# Birch Island Lake Water Quality Study

**Public Engagement Meeting** 

January 9, 2023



# Our Team



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District Engineer



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Photo: Birch Island Lake, June 2021



1. Birch Island Lake Previous Studies and Projects

- 2. Shallow Lake Management Background
- 3. Water Quality Study Objectives

4. How can residents help our study (take survey, volunteer to help)?

### NMCWD – Birch Island Lake Location



# **Birch Island Lake- Timeline**

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#### 2000 – Water Quality Study

- Identified sources of excess phosphorus
- Recommended management activities

2008 – Eden Prairie Lakes – Water Quality Improvements

- Installation of watershed BMPs
- Installation of bypass pipe system

#### 2023 – Water Quality Study

- Use historical and recent monitoring data to understand lake conditions
- Analyze and implement new management techniques

#### 2005 – Water Level Investigation

- Investigated causes of low water levels
- Recommended water level management alternatives

## Agenda

1. Birch Island Lake Previous Studies and Projects

#### 2. Shallow Lake Management Background

- a) What are shallow lakes?
- b) What causes stress in our shallow lakes?
- c) Is Birch Island Lake experiencing these stresses?
- d) How can we break the stressor cycle?
- 3. Water Quality Study Objectives

4. How can residents help our study (take survey, volunteer to help)?

## What are Shallow Lakes?



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## What are Shallow Lakes?



## **Shallow Lake Management Objectives**

- Holistic approach to lake management
- Manage to:
  - Meet water quality standards
  - Achieve a balanced ecosystem

Balanced Phosphorus & Nitrogen



#### **External Source**

#### Stormwater Runoff



Phosphorus Nitrogen

#### **Internal Sources**

Curly-leaf Pondweed (Invasive)



#### Nutrient Rich Sediments





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#### **Internal Sources**

Curly-leaf Pondweed (Invasive)





#### **Internal Sources**

#### **Nutrient Rich Sediments**



#### **Unbalanced Fishery**

- Bottom Feeding Fish: Goldfish/Carp
- Uniform Species



Photo: Mirror Lake, May 2019



Photo: Birch Island Lake, 2022

#### Lake Levels

- Lower water levels  $\rightarrow$ 
  - More sensitive to watershed loading (less volume = higher conc.)
  - Less sediment area (e.g., less internal loading)



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#### D0 - Abnormally Dry

- Soil moisture is low; pasture and row crops are stressed
- Fire danger increases
- Lake and river levels decline; water temperatures rise



#### **D1** - Moderate Drought

- · Winter snow events are canceled
- River and lake levels are lower than normal



#### D2 - Severe Drought

- Ground is hard; seed corn is short; feed is expensive; crop yields are low
- Fire danger is high; burn permits are required
- River flow is very low; snowpack is significantly lower; well levels decrease



#### D3 - Extreme Drought

- Corn is harvested early; emergency haying and grazing are authorized
- Wildfires are widespread
- Surface waters are near record lows



#### D4 - Exceptional Drought

 Minnesota has experienced little or no exceptional (D4) drought, so there are no D4-level drought impacts recorded in the Drought Impact Reporter.







2-year drought can have notable impacts on water levels

## Shallow Lake Stressors/Threats

### Stressors/Threats to Healthy Lake Conditions







Example Algal Blooms

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#### Blue-Green Algae (Cyanobacteria) Abundance

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#### August 2021





Secchi Disk Summer Average (Clarity) 2006 2010 2011 2012 2015 2018 2019 2020 2021 1989 1997 0.0 0.5 Secchi Disk (m) 1.2 1.5 MPCA Standard 1.0 m 2.0 2.5

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## Breaking the Stressor Cycle to Promote a Healthier Lake



Stressors/Threats to Healthy Lake Condition



# Breaking the Stressor Cycle to Promote a Healthier Lake





- 1. Reduce nutrients entering the lake
  - a) External Sources
  - b) Internal Sources
- 2. Promote Diverse, Native Plants
  - a) Within the Lake
  - b) Shoreline Buffer Zones
- 3. Balanced Aquatic Community
  - a) Algae
  - b) Zooplankton/Aquatic Insects
  - c) Fishery



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## Water Quality Study Objectives

#### Monitoring Data (Water Quality, Ecological)

# Public Input/ Observations

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Quantify by Modeling Nutrient Sources/Sinks

In-Lake Management Alternatives

Progress towards Water Quality and Ecological Goals Watershed Management Alternatives

test



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4. How can residents help our study (take survey, volunteer to help)?

- 1. Thank you for attending the meeting today and participating in discussion!
- 2. <u>Survey</u> Available through January 31
  - 1. Tell us how you use/enjoy the lake
  - 2. Describe current concerns regarding lake health
  - 3. Express interest in helping to improve water quality
  - 4. Ask questions
  - 5. And more!

https://ninemilecreek.typeform.com/BirchIsland









#### **Guestions?** For additional resources: <u>www.ninemilecreek.org/birch-island-lake-study</u>