CASCADE CHARTER TOWNSHIP

THORNAPPLE RIVER SAD AD-HOC COMMITTEE MEETING
March 7, 2022 at 5:30pm
Cascade Township Hall
5920 Tahoe Dr. SE
Grand Rapids, MI 49546

Zoom Participation Link:
https://us02web.zoom.us/j/83627708175

ARTICLE 1. Call the Meeting to Order

ARTICLE 2. Approval of the Agenda

ARTICLE 3. Acknowledge Visitors & Public Comment

ARTICLE 4. Approval of the Minutes of the 01.17.22 Meeting

ARTICLE 5. Review of Aquatic Weed Management RFP Responses

ARTICLE 6. Roundtable Q&A

ARTICLE 7. Public Comment

ARTICLE 8. Adjournment

CASCADE CHARTER TOWNSHIP

THORNAPPLE RIVER SAD AD-HOC COMMITTEE MEETING
January 17, 2022 at 5:30pm
Cascade Township Hall
5920 Tahoe Dr. SE
Grand Rapids, MI 49546

Members Present: Trustee Shipley, Members, Scott Rissi, Thomas Keith, Mike Wiegand, Jeff Carpenter, Paul Strauss, Charles Whitley, Lori Gottlieb

Others Present: Township Manager (TM) Ben Swayze

Members of the Public: None

ARTICLE 1. Call to Order: Meeting was called to order at 5:00p

ARTICLE 2. Approval of the Agenda: Motion by Member Rissi, Supported by Member Keith to approve the agenda. Motion Carried.

ARTICLE 3. Acknowledge Visitors & Public Comment: No Members from the public

ARTICLE 4. Approval of the Minutes of the 12.27.21 Meting: Motion by Member Rissi, Supported by Member Keith to approve the agenda. Motion Carried.

ARTICLE 5. Review and Consideration of Aquatic Weed Management RFP - Manager Swayze explained that the RFP was a little different in that costs won't be known until a plan is put together, as such the RFP was designed to solicit costs such as per acre chemical application costs, per acre mechanical harvesting costs, control plan survey costs, etc…

Committee will be responsible for reviewing the proposals and making a recommendation to the Township Board. Evaluation criteria is designed to provide latitude to both the Committee and Board for making decisions. Schedule for RFP was reviewed.

Discussion ensued. Committee discussed timelines, contract length and renewals and insurance requirements. Committee would like clarification from legal counsel on whether indemnification is required for all SAD members or just the Township.

Motion by Member Rissi, Supported by Member Keith to recommend Township Board approve issuance of the RFP. Motion Carried.

ARTICLE 6. Roundtable Q & A Discussion was held regarding other aspects of river management and future planning opportunities. Budget will need to be developed once a consultant is selected.

ARTICLE 7. Discuss and Consider Future Meeting Dates/Times: Monday evenings generally work for everyone. Twice monthly meetings may be necessary to ensure 2022 weed removal plan can be formulated quickly enough. Next meeting tentatively scheduled for February 14.

ARTICLE 8. Public Comment None

Adjournment: Motion was made to adjourn the meeting. Motion carried 8-0. Meeting adjourned at 6:57 pm

Approved by the Thornapple River SAD Ad-Hoc Committee – TBD

PLM
LAKE & LAND
MANAGEMENT CORP

February 21, 2022

Cascade Charter Township
Attn: Ben Swayze, Township Manager
5920 Tahoe Dr. SE
Grand Rapids, MI 49546

Thank you allowing me to submit a proposal to work on the Thornapple River. I am confident that the service you will receive will exceed your expectations. Please feel free to contact any of our references to gain more insight on the services available by PLM. PLM Lake & Land Management Corp. is a Michigan based company with a specific focus of lake management in Kent County. We have numerous offices throughout Michigan to serve our customers with the fastest response time and a highly educated and experienced staff with the latest technologies available in aquatics.

The following proposal is for your review for the Thornapple River for the 2022-2024 seasons with a variety of services available. To highlight a few of the advantages of working with PLM: All treatments are guaranteed. All billings are post service/treatment with itemized billing details. Reports and follow up information are readily available following service. In addition to any scheduled service, PLM is always available via phone or email for treatment/lake evaluation if something changes unexpectedly. Please review the following proposal and if any changes, additions, or modifications are required to suite your specific program needs, please contact me without hesitation.

PLM has been working closely with the Cascade Thornapple River Association over the last six years to help them develop an initial plan for aquatic plant management. PLM has surveyed the river multiple times, including the summer of 2021, therefore very familiar with the plant community and the immediate needs of this waterbody. PLM also works as with the Thornapple River Association located between the Cascade & Ada dams. PLM provides the association with invasive plant management, mechanical harvesting, water quality testing, vegetation surveys and any other lake management services needed. Obtaining an initial EGLE permit to treat this section of the river was a challenge due to the potential presence of a state threatened species. PLM worked tirelessly with the state agencies (EGLE, DNR) until a compromise was made and the permit was issued.

Management Program for 2022: The primary goal of aquatic plant management in the Thornapple River is the control of exotic aquatic plants. The exotic plant species, Eurasian watermilfoil, should be controlled throughout the river. The abundance of this species should be reduced to the maximum extent possible, and efforts should be made to reduce its recovery after treatment. Aquatic plant management should preserve species diversity and cover of native plants sufficient to provide habitat for fish and other aquatic organisms. Native plants should be managed to encourage the growth of plants that support the Thornapple River fishery (by creating structure and habitat) provided that they do not excessively interfere with recreational uses of the lake (e.g., swimming and fishing) in high-use areas. Where they reach recreational nuisance levels, management techniques that reduce the stature of native plants without killing them (e.g., harvesting, contact herbicides) should be used whenever possible. Specific areas should be set aside where native plants will not be managed, to provide habitat for fish and other aquatic organisms. Management will also include performing surveys (AVAS surveys when required), pre/post treatment surveys, water quality analysis and algae treatments if required.

The first step in developing a long-term aquatic plant management plan for the river is conducting a detailed vegetation survey. Performing surveys is a vital part of any lake management program. PLM typically surveys a lake in the spring and fall as well as surveying pre/post treatments. Vegetation surveys determine the locations of target and non-target plant species. The results of the surveys are used to determine the most appropriate management strategy. The vegetation surveys also document the success of the prescribed management program. An AVAS survey is the State of Michigan's method for conducting a complete aquatic vegetation survey. The Aquatic Vegetation Assessment Site (AVAS) survey divides the parts of the lake capable of growing plants (littoral zone) into subareas and records the cover of each aquatic plant found in each "site". This method of surveying considers not only the types of plant species present in the lake but also the densities of those species. AVAS surveys are also an excellent way to track plant species trends over time. A goal of invasive plant management is to have native plants increase or remain stable while exotic plants decrease over time. The success of this goal can be illustrated through the use of the AVAS data collected over several years.

An initial full river survey will take place in the spring to prepare treatment plans and evaluate overall river conditions. Acre plot maps, as well as GPS technology, will be used throughout the surveys when preparing treatment maps. Please note that board/association

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phone 616.891.1294 · fax 616.891.0371
www.plmcorp.net

members can accompany PLM in the field for surveys if pre-arranged. This initial survey will be used to determine the most appropriate, up to date, treatment recommendations based on the current growth in the river. Following this survey, recommendations will be made which will include treatment locations, products to be used and associated costs.

Proposed Timeline of Activities for 2022:

March: Submit Aquatic Nuisance permit application to EGLE (issuance of permit can take 6 weeks or longer)

April: Mail out required Spring Notice to residents, Spring water quality testing (complete in 1 day)

Early May: Spring AVAS vegetation survey to evaluate conditions in the river and direct management efforts (complete in 1 day)

Late May: Initial herbicide treatment to control any aquatic exotic plants that are found (complete in 1 day)

May- August: Monthly Algaecide/Chara/Starry stonewort (if found) treatments, if required (complete in 1 day)

June: Mid-summer herbicide treatment, if required (complete in 1 day)

July: Mid-summer native plant control, mechanical harvesting (complete in 3-5 days and/or herbicide treatments (complete in 1 day), if required

July: Mid-summer water quality sampling (E. coli) (complete in 1 day)

August: Late summer herbicide treatment, if required (complete in 1 day)

August/September: Conduct a fall AVAS vegetation survey (complete in 1 day)

August/September: Conduct Fall water quality sampling (complete in 1 day)

October/November: Compose year-end Lake Management Plan for township review (Plan will be drafted after all water quality results are received from the state certified lab, 1 week)

November: Submit required treatment report to EGLE (complete in 1 day)

Below are the associated costs (on a per acre basis) of products that may be used as part of the aquatic weed management program.

Unit Cost per acre:

Contact Herbicides:	
Diquat	$150.00 (exotics)
Diquat	$210.00 (hybrid/natives)
Aquathol K	$170.00 (exotics)
AquaStrike	$425.00
Nautique (Eel Grass)	$390.00
Clipper 100ppb w/Contacts	$425.00
Clipper 200ppb	$550.00
Systemic Herbicides:	
Navigate 2,4-D	$400.00
Sculpin G	$400.00
Renovate 3 (liquid)	$325.00
Renovate OTF	$580.00
ProcellaCOR	$100.00/PDU
ProcellaCOR/Diquat Combo	$575.00
Algaecides:	
Copper sulfate/Chelated copper	$45.00
Chelated copper	$125.00
SeClear, filamentous algae	$200.00
SeClear G, SSW Control	$375.00
Green Clean	$300.00
Phycomycin	$125.00
PLM Consulting Services:	
Vegetation AVAS Survey	$560.00
Mid-summer brief checks	No Charge
Water Quality Program	$900.00
Lake Management Plan	$750.00
EGLE Permit Fee	$1600.00 (cost of fee determined by EGLE annually)

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Mechanical Harvesting Program:

Mechanical harvesting is best suited for nuisance native plant species. Mechanical harvesting can be used to provide relief from native plant species if they are causing a recreational nuisance. Harvesting does not kill the plants, but simply reduces it's stature, leaving lower growth for fish habitat and sedimnet stabilization. PLM will not harvest Eurasian watermilfoil, as this plant spreads by fragmentation.

PLM owns and operates 3 mechanical harvesting machines that operate throughout the state. We will cut down to a maximum depth of five (5) feet and require a minimum of 18 inches of water depth for harvester flotation. Harvested vegetation will be dumped at a predetermined location designated by the client within a ten (10) mile radius of the river. Any cost associated with the disposing of vegetation is the responsibility of the client, i.e., landfill disposing costs. There will be no set-up or breakdown fees of our equipment if a suitable access site is available. Expenses of an unsuitable launch site will be the responsibility of the river. A representative of the client will be required to periodically evaluate workmanship.

Cost of Harvesting: $250.00/hour with a minimum per cutting of $2,500.00

Water Quality Program:

The water quality program consists of sampling **two** sites on the river twice a season, spring and late summer. Parameter such as secchi disc, pH, D.O., conductivity, alkalinity and nutrient sampling of nitrates and total phosphorus give us the ability to monitor lake trends more efficiently. This information will enable us to include the tropic status of your lake. The program also tests your water for Fecal bacteria (E. Coli), in mid-summer at three separate locations, which can determine the condition of your river and if the water is safe for swimming. Reports will be issued annually in the fall.

Cost of Water Quality Program: $900.00/annually

Estimated Budget for 2022-2024: Although a budget was not required at part of the RFP, PLM was able to put together an estimate based on past surveys of the river. All budgets are comprised using the unit costs per acre listed above and approximate acreages observed in 2021. All treatments will be preapproved prior to application. Low end budget includes EWM control and technical services (permit fee, AVAS Survey, WQ program). High end budget includes everything in the low-end budget and also incorporates native plant control (herbicides and/or harvesting).

2022:	$40,000.00	$58,000.00
2023:	$40,000.00	$58,000.00
2024:	$40,000.00	$60,000.00

Budget Total Three Years: $120,000.00 to $176,000.00

Average per Year: $40,000.00 to $58,667.00

This budget is an estimate and can be adjusted to meet the needs of the residents of the Thornapple River. Any management tool listed is an option and is the suggestion of PLM to meet those expectations. You will only be charged for the actual amount of control required, at the unit per acre prices listed above. All treatments are pending the approval of the Department of Environment, Great Lakes & Energy (EGLE). Treatments must be timed accordingly and conducted during low flow conditions. If native plant control is requested or recommended through the use of herbicides or mechanical harvesting, the high-end budget would be needed.

Description of Additional Management Services Available:

Meeting Attendance/Presentation: A representative of PLM is available to attend association/township meetings upon request. This request has to be made prior to meeting to allow for conflict in representative's schedule. If conflict in meeting time does arise, alternative dates and times need to be determined between representative and board. Residential concerns can always be brought to the lake association/board and then to PLM or directly to PLM by calling our office. There is no cost for PLM to attend a requested meeting.

Bathymetric Mapping: PLM utilizes state of the art mapping technology in order to provide you with an accurate and detailed depth contour map of your lake. This new software, combined with the latest in GPS/Depth finder units, has the ability to quickly collect precise bathymetry (depths) and aquatic vegetation of any given waterbody. This data can then be used to create accurate bathymetric, vegetation bio-volume, bottom hardness or treatment maps. A bathymetric map can be done with or without a survey of the lake and vice versa. A new bathymetric map is recommended every 10-20 years in order to establish updated base data on the lake, track historical changes, etc. Bathymetric mapping costs can range pending the time of year. Inquire for pricing.

Milfoil Genetic Testing: Over the last decade, advancements in technologies have allowed genetic testing of milfoil stems to determine genetic makeup (i.e. Northern watermilfoil versus Eurasian watermilfoil versus Hybrid watermilfoil). This testing has confirmed that there are variances in the genetic makeup of different hybrid milfoils. Genetically testing milfoil can be helpful if treatments have shown unexpected results. PLM has been collaborating with Universities across the country in sampling and studying the genetic makeup of milfoil infestations across Michigan. Although this data is very helpful in researching milfoil, genetic testing is not a requirement. PLM can genetically sample milfoil upon request or if required for management implementation. Inquire for pricing.

Nutrient Abatement: PLM's healthy lakefront living guide, which includes many measures taken to promote a healthy lake and reduce nutrient loads, can be presented to riparian's and discussed in the annual newsletter to residents. Additionally, PLM is certified to work with the natural shoreline partnership to restore shoreline areas for the protection of the lake and reduction of nutrients entering the lake. Cascade Charter Township can work with PLM to perform a "Score the Shore" to evaluate the river's shoreline and explore opportunities to improve conditions. In addition, nutrient remediation efforts can include dredging, bacteria augmentation, watershed planning, and tributary testing/improvement to name a few.

Contract Period:

Three Year Treatment Program: As an incentive to establish a multiple year agreement, we will treat your lake or pond at the same price structure as 2022 for 2023. The remaining year (2024) will have a cost increase of (3%) three percent or less. If total chemical cost increases 10% from the previous year a new agreement will have to be mutually acceptable. If during the life of the contract EGLE or other regulatory agencies significantly change the approved treatment procedures, either party may terminate this agreement upon giving ninety (90) days advance written notice thereof.

Permit Fee: PLM Lake & Land Management Corp. is responsible for completing and submitting aquatic nuisance permit applications. PLM Lake & Land Management Corp. will send an invoice or statement for the yearly EGLE permit application fee. It is your responsibility to send a check made out to the "State of Michigan" to our office. We must include this check with the EGLE permit application.

Posting of Treatment Areas: Posting of shoreline treatment areas is the responsibility of PLM Lake & Land Management Corp. and will be conducted according to EGLE regulations. Due to EGLE guideline changes and specific residential concerns, posting fees may apply. Signs will be attached to thick barked trees, posts or other suitable fixtures already on site. If homeowners wish to have signs posted in designated areas or on specific fixtures they must notify PLM Lake & Land Management Corp., providing lake address, location of property, and where the signs are to be posted. Pictures are the most informative way to relay this information. Notification of alternate posting must be made at least 14 days prior to treatment and additional fees may apply. The removal of posting signs after the restrictions have expired is the responsibility of the homeowner.

Notification of Treatments: It is your responsibility to notify each resident within **100 feet** of the treatment area **at least seven days in** advance, **but no more than forty-five days** prior to the first treatment date, that products will be applied to the lake (with a provided list of addresses from the lake board). This notification requirement **must** be administered to each and every property owner within 100 feet of any treatment area. PLM Lake & Land Management Corp. will provide a tentative treatment schedule and the **Notice** of proposed products to be used during the spring of each year. We will also notify resident within 100 feet of the treatment areas on the day of treatment.

Non-Target Species: Please be aware that we only control weeds and algae **present** at time of treatment. Emergent vegetation (cattails, bulrush, purple loosestrife), lily pads, eel grass and sago pondweed require separate programs for control and are not addressed unless specifically mentioned in the management program. We have no control over future weed or algae growth based on the current chemicals registered for aquatic use in Michigan.

Electronic Treatment Notification: In addition to the above-required notification procedures, the Department of Agriculture allows for electronic notification i.e. email with the contracting entity. Therefore, if the contracting entity is a township, lake board, or municipality, you will also receive the same information that is being distributed to each resident (Posting Sign) prior to the treatment. By signing this agreement with PLM Lake & Land Management Corp and providing us the contracting entity email address, we can legally implement the electronic notification procedure.

Invoicing and Payments: PLM Lake & Land Management Corp. will submit an invoice following treatment that will include the following information; lake and/or pond(s) treated, date of treatment and type of treatment or acres treated. Monies will be due net thirty (30) days after each treatment. The invoice may be subject to a fuel surcharge of up to 1% of the total treatment cost. Interest of 1.25% will be added to your bill for each additional sixty (60) days that payment is not received.

Liability Issues:
We are responsible for workman's compensation and liability insurance for the duration of the contracted period.

PLM Lake & Land Management Corp. is not responsible for fish loss due to low oxygen levels caused during warm water conditions.

Permitting:
PLM Lake & Land Management Corp. will apply for and secure all of the necessary permits from all regulatory agencies in order to carry out the aquatic weed management program.

For further clarification or modifications please contact.

Jaimee Desjardins

Jaimee Desjardins, Environmental Scientist
West MI Regional Manager
PLM Lake & Land Management Corp.
616-891-1294 ext 2005
jaimeed@plmcorp.net
www.plmcorp.net

For: Thornapple River – Cascade Charter Township
Please Check Which Program you are participating in

Electronic Notification email address	Print Name
Text Message Number for Pre-Treatment Notification	Signature

Project Staffing

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Jaimee Desjardins, Project Lead - graduated from Michigan State University with a degree in Environmental Studies before beginning her career with PLM in 1999. While at MSU, Jaimee focused her studies on Environmental Impacts and interned with the Ingham County Drain Commissions Office. With over 20 years' experience in aquatic plants and lake management, Jaimee has focused much of her career in water quality analyzes, lake surveying/evaluation, and new technology. Jaimee's advanced knowledge in GIS has allowed PLM to expand their capabilities with mapping weed beds and preparing and evaluating treatments. Jaimee is PLM's West MI Regional Manager, managing lakes throughout the Grand Rapids Metro area to the lakeshore, as well as our Technical Services Manager where she oversees all water quality and vegetation monitoring.

Jason Broekstra, Project Support - earned his Bachelor's Degree in Biology from Grand Valley State University (GVSU) in 1995. While at GVSU he spent a summer as an intern for the Michigan Department of Natural Resources, Fisheries Division. For the past 25+ years, Jason has worked in all aspects of PLM and currently serves Vice President of MI Operations and is an active board member. Under Jason's leadership, PLM has become approved performing evaluation treatments and is leading the way to determining better application techniques and methods. Jason has focused his career at PLM working with customers in making sound scientific decisions while overseeing the work of his employees on hundreds of inland lakes and ponds. Jason is a past President of the Midwest Aquatic Plant Management Society, current President of the Michigan Aquatic Managers Association and current treasurer for the Michigan Chapter, North American Lake Management Society. He was the recipient of the "2009 Applicator of the Year" award by SePRO Corporation. Jason also serves on the Michigan Inland Lakes Partnership and many other organizations throughout Michigan.

Lucas Slagel, Senior Field Technician – has been with PLM for over 18 years. Lucas is our most senior field technician applying herbicides for the control of nuisance and invasive vegetation, conducting vegetation surveys and collecting water quality sampling. He is licensed through the Michigan Department of Agriculture and is required to take continuing education credits to stay up to date on industry advancements. Lucas is also responsible with training new technicians and managing the PLM shop. Over the years working with PLM, Lucas has been the first to identify new introductions of invasive plants to our customers' waterbodies. He has a keen eye for aquatic plant management and an incomparable asset to our team.

Eric Reed, Senior Field Technician – has been working for PLM for over 7 years. Eric has a Bachelor of Science degree from Aquinas College. As a senior field technician, Eric is responsible for applying herbicides for the control of nuisance and invasive vegetation. He also conducts vegetation survey and water quality sampling. Eric is licensed through the Michigan Department of Agriculture and is required to take continuing education credits to stay up to date on industry advancements.

AJ Weinberg, Field Technician – has been working for PLM for over 6 years. AJ has a Bachelor of Science degree from Grand Valley State University. As a senior field technician, Eric is responsible for applying herbicides for the control of nuisance and invasive vegetation. He also conducts vegetation survey and water quality sampling. Eric is licensed through the Michigan Department of Agriculture and is required to take continuing education credits to stay up to date on industry advancements. When AJ is not working with PLM during the summer he is a 4th grade teacher in Parchment.

Please see attached list of additional PLM staff that are certified to apply herbicides and/or mechanically harvest.

Authorized Negotiations

Jaimee Desjardins, Environmental Scientist
West MI Regional Manager
616-891-1294 ext 2005
jaimeed@plmcorp.net

Jason Broekstra, Biologist
VP MI Operations
616-891-1294 ext 2000
jasonb@plmcorp.net

PLM Lake & Land Management Employee Certifications by Michigan Department of Agriculture.

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Name	PLM Location	Certification #	Certification Expiration	~Initial Certification Date
Salvatore Adams	Evart	C003130361	2022	2013
Jason Broekstra	Alto	C003960201	2023	1996
Adam Cichon	Alto	C001190506	2022	2019
Jaimee Desjardins	Alto	C003000069	2024	1999
William Ducham	Evart	C001200459	2023	2020
Jeff Fischer	Morrice	C007120330	2024	2011
Chris Garner	Morrice	C002150136	2022	2014
BreAnne Grabill	Evart	C003060277	2024	2006
Dustin Grabill	Evart	C003070347	2022	2007
Steve Hanson	Morrice	C006020298	2023	2002
Kyle Heath	Evart	C002160164	2022	2016
Jacob Hunt	Alto	C003060216	2024	2006
Caleb Hutchinson	Evart	C001190373	2022	2019
Anna Lindquist	Evart	C001180502	2024	2018
Blake Mallory	Sturgis	C005100409	2022	2010
Michael Pichla	Alto	C003140297	2023	2014
Eric Reed	Evart	C002170165	2023	2016
Colton Risner	Alto	C003160331	2022	2016
Cameron Robinson	Alto	C003170475	2023	2017
Alison Schermerhorn	Evart	C003170389	2023	2017
Ben Schermerhorn	Evart	C003140356	2023	2014
James Scherer	Morrice	C006100412	2023	2010
Jon (Casey) Shoaff	Evart	C002150071	2022	2015
Lucas Slagel	Alto	C005050338	2023	2005
Keith terHorst	Alto	C007160689	2022	2019
Jeff Tolan	Alto	C003960255	2023	1996
Andy Tomaszewski	Alto	C003010324	2022	2001
Dennis VanGessel	Morrice	C003150254	2024	2015
Andrew Weinberg	Alto	C002170187	2023	2017
Joel Wolthuis	Sturgis		2022	2020

Technical Equipment - Michigan

PLM
LAKE & LAND MANAGEMENT CORP

Boats and Application Equipment: 10 Airboats (16-22 Ft)(2 new 2017 EPA compliant 16'), 6 (19Ft) Carolina Skiffs, 3 (21Ft) Carolina Skiff, 2 (16Ft) Carolina Skiffs, 9 (14Ft) Carolina Skiffs. Equipment is maintained/restored on an as needed basis. 1 -2 new boats/motors are purchased each year.

All boats are equipped with 5Hp pump systems for surface/subsurface (injection) applications of aqueous herbicides. The airboats and larger skiffs are equipped with spreader mounts and electrical connections for granular herbicide applications.

We have 16 boat mount spreaders for granular herbicide applications, such as 2,4-D/Triclopyr, and several backpack and hand-held herbicide sprayers for smaller applications. All boats and equipment older than five years have had upgrades and rebuilding as necessary. Trailers are also MDOT approved on an annual basis.

GPS and Injections Metering Systems: 2 GPS injection-metering systems for liquid application and/or granular products. 10 combination depth/GPS units. 10 Differential mapping Global Positioning (dGPS) receivers

Trucks: 28 4x4 trucks ranging from ½ to 1 ton with enclosed truck beds for on site herbicide storage. Years of trucks range from 2011 thru 2022 (2 new 2022 vehicles). Trucks are MDOT approved on an annual basis.

Spill kits containing supplies to soak up, contain and remove herbicides are in all vehicles. Eyewash safety kits are available on site at all times.

Aquatic Plant Harvesters: 2 Aquarius Harvester & 1 Aquatic Weed harvester, Weed Minder II

Mechanical harvesters use biodegradable hydraulic fluid that is environmentally safe if a spill occurred. Any other spill would be addressed based on the standards set by the Michigan Department of Agriculture.

Land Based Equipment:

1 Terra Track vehicle with 50-gallon spray system

1 Argo 8x8 amphibious vehicle with 50-gallon spray system

2 Honda Rancher 4x4 ATVs with 30-gallon spray systems

2 Back of Truck 50-gallon spray systems

12 Solo backpack sprayers, 12 Handheld 1/2 to 2-gallon spray units, Wick sticks and swiping mitts

2 Stihl chainsaws, 3 Stihl weed whip with brush blade, 1 commercial grade brush hog

Field Survey Equipment:

12 Differential mapping Global positioning (dGPS) receivers

2 Eagle combination Depth/ Global Positioning (GPS) units

3 Hummingbird combination Depth/ Global Positioning (GPS) units

10 Lowrance HDS-5 Depth/ Global Positioning (GPS) unit, 4 with side-scan technology

4 YSI multiparameter water quality meters

Water and sediment sampling equipment

Laboratory Equipment: Compound microscopes and wet chemistry laboratory capabilities.

Mapping/CAD capabilities: BioBase, Auto Cad 2000 LT software, ArcMap- GIS, Global Mapper, planimeter.

Safety Equipment: All applicators are equipped with, and required to wear, personal protective equipment, including chemical suits, gloves and goggles. First aid kits and eye wash kits are kept on-site at all times. A minimum of two U.S. Coast Guard approved floatation devices (Kent) and one fire extinguisher is present on each boat.

MSDS Sheets Located in Every PLM Truck: ProcellaCOR, Aqua Pro, Aquathol K, Hydrothol 191, Clipper, Komeen, Komeen Crystal, Nautique, Navitrol, Navitrol OTF, Renovate 3, Renovate OTF, Sculpin G, Tribune, Reward, Habitat, Copper Sulfate, Cutrine Plus-Ultra, Captain- XTR, Alonglife, Cygnet Plus, PLM Blue, Cygnet Select, Poly An.

Lake References

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Algonquin Lake, 240 acres
2001 – Present
Annual Cost: ~$65,000.00
Patrick Sharpe
2290 Ottawa Trail
Hastings, MI. 49058
269-948-8566
No email address
Specific Challenges: Widespread Eurasian watermilfoil (EWM) & Starry stonewort (SSW) infestations, prolific nuisance native plant population that require management.

Baldwin Lake, 71 acres
2000 – Present
Annual Cost: ~$10,000.00
Don Gibbs
301 Manoka Lake Drive
Greenville, MI 48838
616-754-7714
buddy319@hotmail.com
Specific Challenges: Mis-management by previous company leading to widespread EWM and reduced native plant populations.

Big Whitefish Lake, 489 acres
1998 - Present
Annual Cost: ~$50,000.00
Brad Quist
2680 Rush Point Dr.
Sand Lake, MI 49343
616-292-6734
tbquist@gmail.com
Specific Challenges: Lake has a history of challenging EWM that returns quickly after treatments. It also has a large littoral zone (area capable of growing plants) which can be a challenge to survey and record all exotic plants actively growing.

Lake Bella Vista, 220 acres
1998 – Present
Annual Cost: ~$60,000.00
Dave Schmuker
6411 Bella Vista Dr.
Rockford, MI 49341
616-874-6777
dave@lakebellavista.net
Specific Challenges: Widespread Eurasian watermilfoil (EWM) & Starry stonewort (SSW) infestations, prolific nuisance native plant population that require management.

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 12/14/2021

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME: Brian St. Charles, CIC, CISR
Michigan Community Insurance Agency Inc. 49357 Pontiac Trail Ste 101 PO Box 930599 Wixom MI 48393-0599	PHONE (A/C, No, Ext): (248) 679-7000 FAX (A/C, No): (248) 926-5959 E-MAIL ADDRESS: bwstcharles@michigancommunity.com

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A: Homeland Insurance Company of NY	34452
INSURER B: Selective Ins Co of South Carolina	19259
INSURER C: Accident Fund National	12305
INSURER D:	
INSURER E:	
INSURER F:	

INSURED
PLM Lake & Land Management Corp
DBA Professional Lake Management
PO Box 438
Howard City MI 49329

COVERAGES **CERTIFICATE NUMBER:** 2022/2023 GL AU WC UMB **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE [X] OCCUR X Primary Non-Contributory X Contractual Liability GEN'L AGGREGATE LIMIT APPLIES PER: POLICY [X] PRO-JECT [ ] LOC OTHER:			793001544	01/01/2022	01/01/2023	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 1,000,000 $ 100,000 $ 5,000 $ 1,000,000 $ 2,000,000 $ 2,000,000
B	AUTOMOBILE LIABILITY ANY AUTO ALL OWNED AUTOS X SCHEDULED AUTOS X HIRED AUTOS X NON-OWNED AUTOS			S2416364	01/01/2022	01/01/2023	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 1,000,000 $ $ $
A	UMBRELLA LIAB [X] OCCUR X EXCESS LIAB CLAIMS-MADE DED RETENTION $			Follows Form 793001545	01/01/2022	01/01/2023	EACH OCCURRENCE AGGREGATE	$ 2,000,000 $ 2,000,000
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N [N] N/A If yes, describe under DESCRIPTION OF OPERATIONS below			WCV6156749	01/01/2022	01/01/2023	X PER STATUTE OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ 1,000,000 $ 1,000,000 $ 1,000,000
A	Professional Liability			793001544	01/01/2022	01/01/2023	Each Prof Service Wrongful Act	1,000,000
A	Pollution Liability			793001544	01/01/2022	01/01/2023	Each Pollution Condition	1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER

PLM Lake & Land Management DBA
Professional Lake Management
8865 100th Street S E
Alto, MI 49302

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

William St. Charles

PLM Lake & Land Management is the number one name in invasive plant management. For more than 40 years, our scientists and state-certified applicators have made it their priority to provide the highest quality service in all of our markets.

PLM provides you with a team of expert biologists, foresters, ecologists and managers to evaluate your environment, prioritize existing problems and develop plans to control existing and prevent new infestations. We use state-of-the-art equipment to analyze current conditions, then employ the safest and most effective tools to achieve the program goals while promoting ecological stability.

AN OVERALL PLANT MANAGEMENT PROGRAM

At PLM, our Plant Management Programs focus on preserving and protecting desirable plant life while controlling unwanted "weed" species through remediation services. In addition, these preventative programs strive to keep your site free of unwelcome plants that are known to be pests elsewhere in the region.

Under PLM's Plant Management Program, we first evaluate and record your site goals. Next, we prescribe an individually developed management plan to control unwanted plant growth. After consultation with you, we then implement the agreed upon plan. Later, we assess the results and use the information to modify and improve our priorities, processes and plans–starting the cycle again.

The key to our success is our Plant Management Program, which minimizes the total long-term impact of noxious aquatic and terrestrial vegetation. Our priorities include prevention of new infestations and management of existing plant growth, which provide the most value for your money while protecting our environment.

ABOUT US

- Long-term relationships with manufacturers and vendors which guarantee the highest level of technical and customer service
- Project collaboration with The Nature Conservancy, Ducks Unlimited, US Fish & Wildlife Service, US Forest Services, US Military Services and various state and local municipalities
- Licensed applicators serving the Midwest, Atlantic and Southeast regions of the United States
- Woman-owned business

MEMBERS OF

- Aquatic Plant Management Society (apms.org)
- Midwest Aquatic Plant Management Society (mapms.org)
- Responsible Industry for a Sound Environment (pestfacts.org)
- North American Lake Management Society, MI Chapter (mcnalms.org)
- Michigan Lake & Stream Associations (mymlsa.org)
- Michigan Aquatic Managers Association (mamagroup.org)
- Aquatic Ecosystem Restoration Foundation (aerf.org)
- Grand Rapids Chamber of Commerce (grandrapids.org)
- Better Business Bureau (bbb.org)
- Michigan Island Lake Partnership (canr.msu.edu/michiganlakes)

MICHIGAN LOCATIONS

8865 100th St. SE
Alto, MI 49302-9221

10785 Bennett Dr.
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Sturgis, MI 49091

Phone (616) 891-1294

Fax (616) 891-0371

Toll-free (800) 382-4434

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VEGETATION MANAGEMENT

AQUATIC

Services

- Vegetation Assessment/ Mapping
- Water Quality Monitoring
- Vegetation Management Planning
- Aquatic Invasive Plant and Algae Control
- Fisheries Evaluation
- Lake Depth and volume mapping
- Fountain Installation and Maintenance
- Phosphorus Mitigation
- Aquatic Plant Harvesting
- Aeration
- Shoreline Restoration

Markets

- Watershed Districts
- Lake Improvement Boards
- Lake Associations
- Federal, State and Local Municipalities
- Private Lake and Pond Owners
- Golf Courses
- Property Management Companies

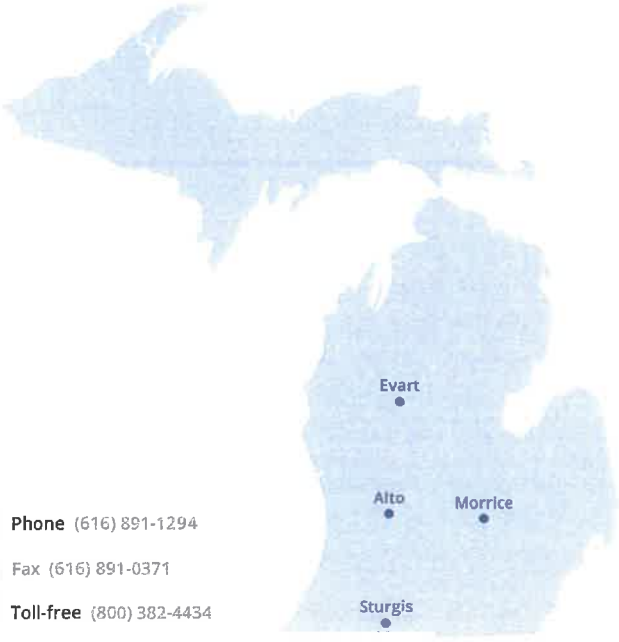
TERRESTRIAL

Services

- Vegetation Assessments/ Mapping
- Invasive Species Management
- Roadside Vegetation Management
- Selective Timberland Improvement
- Wildlife Habitat Enhancement
- Utility Line Maintenance
- Bare Ground Maintenance
- Mechanical Mowing/Brushing

Markets

- Federal, State and Local Municipalities
- Utility Companies
- Power Transmission Companies
- Public Works
- DOTs
- Military Installations
- Private Landowners



PLM LAKE & LAND MANAGEMENT CORP

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Aquatic Vegetation Assessment

Prescribing a Management Plan

PLM
LAKE & LAND MANAGEMENT CORP

AQUATIC PLANTS

In moderation, aquatic plants provide many benefits to aquatic systems by producing oxygen, providing habitat for fish and other aquatic organisms, stabilizing bottom sediments and reducing shoreline erosion.

Problems exist when aquatic plants become too dense and create ecological and recreational issues. Excessive plant growth can impede biological interactions, reduce water quality and have impacts on residential property values.

ASSESSMENT

A number of factors can contribute to excessive aquatic plant growth. In most cases, several factors have combined to create the problem. Although excessive nutrients can impact aquatic plants and algae growth, the introduction of exotic plant species is responsible for the majority of aquatic plant issues.

Exotic aquatic plants are plant species that are not originally from this region. Once introduced to a waterbody they can quickly dominate a system. They have few natural controls and often crowd out native plant species, interrupt biological interactions and negatively affect water quality.

To determine what factors are contributing to excessive plant growth, a vegetation survey is recommended to assess the types, density and distribution of vegetation in the water body. This survey allows us to establish a Management Plan and track the results of management efforts.

It is also recommended to assess the water quality characteristics, as this will give us a baseline of nutrient levels, water clarity, dissolved oxygen and other parameters that can be assessed throughout the Management Program.

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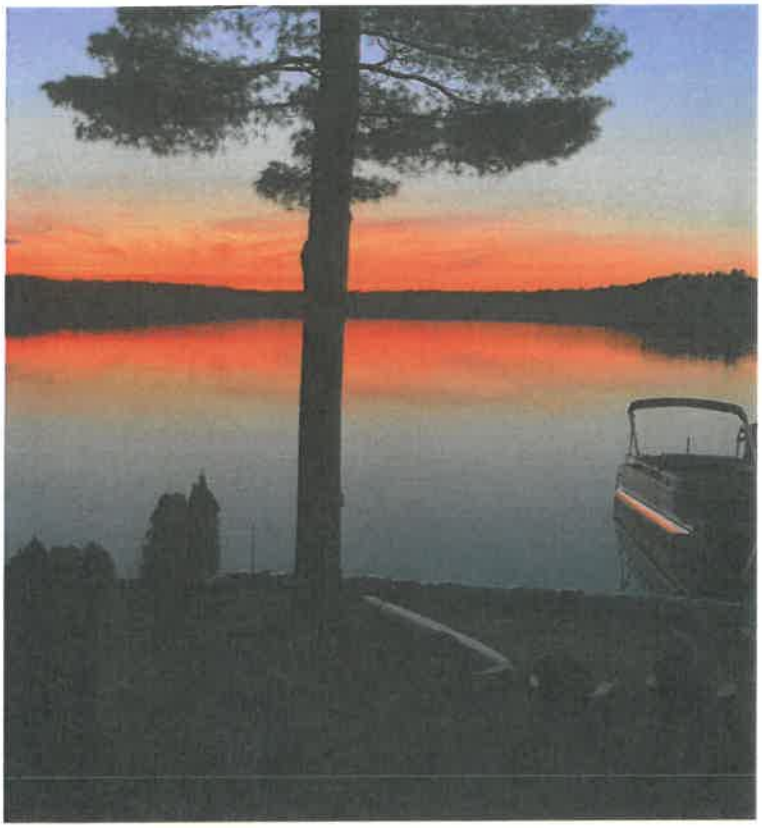
PRESCRIBING & IMPLEMENTING A MANAGEMENT PLAN

Once the causes of the aquatic plant issues can be determined, a Management Plan can be developed to address the specific issues. Whether it is an exotic species, excessive native plant growth or other factors, we can prescribe a plan best suited for your water body's needs. Several options are available for aquatic vegetation management, and based on the goals of the program, the most appropriate options will be presented.



EVALUATION

By evaluating the success of the Management Program through repeated aquatic vegetation surveys, water quality assessment and stakeholder feedback, we can then determine if adjustments to the Plan are required.

HOW TO GET STARTED

To find out more about an assessment of your water body, give us a call or contact our website for the location closest to you. In most cases we can provide an informal meeting and quick assessment at your location free of charge. Complete vegetation surveys and water quality sampling charges are based on the size or specific requirements of your water body.

Don't wait for the impacts to your water body and property value to be irreversible. Contact us for an assessment to start making improvements now. You will be happy you did.

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Getting started with

Aquatic Plant Management

PLM
LAKE & LAND MANAGEMENT CORP

Once an evaluation of your lake has occurred and it is determined that management of aquatic vegetation or algae is required, several options exist. Depending upon the nuisance species, location within the waterbody and established objectives, PLM will develop the most appropriate, cost effective plan to achieve the short- and long-term management goals.

PLM utilizes an Integrated Pest Management (IPM) approach to address aquatic problems. Using this method emphasizes spending more effort evaluating and determining the most effective control methods and applying them at the correct time to maximize effectiveness while minimizing costs and non- target impacts.

AQUATIC PLANT CONTROL METHODS

It is important that aquatic plant control methods meet the expectations of stakeholders' while being economically feasible and ensuring the protection of valued wildlife habitats. Each management method has some advantages and some disadvantages. PLM will prescribe a method best suited for each situation based on a variety of factors.

BIOLOGICAL CONTROL

Biological controls use a naturally occurring pest or disease to control nuisance vegetation. This method is typically used to control invasive exotic species that is displacing native species. Unfortunately, there are limited, if any, effective biological control methods for aquatic plant species in the Midwest.

AQUATIC HERBICIDES

Aquatic herbicides are the most commonly used method to control a variety of nuisance aquatic plant problems. Herbicides are relatively fast acting, cost effective and most can be used selectively to control target species while not affecting desirable native plant species. Aquatic herbicide use in Michigan requires a permit from the Michigan EGLE for most waterbodies and there are regulations on herbicide rates and locations within a waterbody where they can be used.

MECHANICAL HARVESTING

Harvesting is the process of cutting and removing aquatic vegetation from a waterbody. Harvesting is usually best suited for native plant control in areas where herbicides can not be used or in waterbodies where herbicides are not permitted. It is not recommended for some invasive species due to potential fragmentation. Harvesting does not require a permit and can be done anywhere the machines can get access.

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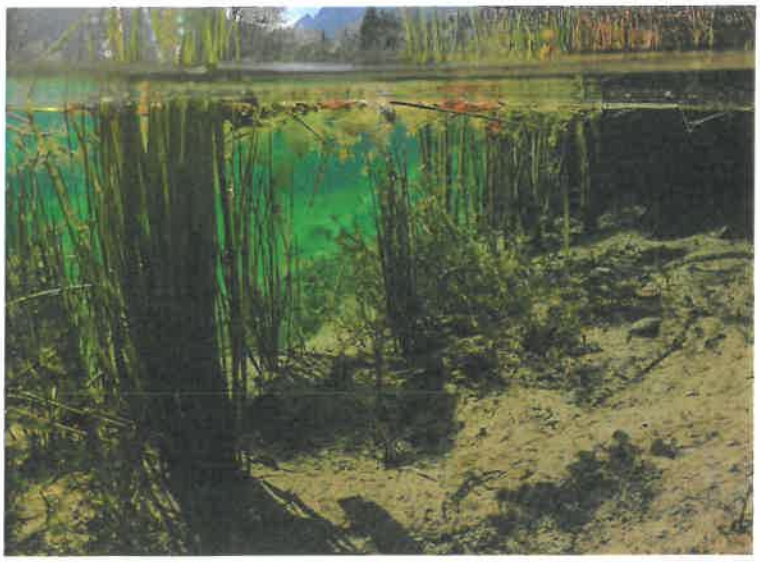
FUNDING AQUATIC PLANT MANAGEMENT

In general, it falls upon the residents to pay for the management of their lake. Unfortunately, there are limited State or Federal grant funds available for lake management activities. Most of the previous grant funding has gone to planning activities, scientific research and watershed level management and not to the direct control of invasive species.

For waterbodies that do not have lake association dues, either mandatory or voluntary, a tax district can typically be developed to assess a fee to riparians to fund management activities. The most common is a Special Assessment District (SAD) utilized by Townships to collect and disperse management funds. A SAD is frequently initiated by a petition process of the landowners within the proposed district. A Statutory Lake Board is similar to a SAD in its formation, but is administered through the County rather than at the Township level. Statutory Lake Board's are best suited for lakes located in more than one township or municipality.

If you have questions about funding for your lake's management, PLM will be glad to assist you. We work with many Special Assessment Districts and Statutory Lake Boards throughout Michigan and have extensive knowledge and experience in assisting riparians through this process.



WHAT TO EXPECT NEXT

After prescribing the best control options and establishing a funding mechanism, the implementation process can begin. A contractual agreement will be required prior to services taking place. In many cases, a signed contract, by either the Association or taxing municipality, is required in order to apply for State permits. The permitting process for the use of aquatic herbicides can take one to two months, so it is best to have this process started by late winter.

In the spring of each year, PLM will provide a schedule of planned management activities to be conducted for that season. For management activities that include aquatic herbicide treatments, a list of the herbicides planned for use and their associated water use restrictions will also be included. Prior to any management activities taking place, the account manager will confirm with the primary contact for your lake the intent of our visit, management activities planned and associated costs. This protocol allows the Association to be aware of our management activities, confirm funds are being spent efficiently and management costs are within the collected budget.

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Aquatic Plant Harvesting

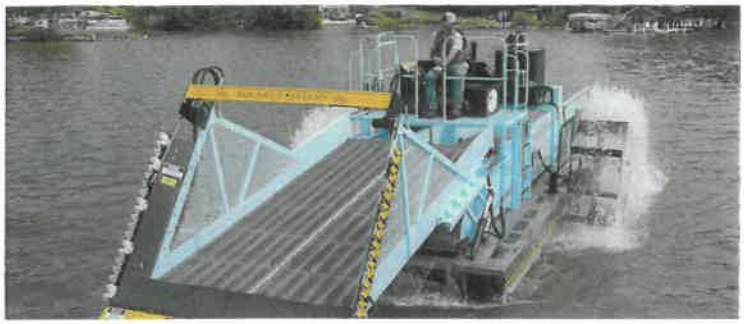
PLM
LAKE & LAND MANAGEMENT CORP

Certain circumstances call for the use of mechanical harvesting for nuisance aquatic vegetation. In this process, the plants are cut, collected and removed from the lake often providing immediate results. PLM Lake & Land Management Corp. has provided aquatic plant harvesting services for over thirty years. We currently operate three state-of-the-art aquatic plant harvesters operated by experienced staff to meet your harvesting needs.

ADVANTAGES OF HARVESTING

Nearly all aquatic plant species can be harvested, including species that are difficult or impossible to control using herbicides. In most cases a permit is not required, and the results are almost immediate as the plant material is cut and removed from the waterbody. In addition, the removal of plant biomass can also reduce the amount of nutrients in the lake by removing organic material contained within the harvested plants. Removal of excessive aquatic plant density can also benefit water quality and improve habitat for fish and other aquatic organisms.

The harvesting equipment can cut the aquatic vegetation 4-6 feet below the water's surface and collect the cut plant fragments for removal from the lake. A single machine can cut approximately 1 acre per hour, depending upon the location and density of the vegetation. The cut material is then deposited in a predetermined location (farm fields, land fill, etc.).



WHERE IS HARVESTING APPROPRIATE?

Some waterbodies may have limitations imposed on the types of aquatic plant management that can be conducted. In some situations, mechanical harvesting may be the only means of managing nuisance aquatic vegetation. The type and location of the aquatic plants within a lake may also dictate the type of management that can occur. In most cases, it is not advised to harvest certain exotic aquatic plant species, such as Eurasian Watermilfoil, as they are known to spread by fragmentation.

Aside from the types and location of the aquatic plants to be harvested, other criteria must be met in order to initiate a harvesting program. An adequate launch site, a suitable nearby location to dispose of the plant material, appropriate water depths and a minimum of stumps and other obstacles that may interfere with harvesting must all be examined prior to harvesting taking place.

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WHY HIRE A HARVESTING CONTRACTOR?

In most instances, it is less expensive for a lake association to contract harvesting services than buying and maintaining their own harvesting equipment. Only lakes with very large harvesting requirements are likely to benefit from having a harvester for their own exclusive use. In addition, management requirements and harvesting needs may vary from year to year as changes in environmental conditions and plant communities take place.

LIMITATIONS OF HARVESTING

The harvesting equipment requires a minimum depth in which to operate safely. This depth is usually a minimum of 24 inches of water, depending upon the harvesting equipment. Harvesting requires an adequate launch site and shoreline offload site for the transportation of cut material. A dump site for the plant material must be established prior to harvesting taking place, preferably within a 10-mile radius of the waterbody. Any fees for dumping the plant material are the responsibility of the contracting party.

For an evaluation of your waterbody and a price quote depending upon feasibility, contact your local PLM branch office for more details.

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EXOTIC AQUATIC PLANT SPECIES

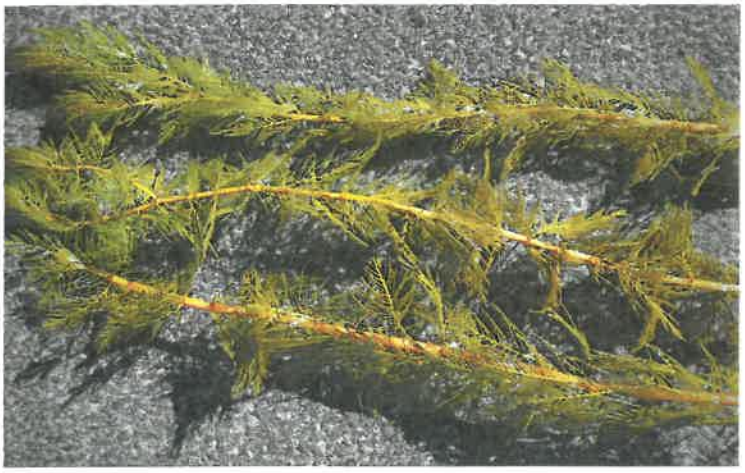
Exotic aquatic plant species cause many of the most serious weed problems in lakes and ponds. Exotic plants are plant species that are not native to this area and have been introduced here inadvertently. Because they have few natural enemies in this region, they tend to grow unchecked often forming dense mats at the water's surface. These dense mats displace native vegetation, reducing diversity and can have serious implications to the aquatic habitat.

The most common exotic aquatic plant species in Michigan are Eurasian watermilfoil (Myriophyllum spicatum), Curlyleaf pondweed (Potamogeton crispus) and Starry stonewort (Nitellopsis obtusa). Other less common species include European frog-bit (Hydrocharis morsus-ranae), Cabomba (Cabomba caroliniana) and Parrot feather (Myriophyllum aquaticum). However, the majority of management efforts focus on the three main species.

EURASIAN WATERMILFOIL

Eurasian watermilfoil is native to Europe, Asia and northern Africa. It was introduced to the United States as early as the 1940s. Since its introduction, it has been identified in 45 states. Eurasian watermilfoil grows in dense stands in water less than one foot to depths of greater than twenty feet, depending upon water clarity. These dense stands in mid to shallow depths will often form surface canopies shading out native plants, restricting water use and altering habitat for fish and other organisms.

Eurasian watermilfoil can reproduce by seed or fragmentation. However, fragmentation is thought to be the main mode of distribution across waterbodies and within a waterbody. Boat activity can increase fragmentation, but auto-fragmentation can occur multiple times within the growing season. These fragments are buoyant and will float to new areas where they will produce roots, settle to the bottom and start a new colony.



Although hybridization of Eurasian watermilfoil and native milfoil species have made control more difficult in some situations, Eurasian watermilfoil and its hybrid variations are almost exclusively through the use of aquatic herbicides. Other options exist, such as suction dredging or sediment covers, these options only apply to limited areas and do little to combat lake-wide infestations. Mechanical harvesting is not recommended for Eurasian watermilfoil as it increases fragmentation, has very limited control time, is not cost effective and tends to increase the distribution and density of Eurasian watermilfoil.

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CURLYLEAF PONDWEED

Curlyleaf pondweed is native to Europe and is thought to have been introduced to the United States as early as the mid-19th century. It typically grows in water depths of three to fifteen feet. Like Eurasian watermilfoil, Curlyleaf will form dense stands and often forms surface canopies from mid-May to Mid-June. However, unlike Eurasian watermilfoil, Curlyleaf pondweed canopies will usually disappear by early July each year as the plants complete their growing cycle.

Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

Reproduction of Curlyleaf pondweed is mainly through the production of buds called turions. These turions are formed on the plants early in the spring and drop to the bottom sediments. There they can remain dormant or germinate and produce seedlings which will remain dormant through the fall and winter. Once spring water temperatures reach around fifty degrees Fahrenheit, the seedling will grow towards the surface at an estimated rate of 1 to 2 inches per day. As they grow, turions are produced and the cycle repeats.

Control options for Curlyleaf pondweed include aquatic herbicides and mechanical harvesting. Mechanical harvesting can be an effective tool, but aquatic herbicides are usually far more cost effective. Either management option, if done prior to turion production, may help control future growth of Curlyleaf pondweed. However, turions may lay dormant in the sediments for more than five years so multiple years of either approach would be needed before reductions in Curlyleaf pondweed populations could be expected.

STARRY STONEWORT

Starry stonewort is native to Europe and Asia. It was first discovered in the St. Lawrence River in 1978. In 1983, it was found in the Detroit River near Belle Isle and has since infested many Michigan lakes. Starry stonewort is a macroalgae, and not a vascular aquatic plant. It resembles a close relative, the native macroalgae Chara. Unlike Chara, which is generally thought of as beneficial to aquatic environments, Starry stonewort will form dense blankets often several feet thick covering over native vegetation habitat and fish spawning areas.

Reproduction occurs through either star shaped structures called bulbils that are seed like formations or through vegetative spread. Fragments of Starry stonewort are capable of producing new colonies when transported within a waterbody or between waterbodies.

Control methods for Starry stonewort include copper products and other herbicides that are effective for algae, or mechanical harvesting. Mechanical harvesting can increase the spread of Starry stonewort and may not be economically advantageous compared to herbicides due to its high density and quick regrowth. Other control methods like suction dredging may be effective in small areas or for new infestations, but is not feasible for large areas or combating lake-wide infestations.

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aquatic doctors
lake management, inc.

March 3, 2022

Thornapple River- Cascade SAD
Attn: Lake Board
5920 Tahoe Dr. SE
Grand Rapids, MI 49546

Thornapple River,

I would like to thank you for considering ***"Aquatic Doctors Lake Management, Inc."*** for your aquatic nuisance control needs. I believe ***Aquatic Doctors*** can provide your association a variety of options and insight to continually improve the condition of **Thornapple River** and possibly offer savings as well.

Aquatic Doctors is a fully integrated lake management company offering a variety of aquatic plant/algae control methods, lake consulting services and utilizes state-of-the art technology for mapping/location (including *"BioBase", GPS* and *"Zero Gravity Aerial"* drone mapping services). ***Aquatic Doctors*** has been servicing Michigan since 1997 and has become one of the most respected lake management companies in the state. Our experience includes: small backyard ponds, large lake associations, government municipalities and everything in-between. In **2021** we managed 200+ ponds and 95 lakes in the State of Michigan ranging in size from .01 acres to 2,800 acres.

Aquatic Doctors is a fully licensed and insured aquatic weed/algae control specialist, dedicated to customer service. Our main office is located in Grand Rapids with a Northern Michigan satellite to better serve the entire state. ***Aquatic Doctors*** is an active member of many related aquatic management organizations including: Michigan Aquatic Managers Association (MAMA), Midwest Aquatic Plant Management Society (MAPMS), Aquatic Ecosystem Restoration Foundation (AERF) and the Better Business Bureau of Michigan (A+ rating). Our experience and dedication will be a valued asset to **Thornapple River**.

Aquatic Doctors is qualified and eager to work with **Thornapple River**. We are confident we can offer a program to fulfill your needs and surpass all your expectations. We greatly appreciate the opportunity to work with **Thornapple River** and hope to continue our long established mutually beneficial relationship based on the continued improvement of **Thornapple River**.

Thank you for giving ***Aquatic Doctors*** the opportunity to submit a lake management bid for **Thornapple River**. As the board reviews our bid, please feel free to contact me with any questions you may have.

Sincerely,

Ryan Schauland- President/Owner
Aquatic Doctors Lake Management, Inc.
616-365-1698 (main)
ryan@aquaticdoctors.com

aquatic doctors
lake management, inc.

Aquatic Doctors Lake Management Professional Staff

Ryan Schauland B.S.- President/Owner/Aquatic Manager:
ryan@aquaticdoctors.com
Qualifications: Ryan received his Bachelor's Degree in Zoology from Michigan State University in 1996. While at MSU, his main focus of study was marine biology and specifically aquatic ecosystems. In 1997, Ryan founded Aquatic Doctors and has since grown the business to one of Michigan's largest Lake Management companies. Ryan directs and facilitates all aspects of Aquatic Doctors including business operations and account development, State of Michigan requirements and legalities, acquisition and deployment of state-of-the art equipment, innovative water treatment and chemical application techniques, franchising initiatives, and most importantly customer service. Aquatic Doctors employs *first-class* treatment professionals, many of whom Ryan has recruited from MSU's biological sciences program. Ryan is an active member of many related aquatic management organizations including Michigan Aquatic Manager Association (MAMA), Midwest Aquatic Plant Management Society (MAPMS) and Aquatic Ecosystem Restoration Foundation (AERF). Ryan is an active sportsman and scuba diver who enjoys spending time with his family.

Zach Berry B.S.- General Manager/Biologist/Fisheries/Aquatic Manager:
zach@aquaticdoctors.com
Qualifications: Zach is a graduate of Lake Superior State University with a Bachelor's degree in fisheries management. Zach has conducted a wide variety of aquatic studies in both the lakes and rivers of the Great Lakes region. He has developed, managed, and analyzed the data of an aquatic restoration project on the St. Marys River in Michigan's Upper Peninsula. He then presented his findings to a board of government officials and phD professors. Zach has a total of 9 years of fisheries and aquatic experience in the field. He is proficient in water quality analysis as well as species identification. Before being hired at Aquatic Doctors as a manager and biologist, Zach worked for the United States Fish and Wildlife Service in the sea lamprey control program. He is well trained in the handling, application, and analysis of restricted use pesticides/herbicides. He is exceedingly familiar with the control of invasive species populations. Zach is also an associate member of MAMA (Michigan Aquatic Mangers Association). Zach spends most of his free time outside and on the water. He is a devoted husband and father to his wife and sons.

Aquatic Doctors Lake Management Commercial Applicators: Ryan Schauland, Zach Berry, Aidon Verhulst, Faida Murithi, Alex Riemersma, Corbin Stone, Chris Drost, Donnie Verhulst, William Mehney, Caleb Beach, Max VanVliet and Taylor Harris.

aquatic doctors
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Treatment Equipment

- **12' Aluminum boat for pond treatment and select emergent treatments**
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- **12' Aluminum boat for pond treatment and select emergent treatments**
- **14' Fiberglass Carolina Skiff for lake & pond treatment 15HP Mercury**
- **2- 14' Fiberglass Carolina Skiff for lake & pond treatment 25HP Yamaha**
- **19' Aluminum Sea Ark for lake treatment 45HP Mercury**
- **19' Aluminum Polar Kraft for lake treatment 25HP Yamaha**
- **20' Fiberglass Carolina Skiff for lake treatment 115HP Evinrude**
- **All boats equipped and calibrated for liquid spray application using Honda Multipurpose pumps and 50 gallon chemical tanks (20 gallon on 12' boats)**
- **19' & 20' boats equipped for granular applications (standard and blower spreaders)**
- **2016 Dodge Ram 1500 4x4 long box**
- **2020 Dodge Ram 1500 4x4 Crew Cab**
- **2018 Dodge Ram 1500 4x4 Crew Cab**
- **2010 Chevy Silverado 1500 Z-71 4x4 Extended Cab**
- **Equipment for AVAS surveys**
- **Bio Base Mapping**
- **Zero Gravity Aerial Mapping- Mapping done by drone, complete macrophyte study available. Examples available upon request.**
- **Lowrance GPS systems**
- **Scuba equipment, all required gear**

Aquatic Doctors Lake Management, Inc.
PO Box 150247 Grand Rapids MI 49515 Office: (616) 365 1698 Fax: (501) 647 3041 www.aquaticdoctors.com

Thornapple River Management Plan

Submitted by: Ryan Schauland and Zach Berry

Aquatic Doctors Lake Management, Inc.

PO Box 150247 Grand Rapids, MI 49515

Phone: 616-365-1698 (main)
Phone: 231-288-0087(northern)

www.aquaticdoctors.com

Integrated Pest Management (IPM)

Aquatic Doctors Lake Management, Inc. uses and practices Integrated pest management (IPM) approach. IPM is an ecological approach to pest management in which all available necessary techniques are consolidated into a unified program so that pest populations can be managed to avoid economic damage and minimize adverse effects.

Chemical control or the use of aquatic herbicides is the most common/widely used method of controlling aquatic vegetation. These products provide expected results and are supported by decades of research and data. Many available products will selectively control exotic plants while having little to no effect on native plants. Chemical control is the most effective way to promote a healthy diverse lake.

Mechanical Control methods to remove existing stands of aquatic weeds include hand pulling, raking and using mechanized equipment. Mechanical removal can be effective but it's extremely time consuming and laborious. Regrowth from seeds and underground plant parts can be expected along with regrowth from plant fragmentation. Mechanical harvesting can actually promote growth and infestations of exotic/invasive plants. Mechanical harvesting is an alternative option to chemical control but is not advised to promote a healthy native plant community.

Biological Control is control by predators and parasites, either naturally occurring or introduced. At this time, there are very few options with biological control. There is no guarantee of success with biological control.

Likely Plants found in The Thornapple River:

Eurasian Watermilfoil is native to Europe, Asia, and north Africa. It is a submerged aquatic plant, and grows in still or slow-moving water.

The stem is thin, flexible, often pinkish red. Whorled leaves delicate, usually spaced at least 2-3cm apart, with 12-20 pairs of leaflets per leaf. The tip of the plant is often red in summer. Flower spike emergent with whorled flowers and tiny, smooth bracts. Hybridizes with northern watermilfoil. Eurasian watermilfoil often branches frequently near the surface, and forms dense mats that make recreational activities difficult. EWM forms a canopy above native plants, choking out the competition. EWM also has the ability to overwinter underneath the ice, allowing it to be present throughout the winter. This gives the plant a head start in growing during the spring and chokes out native plants very quickly. EWM should be controlled as soon as it is found within a waterbody to prevent further infestation and loss of native plant diversity.

Curly Leaf Pondweed is a rhizomatous perennial herb producing a flattened, branching stem up to a meter long. The leaves are linear or oblong in shape. Only submerged leaves are produced, which are sessile, linear or oblong in shape, 25–95 mm long and 5–12 mm wide.[1] The leaves may be bright green, olive green or (especially later in the season) brownish and have noticeably serrated margins, a feature that distinguishes them from other pondweeds. The leaves usually have wavy edges but this is not always apparent, especially on new growth.

Curlyleaf pondweed, an exotic species, usually emerges early each spring, flowers and sets seed in the late spring and early summer, and then collapses by the first week in July. Early treatment/management is also encouraged to take place prior to seed production therefore, reducing the next generation of early pondweed growth.

Starry Stonewart is usually less than 30cm tall. Branchlets 5-8 per whorl, each with 1-2 long bract cells giving the appearance of the branchlet being forked. Often lime-encrusted. White star-shaped bulbils are abundantly produced on colorless rhizoids. Each one of these bulbils can detach and produce a new individual. Starry Stonewort should be actively controlled and managed. Starry stonewort, which looks very similar to the beneficial species Chara, is appearing in more and more lakes.

Chara is a highly-desired plant because it is typically low growing, keeps the water clear and can slow down the invasion of exotic weed species. Starry stonewort also forms dense mats, but unlike chara, it can grow from 5 to 7 feet tall. Starry stonewort can be very detrimental to a lake's ecosystem and has the ability to kill off native plants and have a negative impact on a lake's fisheries

Vallisneria (Water Celery) grows in a basal rosette form with long, thin leaves up to 2 meters long and 1cm wide, that often stream along the surface. Plants are connected by rhizomes. The edge of the leaf may be wavy. Female flowers are produced on a long, spiraled stalk, and can often be seen in large numbers in mid-summer.

Management Goals for The Thornapple River

•The control of exotic aquatic plants in the Thornapple River is the principal goal of the aquatic management plan. The exotic plant species, Eurasian watermilfoil, Curlyleaf pondweed and various nuisance species, should be controlled throughout the river. Attempts to eliminate exotic invasive plants should occur and follow up treatments should be scheduled to reduce their recovery and regrowth.

•An aquatic plant management plan should promote a vast and diverse native plant environment providing optimal habitats for fish and other aquatic organisms. Native plants should be managed to encourage the growth of plants that support sport fishing and other recreational activities but do not impede or interfere with swimming and boating in high traffic areas. Chara should be allowed to grow throughout the lake, except in where it grows so tall as to interfere with boating and swimming.

Managing Submersed Aquatic Plants

The systemic products Triclopyr and 2,4-D are selectively designed to control Eurasian Watermilfoil (EWM), while promoting the growth of native plant community. Worldwide 2,4-D is the most widely used herbicide and is extremely effective in controlling EWM. Due to Michigan Law 2,4-D cannot be used in the vicinity of drinking water wells. Triclopyr is also extremely effective on EWM, while not subject to water well setback laws and can be used in place of 2,4-D. With the proper lake management plan and proper aquatic applicator services the amount of EWM should be reduced and become a maintenance program after it is properly controlled.

Contact herbicides, most commonly Diquat and Endothall, are broad-spectrum products used to control a vast majority of aquatic plants. Curlyleaf pondweed and other exotic species can be controlled very effectively with Diquat and Endothall. Treatments should be performed annually in the spring and maintained throughout the season. Contact herbicides are often used to control native aquatic plants. Native plants are selectively managed when they reach nuisance levels in specific locations such as beaches and developed areas.

Water Quality

Secci Disc depth is a measure of water clarity, determined by measuring the depth to which a black and white disk can be seen from the surface.

PH is the balance of acids and the bases in the water. The PH levels should range between 6 and 9. The level of 7 is considered neutral. Excessive weed growth and algae growth can make these levels increase to 9 and above.

Conductivity estimates the amount of total dissolved salts (TDS), or the total number of dissolved ions in the water. EC is controlled by: Geology (rock types) - The rock composition determines the chemistry of the watershed soil and ultimately the lake. Higher levels typically mean a more productive lake, while lower levels typically indicate a cleaner less productive lake.

Alkalinity is a measurement of the lake's ability to "buffer" or neutralize acidity. Minerals in the soil and watershed affect a lake's alkalinity. Lakes with alkalinity between 2 and 10 mg/L are considered moderately sensitive to acid rain. Alkalinity is measured by chemical analysis

Total Phosphorus measures the total (organic and inorganic, dissolved and particulate) amount of phosphorus in the water. Phosphorus is usually the plant nutrient (i.e., fertilizer) that controls the amount of algal growth in lakes and ponds.

Fecal Bacteria (E. Coli) measurements count the number of live fecal indicator bacteria in the sample. These bacteria are considered reliable indicators of fecal contamination—when they are found in a lake, it is very likely that the water is being contaminated by animal feces. Contamination can potentially be derived from a number of sources, including failed septic systems, agricultural runoff, or waterfowl or wildlife droppings.

Recommendations

- Spring plant/vegetation survey to evaluate the condition of the River and develop best treatment methods and area.
- Late May/Early June Algae & Weed treatment of developed shoreline areas and Offshore weed treatments for exotic invasive plants using systemic selective herbicides.
- Water Quality test in spring, mid-summer and fall.
- End of July a Weed & Algae treatment for developed shoreline areas and a follow up treatment on any remaining offshore exotic invasive plants.

Monitoring Program

While Aquatic Doctors is on the Thornapple River controlling the aquatic vegetation, and collecting water quality tests we will be monitoring and documenting the condition of the river so we can provide warning of any changes in the condition of the river that may need to be addressed by additional lake management activities.

STOP AQUATIC HITCHHIKERS!

Prevent the transport of nuisance species.
Clean all recreational equipment.
www.ProtectYourWaters.net

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AQUATIC DOCTORS LAKE MANAGEMENT, INC. ("Aqua Docs") of P.O. Box 150247, Grand Rapids, Michigan 49515 and Thornapple River Association of Cascade, Michigan agree:

Aqua Docs will provide a professional aquatic program for the control of weeds and/or algae in **Thornapple River- Cascade SAD**. The program will consist of the following:

May/June: Weed and Algae treatment applying restrictive products such as Navigate (2,4-D), Diquat, Triclopyr, Aquathol K, Hydrothol 191, and non-water restrictive products such as copper sulfate, Cutrine-Plus, Cutrine-Ultra, Cygnet Plus, and shade as a tracer.
**3-4 weeks after initial treatment- spot treat weed beds and algae treatment.

July and August: Algae treatments applying non-water restrictive products such as copper sulfate, Cutrine-Plus, Cutrine-Ultra, Cygnet Plus and shade as a tracer. Spot weed treatment for EWM and other nuisance plant growth.

Cost per Acre:

Navigate: Granular systemic 2,4-D herbicide to control Eurasian Watermilfoil	$ 315.00
Triclopyr: Granular systemic herbicide to control Eurasian	$ 560.00
Triclopyr: Liquid systemic herbicide to control EWM	$ 285.00
Clipper: systemic herbicide to control Starry Stonewort	$ 575.00
Harpoon: granular systemic herbicide to contro Starry Stonewort	$ 425.00
Diquat: Liquid herbicide to control EWM, Curlyleaf, and Pondweeds	$ 185.00
Aquathol K-Hydrothol 191: Liquid herbicide to control Pondweeds	$ 199.00
Algaecides: Granular products to control Chara	$ 60.00
Algaecides: Granular and liquid products to control algae	$ 45.00
Water Quality Program:	$ 50.00/sample

Additional Services:

Harvesting: price subject to change by harvester seasonally	$ 600.00/acre
AVAS Survey: price for river survey and identify aquatic plants and location	$ 1250.00

Description and Optional Services:

Weed Treatment: Milfoil, Curly-leaf, Coon-tail, Chara, and various pondweed treatments applying restrictive products such as granular Navigate (2,4-D), Aquathol K, Hydrothol 191, Diquat, Triclopyr, Komeen, Glyphosate, and Cygnet Plus.

Algae treatment: Non-water restrictive algaecides such as Copper Sulfate, Curtain-Plus, Cutrine-Ultra, Chelated Copper, Earthtech, Greenclean, and shade as a tracer. Treatments should occur monthly to prevent existing growth and prevent re-growth. Surrounding conditions (i.e. sunlight, temperature, nutrient concentration, etc…) may require additional treatments.

Muck/Enzyme Treatment: Designed to decrease levels of organic sediment in lakes and ponds while reducing odors and improving water clarity. The pellets sink quickly, targeting 'muck' on the bottom. Mukk Busster does not contain pathogenic bacteria and it is fish and wildlife friendly. Contains 3 billion CFU/gram (Colony-forming units).

Water Quality Program: Water quality program consists of lake samples taken and sent to an independent laboratory (Prein & Newhof). The samples can be tested for a variety of things including; fecal bacteria (E. coli), dissolved oxygen, conductivity, total dissovled solids, pH and alkalinity. Primarily E. coli is the focus.

- Specific treatment dates will be set by Aqua Docs, in cooperation with Ben Swayze.
- Please be aware Aqua Docs can only treat weeds and algae present at the time of treatment. We have no control over future weed or algae growth based on the current chemicals registered for aquatic use in Michigan.
- Unless otherwise stated in the program, all other aquatic pest control will require a separate program (i.e. cattails, duckweed, largeleaf pondweed, lily pads, purple loosestrife, watermeal, etc…)

Aqua Docs will obtain the DEQ "Aquatic Nuisance Control permit" and post restriction signs as required. Any facility or location related permits/requirements, for example, "Discharge or Retention" permits will be the responsibility of the customer, association, resident or facility. It is your association's/group's responsibility to notify each resident within one hundred (100) feet of the treatment area at least seven (7) days in advance of the first treatment that chemicals will be applied. This notification requirement must be provided to every property owner who has consented to have their property treated. Lake boards and townships who assess the lake property owners are exempt from individual consent documentation. The property owner is responsible for removing any restriction signs ten (10) days after the conclusion of water use restrictions.

Aqua Docs carries a general liability policy of insurance for workmans comp, bodily injury and property damage with limits of $1,000,000.00 per occurrence. Certificates of insurance will be provided upon request.

The State of Michigan requires a minimum fee of $75.00 and increases the fee to $1500.00 for treatment areas of 100 acres or more. Please make check to the State of Michigan. Application for the DEQ "Aquatic Nuisance Control permit" shall occur promptly after the fee is received from the customer.

Special Notes & Conditions of Treatments

#1 – Our office must be notified of any inlets/outlets to meet specific permit requirements with the Michigan DEQ.
#2 – If the water body is being used as a source of irrigation, please notify our office prior to any treatments.
#3 – To minimize the possible effects on health and the environment, the treated waters MAY be restricted for such uses as swimming, bathing, irrigation, fish consumption and/or livestock.
#4 – If an access site has not been determined or established prior to services rendered, then an access site must be determined at the discretion of the applicator at the time of treatment.

Payment in full is due within fifteen (15) days of each application. Any amount remaining unpaid when due shall accrue a penalty of 1.5% per month.

All materials utilized by Aqua Docs shall be of the highest quality and are registered with the U.S. Environmental Protection Agency and the Michigan Department of Agriculture.

The accumulation of dying and decomposing plants and algae can deplete the dissolved oxygen supply in the water, which may result in fish mortality. Please note that such occurrences are minimal, however, the possibility does exist. Due to their level of sensitivity, Goldfish, Coy, and Trout are more susceptible to a treatment than other fish species. During Late Spring and Summer, many NATURAL fish kills occur due to an increase in water temperature and spawning habits, primarily.

Three or five year treatment program: As an incentive to establish a multiple year agreement we will treat your lake or pond at the same price structure as 2022 for 2023! The remaining years (2024-2026) will have cost increases of three percent or less. If total chemical costs exceeds 10% from the previous year a new agreement will have to be mutually acceptable. If during the life of the contract the DNR or other regulatory agencies significantly change the approved treatment procedures or the client finds the manner in which the work is performed less than satisfactory, either party may terminate this agreement upon giving ninety (90) days advance written notice thereof.

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Contract:

Signature Page for "Thornapple River- Cascade SAD"

Program Option for Thornapple River- Cascade SAD:

One (1) Year Program- _____
Three (3) Year Program- _____
Five (5) Year Program- _____
(Just initial your choice)

Aquatic Doctors Lake Management, Inc.

By: MT Ryan Schauland B.S.
President

_____ _____
Signature Date

For Thornapple River- Cascade SAD Representative:

Name (Print) _____ _____
Title _____ Signature
Address: _____
_____ _____
Phone: Date
(Day): _____
(Eve): _____ email: _____

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March 3, 2022

Aquatic Doctors Lake Management, Inc.

Thornapple River- Cascade SAD - References
Attn: Lake Board

I. List of References-

a. **City of Douglas- Kalamazoo River,** Allegan County, 302 Acres, 99.90 Acres treated, Target Plants- Eurasian Milfoil, Curly Leaf & Duck Weed. Herbicides applied- Triclopyr and Flumioxazin. Permit # ANC9805982- Currently under contract
Contact- Jenny Pearson, Deputy Clerk, Contact# 269-857-1438

b. **Lincoln Lake**, Kent County, 411 Acres, 110 Acres treated, Target Plants- Milfoil, Curly Leaf, Vallisneria, Various Pondweeds, Chara & Algae. Herbicides applied- Triclopyr, Diquat, Aquathol K, 2,4-D, Nautique, Harpoon, Chelated Copper & Copper Sulfate. Permit # ANC9801152- Currently under contract
Contact- Dean England, # 616-293-5031

c. **Baptist Lake,** Newaygo County, 80 Acres, 16.5 Acres treated, Target Plants- Milfoil, Curly Leaf, Vallisneria, Various Pondweeds, Chara & Algae. Herbicides applied- Triclopyr, 2,4-D, Diquat, Aquathol K, Chelated Copper & Copper Sulfate. Permit # ANC9800548- Currently under contract
Contact- Ken Reed, #616-437-6543

d. **Lower Scott Lake**, Allegan County, 130 Acre Lake, 90 Acres treated, Target Plants- Milfoil, Curly Leaf, Vallisneria, Various Pondweeds, Chara & Algae. Herbicides applied- Triclopyr, 2,4-D, Diquat, Aquathol K, Chelated Copper & Copper Sulfate. Permit # ANC9801153- Currently under contract
Contact- Eleanor DeWeerd, #269-236-5492

e. **Duck Lake**, Muskegon County, 330 Acre Lake, 4.9 Acres treated, Target Plants- Milfoil, Curly Leaf, Vallisneria, Various Pondweeds, Chara & Algae. Herbicides applied- Triclopyr, Diquat, Aquathol K, Chelated Copper & Copper Sulfate. Permit # ANC9800933
Contact- David Pequet, #630-325-7090- Currently under contract

Please feel free to contact me with any questions. If you have trouble contacting any of the references please let me know.

Thank you,

Ryan Schauland
President

Aquatic Doctors Lake Management, Inc.
PO Box 150247 Grand Rapids MI 49515 Office: (616) 365 1698 Fax: (501) 647 3041 www.aquaticdoctors.com