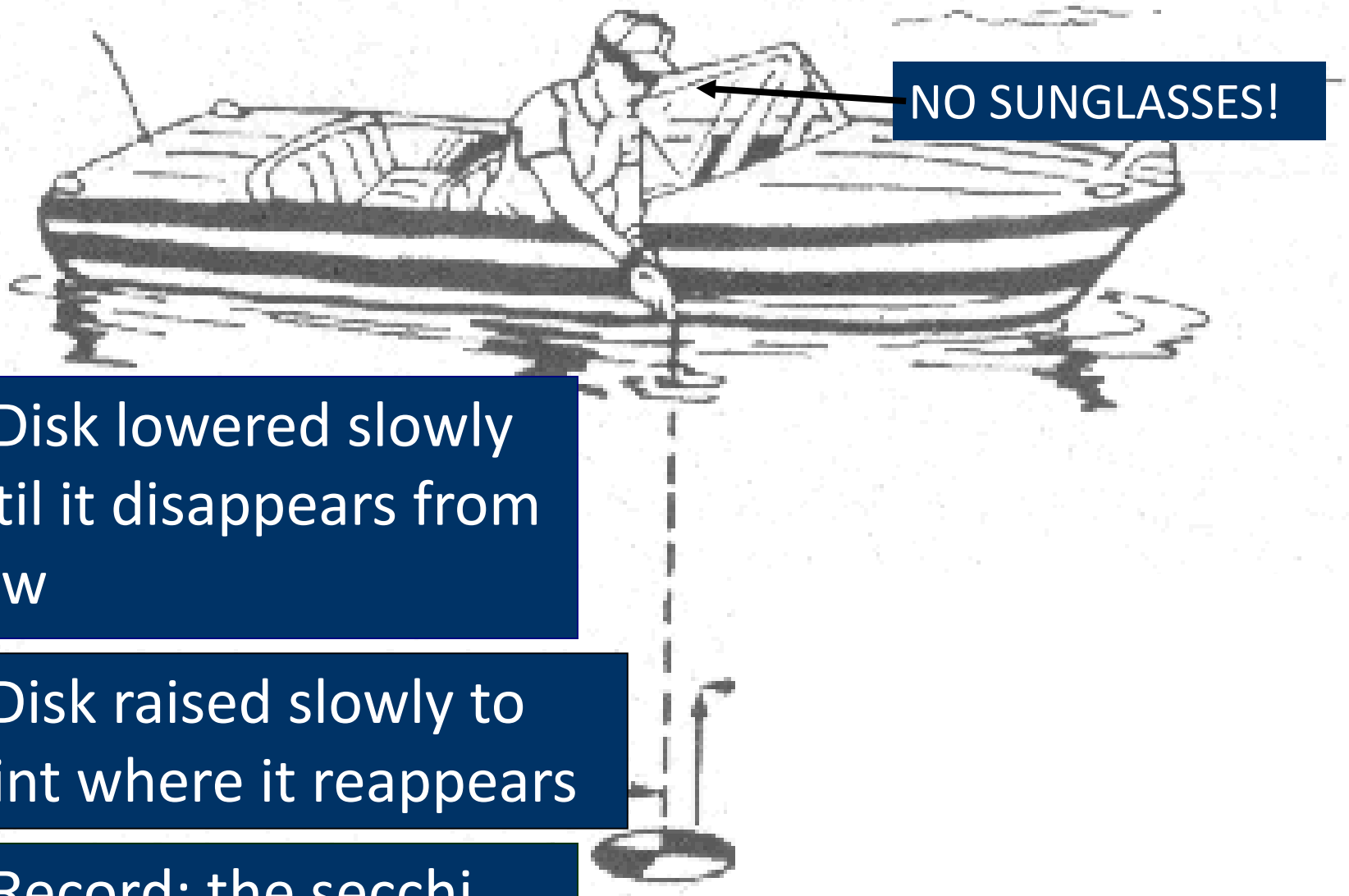
MC0862TA


CHLOROPHYLL
CHLOROPHYLL

Secchi Disk Measurement

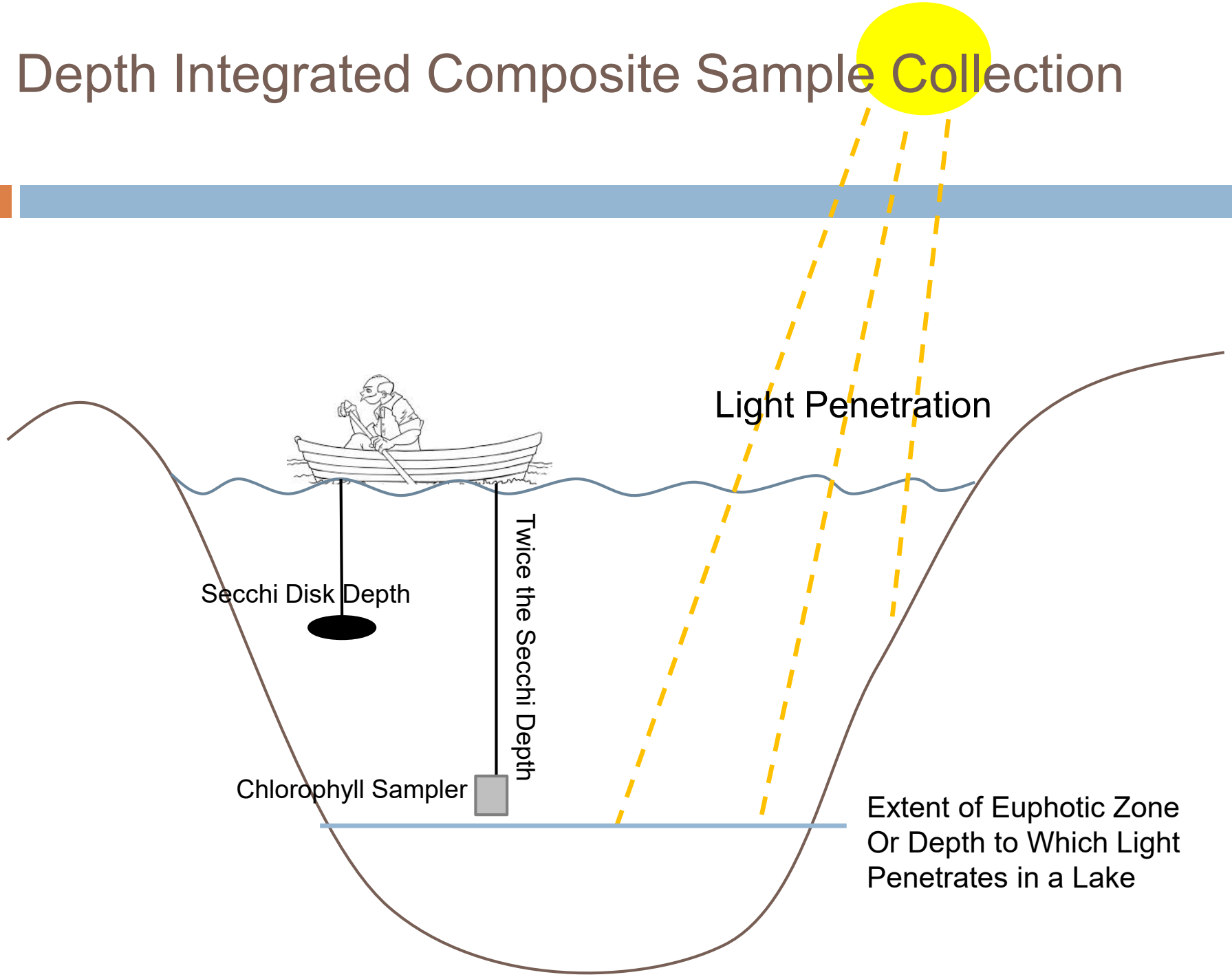


1. Disk lowered slowly until it disappears from view

2. Disk raised slowly to point where it reappears

3. Record: the secchi depth is average

Depth Integrated Composite Sample Collection



Michigan Clean Water Corps

CHLOROPHYLL
2021 Data Form 1

Cooperative Lakes Monitoring Program

Lake Name: _____ County: _____ Township: _____

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

Latitude: _____ Longitude: _____ Circle GPS / Map

Volunteer Monitor Name(s):_____

Sampling Event #1 (May) Date Sampled: _____ Time: _____

Secchi Depth :_____(feet) Composite Sample Depth:_____(feet)

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

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

Filtering Sample (if 50 cc could not be filtered for this sample, indicate amount filtered):

Sample 1: _____ (cc) Sample 2: _____ (cc)

.....

Sampling Event #2 (June) Date Sampled: _____ Time: _____

Secchi Depth : (feet) Composite Sample Depth: (feet)

What if my lake is too shallow to go 2x the Secchi depth

- Drop the sampler down to about a foot off the bottom
- Don't hit the bottom
- Record the depth as your "composite sample depth"

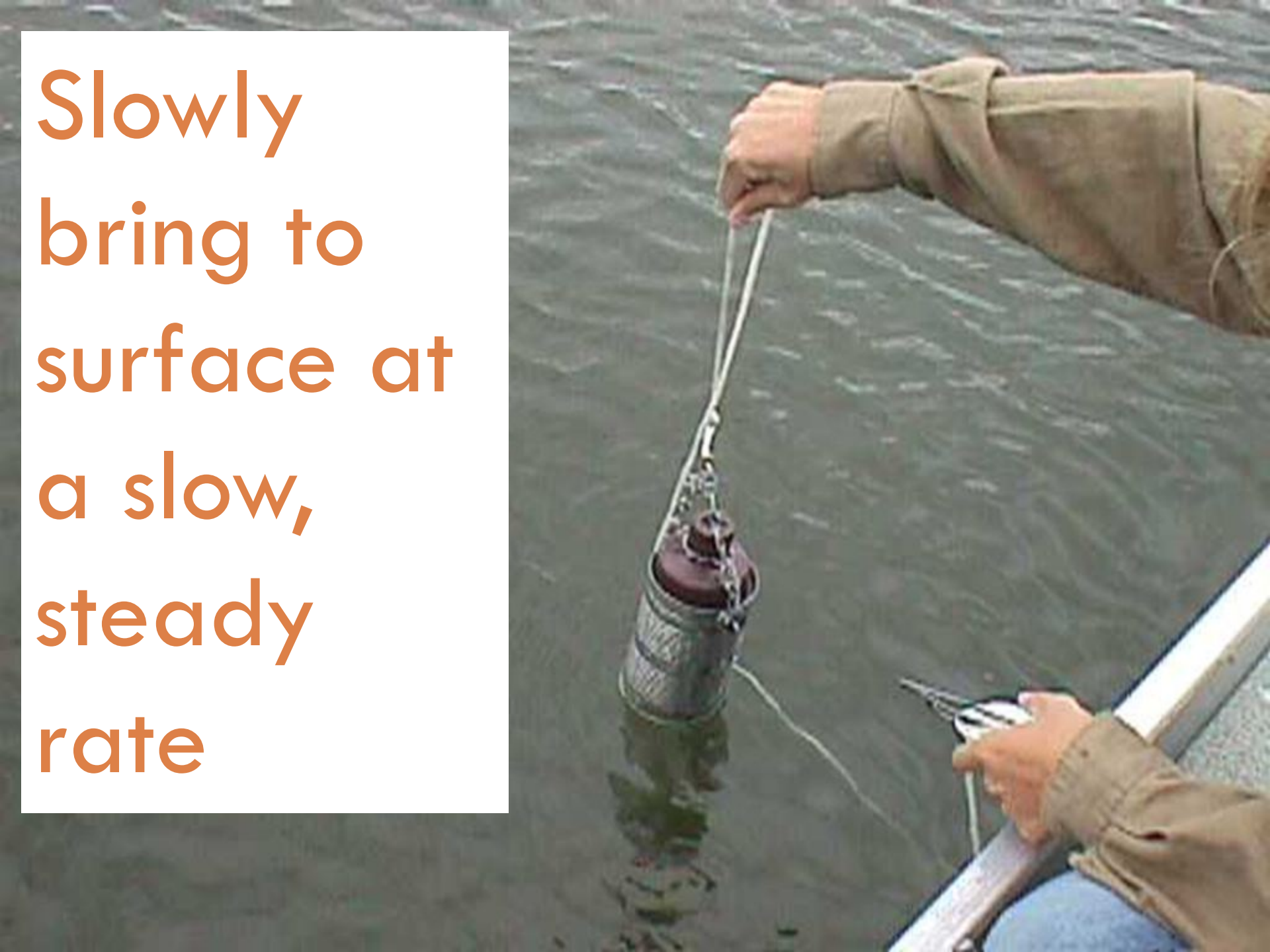
What if my Secchi disk is at the very bottom of the lake?

- Drop the sampler down to about a foot off the bottom
- Don't hit the bottom
- Record the depth as your "composite sample depth"

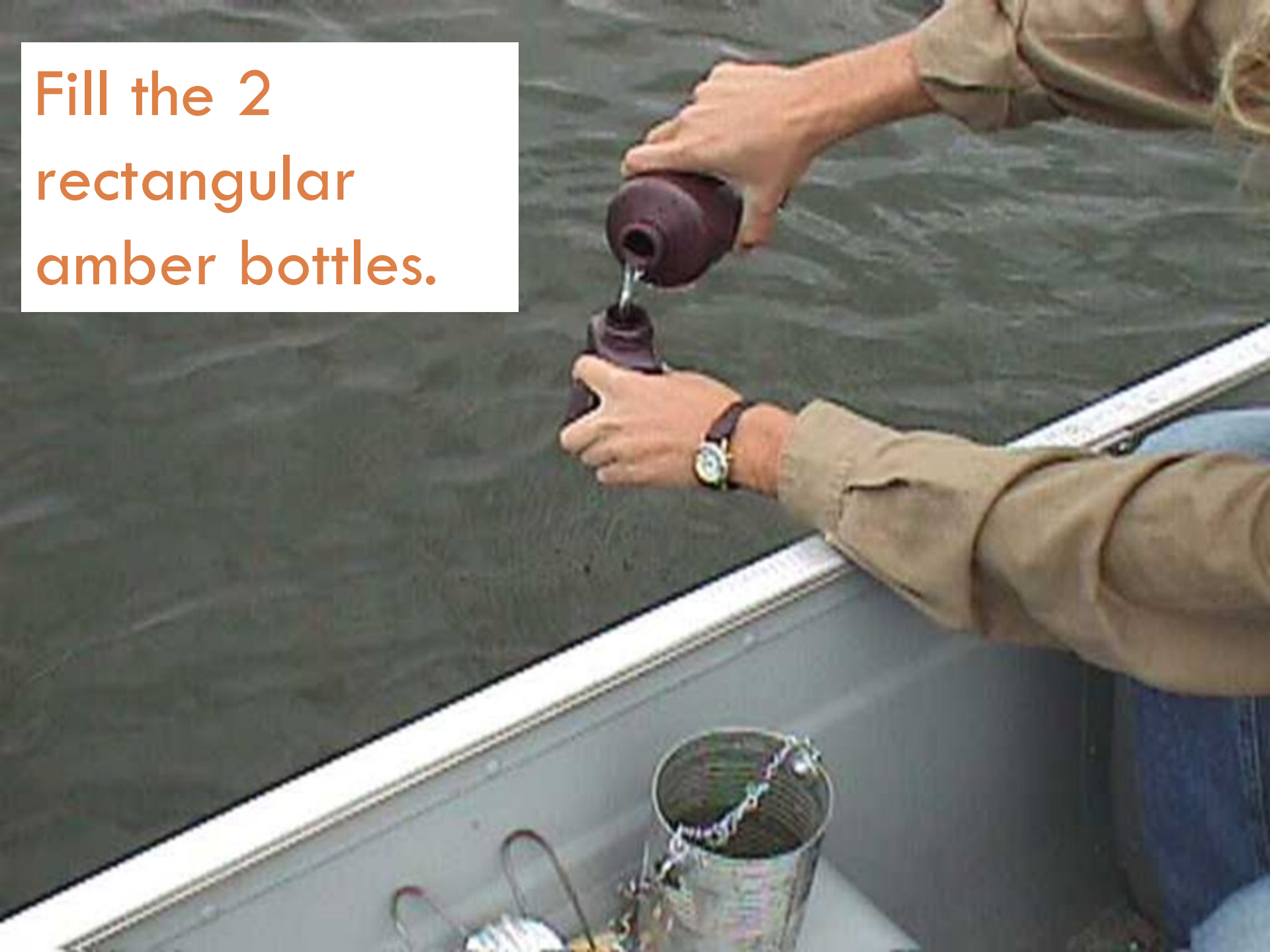

Rinse with lake water

Use clothes pin to mark the depth on the rope; release

Slowly bring to surface at a slow, steady rate




Want
bottle
2/3 to
3/4 full


Fill the 2
rectangular
amber bottles.


5 drops of $MgCO_3$ preservative added to each bottle

Cold storage until returning to shore

CHLOROPHYLL-A

Step 2.
Filtering the water sample

Michigan Clean Water Corps

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Let's go to the video tape!

- Filtering section starts at 5:50.
- https://www.youtube.com/watch?v=iCSAYkScxnY

Sample turn-in and submitting your data

1. Make copies of your data forms for your records.
2. Keep everything frozen! Sample turn in is still TBD due to COVID.
3. Your field notes need to be added to the database. Follow the instructions for data submission on our website, www.micorps.net, and do so by October 31.

Common Reasons for Sample Rejection

- Sample collected at the wrong time
  - Samples collected outside the assigned interval will be rejected
- Samples collected on the packaging slip. BLUE = BAD
- Samples not wrapped in foil
- Incorrect delivery
  - If you forget or can't turn your samples in to the drop-off location on the assigned date – CONTACT US for instructions on safe shipping. Unexpected shipments will thaw and be rejected.

Cooperative Lakes Monitoring Program

Michigan Lakes– Ours to Protect

2019 Data Report for Devils Lake, Lenawee County

Site ID: 460179

41.9882°N, 84.2880°W

The CLMP is brought to you by:

Michigan Clean Water Corps

EGLE Michigan Department of Environment, Great Lakes, and Energy

Michigan State University

Huron River Watershed Council

Great Lakes Commission / des Grands Lacs

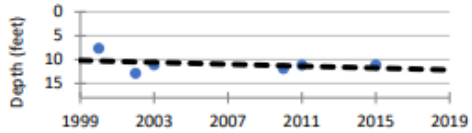
Site ID: 460179

Devils Lake, Lenawee County
2019 CLMP Results

Cooperative Lakes Monitoring Program

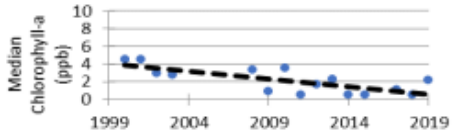
Secchi Disk Transparency (feet)

Year	# Readings	Min	Max	Average	Std. Dev	Carlson TSI
2019	5	8.0	16.0			
2015	24	7.0	17.0	11.1	1.7	42
1993-2013	93	6.0	25.0	10.9	3.9	43
2019 All CLMP Lakes	3392	1.5	50.0	12.8	5.8	42



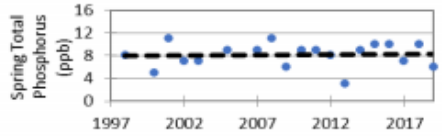
Chlorophyll-a (parts per billion)

Year	# Samples	Min	Max	Median	Std. Dev	Carlson TSI
2019	5	<1.0	5.2	2.2	1.8	38
2014-2018	21	<1.0	4.6	<1.0	0.8	<31
2000-2013	52	<1.0	7.0	<1.0	1.3	41
2019 All CLMP Lakes	635	< 1.0	42.0	2.2	3.4	39



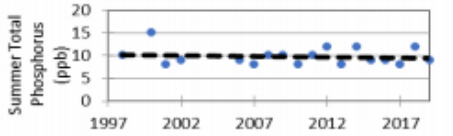
Spring Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev
2019	1	6.0	6.0	6.0	NA
2014-2018	5	7.0	10.0	9.2	1.3
1998-2013	13	<=3 W	11.0	7.8	2.3
2019 All CLMP Lakes	220	<= 3	100.0	14.9	11.0



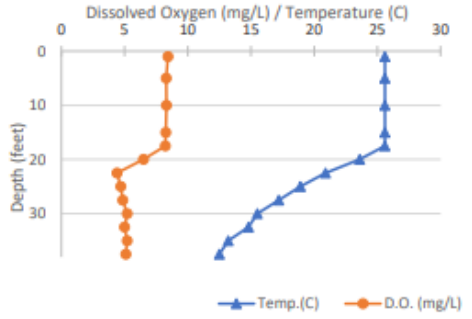
Summer Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev	Carlson TSI
2019	1	9.0	9.0	9.0	NA	36
2014-2018	5	8.0	12.0	10.0	1.9	37
1998-2013	12	8.0	15.0	9.8	2.1	37
2019 All CLMP Lakes	281	<= 3	65.0	12.8	9.3	38



Dissolved Oxygen and Temperature Profile

8/13/2019



Summary

Average TSI	2019	2014-2018	1993-2013
Devils Lake	37	37	40
All CLMP Lakes	40	40	41

With an average TSI score of 37 based on 2019 chlorophyll-a and summer total phosphorus data, this lake is rated between the oligotrophic and mesotrophic lake classification. The lake leans slightly more oligotrophic than mesotrophic.

The low level of nutrients in the lake results in dissolved oxygen being available throughout the water column for the entire summer.

Long term trends indicate that the trophic status parameters have not changed beyond minor year-to year variation since monitoring began.

** = No sample received W= Value is less than the detection limit (<3 ppb) T= Value reported is less than the reporting limit (5 ppb).*
<1.0 = Chlorophyll-a: Sample value is less than limit of quantification (<1 ppb).

Other report components:

- Full sized graphs of each component
- Each Dissolved Oxygen/Temp profile
- Score the Shore results
- Aquatic Plant results

If you find a mistake:

- I will fix it quick
- Email me: psteen@hrwc.org

Chlorophyll-a (parts per billion)

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2019	5	<1.0	5.2	2.2	1.8	38
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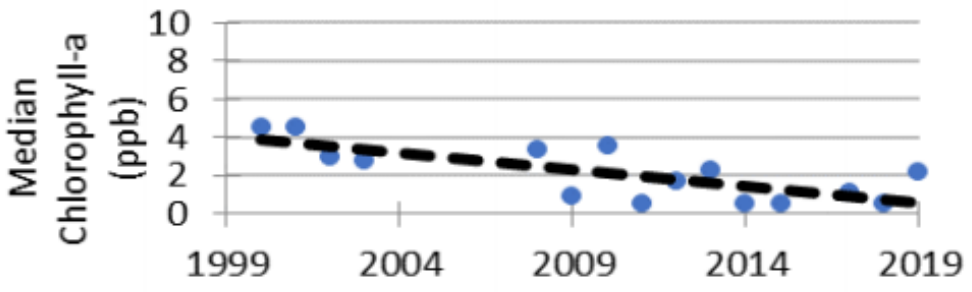

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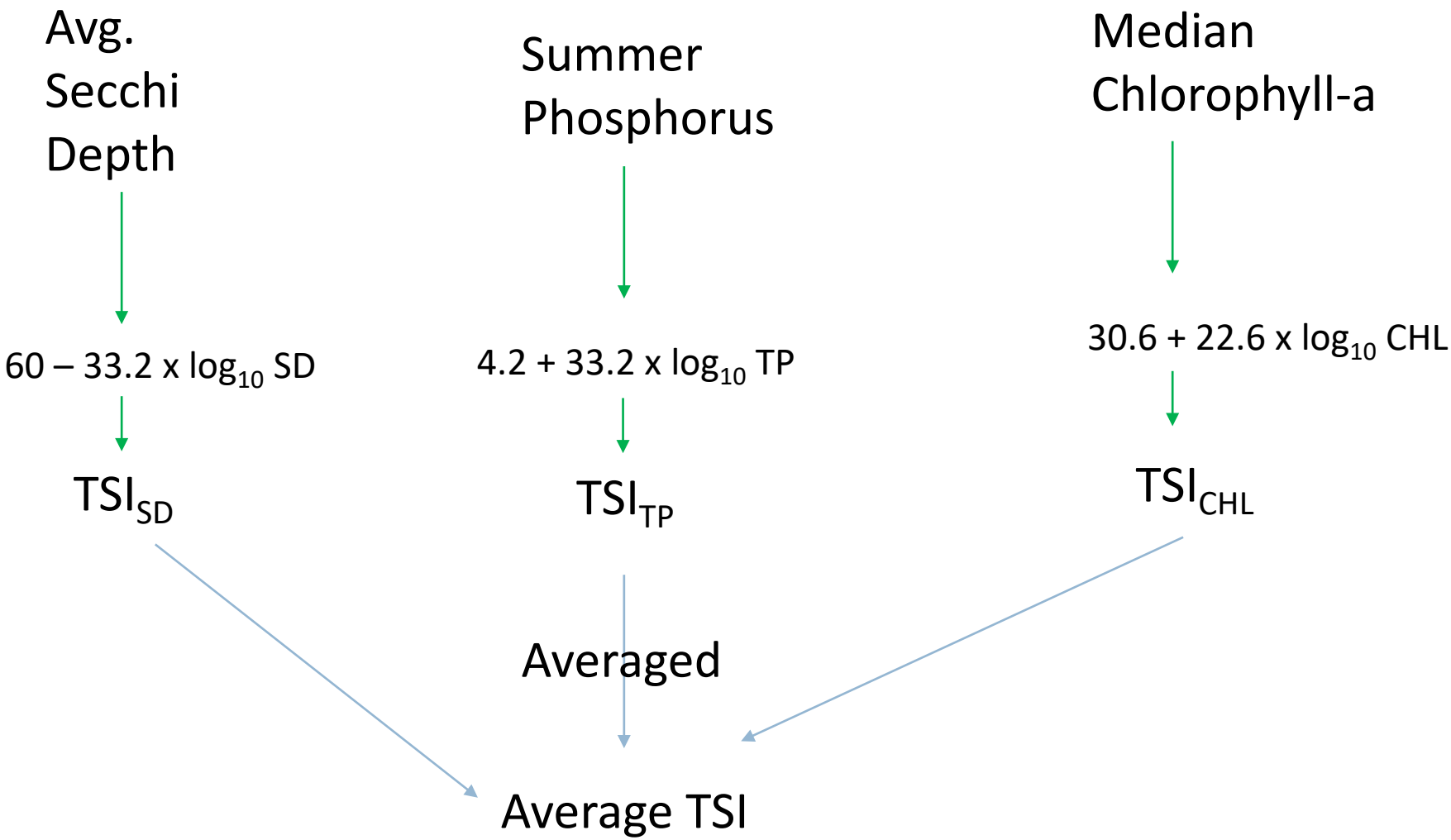
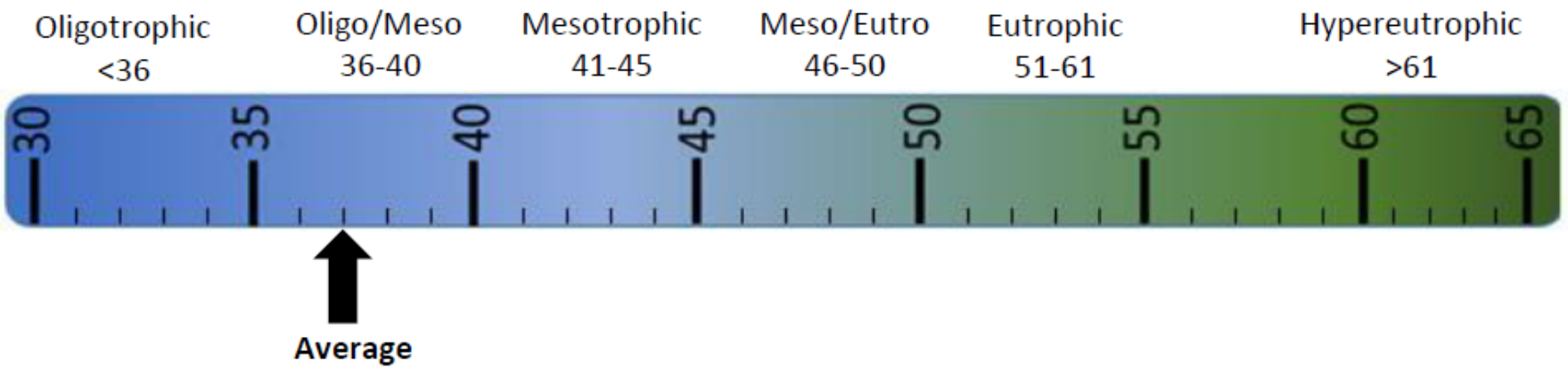
Long term trends indicate that the trophic status parameters have not changed beyond minor year-to year variation since monitoring began.

What is Trophic Status Index?



TSI for Devils Lake in 2019	
Average	37
Secchi Disk	
Summer TP	36
Chlorophyll-a	38



Oligotrophic: Generally deep and clear lakes with little aquatic plant or algae growth. These lakes maintain sufficient dissolved oxygen in the cool, deep-bottom waters during late summer to support cold water fish, such as trout and whitefish.

Mesotrophic: Lakes that fall between oligotrophic and eutrophic. Mid-ranged amounts of nutrients.

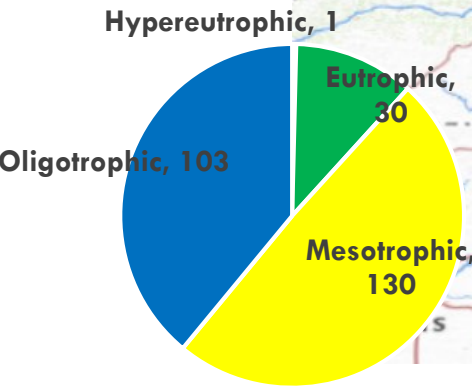
Eutrophic: Highly productive eutrophic lakes are generally shallow, turbid, and support abundant aquatic plant growth. In deep eutrophic lakes, the cool bottom waters usually contain little or no dissolved oxygen. Therefore, these lakes can only support warm water fish, such as bass and pike.

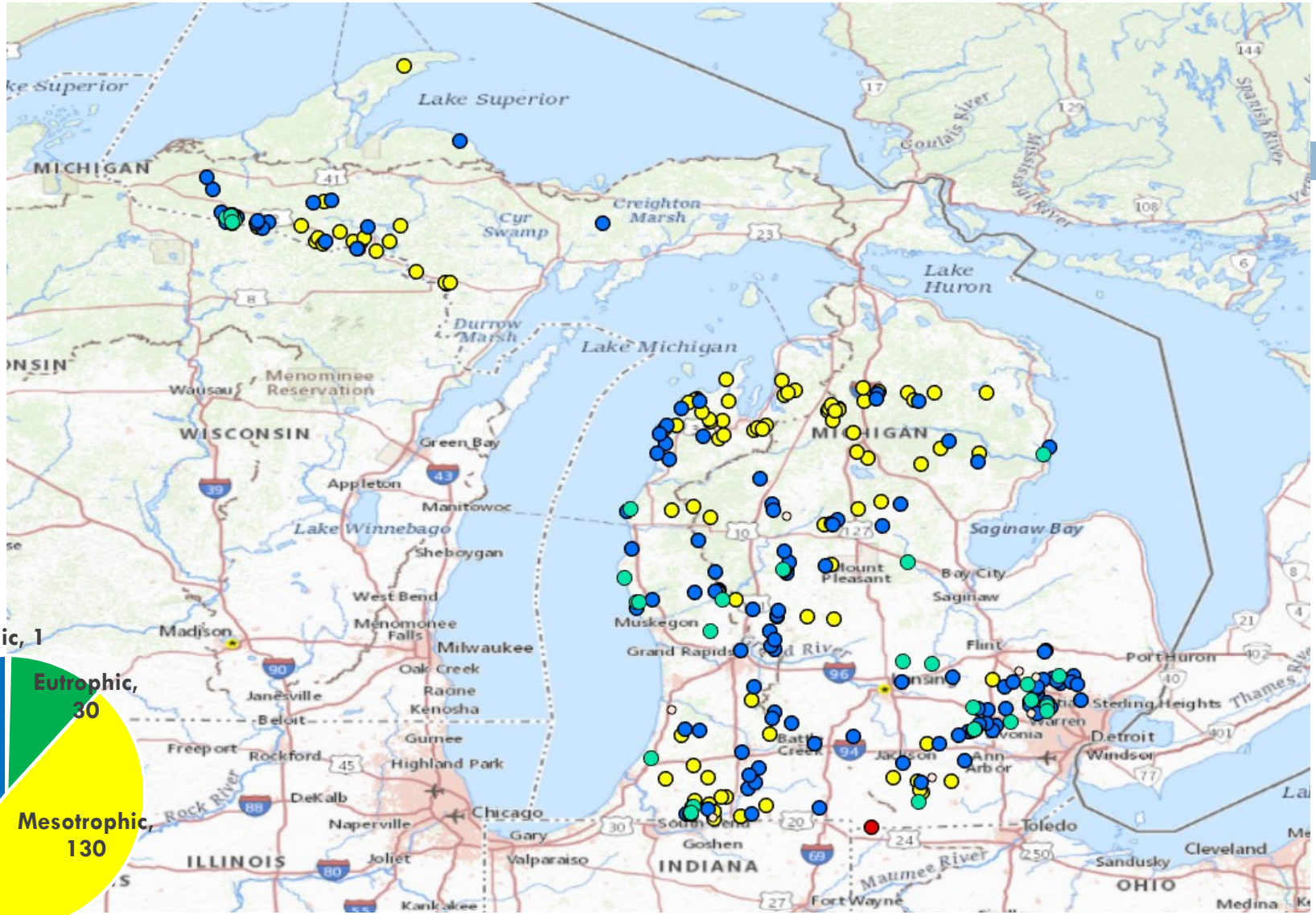
Hypereutrophic: A specialized category of euthrophic lakes. These lakes exhibit extremely high productivity, such as nuisance algae and weed growth.

2019

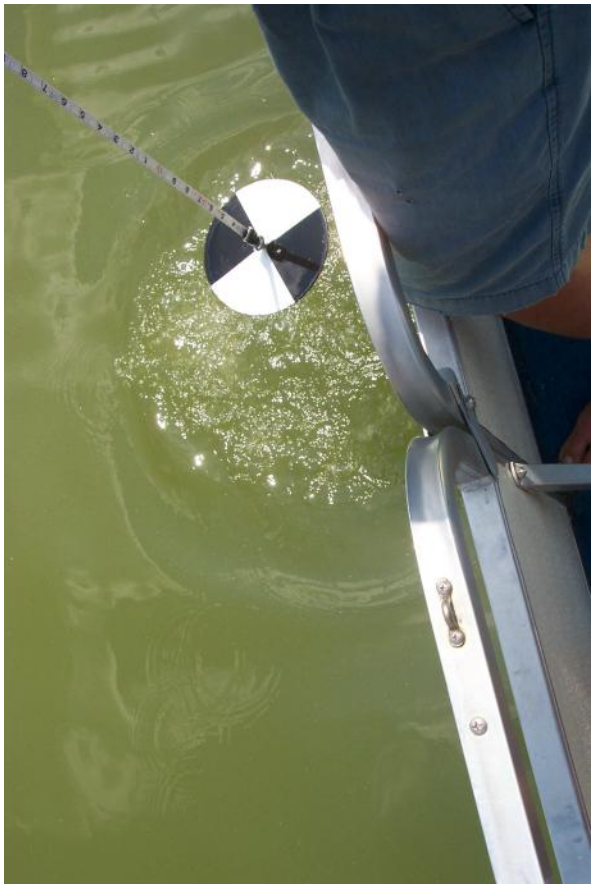
- Oligotrophic
- Mesotrophic
- Eutrophic
- Hypereutrophic

n=264





Working together to protect lakes…



Questions?