

Updating the Fish Lake Management Plan





- **Who is the Watershed District?**
- **Why are we updating the plan for Fish Lake?**
- **How will the lake management plan be updated?**

Fish Lake Algae at Ice Out Photo Credit: Matt Newman



District Mission



Our mission is to manage and preserve the water resources of the District to the best of our ability using input from our communities, sound engineering practices, and our ability to efficiently fund beneficial projects which transcend political jurisdictions

2020
to
2030



Water Resources Management Plan



- Three guiding principles of PLSLWD's Water Resources Management Plan
 - Maintain or improve **water quality** in the District
 - Manage existing and prevent new **aquatic invasive species (AIS)** in the District
 - Reduce **flooding** impacts

Representative Project: Water Quality



Carp management

Representative Project: AIS



Boat inspections

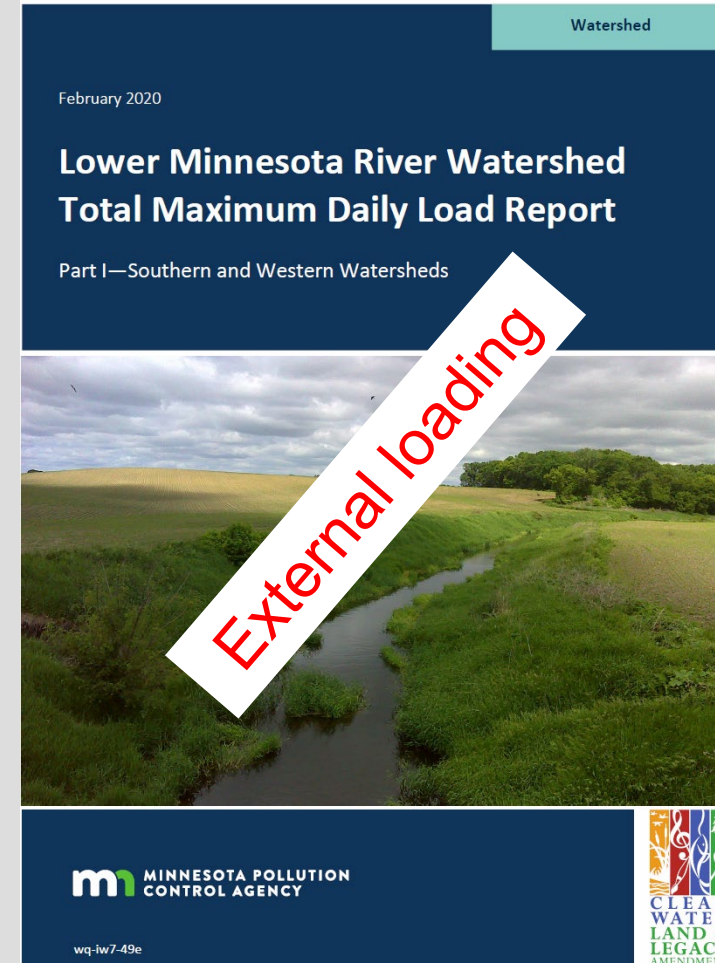
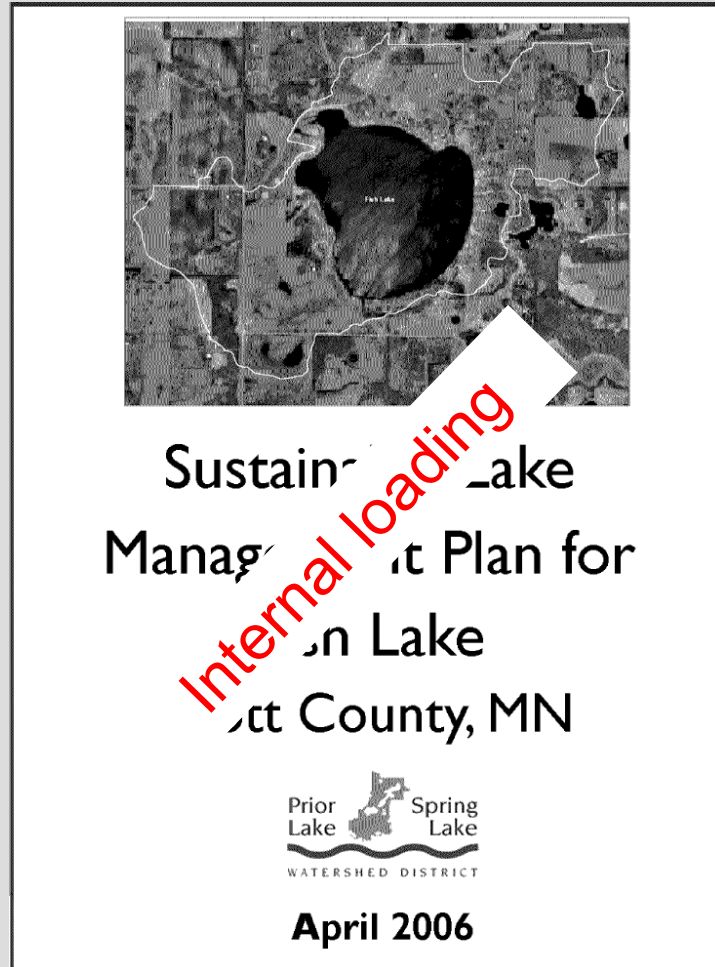
Representative Project: Reduce Flood Impacts



Sutton Lake
Outlet

Why Update?

Goal: Reconcile conflicting reports, so the District can choose effective management tools to improve water quality in Fish Lake

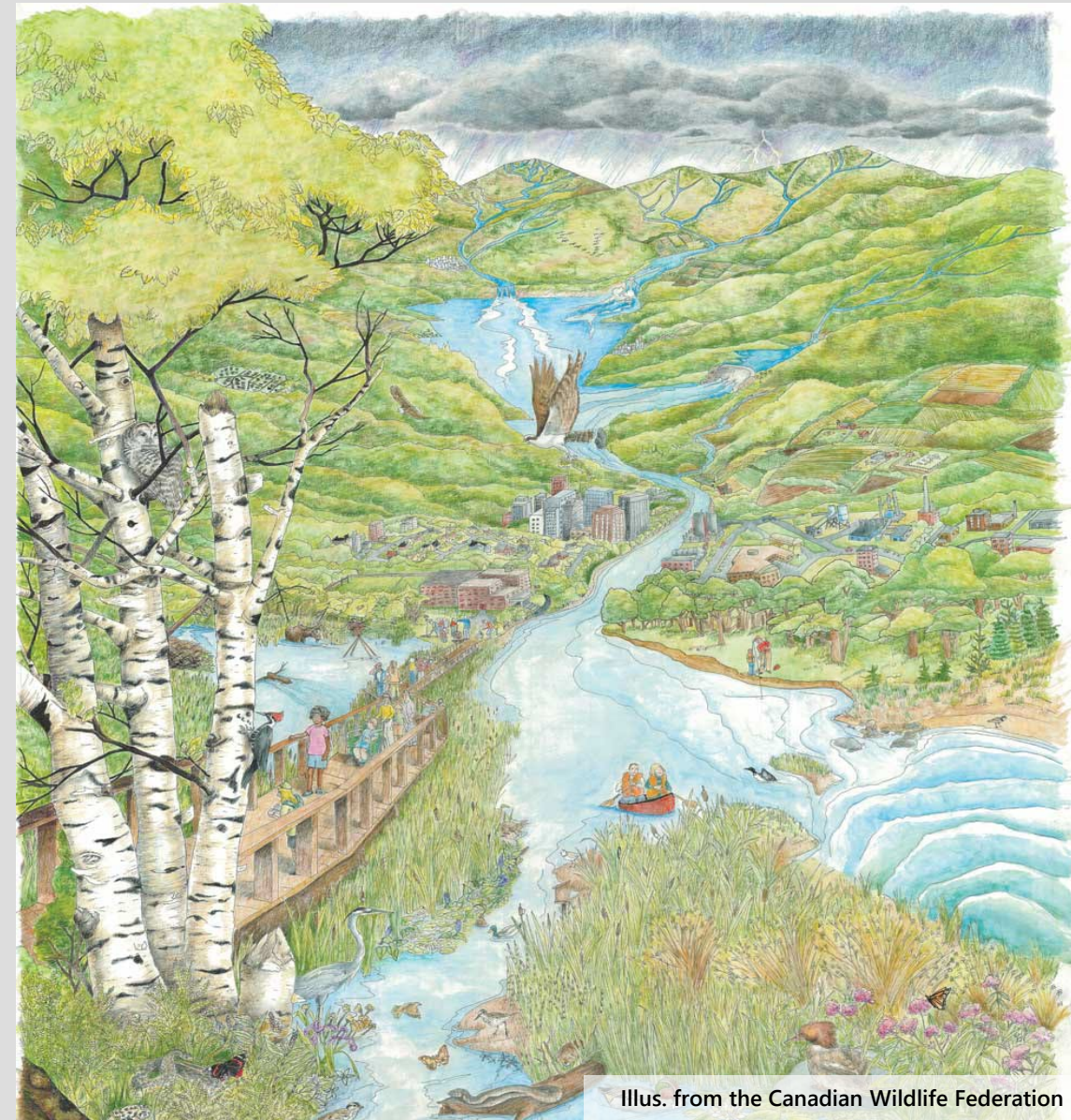


How do we update a lake management plan?

Look at the factors that affect lake health and analyze the data!

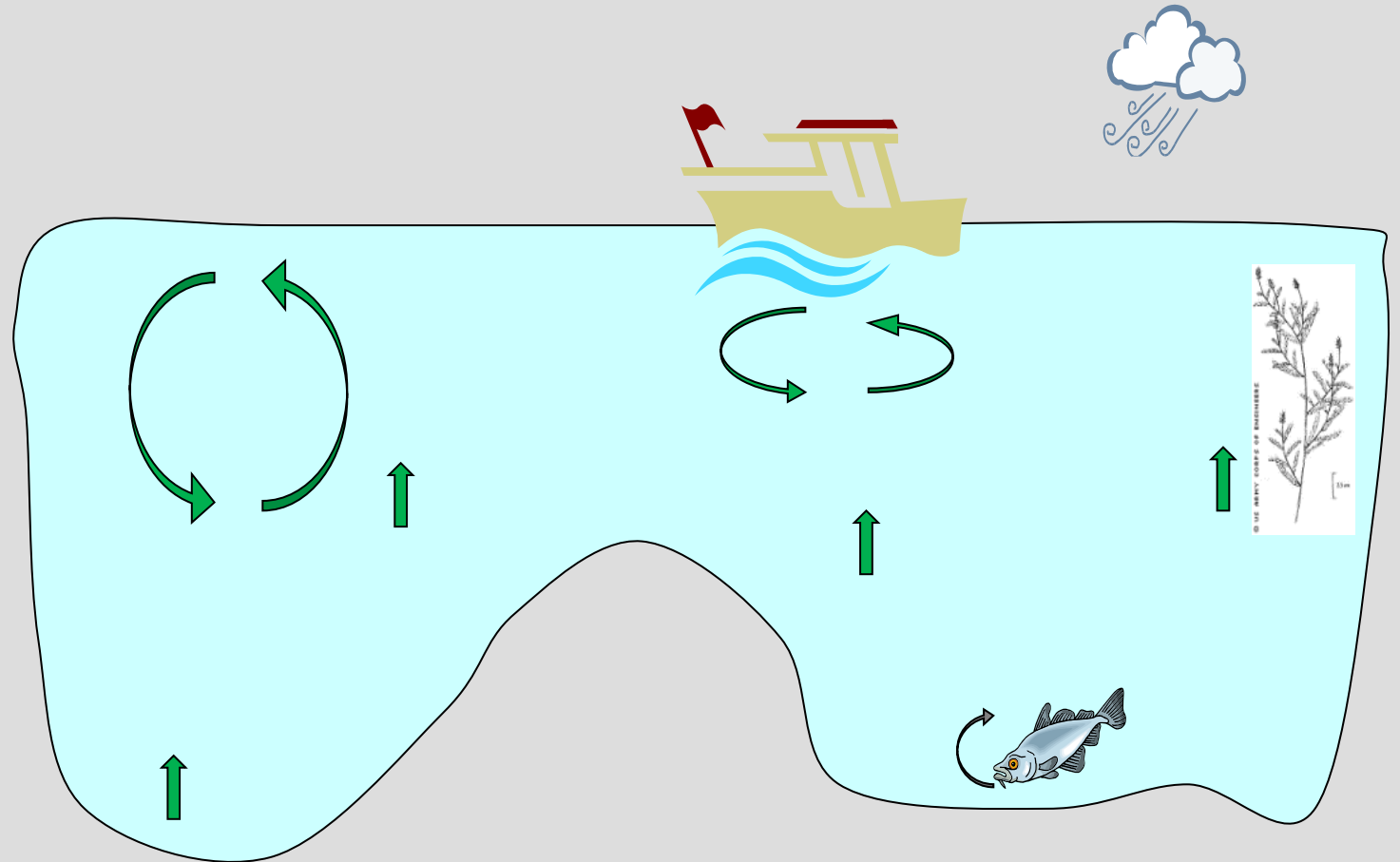
WATERSHED CHARACTERISTICS

- Size & shape
- Topography
- Soils
- Vegetative Cover & Land uses

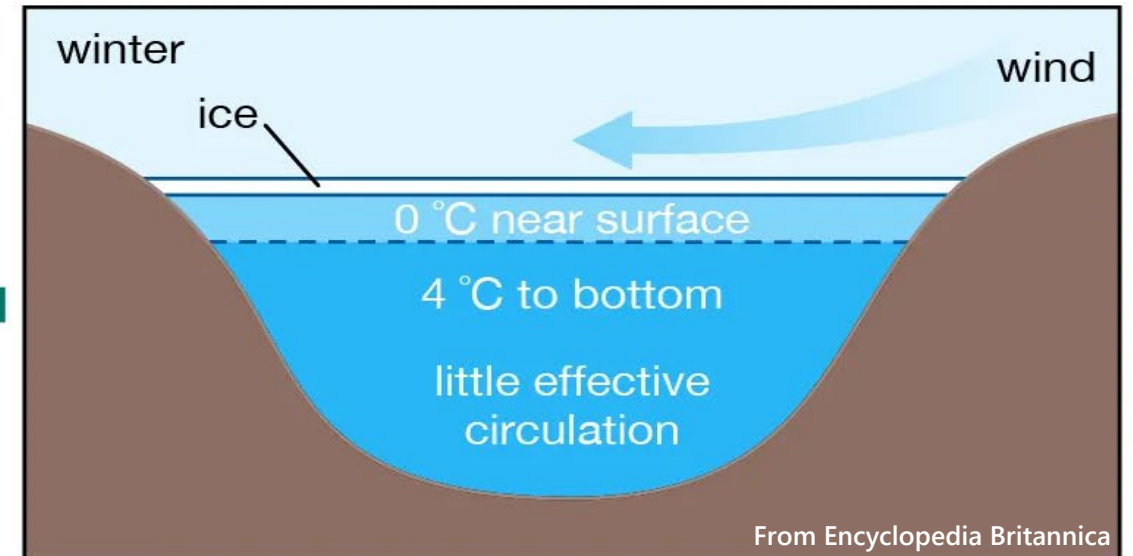
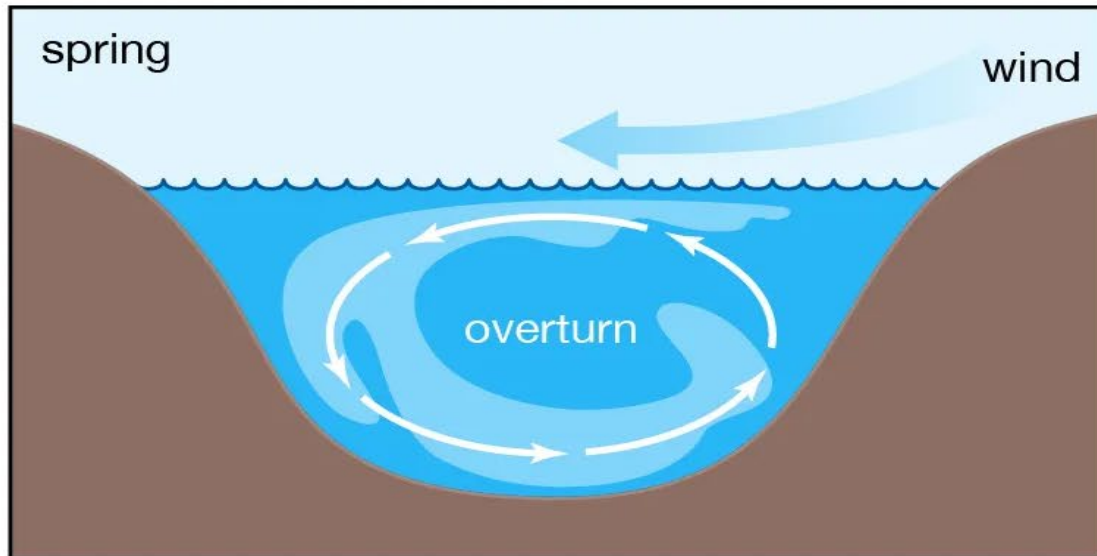
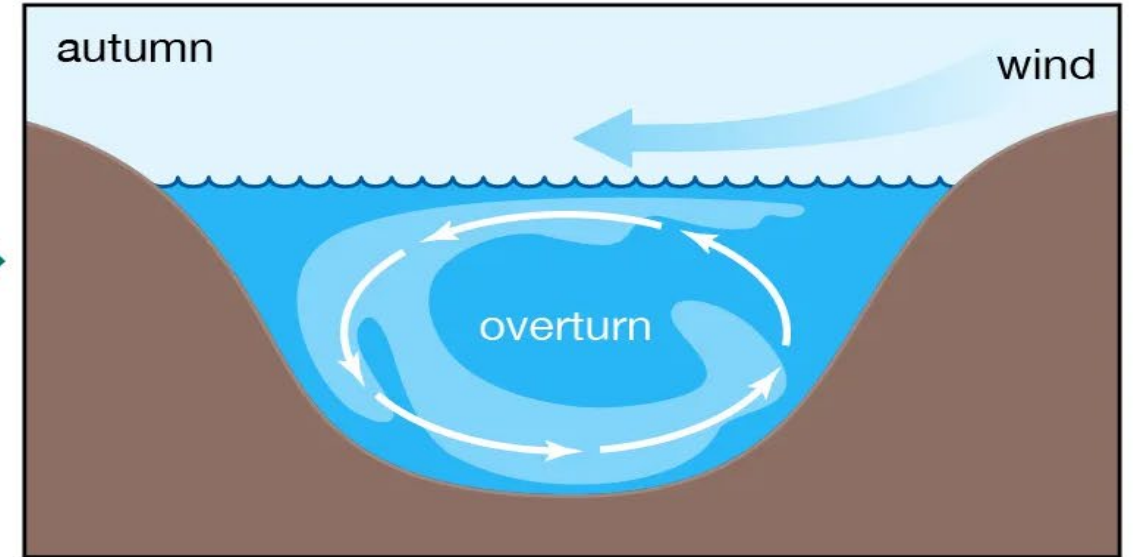
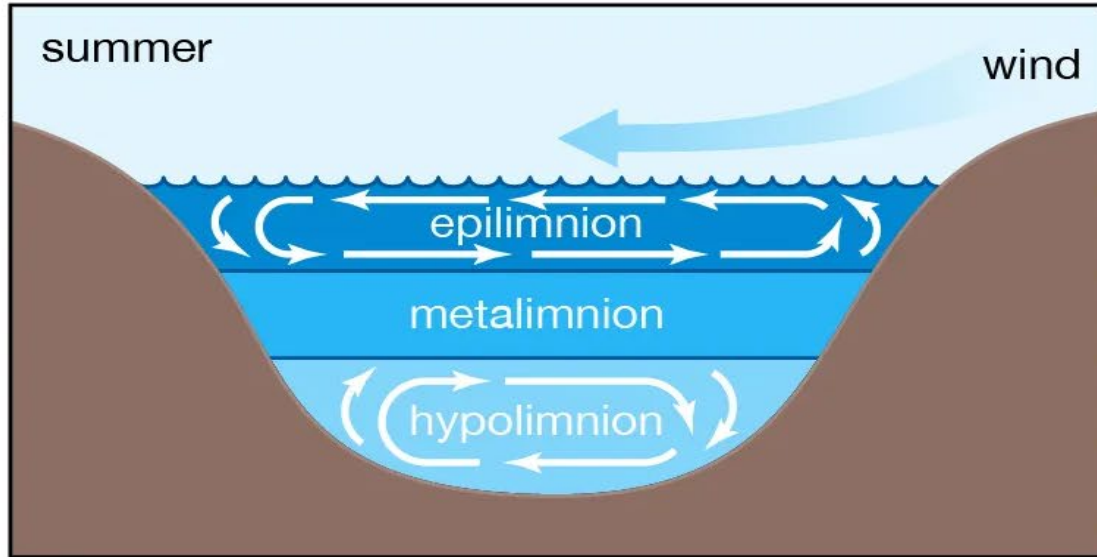


INTERNAL PROCESS

- Lake size & shape
- Wind & boat wave action
- Bottom feeding fish
- Sediment release



LAKE STRATIFICATION

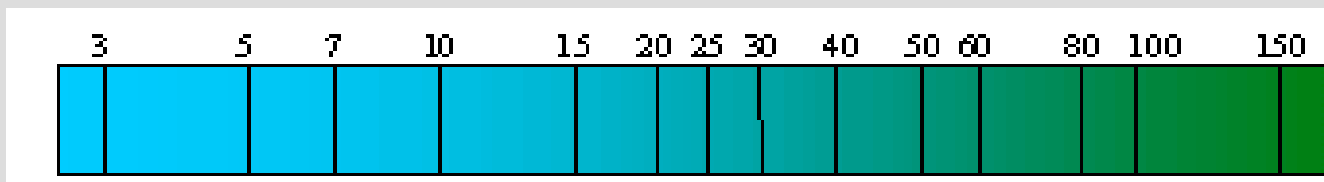


Phosphorus 'limiting' nutrient in lakes

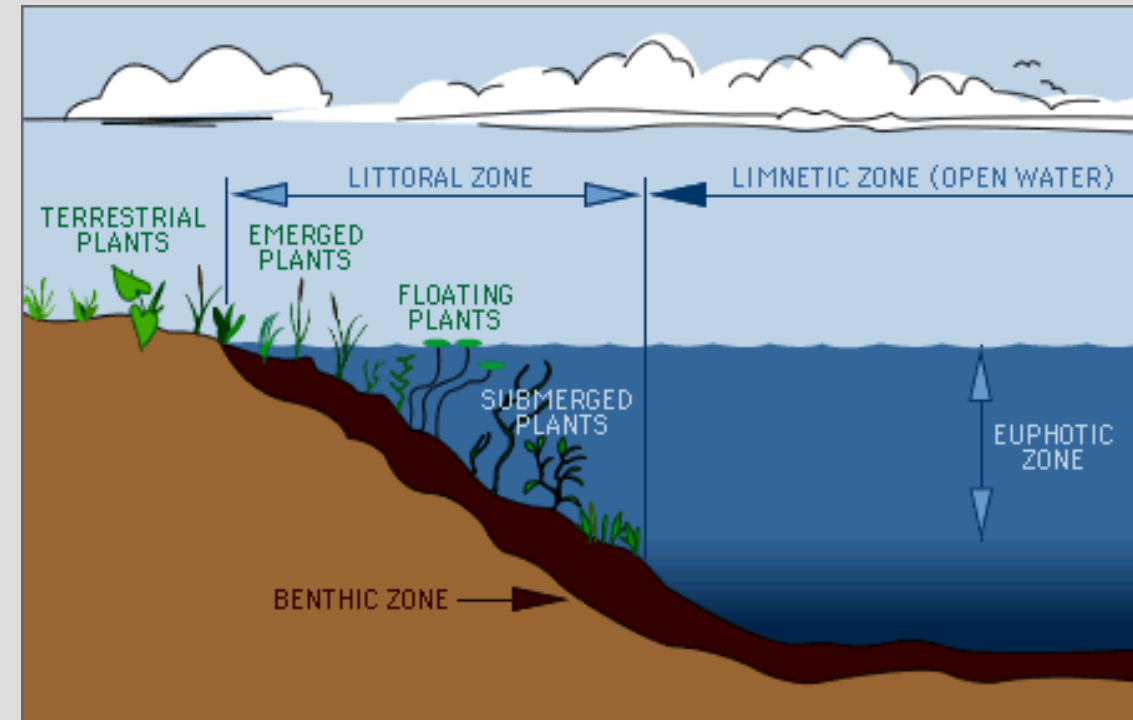
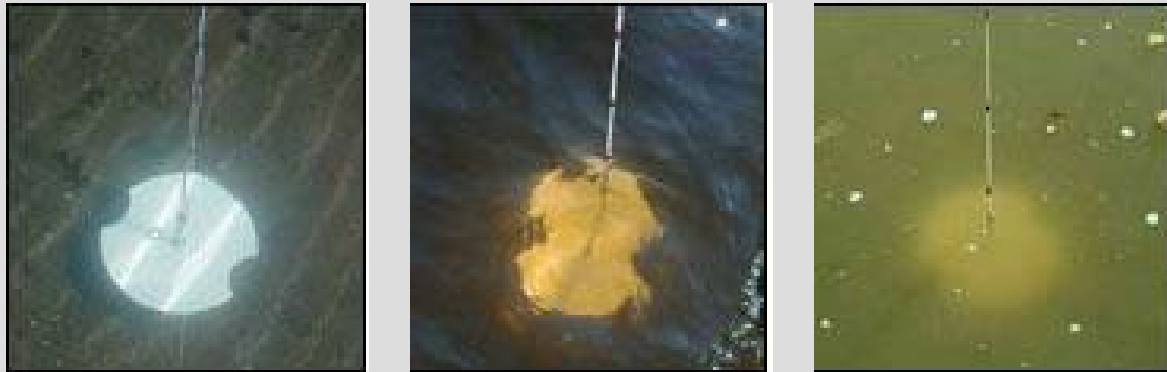


Phosphorus ($\mu\text{g/l}$) related to Lake Trophic State

Oligotrophic Mesotrophic Eutrophic Hypereutrophic

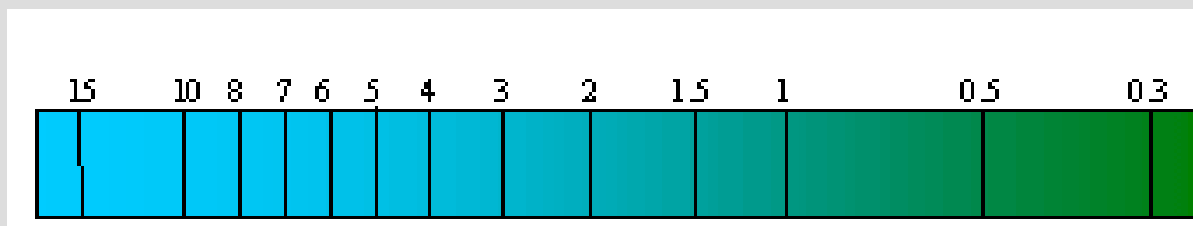


Transparency measure of light penetration



Transparency (m) related to Lake Trophic State

Oligotrophic Mesotrophic Eutrophic Hypereutrophic



Chlorophyll-a measure of algae

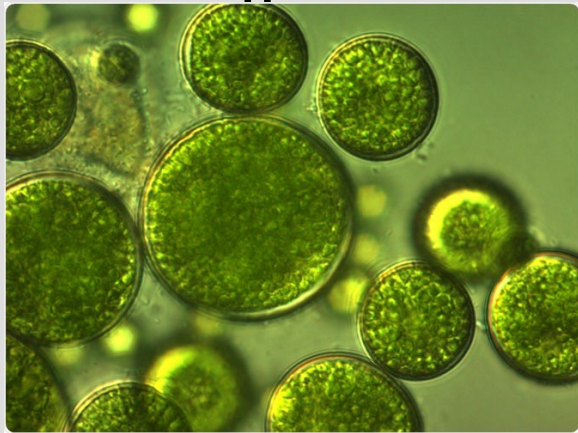
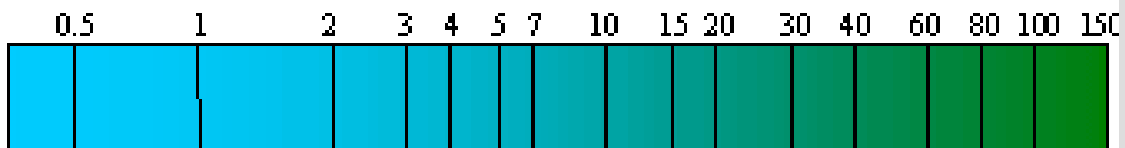


Image Credit: Ye.Maltsev/Shutterstock.com



Chl-a ($\mu\text{g/l}$) related to Lake Trophic State

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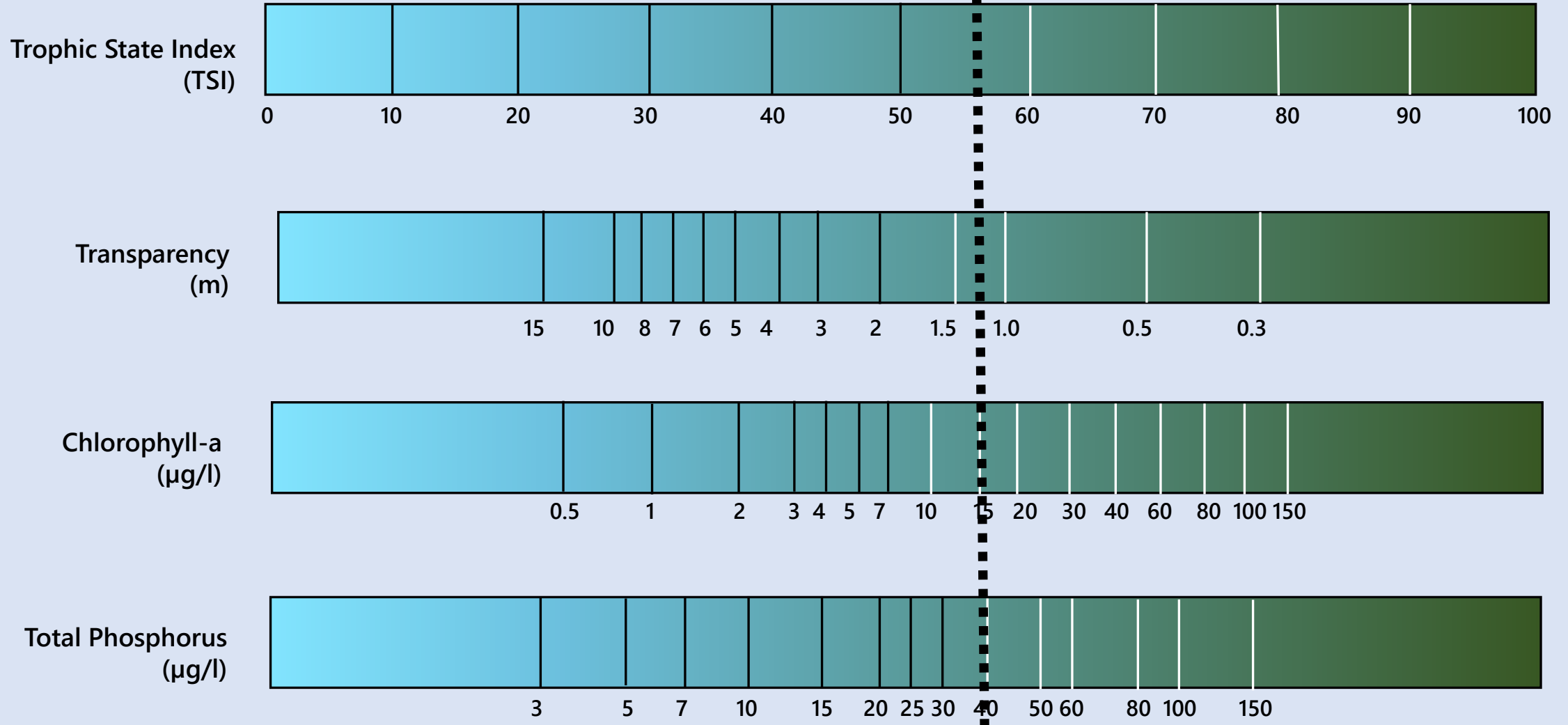


Carlson's Trophic State Index



Oligotrophic (clear water) **Mesotrophic (moderately clear water)** **Eutrophic (green water)** **Hypereutrophic (very green water)**

DEEP LAKE STANDARD:





What we know now

FISH LAKE ASSESSMENT



Assessment Year 2001
Total Phosphorus Exceeds Standard <40 ug/l
Chlorophyll-A Exceeds Standard < 14 ug/l
Secchi Depth Insufficient Information
Standard > 1.4 m

Aquatic Recreation **Not Supporting**

Assessment Year 2015
Fish IBI Insufficient Information
Chloride Insufficient Information
Pesticides No Data

Aquatic Life **Insufficient Information**

Assessment Year 2005
Mercury in Fish Tissue Consumption Advisory

Aquatic Consumption **Impaired**

[Fish Consumption Guidance - MN Dept. of Health \(state.mn.us\)](http://state.mn.us)



2019 Survey Findings

- Primarily managed for Walleye, but includes catchable populations of Largemouth Bass, Bluegill, and Black Crappie
- Many other fish species present
- Carp are present. The District monitors carp population. Currently not deemed to be ecologically detrimental.

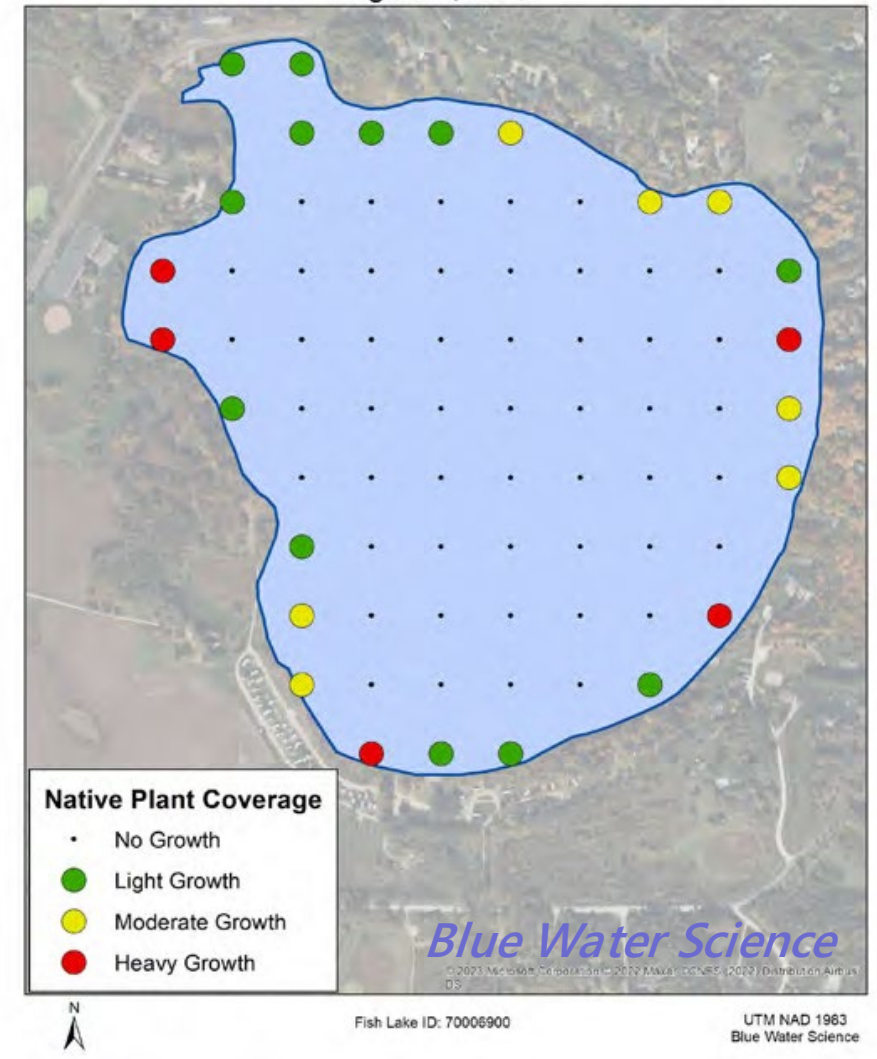


2022 Aquatic Plant Survey

Blue Water Science

- 8 total species, 6 submerged
- Coontail most common plant
- Plants observed only to depth of 6 feet
- Species observed
 - Spatterdock
 - White water lilies
 - Coontail
 - Chara
 - Curlyleaf pondweed
 - Flatstem pondweed
 - Sago pondweed
 - Water celery
 - Water stargrass
- Past surveys: 2015, 2018, 2020 indicate stable plant community

Fish Lake Native Plant Coverage
August 1, 2022



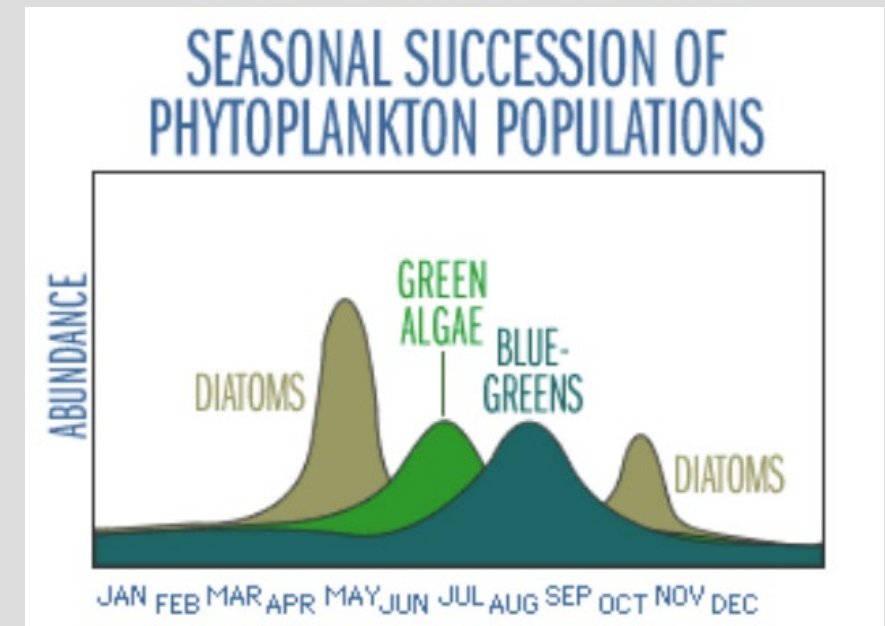
2023 Algae Bloom

Dominant algae: *Fragilaria*

- Diatom
- Common spring-time blooms

Other species in low levels:

- *Cryptomonas*: a common green algae freshwater habitats
- *Oscillatoria*: a blue-green algae that forms dark green or black mats



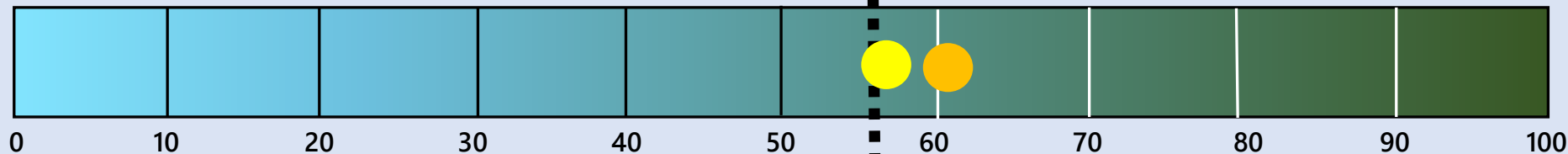
WATER QUALITY: 3 KEY PARAMETERS



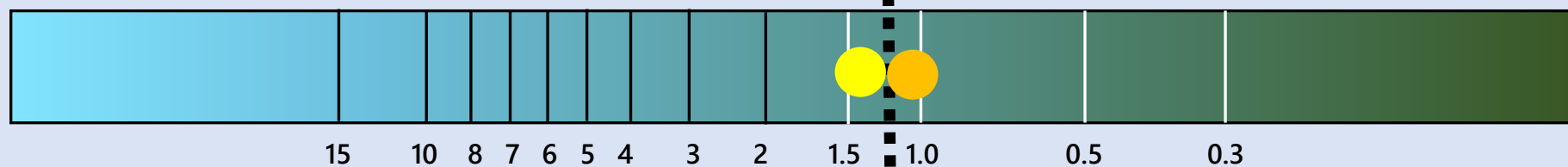
Oligotrophic (clear water) **Mesotrophic (moderately clear water)** **Eutrophic (green water)** **Hypereutrophic (very green water)**

DEEP LAKE STANDARD:

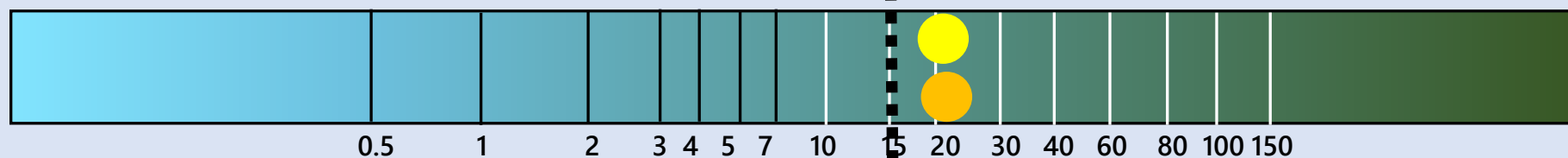
Trophic State Index (TSI)



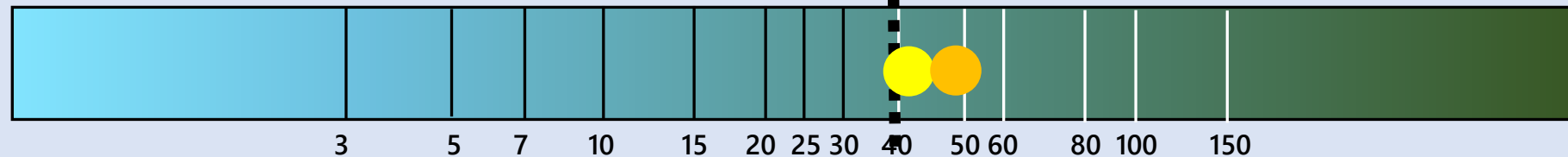
Transparency (m)



Chlorophyll-a ($\mu\text{g/l}$)



Total Phosphorus ($\mu\text{g/l}$)

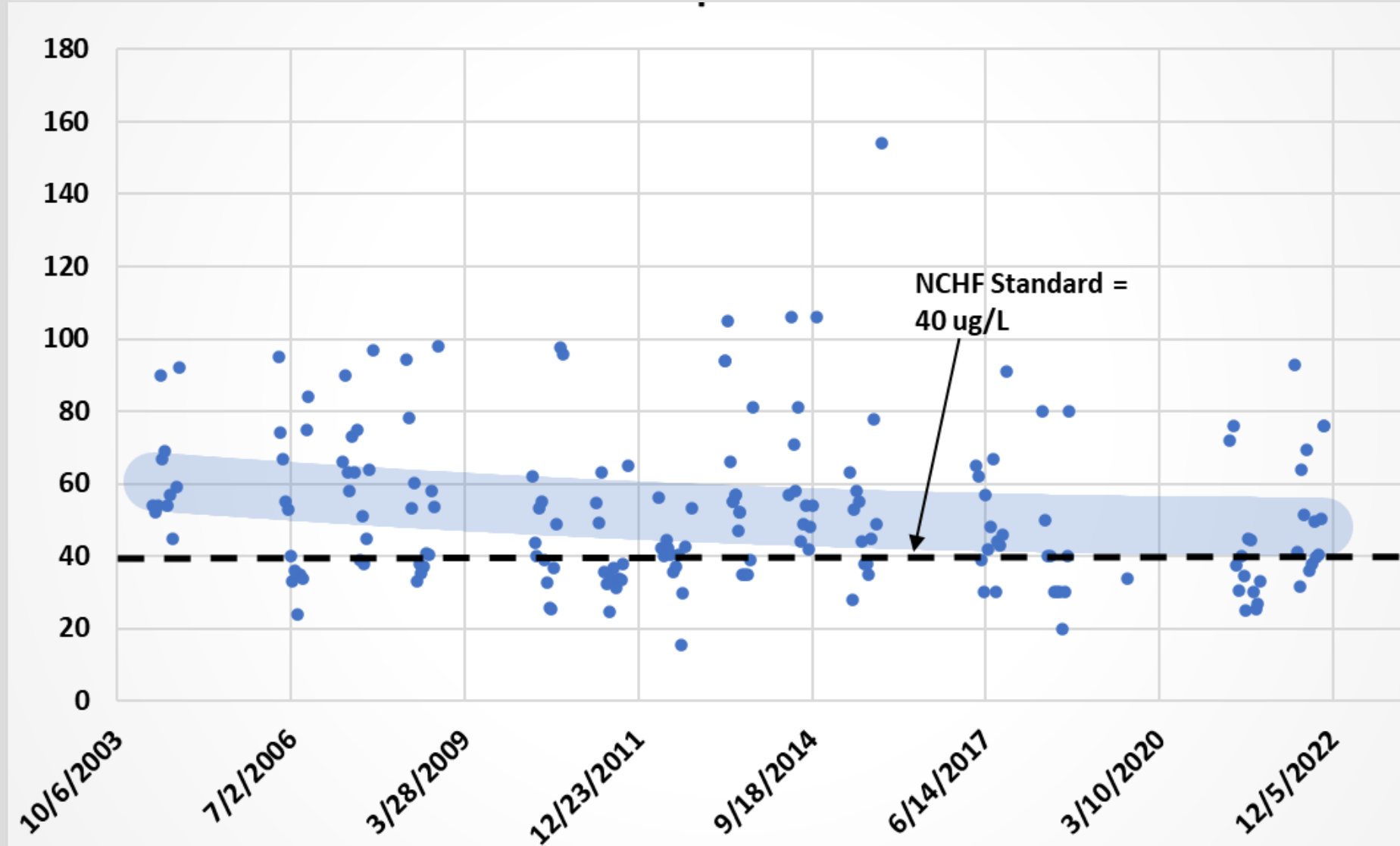


2017-2022

2004-2017

Total Phosphorus

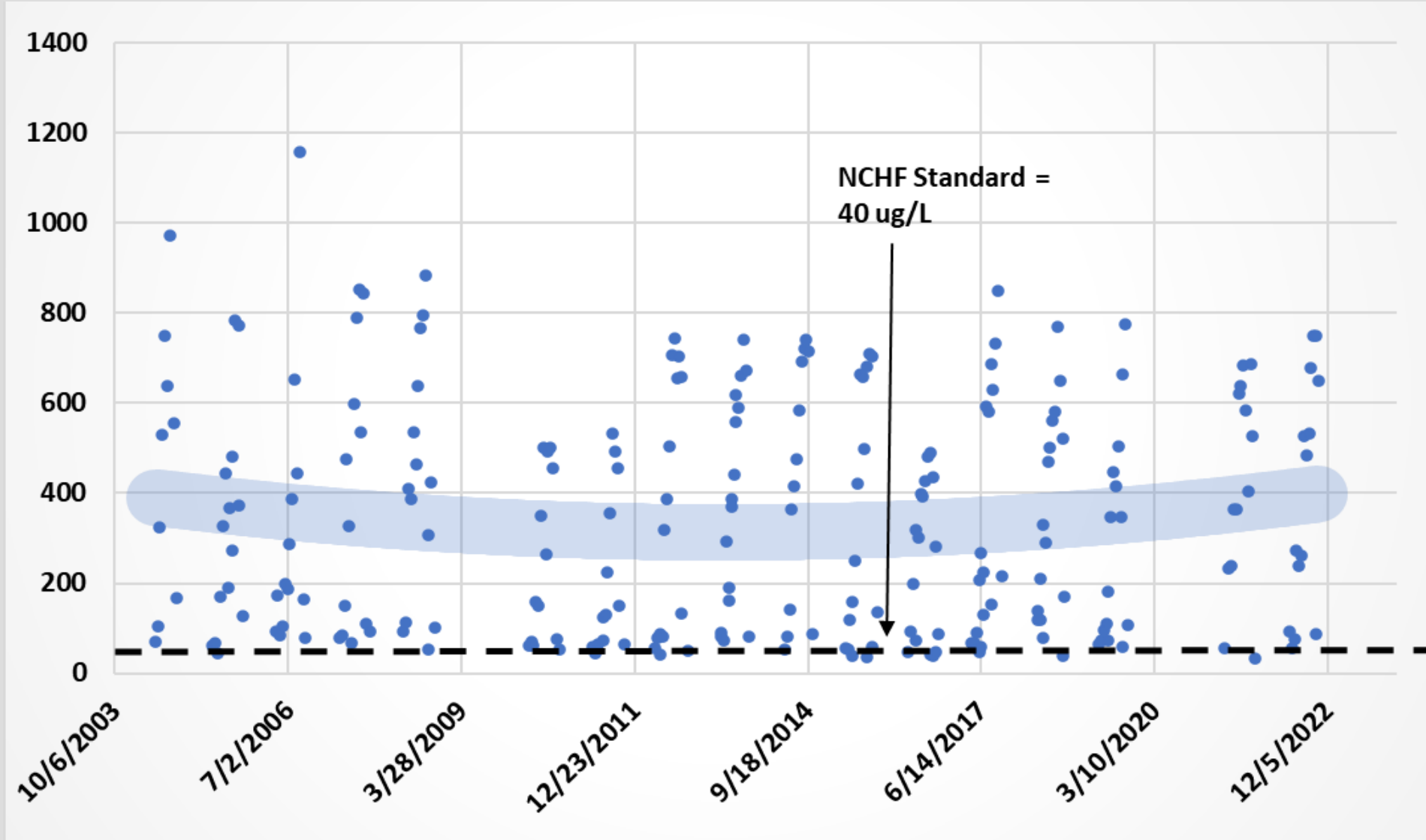
- Surface measurement
- Slight improving trend



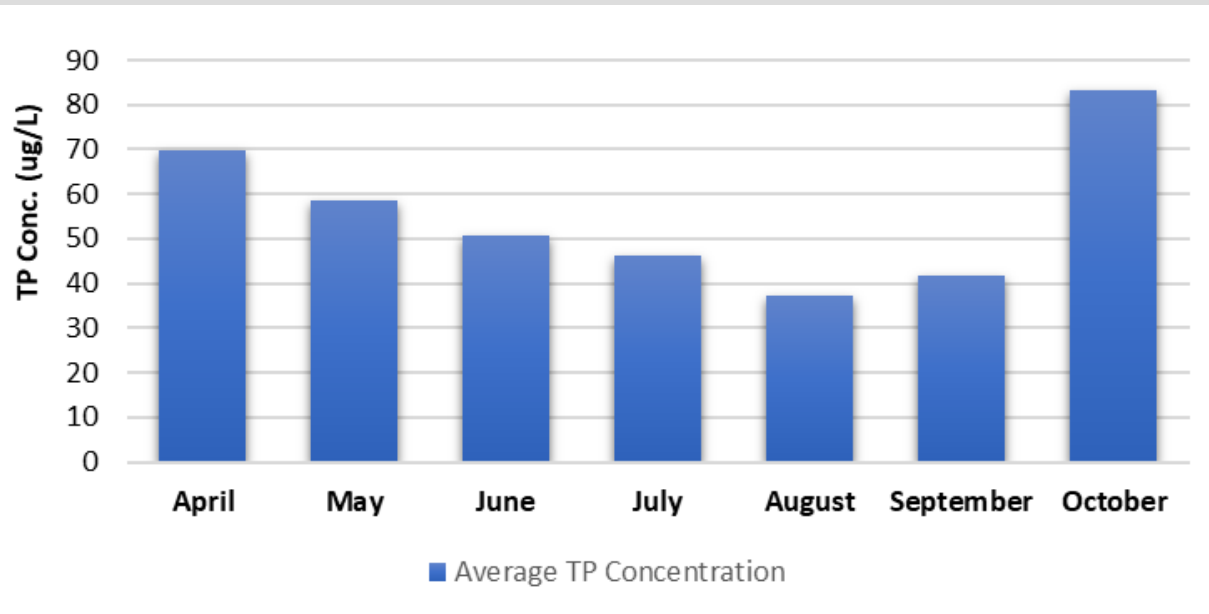
FISH LAKE HYPOLIMNION TP TREND

Total Phosphorus

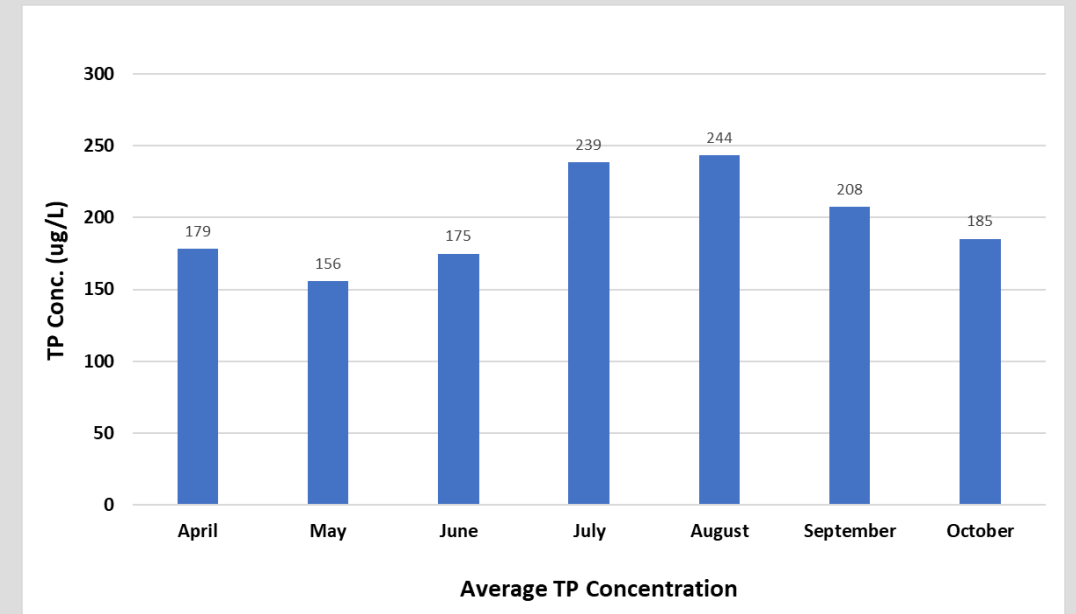
- Lake bottom measurement



Average TP Concentration – Fish Lake



Average TP Concentration – Watershed Inflow



Key Findings

- Healthy fish, aquatic plant & zooplankton community
- 3 Key Parameters exceed standard – “impaired” for designated use recreation
- Near standard & improving trend
- Early & late season blooms & elevated P concentrations
- Di-mictic Lake – ‘turns over’ twice yearly
- Elevation P concentrations in lake sediments coupled with low DO leads to P release
- Evidence points to internal loading dynamics



Remaining Steps

- Analyze soil samples in watershed to validate watershed loading rates
- In-depth, continuous monitoring later this summer
- Finalize modeling to determine phosphorus source partitions
- Based on results, propose recommended management actions





Goals

Fishery Goals

- Maintain **(healthy, edible)** game fish population with management emphasis on walleye. **(mindful of mercury contamination)**
- **Manage** carp and other species that may contribute to bottom-sediment release of nutrients

Aquatic Macrophyte Goal

- Maintain healthy population of diverse native aquatic macrophytes
- Manage infestations of Curlyleaf Pondweed to below 4 acres total **(residents expressed preference for mechanical vs chemical treatment methods)**

Phytoplankton/Algae Goal

- Reduce frequency and severity of early and late season algal blooms
- Ensure that blue-green algal blooms do not become a health concern for recreational users

Water Quality Goals

- Meet the Minnesota standards for deep lakes (growing season averages):
 - Total Phosphorus $\leq 40 \mu\text{g/l}$
 - Secchi Depth Transparency $\geq 1.4 \text{ m}$
 - Chlorophyll-A $\leq 14 \mu\text{g/l}$
- Reduce watershed phosphorus loading
- Control internal recycling of phosphorus

Schedule of Public Meetings

with Fish Lake Management Plan Update presentations

<i>Date & Time</i>	<i>Focus</i>	<i>Meeting</i>	<i>Location</i>
April 13, 7pm	Project Introduction	Spring Lake Township Monthly Meeting	Spring Lake Townhall
May 25, 6-8pm	State of the Lake	Landowner Meeting #1	Spring Lake Townhall
June 8, 7pm	Project Update	Spring Lake Township Monthly Meeting	Spring Lake Townhall
June 13, 4- 6pm	Project Update	PLSLWD Board Workshop	Prior Lake City Hall, Parkview room
September 28, 6-7:30pm	Project Update	PLSLWD Citizen's Advisory Committee Meeting	Prior Lake City Hall
October 5, 6-8pm	Receive Input on Draft Plan	Landowner Meeting #2	Spring Lake Townhall
November 14, 3-4pm	Review Draft Plan	PLSLWD Board and Spring Lake Township Workshop	Prior Lake City Hall
December 12, 6-8pm <i>*Tentative</i>	Review Final Plan	PLSLWD Board Meeting	Prior Lake City Hall

Meetings in bold provide a format more conducive to receiving community feedback.



Next Steps



- **Finalize Modeling and Data Analysis**
- **Develop Management Recommendations**
- **Fall Landowner's Meeting for Feedback**

Questions? Confused? More Feedback?

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PRIOR LAKE-SPRING LAKE

WATERSHED DISTRICT