

# Cedar Lake/Lake of the Isles Master Plan

## A WATER QUALITY OVERVIEW



APRIL 14, 2022

PAT CONRAD – WATER QUALITY SPECIALIST

## PART 1: LIMNOLOGY 101

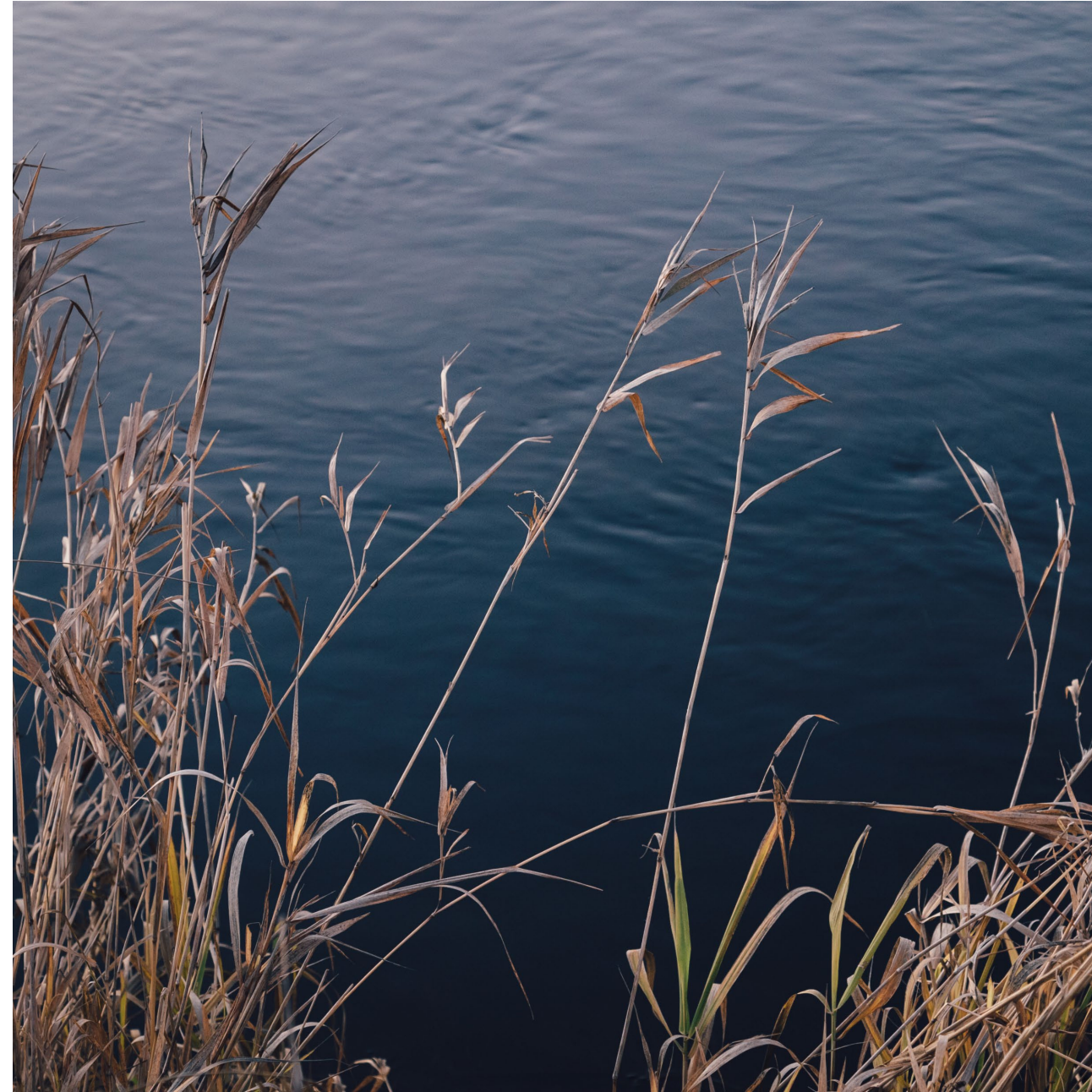
An overview of drivers influencing lake character

## 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 3: CONDITIONS



# LAKE WATER QUALITY MONITORING

## CEDAR LAKE

- 1970-2021

## LAKE OF THE ISLES

- 1970-2021

## BROWNIE LAKE

- 1990-2021

## TWIN LAKE

- 1990-2021

**Surface water data access** Minnesota Pollution Control Agency

Find waterbody or address

**About**

Welcome to the MPCA's Surface water data access

Use the Surface Water Data Access tool to search and view waterbodies and their associated monitoring stations.

Click on a lake or stream to view a short summary and links to more information. (Water Quality Dashboard, Water Quality Assessments, and water monitoring station data download)

- Citizen Monitoring Stations link to the Citizen Monitoring Report.
- Flow stations link to either the USGS gauge report or the DNR/PCA Cooperative Stream Gage network.
- Discharge stations link to a facility's discharge monitoring data.
- Biology stations link to fish and invertebrate community data.
- Lake and stream chemistry stations link to monitoring reports that include water chemistry, bacteria, and physical measurements.
- Impaired lakes, streams, wetlands, and beaches link to water quality assessments
- Delisted impairments are waterbodies that have been restored, or removed from the impaired waters list due to additional monitoring.
- Impaired waters with approved TMDL plans. The Total Maximum Daily Load plan (TMDL) sets limits for point sources and lists goals for non-point source pollution sources. TMDL plans are followed by the implementation corrective actions and continued monitoring.

Tools in the toolbar!



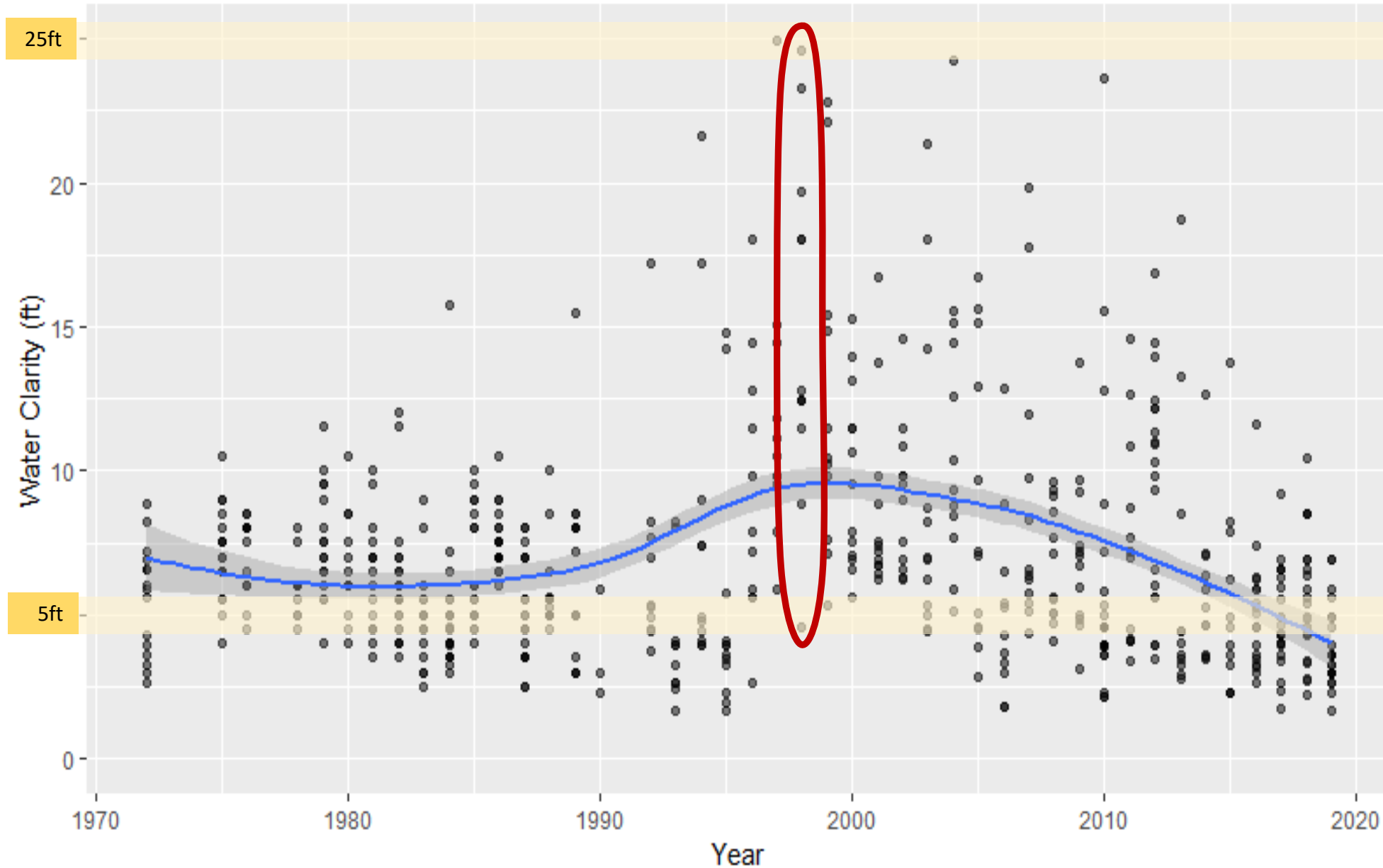
# VARIABILITY IN LAKE WATER QUALITY

## SEASONAL

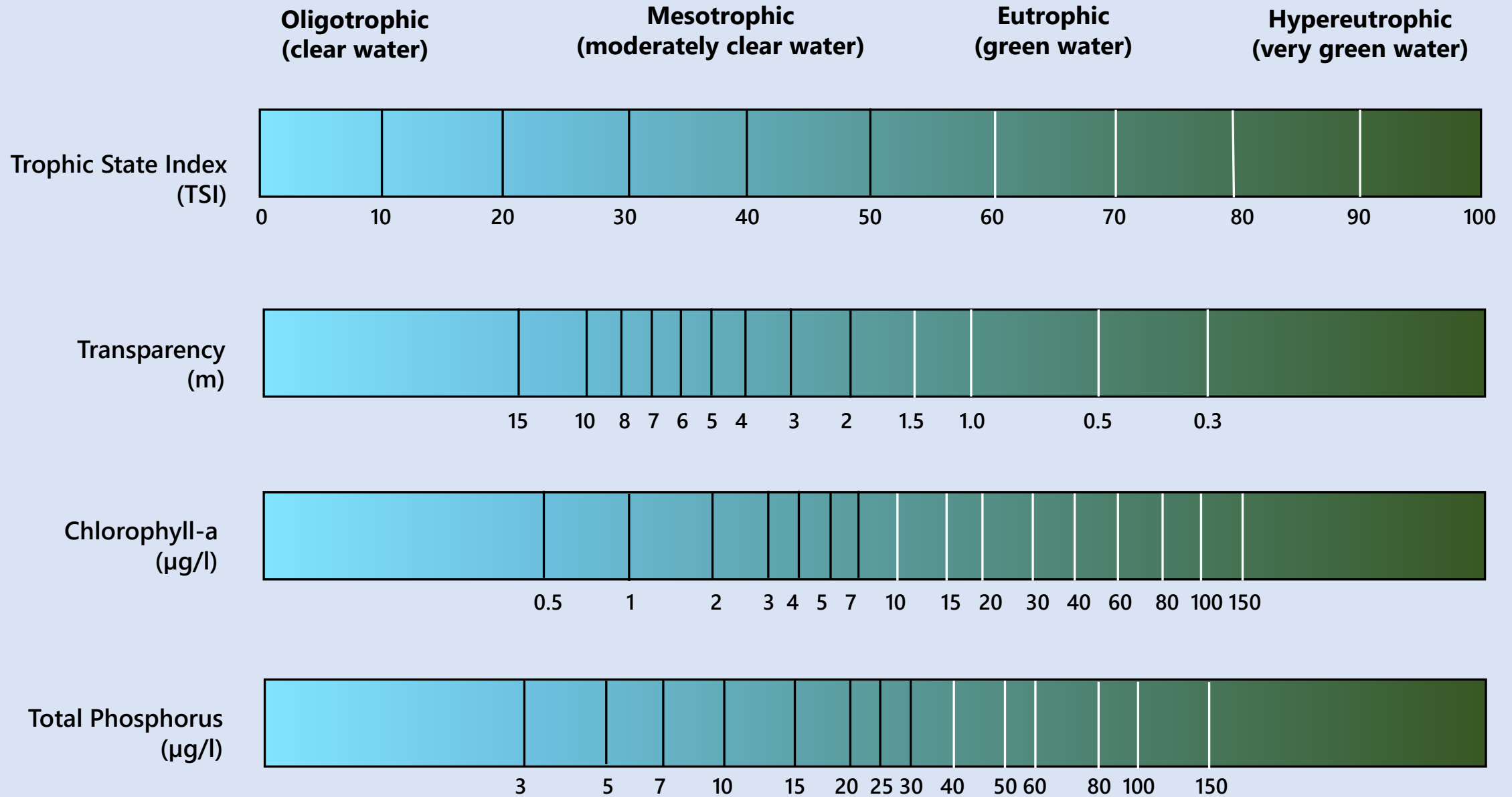
- Growing season averages

## ANNUAL

- >10 years of data for trend analysis

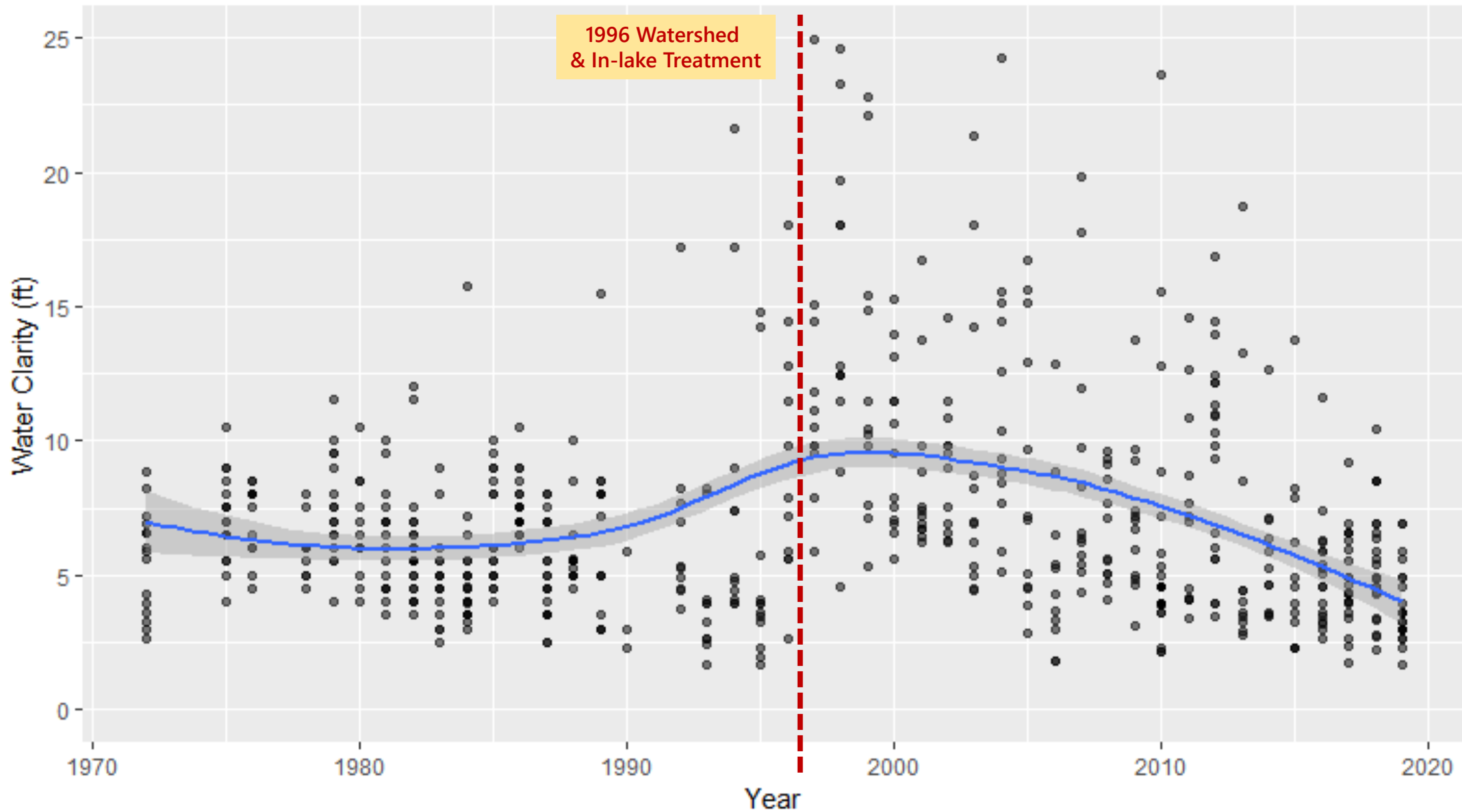


# THREE KEY PARAMETERS



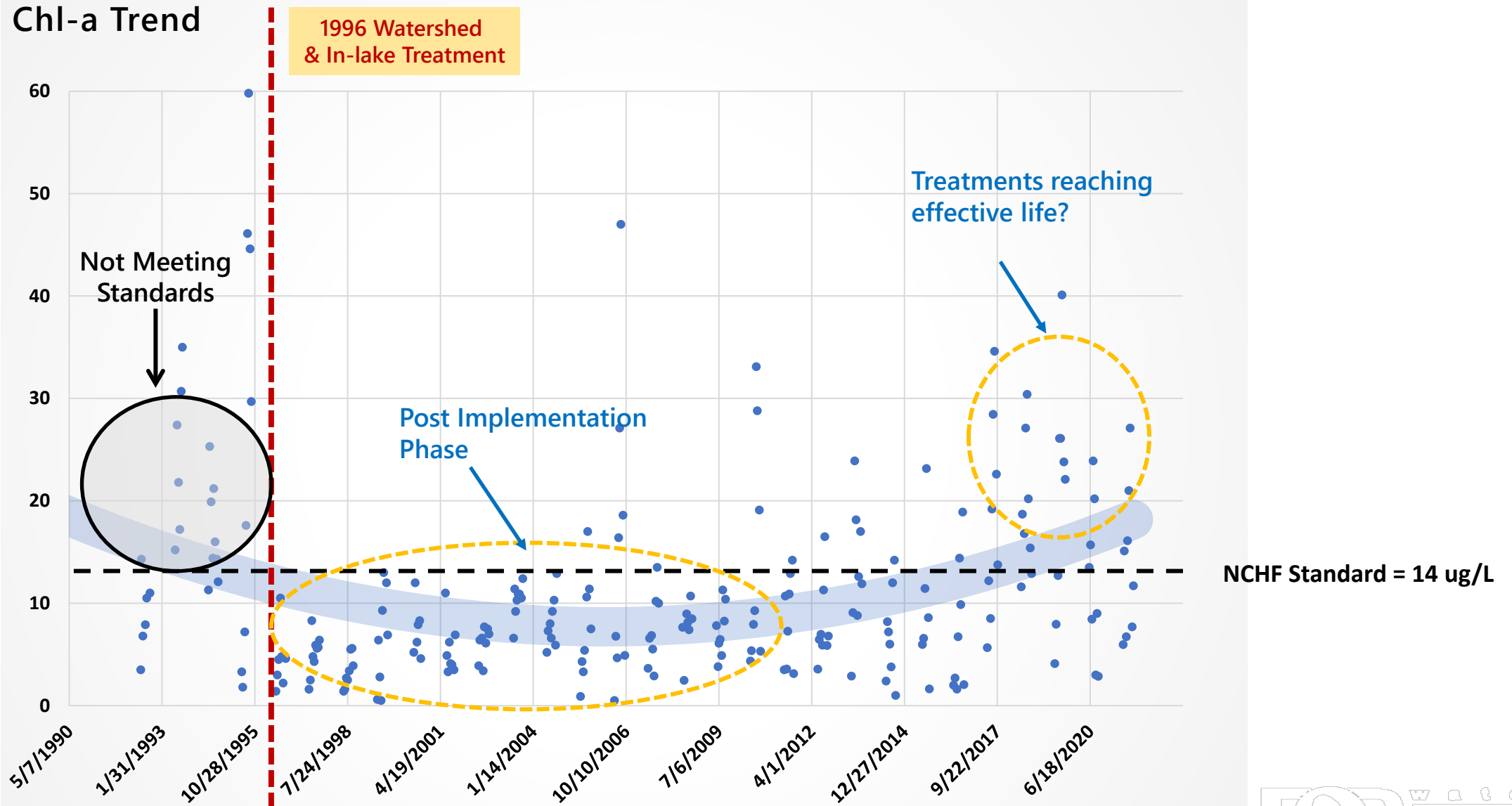


# CEDAR LAKE TRANSPARENCY (1972-2019)



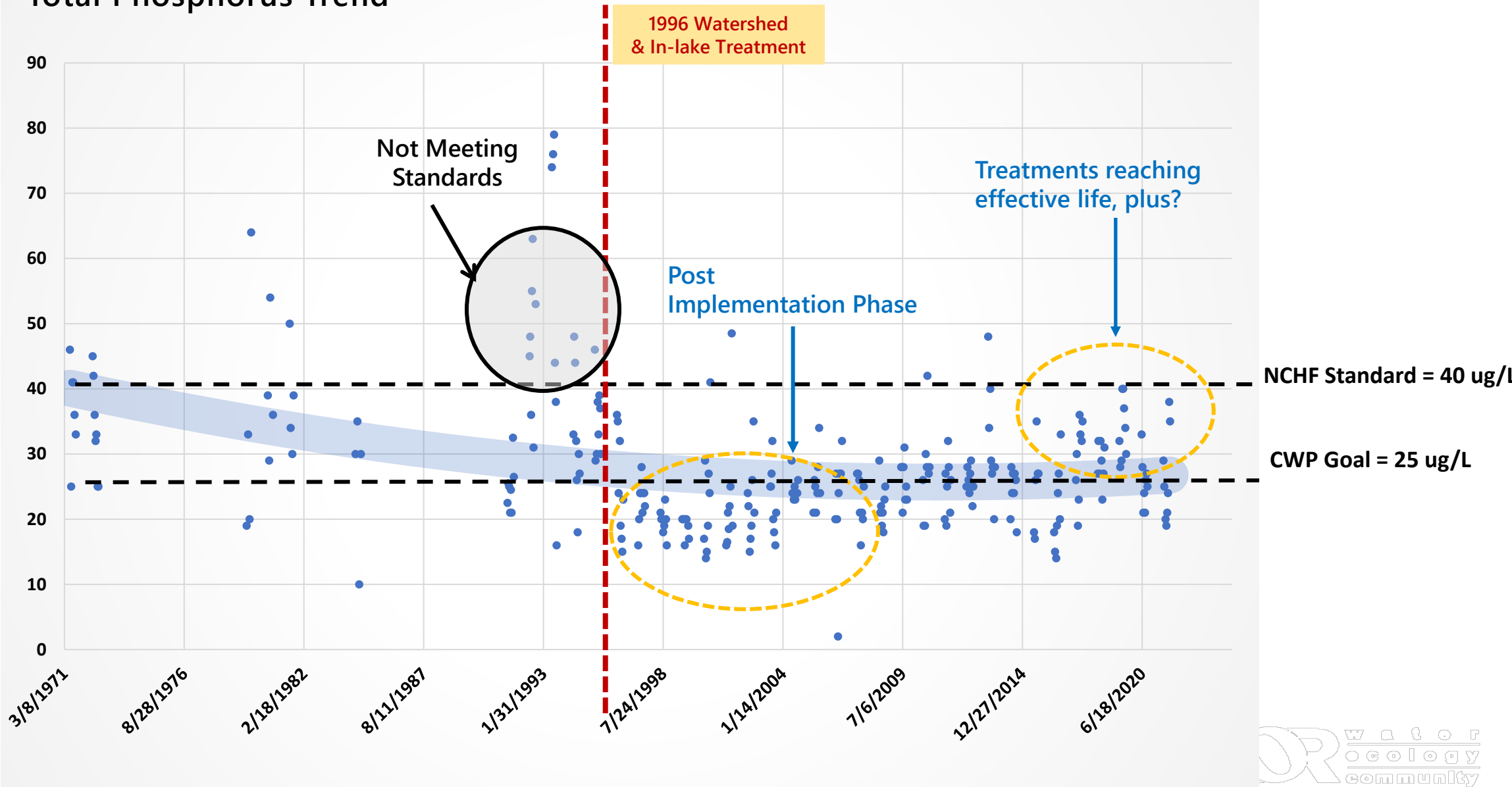
# CEDAR LAKE CHLOROPHYLL-A (1990-2021)

## Chl-a Trend

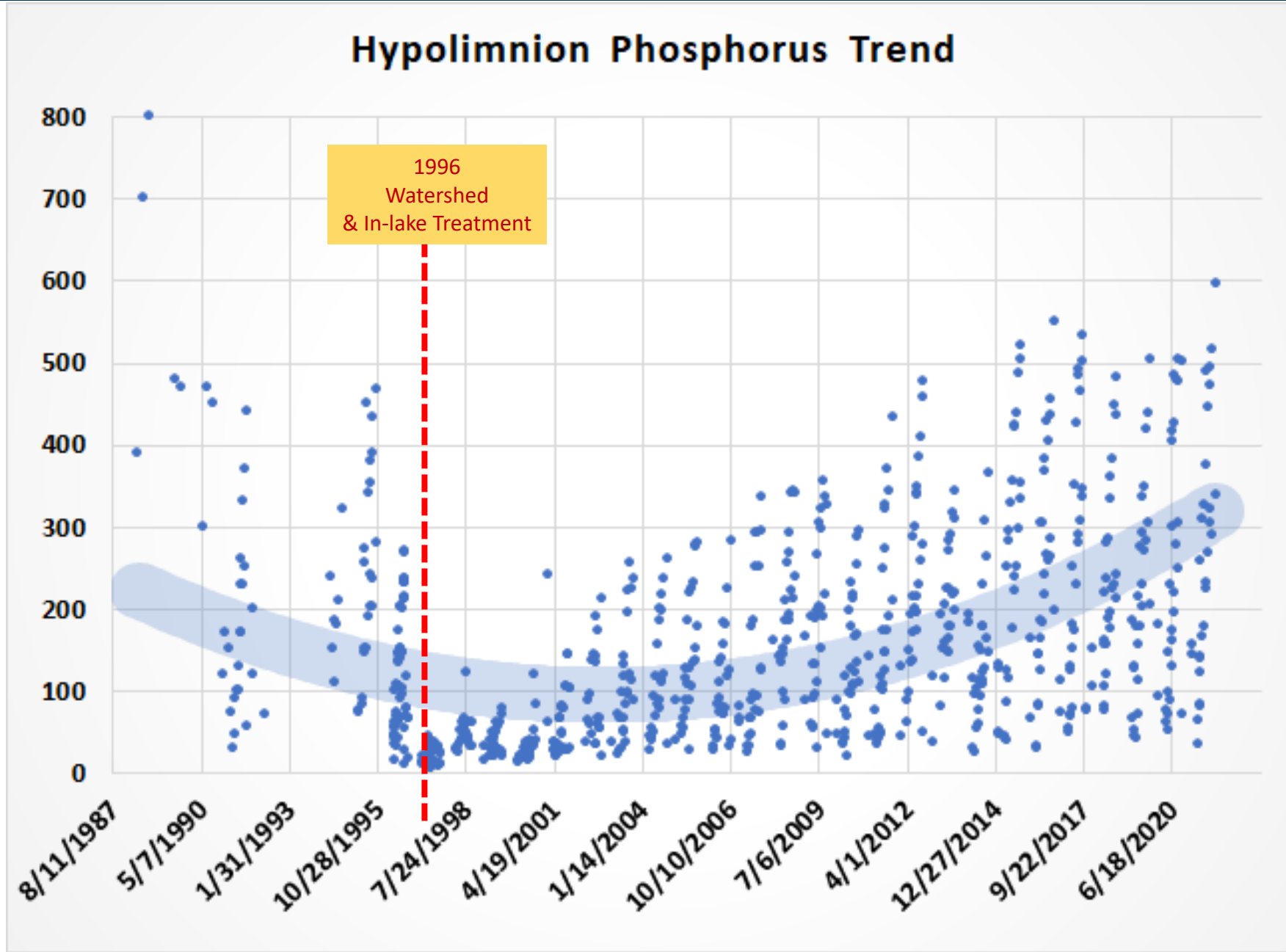


# CEDAR LAKE PHOSPHORUS (1971-2021)

## Total Phosphorus Trend



# CEDAR LAKE HYPOLIMNION (1987-2021)



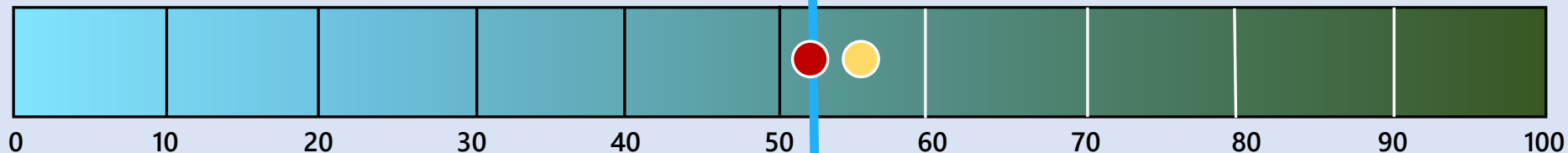
# CEDAR LAKE TROPHIC STATE INDEX (TSI)

MONITORING YEARS

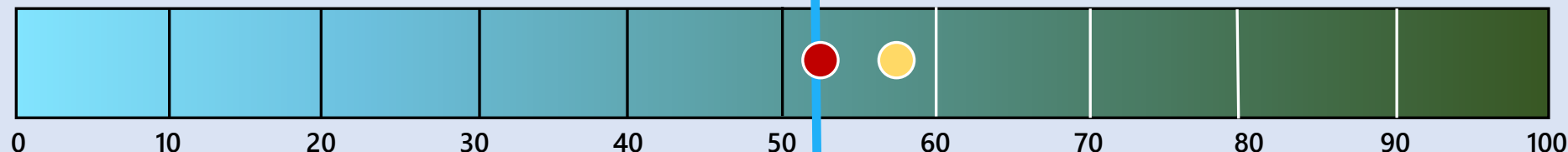
- 2008-2017
- 2017-2021

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

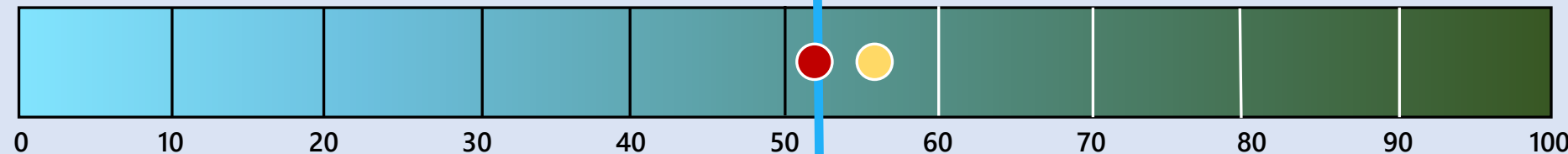
Trophic State Index  
(TSI)



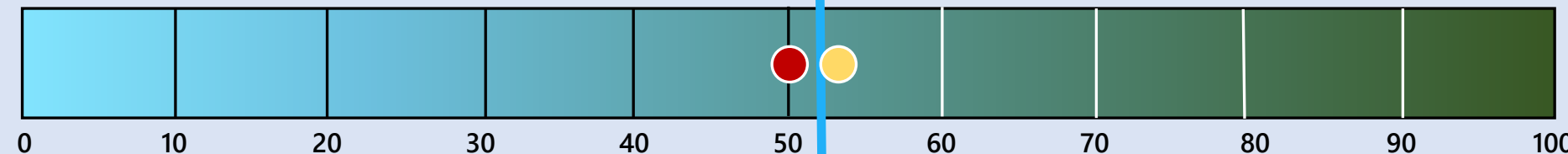
Transparency



Chlorophyll-a

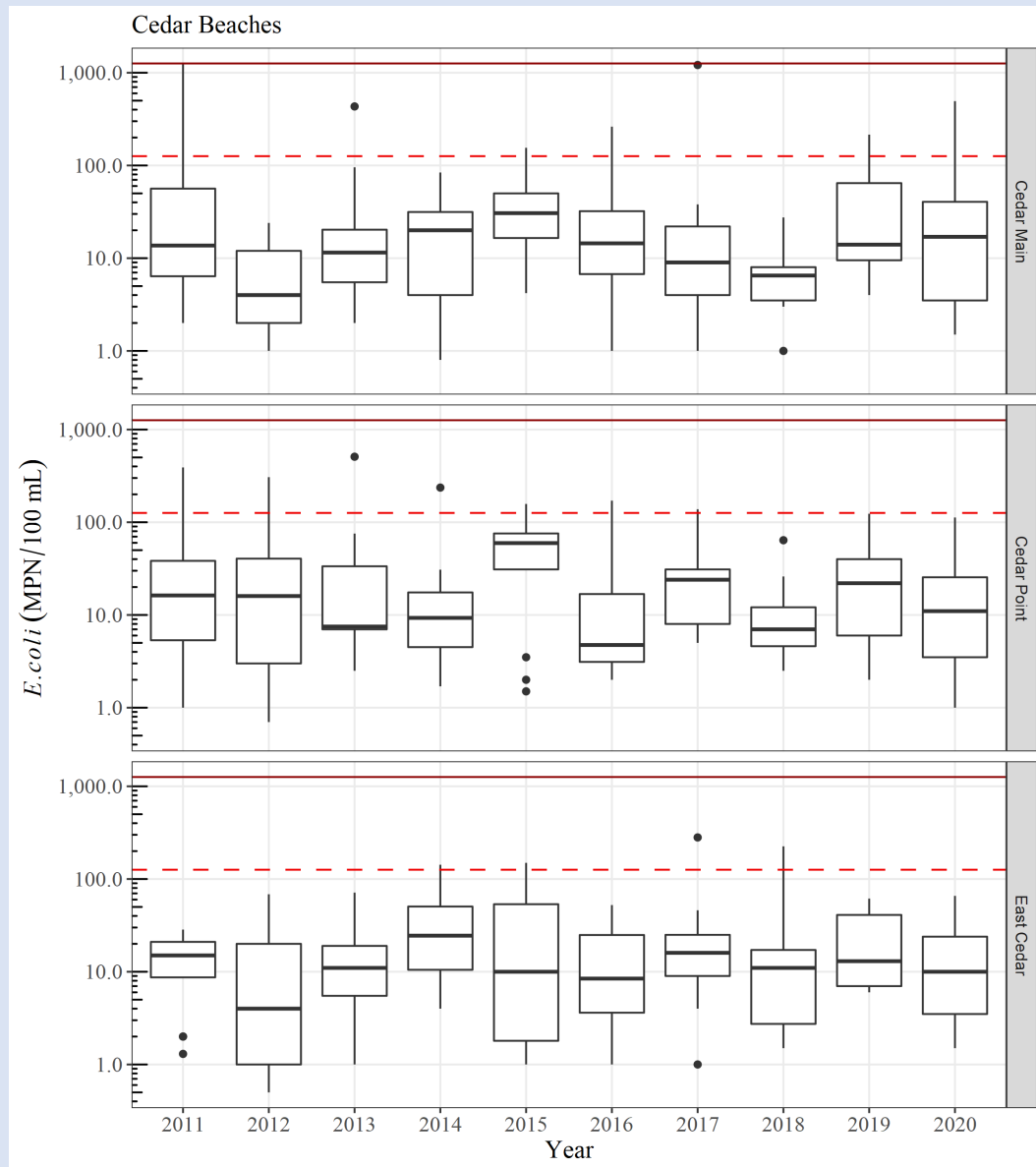


Total Phosphorus



CWP Goal = 51

# CEDAR E COLI BEACH MONITORING



*South  
Beach*

*Point  
Beach*

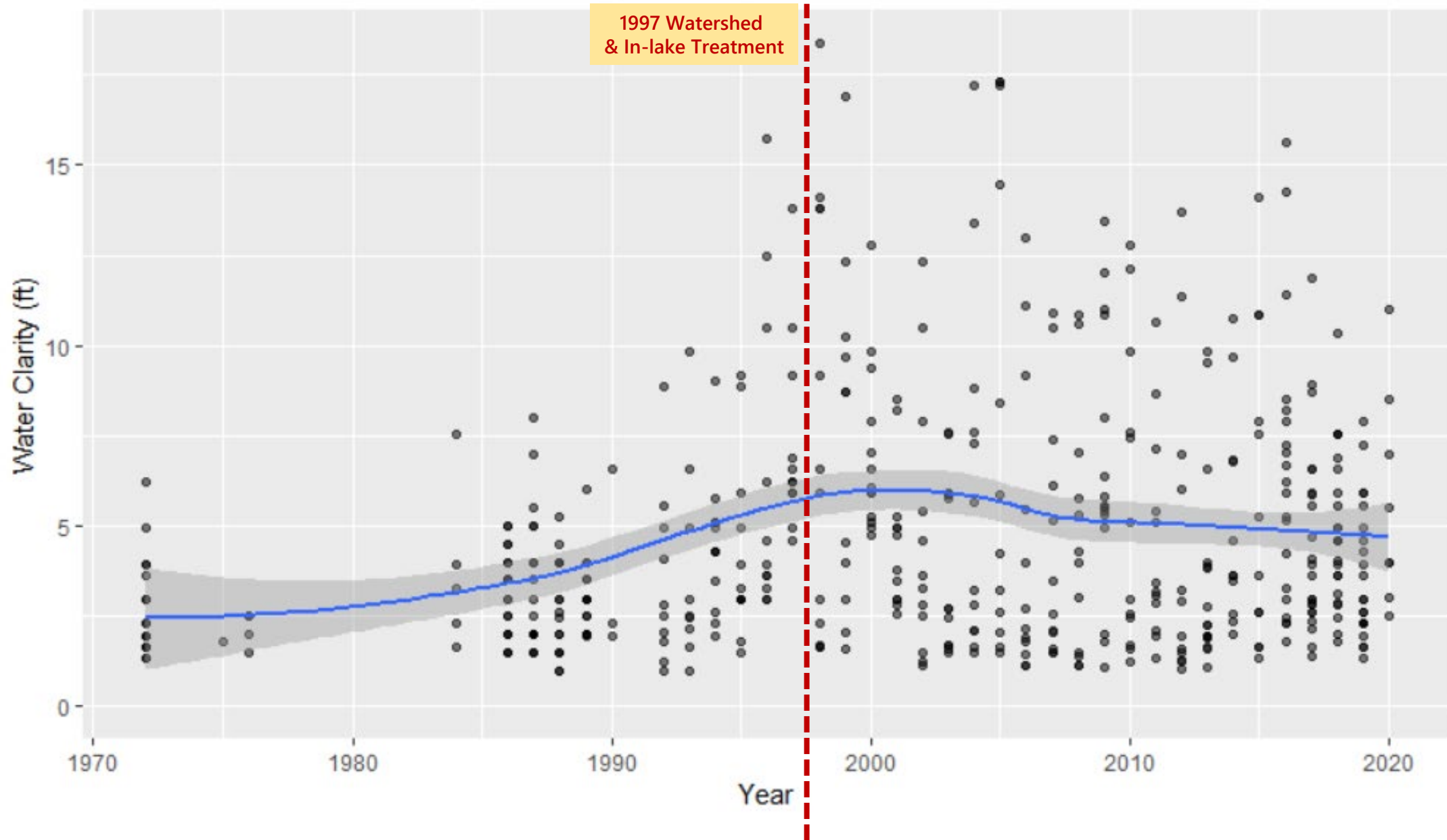
*East  
Beach*

- Bacteria levels at Cedar Lake beaches, have been below the MPCA standard of *E. coli* colony-forming units (red line).

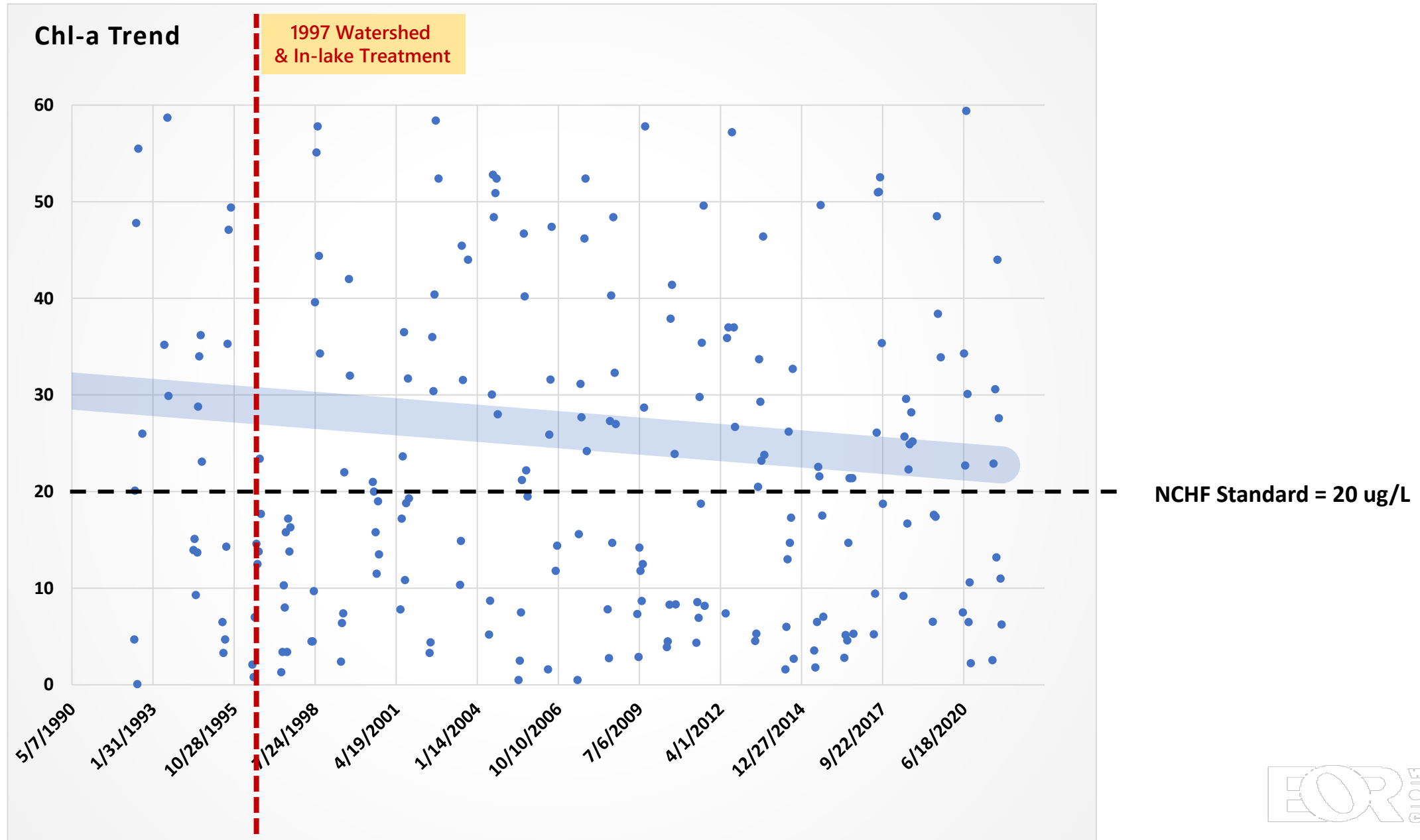
# LAKE OF THE ISLES



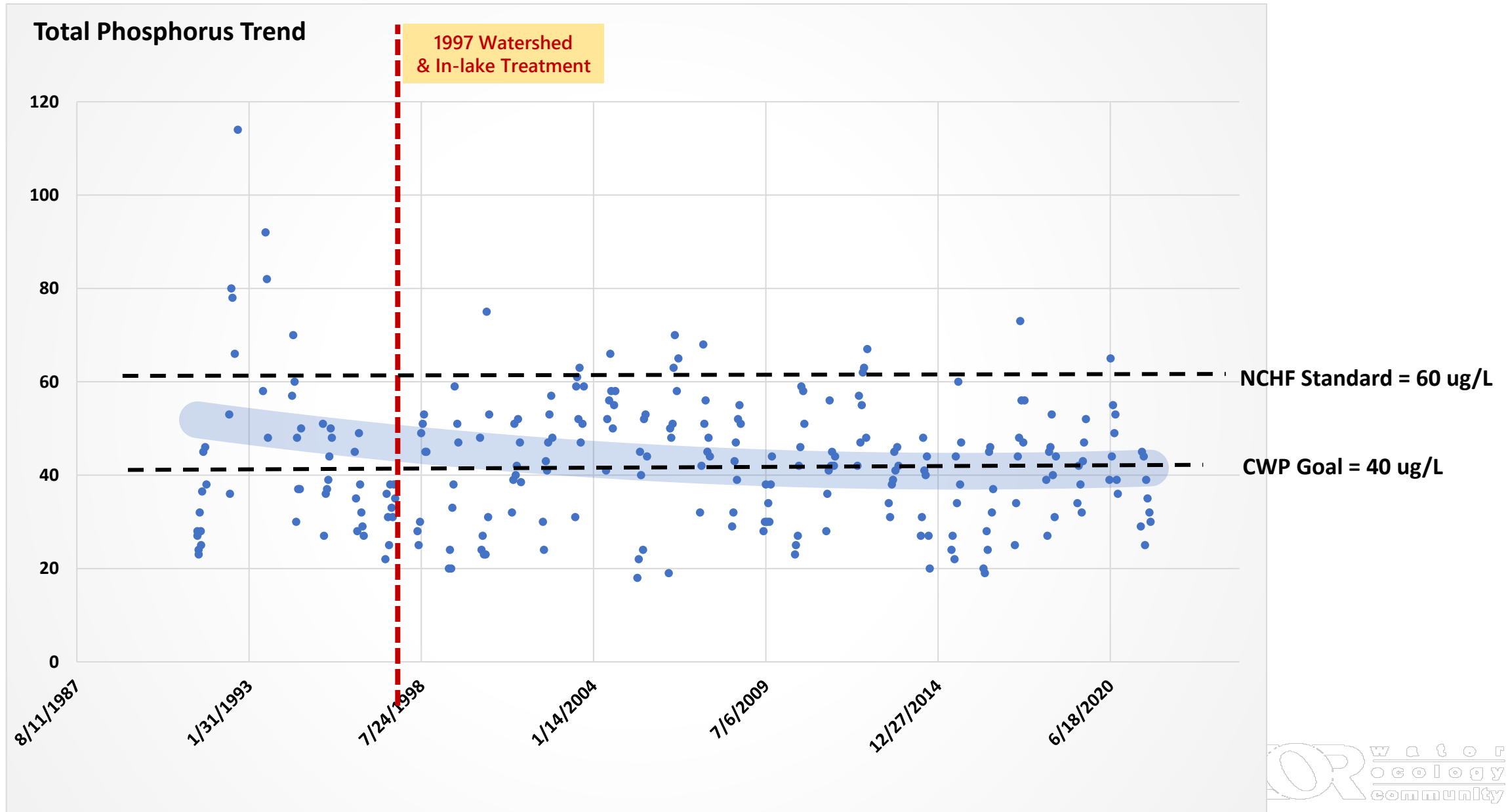
# LAKE OF THE ISLES TRANSPARENCY (1970-2020)



# LAKE OF THE ISLES CHLOROPHYLL A (1990-2021)



# LAKE OF THE ISLES PHOSPHORUS (1987-2021)

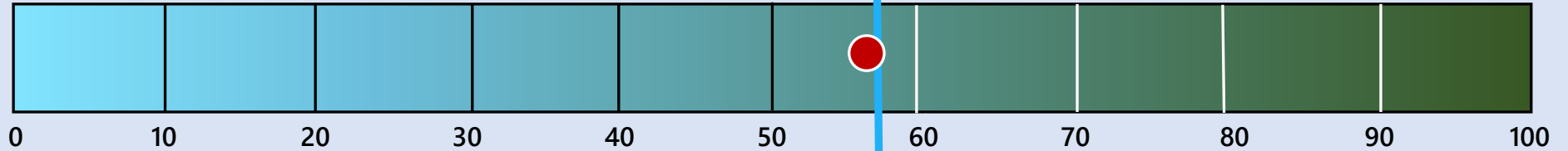


# LAKE OF THE ISLES TROPHIC STATE INDEX (TSI)

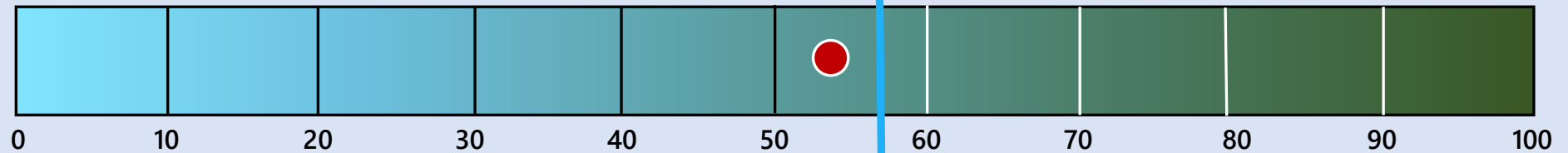
MONITORING YEARS  
● 2008-2021

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

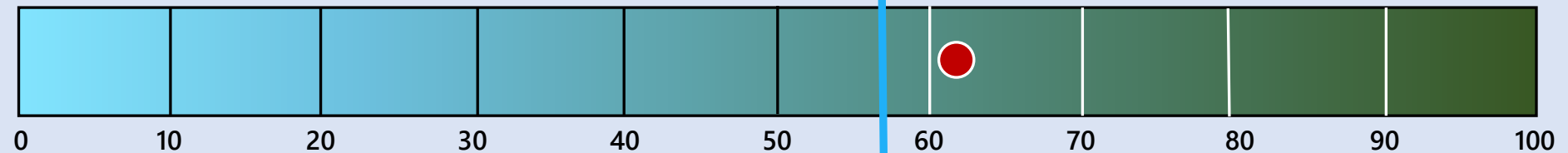
Trophic State Index (TSI)



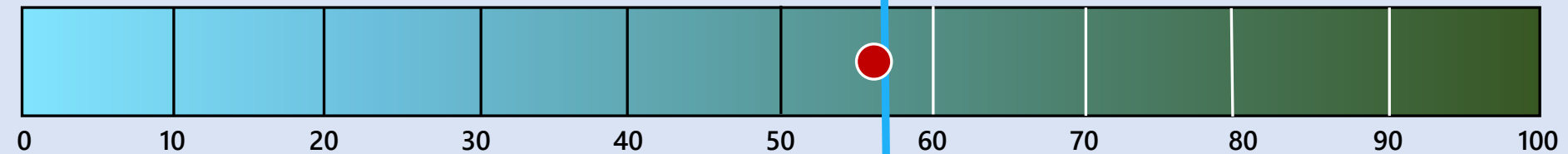
Transparency



Chlorophyll-a



Total Phosphorus



CWP Goal = 57



# BROWNIE LAKE TROPHIC STATE INDEX (TSI)

MONITORING YEARS

● 2008-2021

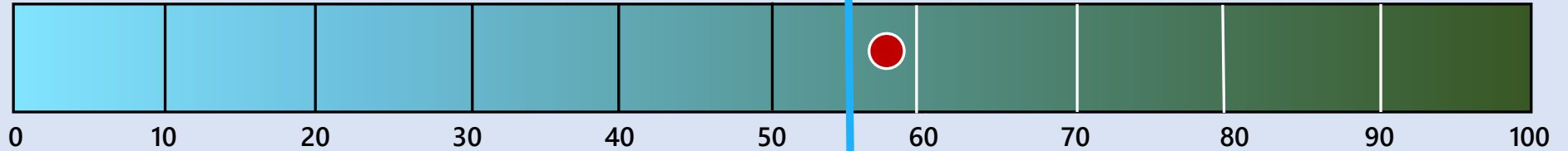
**Oligotrophic**  
(clear water)

**Mesotrophic**  
(moderately clear water)

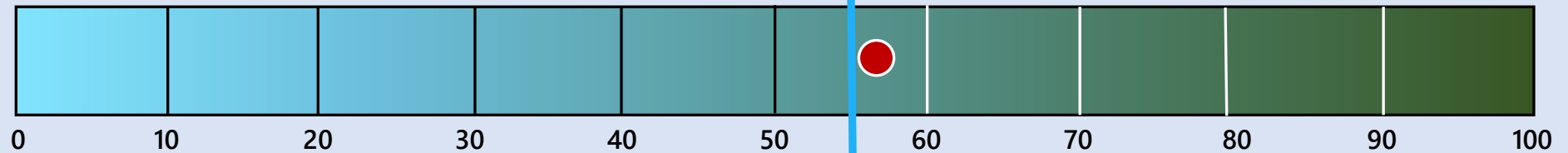
**Eutrophic**  
(green water)

**Hypereutrophic**  
(very green water)

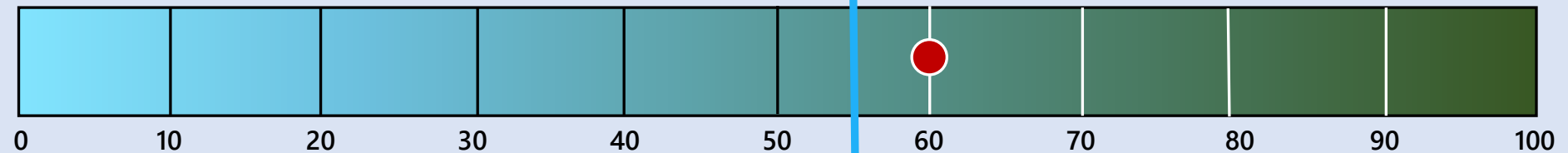
Trophic State Index  
(TSI)



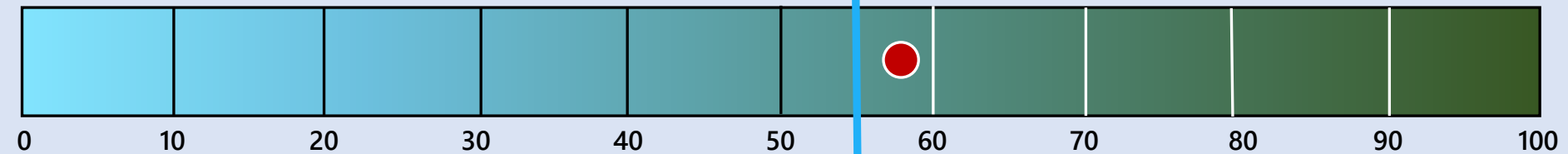
Transparency



Chlorophyll-a



Total Phosphorus



CWP Goal = 55



# TWIN LAKE TROPHIC STATE INDEX (TSI)

MONITORING YEARS

● 2008-2021

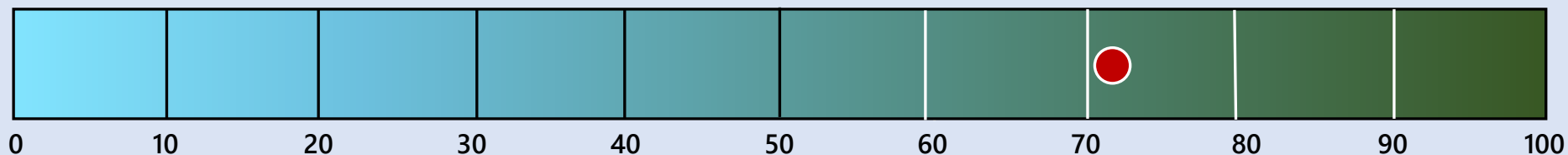
**Oligotrophic**  
(clear water)

**Mesotrophic**  
(moderately clear water)

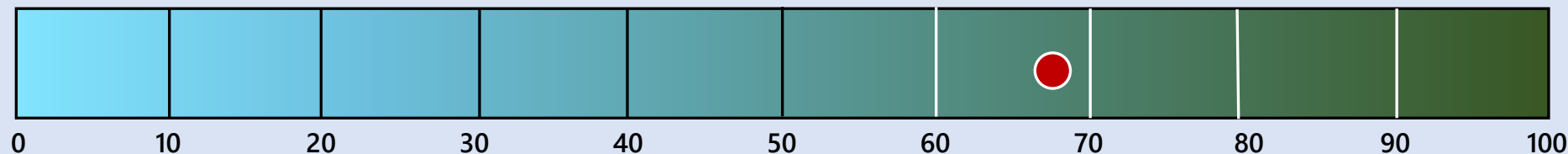
**Eutrophic**  
(green water)

**Hypereutrophic**  
(very green water)

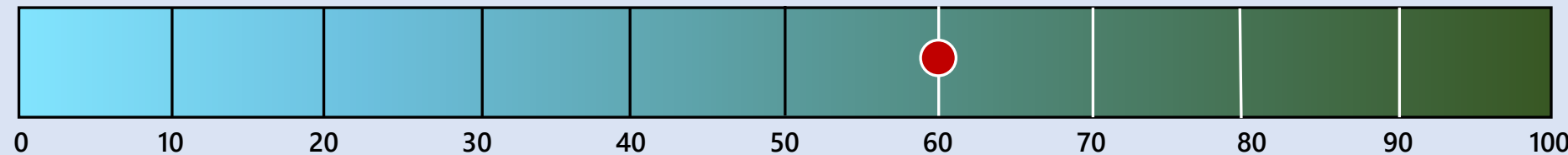
Trophic State Index



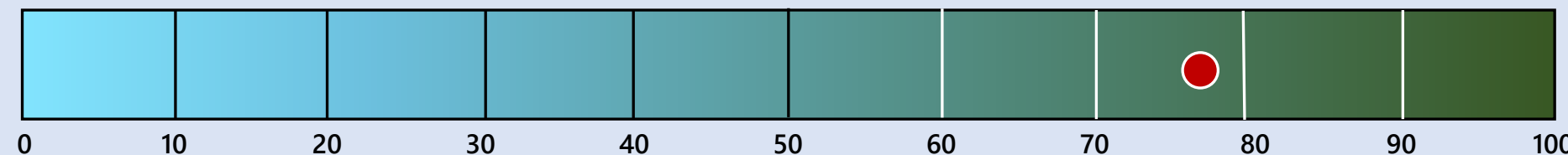
Transparency



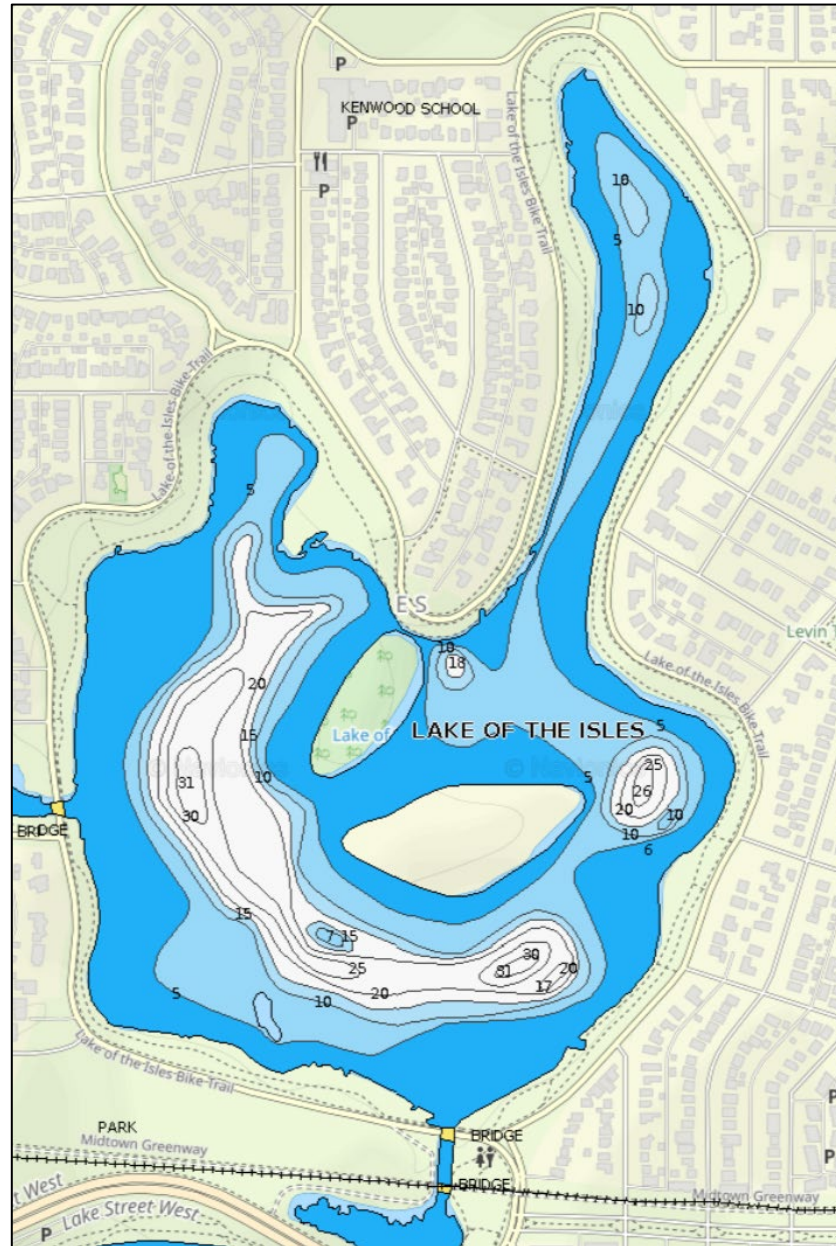
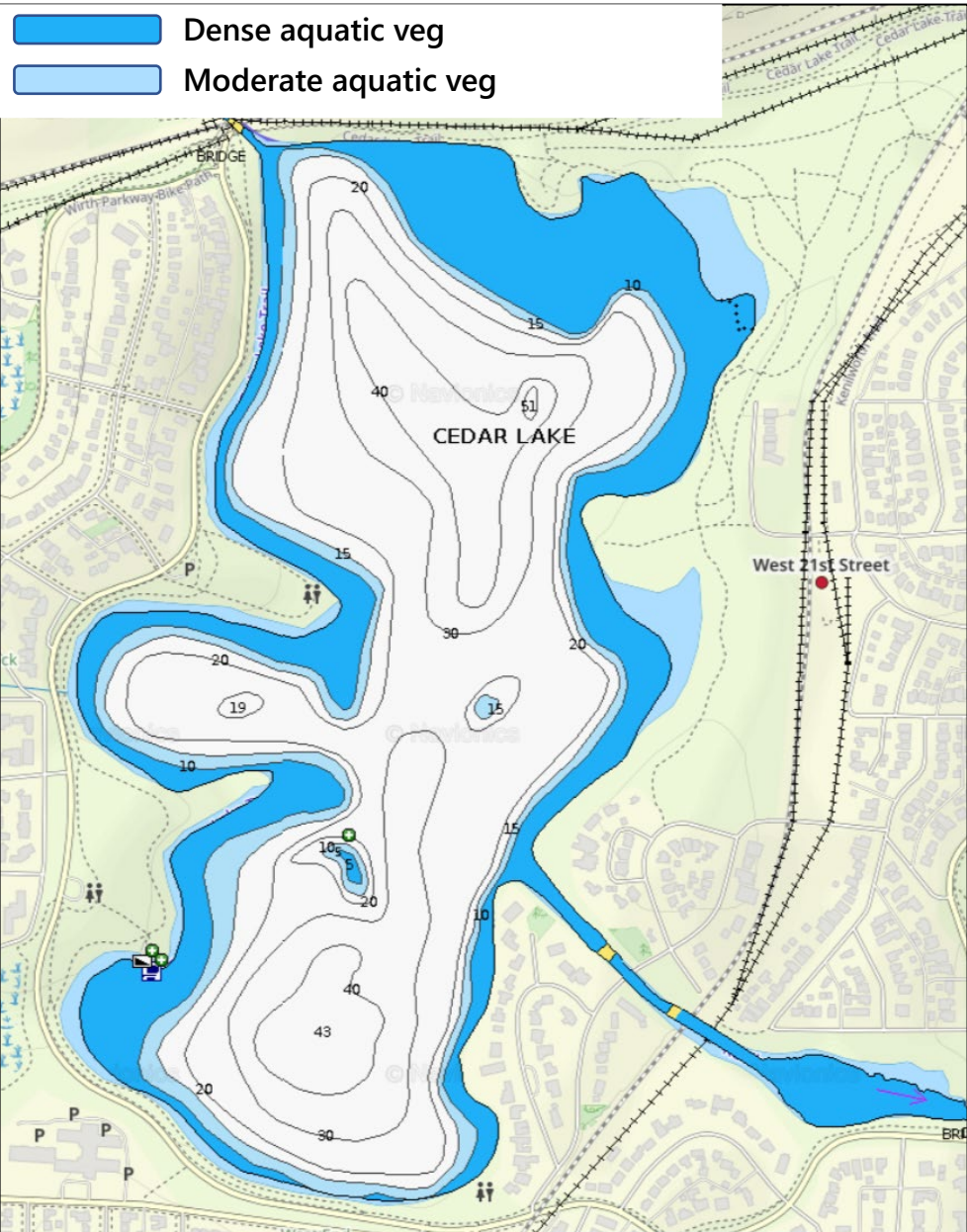
Chlorophyll-a



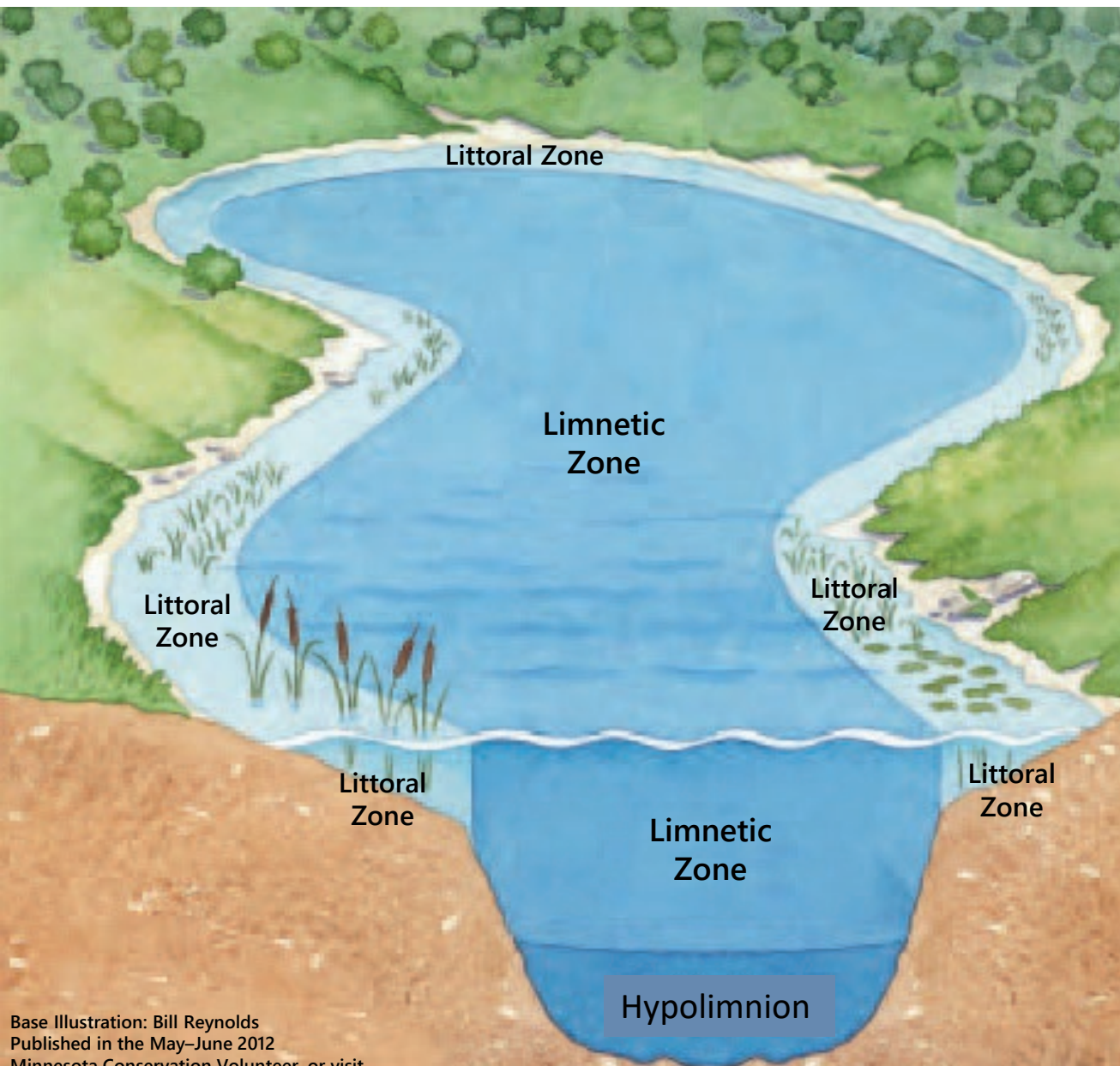
Total Phosphorus



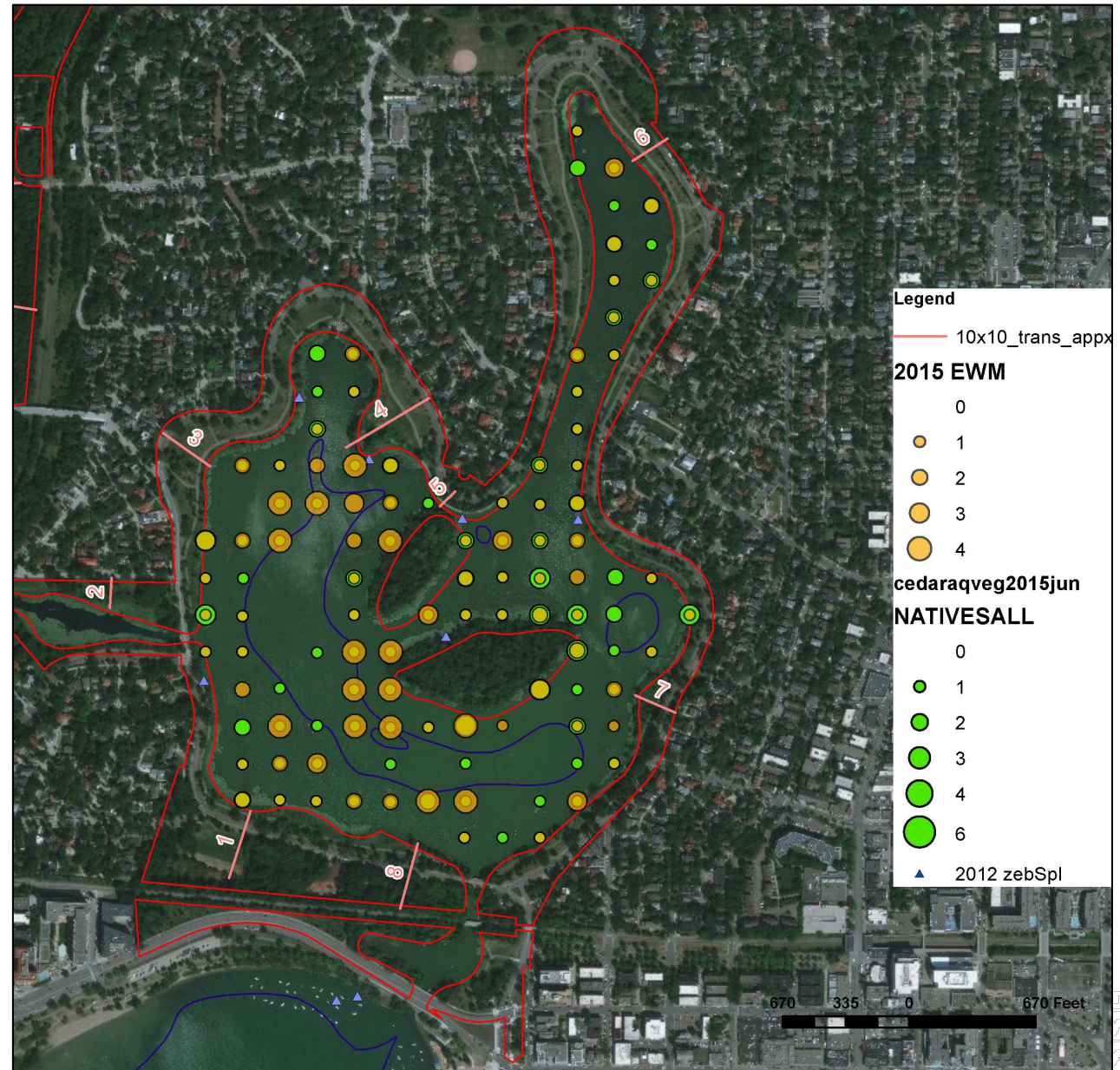
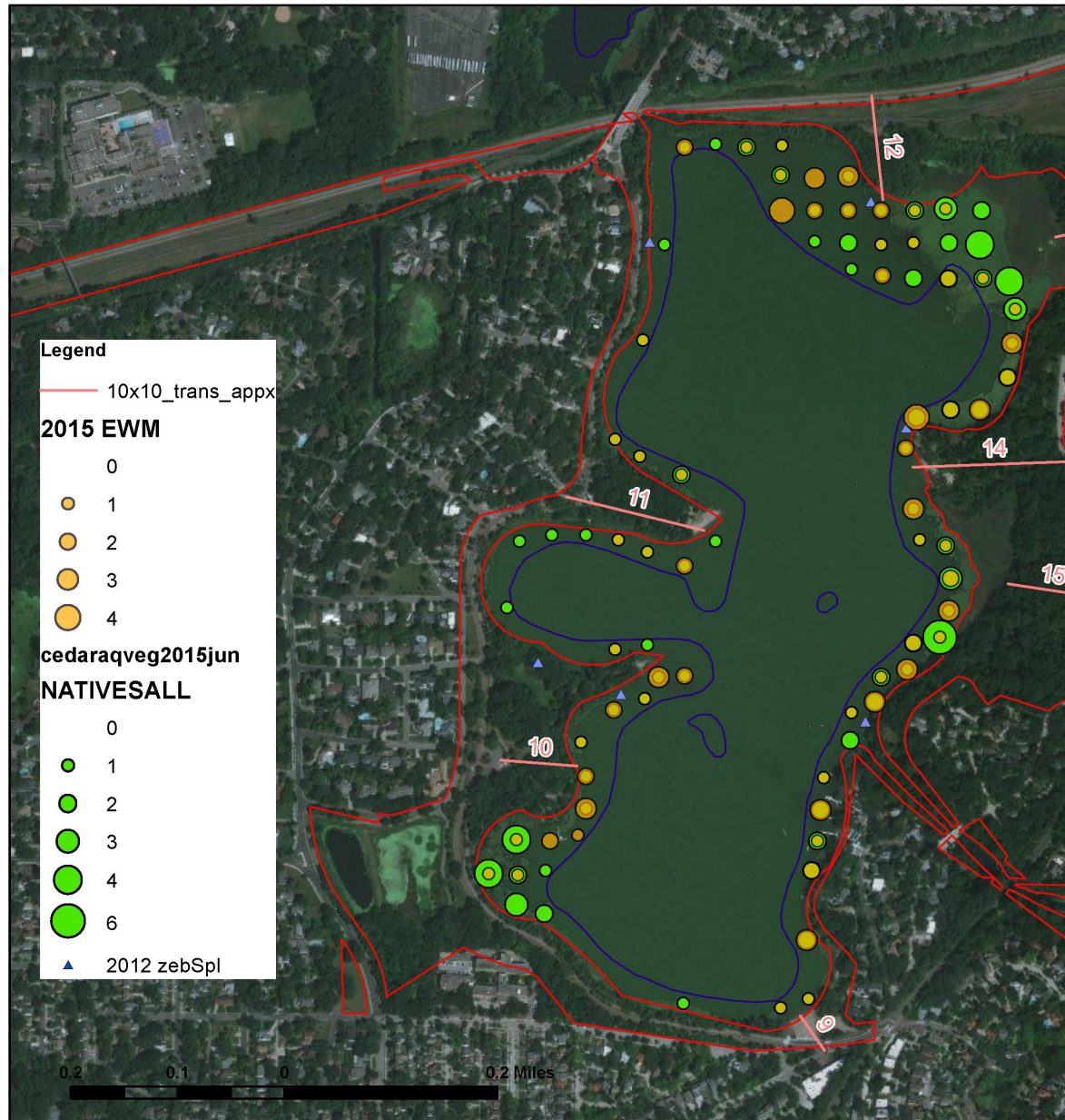
# AQUATIC VEGETATION: LAKE LITTORAL AREAS



# AQUATIC VEGETATION: LAKE LITTORAL AREAS



# AQUATICS: EURASIAN WATER MILFOIL VS NATIVE



## PRIMARY MANAGEMENT

- Largemouth Bass & Muskellunge

## WALLEYE

- Stocked 2005 - 2015

## NORTHERN PIKE

- Increasing in abundance

## BLUEGILL & BLACK CRAPPIE

- Abundant but small
- 2019 Die off

## CARP & OTHER BOTTOM FEEDERS

- Present



## WALLEYE

- Not stocked migrate from Cedar

## NORTHERN PIKE

- Increasing in abundance, smaller size

## BLUEGILL SUNFISH

- Abundant but small

## BLACK CRAPPIE

- Well below average

## CARP & OTHER BOTTOM FEEDERS

- Present



- Primary drivers of water quality in lakes are watershed influence and internal dynamics
- Deep (Cedar) and shallow (Isles) lakes are fundamentally different - these differences form the basis for future management strategies
- Gained an understanding of how lakes are evaluated from a scientific and regulatory standpoint
- The key parameters that lake managers use when assessing lakes are transparency, chlorophyll-a and phosphorus: the TSI Index
- The accomplishments of the Clean Water Partnership were to establish stringent water quality goals and to implement effective watershed and in-lake treatments
- Gained an understanding of current and historic water quality conditions

# QUESTIONS?



Thank you!

