



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

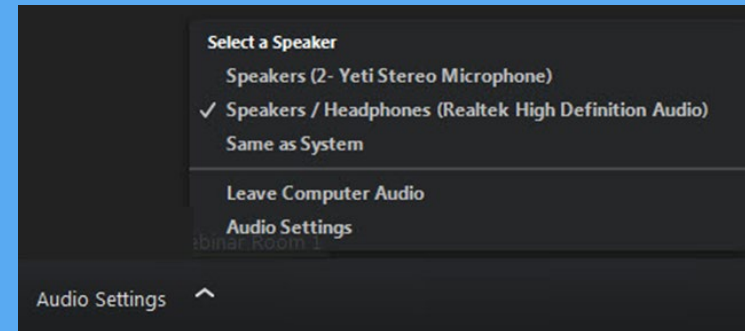
- For CLMP procedures and data forms please visit: micorps.net/lake-monitoring/clmp-documents/ and then click on the name of the parameter.

Today's Agenda:

9:00 AM – 9:15 AM	Welcome and CLMP Review
9:15 AM – 10:15 AM	Secchi Disk & Phosphorus
10:15 AM-10:30 AM	BREAK
10:30 AM – 11:45 AM	Chlorophyll-a (algae indicator)
11:45 AM – 12:30 PM	BREAK
12:30 PM – 1 PM	OPTIONAL: Online Registration Tutorial
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

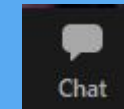
Getting Started

- 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 (CLMP)



Training for Dissolved Oxygen and Temperature





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MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

Dissolved Oxygen (DO) and Temperature

- Why Important
- Program Overview
- Equipment
- Procedure
- End of Year



What D.O. and Temperature Measure?



How much oxygen is dissolved in the water and is available for aquatic organisms to use

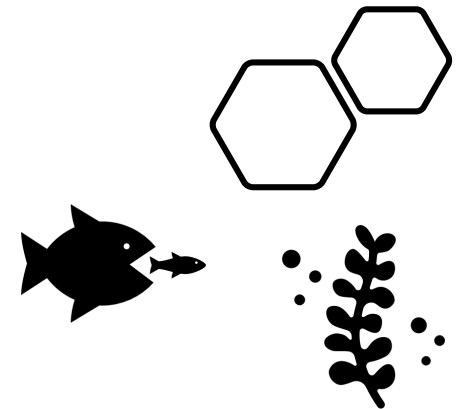


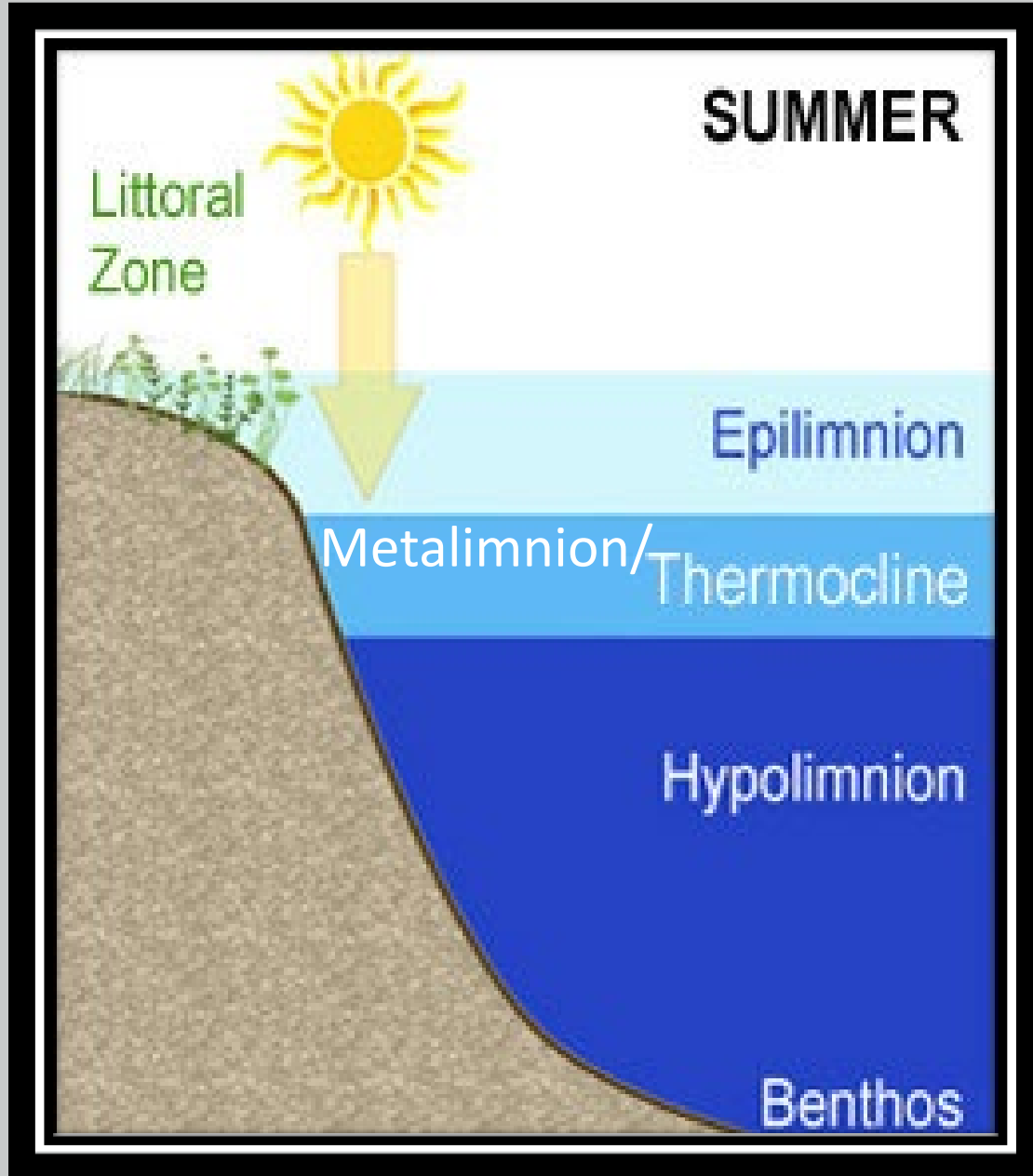
How warm or cold the water is



Why is D.O. and Temperature Important?

- Effects and is affected by many Physical, Chemical, and Biological Components of a Lake





Thermal Stratification

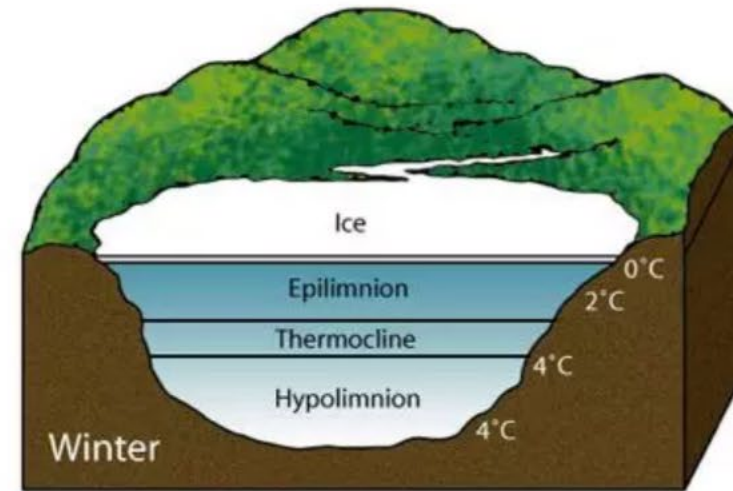
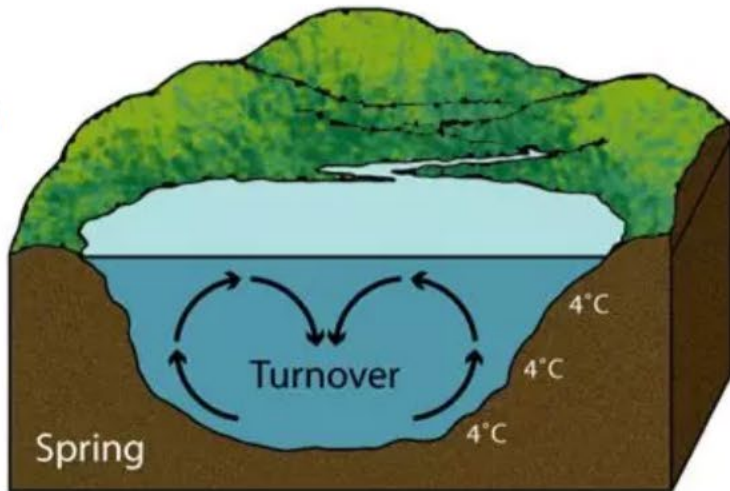
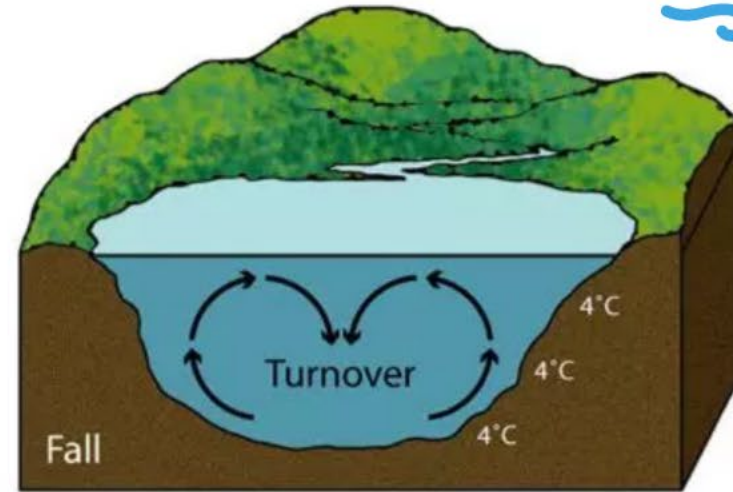
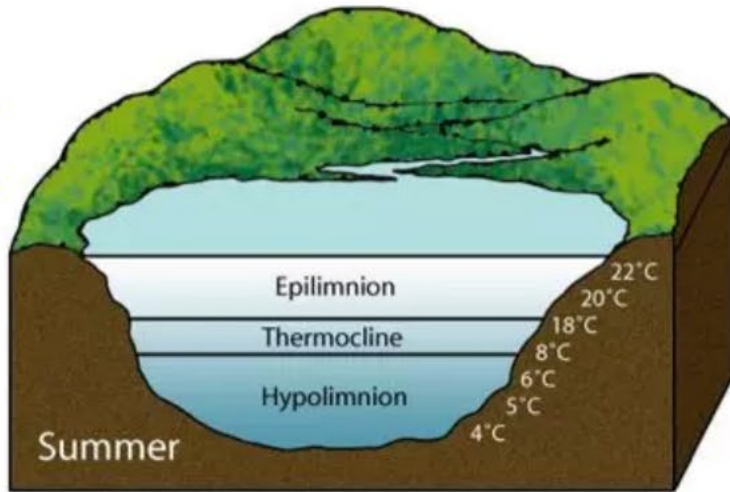
Lake Temperature/Density Zones

- Warm upper zone
- Metalimnion; rapid decrease in temperature and increase in water density (Thermocline)
- Cold bottom zone

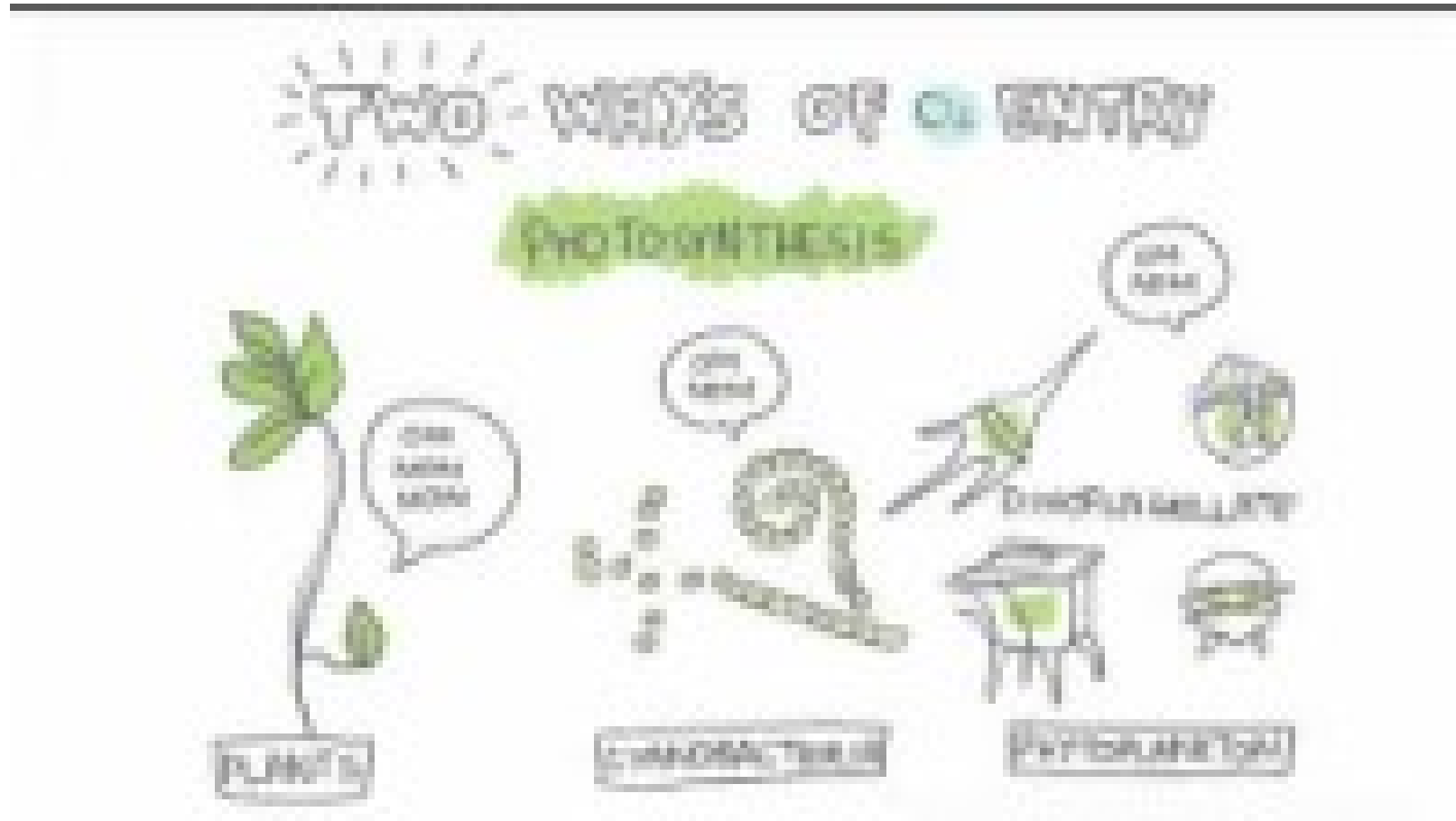
Lake Stratification Video by: Wisconsin Center for Limnology



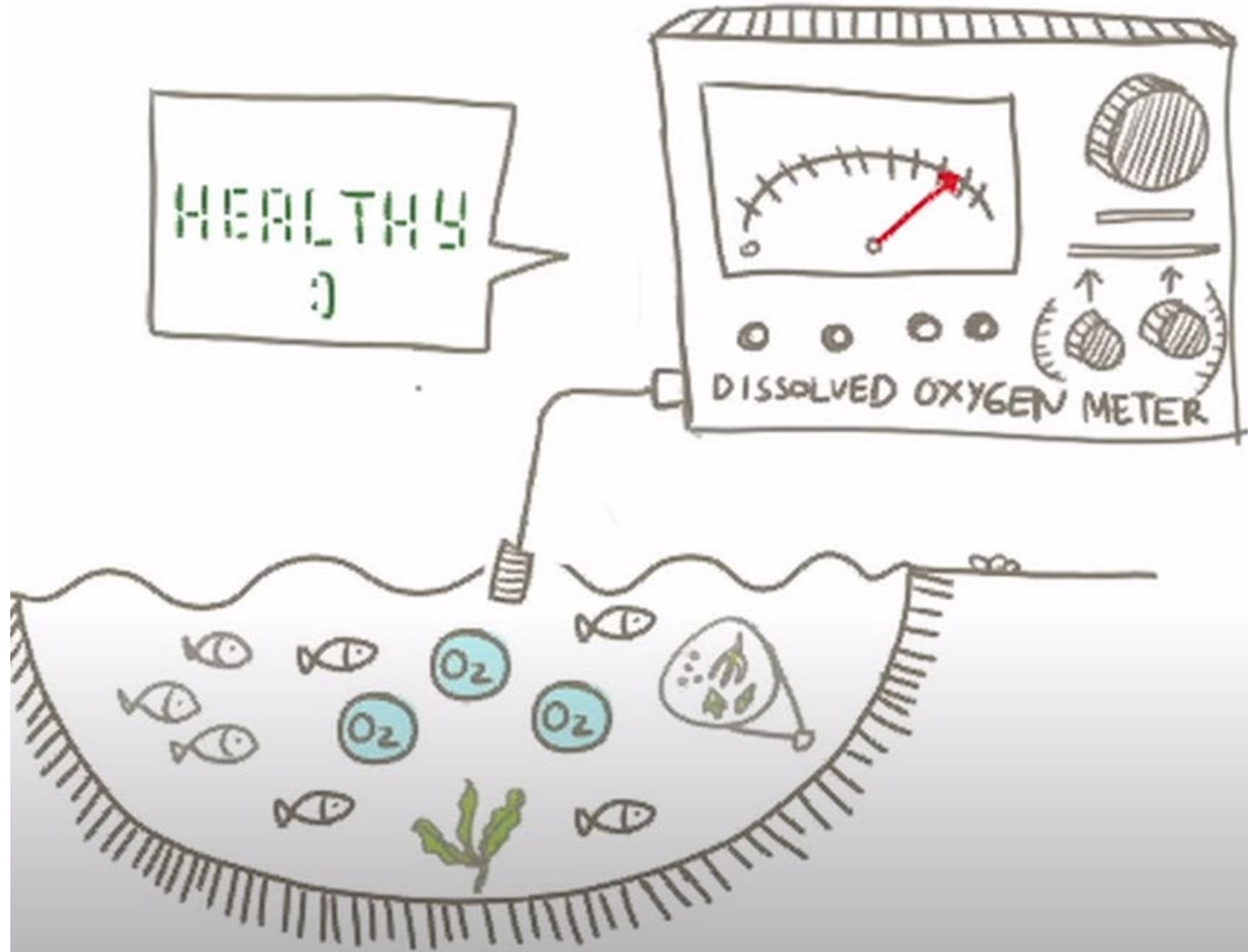
Lake Turnover



Dissolved Oxygen <http://k12videos.mit.edu/>



Dissolved Oxygen Take Home Points



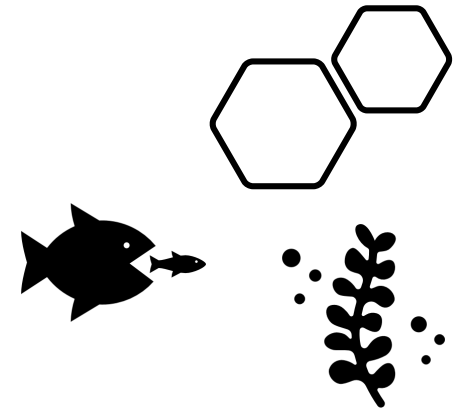
- Oxygen enters the water through the air or by photosynthesis
- The amount of salt and the temperature of the water impact the amount of DO
- Too much algae/cyano bacteria leads to low DO when they die
- Nutrients speed up Eutrophication process

Understanding DO levels in your lake, is one more tool to understanding the health of your lake.



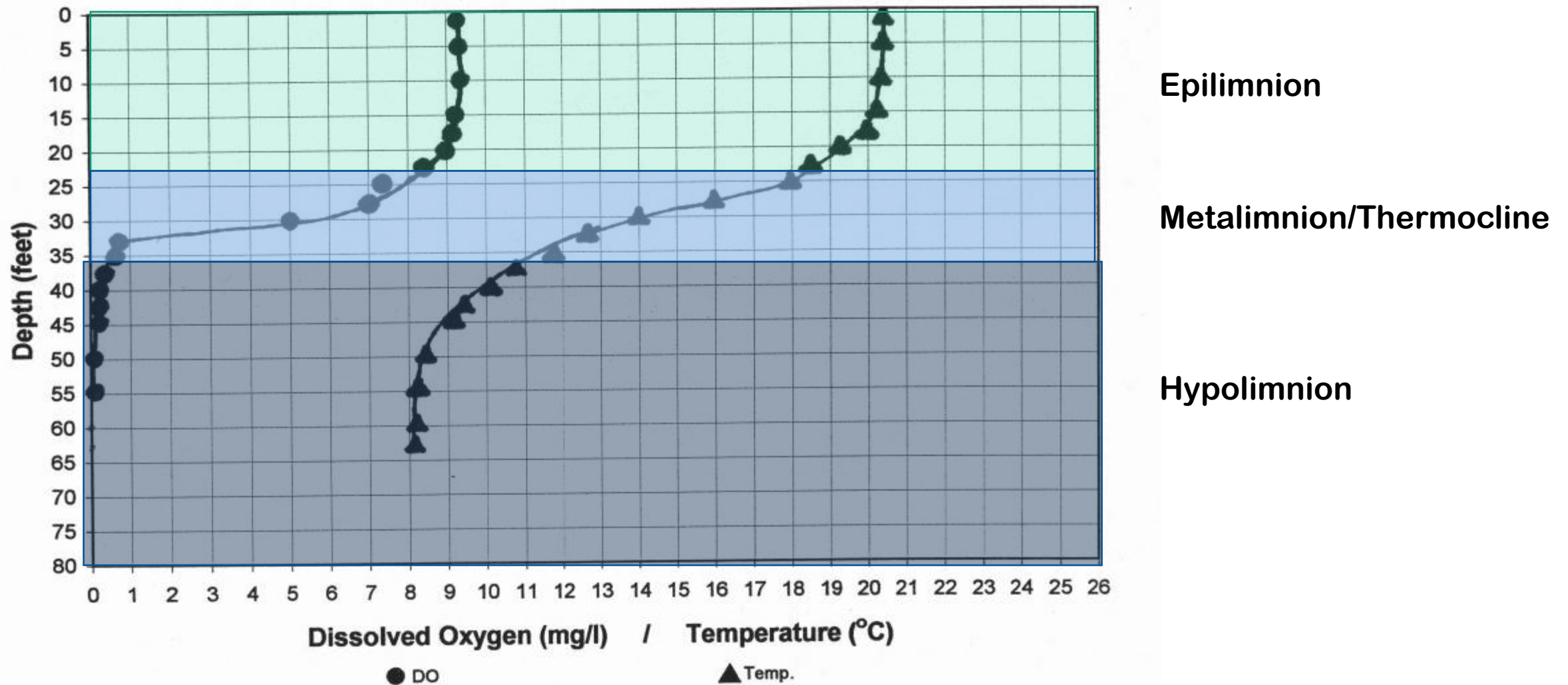
Why is D.O. and Temperature Important?

- Effects and is affected by many Physical, Chemical, and Biological Components of a Lake
 - Define where thermal layers are and classify your lake as a warm or cold-water lake
 - Determine what types of fish the DO levels will support and what depths they can live
 - DO levels can be a nutrient release indicator and trophic state indicator



Dissolved Oxygen and Temperature Profiles

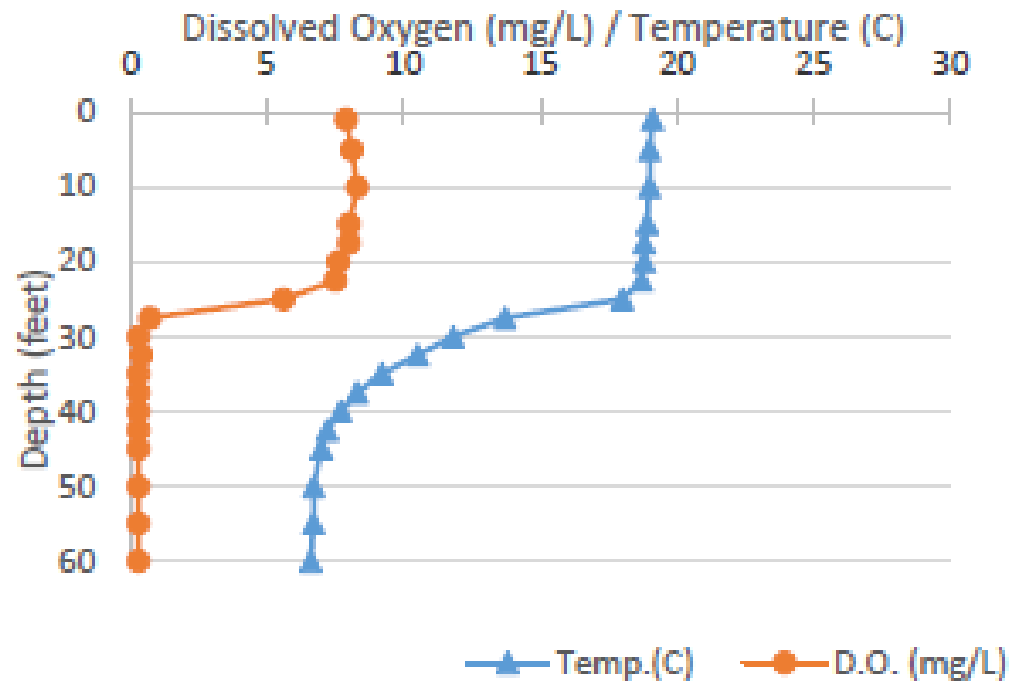
Lake Name DeadSpider (Lake Co.) Date 9-15-03



Lotus Lake, Oakland County

Dissolved Oxygen and Temperature Profile

9/11/2017



Summary

Average TSI	2017	2014-2016	1994
Lotus Lake	33	35	41
All CLMP Lakes	40	40	43

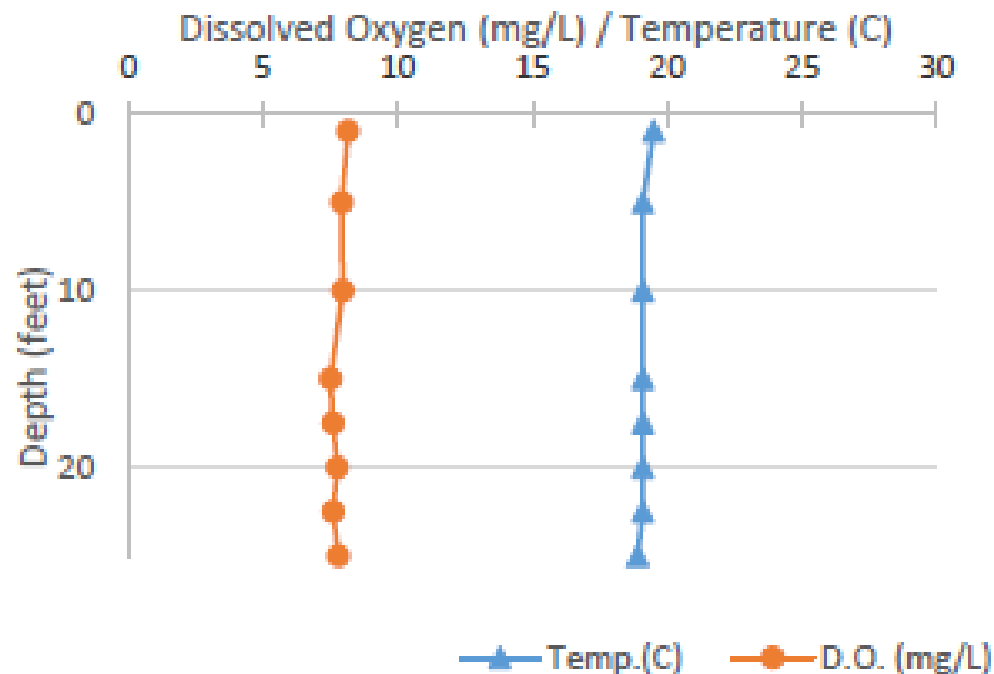
With an average TSI score of 33 based on 2017 Secchi transparency, chlorophyll-a, and summer total phosphorus data, this lake is rated as an oligotrophic lake.

The lake keeps some dissolved oxygen in the bottom waters through mid-summer, but by late summer the lake has stratified and the bottom water is devoid of oxygen.

There is too little data to assess long term trends. CLMP recommends eight years of consistent monitoring in order to develop a strong data baseline.

Lake Independence, Marquette Co.

Dissolved Oxygen and Temperature Profile 8/28/2017



Summary

Average TSI	2017	2012-2016	1977-2011
Lake Independence	43	42	38
All CLMP Lakes	40	40	43

With a TSI score of 43 based on 2017 summer total phosphorus data, this lake is rated as a mesotrophic lake.

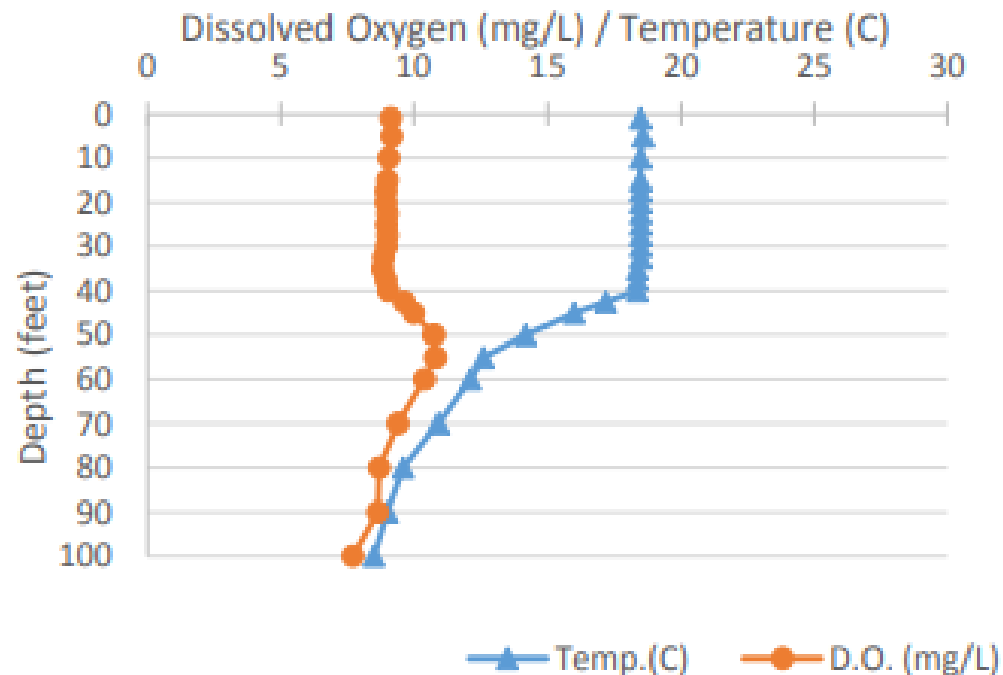
Due to its low depth, the lake is able to maintain dissolved oxygen throughout the water column for the entire summer.

There is too little data to assess long term trends. CLMP recommends eight years of consistent monitoring in order to develop a strong data baseline. Using historical secchi data, it is clear that nutrient levels have dropped in the lake since the 1970's, however.

Higgins Lake, Roscommon County

Dissolved Oxygen and Temperature Profile

9/8/2017



Summary

Average TSI	2017	2012-2016	1974-2011
Higgins Lake (North)	29	29	29
All CLMP Lakes	40	40	43

With an average TSI score of 29 based on 2017 chlorophyll-a and summer total phosphorus data, this lake is rated as an oligotrophic lake.

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 monitored parameters have changed very little since monitoring began, except for transparency which has significantly improved since the 1970s.

A scenic landscape photograph featuring a large, calm blue lake in the center. The lake is framed by trees in the foreground; on the left, a tree with green and yellowing leaves branches across the frame, while on the right, a taller, darker tree trunk stands vertically. The far shore of the lake is lined with a dense forest of green trees under a clear, bright blue sky. The text "Brain Break!!" is centered over the middle of the image in a white, sans-serif font.

Brain Break!!

D.O./Temperature Program Overview

Borrow a Meter

- May need to share with 1-3 other lake groups
- We will match you up

May purchase own meter**

Meters will be distributed ASAP

Measure 2 X per month May-September



DO/Temperature Equipment YSI Oxygen Meter (550A or Pro-20)

- Equipment storage box
- DO/Temp probe & cable (various lengths)
- Batteries/Spare batteries
- Agreement letter sign
- Quick-start calibration card
- Extra DO membrane and electrolyte solution



550A



Pro20



DO Meter Probe

plastic guard

membrane cap

thermistors



Probe of Each Meter





Prepare for Sampling

- ✓ Make sure you have calm and dry weather conditions
- ✓ Pack up your equipment, including safety equipment and a friend to help with data recording
- ✓ Check the Quick Reference Procedure Checklist
- ✓ Make sure you have your data forms
- ✓ Connect Probe Cable to Meter (Pro20)
- ✓ Turn on your meter for 15 minutes and calibrate using Quick Start Guide

Calibration of Pro 20-Video Available



Calibration of 550A



Replacement DO Membrane & Solution

- Check Quick Start Calibration Guide
- Call Tamara to see if she can help out
- Only use for replacing membrane
- Only needed if monitor will not calibrate



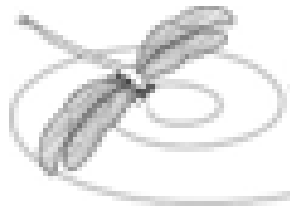
Video of changing a membrane; available online





Proceed to Sampling Location

- Anchor just upwind of deep basin and drift back over deepest spot, as with other parameters
- Check for actual basin depth with depth finder or weighted line or secchi disk
- Turn on the meter.
- Take the Cap off. Leave the guard.
- Begin at 1 foot deep for 1st measurement.



Michigan Clean
Water Corps

Dissolved Oxygen and Temperature 2021 Data Form



Lake Name: _____ County: _____ Township: _____

Lake Sampling Site (Field ID) Number: _____ (mark location on map below)

Page 1 Data Sheet

Latitude: _____ Longitude: _____

Volunteer Monitor Name(s): _____

Date Sampled: _____ Time: _____

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

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

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

Sampling Station Depth (measured): _____ feet

DO/Temp. Meter (circle one): YSI Model 550A YSI Pro20

CLMP Meter ID# : _____ (If this is your meter, enter, "Our Meter")

Calibration Values (Only for 550A; Skip if using a Pro20):

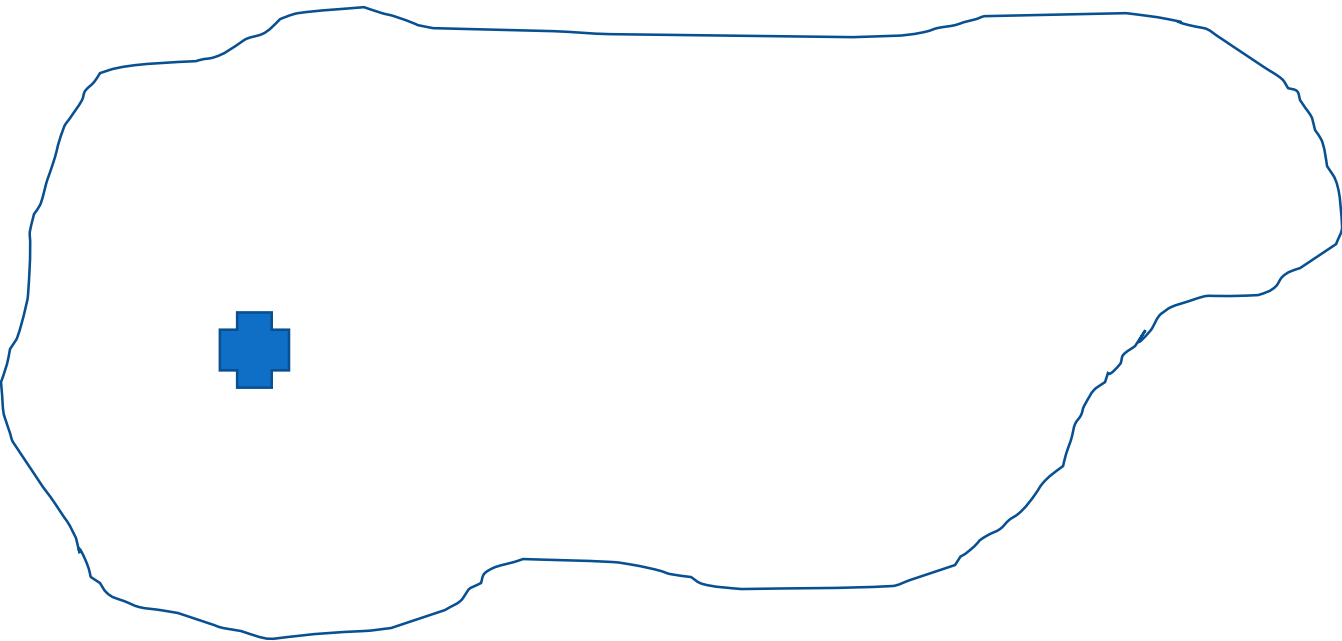
DO: _____ % air saturation (Must be 93-103%; Troubleshoot if out-of-range)

Lake Elevation Value: _____ (x100 ft.)

Page 1 Data Sheet Continued

In the box below draw an outline of your lake (or attach a copy of a lake map). Mark your DO/temperature sampling location (this should be at the deepest location in your lake) and write the total lake depth.

North
▲



Surface Area: _____ (acres)

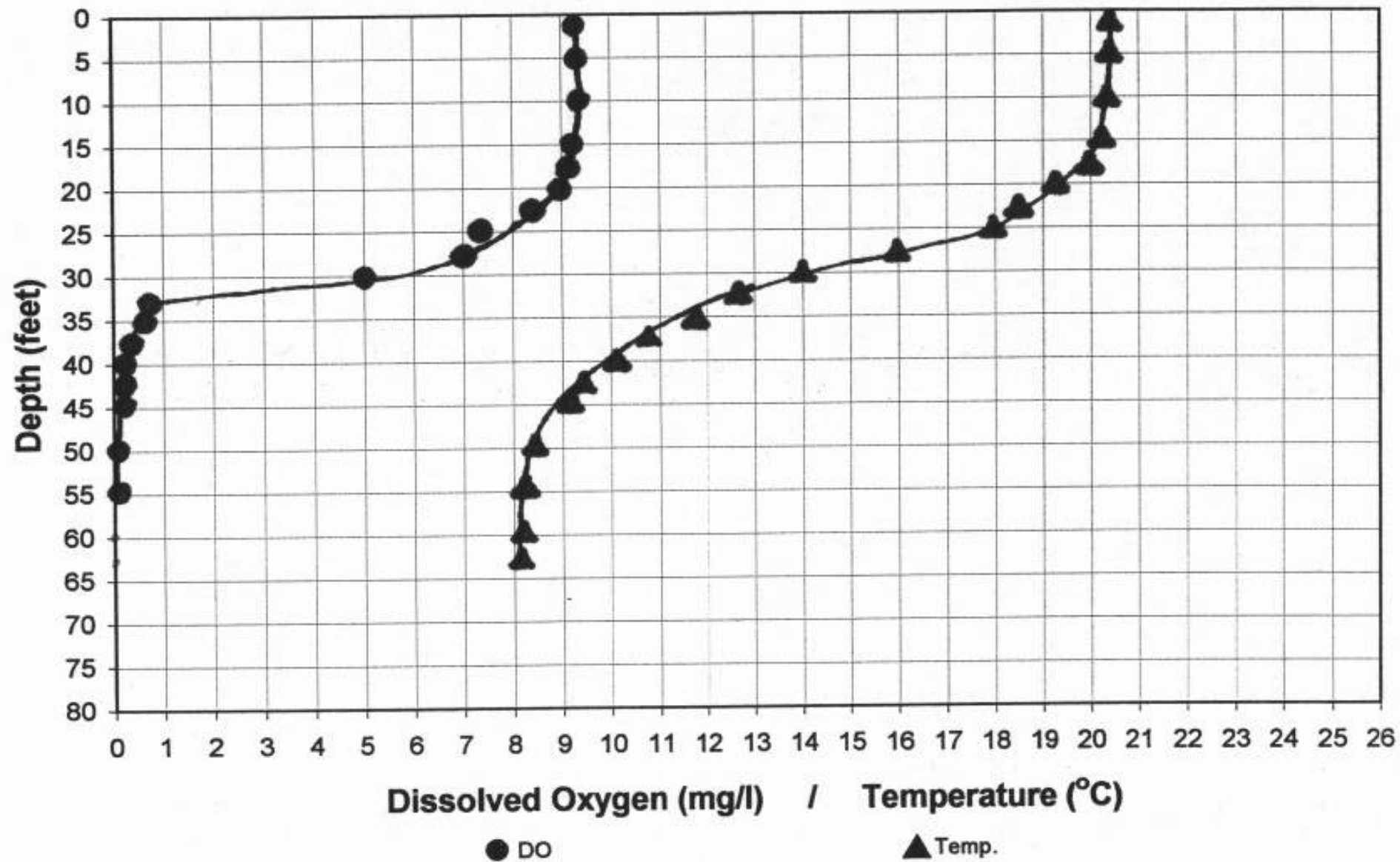
Date Sheet Page 2

**** REMEMBER **** make sure you are measuring oxygen in **mg/l** before making oxygen measurements. **

Depth (ft.)	Temp (°C)	DO (mg/l)	Depth (ft.)	Temp (°C)	DO (mg/l)
1			55		
5			60		
10			65		
15			70		
17½			75		
20			80		
22½			85		
25			90		
27½			95		
30			100		
32½			105		
35			110		
37½			115		
40			120		
42½			125		
45			130		
50			Note: Take last measurement 2½-3 ft. above bottom sediments of the lake.		

Dissolved Oxygen and Temperature Profiles

Lake Name Dead Spider (Lake Co.) Date 9-15-03



Taking a measurement

- Start at 1 foot deep
- Move probe with slight jiggling motion
- The DO reading will drift-judge the nearest mg/l.
- Go to the next depth on your data sheet.
- Stop about 2-3 feet above sediment to protect probe



Submit data using instructions found on
www.micorps.net

I 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**

End of the year- Return Meters



With last water chemistry
sample drop off date



If forget? Call Tamara to
arrange drop off by October
31st.



Damp Sponge-No pooled water



Tamara Lipsey

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Pro20 Calibration

1. Power Up
2. Push CAL for 3 seconds
3. Wait to Calibrate
4. Calibration Successful or Wait and Try Again



550A Calibration

1. Power Up
2. Wait 15 Minutes to Warm Up
3. Push and hold both Up and Down Arrows at same time



550A Calibration

3. CAL will be indicated, hit enter
4. Enter Elevation in 1/100^{ths}, and hit enter
5. Wait for % Saturation to stabilize, 2-3 minutes
6. If 93%-98%, and stable, hit enter, if not, turn off meter, and try again



550A Calibration

7. Make Sure Salinity is 0
8. D.O. Will be in % Saturation, write this down on data sheet, hit Mode
9. D.O. Will then be in mg/L. YOU ARE READY!!!