Mississippi Valley Conservation Authority

# MVCA's Ice Management Plan

## Board of Directors

May 13, 2024

# Background

- Ice – naturally occurring hazard along waterbodies
- Risks:
  - Shoreline erosion
  - Flooding (ice jams)
  - Property damage
  - Public safety
- *Ice Management Plan* required by December 31, 2024 as per Section 4 of O. Reg 686/21

# OBJECTIVES

- Inform Flood Forecasting and Warning (FFW) re:
  - Ice break-up timing
  - Formation of frazil ice and risk of local flooding
  - Ice jamming and risk of local flooding
- Inform future shoreline erosion monitoring activities
- Understand how the ice regime is changing and how this may change the risk of natural hazards

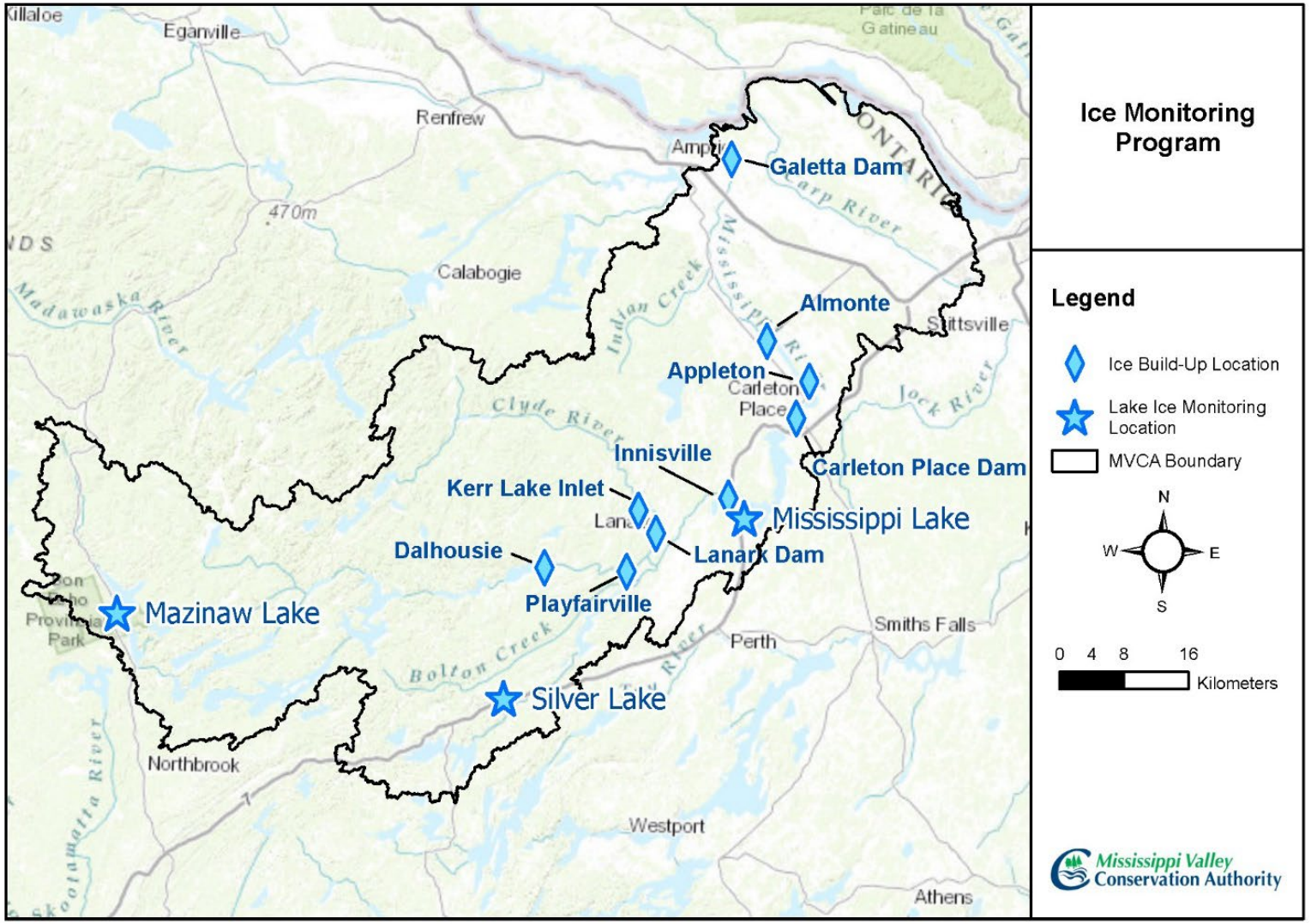
# ICE HAZARDS

- River ice – ice jamming
  - River constrictions and other flow obstructions
  - Localized flooding
- Frazil ice
  - During extreme cold events
  - Carried to bottom and sticks to substrate
  - Clogs sluiceways, water intake pipes, trash racks
- Lake ice
  - Evolving trend in ice-on, ice-off, depth and other physical characteristics
  - Typically does not cause flooding
  - Shoreline erosion and damage to waterfront structures
  - Poses risks to winter recreational activities

# MONITORING PROGRAM

- MVCA monitors:
  - Rivers for ice build-up and ice jamming
  - Lakes for ice thickness and phenology
- Rivers
  - 9 locations (fixed over time)
  - Monitored on an “as-needed” basis
- Lakes
  - 3 locations (will rotate over time)
  - Monitored bi-monthly, and as-needed

# MONITORING SITES



# “AS REQUIRED” TRIGGERS

- Nine sites monitored on as-need basis:
  - Significant increase in temperature that could result in localized ice break-up
  - Significant drop in temperature that could result in frazil ice
  - Observed jump in water level with no associated increase in flows
  - Notification/comments from public



*Appleton Dam (Mississippi River at Appleton)*

# MONITORING

- No observed ice jamming, ice build-up, or flooding associated with ice in 2022-23 or 2023-24

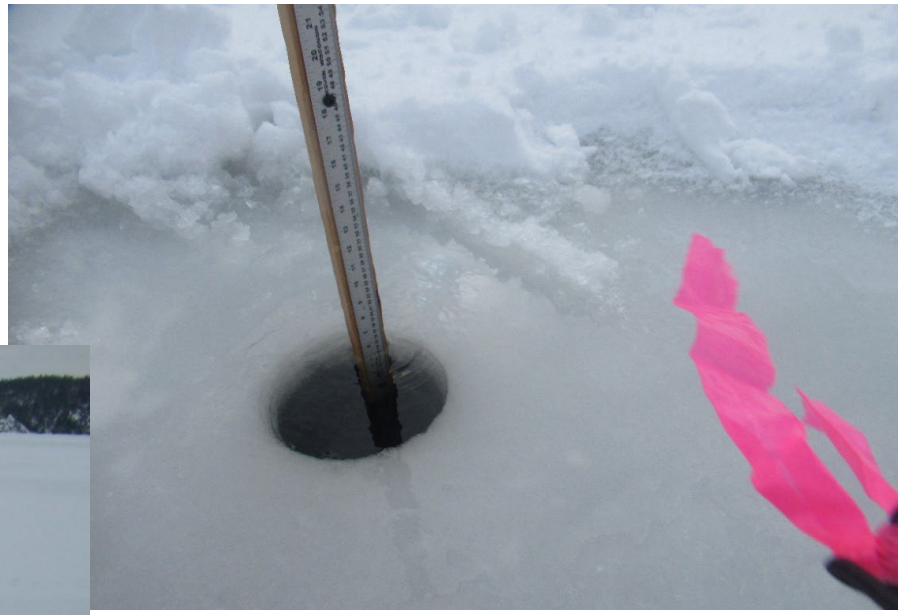


*Mississippi River at Playfairville (upstream side)*

# MONITORING – LAKE ICE

**Ice thickness**

- ❑ Spatial variability
- ❑ Representative, lake-wide thickness



*Mazinaw Lake*

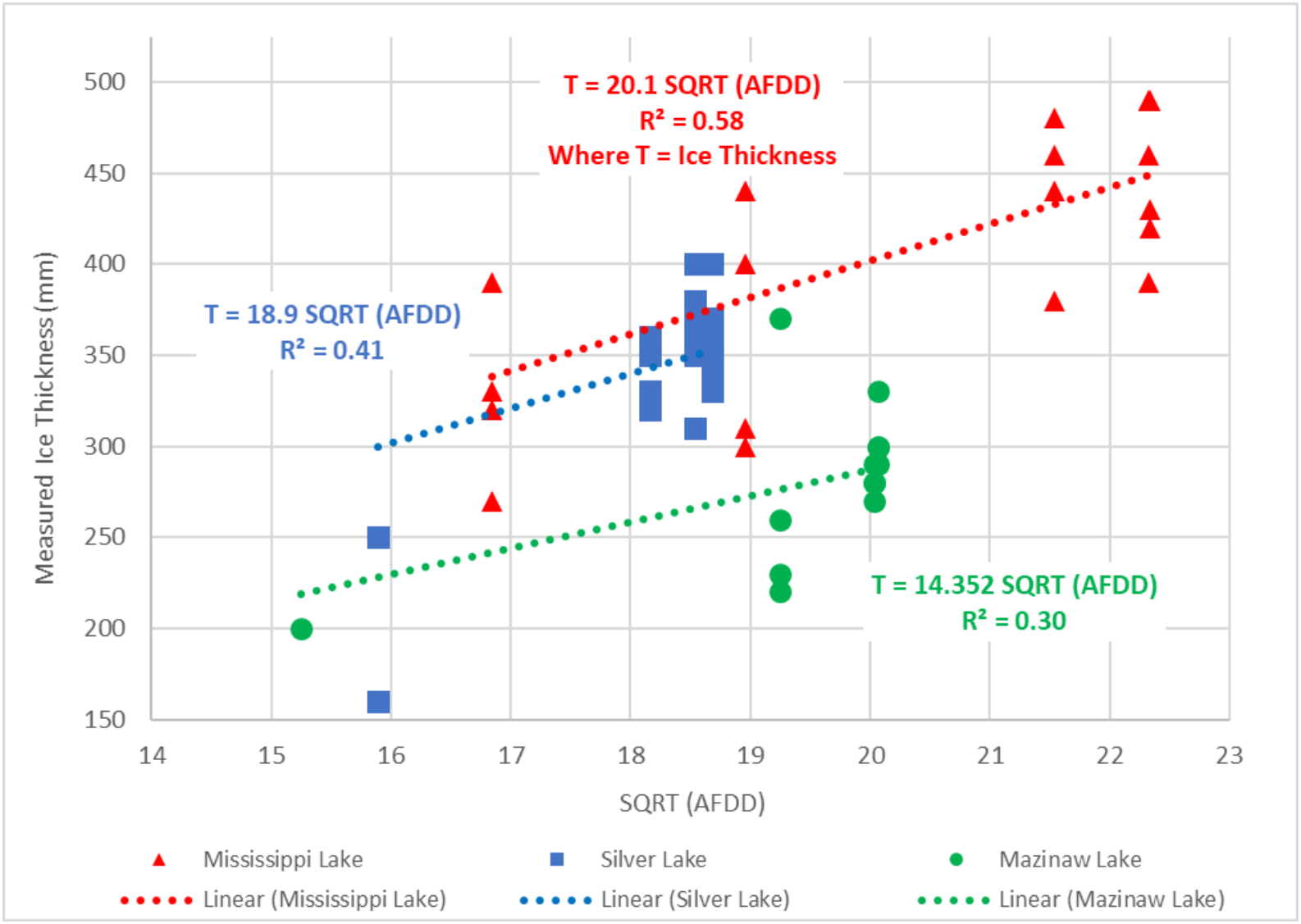


*Mazinaw Lake*

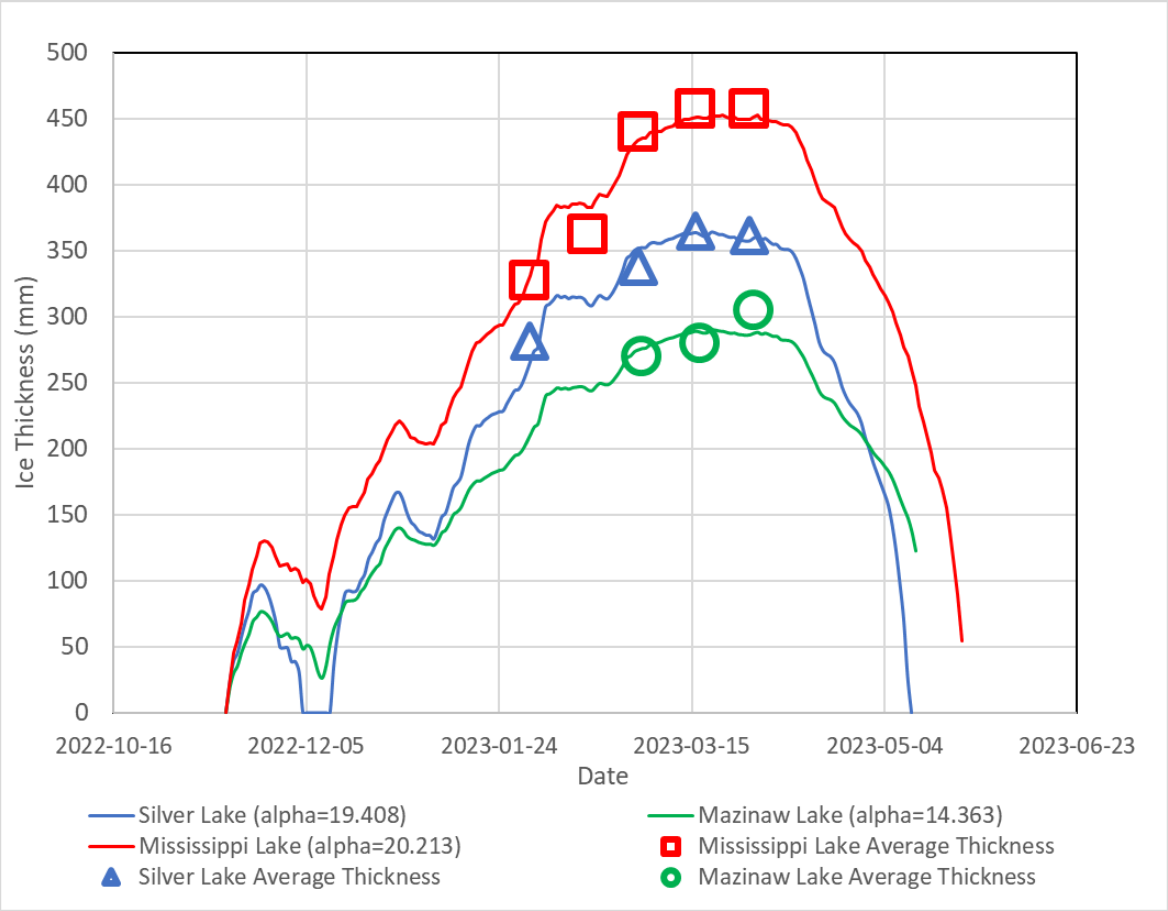
# LAKE ICE MODELING

- Developing ice thickness model
- Using field data to calibrate model
- Determining standard coefficient for calculating theoretical ice thickness
- Theoretical ice thickness informs ice monitoring needs and field work

# 2022-2023 RESULTS



# PREDICTING ICE THICKNESS




*2022-2023*

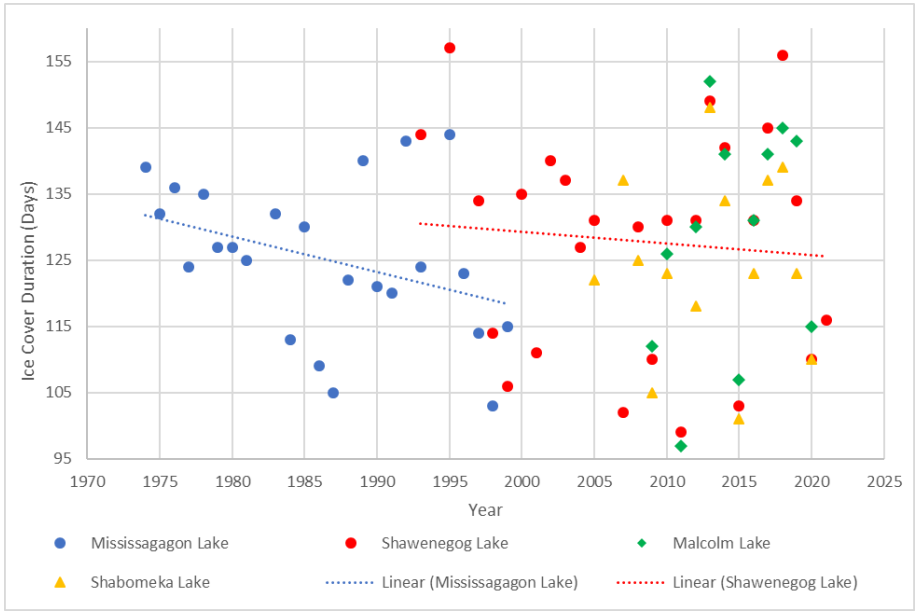
Red – Mississippi Lake  Blue – Silver Lake  Green – Mazinaw Lake

# CITIZEN SCIENCE

## Sample observation form

| Date | Observation Type (see definitions) | Temperature & Weather | Notes |
|---|---|---|---|
| Dec 4, 2022 | Ice On | -2°C, Cloudy, windy | Ice formed on shore overnight, 30 cm wide (EXAMPLE) |

## Records from Citizen Scientists




## Ice break-up, Mazinaw Lake (German Bay)

May 2022 (courtesy of Amy Fraser)

# MONITORING TEAM







# METHODS



*Measuring lake ice thickness (Mazinaw)*



*Lake ice thickness measurement*



*Custom-built ice and snow thickness measuring rod*

# MONITORING – LAKE ICE

*Silver Lake*



*Silver Lake*





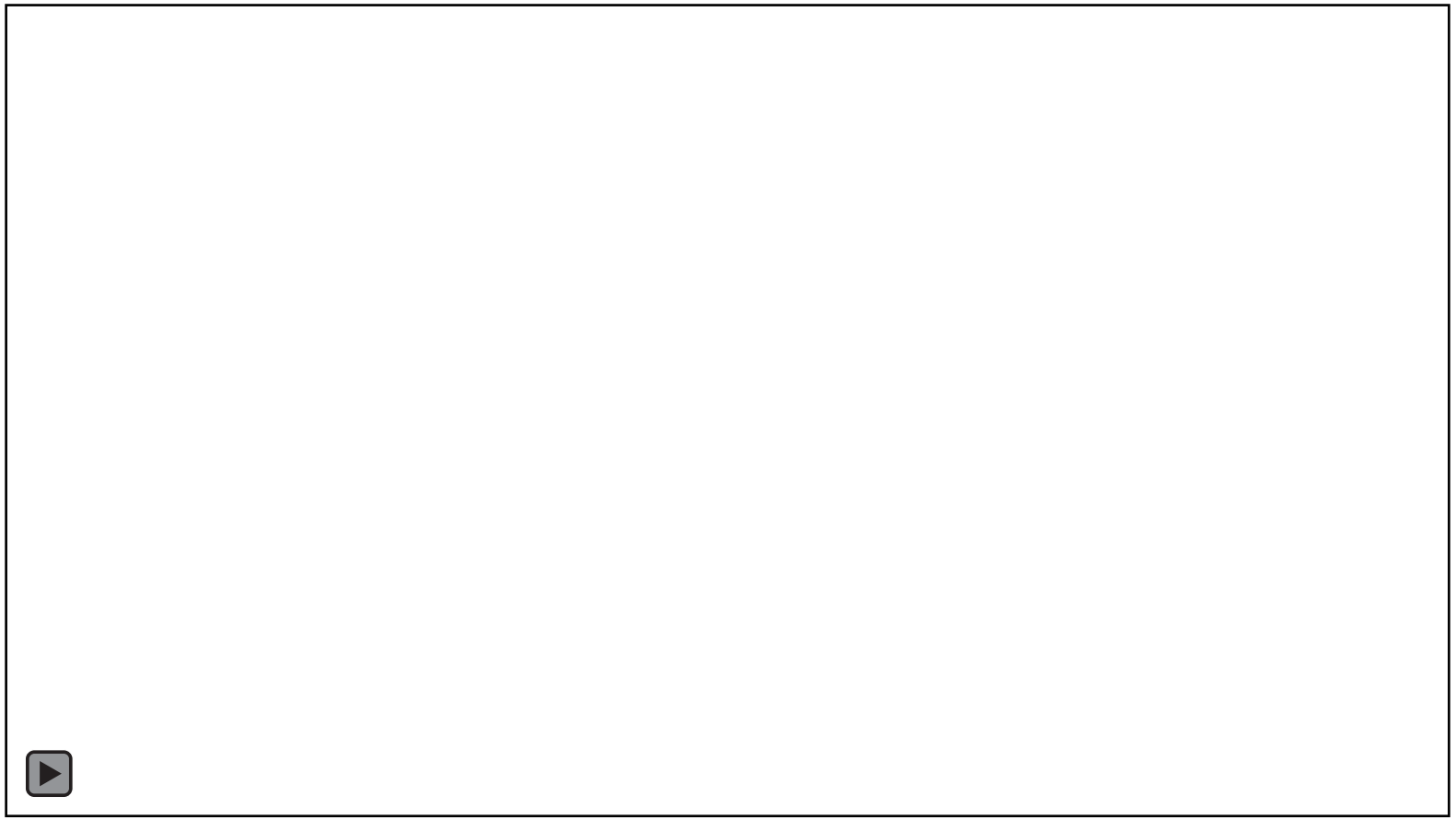
*Mazinaw Lake*




*Mississippi Lake*

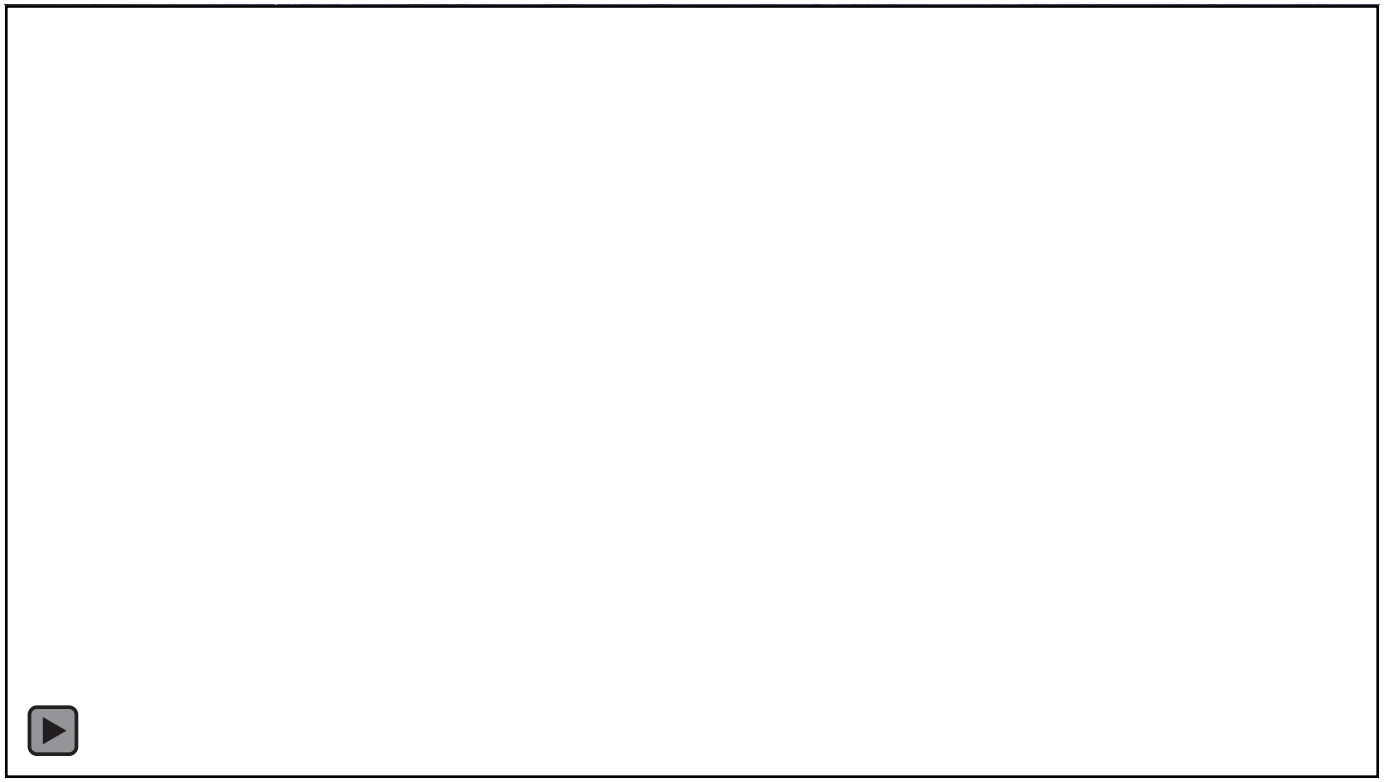
# HEALTH & SAFETY

Monitoring is postponed when lake ice is too thin.



*Mazinaw Lake*

# LESSONS LEARNED



*Silver Lake*

Access point changed for 2023-24 season to minimize exposure to gas holes, which are common at the east end of Silver Lake