

# Cedar Lake/Lake of the Isles Master Plan

## A WATER QUALITY OVERVIEW



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PAT CONRAD – WATER QUALITY SPECIALIST



## PART 1: LIMNOLOGY 101

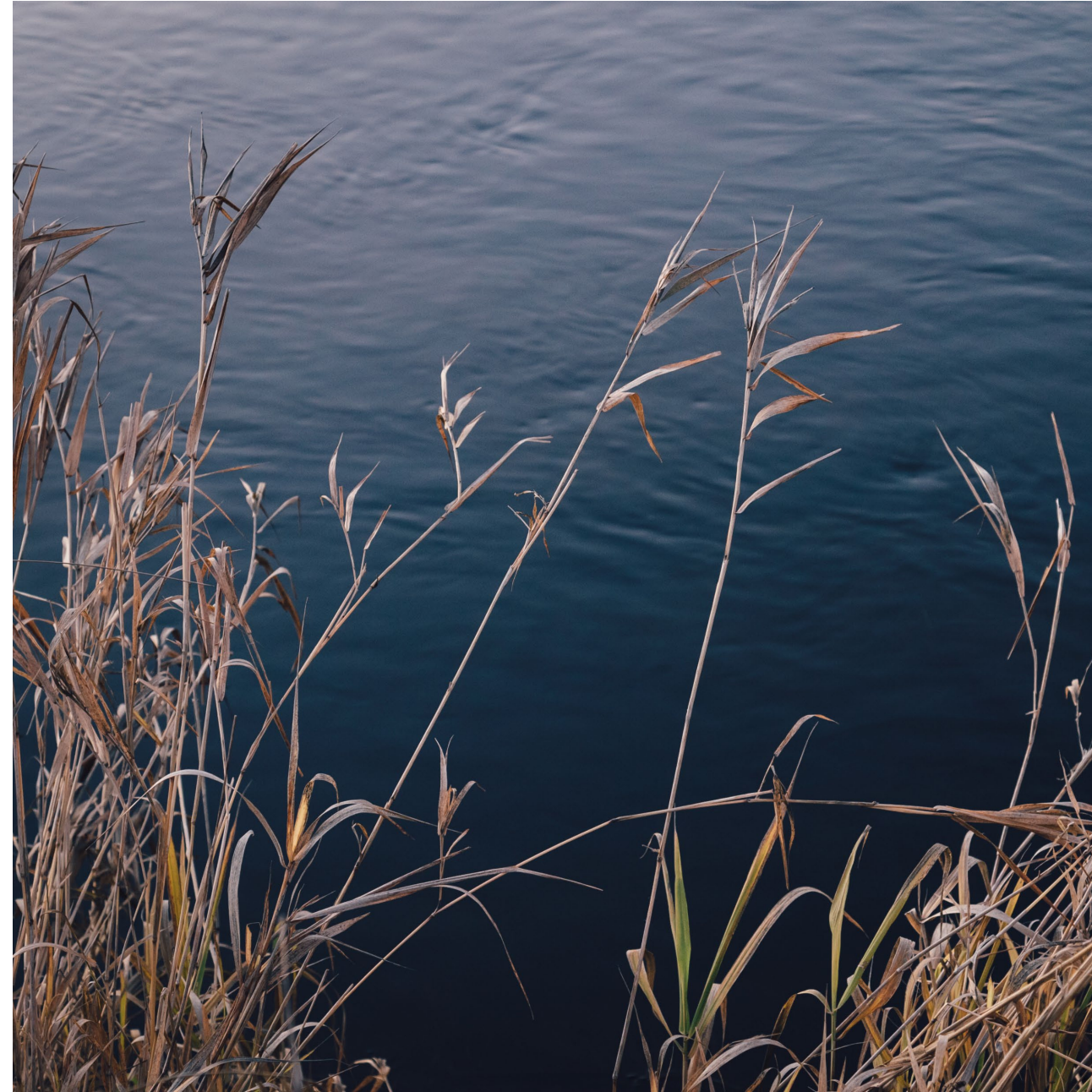
An overview of drivers influencing lake character

## PART 2: CONTEXT

How are lake conditions evaluated?

## PART 3: CONDITIONS

What is the current condition of each lake?  
How has it changed over time?

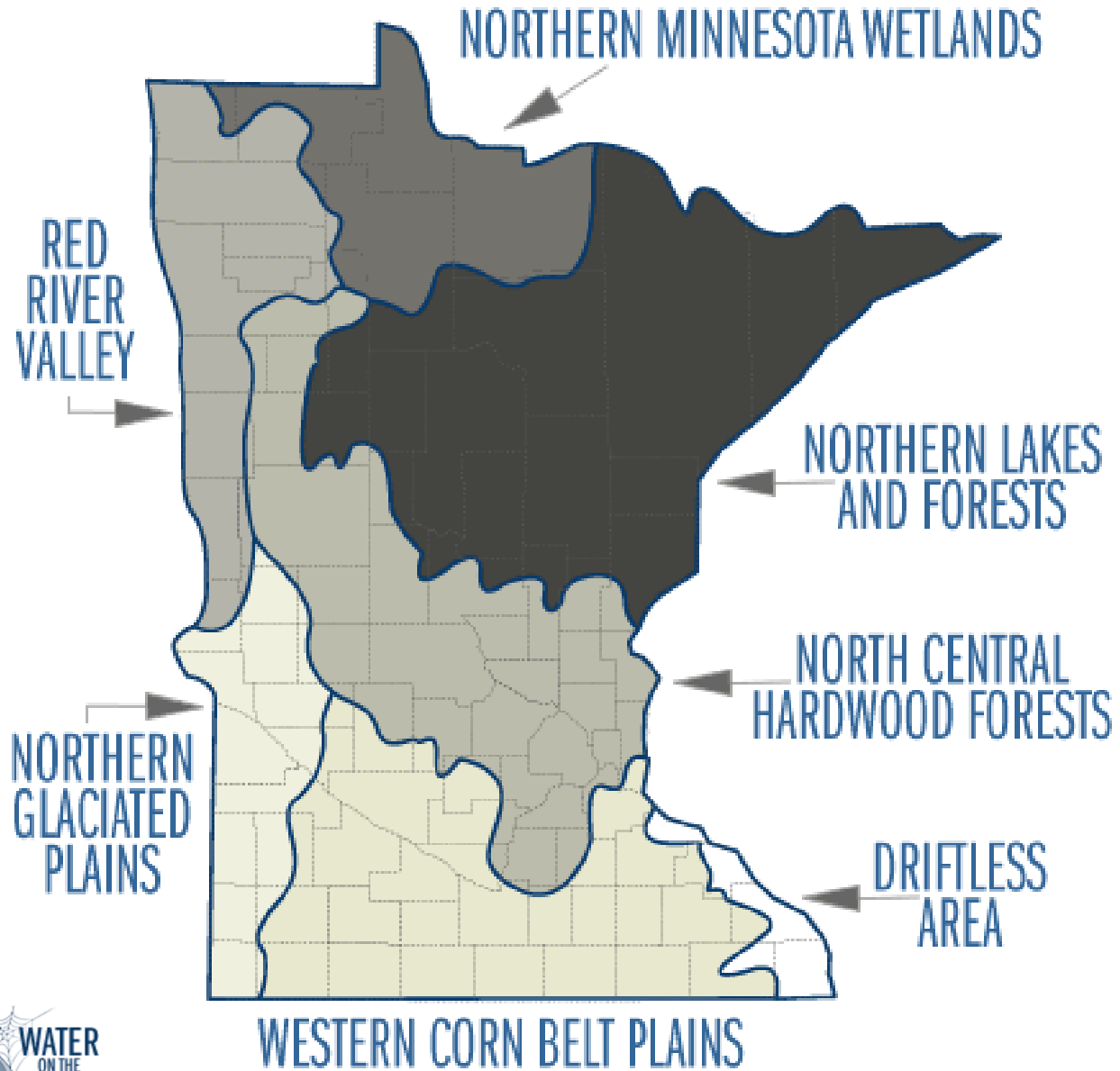


# PART 2: CONTEXT

Urban Location of both Lake of the Isles and Cedar Lake



# STATE SETTING: ECO-REGIONS



## METRO AREA SYSTEM

- Relative ranking as compared to all lakes within region
- Used by many metro Watershed Districts

Lake Grade	Relative Ranking	Description
A	90% & up	Crystal clear beautiful
B	70-90%	Water clarity/Secchi depth
C	30-70%	Aquatic plant and fish diversity
D	10-30%	Availability of ease of public access
F	Lowest 10%	Color and odor of water, garbage and debris



## MPLS PARK & RECREATION SYSTEM

- Lake Aesthetic and User Recreation Index (LAURI)

Public Health Index	Crystal clear, beautiful. These lakes are exceptional and can be enjoyed by recreation users without question or hesitation.
Water Quality Index	Generally good water quality but <u>algae</u> may limit swimming, particularly towards the end of the summer.
Habitat Quality	Average quality. Swimming, boating, and fishing may be undesirable relatively early in the season. Algae blooms occasionally.
Recreational Access	Severe algae problems. People are generally not interested in recreation on these lakes.
Aesthetic Considerations	Not enjoyable. The lakes would have severe limitations to recreational use.

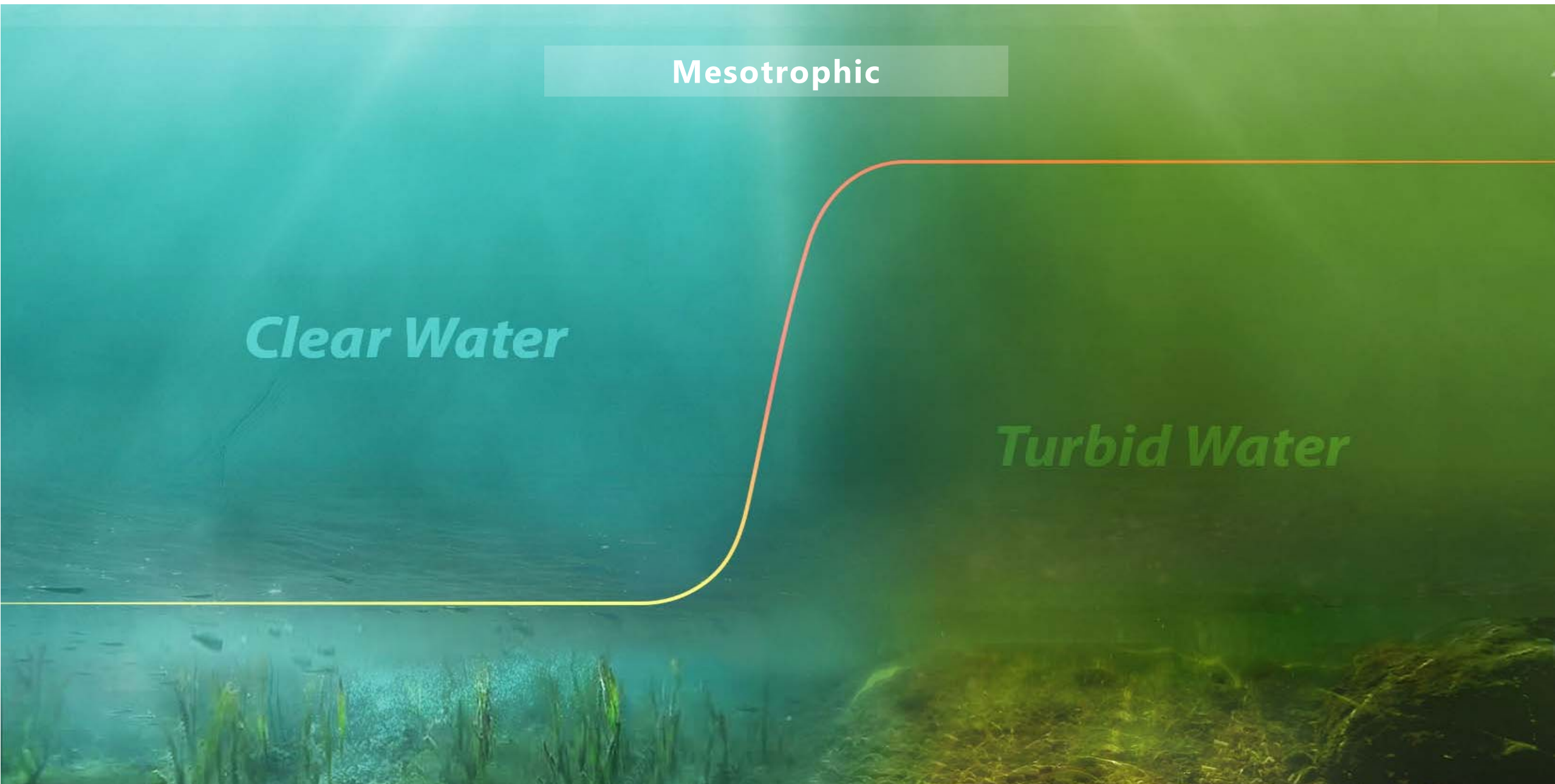


# TROPHIC STATES: measure of fertility/lake productivity

Mesotrophic

*Clear Water*

*Turbid Water*



# TROPHIC STATES: measure of fertility/lake productivity

← **Oligotrophic** (less productive)

**Mesotrophic**

***Clear Water***

**Cooler Temperature  
More Oxygen  
Less Algae**

***Turbid Water***



# TROPHIC STATES: measure of fertility/lake productivity

**Oligotrophic (less productive)**

**Mesotrophic**

**Eutrophic (more productive)**

## ***Clear Water***

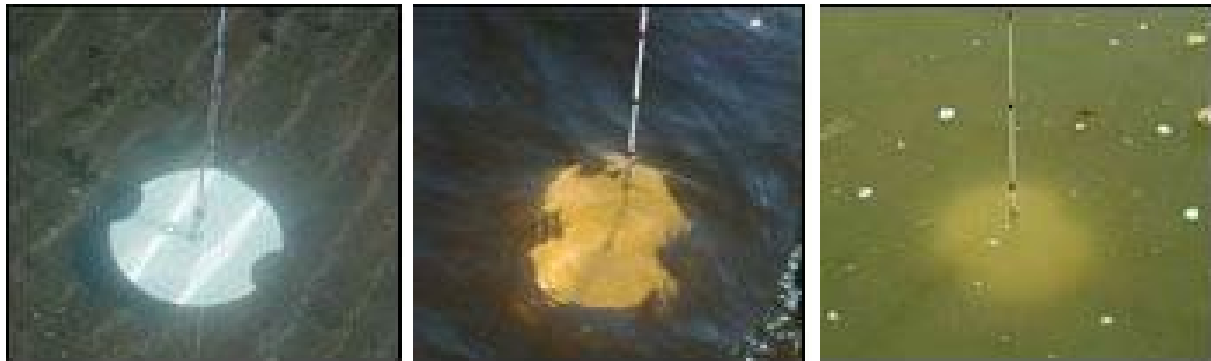
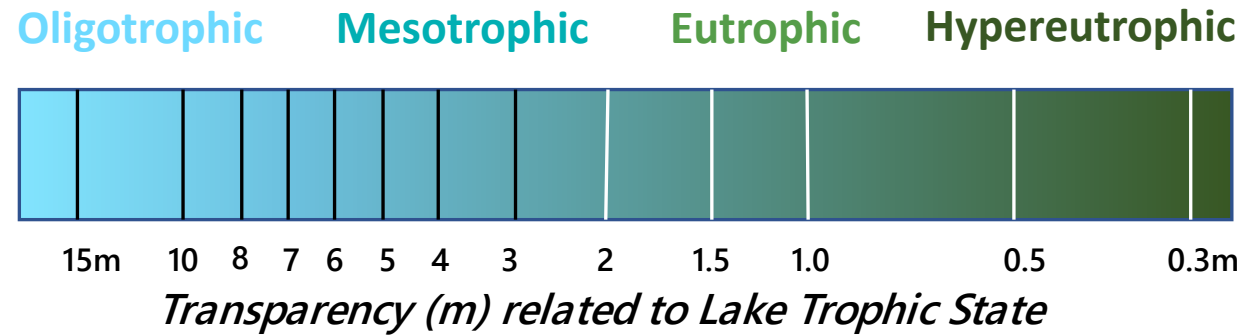
**Cooler Temperature  
More Oxygen  
Less Algae**

## ***Turbid Water***

**Warmer Temperature  
Less oxygen  
Excessive Algal Blooms**

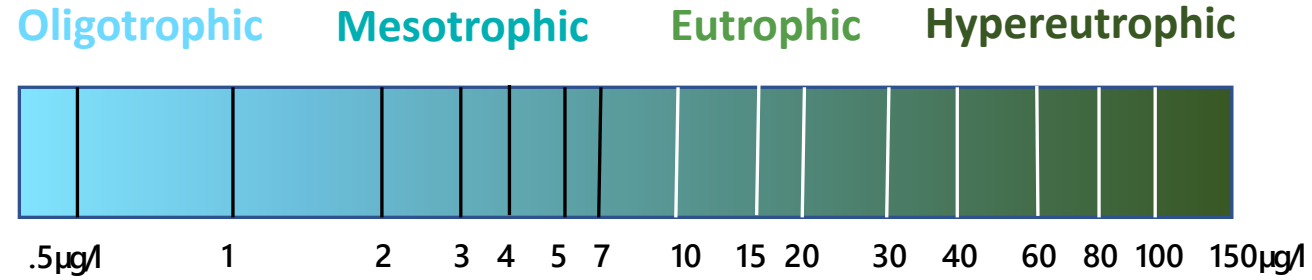
## TRANSPARENCY

Measure of light penetration



## CHLOROPHYLL-A

Chlorophyll-a measure of algae growth



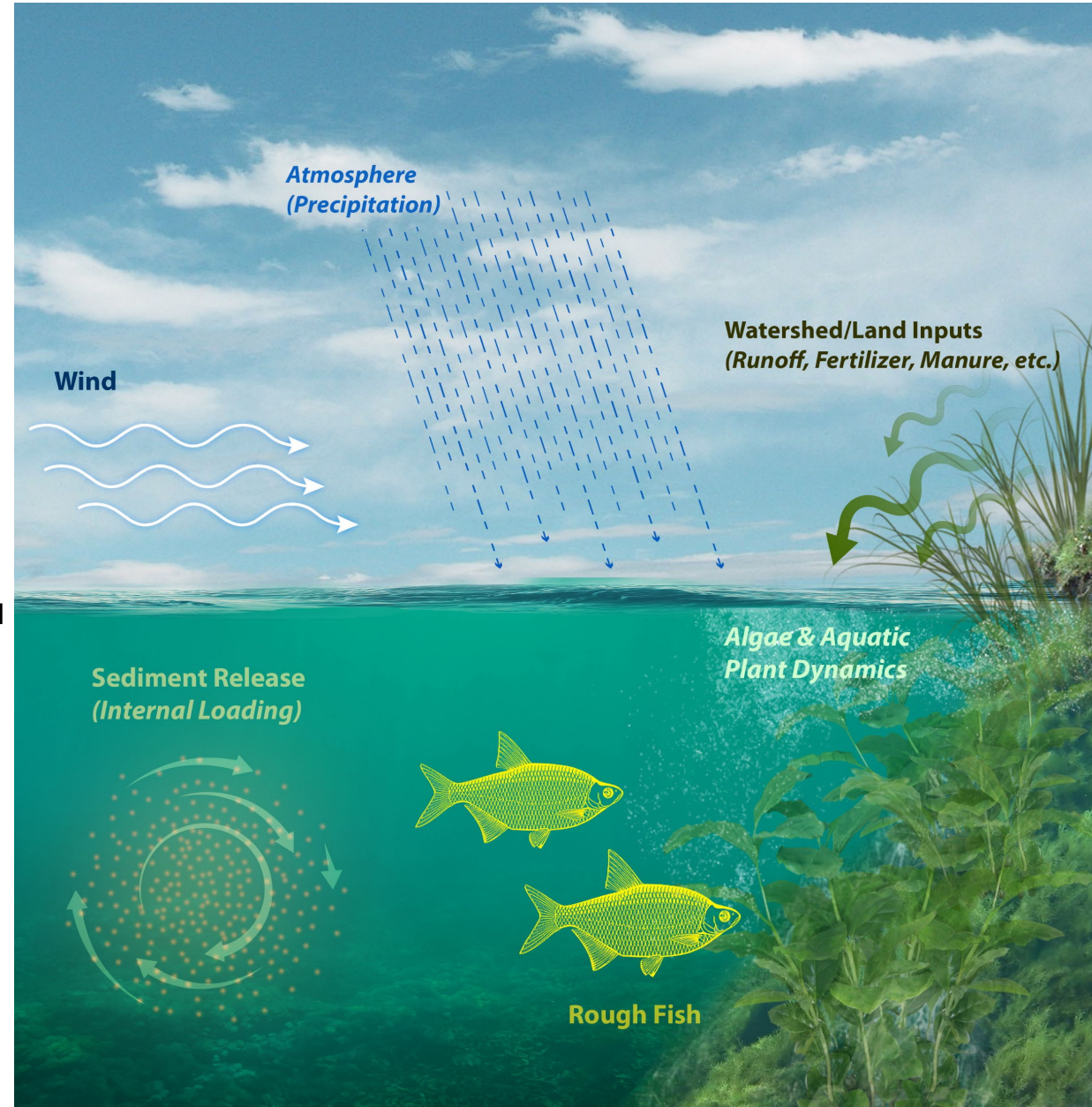
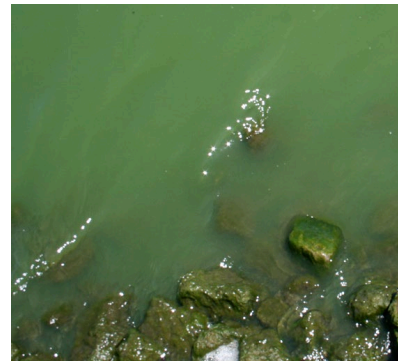
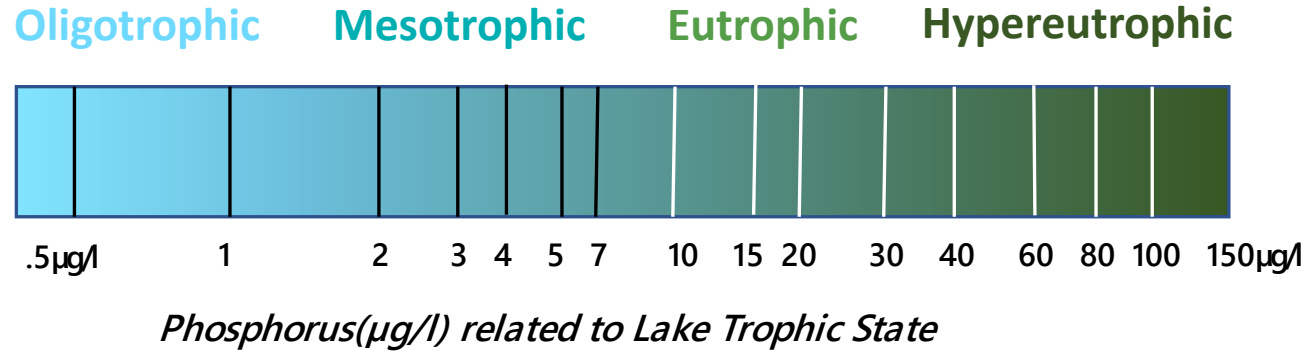
*Chlorophyll-a (µg/l) related to Lake Trophic State*



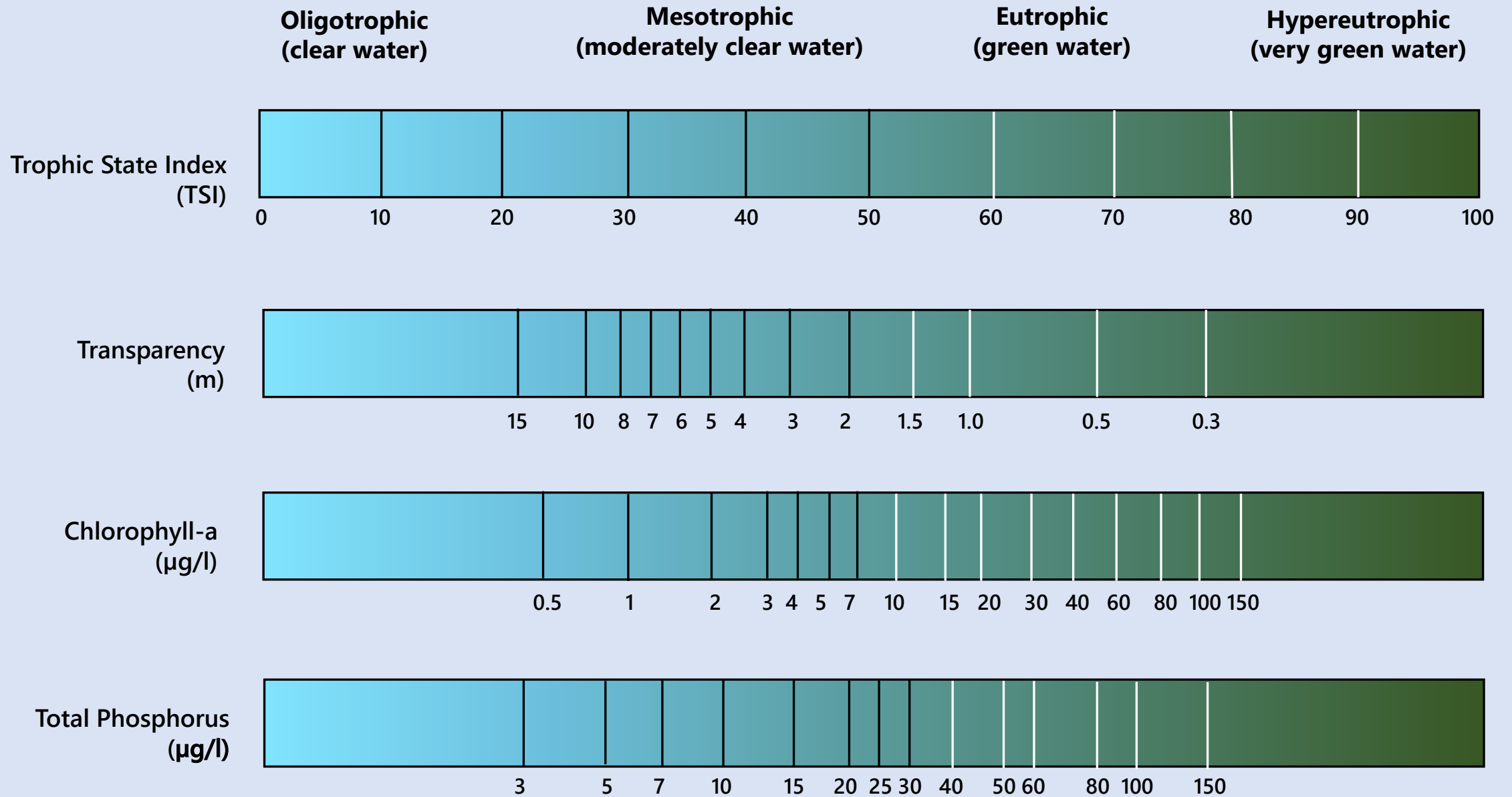
# TROPHIC STATES: key parameters

## PHOSPHORUS

### Limiting Nutrient in Lakes



# CARLSON'S TROPHIC STATE INDEX



## US EPA: Clean Water Act 1972



**Beneficial Uses:**  
Identify how people, aquatic communities, and wildlife use our waters

### **Numeric Standards:**

Amounts of specific pollutants allowed in a body of water and still protects it for the beneficial uses

### **Narrative Standards:**

Statements of unacceptable conditions in and on the water



## MINNESOTA POLLUTION CONTROL AGENCY

**m** Minnesota Rules Chapters 7050  
**MPCA** establishes seven use classes

### Class 2: Aquatic life and recreation

- **Cedar Lake**  
Class 2B - Warm/Cool Water Habitat
- **Lake of the Isles**  
Class 2B - *Shallow* Warm/Cool Water Habitat



## ‘SWIMMABLE – FISHABLE’

### Aquatic Recreation:

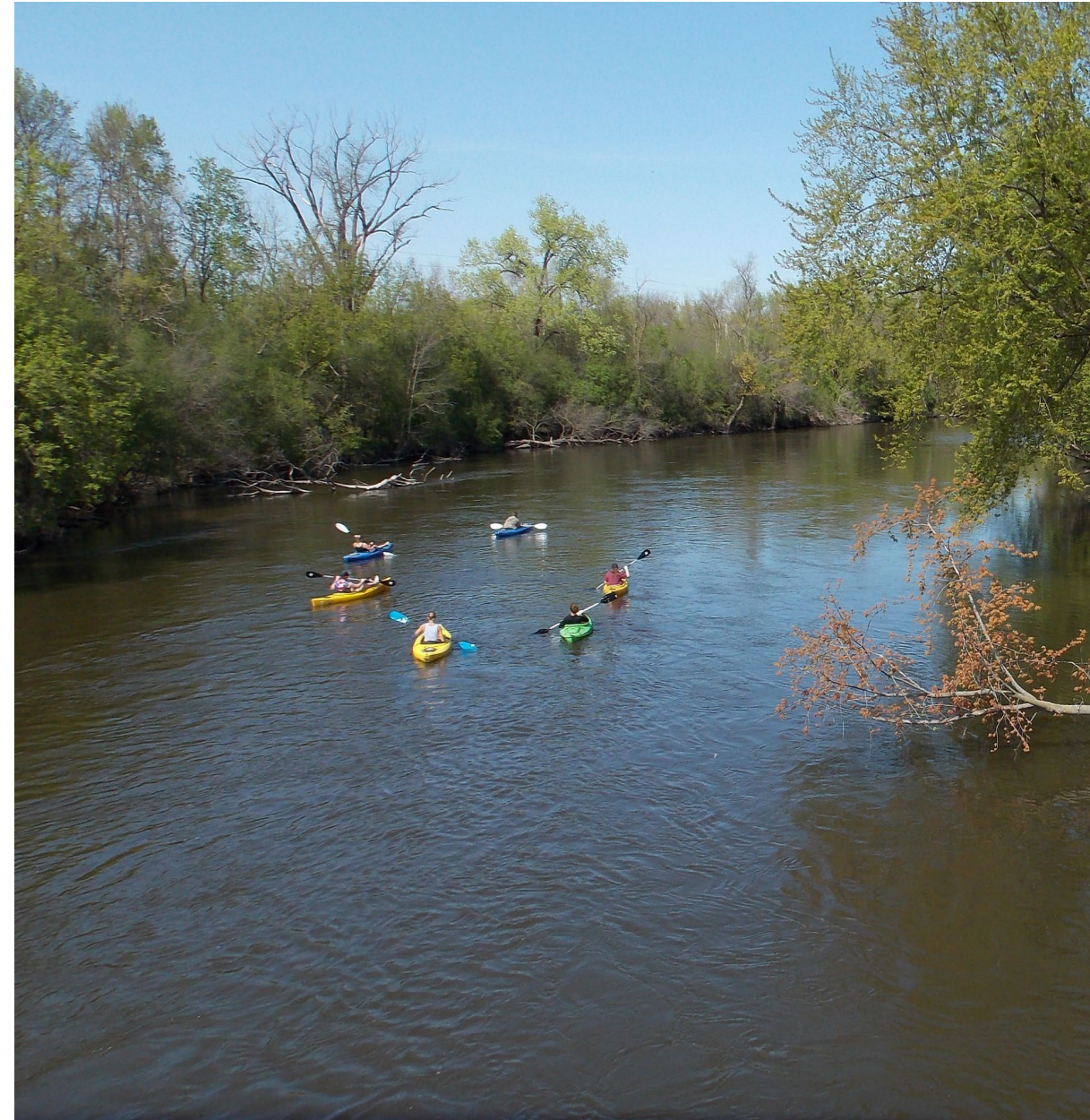
Three key parameters

### Aquatic Life:

Healthy fish and invertebrates

### Aquatic Consumption:

Fish tissue concentrations



## CEDAR LAKE

**Aquatic Recreation (2012):**  
Standards met for all parameters

**Aquatic Life (2017):**  
Insufficient data for use assessment

**Aquatic Consumption (1998):**  
Mercury



## LAKE OF THE ISLES

**Aquatic Recreation (2012):**  
Standards met for all parameters

**Aquatic Life (2013):**  
Insufficient data for use assessment

### **Aquatic Consumption:**

- Mercury (1998)
- Perfluorooctane sulfonic acid (PFOS) in fish tissue (2007)



# ECOREGION STANDARD – TROPHIC STATE INDEX

## STATE STANDARDS PER LAKE

**Oligotrophic**  
(clear water)

**Mesotrophic**  
(moderately clear water)

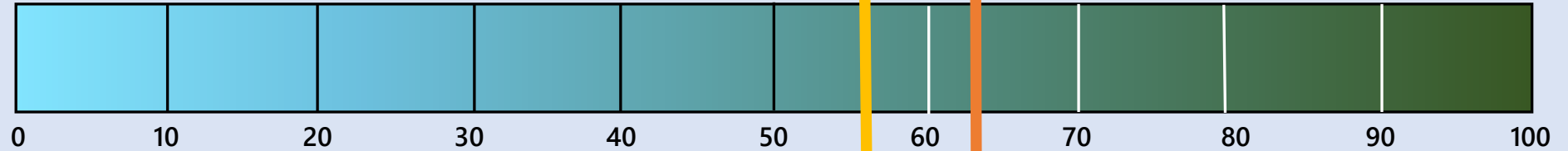
**Eutrophic**  
(green water)

**Hypereutrophic**  
(very green water)

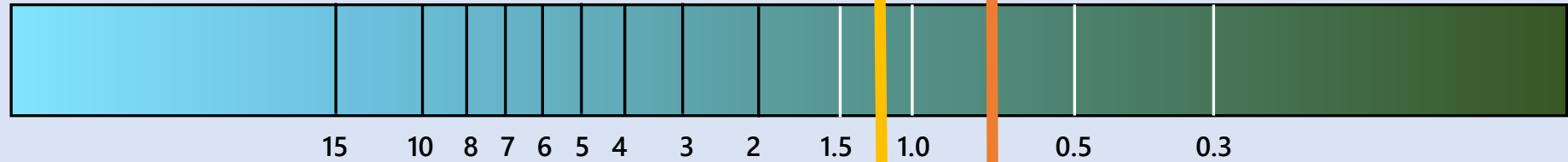
DEEP LAKE STANDARD: CEDAR LAKE

SHALLOW LAKE STANDARD LAKE OF THE ISLES

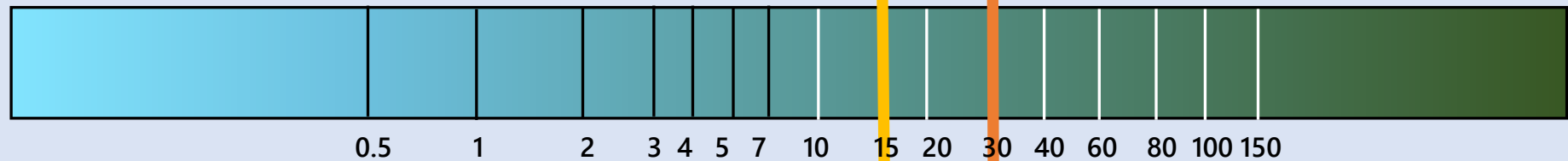
Trophic State Index  
(TSI)



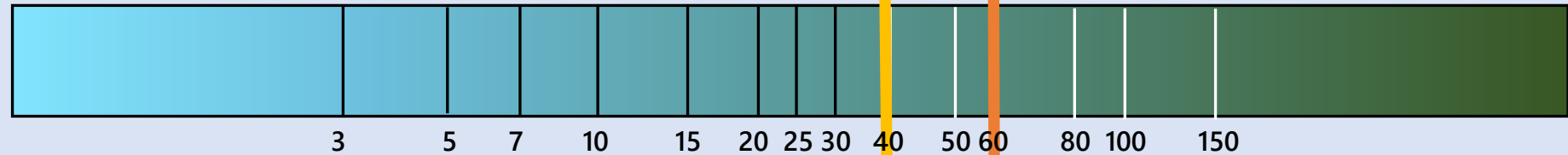
Transparency  
(m)



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



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



## PLANNING PHASE (1990 – 1993)

- 1990 City of Minneapolis & MPRB Awarded WMP Grant
- 1992 Water Quality Management Citizens Advisory Committee Appointed
- 1993 Diagnostic Report & Implementation Plan

## IMPLEMENTATION PHASE (1994 – 1997)

- 1994 Lake of the Isles Grit Chambers
- 1995 Monitoring Program Improved Street Sweeping
- 1996 Cedar Lake Watershed Ponds Alum Treatment: Cedar Lake
- 1997 Alum Treatment: Lake of the Isles

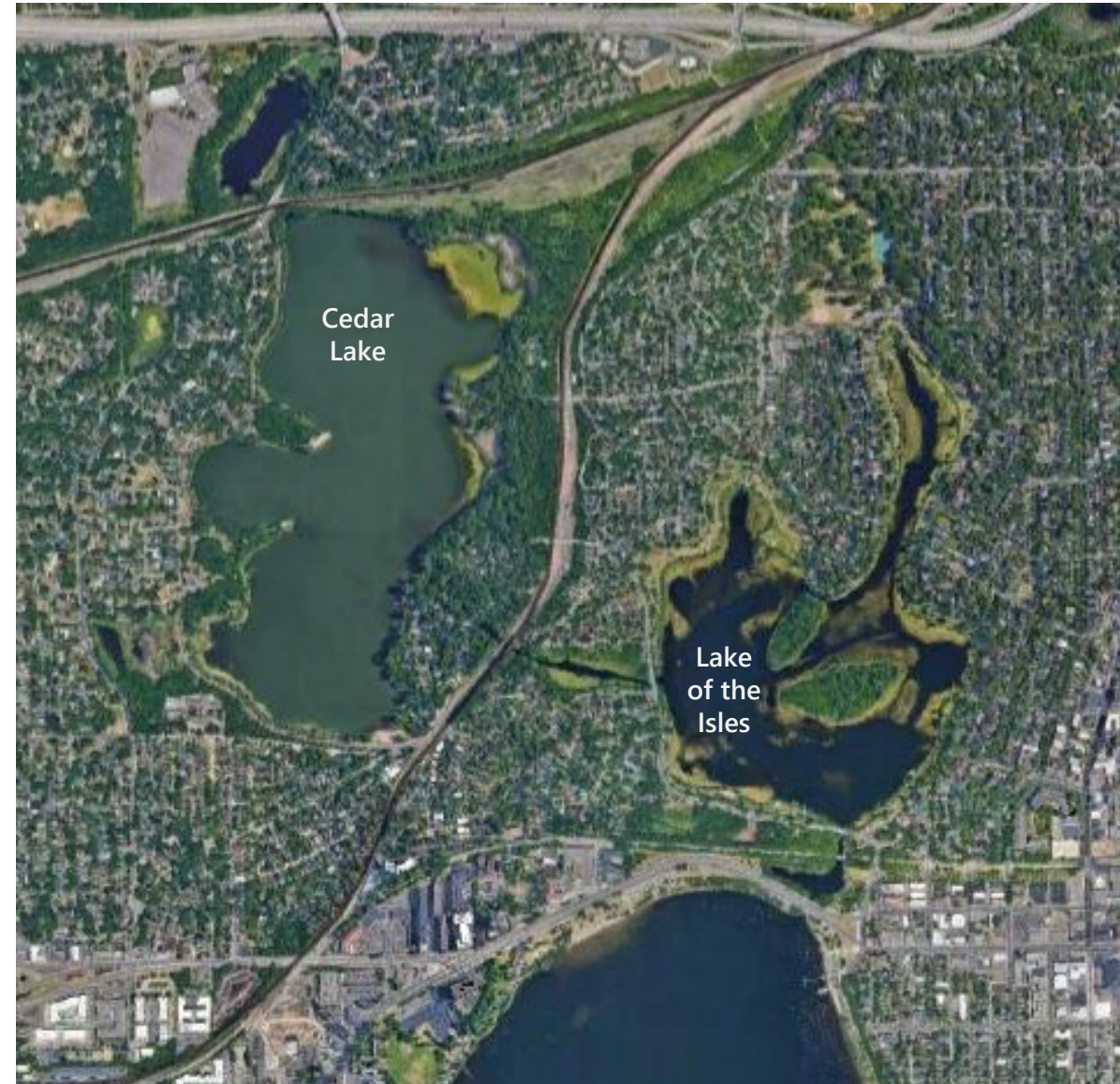


## CEDAR LAKE

- Transparency – 1.9m
- Phosphorus – 25 $\mu$ g/l
- Trophic State Index - 51

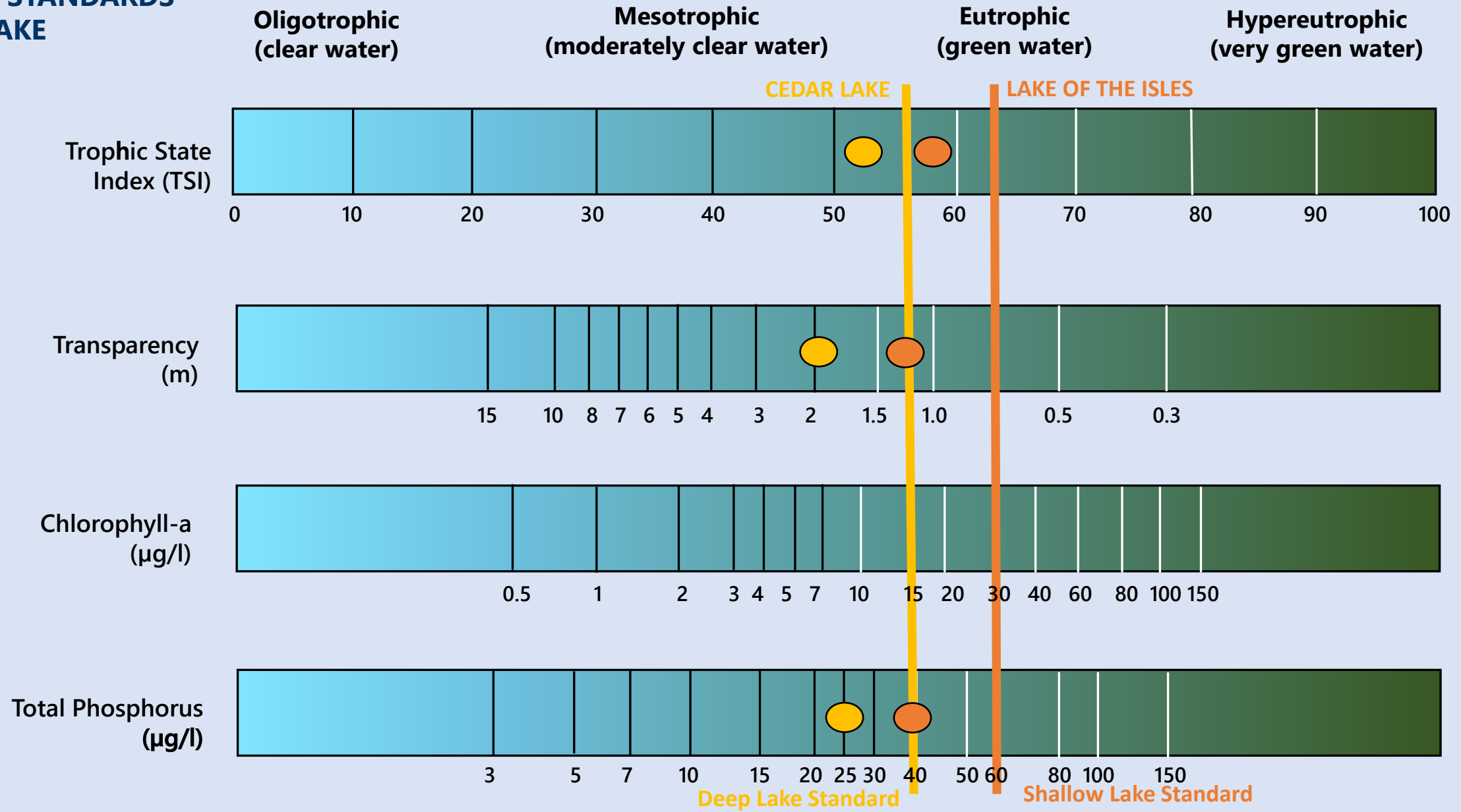
## LAKE OF THE ISLES

- Transparency – 1.2m
- Phosphorus – 40 $\mu$ g/l
- Trophic State Index - 57



# CLEAN WATER PARTNERSHIP GOALS

## STATE STANDARDS PER LAKE



# QUESTIONS?

