HALFMOON LAKE

Watershed Management Plan

Water Quality Analysis Summary

July 13, 2024

Christine Bunyon,
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FB Environmental Associates

Photo credit: Christine Bunyon (FBE)

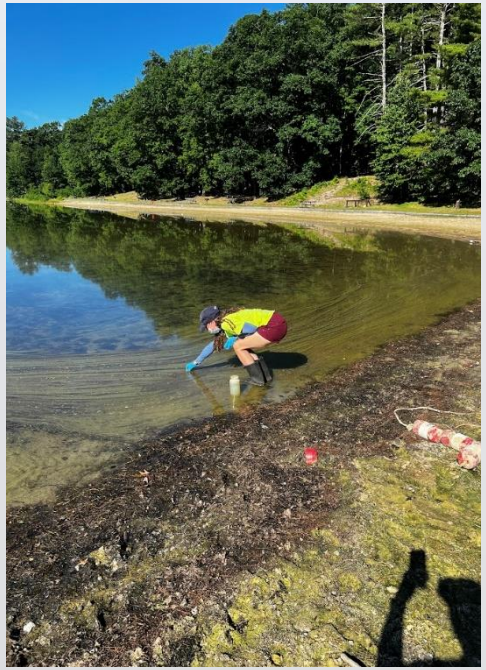
Hello!

FB Environmental Associates – 4.5 years, Project Scientist → Project Manager

University of New Hampshire

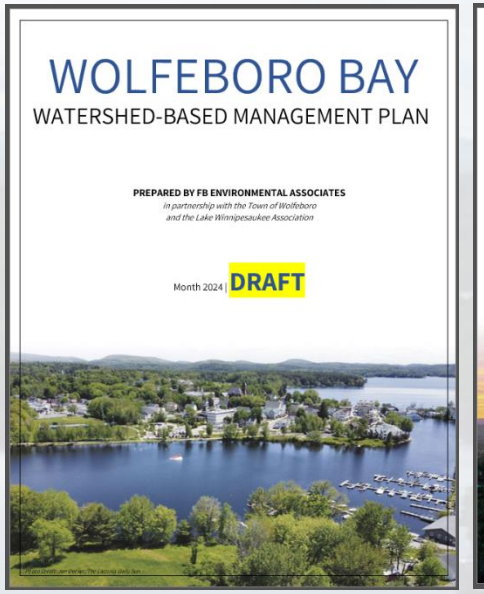
- M.S. in Natural Resources – Remote Sensing of Freshwater Systems
- Graduate Certificate in Geospatial Sciences (UNH)
- B.S. in Environmental Conservation and Sustainability

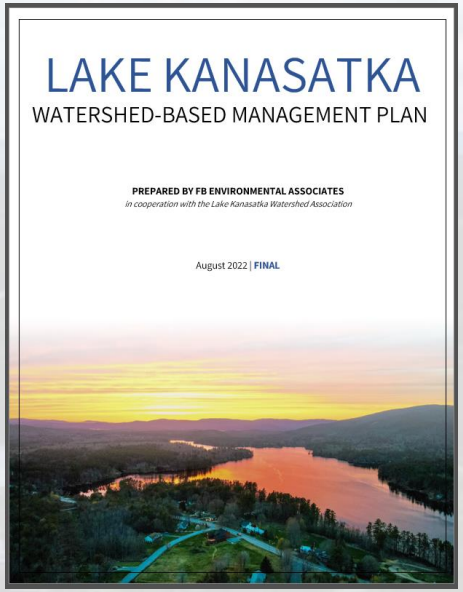


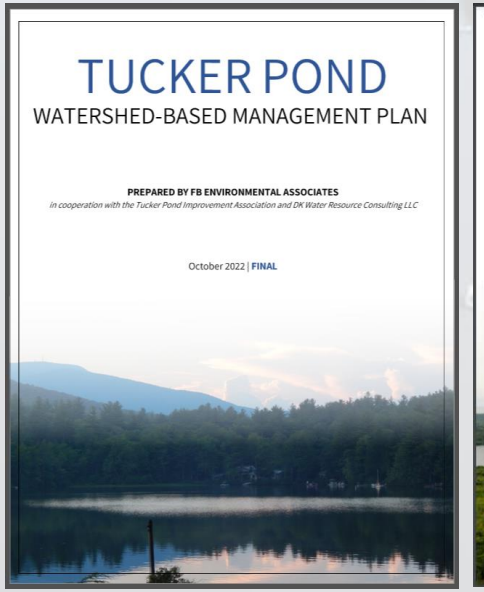



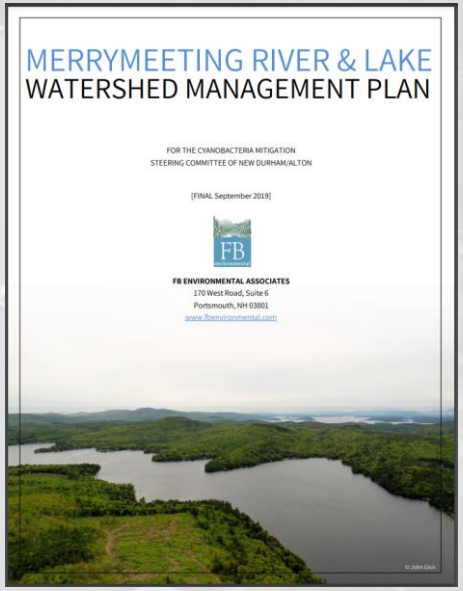

HALFMOON LAKE WATER QUALITY SUMMARY

As part of the development of a **Watershed-Based Management Plan** for Halfmoon Lake FBE conducted a **Water Quality Summary Analysis**



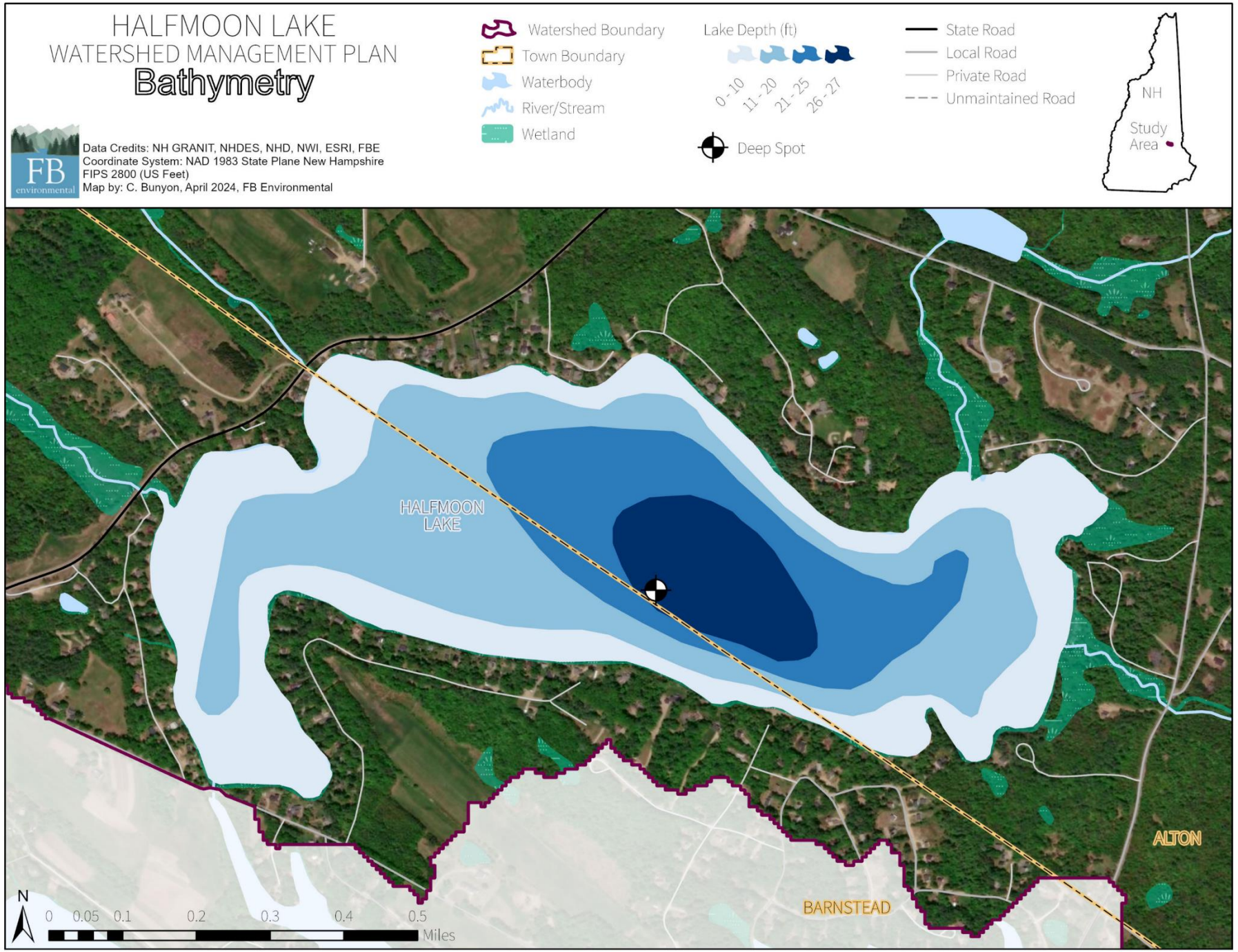






STUDY AREA

- Maximum depth of 27 ft or ~9m
- One deep spot
- Four primary tributaries



WATER QUALITY STANDARDS

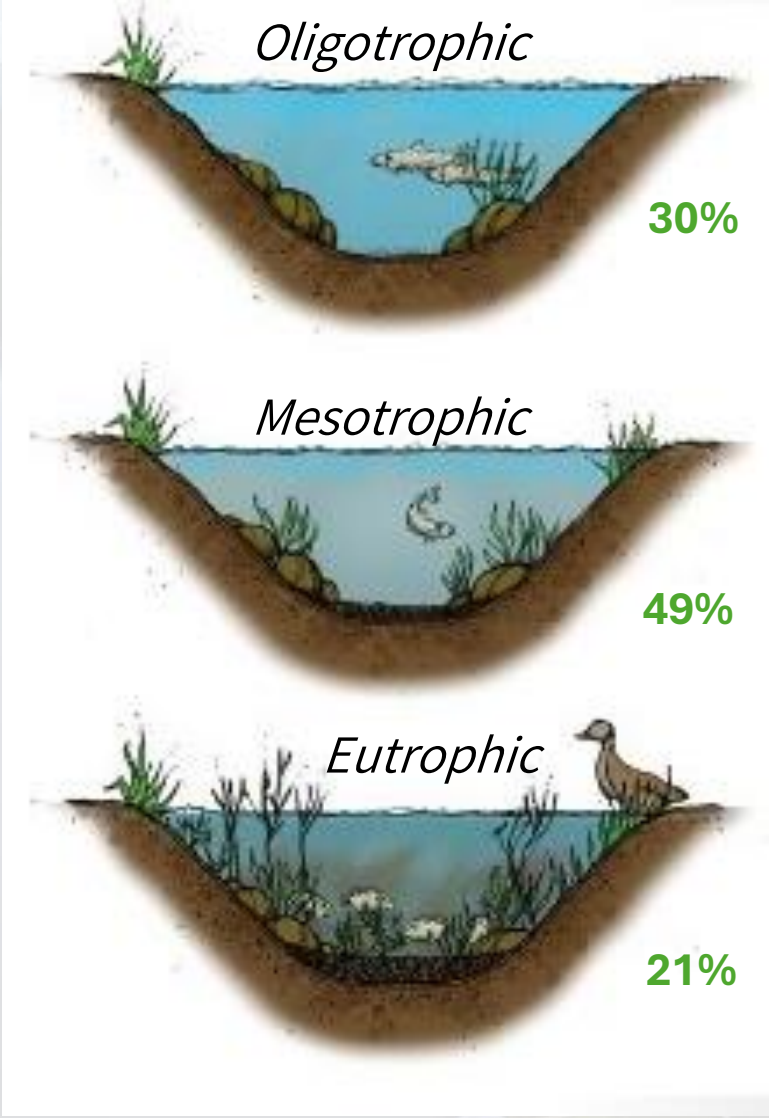
Designated Uses (U.S. Clean Water Act)

- describes desirable activities and services

Primary contact recreation, Aquatic life integrity, Fish & shellfish consumption, Drinking water supply, Wildlife

Trophic Status

- *Oligotrophic* – low nutrients, oxygen rich bottom waters, deep water clarity
- *Mesotrophic* – more organic matter and nutrients, moderate to low bottom oxygen, shallower water clarity
- *Eutrophic* – high levels of organic matter, poor water clarity, anoxic bottom waters.



HALFMOON LAKE CLASSIFICATIONS

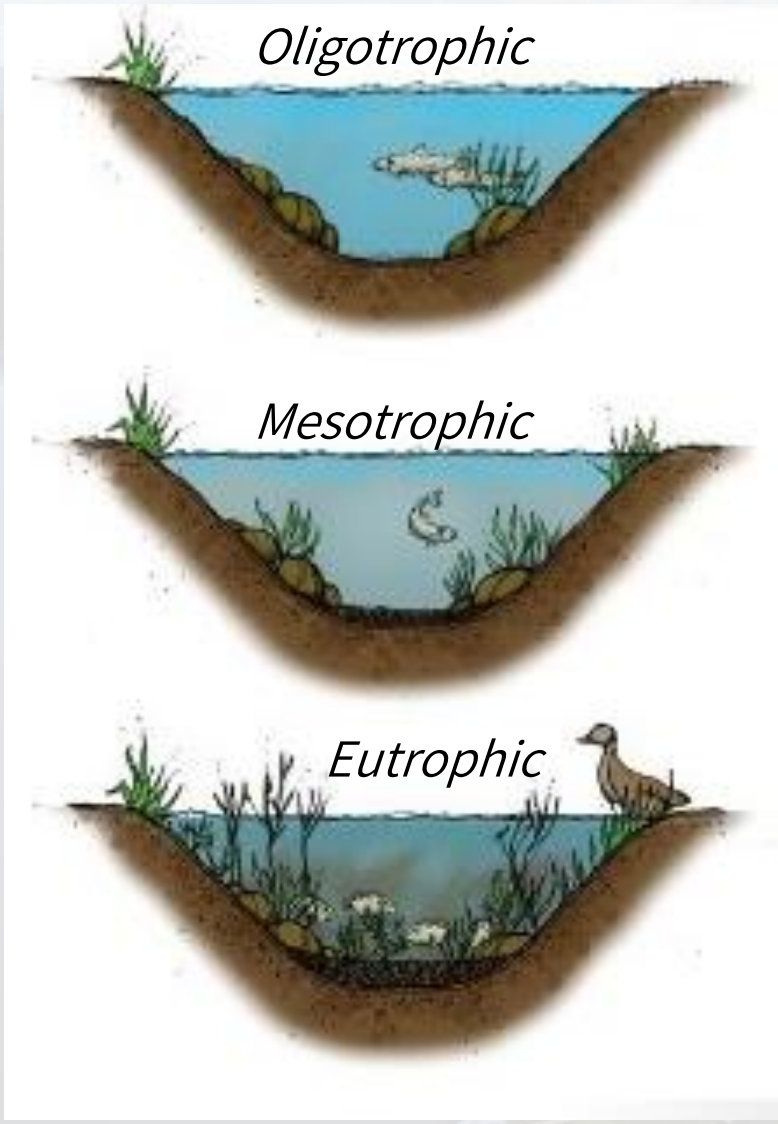
Designated Uses (U.S. Clean Water Act)

- describes desirable activities and services

Primary Contact Recreation & Aquatic Life Integrity

Trophic Status = ***Mesotrophic***

Together this determines the criteria or thresholds to monitor and protect the water quality for the intended uses.



HALFMOON LAKE CLASSIFICATIONS

Designated Uses (U.S. Clean Water Act)

- describes desirable activities and services

Primary Contact Recreation (PCR) & Aquatic Life Integrity (ALI)

98% of NH lakes support PCR

- Though fecal and cyano advisories have significantly increased from 2003-2018
- May 2024 set new cyanobacteria bloom records
- When in doubt, stay out (NH Healthy Swimming Mapper)

Only 12.9% of NH lakes support ALI

- 51.9% don't support this use – mostly due to pH
- 35.1% were unable to be assessed

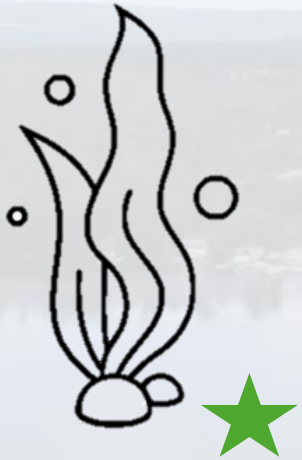
NHDES 2020 Lake Trend Analysis

INDICATOR PRAMETERS

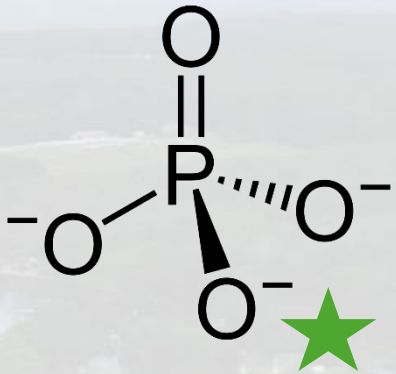
Temperature profiles help determine the stratification status of a lake through the seasons.

Dissolved Oxygen is a measure of the amount of oxygen dissolved in water. Low oxygen can directly kill or stress organisms and stimulate release of phosphorus from bottom sediments.

Secchi Disk Transparency is a vertical measure of the transparency of water.



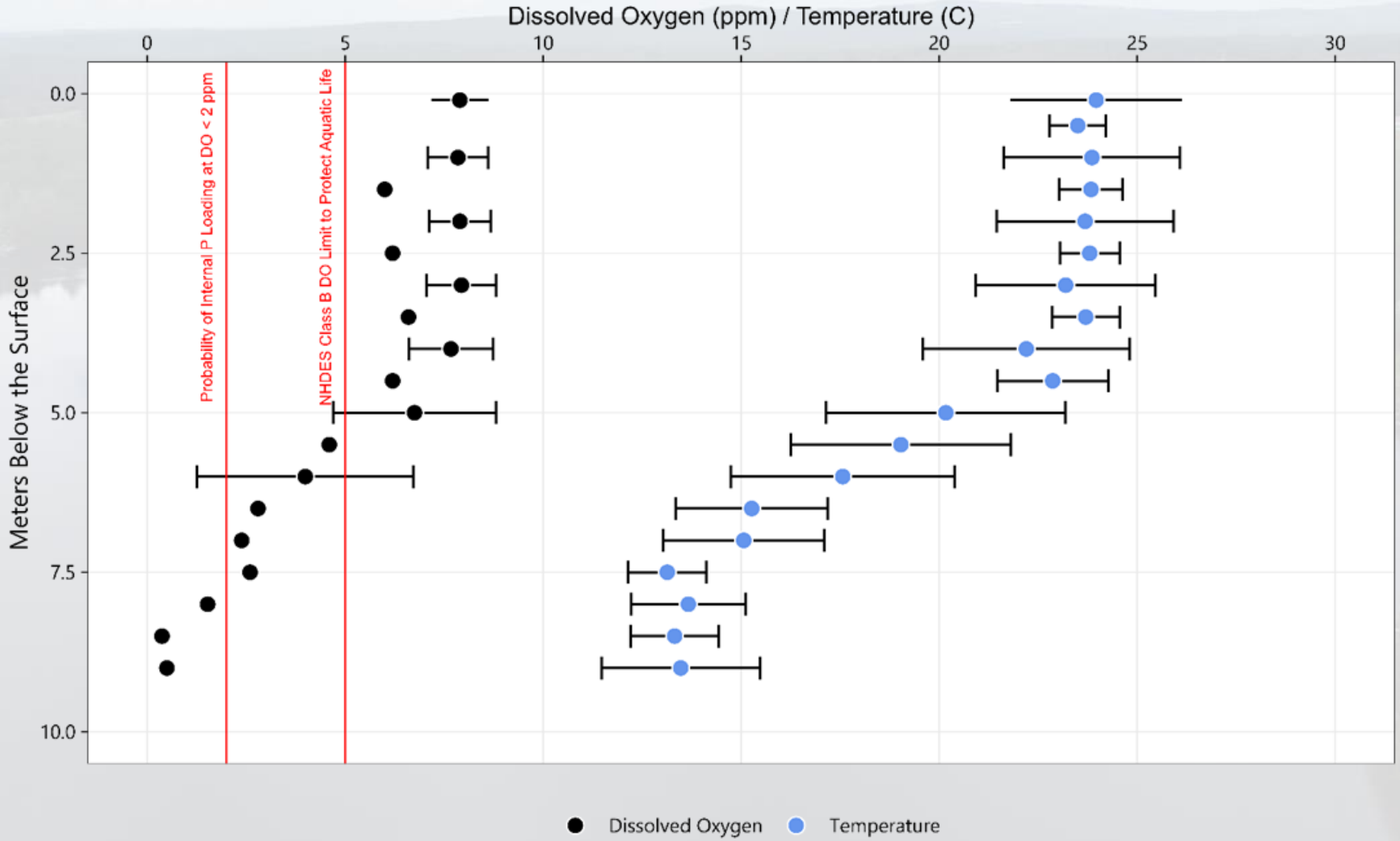
Chlorophyll- a is the green pigment found in nearly all plants, including microscopic algae.



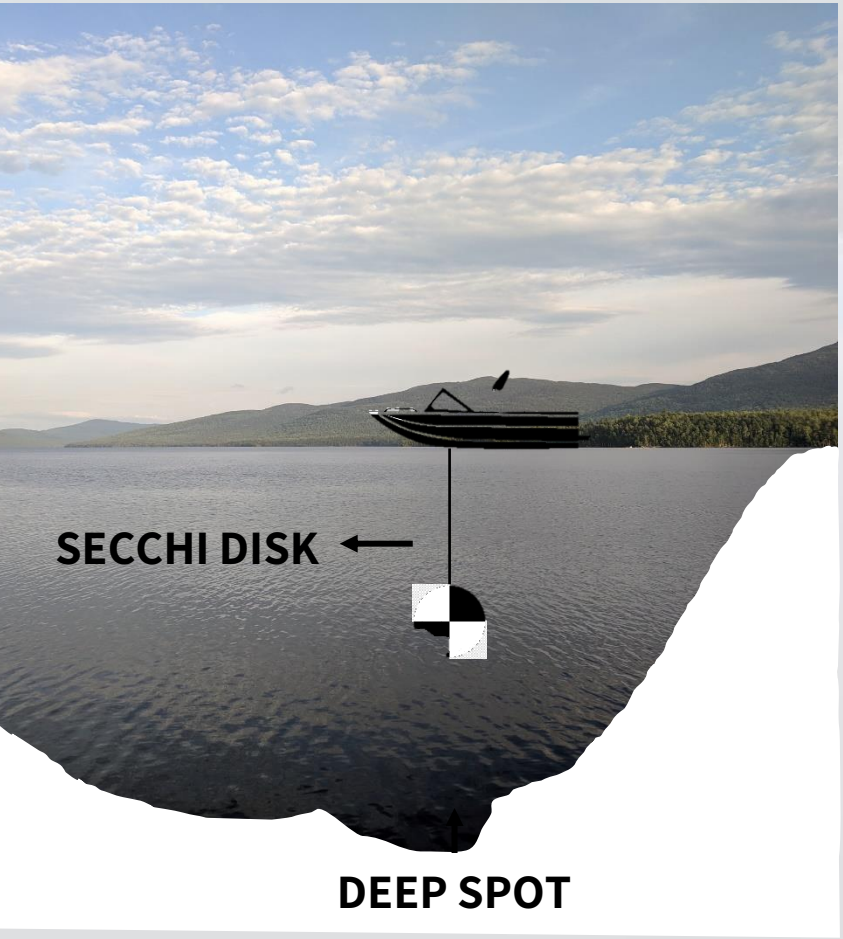
Phosphorus is a nutrient that stimulates the growth of algae and plants.

DISSOLVED OXYGEN & TEMPERATURE

HALFMOON LAKE historical data (1989-2022)



SECCHI DISK TRANSPARENCY



Halfmoon Lake (2006-2023)

NH Mesotrophic Lakes

NH Oligotrophic Lakes

NH Eutrophic Lakes

State data: 1991-2018

SDT (meters)

POOR

1.67

2.68

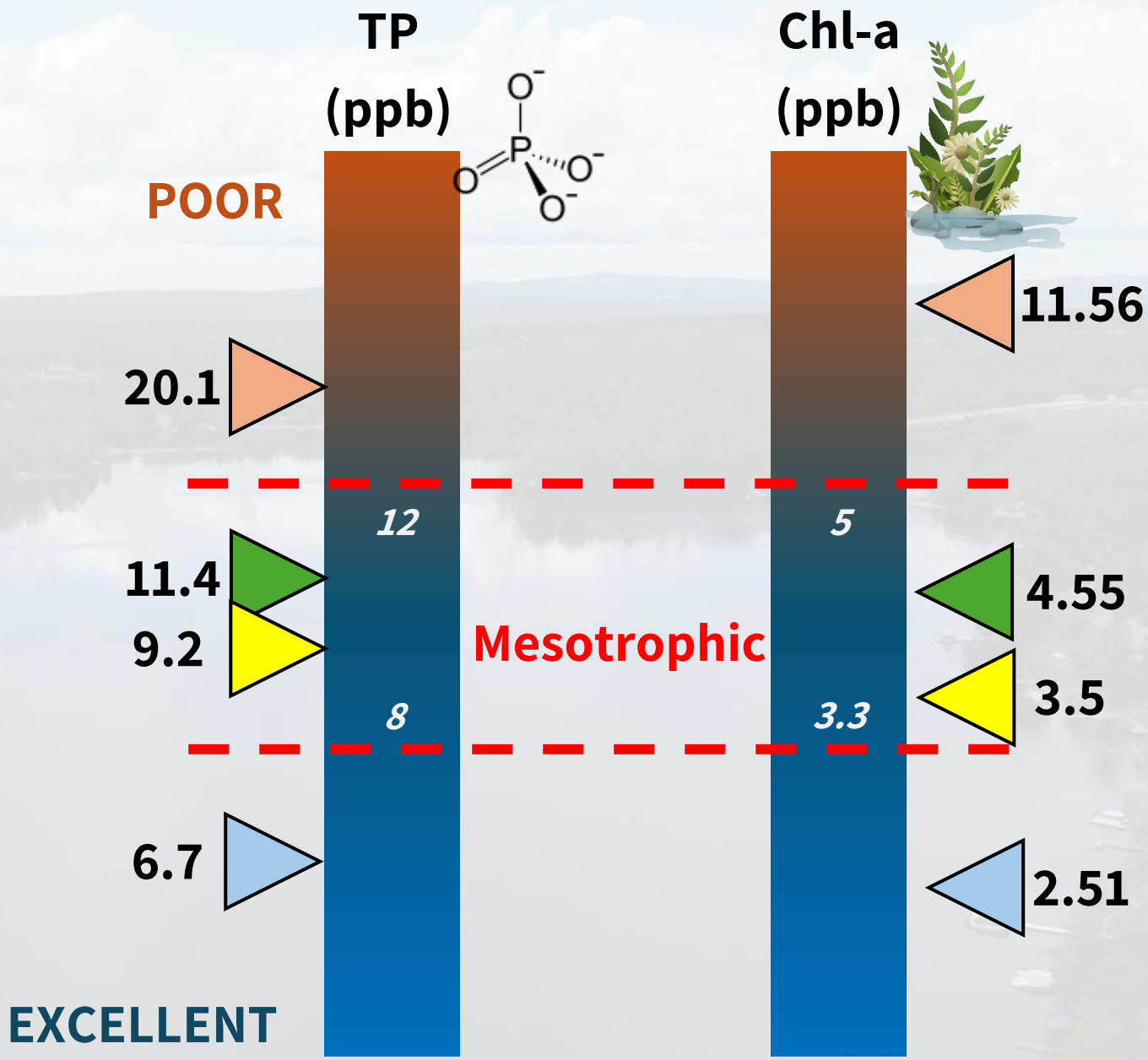
4.5

4.53

EXCELLENT

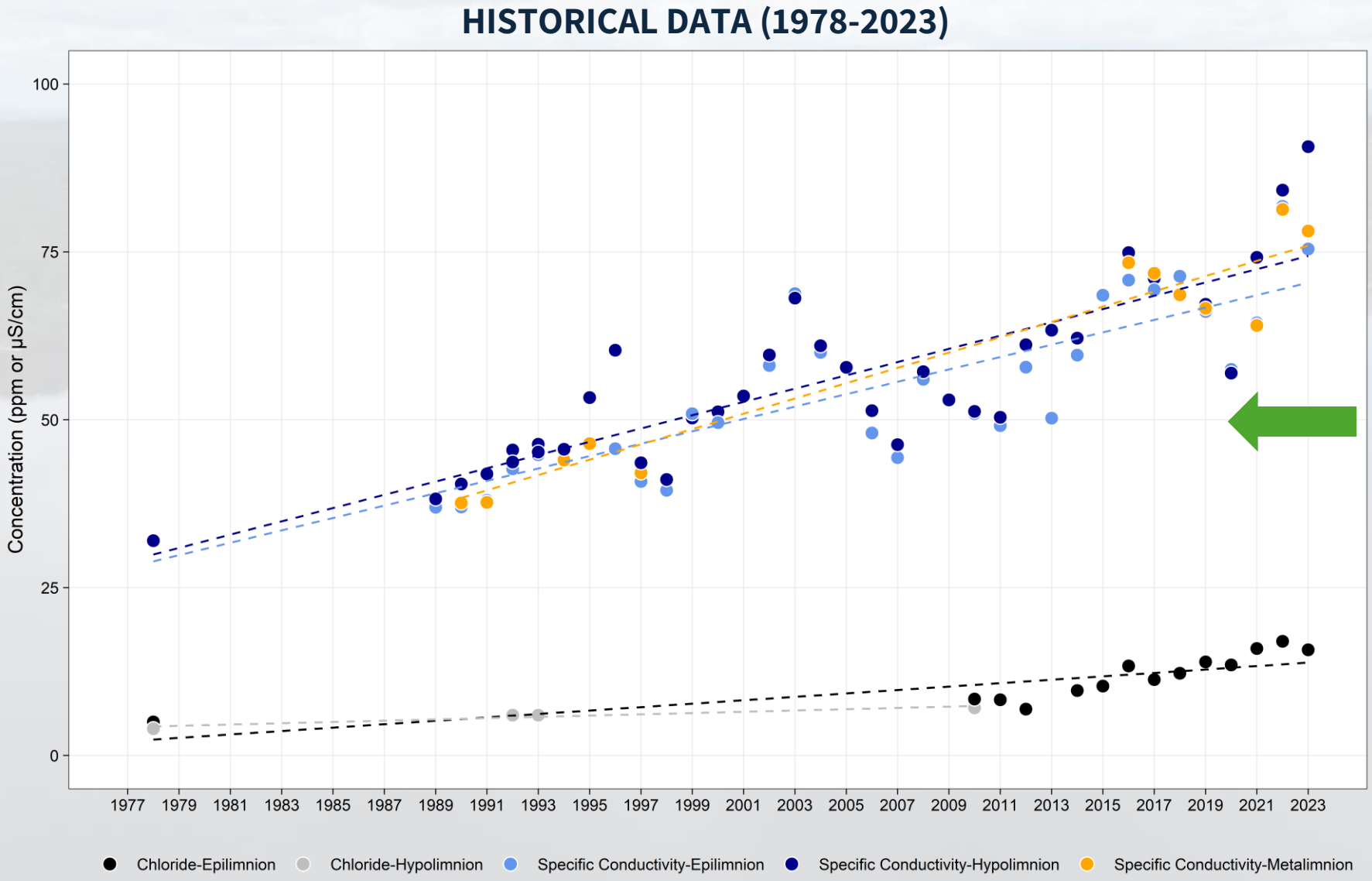
WATER QUALITY

- Halfmoon Lake
- NH Mesotrophic Lakes
- NH Oligotrophic Lakes
- NH Eutrophic Lakes



[NHDES 2020 Lake Trend Report]

CHLORIDE & SPECIFIC CONDUCTIVITY

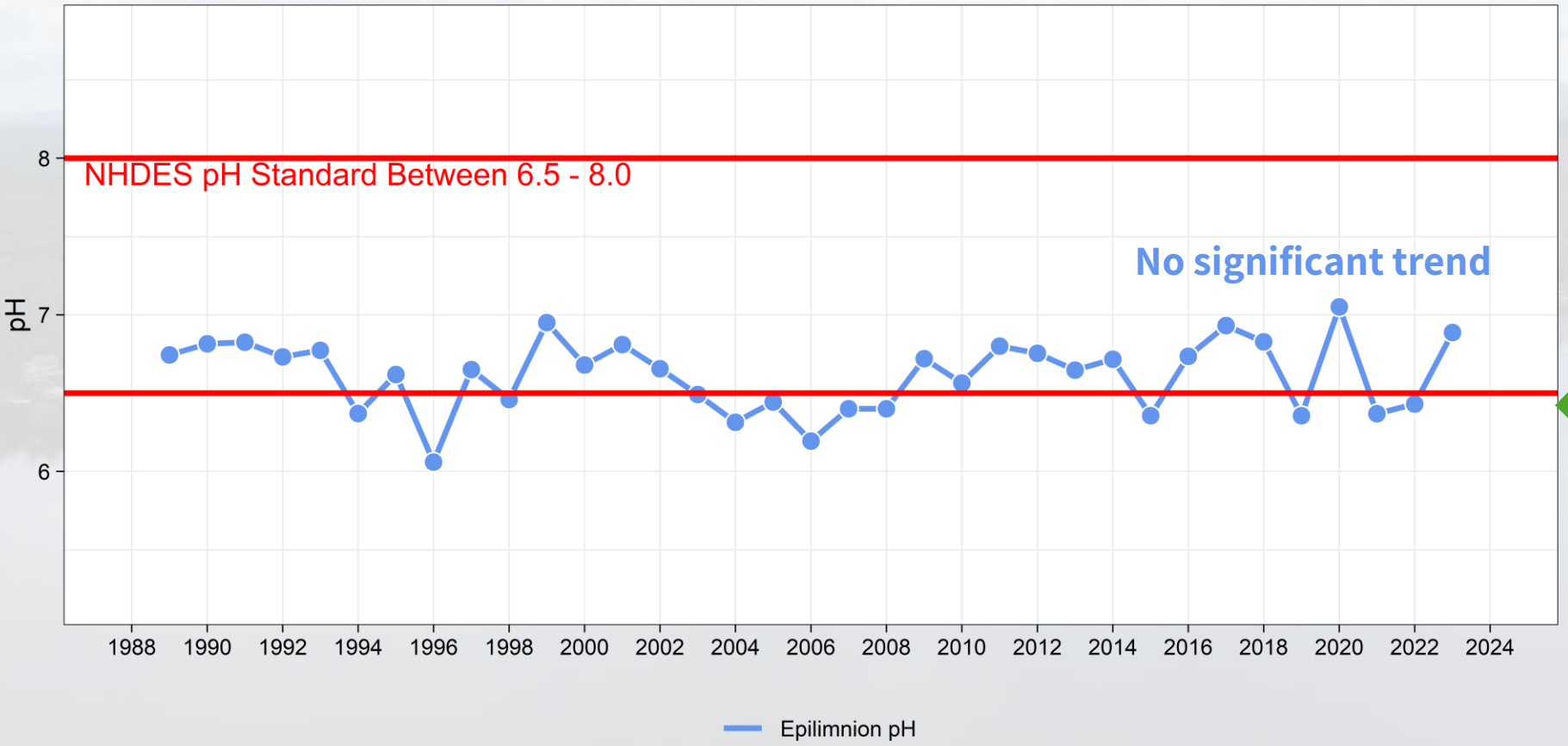


State threshold = 230 ppm chloride, 835 µs/cm specific conductivity

Most mesotrophic NH lakes are ~50 uS/cm with an increasing trend too

pH

HISTORICAL DATA (1989-2023)



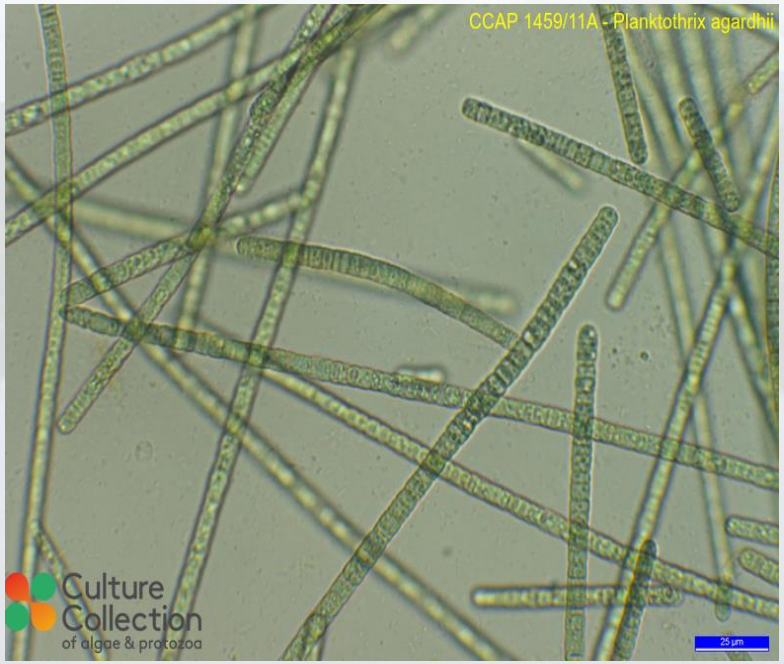
NH mesotrophic lakes median = 6.49

- 12% of NH lakes are improving,
- 82% show no trend,
- 5.3% show a worsening trend.

NHDES 2020 Lake Trend Report

CYANOBACTERIA

2011 (9 DAYS)
Oscillatoria/
Plankothrix



2018 (14 DAYS)
Oscillatoria/
Plankothrix

2019 (7 DAYS) ★
Dolichospermum

SUMMARY

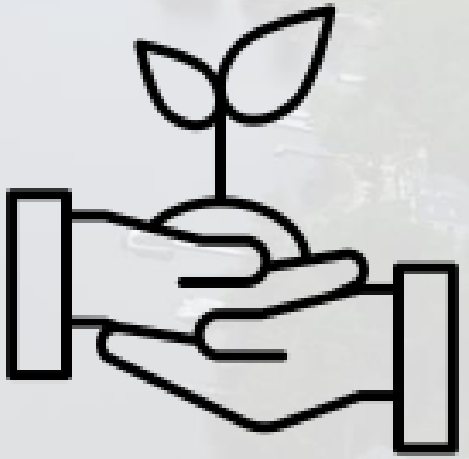
GOOD but keep monitoring and improving watershed practices… climate change

Parameter	Notes	Interpretation
Temperature	Seasonal stratification and mixing	Normal (climate change)
Dissolved Oxygen	Low DO at the bottom under summer stratification	Worry some for aquatic life and internal loading is possible
Secchi Disk Transparency	Better than most mesotrophic lakes	Great!
Total Phosphorus	On par for mesotrophic lakes	Normal and overall stable (important for DO and Cyanobacteria)
Chlorophyll-a	On par for mesotrophic lakes	Normal and overall stable
Chloride & Specific Conductivity	Below threshold but increasing	Fine, but significantly increasing
pH	Low end of threshold	Slightly acidic and stable
Cyanobacteria	History of three bloom advisories	Blooms are possible. When in doubt, stay out.

WHAT'S NEXT?

Developing a Water Quality Goal

- To make Halfmoon Lake more resilient to climate change
- To set water quality targets to reach for
  - These may be to the oligotrophic thresholds



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