

Bay Lake Water Quality Update



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July 14, 2018

Bay Lake Annual Meeting

Measuring Water Quality

Trophic State Index (TSI)

- Based on 3 measurements:
 - **Total Phosphorus**
 - **Chlorophyll a**
 - **Secchi Disk (transparency)**
- Algorithms developed by Dr. Robert Carlson, Kent State University
- Value from 0 to 100 that summarizes water quality
- Used to compare water quality between lakes and monitor changes over time

Measuring Water Quality

TSI is a measurement of lake productivity

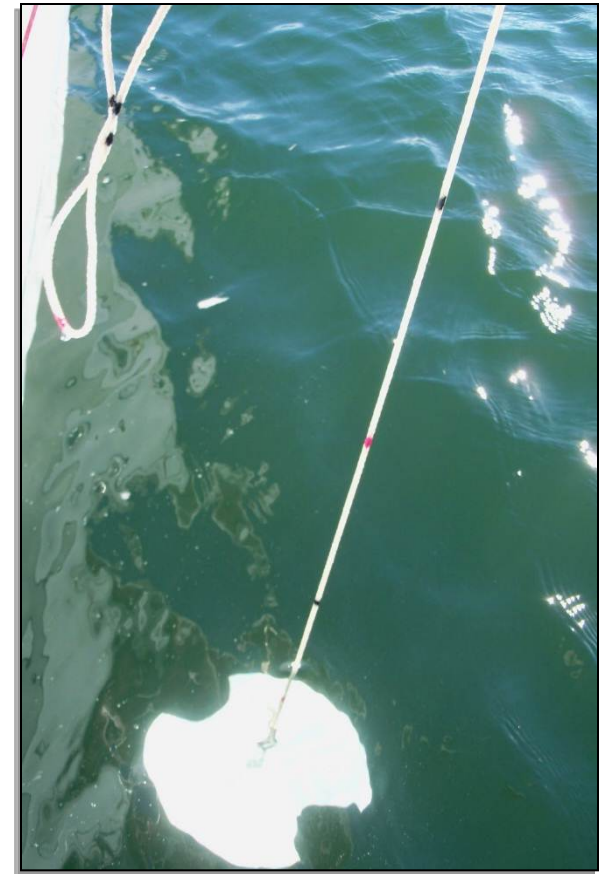
High nutrients = high productivity
(more food for stuff to grow)

TSI Value	Trophic Status	Lake Characteristics
0 – 40	Oligotrophic	Low productivity, water is clear, very little algae and aquatic plants
41 – 50	Mesotrophic	Intermediate productivity, water is generally clear, some aquatic plants and algae present
51 – 70	Eutrophic	High productivity, large amount of aquatic plants and/or algae, occasional algae blooms
71 – 100	Hypereutrophic	Very high productivity, excessive nutrients, algae blooms common

Measuring Water Quality

Trophic Status Index (TSI)

- Samples collected once monthly from May-Sept at deep hole
- Secchi reading and water samples
 - Secchi disk
 - Integrated sampler
- Samples analyzed by certified lab



Trophic Status Index

Oligotrophic Lakes

- Northern MN - infertile soils and conifer forests
- Larger and deeper
- Sandy or rocky shores and bottom

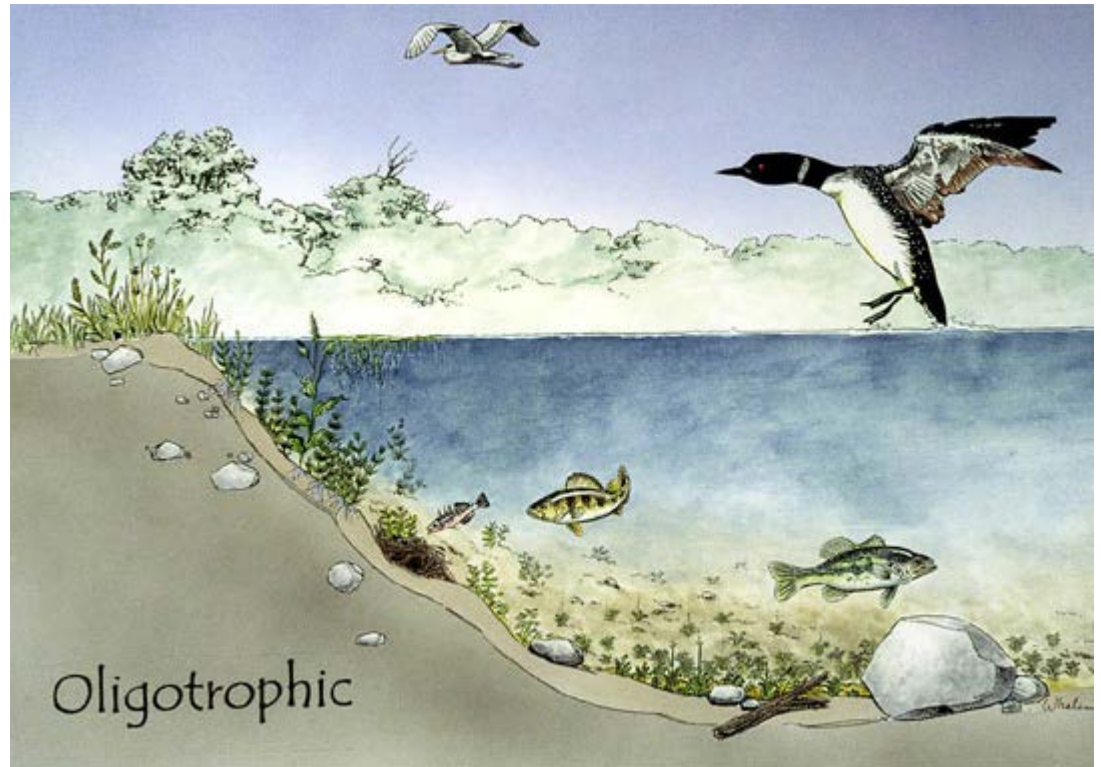


Image from:
UW-Extension Lakes Program

Trophic Status Index

Mesotrophic Lakes

- Moderately productive
- Higher phosphorus input than oligotrophic lakes
- Undergo periods of oxygen depletion at lower depths in late summer.
- Clear water and good amounts of fish

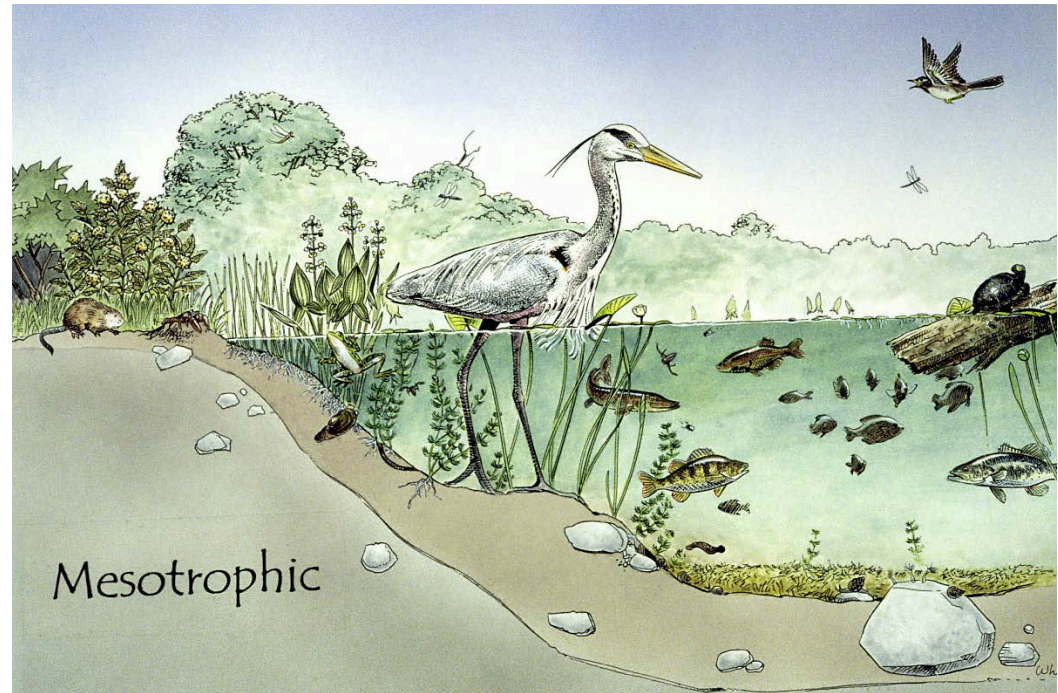


Image from:
UW-Extension Lakes Program

Trophic Status Index

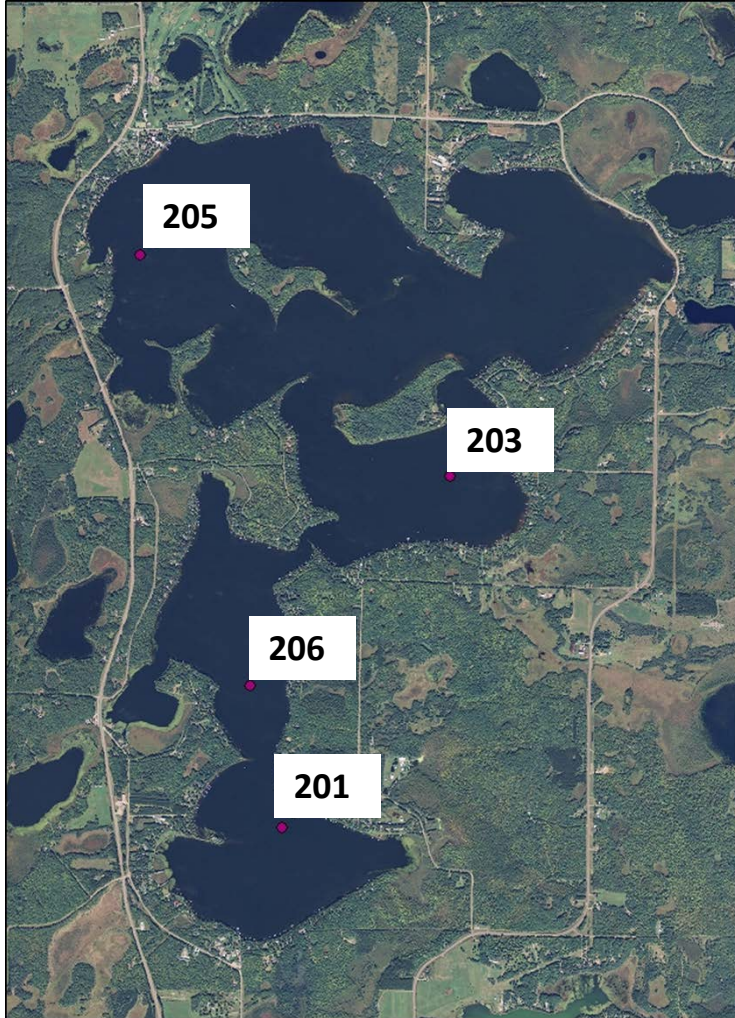
Eutrophic Lakes

- Greek: “well nourished”
- Highly productive
- Abundant nutrient supplies
- Abundant fish and wildlife
- Shallow



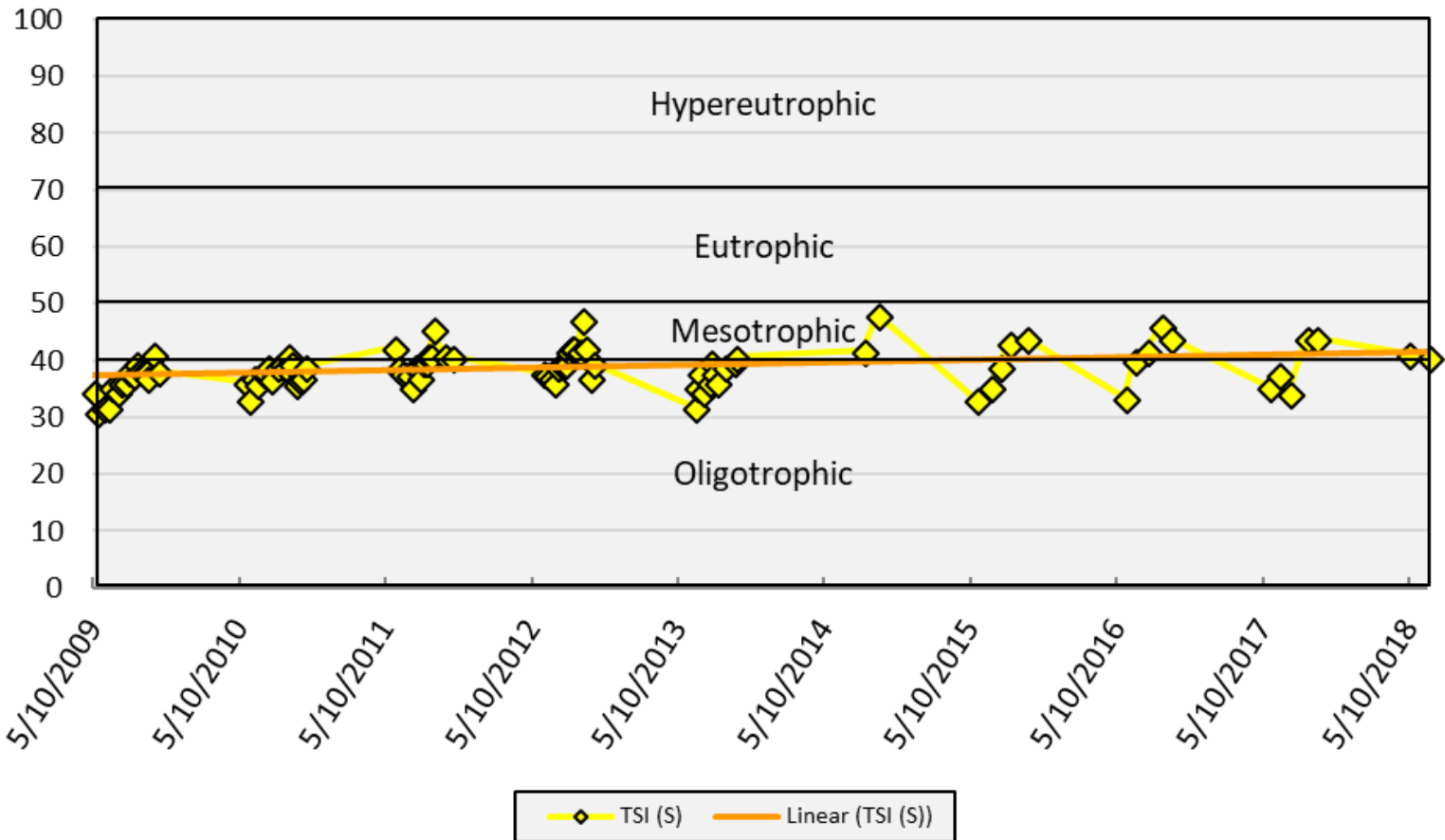
Image from:
UW-Extension Lakes Program

Trophic Status Index

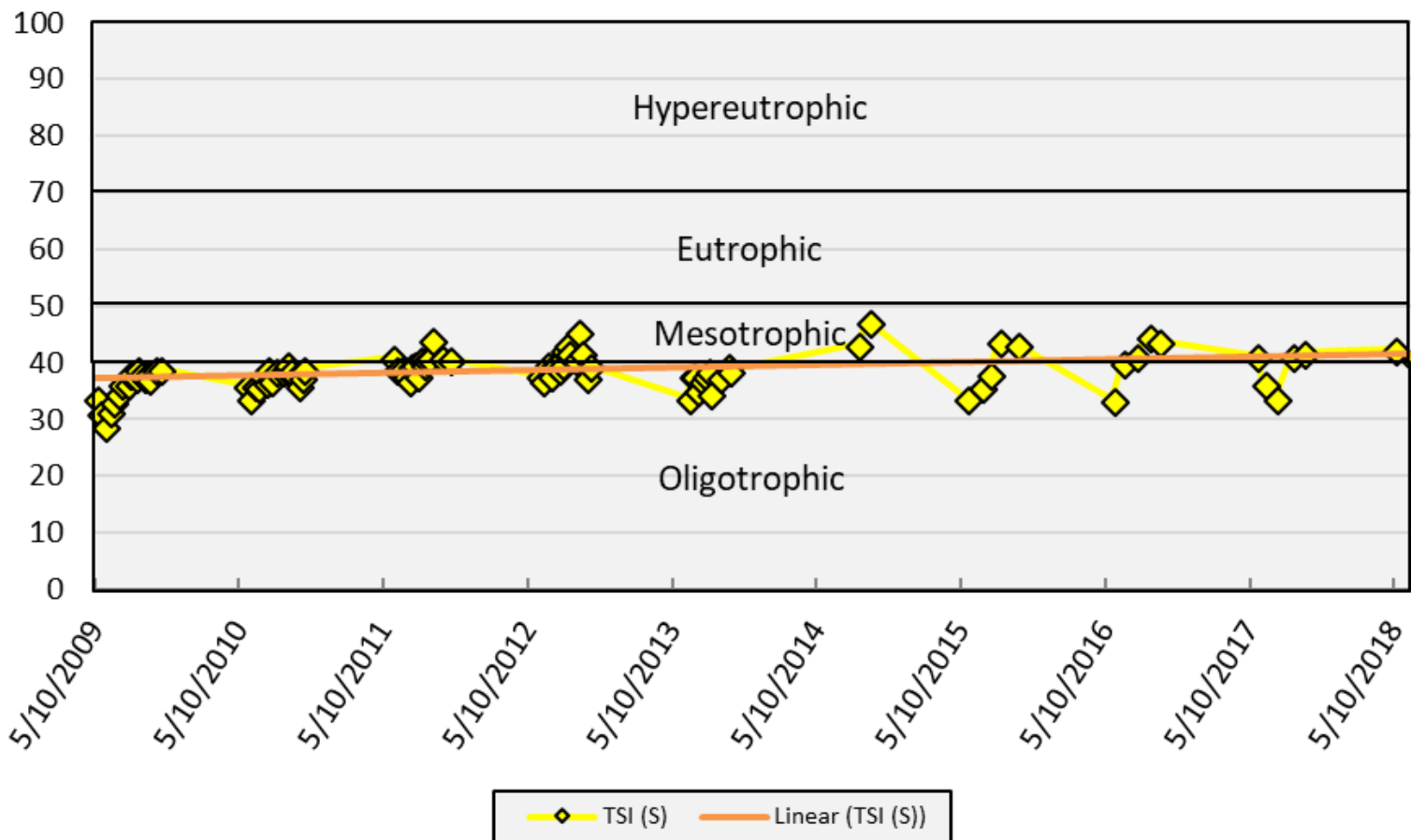


- Samples collected once every month from May through September
- 4 Sites

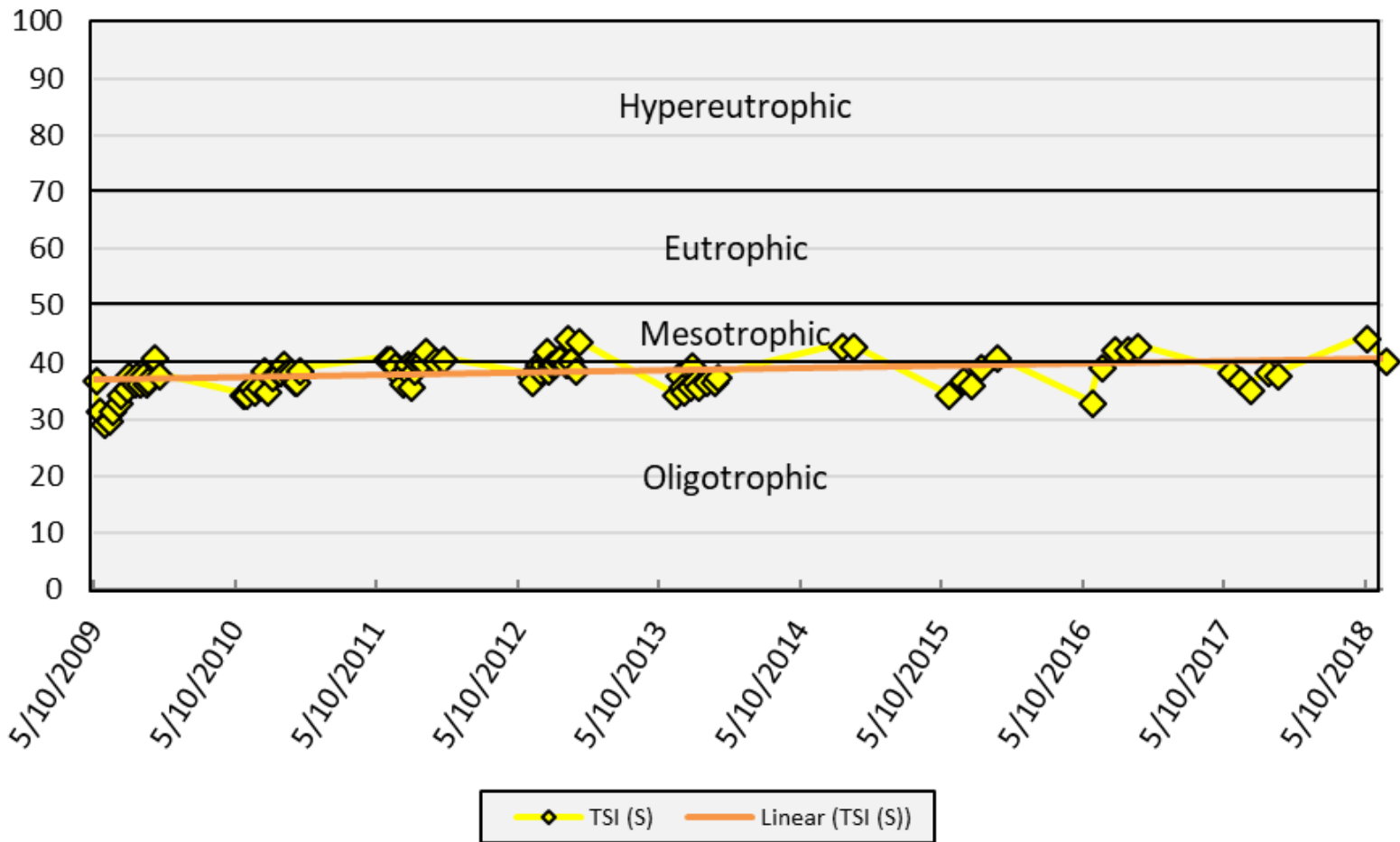
TSI Secchi - Bay Lake 205 2009-2018



TSI Secchi - Bay Lake 203 2009-2018

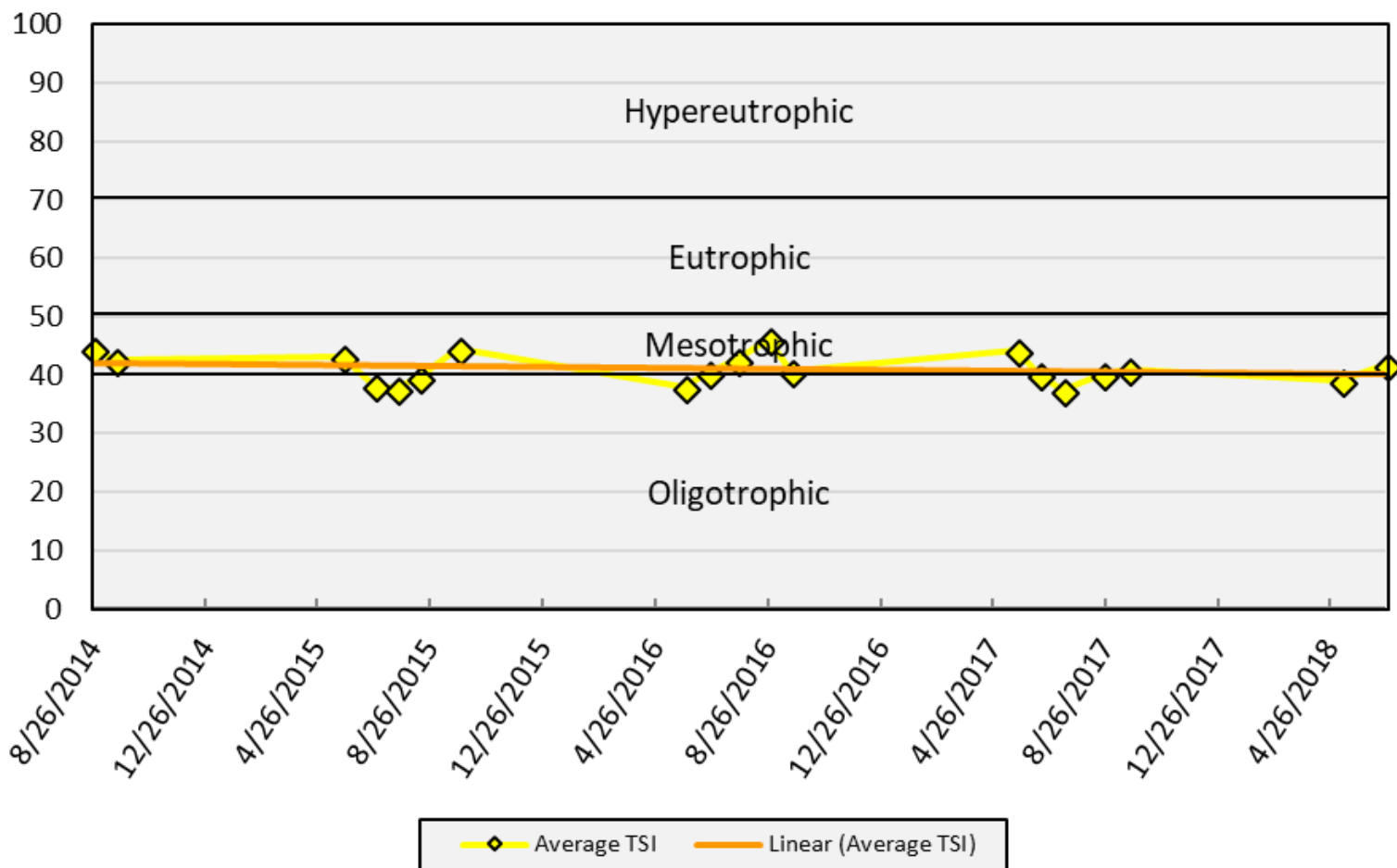


TSI Secchi - Bay Lake 206 2009-2018

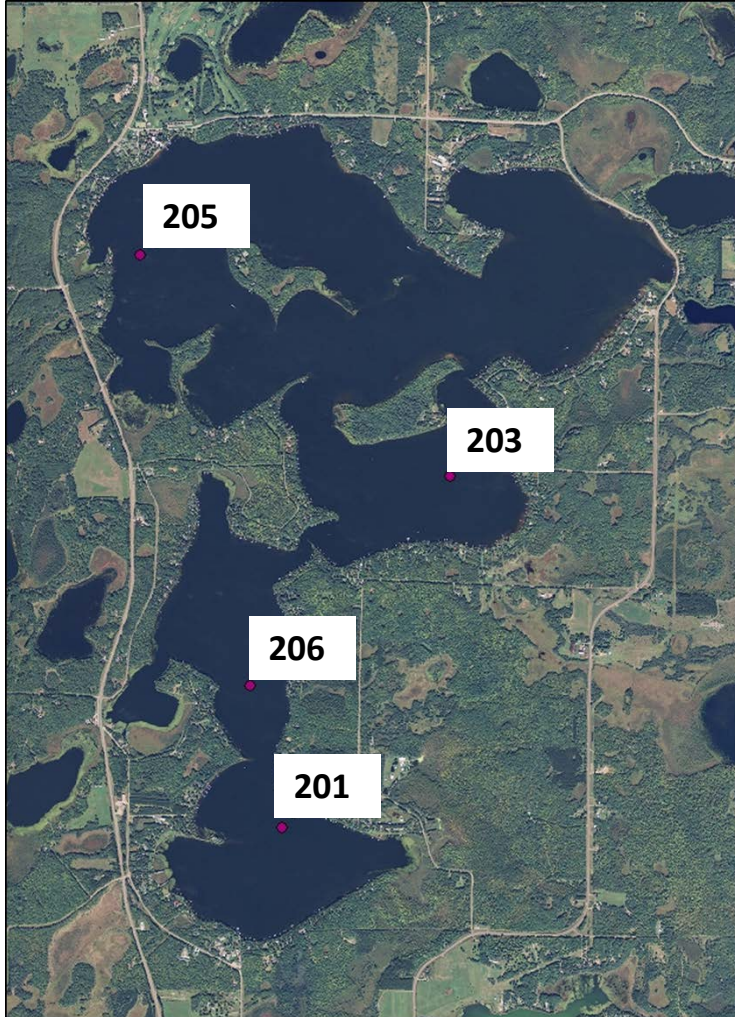


Average TSI - Bay Lake 201

2014 - 2018



Trophic Status Index



SUMMARY

TSI increasing slightly (water quality decreasing) at Sites 205, 203, 206

TSI decreasing slightly/steady at Site 201 (only 4 years of data)

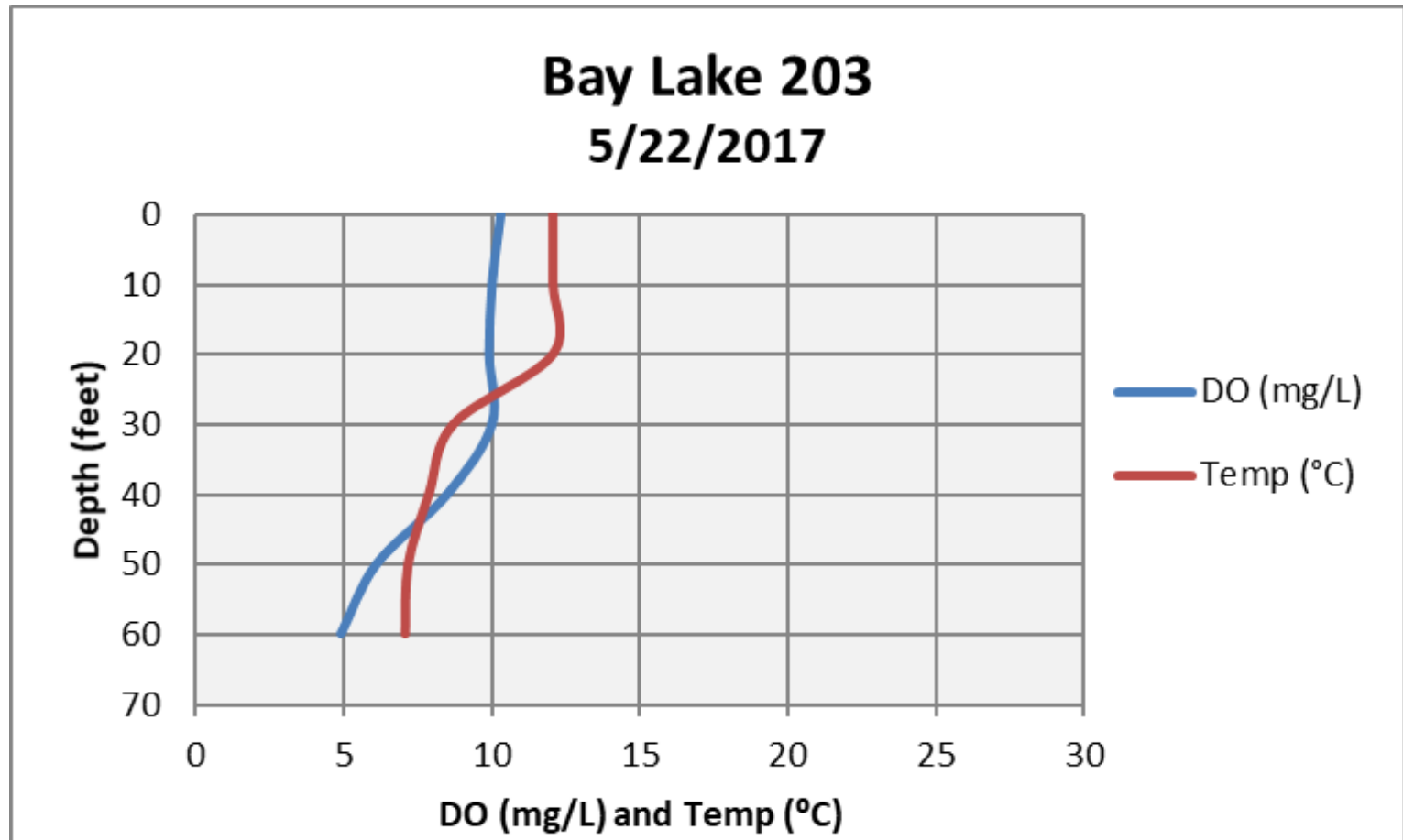
Profile Sampling

Measurements collected at surface and every 10 feet to the bottom

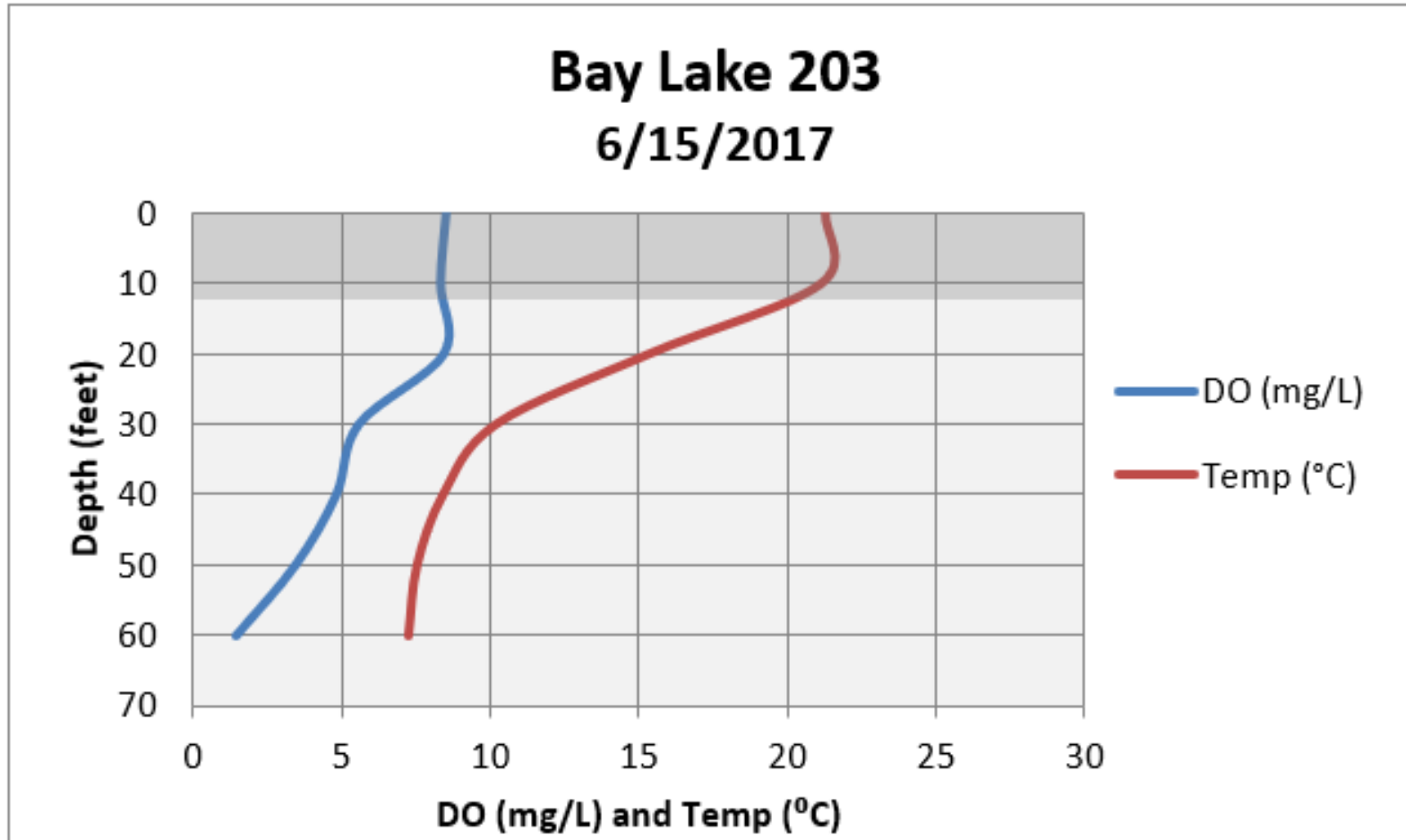
- Electronic field meter – Hydrolab
- Monthly from May-Sept.
- Temperature
- Dissolved Oxygen
- pH
- Conductivity



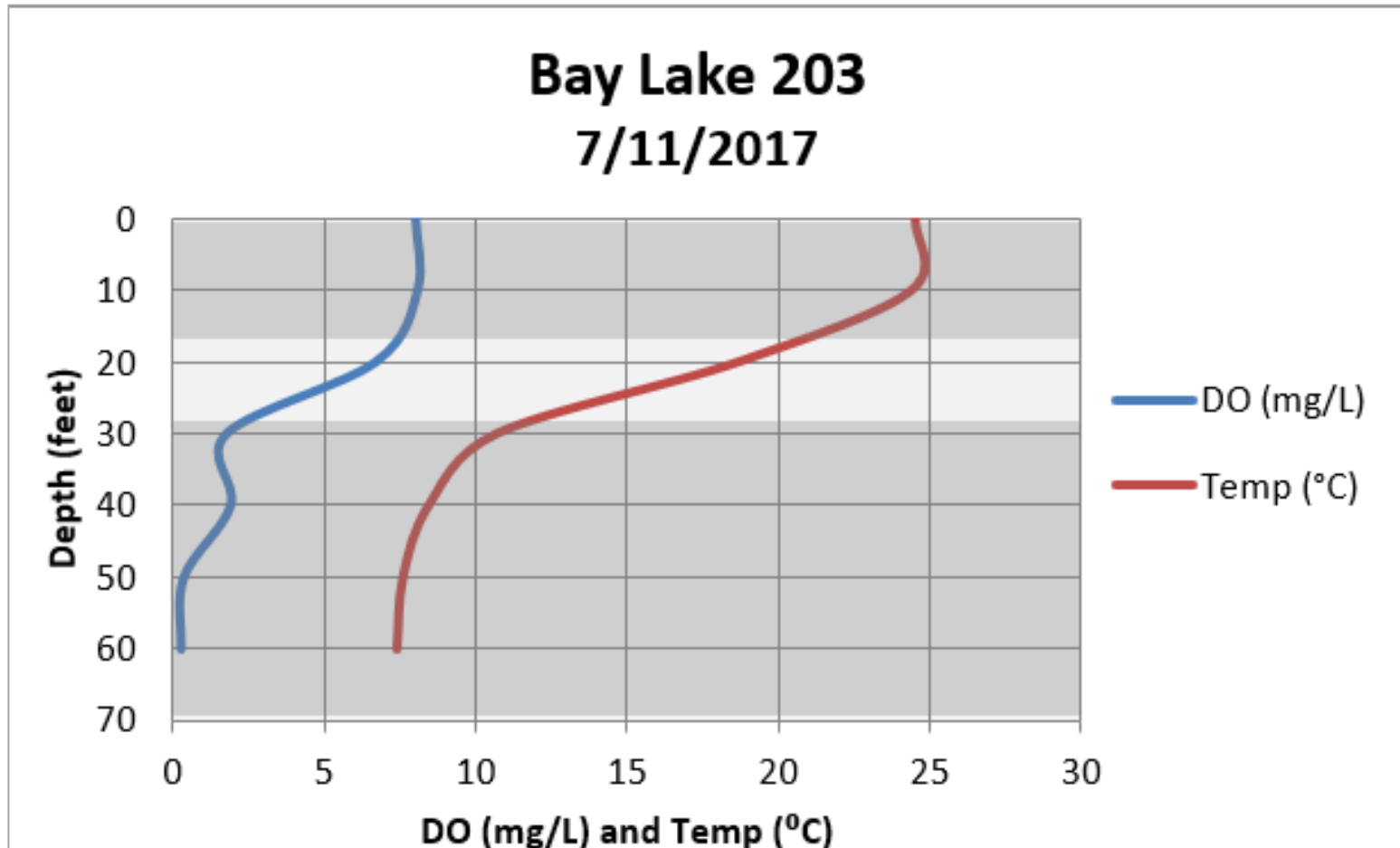
Profile Sampling



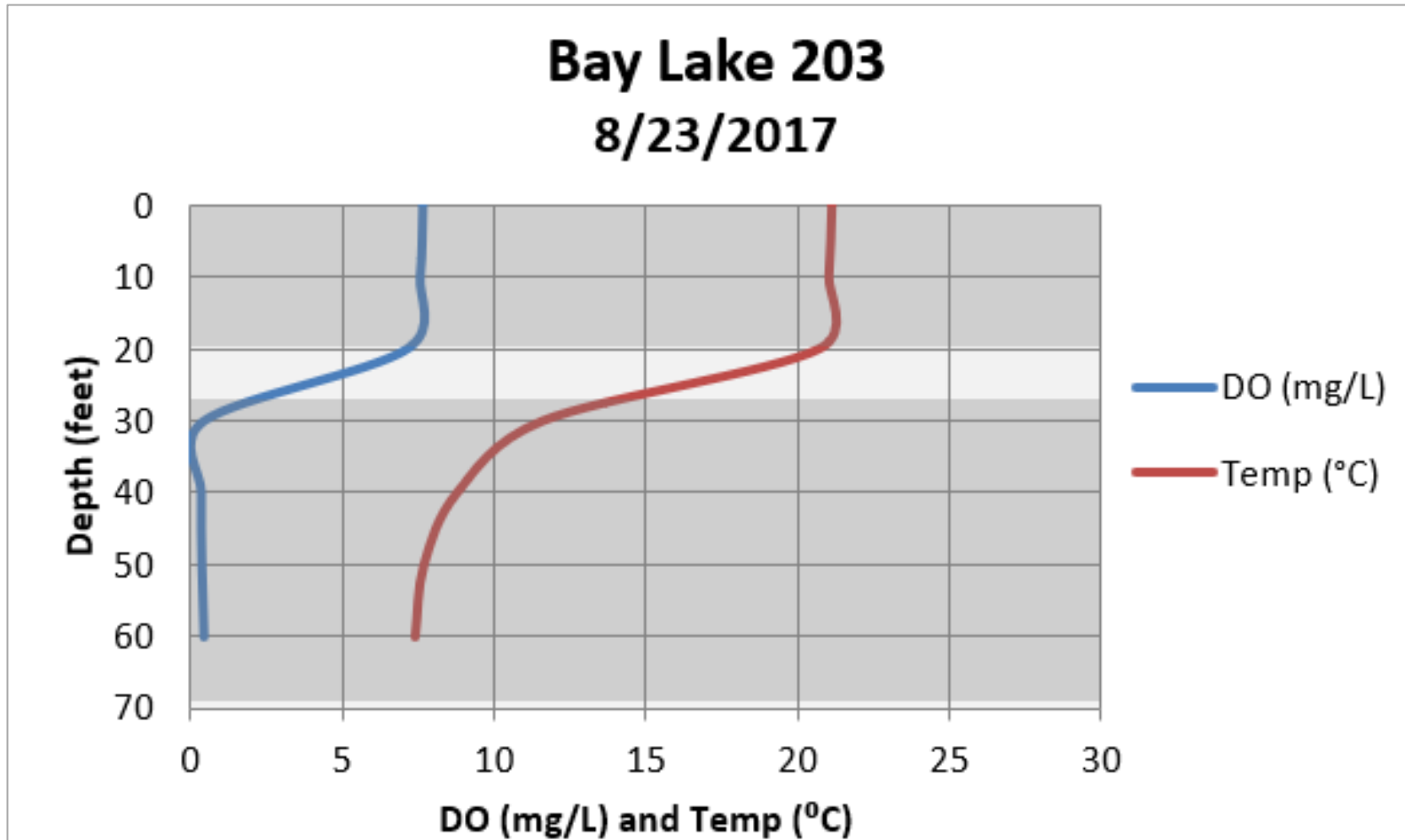
Profile Sampling



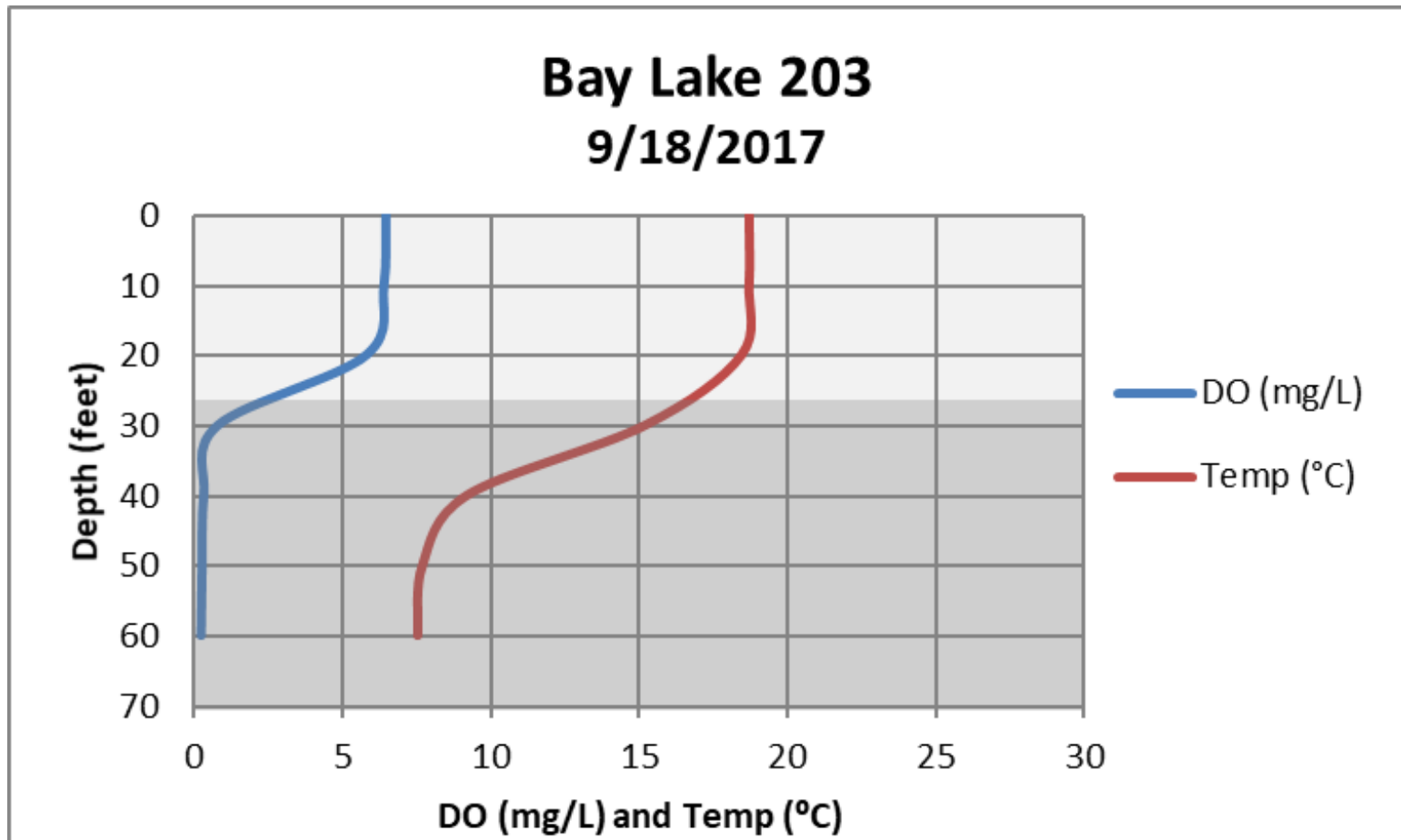
Profile Sampling



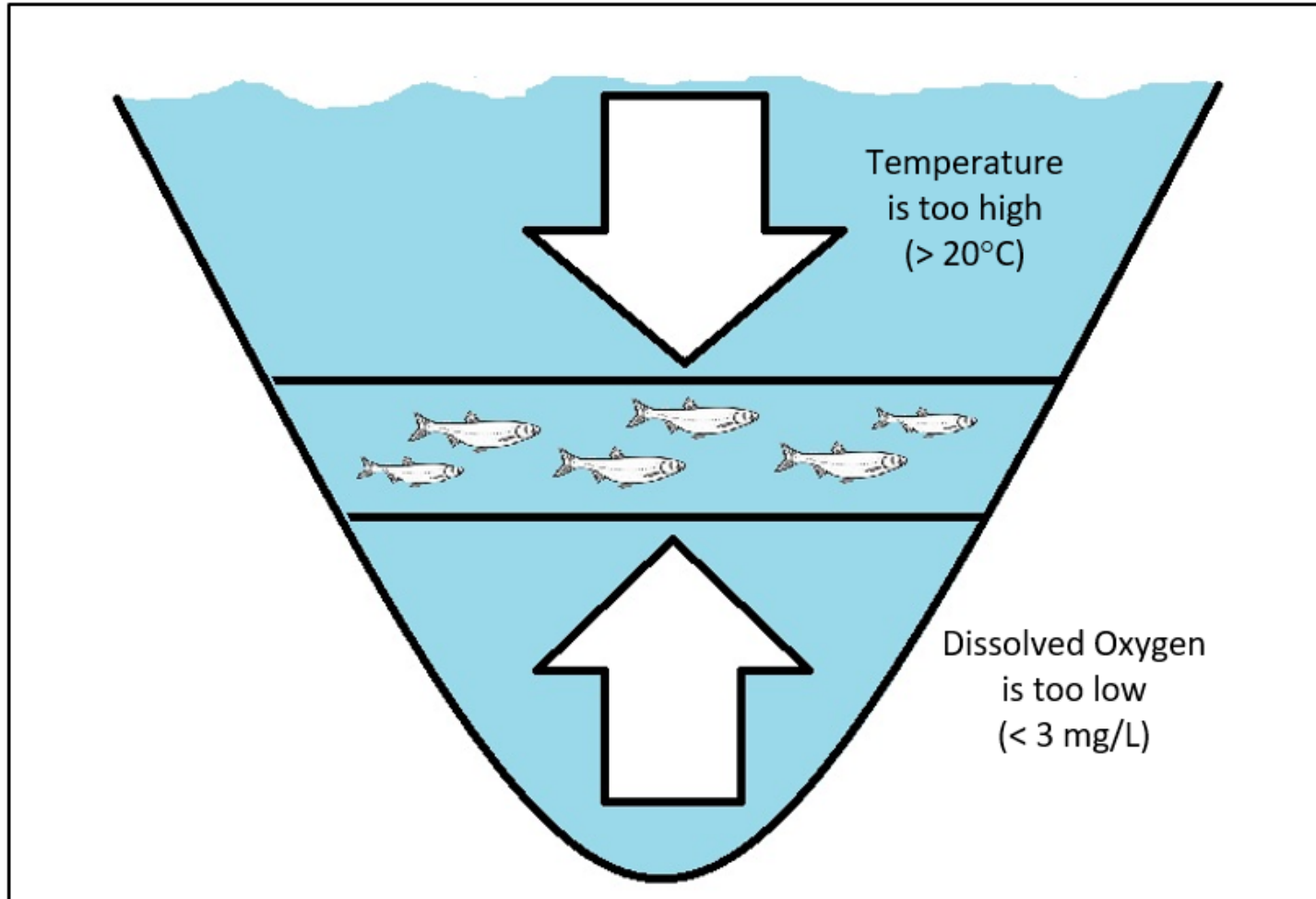
Profile Sampling



Profile Sampling



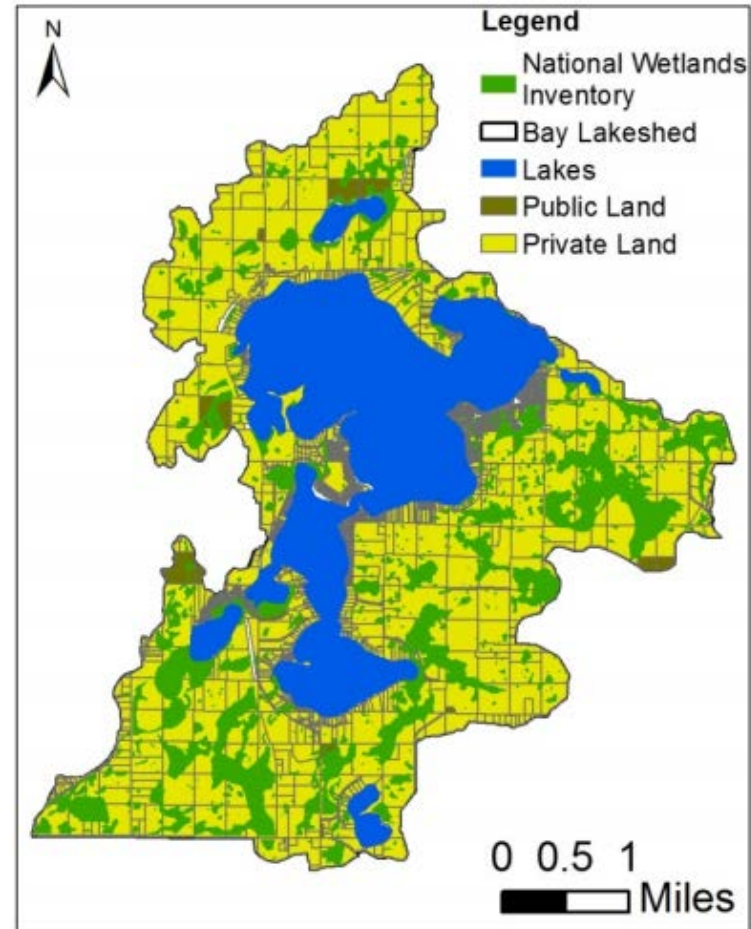
Tulibee Squeeze



Watershed Impacts

Watershed: area of land that drains to the lake.

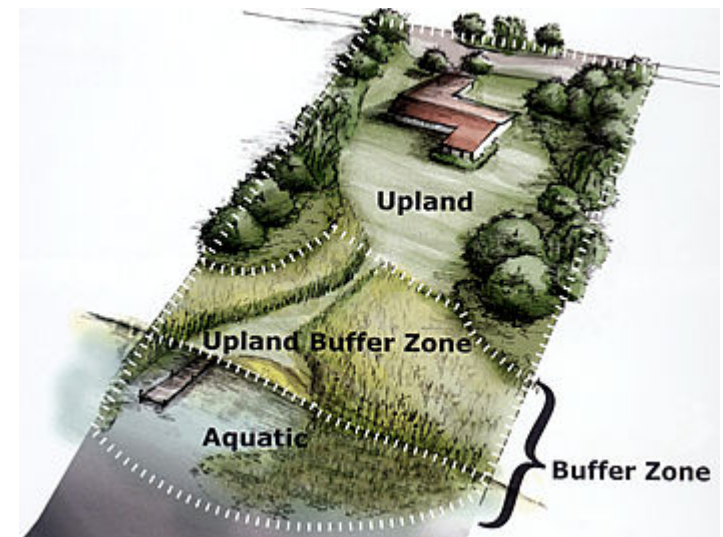
- Bay Lake has a small watershed relative to it's size.
- Majority of land in watershed is privately owned.
- Land-use practices of watershed residents can have a large impact on water quality.



Shoreline Best Practices

A natural shoreline is the foundation of a healthy lake.

- Native vegetation provides shelter and food for wildlife.
- Trees slow rainfall from hitting the ground and absorb nutrients
- Aquatic plants provide habitat for fish and help to keep the lake clean.
- A natural shoreline filters pollutants washing out from the land before they enter the lake.



Shoreline Best Practices



Tips for Property Owners:

- Keep forested land forested
- Grow native plants and trees along the lakeshore.
- Keep your lawn taller and fertilize less to keep pollutants out of the lake.
- Plant a rain garden or shoreline buffer to absorb rain water and runoff.
- Use rainbarrels to capture rainwater.
- Use pervious pavers on driveways and paths to allow water to soak in instead of running off.

Shoreline Best Practices

Altering the shoreline can have serious impacts on lake health.

DON'T

- Mow the lawn all the way to the lake or use fertilizer near the lake.
- Remove aquatic vegetation.
- Harden the shoreline with rip-rap, rock, or paved areas.
- Remove trees – trim them instead to allow for a view.
- Add impervious surfaces to your yard.
- Place a fire pit near the lake.



Action Items

- Assess your lakeshore. Where can you improve?
- Have your septic system inspected and pumped regularly (every 3 years).
- Mow and fertilize less.
- Tell your friends and neighbors
- Be an example – never underestimate the power of peer pressure!

“What you do makes a difference, and you have to decide what kind of difference you want to make.”

– Jane Goodall



Thank You!

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