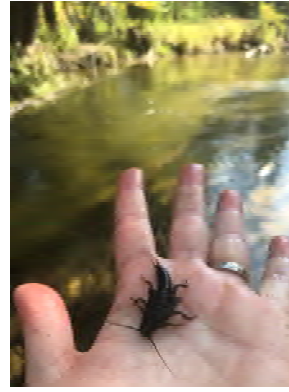
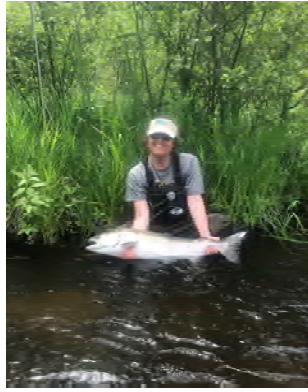




# Dissolved Oxygen and Temperature

Tamara Lipsey



MICHIGAN DEPARTMENT OF  
ENVIRONMENT, GREAT LAKES, AND ENERGY

**Tamara Lipsey**

Aquatic Biology Specialist  
and MiCorps Program Lead

Water Resources Division

**517-342-4372**

**lipseyt@michigan.gov**





## Poll the Audience

- How comfortable are you with dissolved oxygen/ temperature monitoring?
  1. I am not entirely sure why it is important, and I am here to learn!
  2. I am signed up to sample it for the first time this year and am here to learn!
  3. I have sampled it before but am here for a refresher and relearn what I may have forgotten~
  4. I have done it for many years but can always learn more!

# Dissolved Oxygen (DO) and Temperature

---

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



## How is Dissolved Oxygen and Temperature Measured in CLMP?





# What D.O. and Temperature Measure?



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



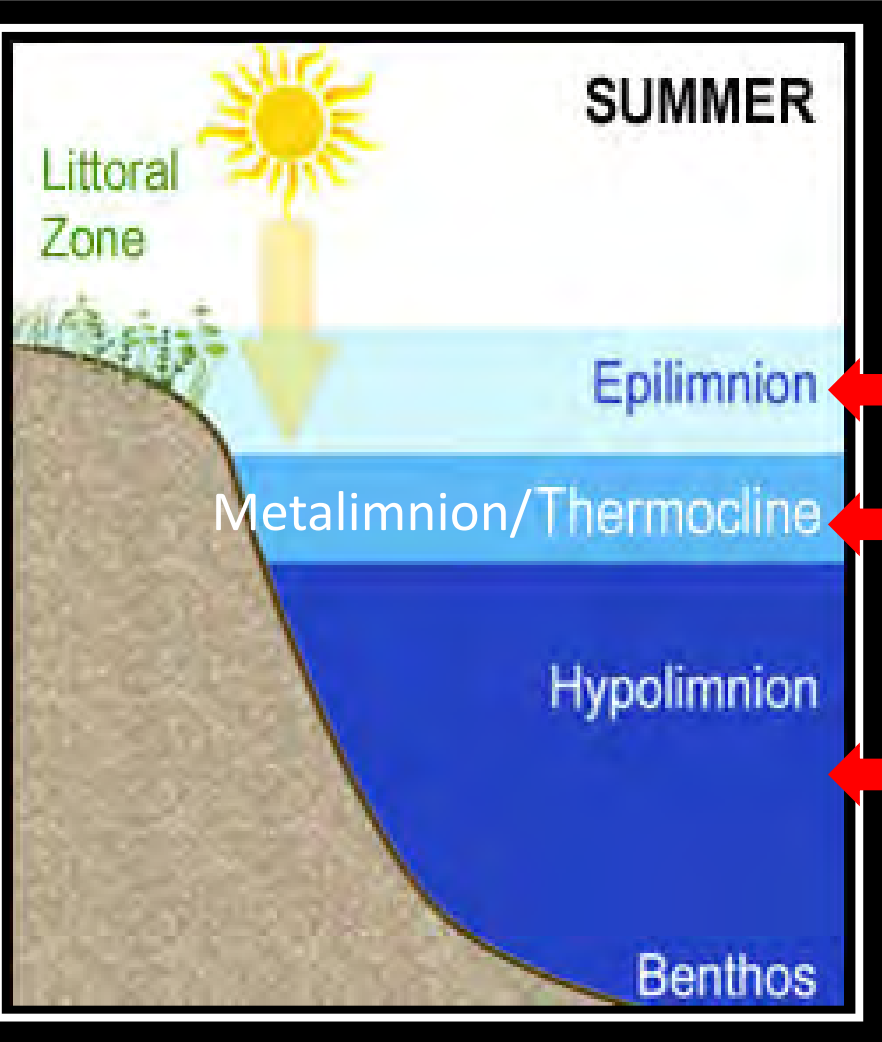
How warm or cold the water is

# Temperature and Oxygen impacts...

- Physical
  - Density zones
- Chemical
  - Oxygen and Phosphorus
- Biological
  - Fish Habitat Availability



Slide Credit E. Elgin



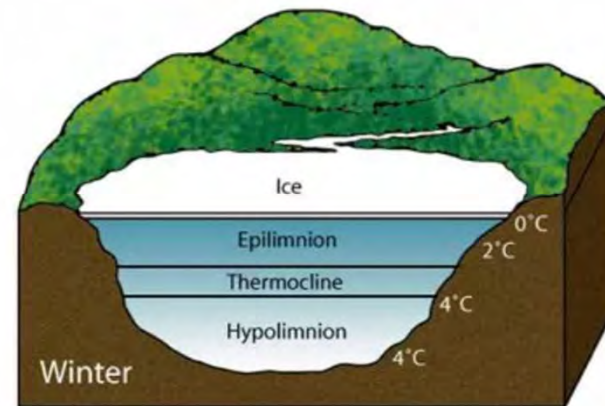
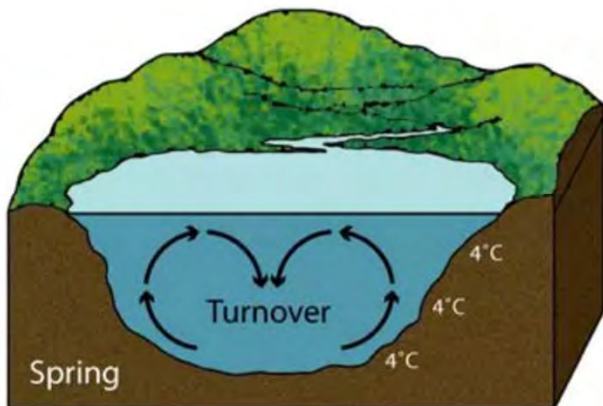
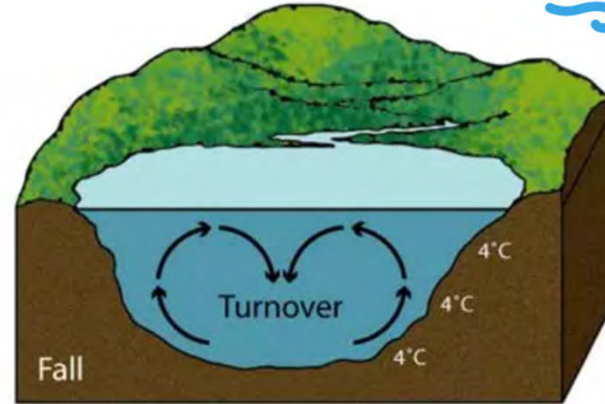
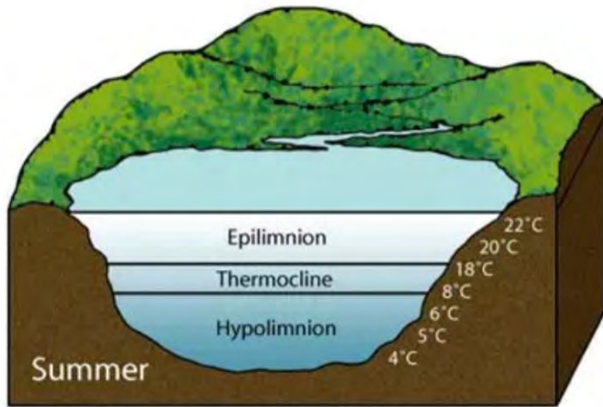
# Thermal Stratification

## Lake Temperature/Density Zones

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



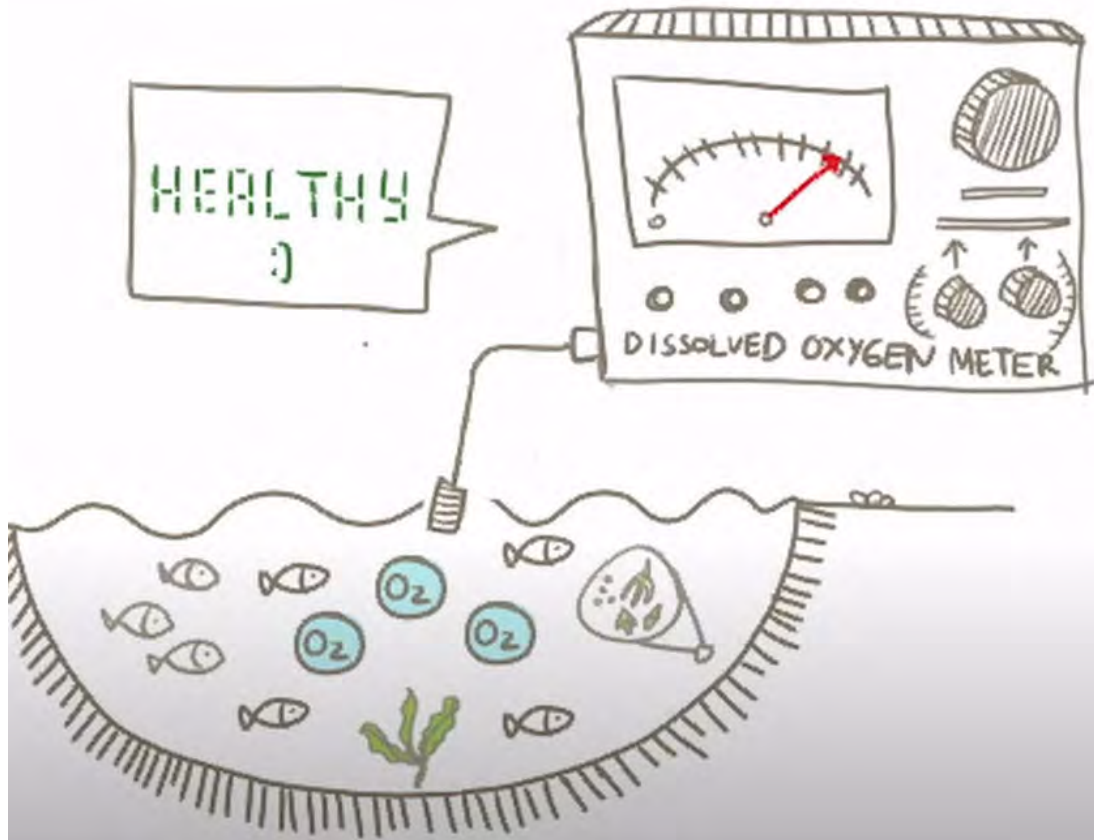
# Lake Turnover



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



## Dissolved Oxygen Take Home Points



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

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

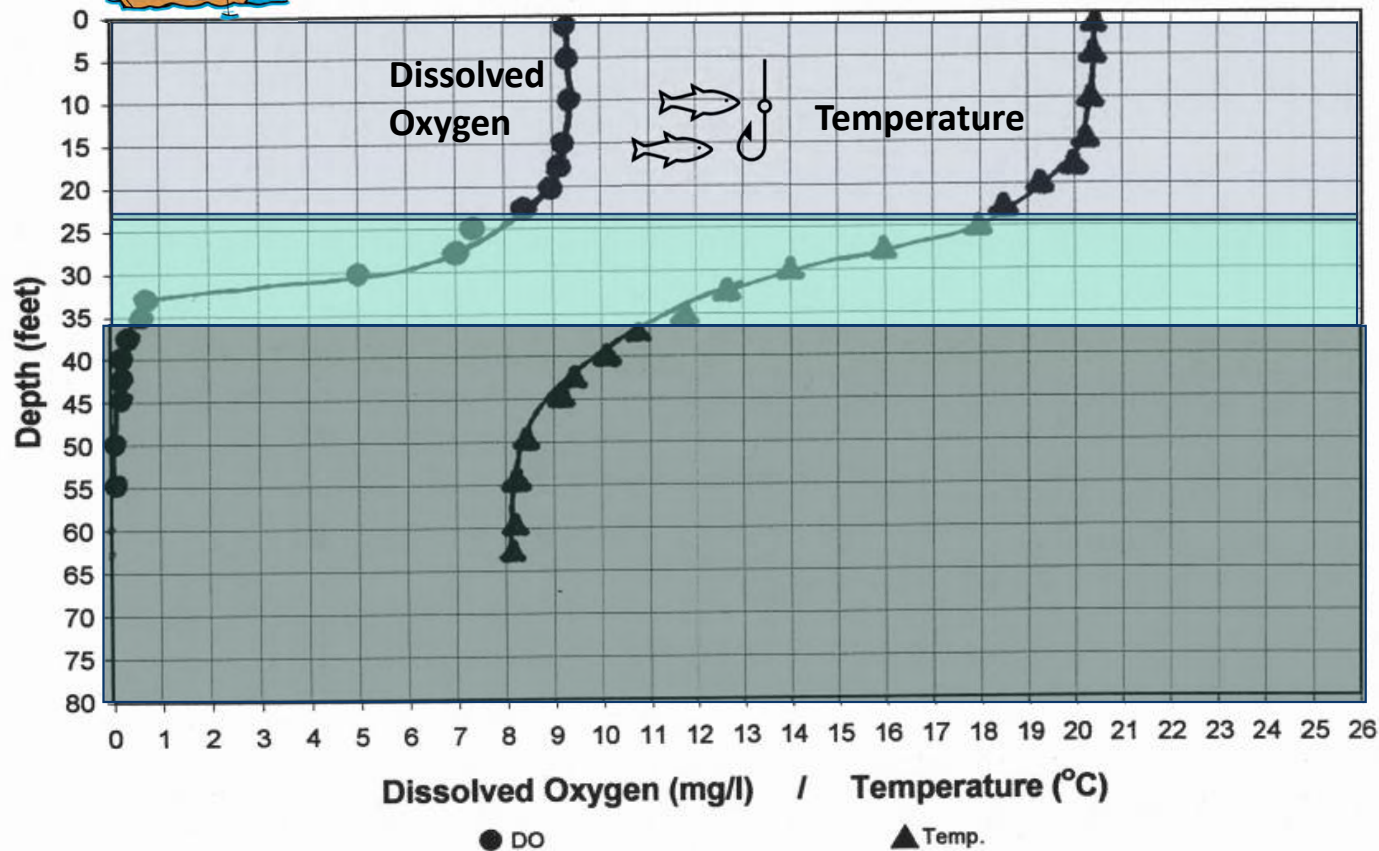


<https://micorps.net/wp-content/uploads/CLMP-DO-Temp-DataPlottingForm.pdf>

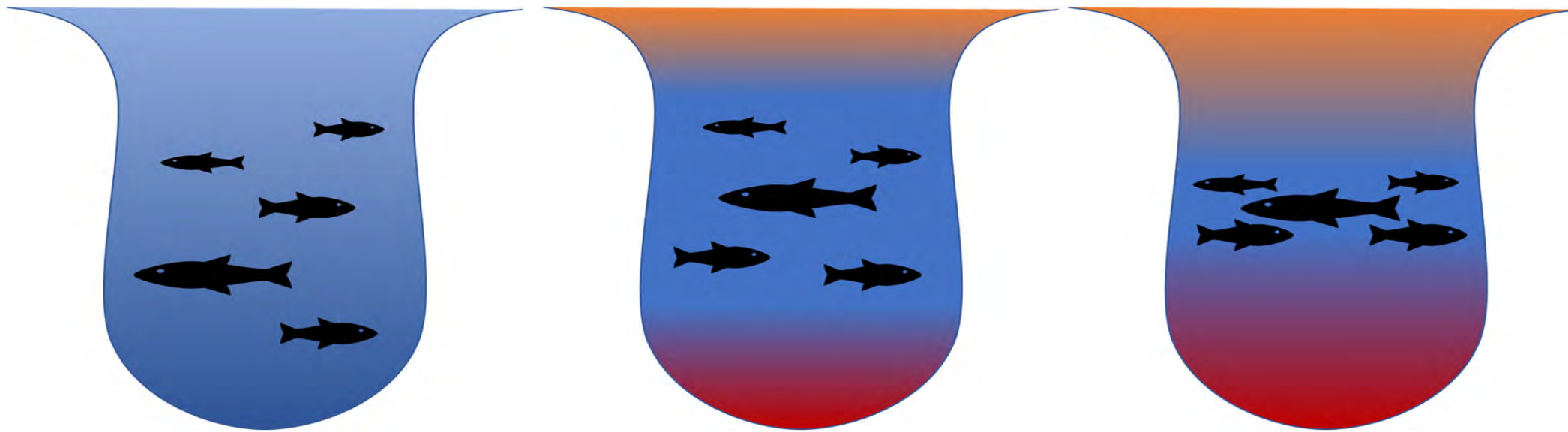
### Dissolved Oxygen and Temperature Profiles



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



# Impact of Stratification on Fish



**Spring**

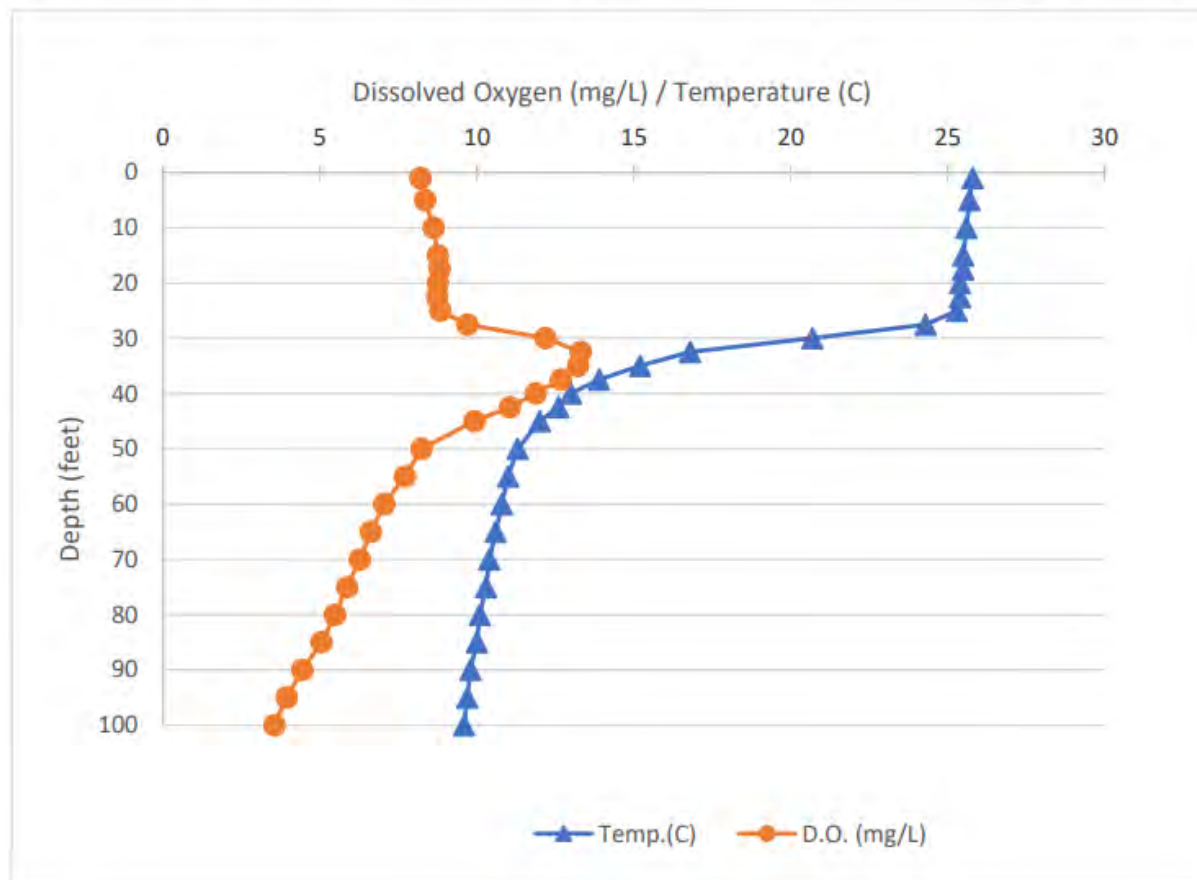
**Middle summer**

**Late summer**

# The power of photosynthesis

Lake: Gull Lake (Kalamazoo Co.)

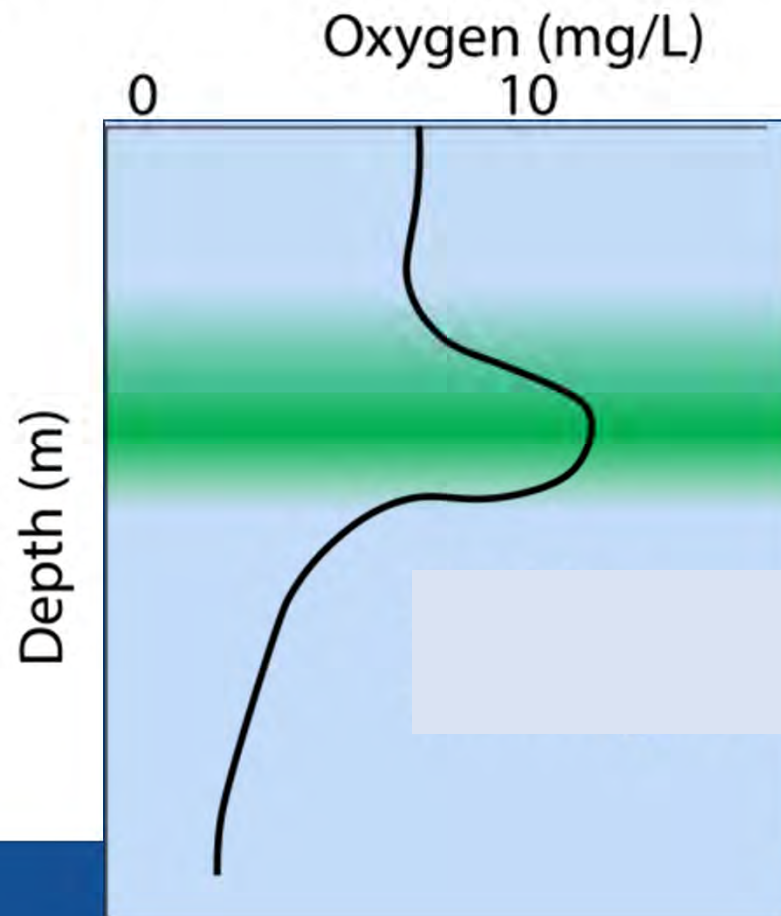
8/10/2021



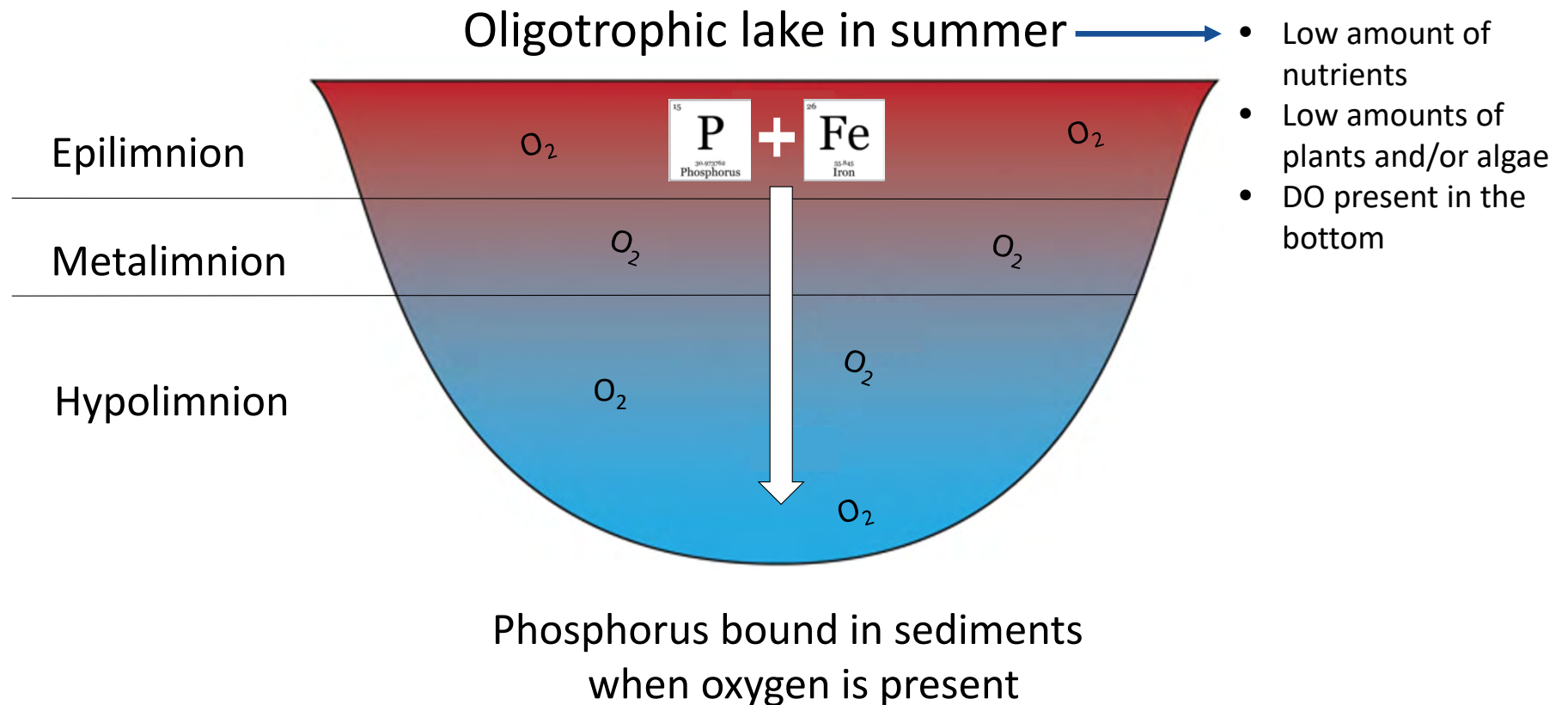
Slide Credit: E.  
Elgin



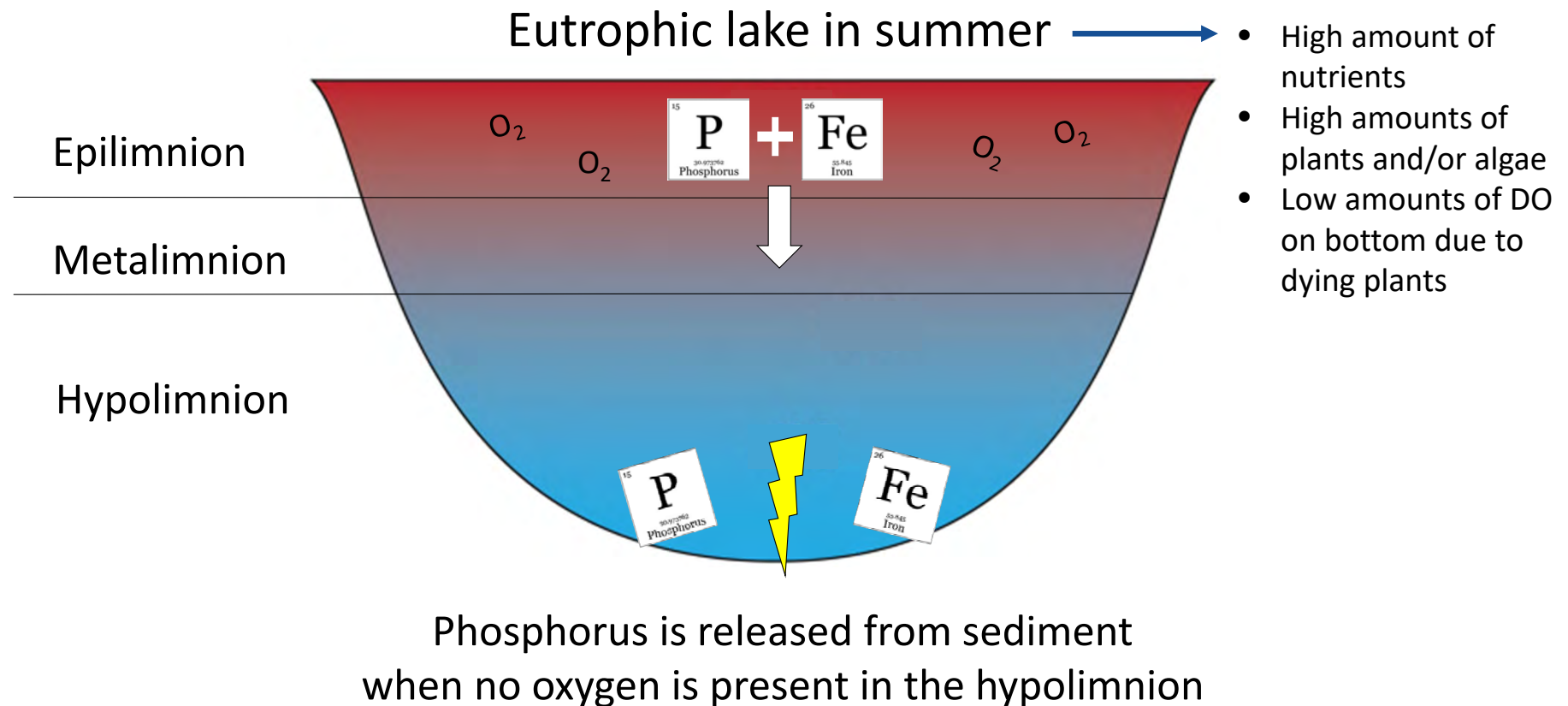
# The power of photosynthesis



# Impacts of Dissolved Oxygen and Phosphorus



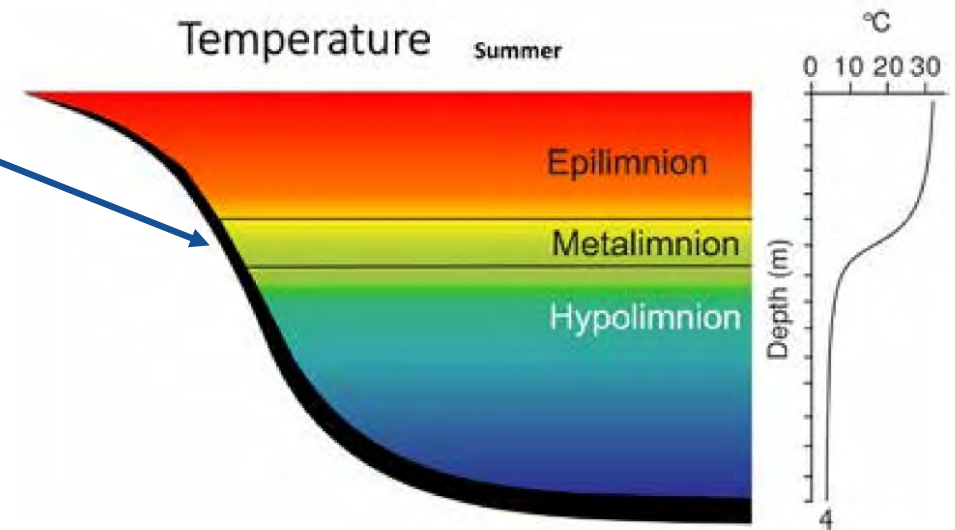
# Impacts of Dissolved Oxygen and Phosphorus





# Coldwater Fishery Designated Use Assessments with CLMP data

- Stratified Lakes: Maintain 7.0 mg/L dissolved oxygen in upper 1/3 of the metalimnion CLMP
- Temperature and DO monitoring ~ 2x month
- 2024 Integrated Report for the Clean Water Act
  - Listed 23 coldwater lakes as not supporting a coldwater fishery
- 2026 Integrated report is next!





A scenic photograph of a calm lake, likely a Great Lake, framed by the branches of trees in the foreground. The water is a deep blue, and the far shore is lined with a dense forest of green trees under a clear blue sky. The text "Brain Break!!" is overlaid in the center in a bold, dark blue font.

**Brain Break!!**

# D.O./Temperature Program Overview

Borrow a Meter

May purchase own meter\*\*

Meters will be distributed by mid-May

Measure 2 X per month May-September





No longer sold, parts will not be available in the future.

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



# Probe of Each Meter

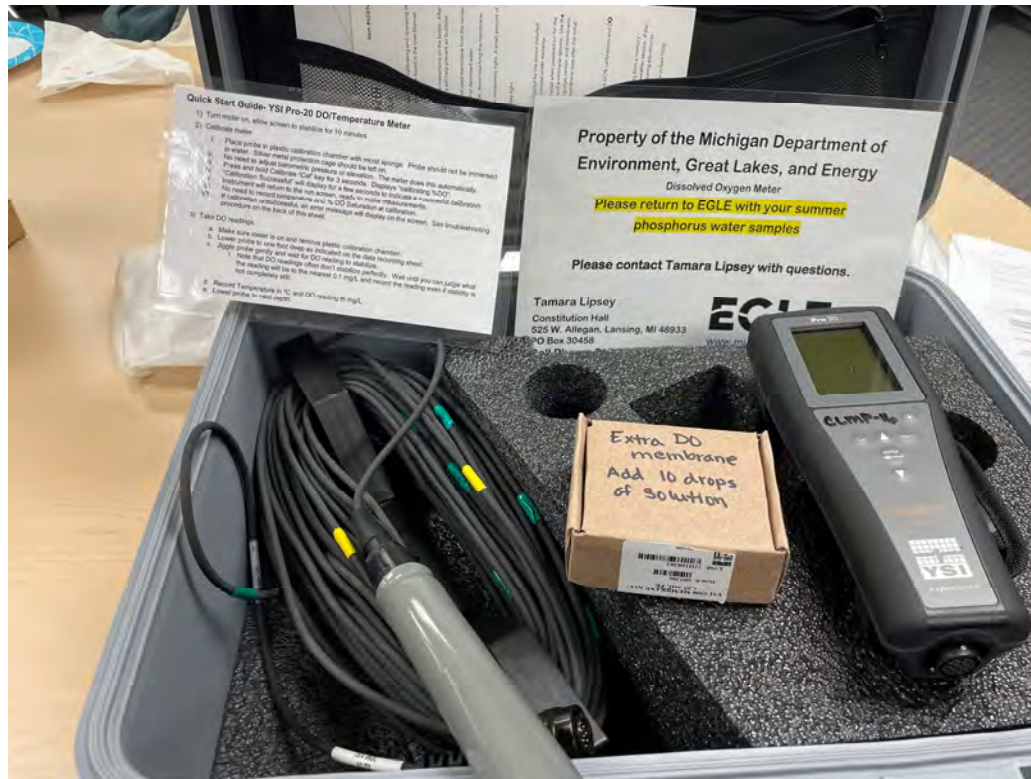


# Pro-20 Dissolved Oxygen and Temperature Probe





# Example of Do/Temperature Meter Kit





# New for 2024-Stainless Steel Weights







# Prepare for Sampling



Make sure you have calm and dry weather conditions



Safety equipment and a friend to help with data recording



Check the Quick Reference Procedure Checklist



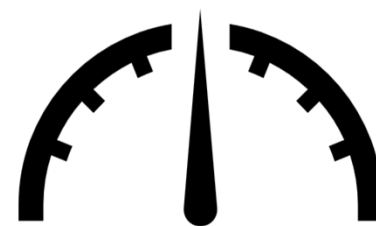
Make sure you have your data forms



Turn on your meter for 15 minutes and Calibrate Meter

# Calibration and DO membrane change

- Videos Available Online
  - <https://micorps.net/lake-monitoring/lake-training/>
- Remember to turn on to warm up prior to calibrating
  - 5-10 minutes Pro-20
  - 15 minutes 550A
- Card available inside tub for reminders
- **Calibrate EVERYTIME you sample!!!!**







# DISSOLVED OXYGEN AND TEMPERATURE 2024 Data Form



Lake Name: \_\_\_\_\_ County: \_\_\_\_\_ Township: \_\_\_\_\_

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

Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_

Volunteer Monitor Name(s): \_\_\_\_\_

Date Sampled: \_\_\_\_\_ Time: \_\_\_\_\_

Weather Conditions (sunny, cloudy, windy, etc.): \_\_\_\_\_

Unusual Conditions (heavy rain, boating, etc.): \_\_\_\_\_

Sampling Station Depth (make sure to measure before you begin sampling): \_\_\_\_\_ feet

Page 1  
Data  
Sheet



# Dissolved Oxygen and Temperature Monitoring Demonstration





# At Sampling Location

- **Must anchor** just upwind of deep basin and drift back over deepest spot, as with other parameters
- **Must check** for actual basin **depth** with depth finder or weighted line or secchi disk
- Turn on the meter, **calibrate** if you did not do on shore.
- Take the Cap off. Leave the guard.
- Add weight if needed

## Taking a measurement

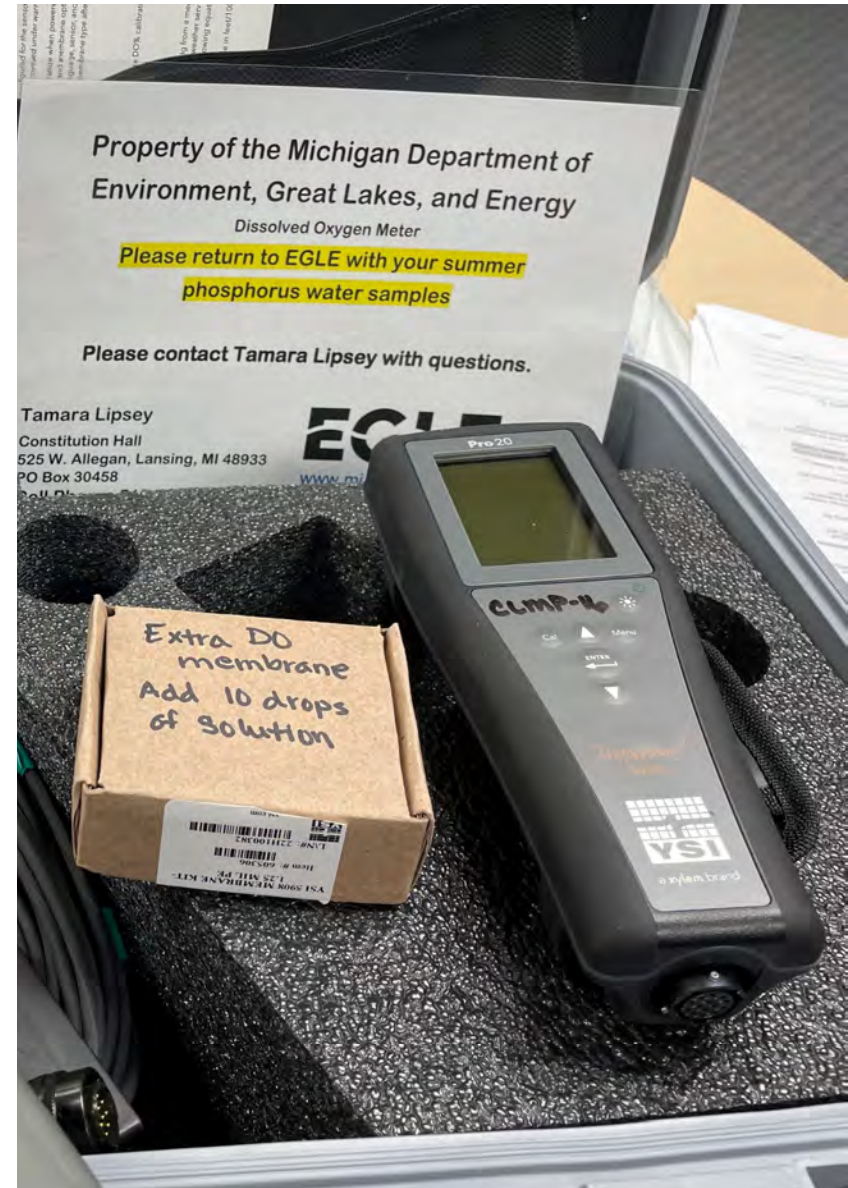
- Start at 1 foot deep
- Make sure in mg/L
- Move probe with slight jiggling motion
- The DO reading will drift-judge the nearest .5 mg/l.
- Go to the next depth on your data sheet.
- Stop about 2-3 feet above sediment to protect probe





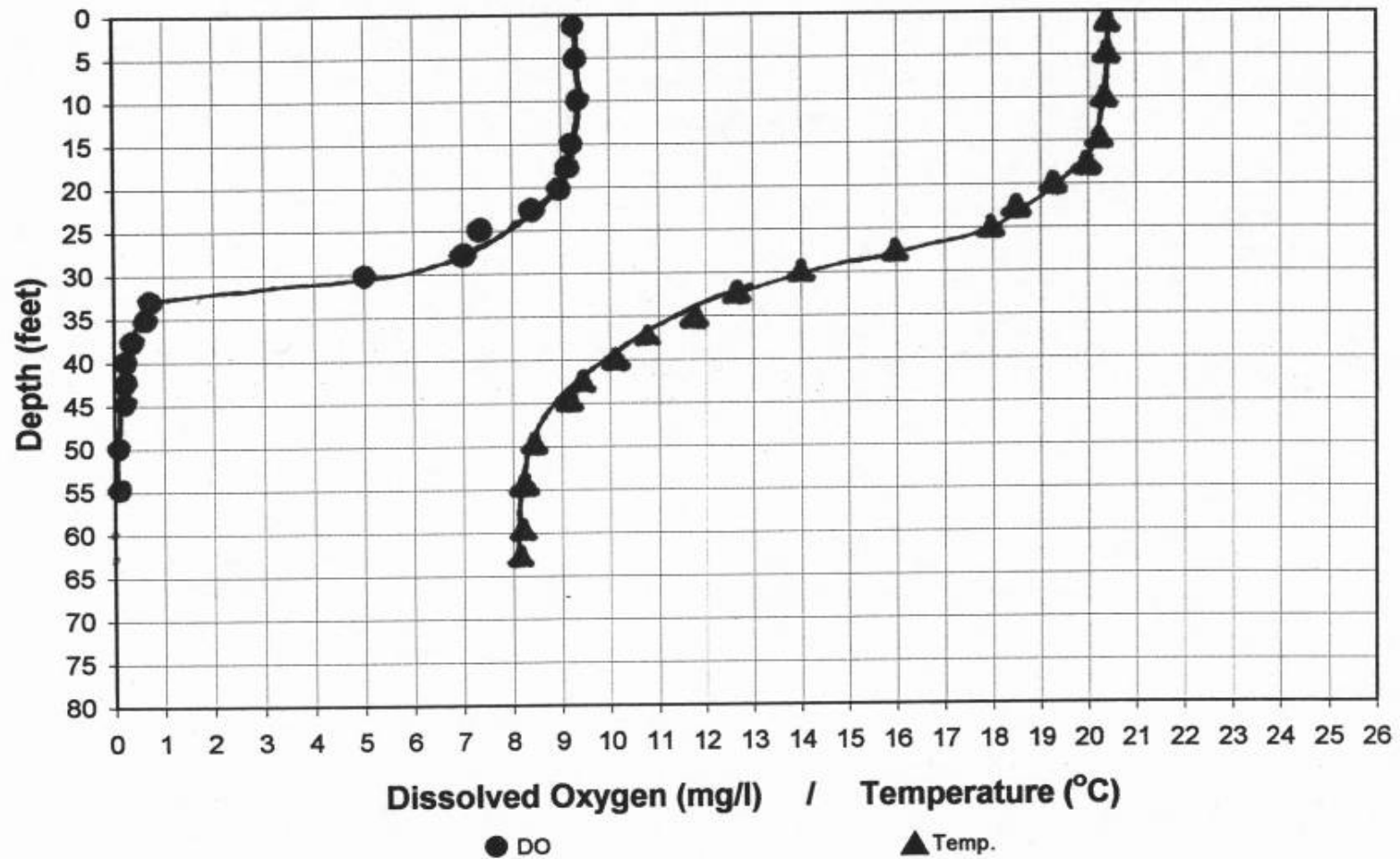
# After Sampling

- Turn off meter
- Disconnect meter from cable
- Wrap cable carefully, **WITHOUT CRIMPING**
- Make sure meter is **completely dry** before closing case or it will cause mold!
- Store in a dry location out of the sun
- **Keep sponge damp**, but do not store in standing water.
- Do not attach any weights to cable. Use manufacture weight only.



## Dissolved Oxygen and Temperature Profiles

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



[www.micorps.net](http://www.micorps.net)

---

## DATA ENTRY

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

---

## 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 31<sup>st</sup> to: **MLSA, P.O. Box 303, Long Lake, MI 48743**

# End of the year- Don't Forget-Return the Meters



With last water chemistry sample drop off date



If forget? Contact Tamara to make plan for volunteer to ship meter or return it to Lansing.



Include sponge, no standing water.



Meter disconnected from cable



# Questions?

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

[MiCorps.net](http://MiCorps.net)



**Working Together to Protect Lakes**

