Dredging Outcome

North Lake Water Quality Concerns – B4 project

- Poor water quality
- Excessive aquatic plant growth
- Algae Blooms
- Navigation access from shoreline

North Lake Water Quality – After Dredging

- Water quality – all metrics show improvement in water quality
  - Sechi – August was 14’, you have to go back to 1998 to get a better reading in the month of August
  - Phosphorus - 28.5% decrease
  - Chlorophyll - 67% decrease
  - Dissolved Oxygen (DO) – ***MAJOR IMPROVEMENT!***

Dissolved Oxygen (DO) – After Dredge

- August 26, 2023 DO was 6.3 mg/L temp was 70.5^0 at 20’
  4.33 mg/L temp was 62^0 at 25’
- August 17, 2022 DO was 0.1 mg/L temp was 60^0 at 20’

This is a significant increase in DO available for fish!

Over a 4,000% improvement!

North Lake Water Quality Concerns – After Dredge

- Excessive aquatic plant growth – diminished plant growth in N bays

- Algae Blooms – improving but still have issues - early spring algae blooms, early Aug algae bloom, NE corner of small lake has had several instances of blue green algae

- Navigation access from shoreline - resolved in North bays

Why should we dredge Ice House Bay?

We don’t want our lake to look like this: Picture taken 8/24/2021 in Ice House Bay

After Dredging - Ice House Bay August 18, 2023


Ice House Bay August 20, 2021


Ice House Bay August 18, 2023


Nack Island Bay July 2019


Nack Island Bay August 18 2023

Sediment leaches phosphorus into the lake

- Removing the sediment removes the phosphorus in the sediment –

  We removed 14,365 lbs of phosphorus

- OWPP estimates that the dredging reduced the total annual Phosphorus load to the lake by 517 lbs per year.

- 517 lbs of Phosphorus = 258,500 lbs of algae per year

Thank you

- Michels' Family for a significant financial pledge to get the project started
- All those that have supported and paid for the dredging project
- MICHELS® corp for the competitive bid and successful completion of the project.

Mason Creek Re-meandering

Tall Pines Conservancy partnered with NLMD & OWPP to convert a historically channelized section of the creek to a natural, meandering course to handle periods of high water flow and reduce the movement of phosphorous-laden sediment to downstream properties and North Lake. The project was completed late in 2022.

What's Next?

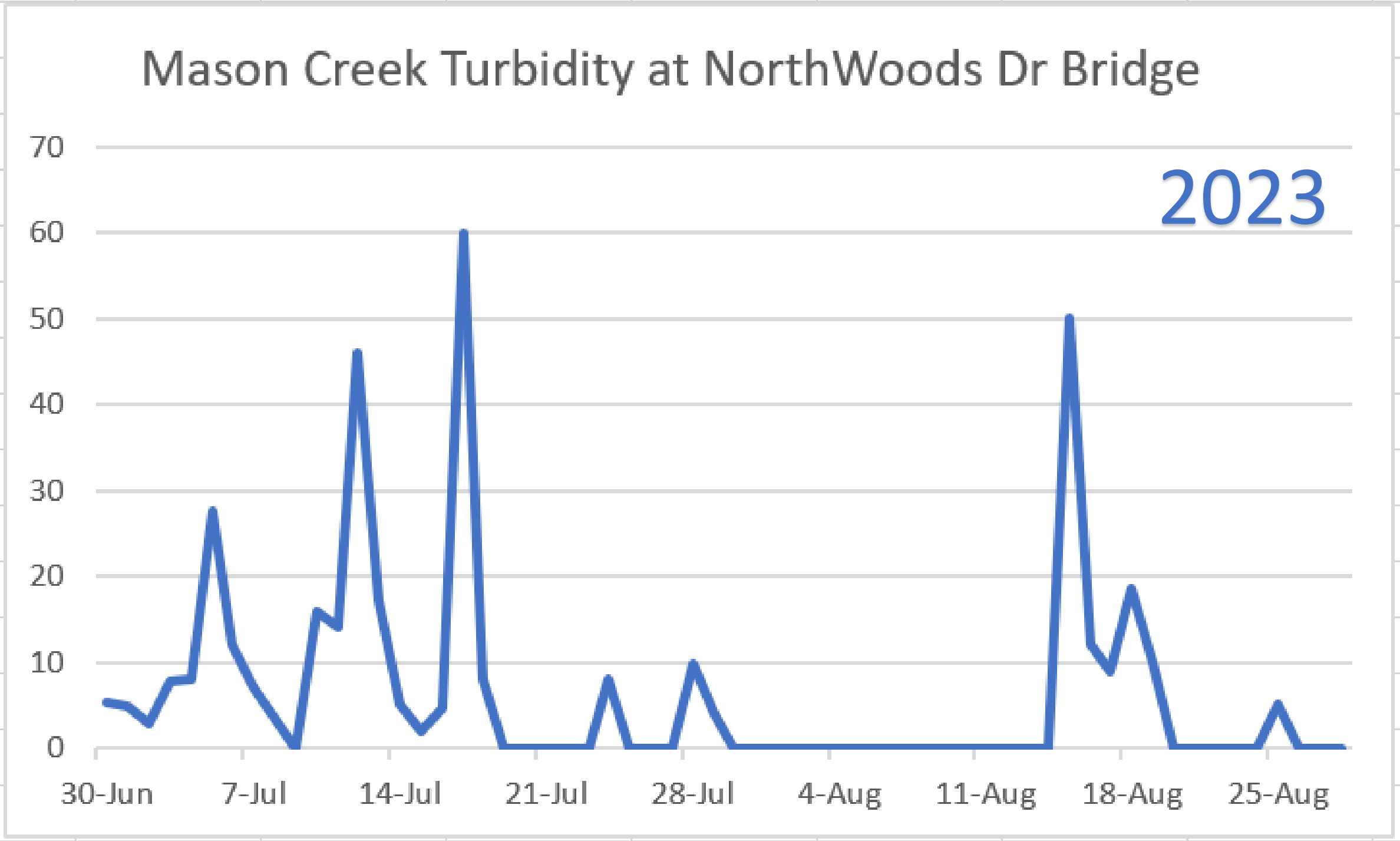
Mason Creek continues to be a source of phosphorus and sediment. NLMD received a grant from the WI DNR to study the hydraulic impacts of plugging the West branch of Mason Creek to prevent further sediment flow

Mason Creek (looking upstream, before entering North Lake) after a storm event. July, 2014

6/15/2022

2.2” rainfall

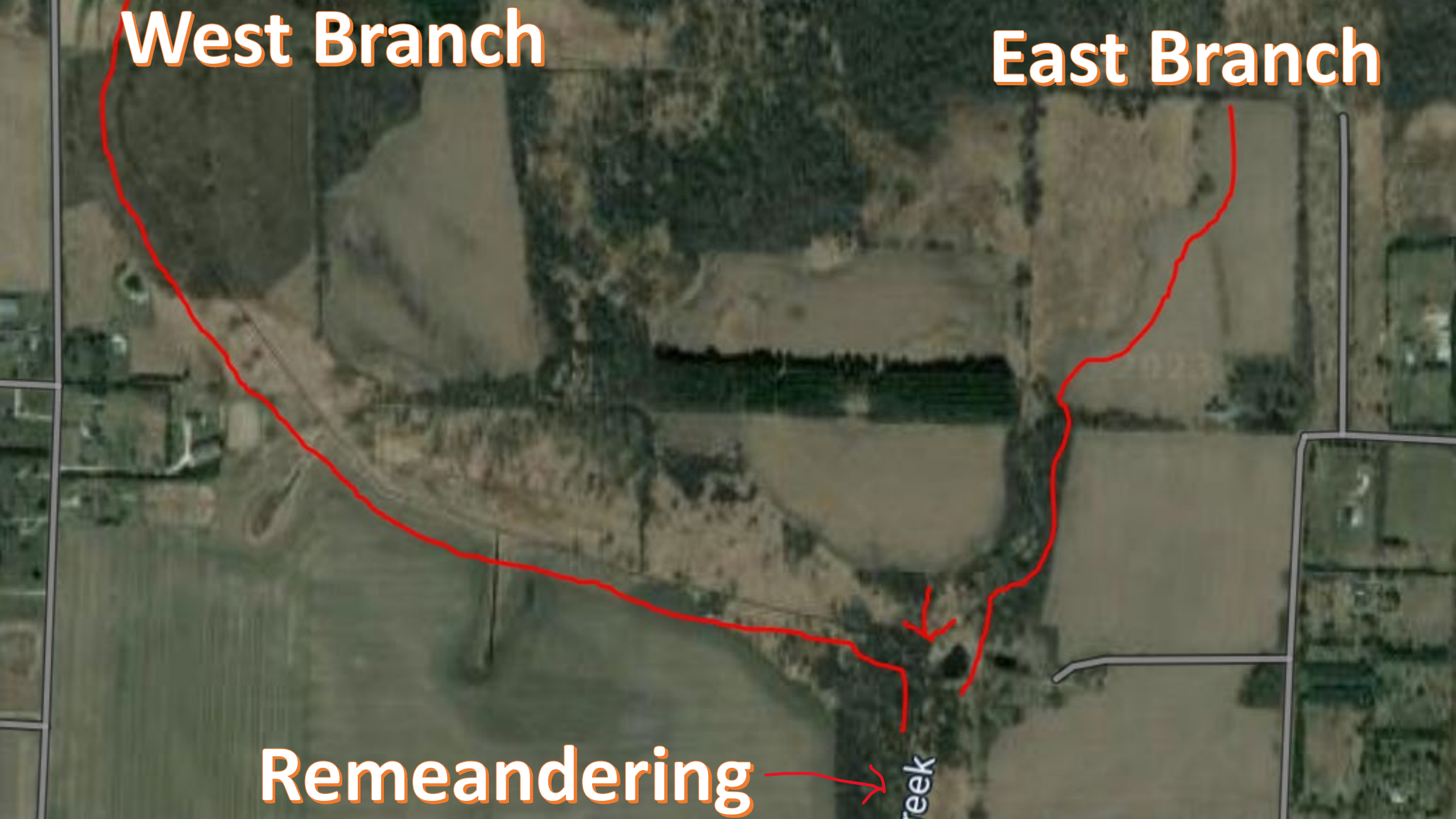
Mason Creek inlet

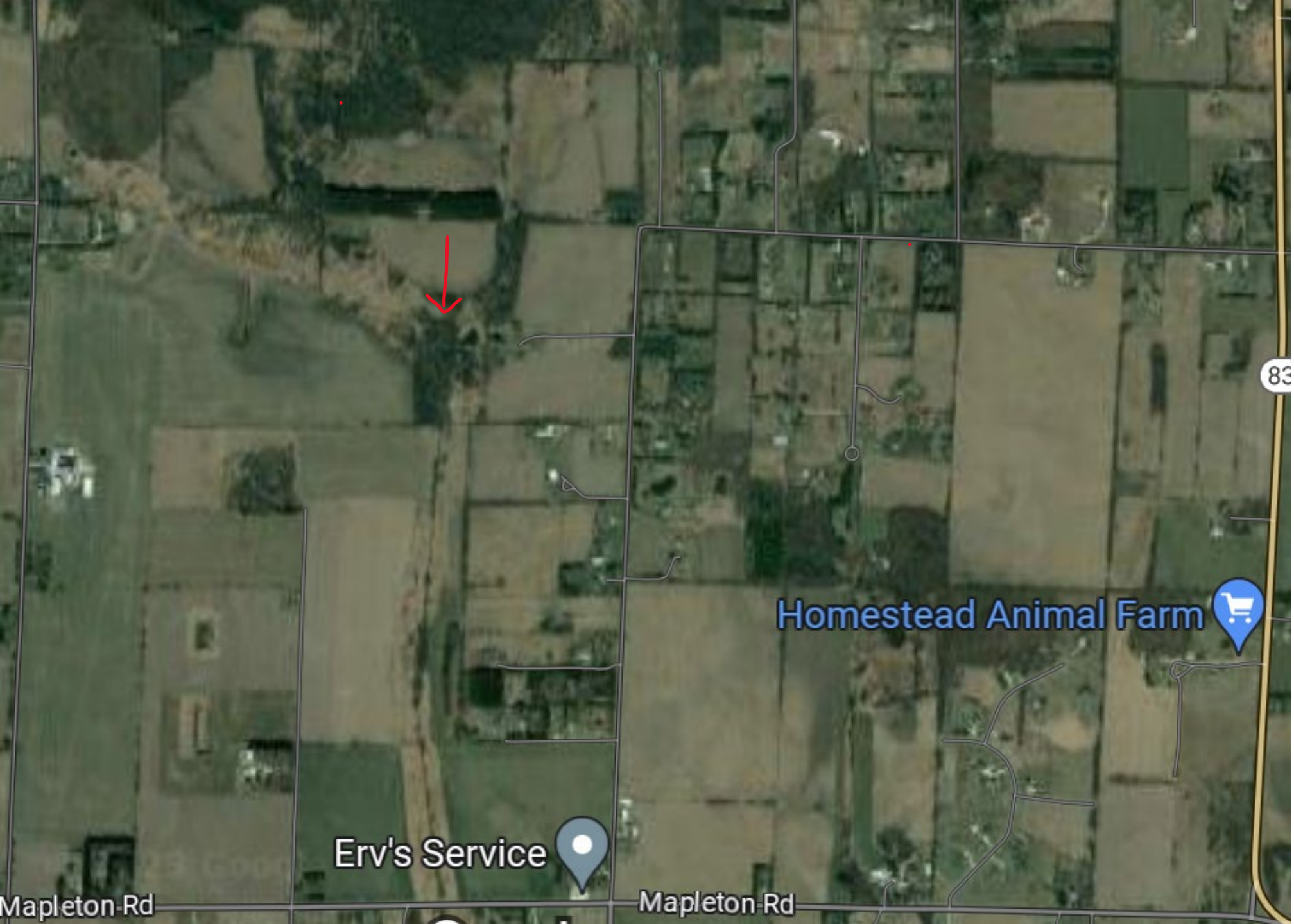

Mason Creek Turbidity at NorthWoods Dr Bridge
2023
70
60
50
40
30
20
10
0
30-Jun
7-Jul
14-Jul
21-Jul
28-Jul
4-Aug
11-Aug
18-Aug
25-Aug

Mason Creek

- West Branch - man made ditch dug sometime between 1909 and 1939 through the wetlands to drain farm land

- East Branch – class A trout stream – currently a wetland mitigation bank with many planned improvements which will help North Lake


West Branch
East Branch
Remeandering
reek



Confluence of the West and East Branches of Mason Creek

Mason Creek Confluence

August 15, 2023 after 1.5 to 2” rainfall 1 day earlier

West Branch washing sediment into the crystal clear water coming from the East Branch

Phosphorus WB = 0.123

Phosphorus EB = 0.025

5 x more P in WB

Mason Creek Re-meandering impact

The sediment flowing from the West branch is accumulating in the re-meandered section of Mason Creek. This slows the transfer downstream but in major rain events, this will be washed down stream

What is a ditch plug?

When attempting to restore wetlands drained by surface ditches, it is usually necessary to place earth fills at strategic locations within the drainage ditch to block the flow of water. This wetland restoration strategy is commonly referred to as constructing a “ditch plug”

We are working with an engineering firm to come up with a plan to stop the flow of water in the West branch of Mason Creek using a ditch plug and return the water to the natural wetlands the creek runs through.

Other opportunities to improve water quality

Carp Reduction – Plans are being developed by Scott Jankowski and Travis Theisen to reduce the carp population

Nitrogen study – Initial study by NLMD is complete. Need to develop a plan to identify the sources of Nitrogen

Cornell Inlet – Remove sediment from the inlet and south shore of the big lake

Shoreline Stabilization – Native plantings, effort is being led by Marilyn Gunther – reduces runoff nutrients reaching the lake

Other opportunities to improve water quality

Aquatic plant removal – removing aquatic plants from the lake reduces the amount of nutrients released into the water column by decaying plants

Pet Waste – remove pet waste from the near shore areas to prevent the nutrients from running into the lake

Septic Systems – Please replace old ineffective septic systems that may be releasing nutrients into the lake

Wake Surfing – Surf in the middle of the big lake

Other opportunities to improve water quality

Reduce the local Goose Population – Dan Aicher and Travis Theisen scour the shores of the lake each spring to reduce the goose population by removing the eggs from the nests

Encourage Duck and Goose hunting on the lake – Duck & Goose feces ads excess nutrients to the lake. Just look at swim rafts to see how quickly it adds up. Now multiply that by 1000's to see what the southern migration adds to the lake

Let the Chara grow – Chara reduces the phosphorus in the water column and binds it to the bottom of the lake

Let the Chara do it’s job!

Removes Phosphorus from the water column and binds it to the bottom

Stabilizes sediment on the lake bottom

Prevent the spread of invasive plants

End of presentation

EXECUTIVE SUMMARY: NORTH LAKE 2022 NITROGEN STUDY SUGGESTIONS

* Contract for a study of near-surface (i.e., piezometer-based) groundwater chemistry around the perimeter of the lake in early spring and mid-late summer.

* Acquire kits from your analytical services vendor in advance for dissolved nutrients (minimum ammonia or TAN, nitrite, nitrate, dissolved organic N, Total P, soluble reactive P)

* Acquire a set of Hach quick analysis kits for ammonia and nitrite. Have a citizen scientist use the kits at regular intervals to assess loading.

* Using existing high-resolution depth contour maps, construct a hypsographic curve for each basin of North Lake

* Install a current meter in the channel to assess flow rates and temporal patterns between basins.