PAW PAW LAKE
2024 MANAGEMENT PLAN

Prepared for:
Coloma and Watervliet
Charter Townships

Prepared by:
Progressive AE
1811 4 Mile Rd NE
Grand Rapids, MI 49525

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INTRODUCTION

Since 2012, a management plan has been underway to monitor and improve conditions in Paw Paw Lake. The plan is being implemented under the direction of Coloma and Watervliet Charter Townships with assistance from environmental and engineering consultants. The plan is funded through special assessment districts established under Michigan's township public improvement statute (Public Act 188 of 1954).

The Paw Paw Lake Management Plan is a multi-faceted project that includes both in-lake and watershed components. The consulting team includes Progressive AE and Spicer Group. Progressive AE assists with the overall coordination of project activities and in-lake improvements, and Spicer Group's primary focus is watershed management.

This plan provides an overview of management plan activities proposed to be implemented in the 2025 to 2028 timeframe.

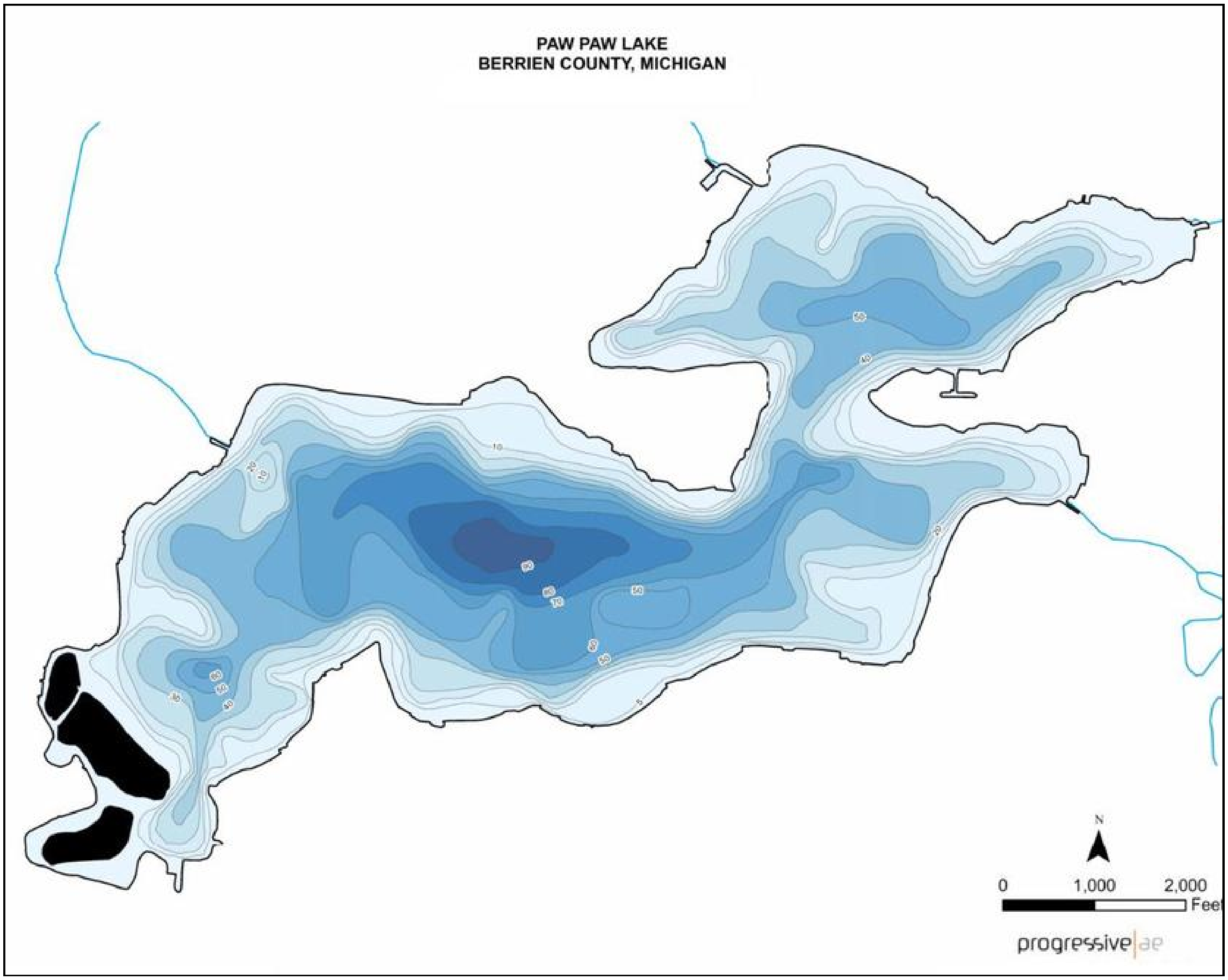

Figure 1. Paw Paw Lake

EXECUTIVE SUMMARY

The Paw Paw Lake Management Plan will include in-lake management strategies as well as watershed management strategies in order to manage the lake ecosystem in a holistic manner. The project working team including scientists, engineers, and technicians from the consulting team of Progressive AE and Spicer Group, and representatives from both Watervliet and Coloma townships have developed this plan and will be overseeing the implementation of the plan.

Primary goals of the management plan include:

- Manage and control invasive and nuisance species.
- Improve overall water quality and water clarity – halt/reverse lake degradation.
- Improve fisheries, wildlife, recreational, and aesthetic values of the lake.
- Manage watershed sediment and nutrient contributions to minimize impacts to the lake.
- Provide educational outreach.
- Measure success of the plan.

The proposed budget for the management plan is as follows:

Work Element	Annual Cost
Aquatic Plant Control	$45,000
Aquatic Plant Control Oversight & Administration	$12,000
Water Quality Sampling	$7,500
Watershed Engineering & Coordination	$25,000
Watershed Improvement Projects	$95,000
Dredging/Alum Feasibility Study	$27,000*
Information and Education	$2,500
Alum Sediment Testing	$20,000*
Project Administration & Coordination	$9,000
Administration and Contingency	$32,000
Total Annual Cost	**$228,000**

*2025 only ($275,000 total budget in 2025)

IN-LAKE IMPROVEMENTS

INVASIVE AND NUISANCE SPECIES CONTROL

Managing and controlling invasive aquatic species is a primary objective of the Paw Paw Lake management plan. In attempting to manage aquatic plants, it is important to note that aquatic plants are an important ecological component of lakes. They produce oxygen from photosynthesis, provide food and habitat for fish, and help stabilize shoreline and bottom sediments. The goal of the plant control program on Paw Paw Lake is to control invasive plant species while preserving beneficial plants.

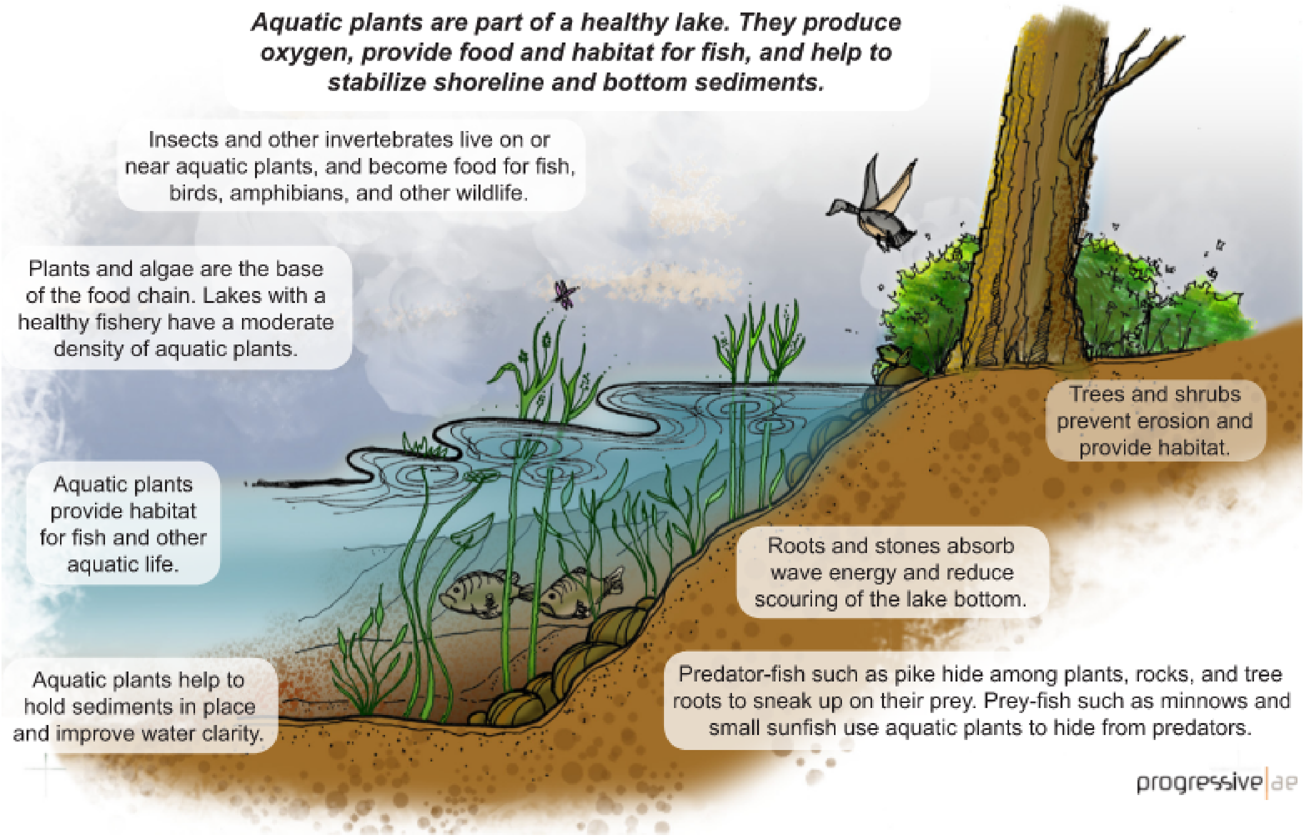

Figure 2. Benefits of Aquatic Plants

The distribution and abundance of aquatic plants are dependent on several variables including light penetration, bottom type, temperature, water levels, and the availability of plant nutrients. The term aquatic plants" includes both the algae and the larger aquatic plants or macrophytes. The macrophytes can be categorized into four groups: emergent, floating-leaved, submersed, and free floating. Each plant group provides unique habitat essential for a healthy fishery.

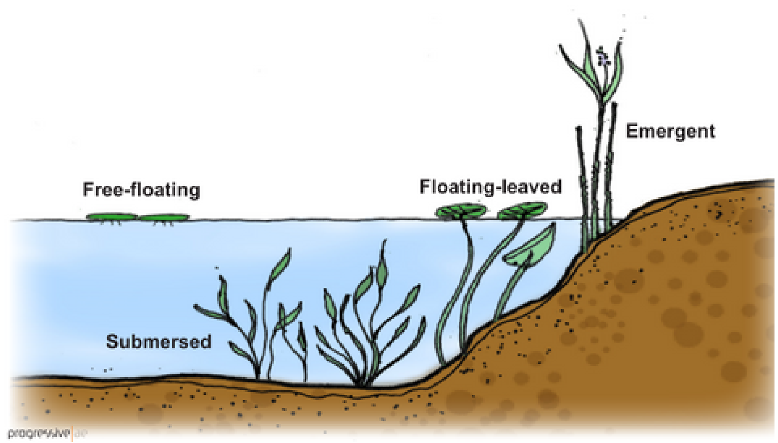

Figure 3. Aquatic Plant Groups

Paw Paw Lake has a diverse aquatic plant community consisting of a variety of plant types (Table 1). Of primary concern in Paw Paw Lake are the invasive species Eurasian milfoil and starry stonewort (Figure 4). Both plants have the potential to spread rapidly in the lake if not controlled.

Common Name	Scientific Name	Group	Percentage of sites where present
Slender naiad	*Najas flexilis*	Submersed	50
Coontail	*Ceratophyllum demersum*	Submersed	47
Chara	*Chara* sp.	Submersed	41
Eurasian milfoil*	*Myriophyllum spicatum*	Submersed	41
Flat-stem pondweed	*Potamogeton zosteriformis*	Submersed	28
Ribbon-leaf pondweed	*Potamogeton epihydrus*	Submersed	28
Wild celery	*Vallisneria americana*	Submersed	26
Large-leaf pondweed	*Potamogeton amplifolius*	Submersed	21
Starry stonewort*	*Nitellopsis obtusa*	Submersed	12
Thin-leaf pondweed	*Potamogeton* sp.	Submersed	8
Small pondweed	*Potamogeton pusillus*	Submersed	6
Illinois pondweed	*Potamogeton illinoensis*	Submersed	4
Variable pondweed	*Potamogeton gramineus*	Submersed	4
Robbins pondweed	*Potamogeton robbinsii*	Submersed	2
Curly-leaf pondweed*	*Potamogeton crispus*	Submersed	2
Water stargrass	*Heteranthera dubia*	Submersed	1
Elodea	*Elodea canadensis*	Submersed	1
Sago pondweed	*Stuckenia pectinata*	Submersed	1
Duckweed	*Lemna minor*	Free-floating	2
Yellow waterlily	*Nuphar sp.*	Floating-leaved	16
White waterlily	*Nymphaea odorata*	Floating-leaved	13
Floating-leaf pondweed	*Potamogeton natans*	Floating-leaved	1
Purple loosestrife*	*Lythrum salicaria*	Emergent	11
Arrowhead	*Sagittaria latifolia*	Emergent	10
Lake sedge	*Carex lacustris*	Emergent	5
Pickerelweed	*Pontederia cordata*	Emergent	4
Bulrush	*Schoenoplectus* sp.	Emergent	3
Cattail	*Typha* sp.	Emergent	2
Swamp loosestrife	*Decodon verticillatus*	Emergent	1
*Phragmites**	*Phragmites australis*	Emergent	1
Iris	*Iris* sp.	Emergent	1
Exotic Invasive Species*			

Table 1. Paw Paw Lake Aquatic Plants - August 31, 2023

Figure 4. Eurasian Milfoil (left) & Starry Stonewort (right)

The control of invasive plants in Paw Paw Lake is accomplished through the select use of aquatic herbicides. In Michigan, herbicide treatments require a permit from the Michigan Department of Environment, Great Lakes, and Energy (EGLE). The permit lists herbicides that are allowed, dose rates, plants targeted for treatment, use restrictions, and indicates specific areas of the lake where treatments are permitted.

Plant control activities in Paw Paw Lake are coordinated under the direction of biologists from Progressive AE, the environmental consultant employed by Watervliet and Coloma Charter Townships. Biologists from Progressive conduct GPS-guided surveys of the lake throughout the growing season to identify problem areas, and detailed treatment maps are provided to the plant control contractor, PLM Lake and Land Management. Follow-up surveys are conducted to evaluate treatment effectiveness and the need for additional treatments.

In addition to surveys of the lake to identify invasive plant locations, detailed vegetation surveys of Paw Paw Lake are conducted annually to evaluate the type and relative abundance of all plants in the lake. These surveys are conducted in accordance with EGLE Procedures of Aquatic Vegetation Surveys. With these surveys, the shoreline is divided into individual assessment areas and the type and relative abundance of each plant species is determined at each assessment site (Figure 5). These data are useful for determining the overall health of the aquatic plant community in Paw Paw Lake and the relative abundance of invasive versus beneficial plant species.

At the end of each summer, reports would be prepared that summarize plant control activities and plant survey results.

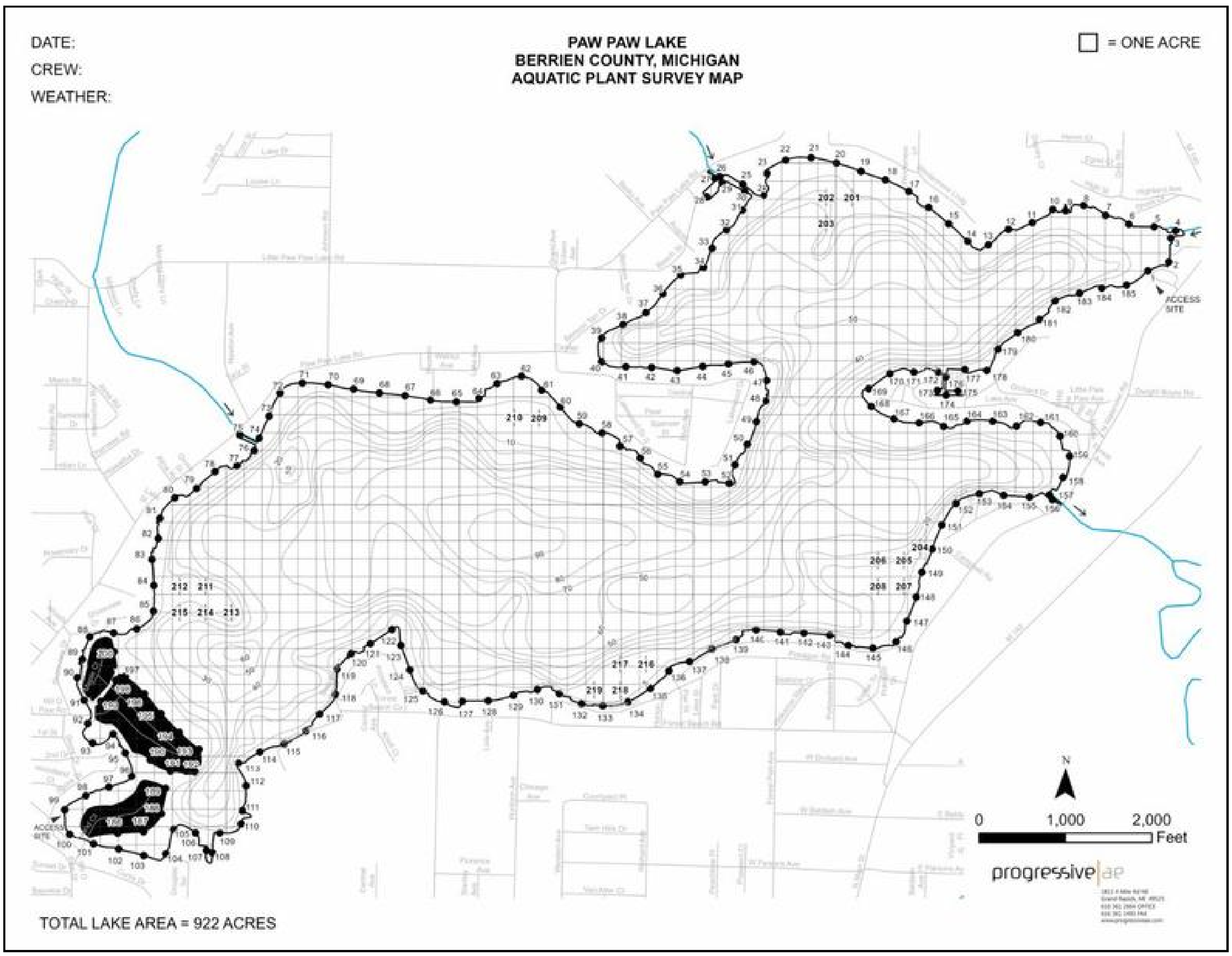

Figure 5. Paw Paw Lake Plant Survey Map

WATER QUALITY MONITORING

Monitoring of water quality conditions in Paw Paw Lake is a key component of the Paw Lake management Plan. Over time, monitoring data can be helpful in determining general trends in water quality and the effectiveness of various lake management alternatives.

Lake Water Quality

Lakes can be classified into three broad categories based on their productivity or ability to support plant and animal life. The three basic lake classifications are "oligotrophic," "mesotrophic," and "eutrophic" (Figure 6). Oligotrophic lakes are generally deep and clear with little aquatic plant growth. These lakes maintain sufficient dissolved oxygen in the cool, deep bottom waters during late summer to support coldwater fish such as trout and whitefish. By contrast, eutrophic lakes are generally shallow, turbid, and support abundant aquatic plant growth. In deep eutrophic lakes, the cool bottom waters usually contain little or no dissolved oxygen. Therefore, these lakes can only support warmwater fish such as bass and pike. Lakes that fall between these two extremes are called mesotrophic lakes. In a recent assessment of Michigan's lakes, the U.S. Geological Survey estimated that statewide about 25% of lakes are oligotrophic, 52% are mesotrophic and 23% are eutrophic (Fuller and Taricska 2012).

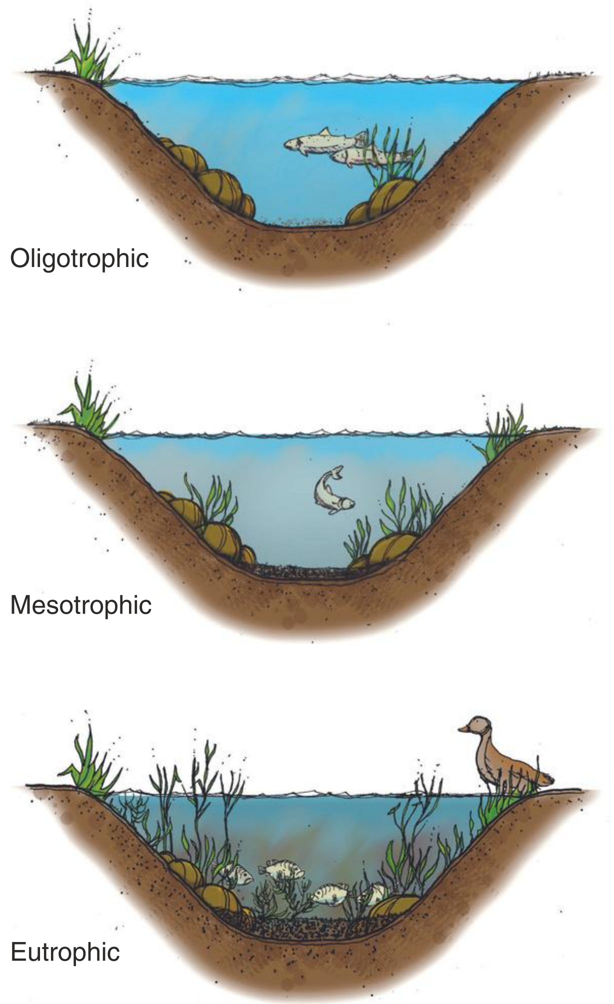

Figure 6. Lake Classification

Under natural conditions, most lakes will ultimately evolve to a eutrophic state as they gradually fill with sediment and organic matter transported to the lake from the surrounding watershed. As the lake becomes shallower, the process accelerates. When aquatic plants become abundant, the lake slowly begins to fill in as sediment and decaying plant matter accumulate on the lake bottom. Eventually, terrestrial plants become established and the lake is transformed to a marshland.

The natural lake aging process can be greatly accelerated if excessive amounts of sediment and nutrients (which stimulate aquatic plant growth) enter the lake from the surrounding watershed. Because these added inputs are usually associated with human activity, this accelerated lake aging process is often referred to as cultural eutrophication.

There are many ways to measure lake water quality, but there are a few important physical, chemical, and biological parameters that indicate the overall condition of a lake. These measurements include temperature, dissolved oxygen, total phosphorus, chlorophyll-*a*, and Secchi transparency.

Temperature

Temperature is important in determining the type of organisms which may live in a lake. For example, trout prefer temperatures below 68°F. Temperature also determines how water mixes in a lake. As the ice cover breaks up on a lake in the spring, the water temperature becomes uniform from the surface to the bottom. This period is referred to as "spring turnover" because water mixes throughout the entire water column. As the surface waters warm, they are underlain by a colder, more dense strata of water. This process is called thermal stratification (Figure 7). Once thermal stratification occurs, there is little mixing of the warm surface waters with the cooler bottom waters. The transition layer that separates these layers is referred to as the "thermocline." The thermocline is characterized as the zone where temperature drops rapidly with depth. As fall approaches, the warm surface waters begin to cool and become more dense. Eventually, the surface temperature drops to a point that allows the lake to undergo complete mixing. This period is referred to as "fall turnover." As the season progresses and ice begins to form on the lake, the lake may stratify again. However, during winter stratification, the surface waters (at or near 32°F) are underlain by slightly warmer water (about 39°F). This is sometimes referred to as "inverse stratification" and occurs because water is most dense at a temperature of about 39°F. As the lake ice melts in the spring, these stratification cycles are repeated.

Dissolved Oxygen

An important factor influencing lake water quality is the quantity of dissolved oxygen in the water column. The major inputs of dissolved oxygen to lakes are the atmosphere and photosynthetic activity by aquatic plants. An oxygen level of about 5 mg/L (milligrams per liter, or parts per million) is required to support warmwater fish. In lakes deep enough to exhibit thermal stratification, oxygen levels are often reduced or depleted below the thermocline once the lake has stratified. This is because the oxygen has been consumed, in large part, by bacteria that use oxygen as they decompose organic matter (plant and animal remains) at the bottom of the lake. Bottom-water oxygen depletion is a common occurrence in eutrophic and some mesotrophic lakes. Thus, eutrophic and most mesotrophic lakes cannot support coldwater fish because the cool, deep water (that the fish require to live) does not contain sufficient oxygen.

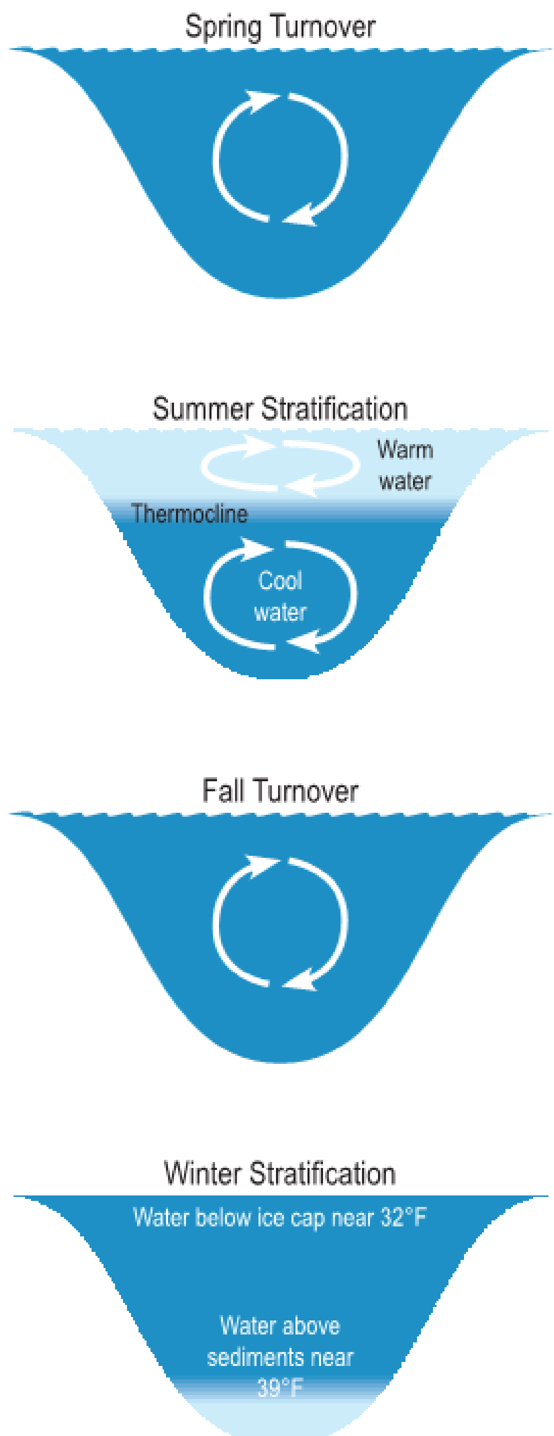

Figure 7. Seasonal Thermal Stratification Cycles

Phosphorus

The quantity of phosphorus present in the water column is especially important since phosphorus is the nutrient that most often controls aquatic plant growth and the rate at which a lake ages and becomes more eutrophic. By reducing the availability of phosphorus in a lake, it is often possible to control the amount of aquatic plant growth. In general, lakes with a phosphorus concentration of 20 µg/L (micrograms per liter, or parts per billion) or greater are able to support abundant plant growth and are classified as nutrient-enriched or eutrophic.

Phosphorus enters the lake either from the surrounding watershed, or from the sediments in the lake itself, or both. The input of phosphorus from the watershed is called "external loading," and from the sediments is called "internal loading." External loading occurs when phosphorus washes into the lake from sources such as fertilizers, septic systems, and eroding land. Internal loading occurs when bottom-water oxygen is depleted, resulting in a chemical change in the water near the sediments. The chemical change causes phosphorus to be released from the sediments into the lake where it becomes available as a nutrient for aquatic plants.

Chlorophyll-*a*

Chlorophyll-*a* is a pigment that imparts the green color to plants and algae. A rough estimate of the quantity of algae present in lake water can be made by measuring the amount of chlorophyll-*a* in the water column. A chlorophyll-*a* concentration greater than 6 µg/L is considered characteristic of a eutrophic condition.

Secchi Transparency

A Secchi disk is often used to estimate water clarity. The measurement is made by fastening a round, black and white, 8-inch disk to a calibrated line (Figure 8). The disk is lowered over the deepest point of the lake until it is no longer visible, and the depth is noted. The disk is then raised until it reappears. The average between these two depths is the Secchi transparency. Generally, it has been found that aquatic plants can grow at a depth of at least twice the Secchi transparency measurement. In eutrophic lakes, water clarity is often reduced by algae growth in the water column, and Secchi disk readings of 7.5 feet or less are common.

Figure 8. Secchi Disk.

Lake Classification Criteria

Ordinarily, as phosphorus inputs (both internal and external) to a lake increase, the amount of algae the lake can support will also increase. Thus, the lake will exhibit increased chlorophyll-a levels and decreased transparency. A summary of lake classification criteria developed by the Michigan Department of Natural Resources (DNR) is shown in Table 2.

Lake Classification	Total Phosphorus (ug/L)[1]	Chlorophyll-*a* (ug/L)[1]	Secchi Transparency (feet)
Oligotrophic	Less than 10	Less than 2.2	Greater than 15.0
Mesotrophic	10 to 20	2.2 to 6.0	7.5 to 15.0
Eutrophic	Greater than 20	Greater than 6.0	Less than 7.5

Table 2. Lake Classification Criteria

1 ug/L = micrograms per liter

Paw Paw Lake Water Quality

Historical water quality sampling indicates Paw Lake has many eutrophic characteristics (Spicer Group 2023a, Water Quality Investigators 2010). The lake has elevated bottom water phosphorus levels, abundant algae growth, and poor water clarity. During the summer months, the deep waters of the lake are devoid of dissolved oxygen. Over the years, Paw Paw Lake has been prone to periodic blooms of blue-green algae which are potentially capable of producing algal toxins. However, algal toxins measured in Paw Paw Lake have been well below levels of concern to human health (Spicer Group and GEI Consultants of Michigan 2022).

In 2023, lake sampling was conducted in August during the period of summer thermal stratification. Samples were collected at 10-foot intervals surface to bottom over the three deep basins in Paw Paw Lake (Figure 9; Tables 3 and 4).

During the August sampling period, the lake was thermally stratified with warm surface waters underlain by cold bottom waters (Table 3). The thermocline, where temperature dropped rapidly with depth, occurred between 20 and 30 feet. At depths greater than 30 feet the lake was anoxic (i.e., devoid of dissolved oxygen).

At the time of sampling, near-surface phosphorus levels were relatively low. However, in the anoxic deep waters of the lake, phosphorus levels were greatly elevated especially in the main and north lakes basins where bottom water phosphorus levels were 269 and 374 parts per billion, respectively (sampling sites 2 and 3, Table 3). These data suggest that the internal release of phosphorus from the anoxic deep water sediments may be a significant source of phosphorus in Paw Paw Lake.

During the August sampling event, chlorophyll-*a* levels in the lake were moderate and below the eutrophic threshold of 6 parts per billion. Water clarity at the time of sampling ranged from 7.0 to 7.5 feet indicative of a eutrophic lake.

The water quality data collected in 2023 is similar to historical sampling results which indicate that Paw Paw Lake is eutrophic (Spicer 2023a, Water Quality Investigators 2010). It is recommended that water quality monitoring to evaluate baseline water quality conditions in Paw Paw Lake be continued and that samples be collected each year at 10-foot intervals surface to bottom over the three deep lake basins during the periods of spring turnover (March or April) and summer thermal stratification (August or September). Parameters of primary concern would include temperature, dissolved oxygen, and total phosphorus. To better evaluate the potential for internal loading in Paw Paw Lake, soluble reactive phosphorus (the form readily available for uptake by algae) should be measured as well during the summer sampling period. In addition, during each sampling period and at each sampling location, measurements would be made of Secchi transparency and chlorophyll-*a* concentration. Finally, periodic monitoring for algal toxins should be continued on an as needed basis. This streamlined sampling protocol would augment the historical database and allow an evaluation to be made of changes in lake water quality over time. Lake water quality monitoring results would be reported annually.

Branch & Derby Drain

About half of the Paw Paw Lake watershed is drained by the Branch and Derby Drain. Annual monitoring of storm events at several locations on the drain have found that nutrient and sediment levels in the drain are substantially greater than levels measured in the lake (Spicer Group 2023b). These data have helped to document conditions in the drain and underscore the importance of watershed improvements to reduce the transport of nutrients and sediment to Paw Paw Lake. Moving forward with the plan, monitoring programs are proposed to be designed to measure the efficiency of specific watershed management practices.

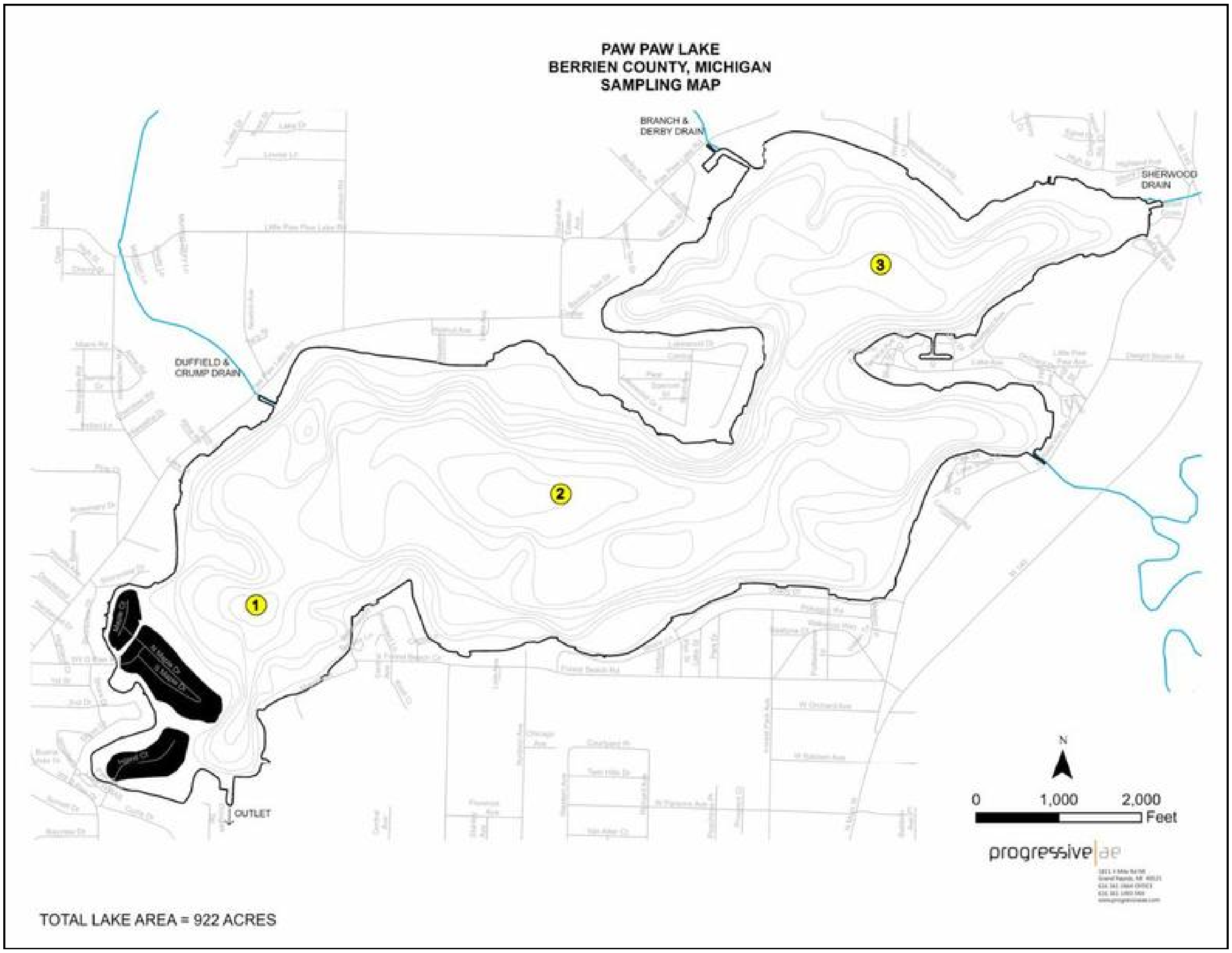

Figure 9. Paw Paw Lake Sampling Location Map

Date	Station	Sample Depth (feet)	Temperature (F)	Dissolved Oxygen (mg/L)[1]	Total Phosphorus (ug/L)[2]
28-Aug-23	1	1	77.1	8.9	<10
28-Aug-23	1	10	76.7	8.6	<10
28-Aug-23	1	20	70.2	1.2	<10
28-Aug-23	1	30	52.3	0.2	<10
28-Aug-23	1	40	49.7	0.2	31
28-Aug-23	1	50	49.2	0.2	74
28-Aug-23	1	56	49.3	0.3	80
28-Aug-23	2	1	77.2	8.5	<10
28-Aug-23	2	10	76.5	8.2	<10
28-Aug-23	2	20	71.3	2.3	<10
28-Aug-23	2	30	52.1	0.0	<10
28-Aug-23	2	40	49.4	0.0	<10
28-Aug-23	2	50	47.9	0.0	49
28-Aug-23	2	60	47.3	0.0	112
28-Aug-23	2	70	46.9	0.1	150
28-Aug-23	2	80	46.8	0.1	225
28-Aug-23	2	88	46.9	0.2	269
28-Aug-23	3	1	76.8	7.9	<10
28-Aug-23	3	10	76.2	7.7	27
28-Aug-23	3	20	71.3	2.0	17
28-Aug-23	3	30	52.2	0.0	46
28-Aug-23	3	40	48.8	0.0	200
28-Aug-23	3	52	48.2	0.0	374

Table 3. Paw Paw Lake 2023 Deep Basin Water Quality Data

Date	Station	Secchi Transparency (feet)	Chlorophyll-*a* (ug/L)[2]
28-Aug-23	1	7.0	1
28-Aug-23	2	7.5	3
28-Aug-23	3	7.0	5

Table 4. Paw Paw Lake 2023 Surface Water Quality Data

1 mg/L = milligrams per liter
2 ug/L = micrograms per liter

LAKE ALUM TREATMENT

Recent sampling indicates that the release of phosphorus from the anoxic deep water sediments in Paw Paw Lake (i.e., internal loading) may be significant in Paw Paw Lake. Alum (aluminum sulfate) is a chemical that has been used successfully in many lakes to reduce internal phosphorus loading and improve water quality. Once applied, alum binds with phosphorus in the water column and settles to the bottom as a floc (Figure 10). The floc inhibits the release of phosphorus from lake sediments. In lakes with high rates of internal phosphorus loading, alum can be an effective tool to reduce phosphorus levels in the water column, improve water clarity, and reduce the frequency and duration of algae blooms.

Figure 10. Alum Application Barge

A primary consideration in evaluating the efficacy of an alum treatment in a particular lake is the relative importance of internal loading versus external (watershed) loading. A detailed modeling analysis of the Paw Paw Lake watershed conducted previously estimated an annual external phosphorus load from the watershed of 3,675 pounds per year (Spicer Group 2008).

While currently it appears that internal loading of phosphorus is occurring in Paw Paw Lake, the rate of release is unknown. Moving forward, it is recommended that sediment cores be collected from the deep basins in the lake and analyzed to determine the amount of biologically available phosphorus contained in the sediment. This data, in turn, can be used to estimate the rate of internal phosphorus loading (i.e., how many pounds of phosphorus are released annually from deep water sediments). Once this information is known, the magnitude of internal loading and external loading can be compared to evaluate if alum is a viable and cost-effective management tool for Paw Paw Lake.

It is important to emphasize that alum should not be viewed as a cure-all. If watershed loadings of phosphorus are excessive, the efficacy of an alum treatment in improving water quality may be short-lived. Alum is but one tool that can be used to restore water quality and should not be applied to the exclusion of watershed management alternatives. As with any lake management technique, sufficient information must be gathered to evaluate effectiveness, technical feasibility, environmental impacts, regulatory requirements, and costs.

In Michigan, the application of alum to surface waters requires a Rule 97 Certification of Approval from the Michigan Department of Environment, Great Lakes, and Energy (EGLE). State approval would likely require monitoring of lake conditions before, during, and after the alum treatment.

DREDGING

Dredging is a lake management tool that may be used to accomplish several objectives: to control aquatic plant growth; to increase water depth; to improve navigability; or to remove undesirable sediments. There are two major dredging methods: drag-line and hydraulic. Both of these involve removing sediment from the water. In some cases, dredging can also be accomplished by lowering the water level and excavating the exposed sediments with earth-moving equipment. The latter method is only feasible when a dam or similar structure is in place to lower the water level and expose bottomlands. Given the limited operational capability of utilizing a "drag-line" type dredge, most lake dredging operations are conducted with hydraulic dredges. Material excavated with a hydraulic dredge is pumped in a slurry through a floating pipeline to the point of disposal. To maintain pumping pressure, hydraulic dredges are generally only used in deeper portions of lakes (i.e., greater than 3 to 4 feet in depth).

A primary consideration in a lake dredging project is identifying a suitable location (or locations) for the placement of dredged material. Disposal sites are usually constructed by excavating an area and creating an earthen dike to contain the dredged slurry. Given the flocculent nature of the organic sediments found in most lakes and the extended time frame for dredged material to dewater and consolidate, the disposal cell must be adequately sized to accommodate the large amount of dredged material produced. The disposal cell should be designed to maximize the settling of solids while allowing excess water to drain back to the lake. After dredged materials have been deposited and sufficiently drained and dried, the disposal area may be graded and seeded.

Figure 11. Hydraulic Dredging Barge

Pursuant to provisions of Part 301, Inland Lakes and Streams, of P.A. 451 of 1994, the Natural Resource and Environmental Protection Act, a permit must be acquired from EGLE before a dredging project on an inland lake can be initiated. Permit conditions will generally require that the dredge disposal site be located in an upland location and that steps be taken during the dredging operation to prevent excessive sediment transport to adjacent areas. EGLE does not typically allow dredge spoils to be placed in wetland areas. In order to determine if dredging is a feasible alternative for Paw Paw Lake, a study would be conducted to evaluate shallow areas of the lake and determine the costs and regulatory hurdles expected for dredging these areas.

WATERSHED MANAGEMENT

Drainage from both the developed shoreland areas around the lake and from agricultural lands in the extended watershed both have the potential to contribute excessive nutrient and sediment loads to Paw Paw Lake. Improvements in water quality over the long term will require that watershed nutrient and sediment inputs to Paw Paw Lake from both sources be reduced. A two-pronged watershed management strategy is being proposed to address this issue.

Shorelands Management

To date, an extensive inventory of all the stormwater catch basins around the lake has been completed (Figure 11) and a total of 396 stormwater catch basins have been cleaned out to remove accumulated debris. At several locations, the installation of stormwater water quality structures is being considered to enhance removal of debris and prevent it from being discharged directly to the lake. Various financing mechanisms and maintenance agreements are also being evaluated to ensure regular cleanout and maintenance of all the catch basins draining to the lake.

As development occurred around Paw Paw Lake, many natural shoreline areas have been lost. In a recent nationwide study, the U.S. Environmental Protection Agency found that lakes lacking natural shoreline areas were three times more likely to be in poor biological condition (USEPA 2010). A focus of the management plan moving forward will be to document the extent of natural shoreline currently existing around the lake and to educate lake residents on specific shoreland management practices to help protect the lake.

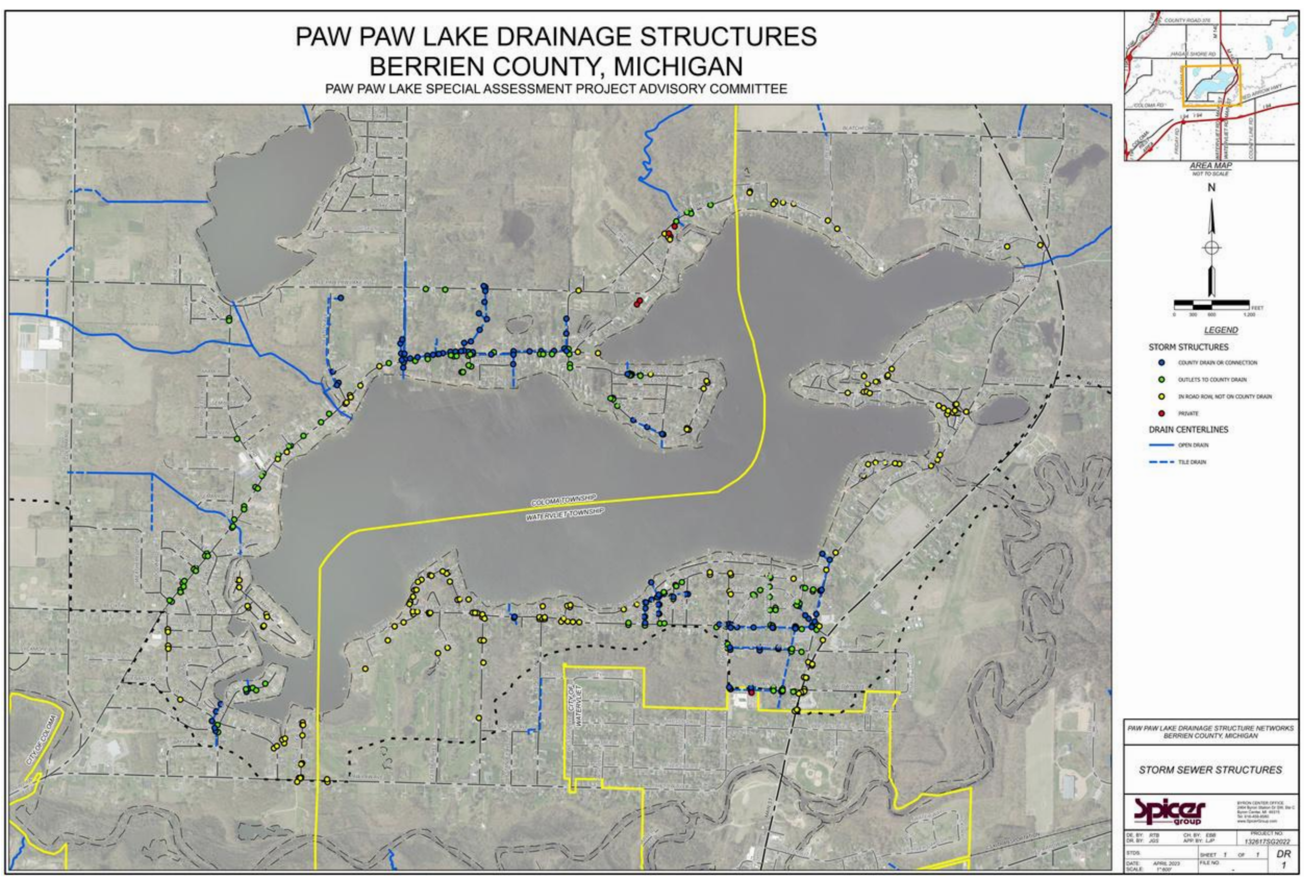

Figure 12. Paw Paw Lake Drainage Structures

Extended Watershed

Sampling to date has documented that the Branch & Derby Intercounty Drain is a substantial source of nutrients and sediments inputs to Paw Paw Lake. To address this problem, a sediment basin was constructed upstream of the lake at M140 and Hagar Shore Road, a floodplain reconnection project immediately upstream of the lake was evaluated as have several wetland filtration and erosion control projects. However, these types of projects require construction easements in addition to various permits and approvals. To date, landowner permissions to implement these projects have been difficult to obtain. Despite these challenges, work in the extended watershed is proposed to continue to identify opportunities for additional projects.

EDUCATIONAL OUTREACH

To provide educational information about Paw Paw Lake and its watershed, a website has been created to keep lake residents informed of project activities (www.pawpawlakemanagement.org). The website contains information about the physical characteristics of the lake and watershed, lake water quality, nuisance species control, watershed management, and includes links to historical studies and useful information sources. Much of the information posted on the website is readily downloadable. The website would be updated annually to provide current information on the status of the management plan.

In addition, project consultants would attend meetings of the Coloma and Watervliet Charter Townships on a periodic basis to present project updates and answer questions about various project activities.

MEASURING SUCCESS

Monitoring of key water quality parameters in the lake would be continued to measure baseline water quality conditions in the lake and changes in water quality over time. As various watershed improvements are implemented, sampling strategies would be devised to measure the efficacy of the improvements in reducing nutrient and sediment inputs into the lake. Sampling programs would be designed to both cost-effective and practical.

PROJECT ORGANIZATION & FINANCING

The Paw Paw Lake Management Plan has been ongoing since 2012. The plan is funded through special assessment districts established under Michigan's township public improvement statute (Public Act 188 of 1954). Under provisions of Act 188, the scope and cost of the project are reviewed at public hearings held every four years.

At this time, it is recommended that the annual budget for the project remain the same as in the last assessment cycle (i.e., $212,000) and that the cost of the plan be apportioned according to the previously established assessment criteria in which lakefront and lake access properties are assessed 1.0 unit, shared access properties are assessed 0.1 unit, and marinas are assessed 2 or more units based on the number of boat slips. Moving forward, the plan would continue to focus on the control of invasive species in Paw Paw Lake, water quality monitoring, educational outreach, and various programs to help reduce nutrient and sediment inputs into the lake. Currently, there are over 1,000 full assessment units within the lake improvement special assessment district. With an annual budget of $212,000, the annual assessment for lakefront and lake access properties would be approximately $200.

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