

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

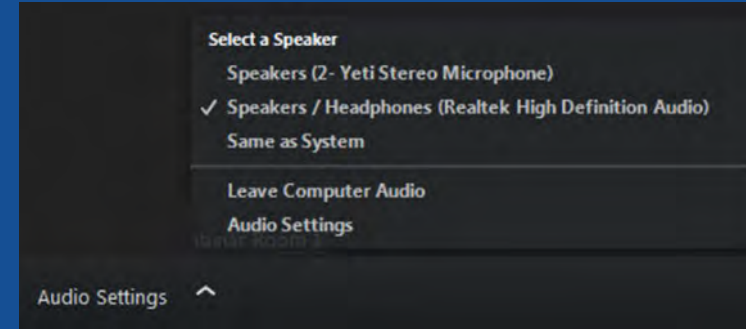
- For CLMP procedures and data forms please visit: micorps.net/lake-monitoring/clmp-documents/ and then click on the name of the parameter.

Today's Agenda:

9:00 AM – 9:30 AM	Welcome and Introduction to CLMP
9:30 – 10:00 AM	Secchi Disk
10:00 - 10:15 AM	BREAK
10:15 – 10:45 AM	Spring and Summer Phosphorus
10:45 AM – Noon	Dissolved Oxygen & Temperature
Noon – 1:00 PM	Lunch Break
1:00 – 2:00 PM	Score the Shore
2:00 – 3:00 PM	Chlorophyll-a
3:00 – 3:15 PM	BREAK
3:15 PM – 4:30 PM	Exotic Aquatic Plant Watch

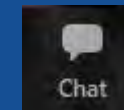
Getting Started

- 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 MSU Distance Learning Help Desk 844-678-6200 for technical support.



Cooperative Lakes Monitoring Program

Welcome and Introduction

Tamara Lipsey

Jo Latimore

Erick Elgin



MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

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Michigan Clean Water Corps (MiCorps)



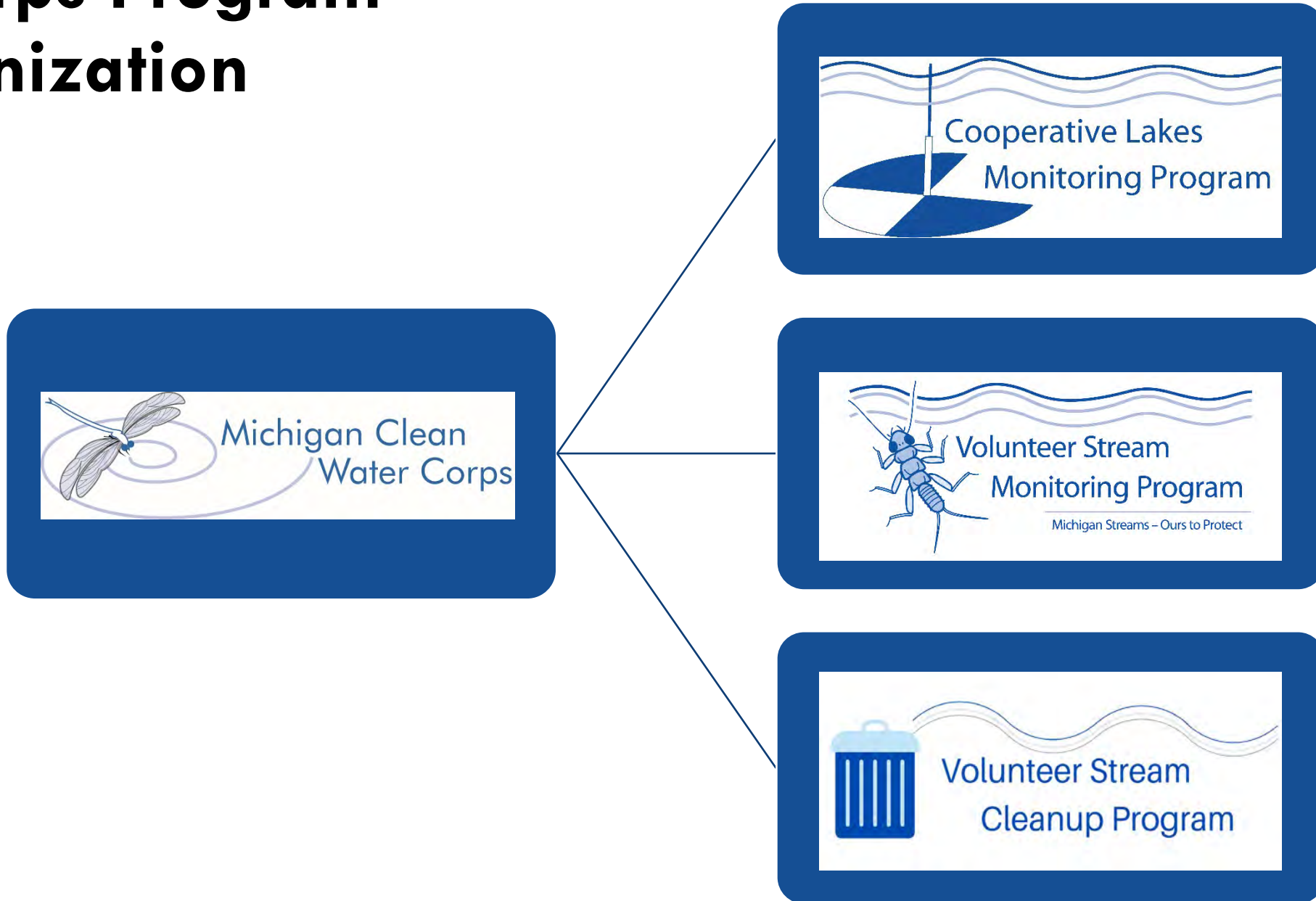
MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

MICHIGAN STATE | Extension
UNIVERSITY |
Center for Lakes and Streams



- Funded through EGLE
 - RENEW Michigan-state general fund
 - Special water quality license plate funds
- 5-Year Contract with MSU
 - 2 staff, plus 2 additional RS/GIS staff
- 2 subcontracts
 - 2 staff
- TEAMWORK!!

MiCorps Program Organization



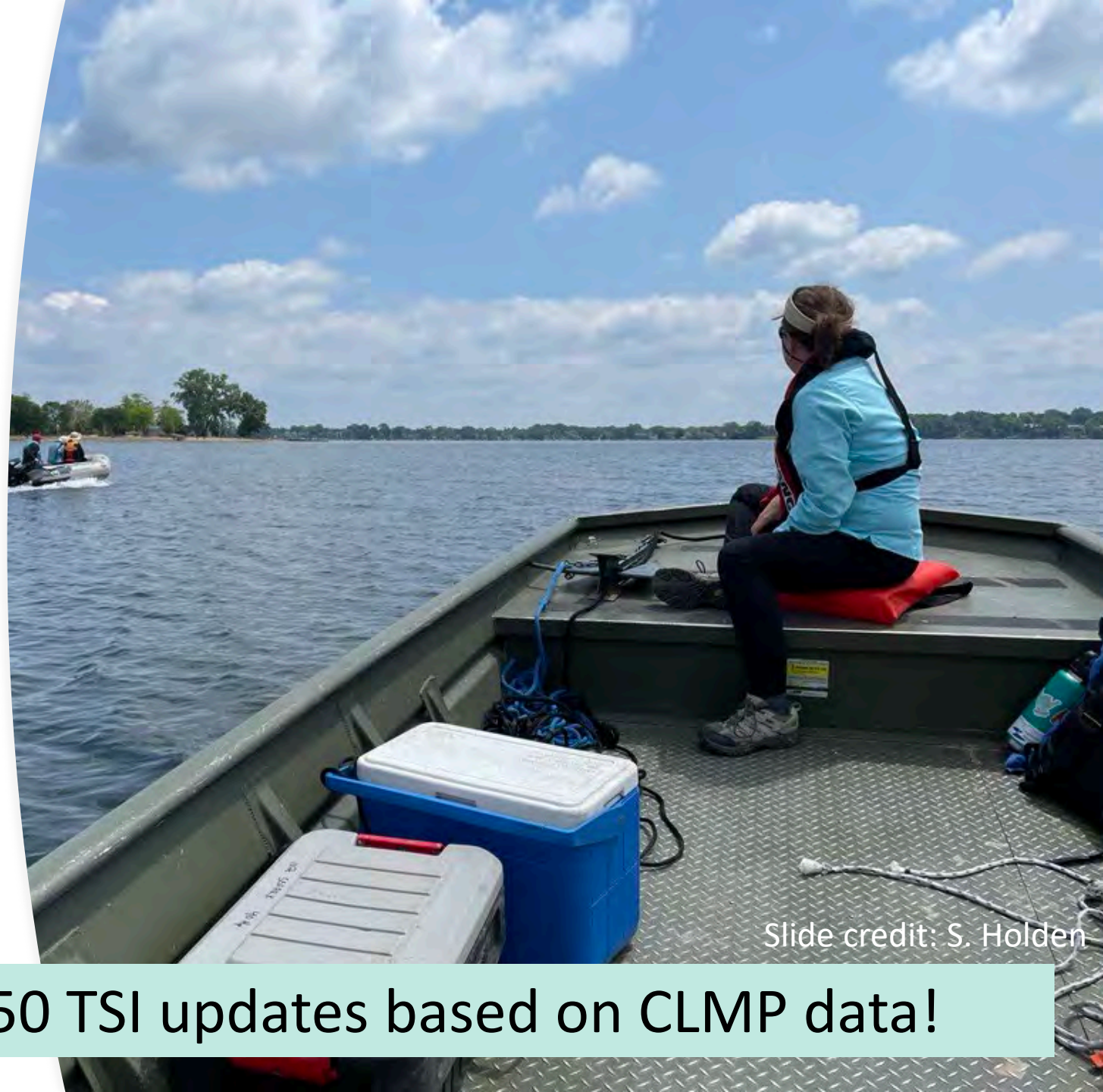
The logo features a stylized blue and white water gauge or float with a vertical stem and a circular float body. Above the float are three wavy blue lines representing water. The text "Cooperative Lakes Monitoring Program" is written in blue to the right of the float.

Cooperative Lakes Monitoring Program

- **Celebrating 50 years**
 - Second oldest volunteer monitoring program in the country
 - Online Database available
 - Reliable data is used by many!!

Trophic State Index: CLMP data

- 2022 CLMP lakes
 - 199 total phosphorus
 - 161 chlorophyll a
 - 275 secchi disk
- 115 lakes collected all 3!
- CLMP strengths
 - Multiple measurements in a year
 - Long term data



Slide credit: S. Holden

2024 Integrated Report: ~ 250 TSI updates based on CLMP data!



Jo Latimore
(MSU)



Erick Elgin
(MSU)



Paul Steen
(HRWC)



Tamara Lipsey
(EGLE)



Melissa
DeSimone
(MLSA)



Mike
Gallagher
(MLSA)



Jean Roth
(MLSA)

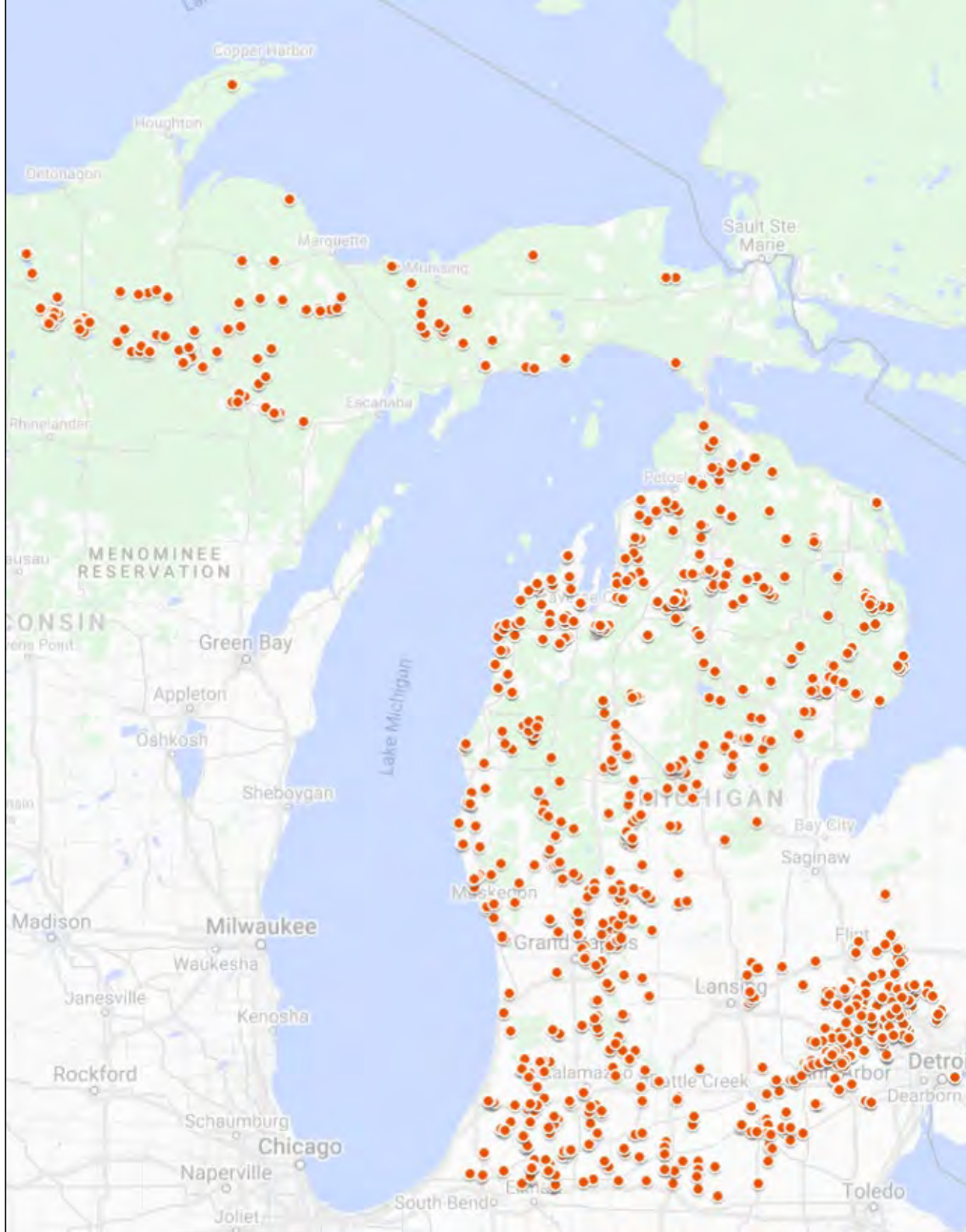


MICHIGAN STATE

UNIVERSITY

Jo Latimore, Ph.D.
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You collect a lot of data!



The screenshot shows the Michigan Clean Water Corps website. The header includes the logo and navigation links: About, Lake Monitoring, Stream Monitoring, Data Exchange, and Resources. A search bar is present in the top right. The main heading is "MiCorps Data Exchange Search Results". Below this, it indicates the search was for "Oakland" county, covering the period from January 01, 1970, to November 12, 2021. There are buttons for "Download in Excel" and "New Search". A red arrow points to the "Download in Excel" button. The page shows "Page 1 of 29" and "5, 10, 25 sites per page". The results are sorted by "County" and "Watershed".

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

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



Fact Sheet

Chlorophyll *a*

What do chlorophyll measurements tell us about our lakes?

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 found in green plants and algae. Measuring chlorophyll *a* concentrations in water is a surrogate for actually measuring algae biomass, which is far more expensive and time consuming.

Why is chlorophyll important?

Algae are remarkably diverse and are naturally present in all lakes. They produce oxygen and form the base of the entire lake food web. By measuring chlorophyll *a*, we can better understand the biological community a lake can support and how a lake may be changing through time. For example, if chlorophyll *a* is increasing in a lake through the years, this may indicate there are serious nutrient pollution problems. Chlorophyll *a* is also the main parameter used to calculate the trophic state of a lake (Oligotrophic, Mesotrophic, and Eutrophic). Trophic state is used to classify lakes based on productivity/overall biological growth. Trophic state helps us understand many aspects of the lake from its chemical properties to the amount of fish biomass a lake can support.

What affects chlorophyll?

Algae growth, and thus chlorophyll *a* levels, are directly affected by the amount of nutrients in a lake. Phosphorus is a naturally occurring element in the sediment, water, and biota of a lake. It is the most influential nutrient in most Michigan lakes. Some lakes naturally have more phosphorus than others. However, humans often introduce extra phosphorus into a lake through poorly maintained septic systems, shoreline erosion, lawn fertilizer, and from agricultural or urban runoff. The more phosphorus inputs a lake receives, the more algae it will likely have.



Bruce Lichliter, CLMP volunteer from Big Glen Lake, prepares to lower the water column composite sampler into the lake (credit: Mike Litch).

How is it measured?

The amount of chlorophyll in an algal cell varies with algae species as well as with changing light conditions at different depths within the lake. Changing seasons also create different light and nutrient conditions that, in turn, affect the algae community. To account for some of this variability, Cooperative Lake Monitoring Program (CLMP) volunteers monitor chlorophyll *a* during five sampling events over the summer season (May through September) using a sampling technique that collects water throughout the lake's 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 (aka phytoplankton). The CLMP program defines the photic zone as twice the Secchi disk transparency measurement.

Once the water sample is obtained, CLMP volunteers push a known volume of water through a filter disk, which collects the algal cells. The filter disk is frozen and delivered to the Michigan Department of Environment, Great Lakes, and Energy laboratory for analysis.

A lake is going to vary in chlorophyll *a* levels over time. Therefore, it is very important to monitor it over a long period of time to understand if levels are truly increasing, decreasing, or staying the same. Increasing chlorophyll *a* levels may indicate that management actions are needed to maintain a healthy lake.

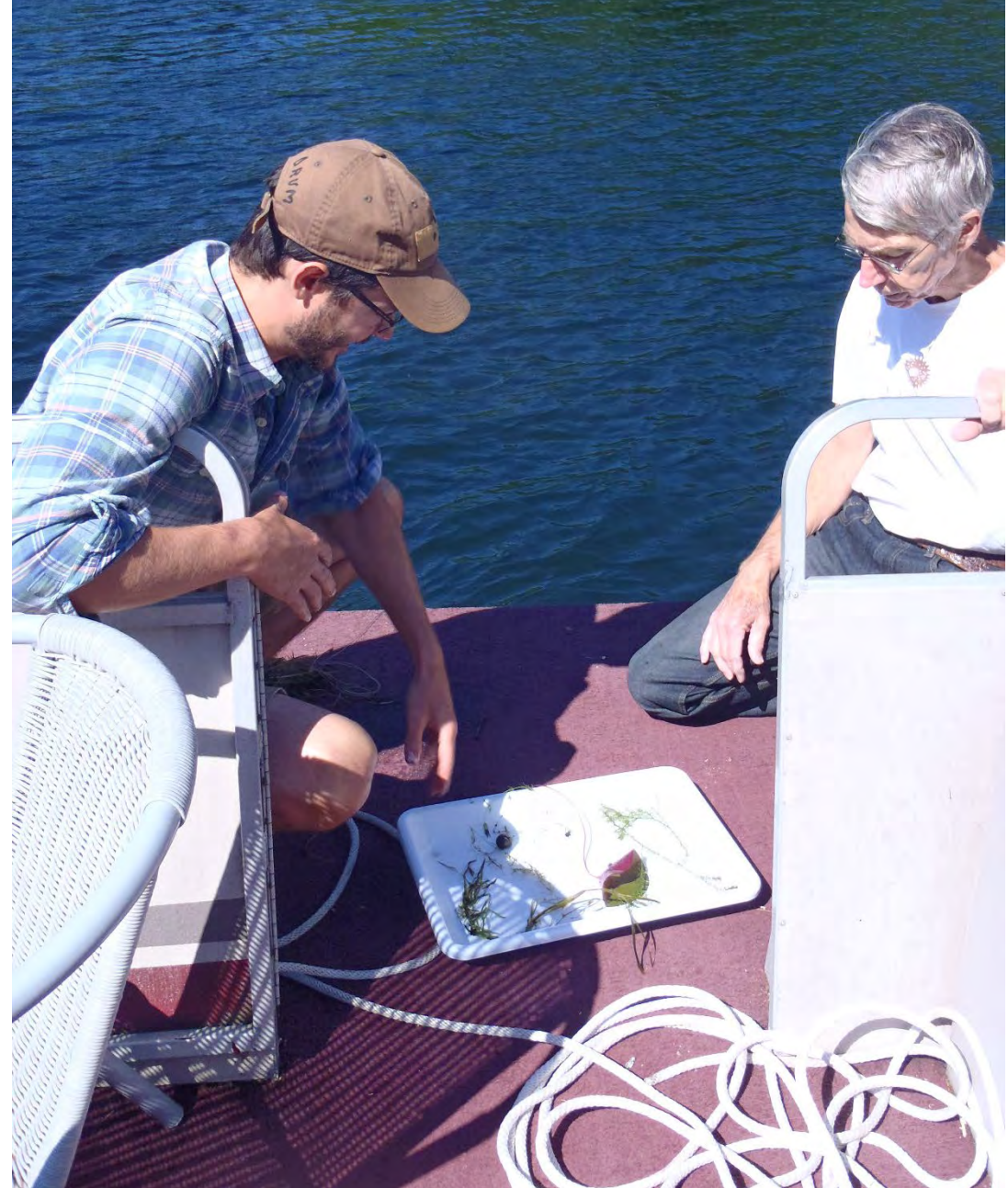
For more information about the MiCorps Cooperative Lakes Monitoring Program, visit www.MiCorps.net



MiCorps is funded by the Michigan Department of Environment, Great Lakes, and Energy and administered in partnership with Michigan State University Extension, Michigan Lakes and Streams Association, and the Huron River Watershed Council.

CLMP: Monitoring First

- Since 1974
 - Happy 50th Anniversary, CLMP!
- Supports management
 - But today – monitoring first!





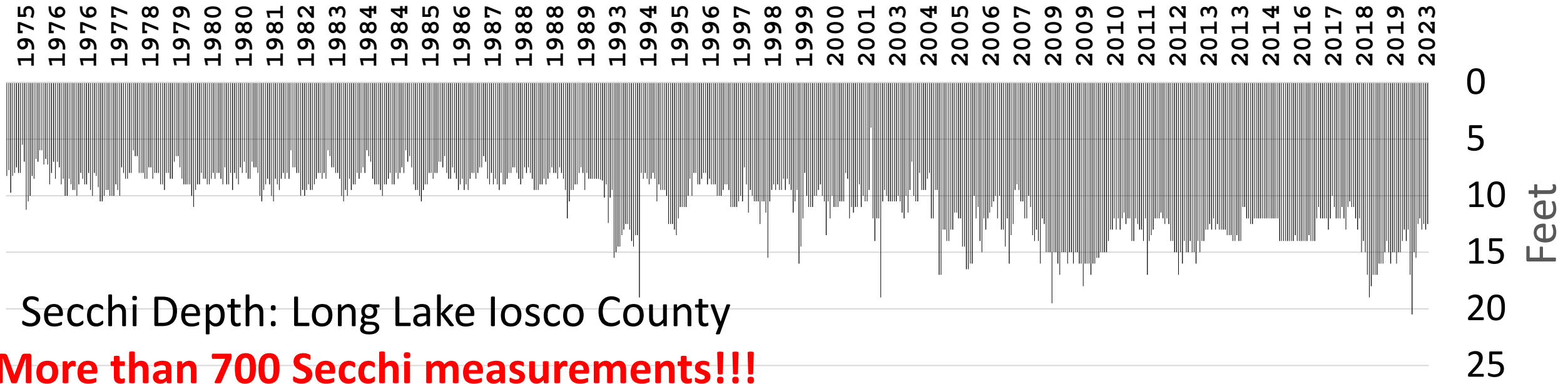
Cooperative Lakes Monitoring Program

Introduction to Lake Monitoring

Erick Elgin

Long Term Lake Monitoring Program

Consistency in protocol and collections are very important to maintain data quality and reliability





Measuring a lake's condition

- **Water quality**

- Secchi
- Phosphorus
- Algae
- Dissolved Oxygen/Temp

- **Shoreline and nearshore habitat**

- Score the Shore
- Aquatic Plant Mapping
- Dissolved Oxygen/Temp

- **Aquatic invasive plant**

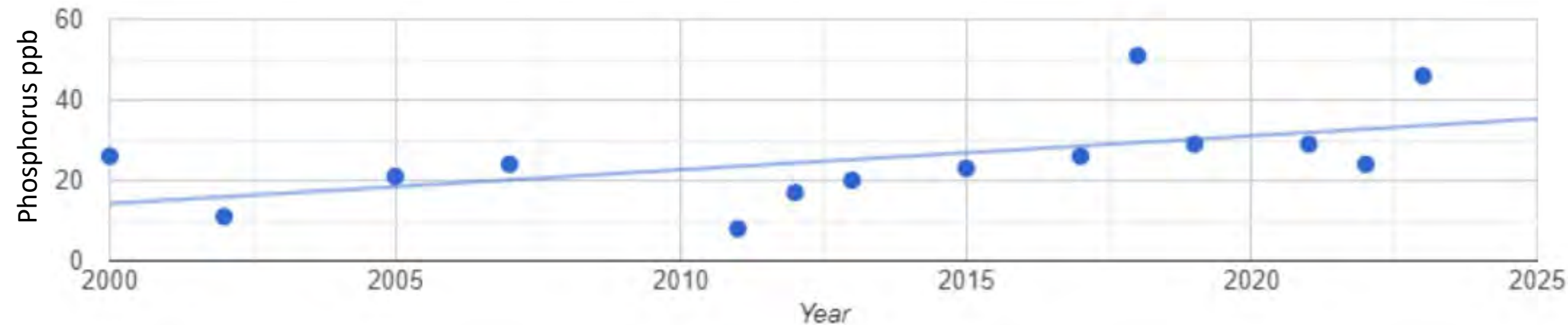
- Exotic Aquatic Plant Watch



Evaluating individual data and trends

2023 phosphorus sample: 46 ppb

Average phosphorus concentration for CLMP lakes: 17.4 ppb



Classifying lakes: Trophic status

- Water transparency
- Total phosphorus
- Chlorophyll a



Carlson's Trophic Index

Oligotrophic

Clear water | Oxygen throughout water column | Low plant biomass



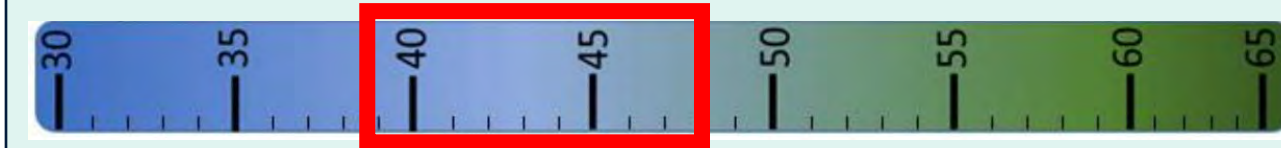
> 15 feet
Secchi

<0.010 mg/L
Summer P

<2.2 ug/L
Chla

Mesotrophic

In the Middle



7.5 – 15 feet
Secchi

0.01 – 0.02 mg/L
Summer P

2.2 - 6 ug/L
Chla

Eutrophic

Low water clarity | Loss of oxygen in hypolimnion | Can support abundant aquatic plants

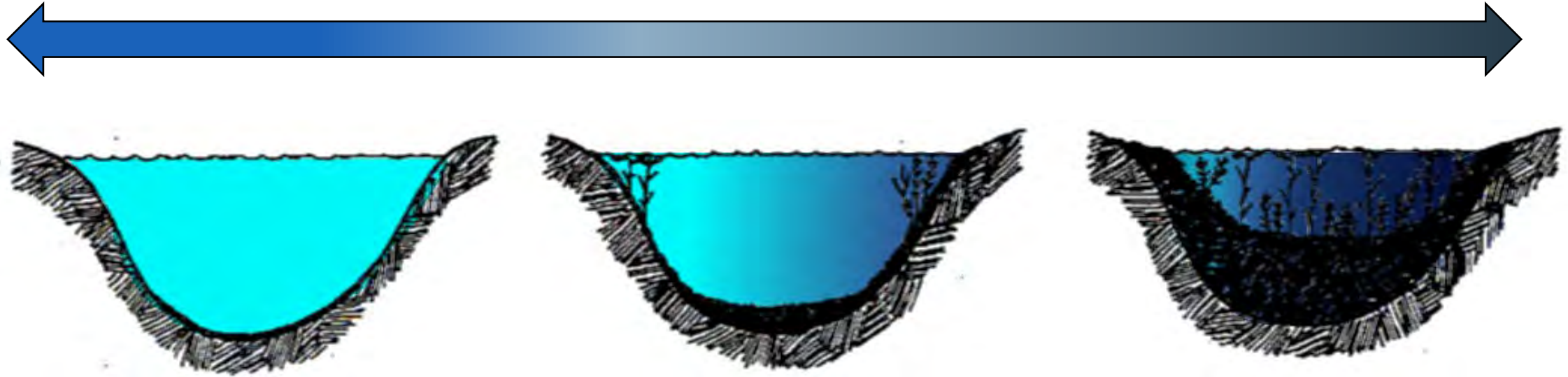


3 - 7.5 feet
Secchi

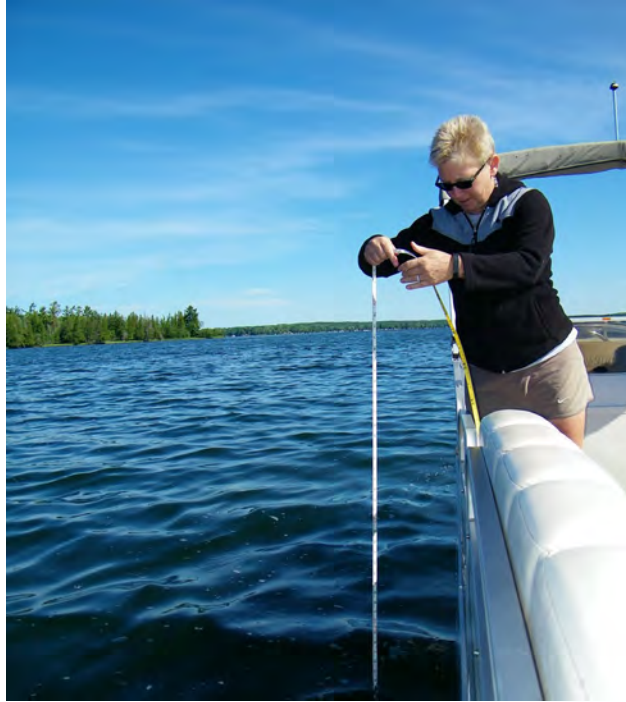
0.021-0.05 mg/L
Summer P

6.1 - 22 ug/L
Chla

Changes in Trophic Status



- Eutrophication (cultural)– Becoming more eutrophic
- Oligotrophication- Becoming more oligotrophic



Measuring a lake's condition

- **Water quality**

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- Phosphorus
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- Aquatic Plant Mapping
- Dissolved Oxygen/Temp

- **Aquatic invasive plant**

- Exotic Aquatic Plant Watch

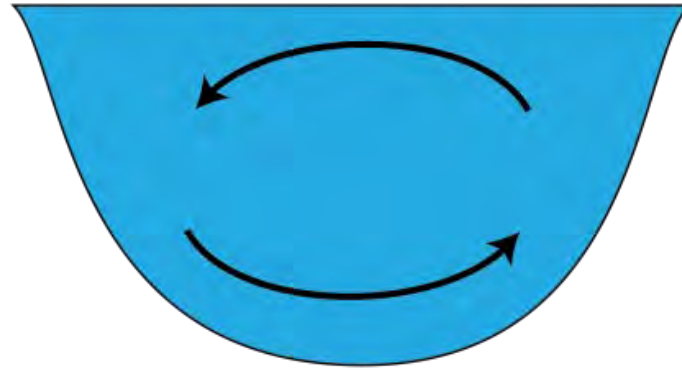




NATURAL SHORELINE (1938)
TO
DEVELOPED SHORELINE (2014)

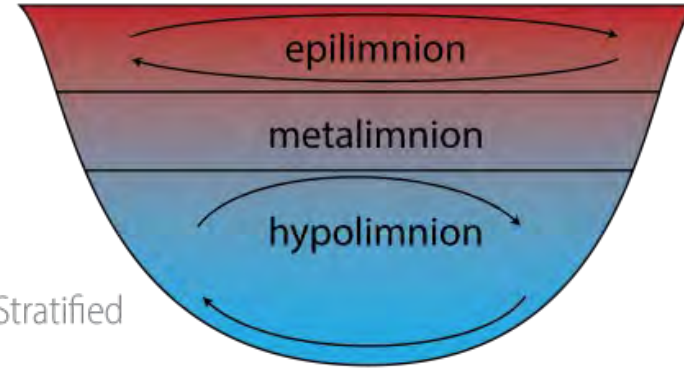
Dissolved Oxygen/Temp

SPRING



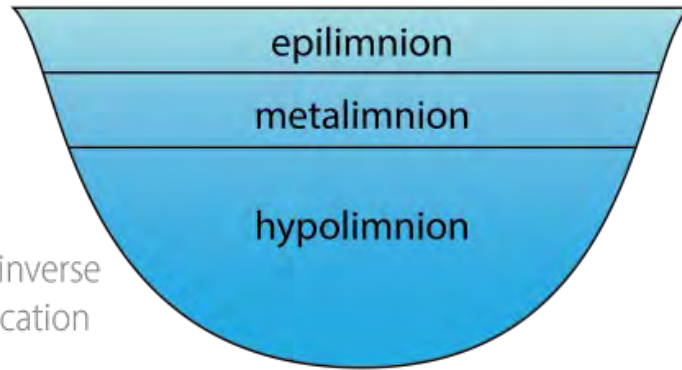
Mixed

SUMMER



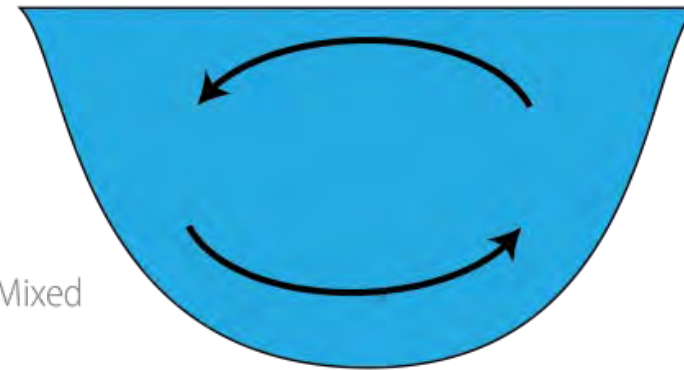
Stratified

WINTER



Weak inverse stratification

FALL



Mixed



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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

