ALGAE OPTIONS/DISCUSSION

PREPARED FOR LAKE MARTHA RESIDENTS

WHY DOES THIS HAPPEN?

- The algae blooms happen when the following ingredients are present
  - Lots of nutrients
    - Nitrogen /Phosphorus
  - High surface water temperatures
  - Sunlight
  - Lack of water movement
  - Dead Organic Matter

COMMON APPROACHES TO ALGAE REDUCTIONS

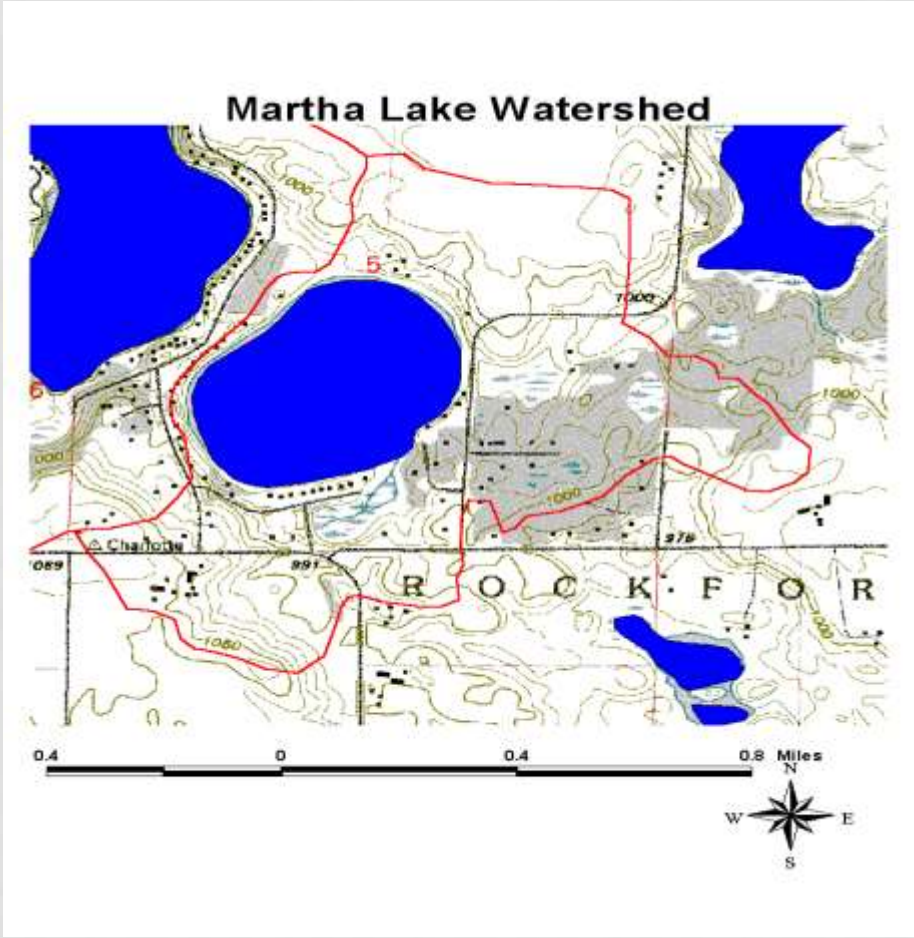
- Reducing incoming Nutrients
  - Filter incoming water
  - Shoreline buffer zones
  - Less fertilizer use
- Aeration
- Chemical
  - Copper Treatments
    - Kills existing algae it contacts
  - Alum/Iron Treatments
    - Tie up existing nutrients and pin them to the bottom
- Biological
  - Barley Treatments
    - Decaying barley hinders algae reproduction
    - Place it in bags around the lake
  - Introducing "good" bacteria to reduce dead organic matter
- Ultrasound
  - Smaller bodies of water
  - Ultrasound "sinks" Algae depriving it of sunlight and hinders reproduction

WHAT HAS ALREADY HAPPENED AT LAKE MARTHA?

- Weed Cutting (1980's) to remove future nutrients-dead weeds
- Installation of DNR Culvert (1987) to control lake level
- Iron Treatments (1990's) to tie up phosphates on the bottom
- Replacing individual sewers (2001) to reduce incoming nutrients
- Periodic Copper Treatments to kill existing algae(Unknown but most years for likely decades)
- Iron/Sand Filter (2014) on south side of lake to Pre-Treat Farm run-off-reduce incoming nutrients
- Aeration (2019 and ongoing)
- Lake Level Control maintenance (2020) to reduce tree/shoreline erosion
- Whole lake weed Treatment (2021)

NUTRIENTS

- Where do our nutrients come from
  - Outside sources
    - Nearby Ag activities
    - Lawn Fertilizers
  - Internal Sources
    - Dead weeds/Fish



NUTRIENT REDUCTION

- Incoming Stream on East side-is filtered by wetland
- Incoming Stream in Bay is filtered by sand/iron trap and further by the shallow bay
- Lake Level control reducing bank erosion
- Killing Curly leaf sooner and reducing volume of dead weeds

What else can we do

-Be responsible with lawn fertilizers

-native grass buffer zones where possible to filter runoff

AERATION

- Aeration on its own does not kill algae but it does give oxygen to beneficial bacteria to help them thrive. This bacteria breaks down dead organics which starves future algae blooms.
- Is it working???

  -may simply need more time to get our bacteria thriving and eat down that steadily increasing volume of curly leaf we've been putting in every year.

  -possible the years of copper treatments have reduced our beneficial bacteria and the increased oxygen is having limited effect.

  -Can relook at sizing to see if its something where more aerators would help

COPPER TREATMENTS

- Copper Sulfate is probably the most commonly used algaecide in lakes/ponds because it works,
  - Very Toxic to Algae, effective in the short term
    - Expect 1-2 weeks effectiveness
  - Long term it may actually promote algae blooms
    - The copper buildup in sediments kills beneficial bacteria that helps break down organics
    - The dead algae becomes nutrients for future algae.

ALUM/IRON TREATMENTS

- Alum (Aluminum Sulfate) and Iron treatments both work the same
  - tie up Phosphorus and drag it to the bottom so its not available to algae, does not directly kill algae
  - Alum seems to be the common option applied today a barge (liquid form)
- Seen as a Environmentally Friendly option.
  - Its done in drinking water reservoirs
- Expect immediate effectiveness lasting 5-10yrs,
  - Then maintenance is required,
  - Effective in shallow lakes that are not wind swept, Want bottom not to get stirred up to keep phosphorus locked up on the bottom.
  - Wind protection and Lack of carp in Martha would be beneficial
- Lots of MN case studies out there with significant water clarity improvements

ALUM COSTS

- $$$ -This is expensive
  - A quote would be needed but this could be in the neighborhood of $100K-$150K for a 100 acre lake
    - phosphorus studies and alum application.
  - Grants from the state do occur for this but not common, I think it would help if we can get Martha on the list of "impaired" lakes maintained by Minnesota Pollution Control Agency.
    - Many of the popular lakes in wright county are already on this list (Pulaski/Charlotte ect)

BARLEY TREATMENTS

- Its unclear why this seems to work but filling up mesh bags with barley in the spring and letting them degrade seems to slow algae reproduction. The bag is removed in the fall.

- Cheap and Environmentally friendly but not sure how practical this is for Martha, We are talking about 200-300 bales of barley for a 100 acre lake.

ULTRASOUND

- Not commonly used but Ultrasound generators are placed around lake and turned on which sinks algae, Starving it of sunlight it needs to reproduce.
- Not real practical in a lake with boat traffic

HAS ANY OF THIS ACTUALLY WORKED IN LAKE MARTHA?