

DNR use of Cooperative Lakes Monitoring Program data

Joe Nohner

Department of Natural Resources

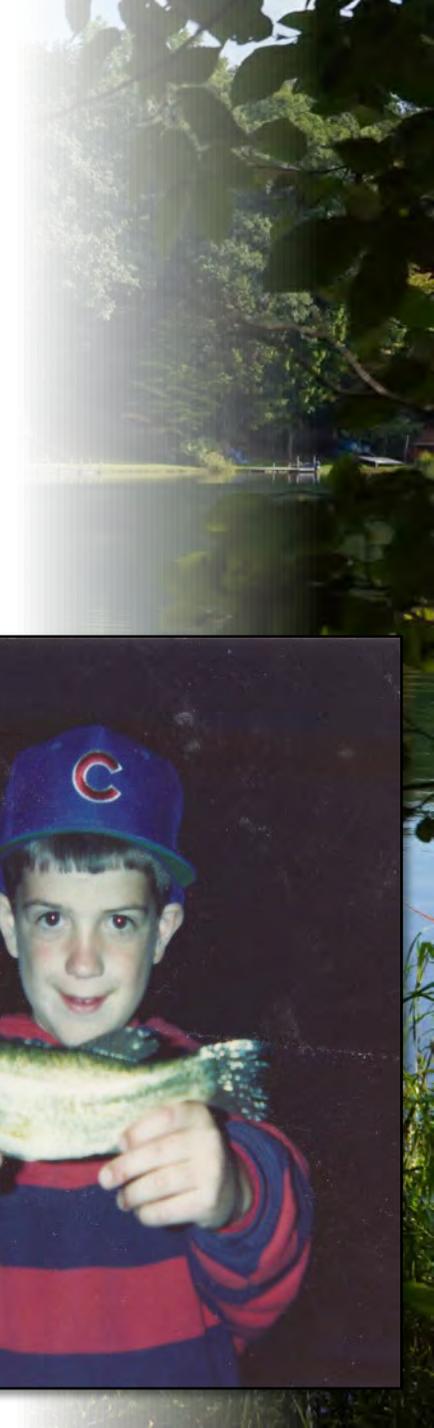
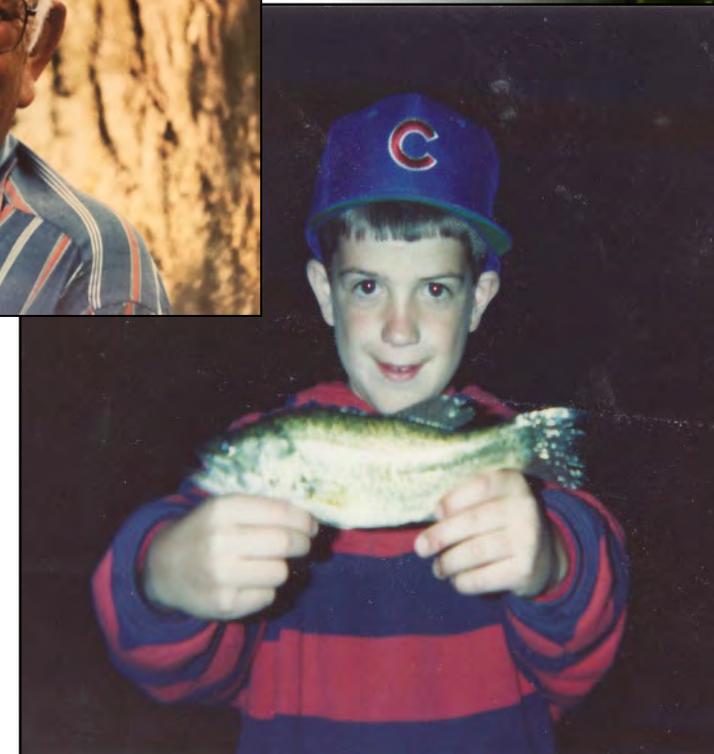
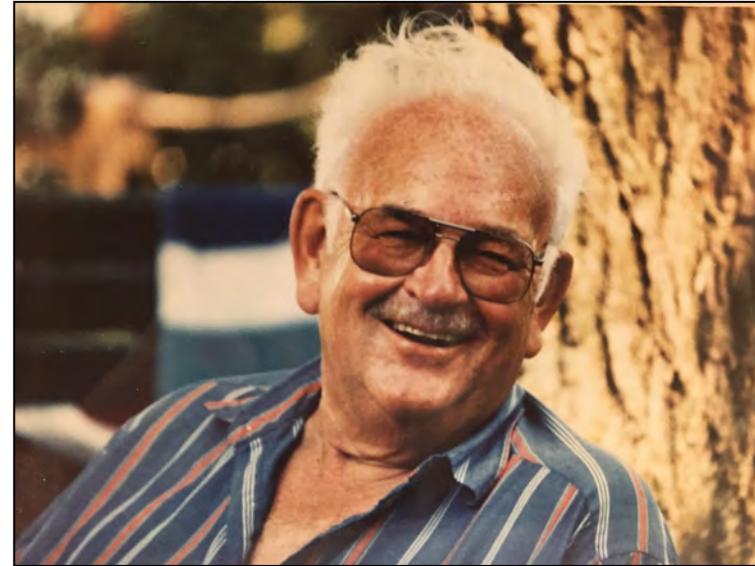
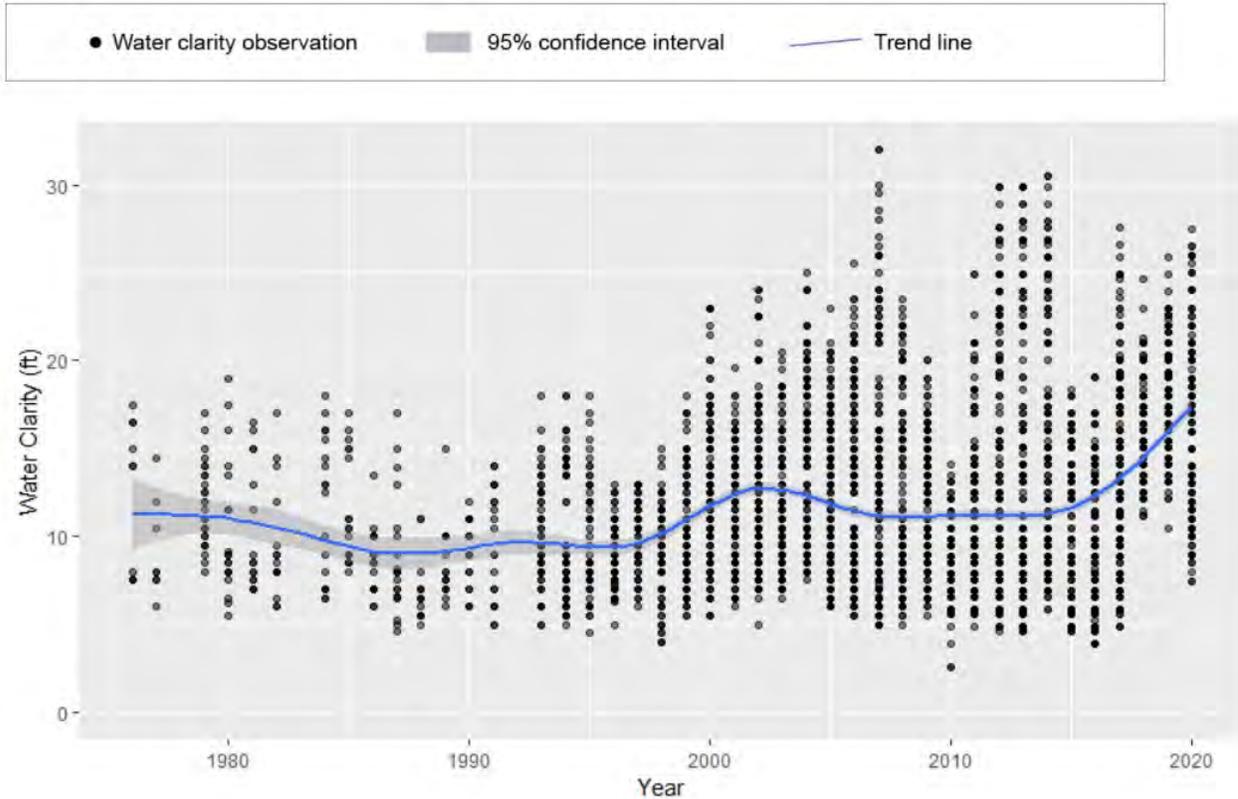
October 20, 2023

Mark Bugnaski Photography



A personal story about citizen science

Big Birch Lake, MN, Citizen Monitoring Program Data



What does DNR do?

- Mission
 - Committed to the conservation, protection, management, use and enjoyment of the state's natural and cultural resources for current and future generations.
- Fisheries Division
 - Research
 - Fishing regulations
 - Habitat management
 - Fish stocking
 - Management recommendations
 - Outreach and education
 - Surveys and assessments



DNR Fisheries Surveys and Assessments

- Discretionary surveys
- Status and Trends surveys
 - Lakes
 - Random sites, but no fixed sites
 - Water quality, shoreline development, woody habitat, fish populations
- Long term monitoring incredibly important



Working together

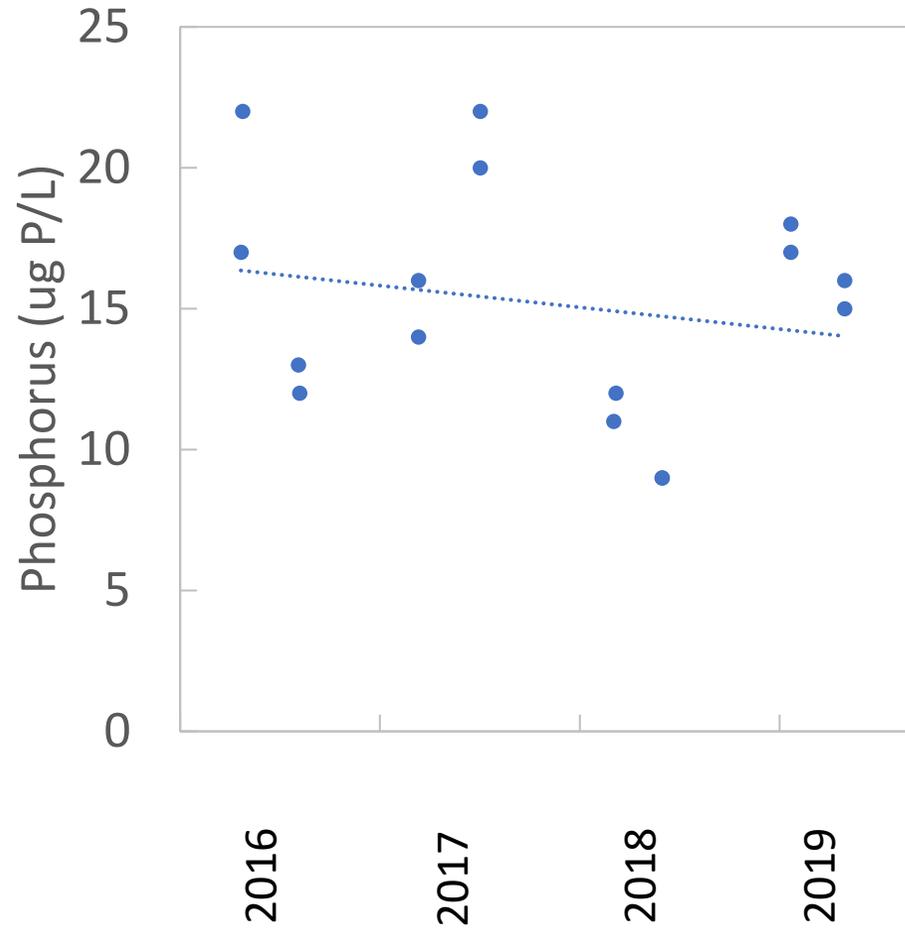
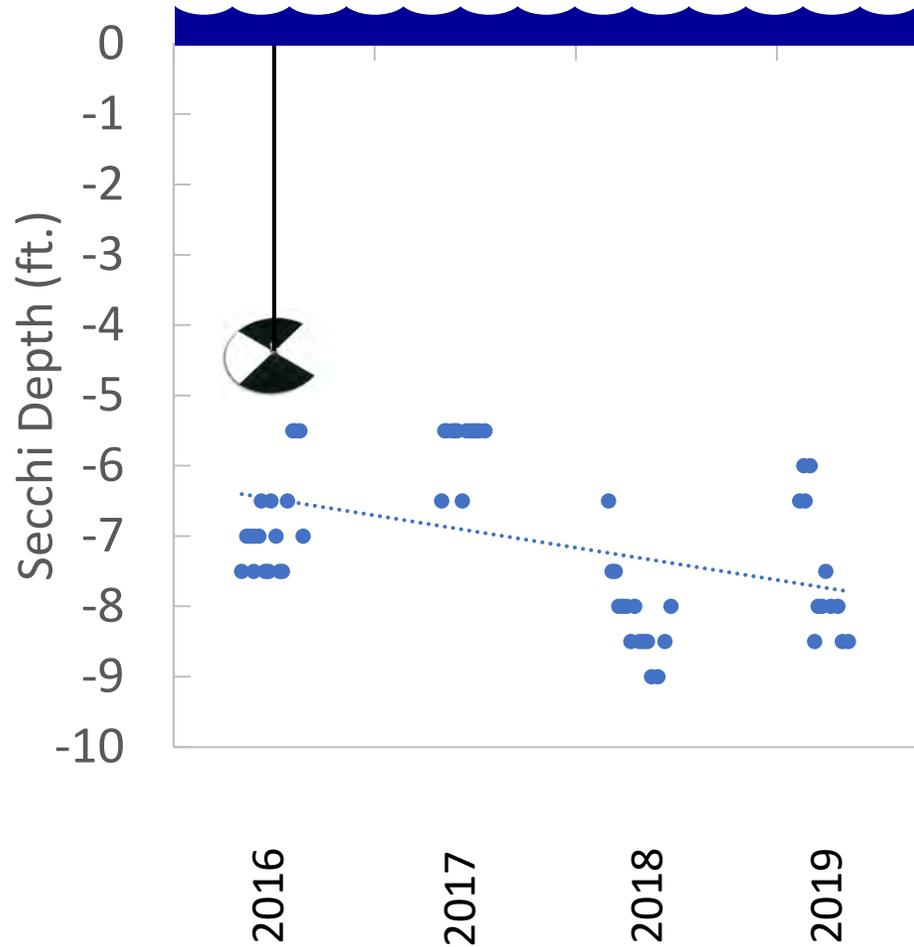
- Mission
 - Conservation, protection, management, use and enjoyment of the state's natural and cultural resources for current and future generations.
- How does DNR Fisheries use MiCorps data?
- How can we do a better job of working together toward shared goals?



Lake Gogebic



Lake Gogebic

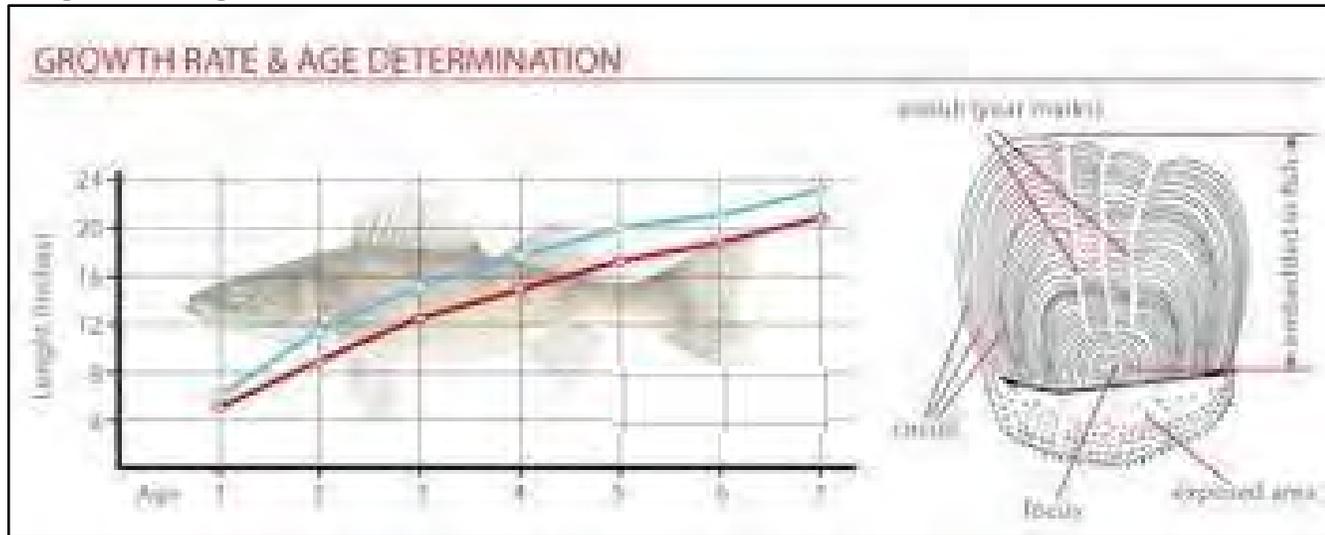


Data provided by MiCorps



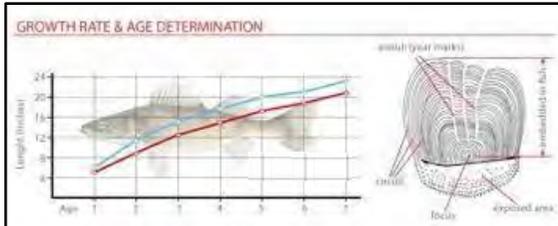
Lake Gogebic

Age and growth



Lake Gogebic

Age and growth

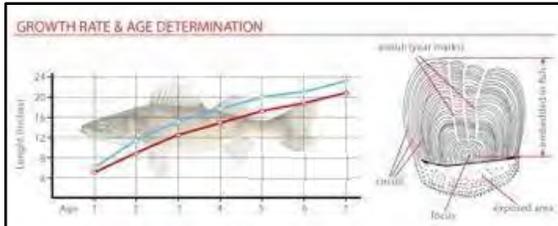


Mortality



Lake Gogebic

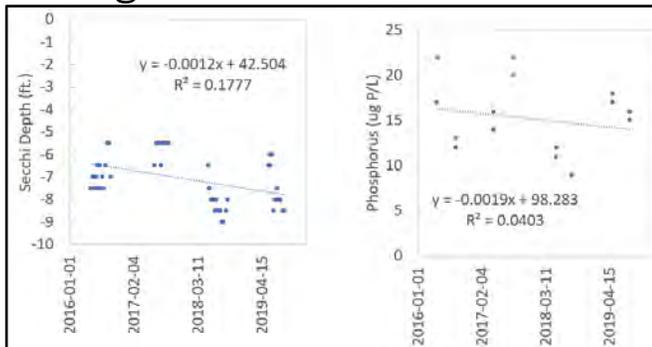
Age and growth



Mortality

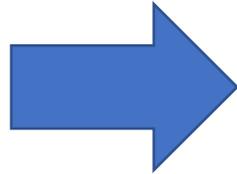
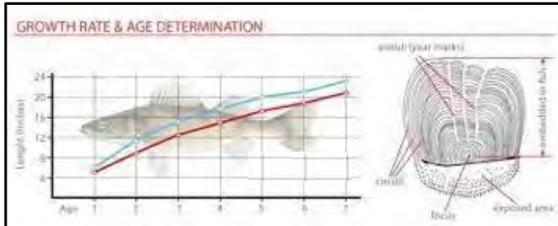


Changes in habitat

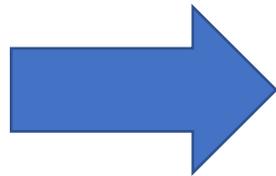


Lake Gogebic

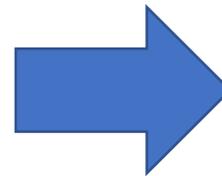
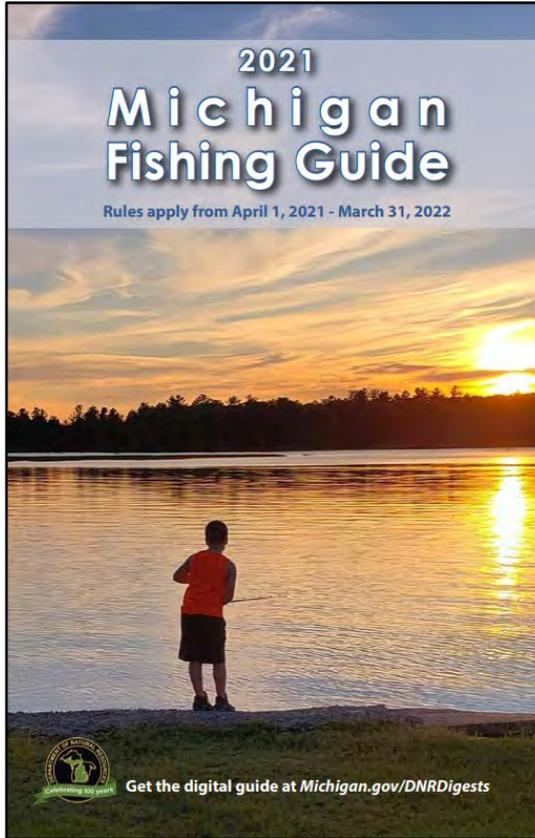
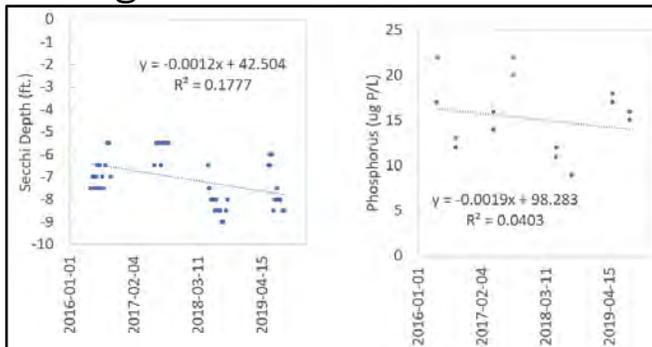
Age and growth



Mortality



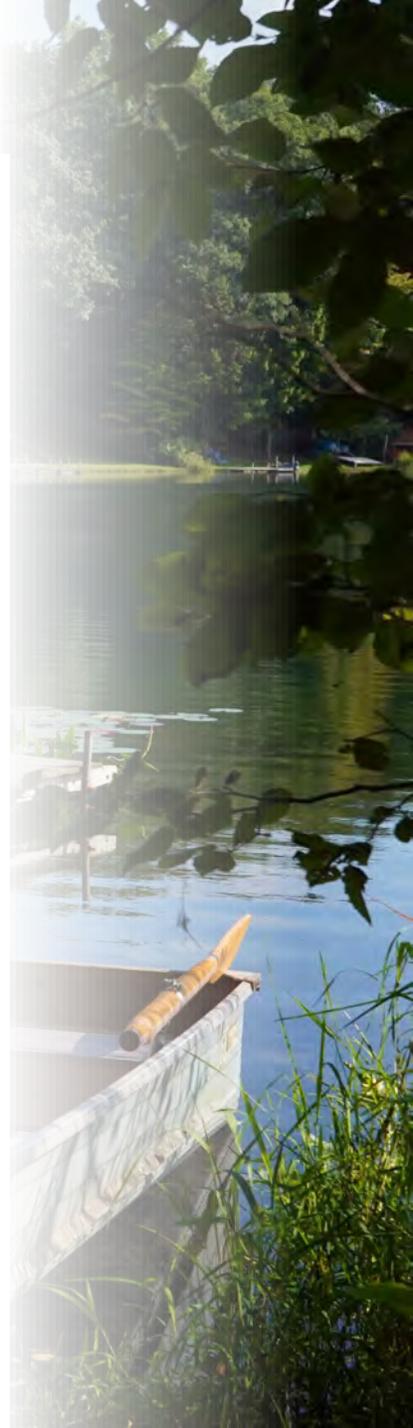
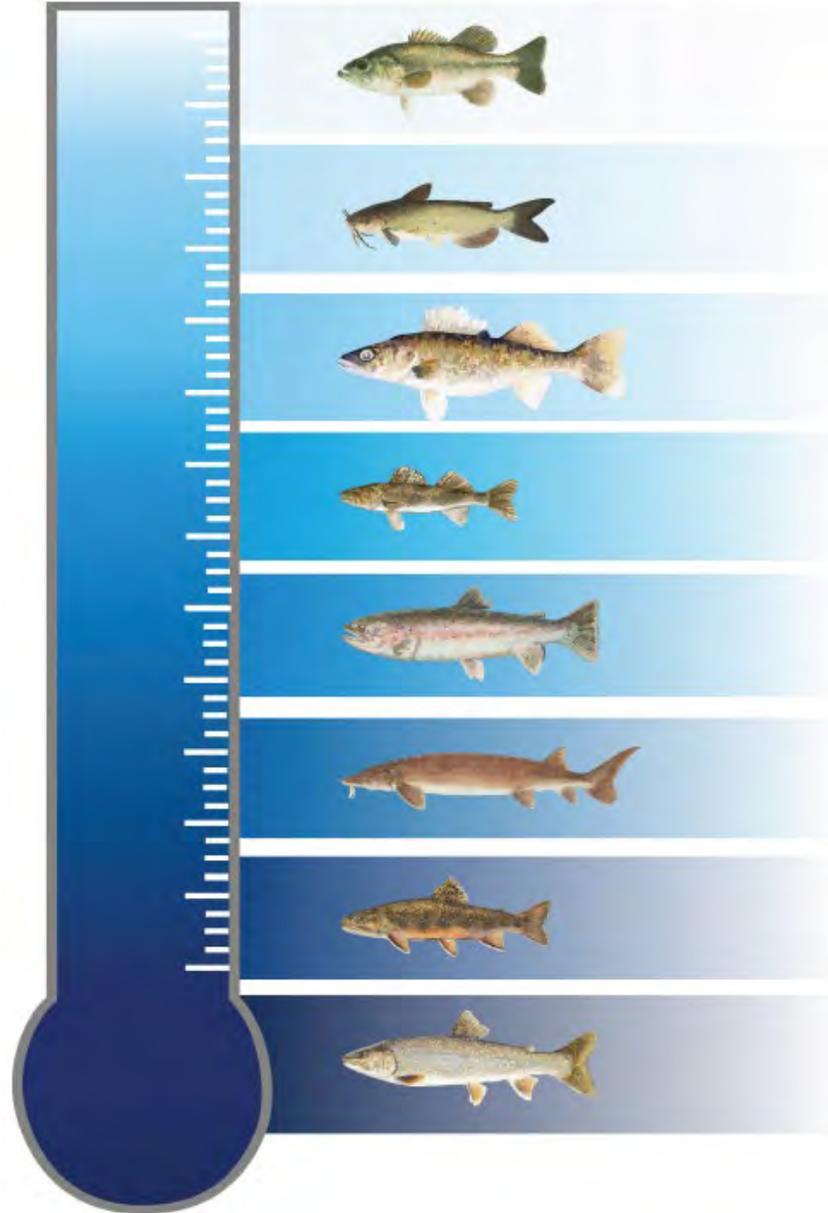
Changes in habitat



Temperature preferences

Some like it hot...

...and some like it cold.

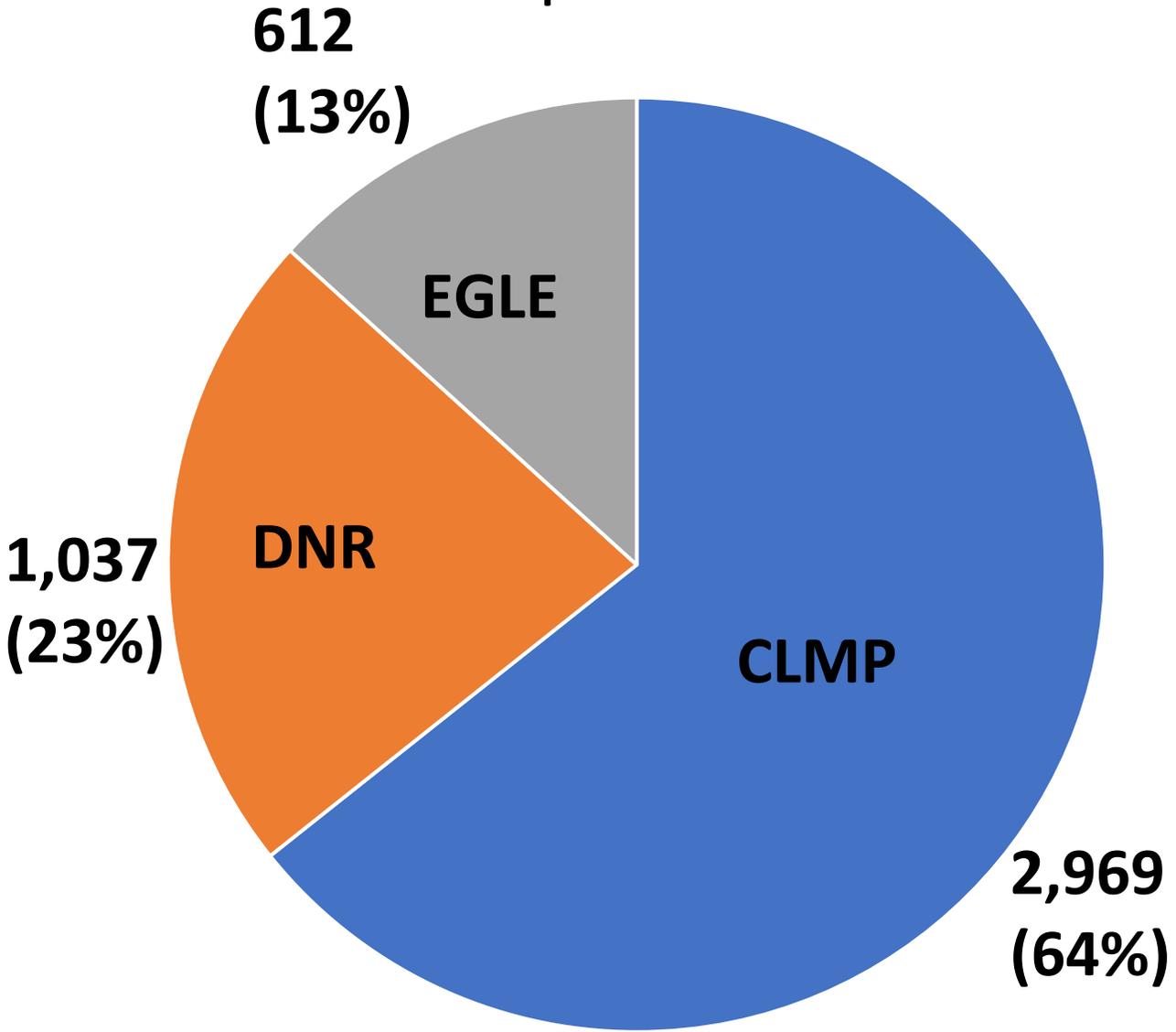


Coldwater fish example: Cisco habitat

- Wildlife Action Plan priority
- Losing habitat due to
 - ↑ Temperature
 - ↓ Dissolved oxygen

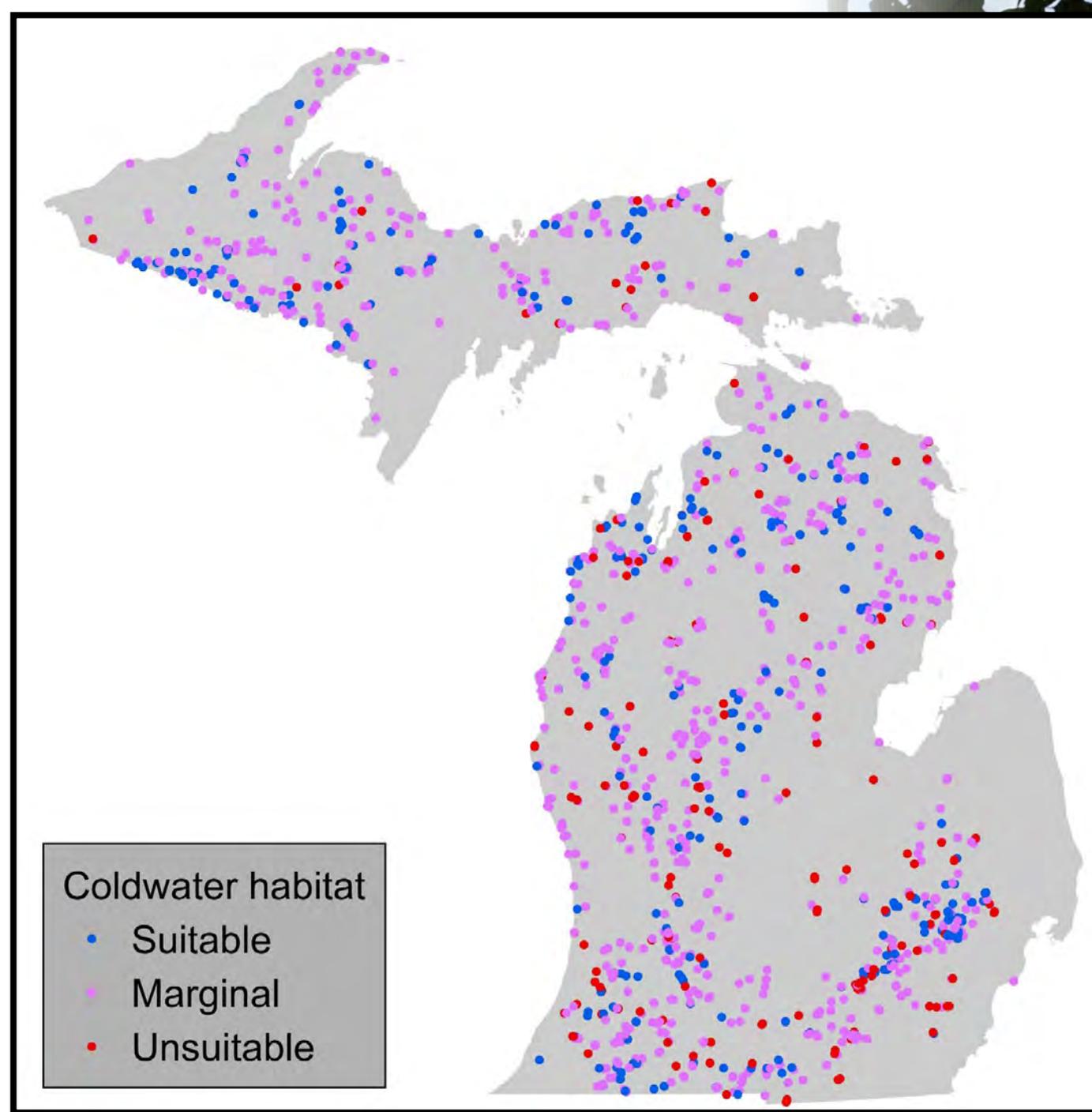


Statewide temperature and oxygen profiles



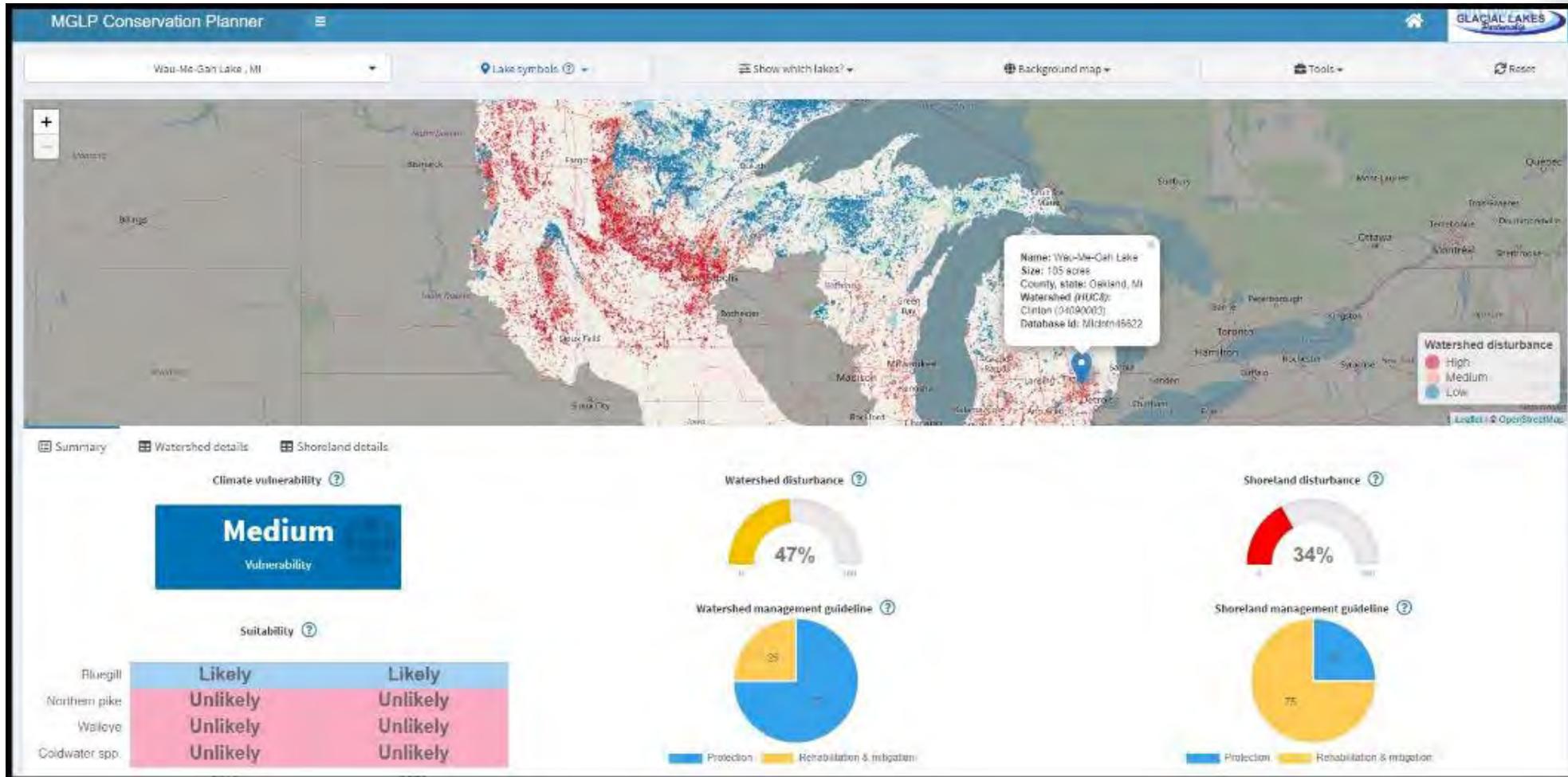
Coldwater habitat statewide

- Classified lakes based on temperature and oxygen
- Lake-specific management
- Regional and statewide planning
- Tracking trends over time





Changes in Fish Distribution: Midwest Glacial Lakes Partnership Conservation Planner



Available at: Midwestglaciallakes.org

Other examples of MiCorps data in action

- Walleye assessments on Mullet, Burt, Black, and Long lakes
- Status of the Fishery Reports
- Trophic status for managed lakes
- AIS surveillance
- Understanding causes of fish kills
- Fish stocking
- Understanding shoreline development



Benefits of MiCorps Data

- More information -> better decisions
- Data are yours
- Data wouldn't be collected otherwise
- Data are shared for larger regional and statewide analyses
- Gives you a seat at the table



Contacting DNR Fisheries



Michigan.gov | DNR COVID-19 RESPONSE | KEY TOPICS | CONTACT US | DOING BUSINESS | SEARCH

THE DEPARTMENT OF
NATURAL RESOURCES

THINGS TO DO | PLACES TO GO | BUY & APPLY | EDUCATION & SAFETY | MANAGING YOUR RESOURCES | ABOUT US

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Fisheries

Doing Business

Creel Clerks & Angler Surveys

Dams

Disease

Habitat Management

Hatcheries & Weirs

Natural Rivers

Research

Fish Stocking

Tribal Coordination

Management Units

Management Units

Each management unit covers the watersheds in their area - which includes the inland lakes, rivers and streams - in addition to the part of the Great Lakes that these drain into. Each unit has fisheries biologists and technicians that do research, conduct surveys, work with hatcheries to make stocking decisions, set fishing regulations, and work with their area research stations. All of this contributes to making sound decisions on how to manage Michigan's fisheries in both the Great Lakes and the inland lakes, rivers and streams.

WESTERN LAKE SUPERIOR	EASTERN LAKE SUPERIOR	NORTHERN LAKE MICHIGAN
NORTHERN LAKE HURON	CENTRAL LAKE MICHIGAN	SOUTHERN LAKE HURON
SOUTHERN LAKE MICHIGAN	LAKE ERIE	

Contact Us

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MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

Using Cooperative Lakes Monitoring Program Data for Inland Lake Assessment

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Using CLMP Data for Lake Assessment

- What is *assessment*?
- Nutrient assessment
- Coldwater Fishery assessment



Integrated Report

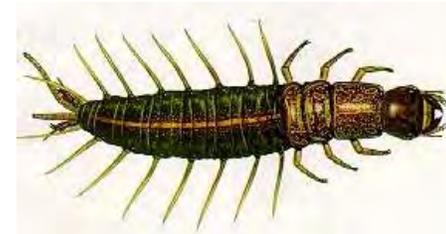
- Requirement for those with Clean Water Act authority (EGLE- WRD)
- Biennially (even years): report on water quality
 - **303(d) Impaired Waters.** Not supporting designated use(s)
 - **305(b) All Water Conditions.** Extent of designated use support
 - **314 Lakes.** Trophic classification and designated use support
- **INTEGRATED** report – all three sections

Integrated Report

- Takes *Monitoring Data*, translates to waterbody health through *Designated Use Support*
- Assessment Decision:
Supporting *Not Supporting (Impaired)* *Insufficient Information*

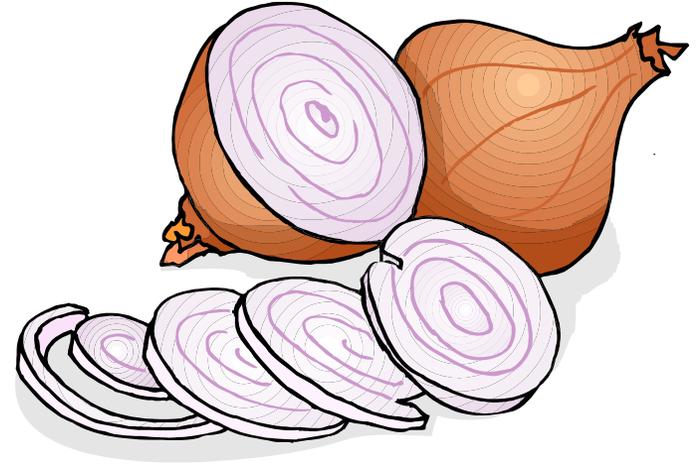
Monitoring Data

- Water Chemistry
- Fish Contaminant
- Biological Integrity
- Beach *E. coli*
- River/Stream *E. coli*
- Sediment Chemistry
- WRD & outside agencies, organizations, volunteers



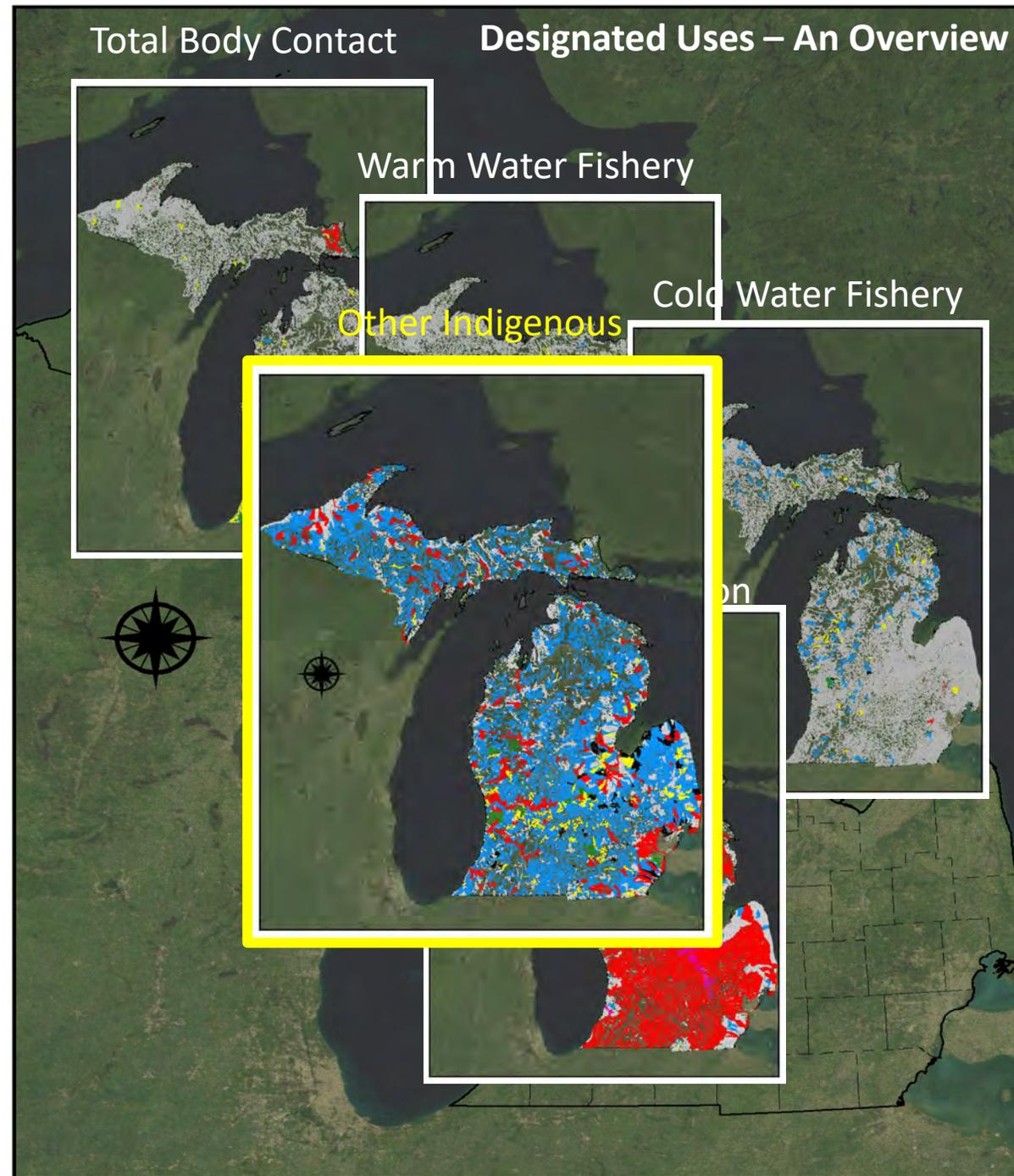
Designated Uses

- The uses/values for which ALL Michigan's surface waters are protected.
 - Agriculture
 - Navigation
 - Industrial water supply
 - Warmwater fishery/*Coldwater fishery**
 - **Other indigenous aquatic life and wildlife**
 - Partial body contact recreation
 - Fish consumption
 - Total body contact recreation (May 1 – Oct 31)
 - *Public water supply**
- Each one is looked at as a separate 'layer'.



Support **Not Support**
Insufficient Info

Each use is looked at separately to understand data and potential problems on a statewide basis.



Other Indigenous Aquatic Life & Wildlife Use

- Broadly encompasses those critters living in/near water
- Indicators of water and habitat quality
- Monitoring Tools:
Water Chemistry, Biological Surveys



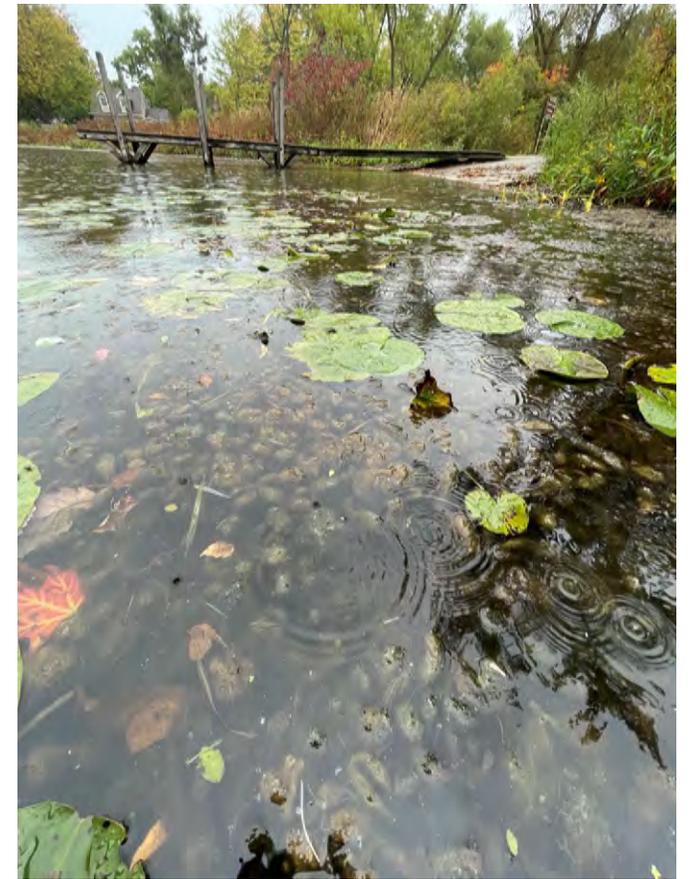


Other Indigenous Aquatic Life & Wildlife Use in Lakes

- Water chemistry
- Nutrient Impacts/Expression
- Water Quality Standards: *No numeric nutrient criteria*
- Narrative Rule: “Nutrients shall be limited...”

Nutrient Expression Assessment in Lakes

- Algal Blooms (complaints, aerial imagery)
 - Repeated, persistent, extensive blooms
- Macrophyte coverage (field documentation, ANC permits)
 - Very dense macrophyte coverage
 - High extent and frequency of treatment; can not mask problems through herbicide application
- Trophic State (total phosphorus, chlorophyll a, and secchi depth)



Lake Trophic State Classifications

- Trophic State Index: Set of equations to put *Phosphorus, Chlorophyll a, and Secchi depth* on the same scale and set cutoffs for different lake classes based on productivity

	Nutrients	Algae/Macrophytes	Water Clarity	Oxygenated Cool/Cold Water
Hypereutrophic	High	High		
Eutrophic				
Mesotrophic				
Oligotrophic			High	High

Integrated Report: OIALW Assessment TSI CLMP data (Secchi, TP, Chlorophyll a)

MI/EGLE/WRD-22/001

- Calculate TSI value for each parameter
- Average July – September data
- IR Assessment: requires 2 or 3 parameters
- Focus on previous 2 years, also look at trend
- Overall OIALW Assessment can include CLMP TSI, other program TSI, & algae/macro info
- Details in Integrated Report Assessment Methodology



Water Quality and Pollution Control in Michigan 2022

Sections 303(d), 305(b), and 314
Integrated Report

Table 3.1: Carlson's TSI Equations.

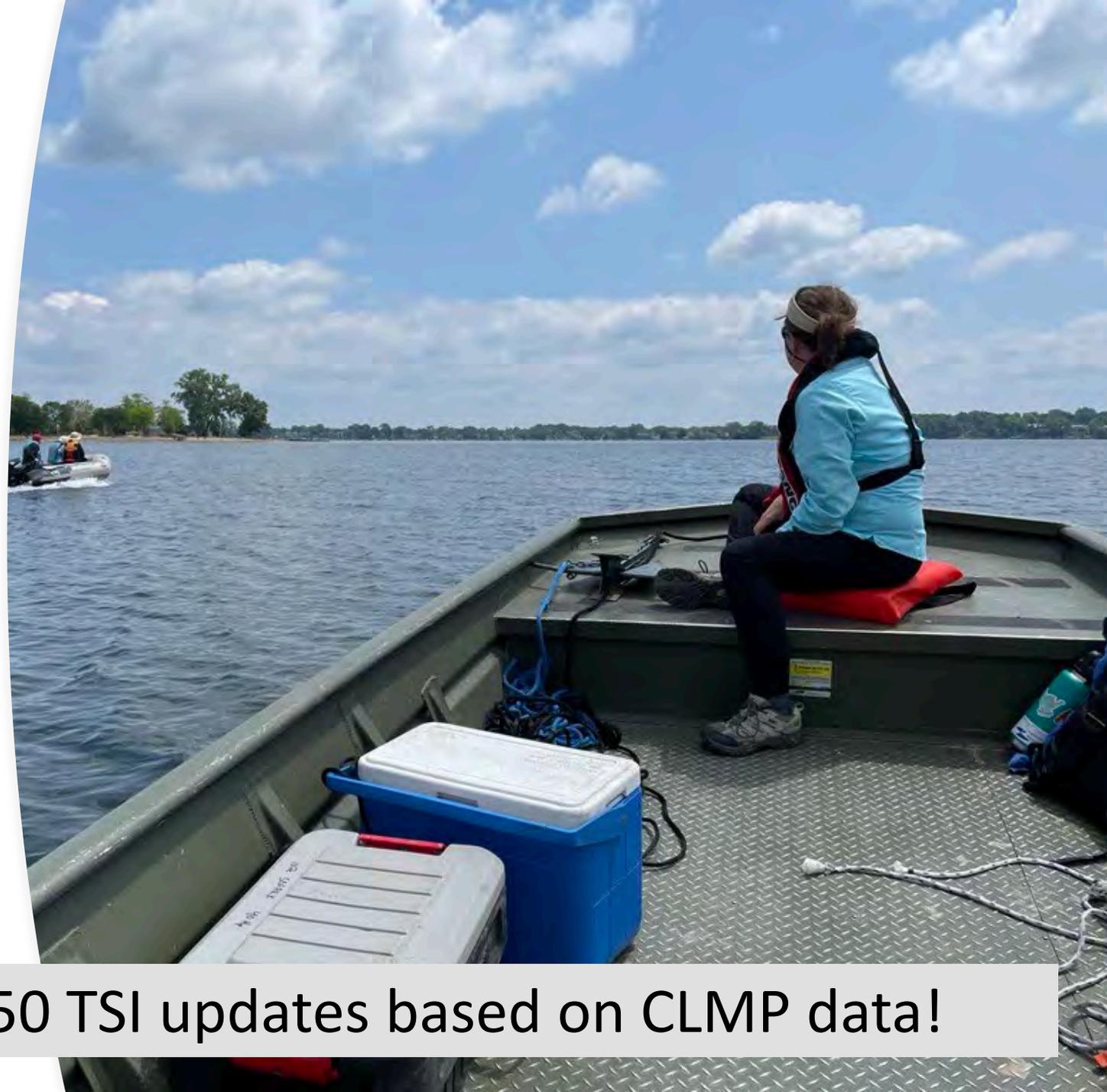
$TSI_{SD} = 60 - 14.40 \ln SD$	SD = Secchi depth transparency (m)
$TSI_{TP} = 4.15 + 14.42 \ln TP$	TP = total phosphorus concentration (ug/l)
$TSI_{CHL} = 30.6 + 9.81 \ln CHL$	CHL = chlorophyll a concentration (ug/l)

Table 3.2: Michigan Inland Lakes Trophic Status Classification Criteria.

Trophic State	Carlson's TSI	TP (ug/l)	SD (m)	CHL (ug/l)
Oligotrophic	<38	<10	>4.6	<2.2
Mesotrophic	38-48	10-20	2.3-4.6	2.2-6
Eutrophic	49-61	21-50	0.9-2.2	6.1-22
Hypereutrophic	>61	>50	<0.9	>22

Trophic State Index: CLMP data

- 2022 CLMP lakes
 - 199 total phosphorus
 - 161 chlorophyll a
 - 275 secchi disk
- 115 lakes collected all 3!
- CLMP strengths
 - Multiple measurements in a year
 - Long term data



2024 Integrated Report: ~ 250 TSI updates based on CLMP data!

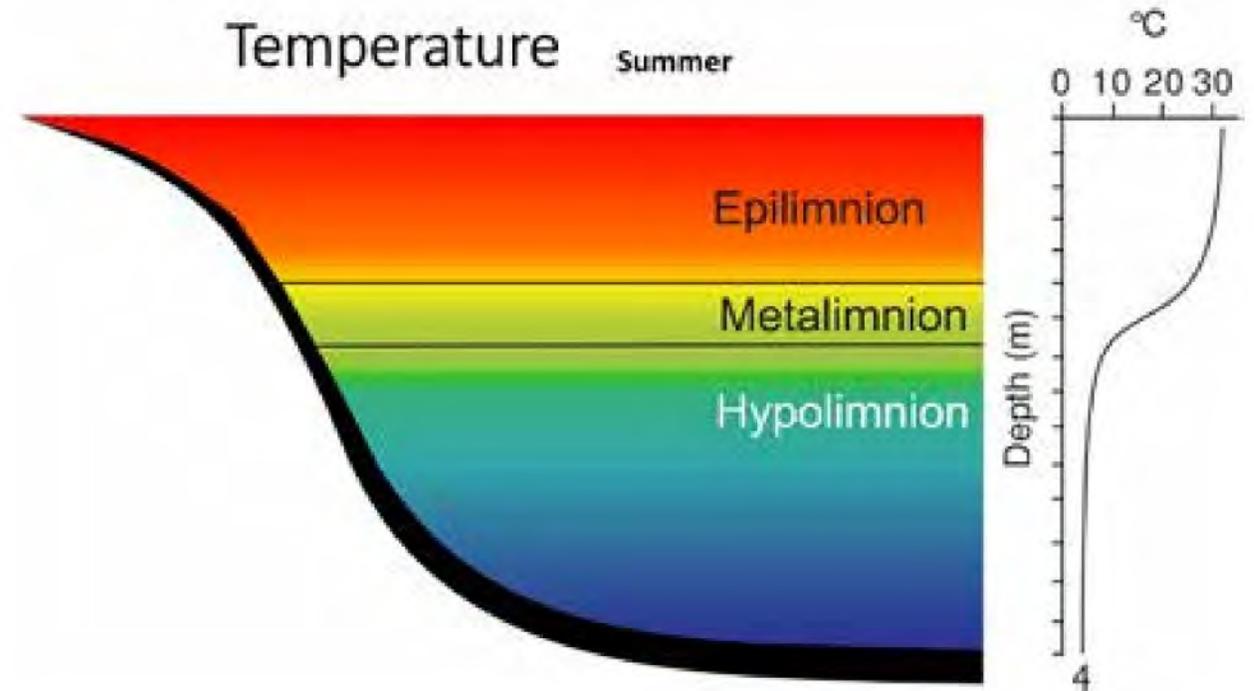
Coldwater Fishery Designated Use

- Designated Coldwater Lakes
 - WQS Definition: ability of a waterbody to support a **balanced, integrated, adaptive community** of fish species which thrive in relatively cold water, generally including any of the following: (i) Trout. (ii) Salmon. (iii) Whitefish. (iv) Cisco
 - Coldwater Lakes of Michigan," August 1976
- Fish community – BPJ, no biotic index
- ***Dissolved Oxygen Water Quality Standard***



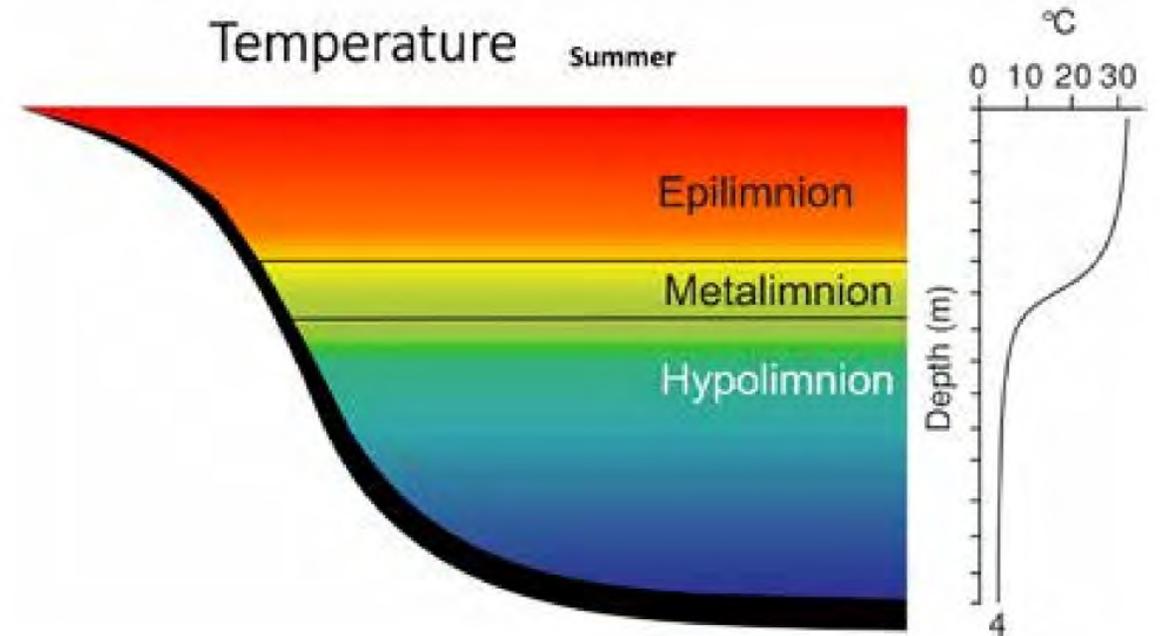
Coldwater Lakes Dissolved Oxygen WQS

- Goal: maintain an area oxygenated cold water
- Critical period: summer stratification



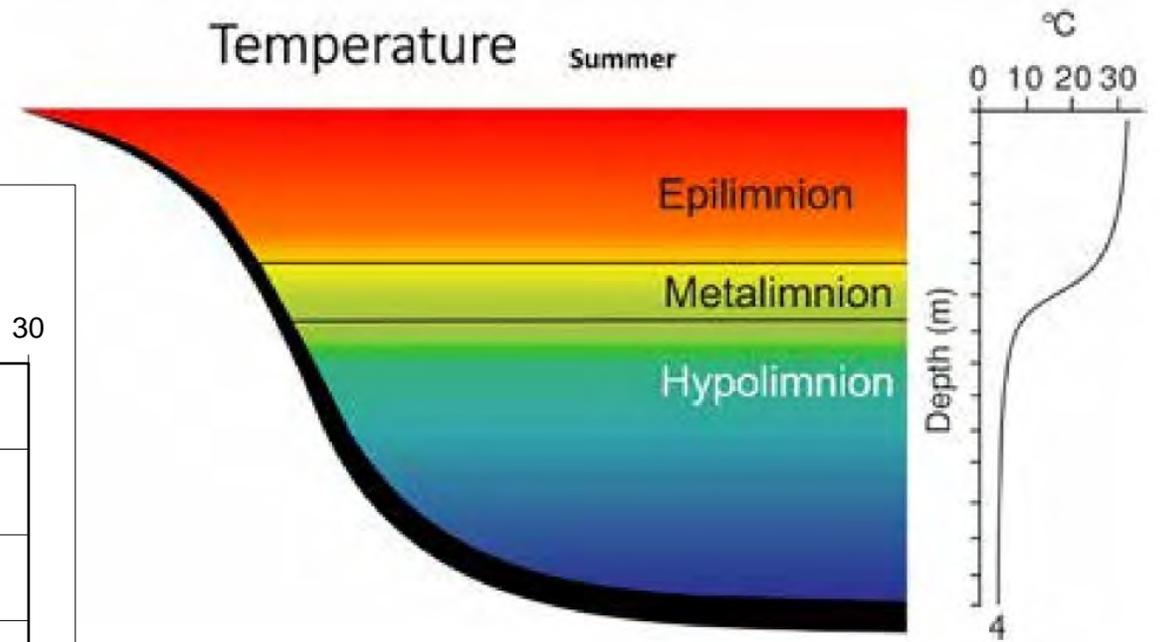
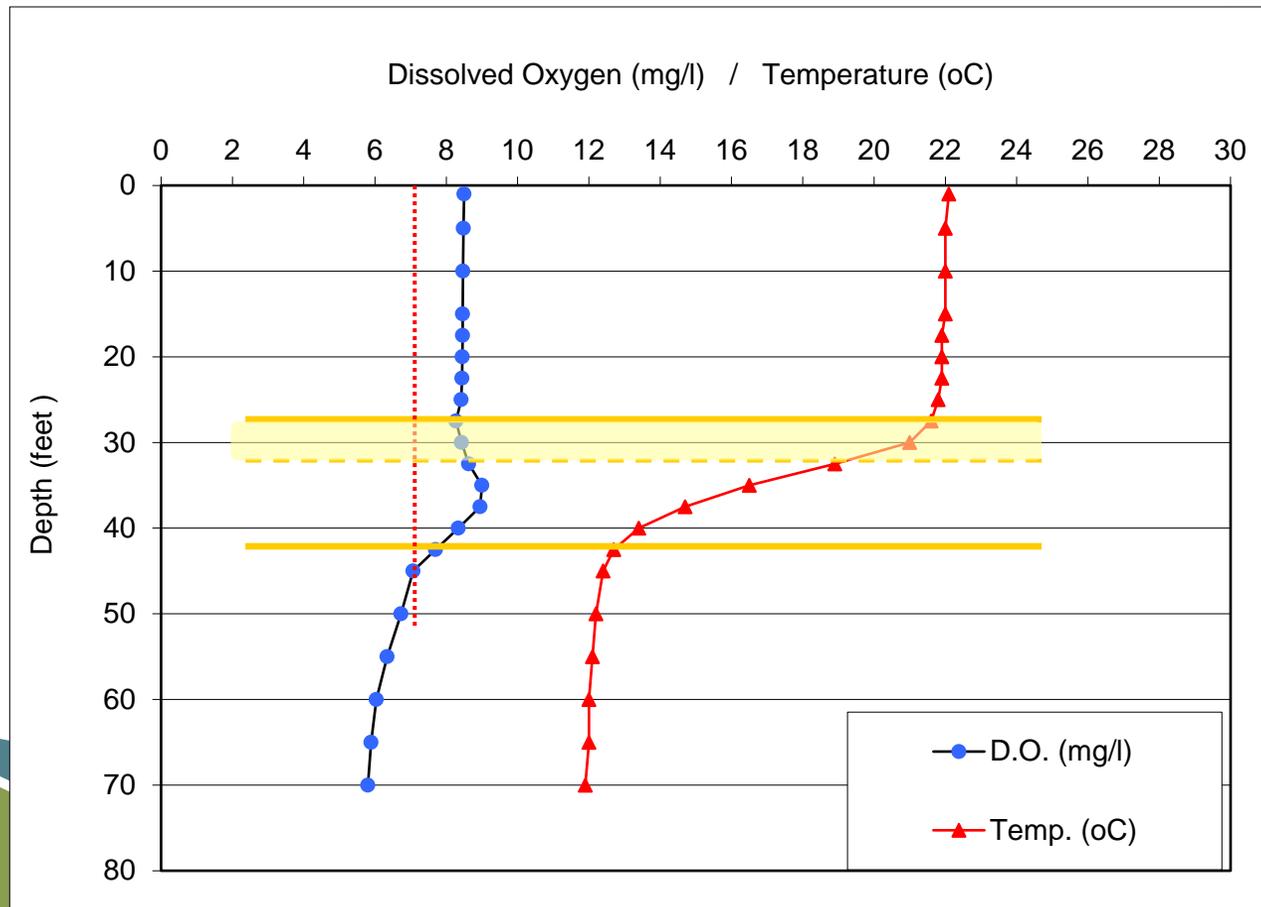
Coldwater Lakes Dissolved Oxygen WQS

- Thermal lake stratification creates layers in the lake
 - Warm epilimnion
 - Metalimnion: highest rate of temp change
 - Cold hypolimnion



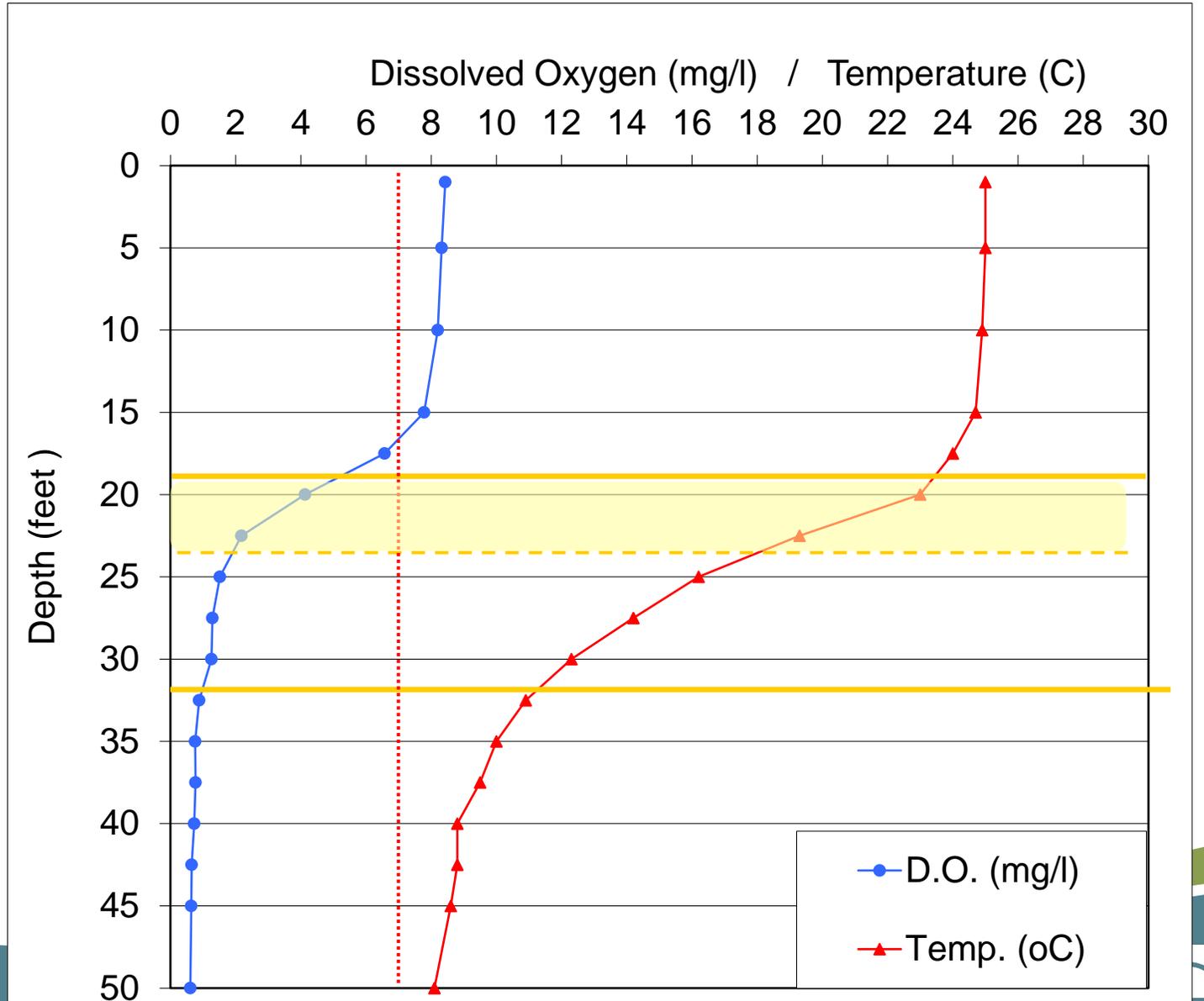
Coldwater Lakes Dissolved Oxygen WQS

- Maintain 7.0 mg/L dissolved oxygen in upper 1/3 of the metalimnion



Coldwater Lakes Dissolved Oxygen Assessment

- CLMP Temperature and DO monitoring collects data roughly 2x month
- More data = more opportunity to detect problems
- Example of water quality problem

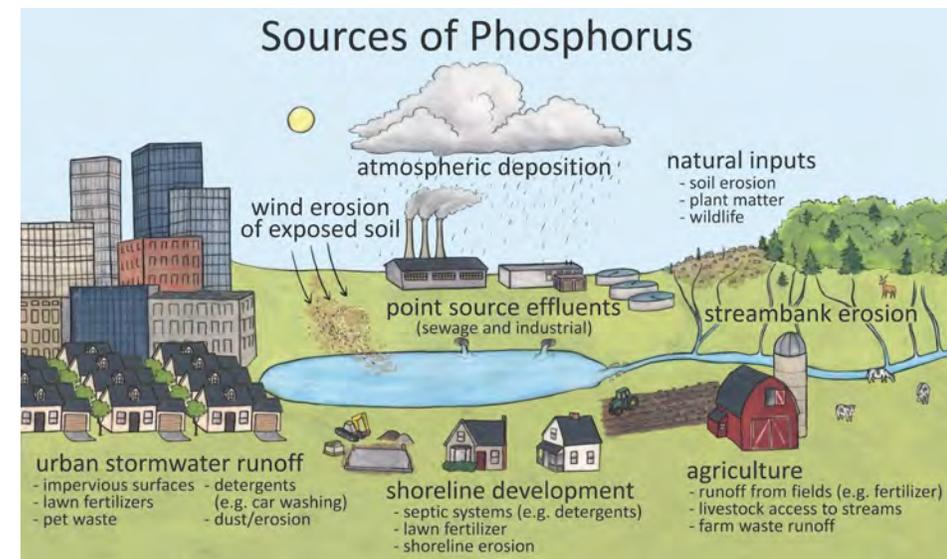
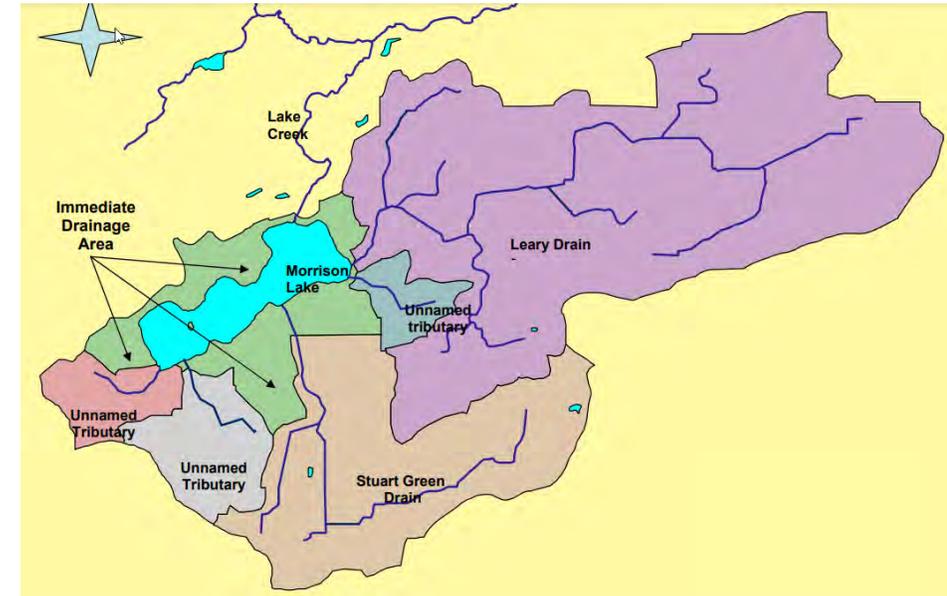


Coldwater Lakes Dissolved Oxygen Assessment

- 2024 Integrated Report: First attempt at using CLMP to evaluate Coldwater Fishery Use using DO WQS
- 28 coldwater CLMP lakes with 2021-2022 Temperature & Dissolved Oxygen data
- Identified some lakes that may have water quality problems and are finalizing assessment soon
- Continue to fine tune the process for working with CLMP Temp/DO data

What happens after finding a Water Quality problem?

- Add to the 303(d) Impaired Waters list
- Identify pollutants causing the problem
- Schedule development of a Total Maximum Daily Load
 - A TMDL establishes the maximum amount of a pollutant allowed in a waterbody to Support the Designated Use
 - Serves as the starting point/planning tool for restoring water quality



Michigan Department of Environment, Great Lakes, and Energy

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Michigan Nutrient Standards: 1986

- 1986 –Rule 323.1060 Plant Nutrients (*Current Nutrient Criteria*):

(1) Consistent with Great Lakes protection, phosphorus which is or may readily become available as a plant nutrient shall be controlled from point source discharges to achieve 1 milligram per liter of total phosphorus as a maximum monthly average effluent concentration unless other limits, either higher or lower, are deemed necessary and appropriate by the department.

(2) In addition to the protection provided under subrule (1) of this rule, nutrients shall be limited to the extent necessary to prevent stimulation of growths of aquatic rooted, attached, suspended, and floating plants, fungi or bacteria which are or may become injurious to the designated uses of the surface waters of the state.