

Training Agenda

9:00 AM – 9:15 AM	Welcome to CLMP
9:15 AM – 10:15 AM	Secchi Disk & Phosphorus
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	Score the Shore
2:00 PM – 3:30 PM	Exotic Aquatic Plant Watch
3:30 PM – 3:45 PM	BREAK
3:45 PM – 5:00 PM	Dissolved Oxygen & Temperature



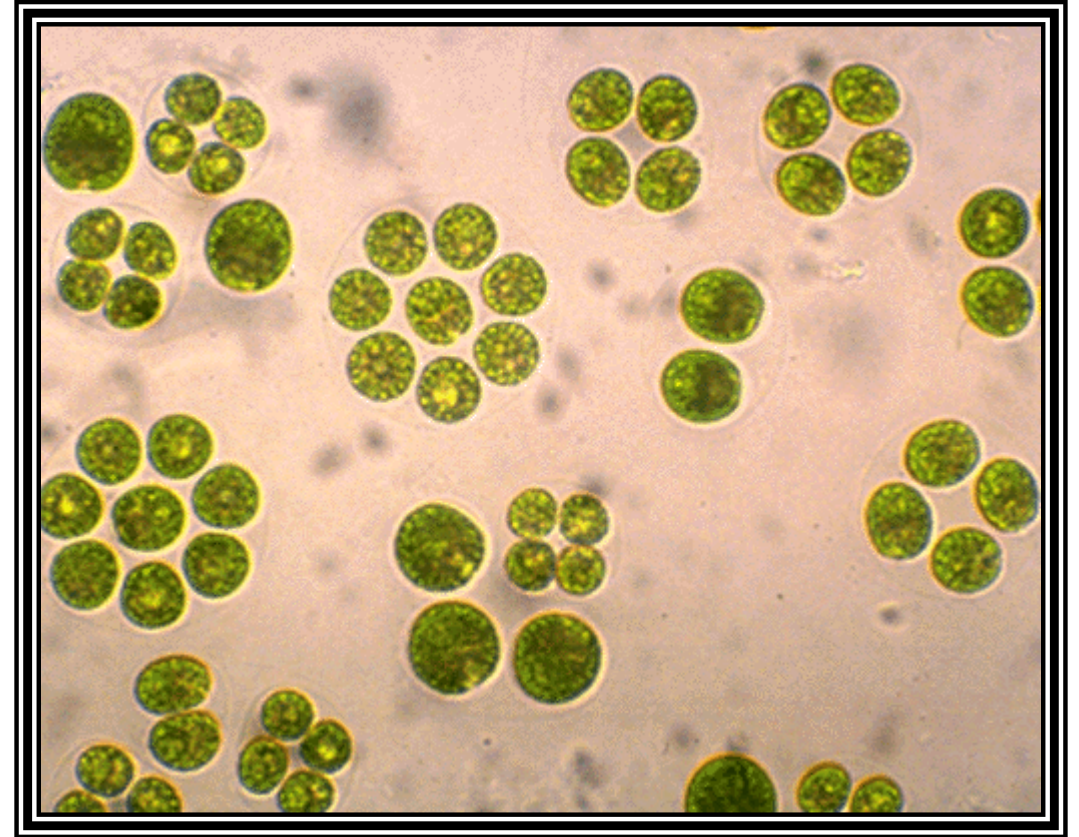
Chlorophyll a

Dr. Paul Steen



Chlorophyll *a* Training Outline

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

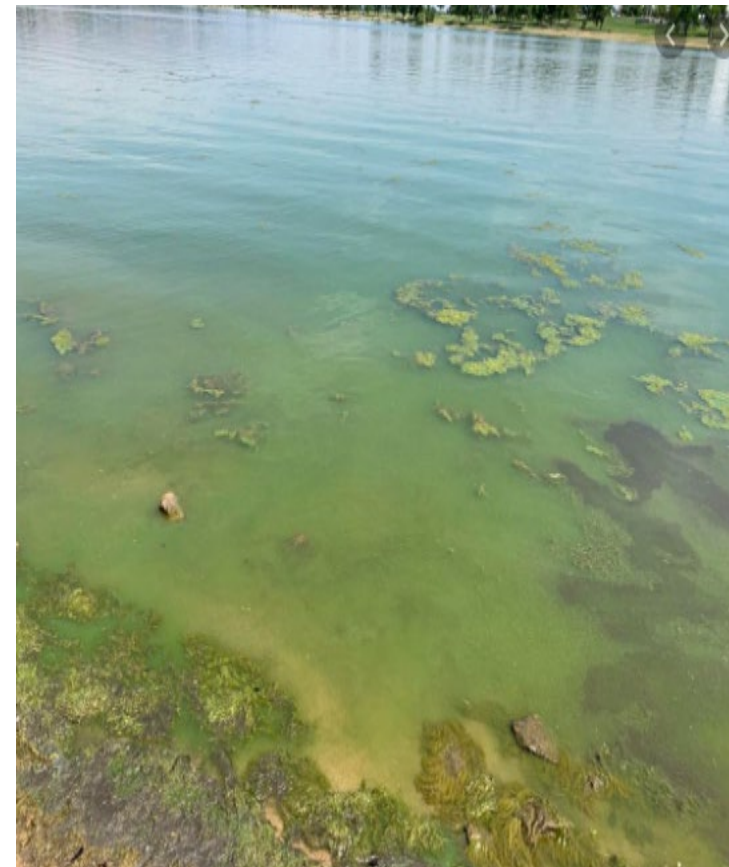
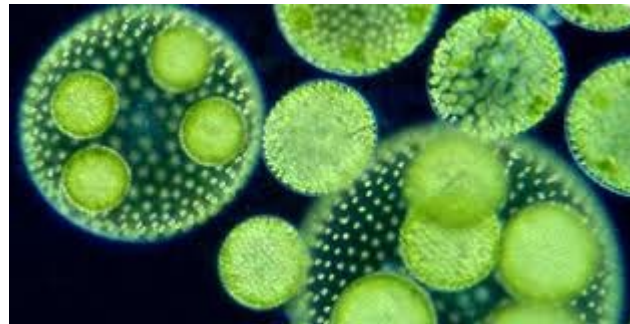


What is Chlorophyll-a?

Chlorophyll a Training Outline

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





Sampling Schedule

micorps.net → Lakes → CLMP documents

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 Mercks: 269-330-8571	Sample #1 May 10-20 Sample #2 June 10-20 Sample #3 July 10-20 Sample #4 Aug 10-20 Sample #5 Sept 22-26	8 am-Noon June 27 8 am-Noon September 26
Calhoun, Jackson, Washtenaw, Branch, Hillsdale, Lenawee	EGLE Jackson District Office 301 E. Louis B. Glick Hwy. Jackson, MI 49201 Kathy David: 517-257-0251	Sample #1 May 10-20 Sample #2 June 10-20 Sample #3 July 10-20 Sample #4 Aug 10-20 Sample #5 Sept 22-26	8 am-Noon June 27 8 am-Noon September 26
St. Clair, Macomb, Oakland, Wayne, Monroe	EGLE Warren District Office 27700 Donald Court Warren, MI 48092 Jack Cotrone: 248-763-1994	Sample #1 May 10-20 Sample #2 June 10-20 Sample #3 July 10-20 Sample #4 Aug 10-20 Sample #5 Sept 22-26	8 am-Noon June 27 8 am-Noon September 26
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	Sample #1 May 10-20 Sample #2 June 10-20 Sample #3 July 10-20 Sample #4 Aug 10-20 Sample #5 Sept 15-19	8 am-Noon June 27 8 am-Noon September 19
Eaton, Ingham, Livingston, Clinton, Gratiot, Genesee, Shiawassee	EGLE Lansing Downtown Office Constitution Hall, 525 W. Allegan Lansing, MI 48933 Tamara Lipsey: 517-342-4372	Sample #1 May 10-20 Sample #2 June 10-20 Sample #3 July 10-20 Sample #4 Aug 10-20 Sample #5 Sept 15-19	8 am-Noon June 27 8 am-Noon September 19
Isabella, Midland, Bay, Saginaw, Tuscola, Huron, Sanilac, Arenac, Lapeer	EGLE Bay City Office 401 Ketchum Street Bay City, MI 48708 Crystal Zielinski: 989-545-9318	Sample #1 May 10-20 Sample #2 June 10-20 Sample #3 July 10-20 Sample #4 Aug 10-20 Sample #5 Sept 15-19	8 am-Noon June 27 8 am-Noon September 19

COUNTY	TURN-IN ADDRESS (EGLE unless noted otherwise)	SAMPLING DATES	TURN-IN DATES
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Iosco, Ogemaw, Alcona, Oscoda, Gladwin, Roscommon, Crawford	The Roth's Residence 7311 N. Chain Lake Drive South Branch, MI 48761 Jean Roth: 989-257-3715	Sample #1 May 10-20 Sample #2 June 10-20 Sample #3 July 10-20 Sample #4 Aug 10-20 Sample #5 Sept 8-12	8 am-Noon June 27 8 am-Noon September 12
Antrim, Otsego, Montmorency, Alpena, Charlevoix, Emmet, Cheboygan, Presque Isle	DNR Gaylord Customer Service Center 1732 West M-32, Gaylord, MI 49735 Ashley Colborn and Andy Evans: 989-732-3541	Sample #1 May 10-20 Sample #2 June 10-20 Sample #3 July 10-20 Sample #4 Aug 10-20 Sample #5 Sep 1-5	8 am-Noon June 27 8 am-Noon September 5
Ontonagon, Gogebic, Houghton, Keweenaw, Baraga	Lando Center 4258 County Highway B Land O' Lakes, WI 54540 Michelle Kanipes: 906-285-9262	Sample #1 May 10-20 Sample #2 June 10-20 Sample #3 July 10-20 Sample #4 Aug 10-20 Sample #5 Aug 25-29	8 am-Noon June 27 8 am-Noon August 29
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CHLOROPHYLL 2023 Data Form 1



Lake Name: _____ County: _____ Township: _____

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

Latitude: _____ Longitude: _____ 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.): _____

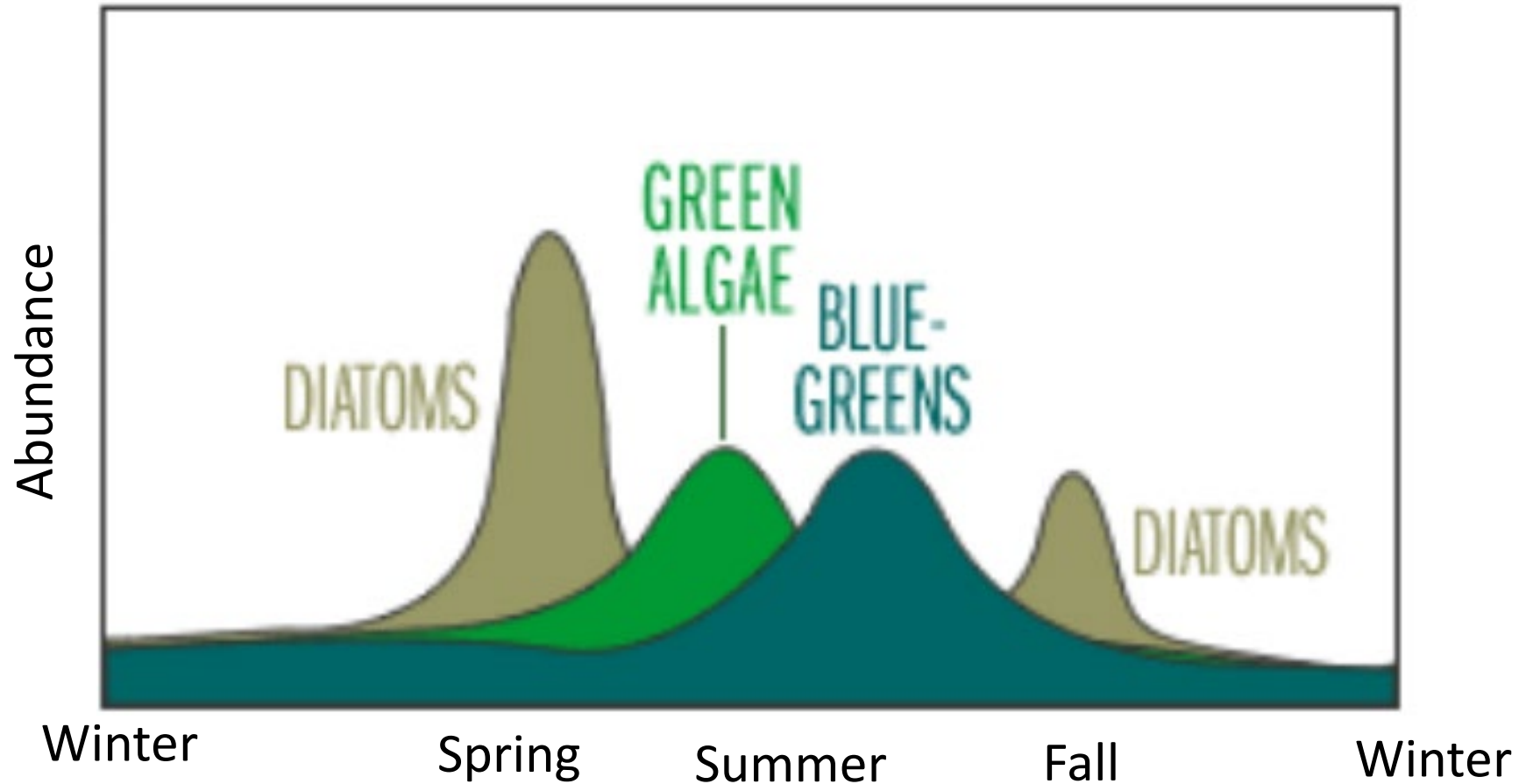
Unusual Conditions (heavy rain, boating, etc.): _____

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

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



Data Requirement: 4 or 5 samples.
Lakes change over the course of the season!

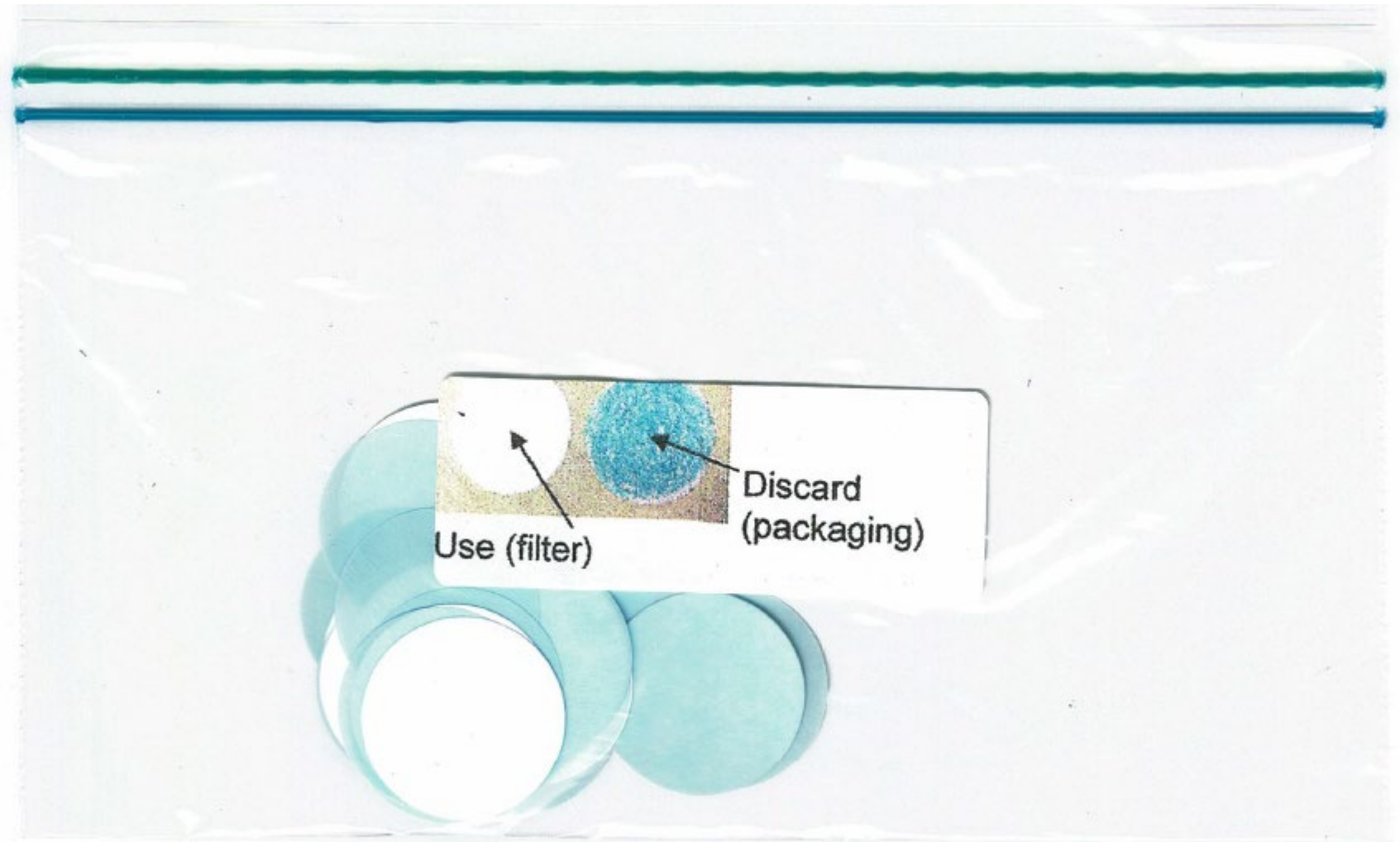


Credit: Water on the Web

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

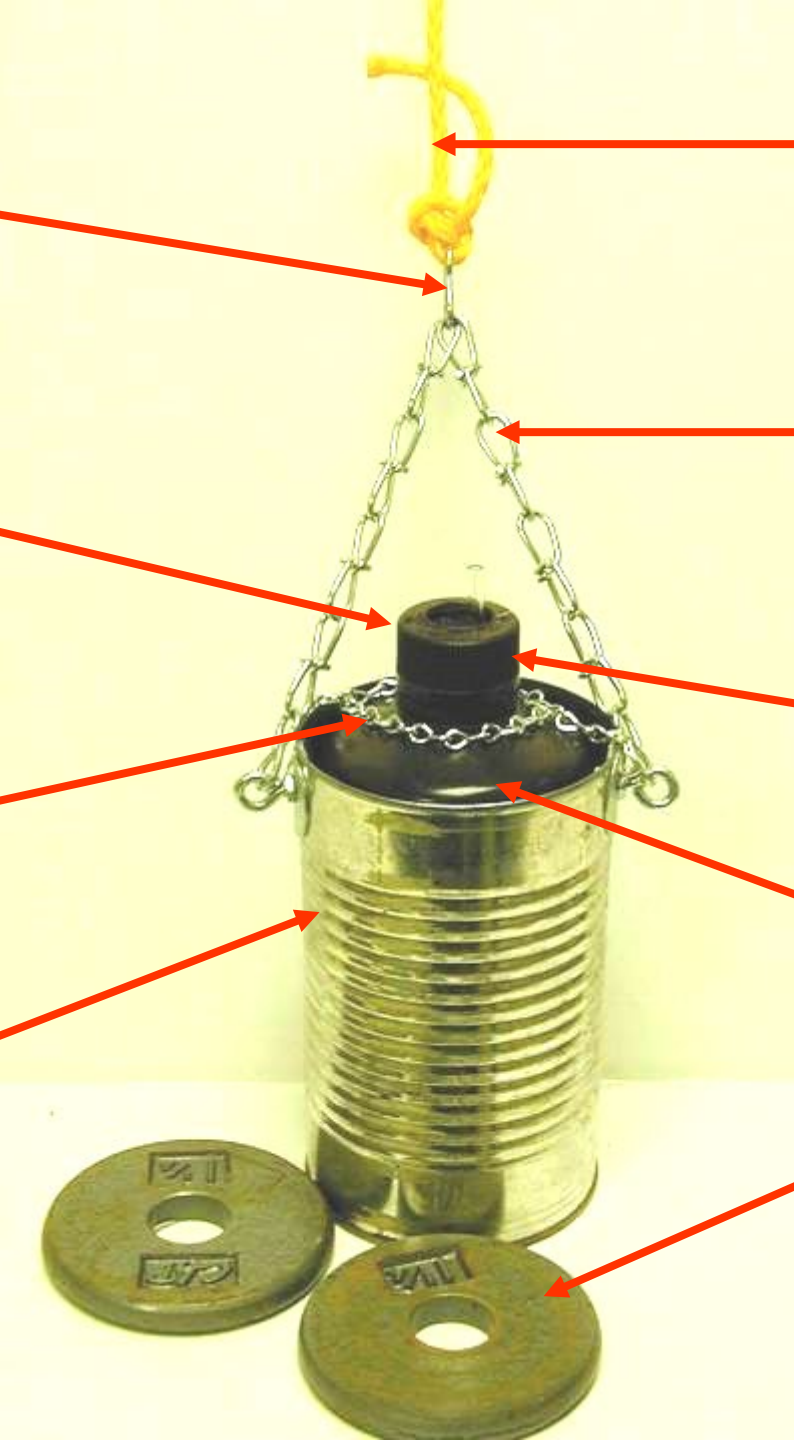
Retaining chain

Bottle cap

Juice can

One liter amber bottle

2 dumbbell weights



What is a resupply kit?

- Filters (11- 12) with warning label (in envelope).
- Vials with caps (11)
- Dropper bottle with MgCO_3 (labeled)
- Zip-lock bags
- Labels (11)

Returning volunteers- don't use old filters.

Chlorophyll Sampling Equipment

Provided by volunteer:

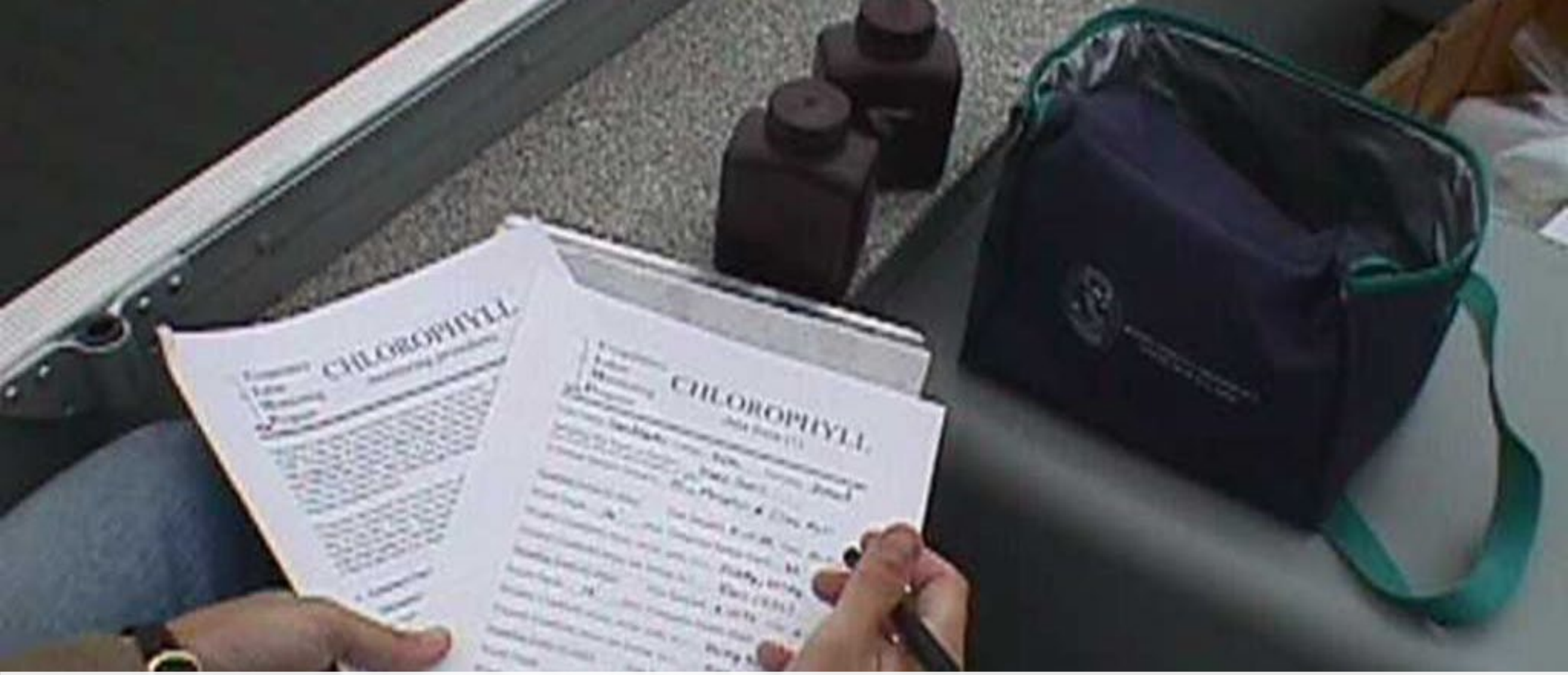
- boating safety equipment
- anchor
- pencil or indelible ink pen
- measured line for sampler
- freezer pack/ ice

Sampling Step 1

Getting a depth integrated water sample

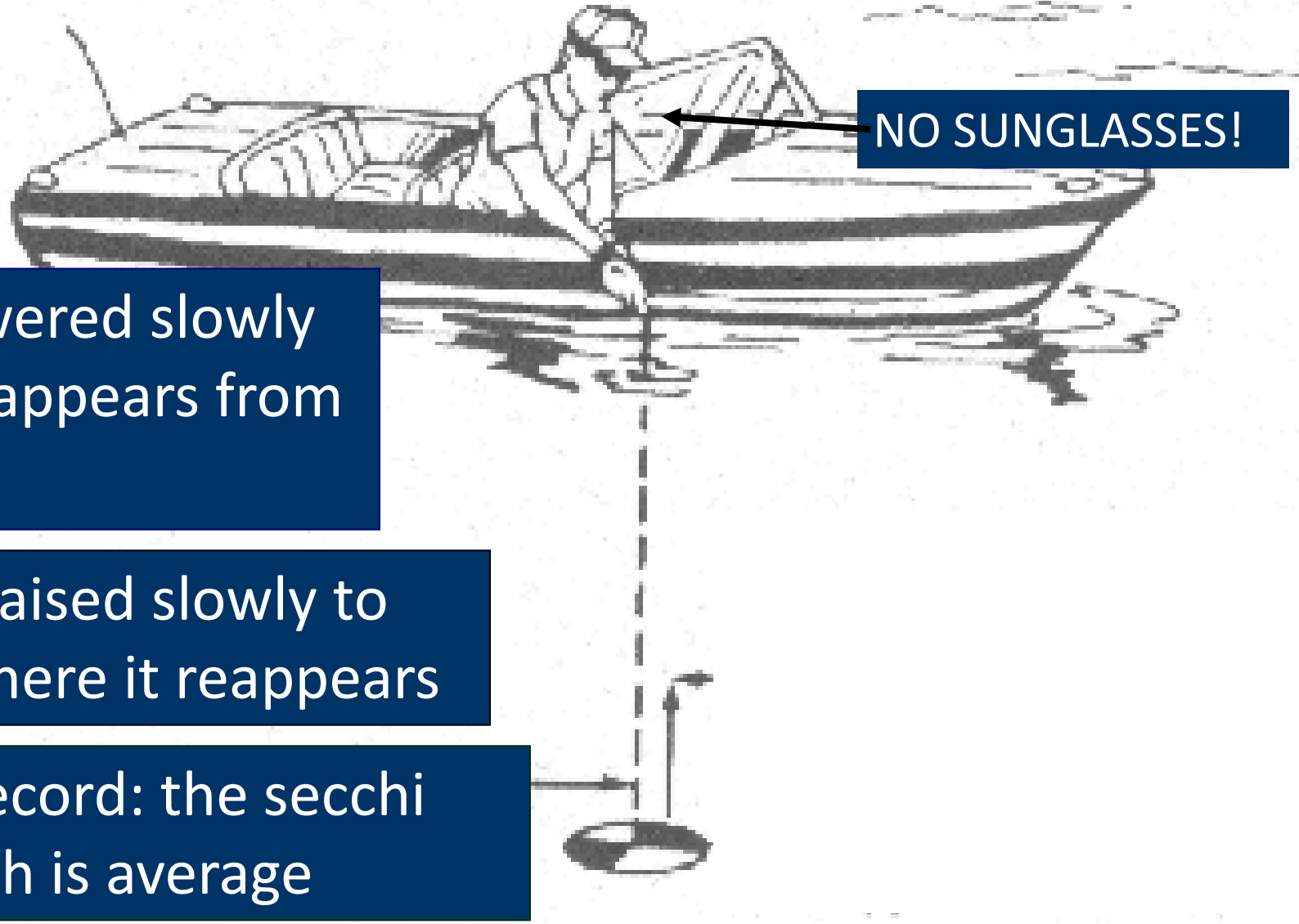


Head out onto the water



Start to fill out the data sheet

Secchi Disk Measurement

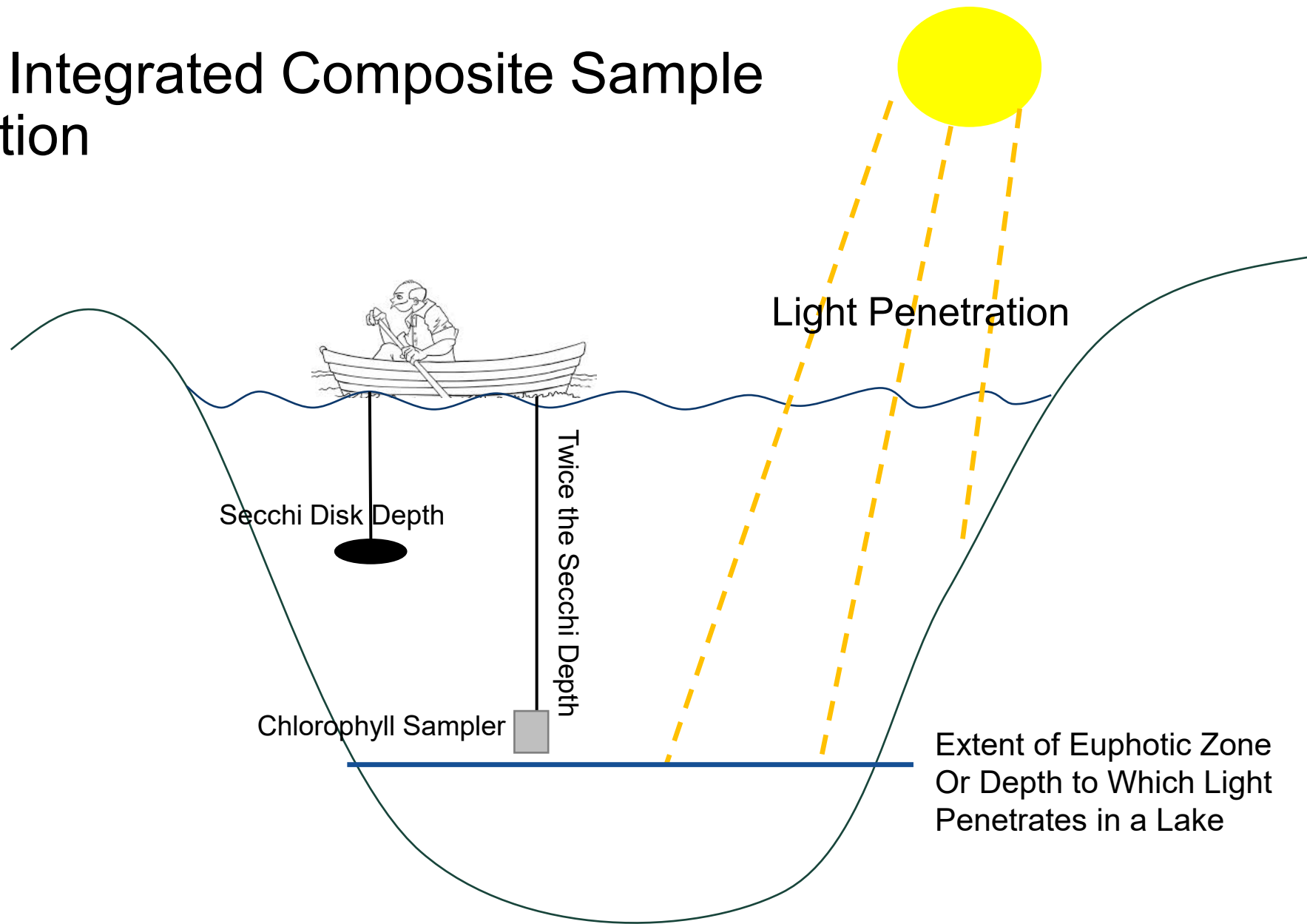


1. Disk lowered slowly until it disappears from view

2. Disk raised slowly to point where it reappears

3. Record: the secchi depth is average

Depth Integrated Composite Sample Collection



Lake Name: _____ County: _____ Township: _____

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

Latitude: _____ Longitude: _____ 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)

What if...

- ...my lake is too shallow to go 2x the Secchi depth?

- Measure the depth to bottom
- Record the depth minus 1 foot as your “composite sample depth”
- Don’t hit the bottom when you drop your sampler

- ...my Secchi disk is at the very bottom of the lake?

- Record the depth minus 1 foot as your “composite sample depth”
- Don’t hit the bottom when you drop your sampler

Take sampler apart. Rinse 1 liter bottle with lake water



Use clothes pin to mark the composite sample depth on the rope;

Release and let it free fall sink until the clothes pin is about to sink below the water surface.



Slowly bring to surface at a slow, steady rate.



Goal: Your bottle is 2/3 to 3/4 full

If it is too empty or full, dump the water and try again, changing your pulling speed.



Swirl your bottle to gently mix it...

... and then fill the 2 rectangular amber bottles.



Mix MgCO_3 well...

...add 5 drops to each
bottle; swirl to mix



Cold storage until returning to shore



Sampling Step 2

Filtering the water sample

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. (Take a picture of it).
2. Keep everything frozen! Sample turn in is the same days as Spring and Summer Phosphorus turn ins.
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.

micorps.net → Lakes → CLMP documents

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Common Reasons for Sample Rejection

- Sample collected at the wrong time
 - Samples collected outside the assigned interval will be rejected
- Samples collected on the separator sheet. 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.

Questions about procedures?





**2019 Data Report
for
Devils Lake, Lenawee County**

Site ID: 460179

41.9882°N, 84.2880°W

The CLMP is brought to you by:





View Data

Enter Data

MiCorps Data Exchange Network

The MiCorps web-based data exchange platform provides online access to volunteer monitoring data through a searchable database. Choose which water bodies you would like to search through and narrow down your search by county, hydrologic unit code (HUC) and/or water body name.

Search by Streams or Lakes

Streams

Lakes

Narrow Your Search

County

HUC

Name

All

Date Range

From to

Sampling Parameters

- Secchi Disk
- Phosphorus (Spring Overturn)
- Phosphorus (Late Summer)
- Chlorophyll
- Dissolved Oxygen/Temperature
- Aquatic Plants
- Exotic Plants
- Score The Shore

Data Tier

Data generated under different Quality Assurance Project Plans (QAPPs) belong to different tiers.

- Tier 1: The MiCorps QAPP
- Tier 2: Another acceptable QAPP
- Tier 3: No QAPP, but acceptable Standard Operating Procedures

View Results

Download in Excel

https://micorps.net

<https://micorps.net/lake-monitoring/individual-lake-reports/>



Individual Lake Reports

Please click on the County Name to view reports listed by "Lake Name, Site ID. Last Updated." Older reports (back through 2014) may be available by contacting Paul Steen.

▼ Alcona County

- Cedar Lake, 010017. 2022
- Hubbard Lake, 010106. 2017
- Jewell Lake, 010041. 2022

▼ Alger County

- Deer Lake, 020127. 2018
- Tie Lake, 020168. 2021

> Allegan County

> Alpena County

> Antrim County

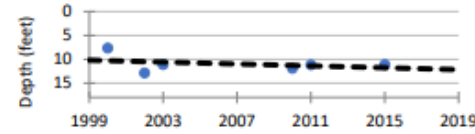
> Barry County

Devils Lake, Lenawee County 2019 CLMP Results



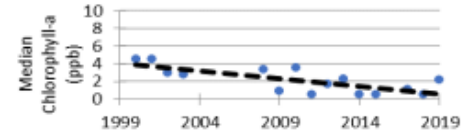
Secchi Disk Transparency (feet)

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



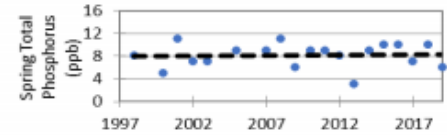
Chlorophyll-a (parts per billion)

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



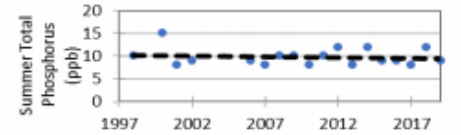
Spring Phosphorus (parts per billion)

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



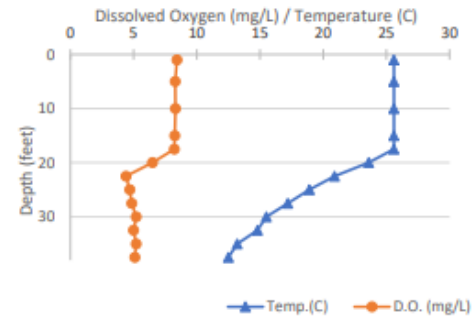
Summer Phosphorus (parts per billion)

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:

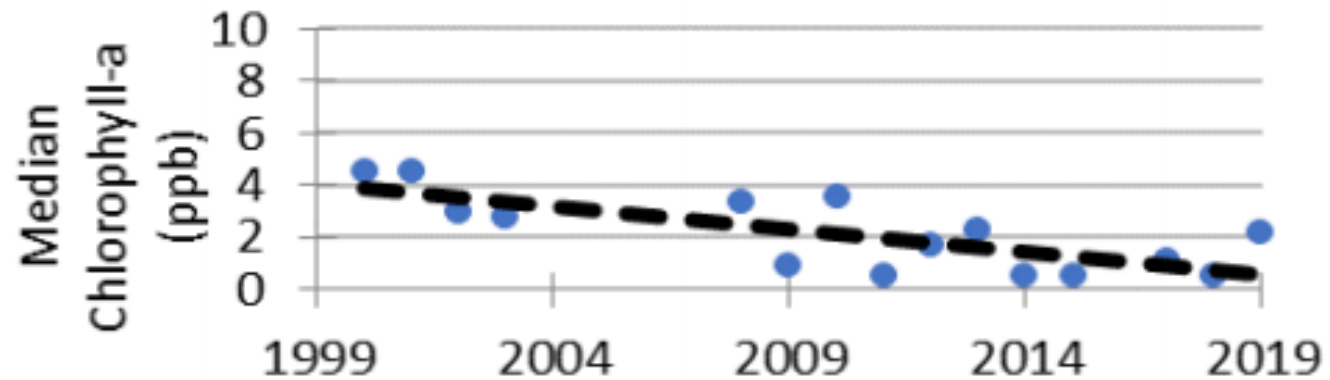
- Full sized graphs of each component
- Each Dissolved Oxygen/Temp profile
- Score the Shore results
- Aquatic Plant results

If you find a mistake:

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

Chlorophyll-a (parts per billion)

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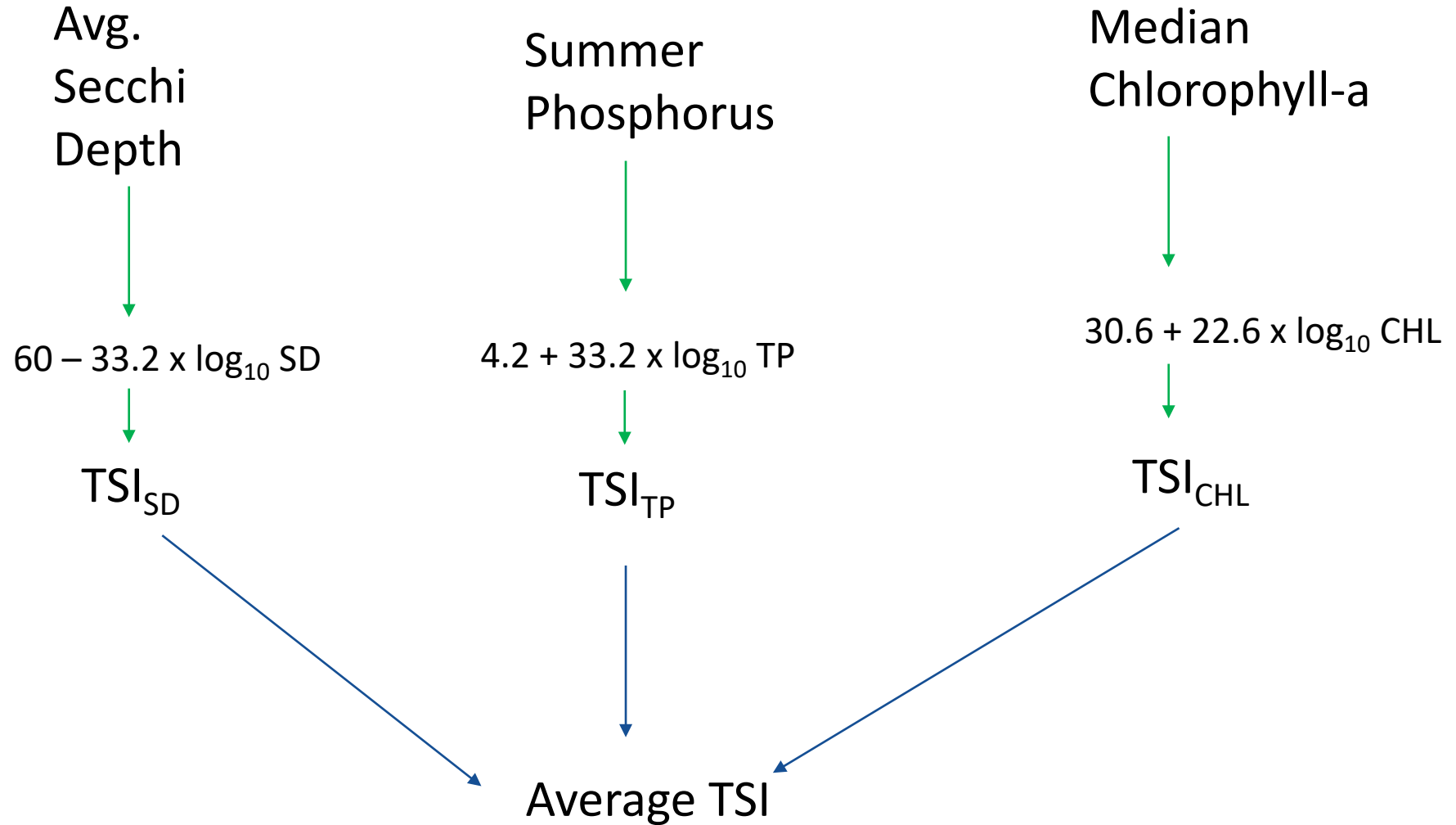
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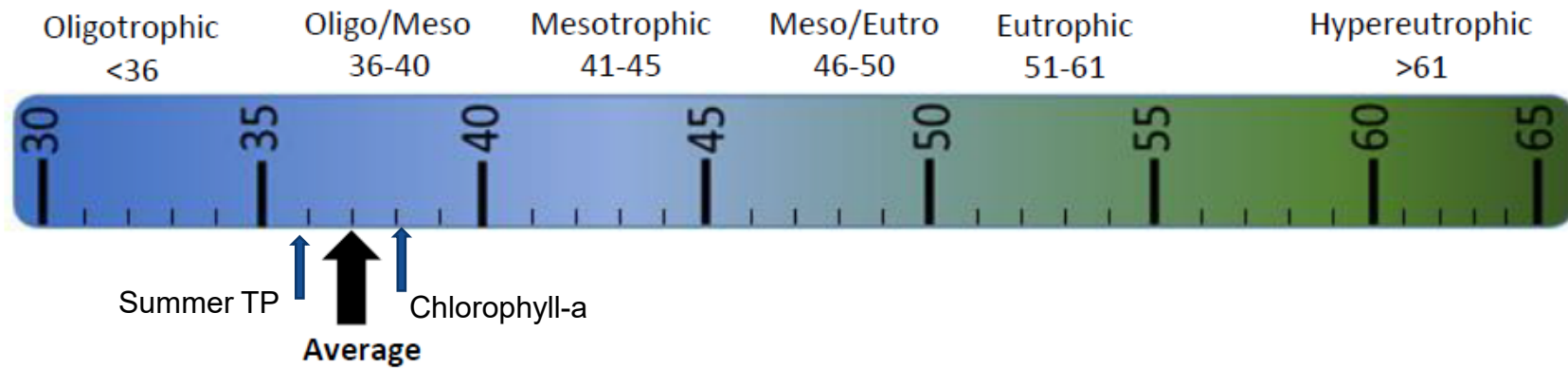
The low level of nutrients in the lake results in dissolved oxygen being available throughout the water column for the entire summer.

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

What is Trophic Status Index?



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



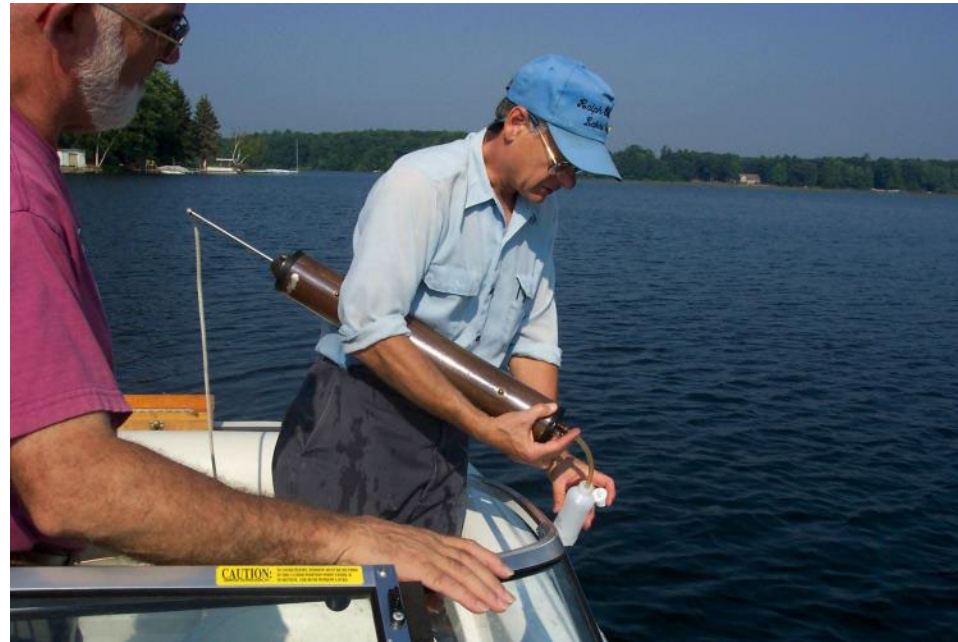
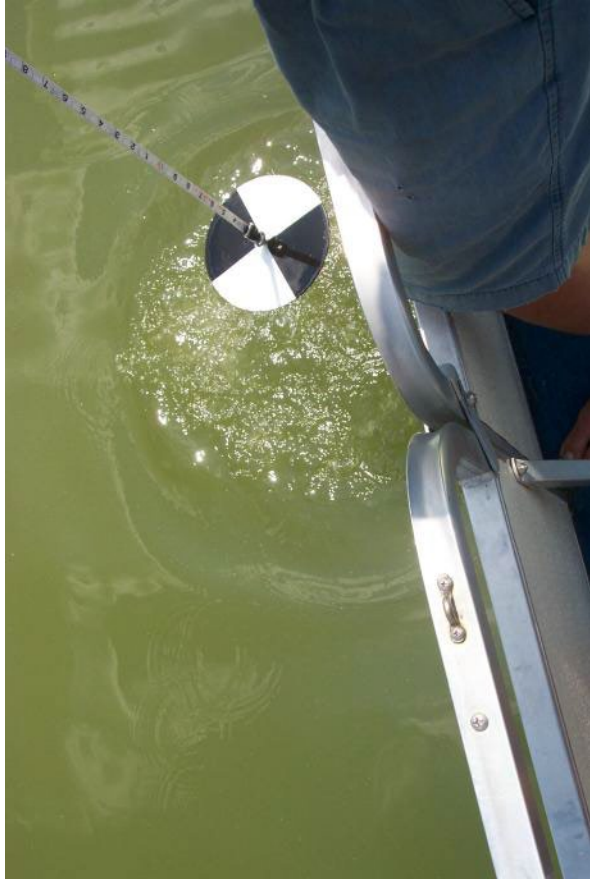
Oligotrophic: Generally deep and clear lakes with little aquatic plant or algae growth. These lakes maintain sufficient dissolved oxygen in the cool, deep-bottom waters during late summer to support cold water fish, such as trout and whitefish.

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 eutrophic lakes. These lakes exhibit extremely high productivity, such as nuisance algae and weed growth.

Let's do some filtering practice!



Questions?

To learn more about the Cooperative Lakes Monitoring Program, visit:

MiCorps.net



MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY



Huron
River
Watershed
Council



Working Together to Protect Lakes

