

Maple Lake Preservation and Improvement Committee

Summary of Findings

August 26, 2019



I. Introduction

The Maple Lake Preservation and Improvement Committee (MLPIC) was formed in November of 2017. The committee was formed to evaluate the conditions of Maple Lake, review past improvement efforts, and suggest strategies for preserving and improving lake quality. MLPIC is a six-person committee which includes the following members:

- Roman Plaszczak, Village Council President, Maple Lake Association Member, Maple Lake Resident
- Jeff Brown, Maple Lake Association member, Maple Lake Resident
- Frank Walters, Maple Lake Association President, Maple Lake Resident
- Erin Fuller, VBCO Conservation District Watershed Coordinator
- Joe Parman, VBCO Drain Commissioner
- Sarah Moyer-Cale, Village Manager

II. Preservation and Improvement

The committee determined which qualities of Maple Lake it would seek to preserve and which qualities need improvement. Preservation objectives included the overall water quality and the recreational uses of the lake. Desired improvements included lake depth, navigability of the south basin, reduction in weeds and invasive species, reduced algae, and lakeshore stability. Evidence that the improvement activities have been successful will be that the sediment is controlled before it enters the lake, weeds do not interfere with water recreation activities, there is minimal algae on the lake surface, and erosion is reduced.

III. Partners & Stakeholders

The committee identified existing and potential partners for this project. These stakeholders are either members who have assisted in the development of these recommendations or who can help to implement the recommended strategies. These stakeholders include:

- Maple Lake Association
- Paw Paw Village Planning Commission
- Paw Paw Township
- Bronson Lakeview Hospital
- Van Buren County Conservation District
- Southwest Michigan Planning Commission
- Two Rivers Coalition
- Van Buren County Drain Commissioner
- Lake residents and property owners
- Other local residents
- MDNR
- EGLE Nonpoint Source Pollution Grant Team

IV. Primary Considerations

The committee met approximately 22 times to discuss various aspects of Maple Lake. Primary points of discussion included:

- History of the lake
- Review of past studies
- Lake depth/dredging
- Sediment quality (arsenic impacts)
- Sediment traps
- Weed control
- Drawdown
- Algae control & treatment
- Aeration systems
- Watershed management & 319 grant activity
- Reconnecting floodplain
- DEQ requirements and regulations for various activities
- Shoreline management
- Invasive species management

In order to gain a fuller understanding of the issues and potential solutions for the lake, the committee met with several professionals. The committee is grateful to all of them for their participation and expertise. Below is a list of those who provided valuable input to the committee and a summary of the information discussed (in no particular order).

Jim Donahoe, Aquatic Weed Control

Mr. Donahoe has been providing chemical weed treatments for Maple Lake for several years. He was able to discuss the various weeds in Maple Lake, what treatments are used to control them, and the permitting process for chemical treatments.

John Tucci, Lake Savers

Mr. Tucci discussed lake aeration and the potential uses of Biochar for “absorbing” arsenic from sediment.

Julia Kirkwood & Derek Haroldson, Dept. of Environment, Great Lakes, and Energy (EGLE)

Ms. Kirkwood and Mr. Haroldson are regional representatives for EGLE. They discussed the relationships between various departments within EGLE for permitting activity and some of the requirements of Part 301. Some of the ideas the committee had formed were run past them and they gave several suggestions for the types of activities EGLE is interested in permitting and funding. These primarily related to upstream prevention endeavors such as reconnecting floodplain.

Marcy Hamilton, Southwest Michigan Planning Commission (SWMPC)

Ms. Hamilton discussed the 319 grant and the Paw Paw River Watershed Plan. SWMPC is currently working toward updating the plan.

Jennifer Jermalowicz-Jones, PhD, Restorative Lake Sciences

Dr. Jones has been a consultant for the village for a number of years including creating the Maple Lake Management Plan, aeration study, and drawdown studies. She discussed the general condition of the lake and what has been done to manage it.

Joe Parman, Drain Commissioner

Mr. Parman discussed the purpose and activities of his office and the upstream conditions of the Gates Drain. He also shared information about upcoming studies his office will be doing about the drain.

Eleanor (Nor) Serocki, SWxSW Corner CISMA Coordinator

Nor presented information about invasive species that are in and around Maple Lake and how they can be managed.

V. Desired Conditions and Recommended Activities

The committee narrowed the desired conditions for Maple Lake into four categories: lake depth and navigability of the south basin, weed and algae reduction, lakeshore stability, and leveraging natural resources toward economic development. Recommendations have been subdivided into short- and long-term goals. Short term goals can be achieved immediately or within four years. Long term goals can be realized in five years or longer.

1. Lake Depth and Navigability of the South Basin

Maintaining an adequate lake depth is vital for continuing recreation activities on the lake such as boating and fishing. It also reduces lake weeds because the lake bottom is further from the sunlight. Sediment from upstream continually fills the lake. At its creation, the lake was fifteen feet in depth. Today, the average depth is seven feet. The South Basin of the lake is most impacted by the infill, most recently due to the breach of the Briggs Mill Dam in 2017. The Village has taken on dredging activities in the past, but the cost is significant.

Short Term:

Participate and provide input for the updated Paw Paw River Watershed Management Plan.

Aeration was considered but it cannot be proven to be effective.

Long Term:

The Drain Commissioner is investigating the quality of the sediment that is being transported downstream to the Paw Paw River and Briggs Pond. The results of this study will impact whether or not a sediment trap would be effective. If effective and reasonable to maintain, a sediment trap could be installed upstream of Briggs Pond.

The Village should consider limited dredging in the future as the budget allows. The committee recommends dredging near the natural river course, amphitheater area, and an area near the houses that border the lake so that property owners can get their boats out. Dredging the entire south basin is not recommended as it is not financially feasible and it serves little value to the overall lake. As the area becomes shallower, it should be considered to plant native water plants in the area so that invasive plant species do not take over the exposed sediment and a healthy wetland can develop.

Development of a lake management plan that extends to include improvements to upstream areas that would reduce the amount of sediment and nutrients entering Maple Lake.

New techniques such as use of muck pellets should be explored further for use in bay areas to reduce muck and weeds.

2. Weed and Algae Reduction

Nuisance and invasive weeds are a significant problem for Maple Lake. Lake weeds include Eurasian Watermilfoil, Starry Stonewort, and Curly Leaf Pondweed as well as weeds that are not invasive but can become overgrown and impact the use of the lake. Algae is becoming a more prevalent problem, particularly in the South Basin. Algae is not only unattractive, but also creates an unpleasant scent that detracts from enjoyment of the lake.

Short Term:

Signage can be added at the boat launch with requirements for washing boats. Washing boats can prevent new invasives from being introduced into the lake and from carrying existing invasive plants to other lakes.

Regular weed cutting should continue. Weed boat operators should continue to be trained in identifying Eurasian Watermilfoil and Starry Stonewort which can be made more aggressive through weed harvesting.

Chemical weed treatments should continue. The lake association should continue to work to identify the most effective chemical treatments and time the treatments appropriately for the best results.

The annual drawdown is recommended to continue. The drawdown has a significant effect on lake weeds, especially Eurasian Watermilfoil and Starry Stonewort which are more difficult to treat chemically.

Waterfowl management should continue to reduce the number of geese and invasive mute swans on Maple Lake. Waste from these animals contributes phosphorus to the lake and promotes the growth of weeds.

Continue to educate lake front property owners about the impact of dumping grass clippings and leaves into the lake.

Phragmites have been found on the lakeshore north of Maple Island. This species should be treated quickly as it can spread and take over the lake.

Burlap bags/barley can be used to attract algae. This should be tested in a limited area for effectiveness and determined whether or not to use it on a larger scale in the lake.

Use of copper sulfate to reduce algae was considered but was not deemed cost effective or to have a long-term impact.

Long Term:

Strategies for improved storm water management should be implemented to reduce phosphorus and general pollution from entering the lake. Seventy-five percent of pollution into rivers, streams, and lakes enters through storm water.

Algae may be effectively reduced or eliminated through use of ultrasound technology.

Install a boat wash station at Sunset Park.

Work with landowners upstream to reduce storm water runoff.

Support upstream wetland restoration.

3. Lakeshore Stability

Lakeshore erosion has significantly impacted the lake. Many residents have installed seawalls to prevent erosion. The Village owns a relatively large percentage of the Maple Lake shoreline so its own shoreline management techniques are very important and impactful. Shoreline erosion adds to sediment in the lake. Unstable soils near the shoreline are more prone to have invasive plant species take root. Shorelines are also an important habitat for many native species and promotes biodiversity.

Short Term:

Continue to install natural shoreline on village owned property along the lake, most importantly Maple Island.

Continue to promote the use of natural shorelines to Maple Lake property owners and assist with the permitting process.

Remove invasive plants growing along the lakeshore including purple loosestrife, yellow iris, garlic mustard, Russian olive, autumn olive, and reed canary grass.

Consider passage of the Waterfront Overlay District.

Vegetative filter strips could be installed along the lake edge to filter pollutant runoff before it reaches the lake.

Long Term:

The short-term recommendations presented above can also be used as long-term solutions.

4. Leverage Natural Resources Toward Economic Development

Lakes and rivers attract interest from those within and outside of the community. People coming to Paw Paw to use the lake or the Paw Paw River Water Trail can spend money locally at restaurants and shops in town. The Village has put considerable effort into improving Maple Island and Sunset Park. These amenities can be leveraged to promote economic activity in Paw Paw.

Short Term:

Ensure Maple Lake area park facilities including restrooms are maintained and parking areas remain well lit. The canoe and kayak launch should also be maintained appropriately.

Continue to support promotional efforts for the Paw Paw River Water Trail.

Use a consultant to determine the economic impact of Maple Lake and use the information gleaned to focus future improvement efforts.

Long Term:

Seek an entrepreneur interested in facilitating canoe or kayak rentals in the village.

VI. Public Engagement Strategy

Open dialogue and communication about the Maple Lake Improvement Activities is vital for the plan's success. The stakeholders mentioned in section 3 of this report should all be made apprised of the resulting recommendations and the status of implementing these strategies.

This can be done in the following ways:

- Public meetings
- Newsletters
- Website updates
- Mailings
- Maple Lake Association meetings
- Personal phone calls or informal follow up
- Press Releases

VII. Conclusion

The MLPIC is pleased to present these findings to the Village Council in hopes that it will assist with project and financial planning for Maple Lake improvements. The findings of the report should be reviewed in five years to ensure the recommendations continue to be relevant.

Summary of Recommendations

Desired Condition	Short Term (1-4 years)	Long Term (5+ years)
Lake Depth and Access Navigability of the South Basin	<ul style="list-style-type: none"> Participate in update of Paw Paw River Watershed plan 	<ul style="list-style-type: none"> Dredging Drain Commission to investigate sediment trap Develop a lake management plan that extends to upstream activities
Weed and Algae Reduction	<ul style="list-style-type: none"> Signage about boat washing Regular weed cutting Chemical Treatments Annual Drawdown (good for milfoil & starry stonewort) Water fowl management Property owner education of lakefront practices Treat for phragmites Test burlap bags/barley bales 	<ul style="list-style-type: none"> Improve storm water management Ultrasound technology Install a boat wash station at Sunset Park Work with upstream land owners to reduce storm water run off Support upstream wetland restoration
Lakeshore stability	<ul style="list-style-type: none"> Continue to install natural shorelines Promote natural shorelines Remove invasive species growing on shoreline Consider passage of waterfront overlay district 	
Leverage natural resources toward economic development	<ul style="list-style-type: none"> Upkeep of Maple Lake park facilities and launches Support River Trail promotional efforts Conduct study about economic impact of Maple Lake 	<ul style="list-style-type: none"> Seek canoe and kayak rental establishment

Appendix List

- A. Most Concerning Maple Lake Invasive Species
- B. Map of Invasive Species in Maple Lake
- C. Natural Shoreline Informational Brief
- D. Wetland Loss Map for Paw Paw River Watershed
- E. Sonic Solution Algae Control Info Sheets

Most Concerning Maple Lake Invasive Species



PURPLE LOOSTRIFE

- Perennial herb with a woody, square stem covered in downy hair
- Height varies from 4 to 10 feet
- Leaves are arranged in pairs or whorls
- Magenta flower spikes with 5-7 petals per flower are present for most of the summer

Given the right conditions, purple loosestrife can rapidly establish and replace native vegetation. This can lead to a reduction in plant diversity, which reduces habitat value to wildlife.



PHRAGMITES

- Warm-season perennial grass with a rigid, hollow stem
- Height ranges from 6-13 feet
- Leaves are flat, smooth, and green to grayish-green
- Flowers grow as dense branched clusters on the end of each stem that are open and feathery at maturity

Phragmites can be difficult to walk through (for humans and wildlife) and often obstructs landowner views because of its ability to grow in tall, dense patches. The exotic strain can reduce native fish and wildlife populations, block out native salt marsh vegetation, and can be a fire danger for nearby residents.



EURASIAN WATERMILFOIL

- Stems are whitish-pink to reddish-brown
- Leaves are greyish-green with finely divided pairs of leaflets that are 1/2-2 inches long, gives the plant a feathery appearance
- Leaves arranged in whorls of 3-6
- Yellow or reddish flower with 4 parts on a projected spike sitting 2-4 inches above water
- Usually 3-10 feet tall with a maximum of 33 feet

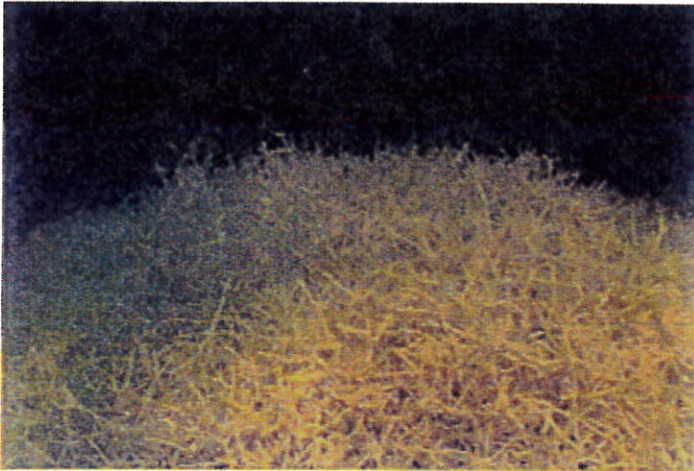
Eurasian watermilfoil forms large mats of floating vegetation that will shade-out native aquatic plants and impede recreational activities. This species is not a valuable food source of waterfowl and may interfere with fish predation. Thick vegetation like this can also clog residential or industrial water intakes.



CURLY LEAF PONDWEED

- Leaves are dark green with wavy, serrated margins
- Submersed, perennial herb with thick roots
- Can reach 2 meters in length
- Flowering spike grows above water's surface
- Starts growing in fall and winter, flowers in late spring, dies in late July

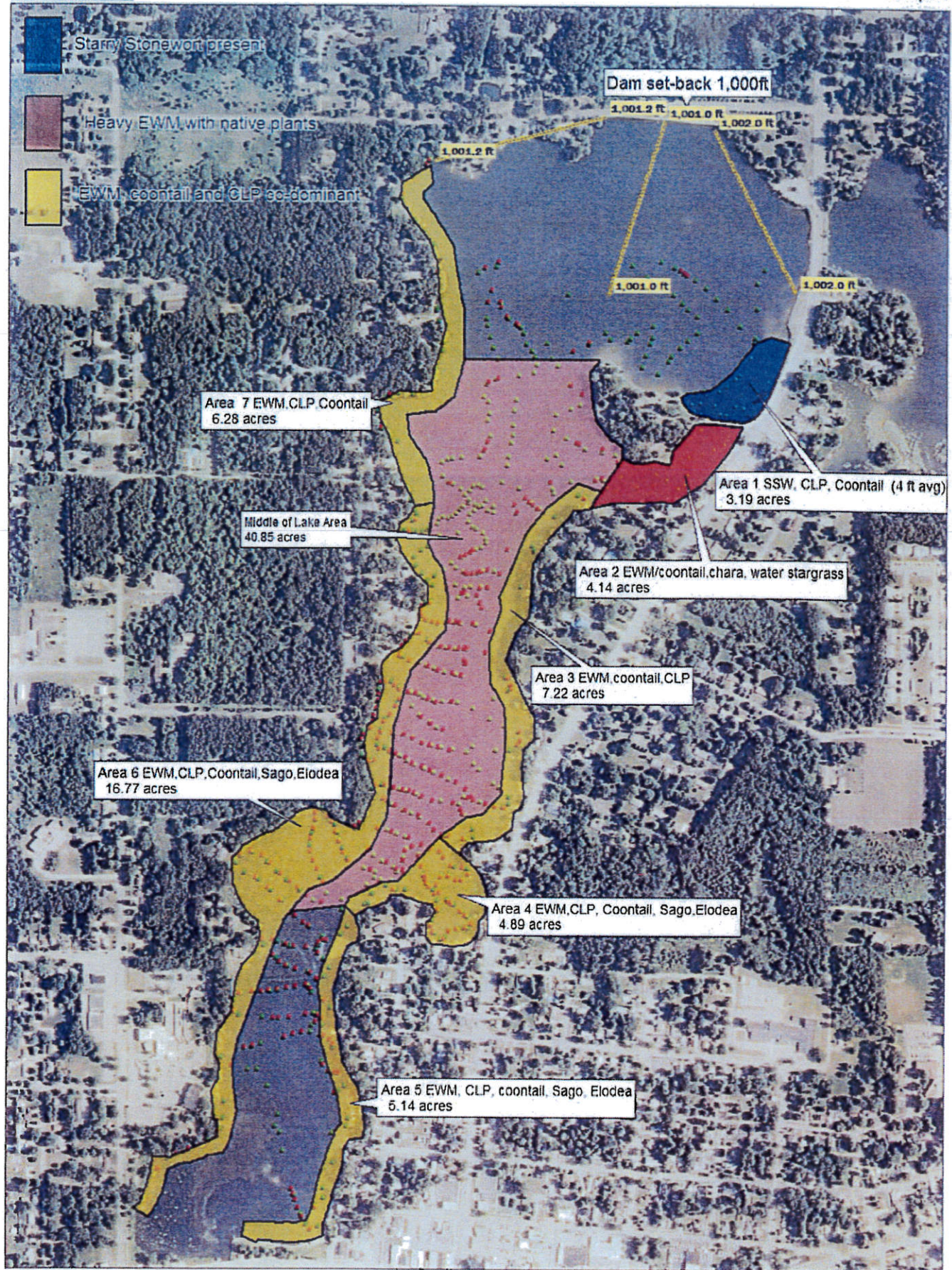
As with many invasive species, curly-leaf pondweed out-competes native aquatic plant species and reduces diversity. Dense colonies can hinder fish movement as well as recreational activity.



STARRY STONEWORT

- Whorls of 4-6 branchlets/leaves with blunt tips
- Star-shaped bulbils are produced at the nodes, generally 3-6 mm wide
- Can reach up to 33 inches

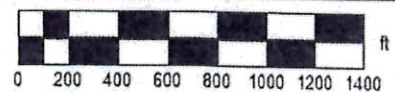
Starry stonewort forms dense mats in lakes and can significantly reduce the diversity of other aquatic plants. Dense mats of vegetation can also impede movement of fish, spawning activity, water flow, and recreational activities.



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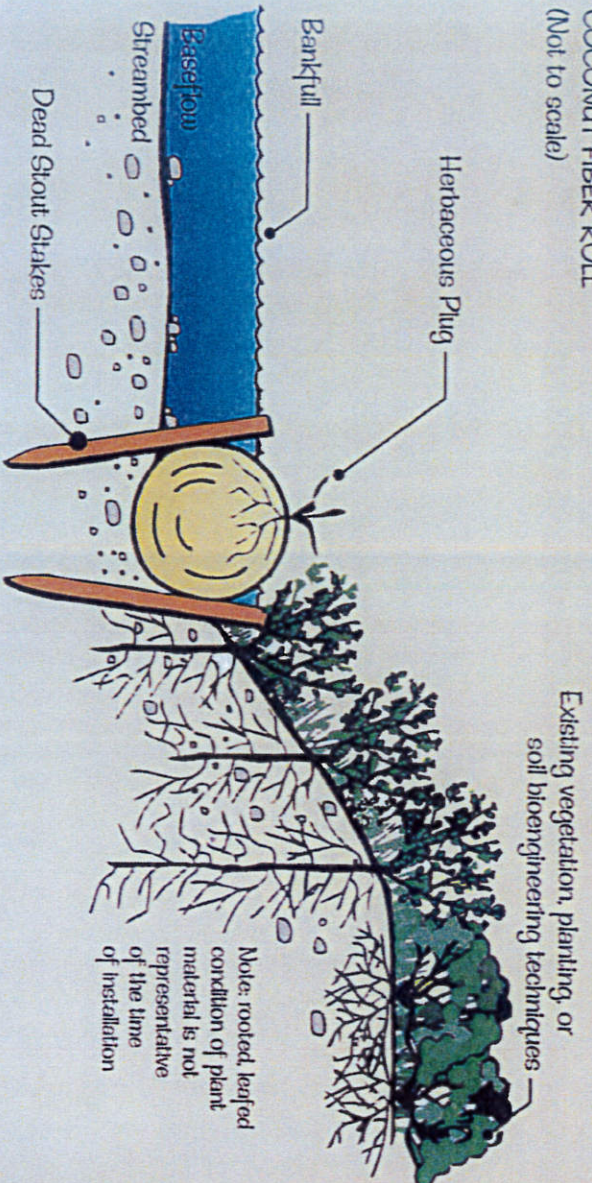
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Data Zoom 14-5

COCONUT FIBER ROLL (Not to scale)

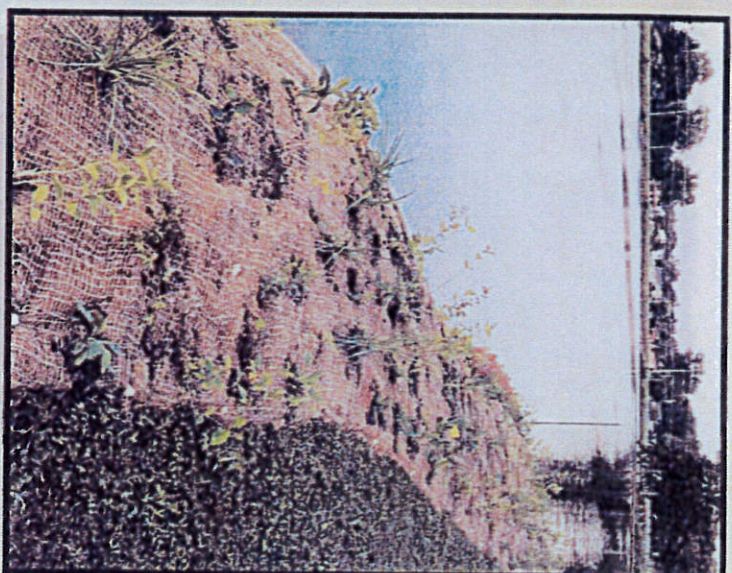


Natural Shorelines

Much of what we enjoy about lake front living and recreation depends on natural vegetation. A healthy shoreline has a variety of native trees, shrubs, and plants. Native plants are best adapted for providing the root structure required to stabilize a shoreline and are also adapted to the climatic conditions of the natural habitat. Native shoreline vegetation supports a large variety of fish and wildlife by providing habitat and protection. The near shore areas of lakes are where the greatest diversity of animal species can be found. Natural shoreline vegetation also helps the lake in many other ways including:

- Slowing and filtering runoff as it moves toward the lake to help keep it clean
- Allowing more water to be absorbed into the ground than runoff
- Providing necessary shade for keeping the water cooler close to the shore
- Protecting the lake edge from wave and ice erosion
- Detering nuisance water fowl

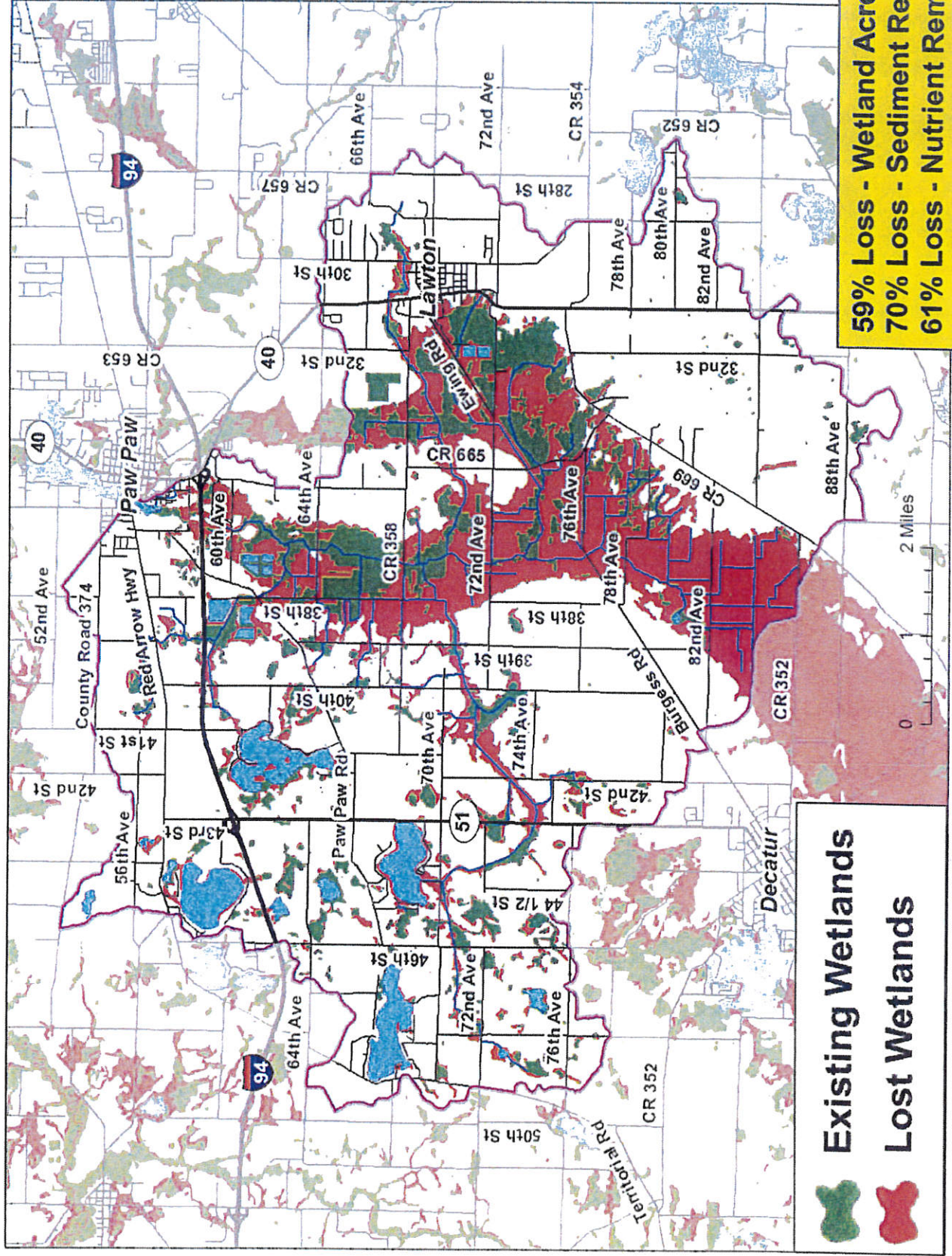
The Village of Paw Paw has installed natural shoreline along the lakefront to protect the shore and animal habitat.



This project was completed in
partnership with Coca-Cola.



We've *Lost* So Much!

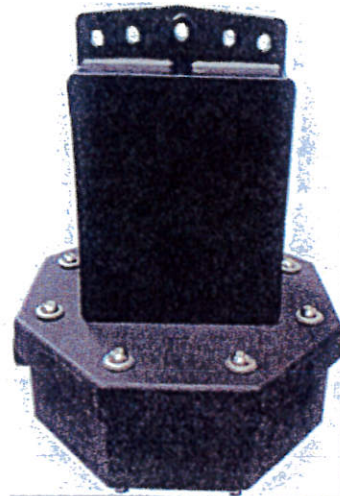




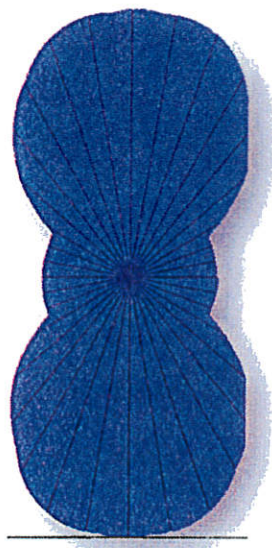
SonicSolutions
ALGAE CONTROL

Mezzo-DB®

The Mezzo-DB®, is a state of the art ultrasonic device for algae and biofilm control. The Mezzo (*Bi-Directional*) – DB (*Dual Bandwidth*) offers features not found before in these types of devices. The bi-directional sound output is achieved with just one piezo sound emitter that operates in two different bandwidths for better control of green algae and diatoms in the lower bandwidth and blue-green algae in the higher bandwidth.



Mezzo-DB® is perfect for:
Swimming Pools • Small Decorative Ponds
Water Features • Tanks



Mezzo-DB® Design Capability:

Green Algae and Diatom Algae Control Range:

150 meters bi-directionally from the device.

Blue-green Algae with gas vesicles Control Range:

400 meters bi-directionally from the device.

Frequency ranges:

Bandwidth 1: Low ultrasonic range 34 kHz

Bandwidth 2: High ultrasonic range 10 kHz

Total Frequencies per cycle: 2000+

Time per cycle: about 34 minutes

Power consumed: 8 watts average on 120 volts AC
(about \$11 per year at \$0.15/kwh)

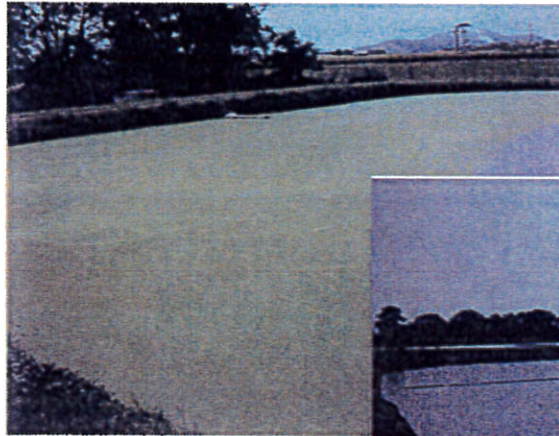
Peak instantaneous power - 25 watts.



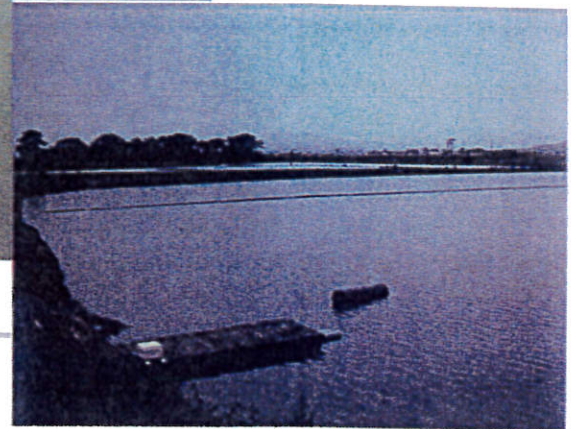
How Ultrasound Works

Ultrasound units for algae control work in harmony with aquatic wildlife (fish and animals), aquatic plants, bio-solids and planktonic organisms other than algae.

The devices will also prevent and control biofilm formation on cleaned surfaces, so you may notice surfaces near the device remain clean for long periods after being initially cleaned. This is due to inhibiting anaerobic bacterial colonization due to their sensing the ultrasonic signature as water turbulence.



Before



After

Fungi (e.g. Pythium) and bacteria with gas vesicles will also be controlled by the device by causing them to lose buoyancy.

The device creates ultrasonic frequencies that cover two important bandwidth areas where algae can be controlled via critical structural resonance similar to the way a crystal glass can be broken by the right sound pitch. Ultrasound works as the force to cause these internal vibrations in algae cells or in organelles inside the algae cells that disable them.

The system is powered via the power module that is available for use with many types of power input.

For more information, and to schedule a consultation, please call us toll-free at 866-KO Algae!

Www.SonicSolutionsllc.com