

Lower Straits Lake, Management Program 2023 - 2025

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PLM
LAKE & LAND
MANAGEMENT CORP



PLM Lake & Land Management Corp.

- Jason Broekstra, Vice President of Great Lakes Operations
- Steve Hanson, Senior Regional Manager-Fisheries Biologist
- Grand Valley State University, Biologist
 - Michigan Aquatic Managers Association (MAMA), President
 - Midwest Aquatic Plant Management Society (MAPMS), Past President
 - Michigan Chapter of The Northern American Lake Management Society (McNALMS), Treasurer
- PLM is a full service Lake Management Company serving Michigan for 43 years
 - Consulting, Lake Management Planning, Education, Implementation, Special Assessment Districts
 - Surveying, Mapping, Water Quality, Fishery Assessments
 - Herbicide Applications, Harvesting, Fountains/Aeration, Biological Control etc.



“Big Picture” Goals of Aquatic Plant Management

- Control Exotic Species
 - Promote a Balanced and Diverse Native Plant Aquatic Ecosystem
 - Improve Fisheries
 - Maintain Property and Recreational Values





Native Plants & Algae

- **“Typically”** do not cause recreational problems
- Fundamental component of aquatic ecosystems
- Perform important functions
 - Stabilizing sediments
 - Support aquatic insects
 - Maintaining Oxygen
 - Provide forage and refuge areas for fish
- When control is needed, harvesting or use of contact herbicides are best management options.





Exotic, Invasive Species, eutrophication....

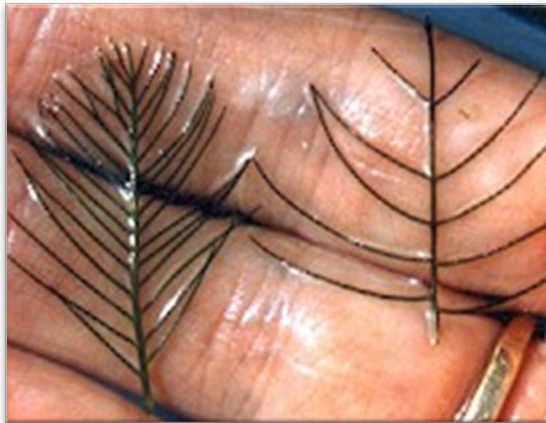
(by no means all of them)

- Eurasian watermilfoil (*Hybrids*)
 - Wide spread
- Curlyleaf pondweed
 - Wide spread
- **Starry Stonewort**
 - **Macro alga, exponential invasiveness.....**
- Cabomba
 - More limited infestations
- Phragmites
 - Wide spread
- Hydrilla
 - Michigan border in Indiana
- Michigan's Aquatic Invasive Plant Watch list
 - European frog-bit
 - Water Solider
 - Brazilian waterweed
 - Water Lettuce
 - Water Hyacinth
 - European Water-Clover
 - Parrot feather
- **Phosphorus..?**



Eurasian Watermilfoil (EWM/HWM)

- Not native to North America
- Highly invasive, forms a canopy & monoculture
- Spreads from root system, seed, and **fragmentation** (cutting, raking increases spread)
- Over winters (lives under the ice).
- Outcompetes other native plants
- Negatively impacts fisheries
- A single plant can produce millions new plants in a single year!



Myriophyllum spicatum
Eurasian water milfoil
Photo by Vic Ramey
Copyright 2000 Univ. Florida



Starry stonewort

- Anchored macro algae
 - Takes all nutrients from water column, not roots
- Originated in Europe
- First found in St. Clair River/ Detroit Area
- Can grow in 20' of water
- Preferred by Zebra Mussels
- Forms a dense mat
- Rated as one of the more detrimental species to infest our waterways





Starry stonewort

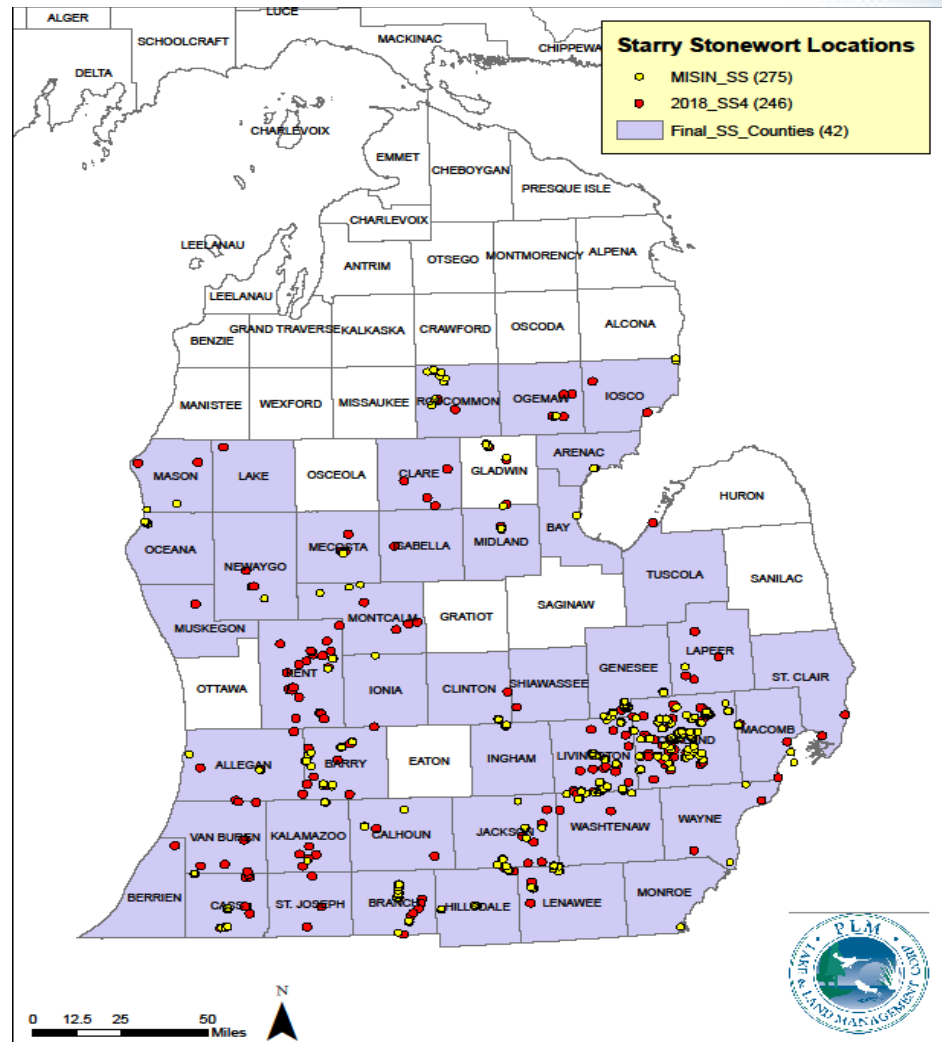


- Photo credit: Bre Grabill, PLM



Starry Stonewort Location (Known)

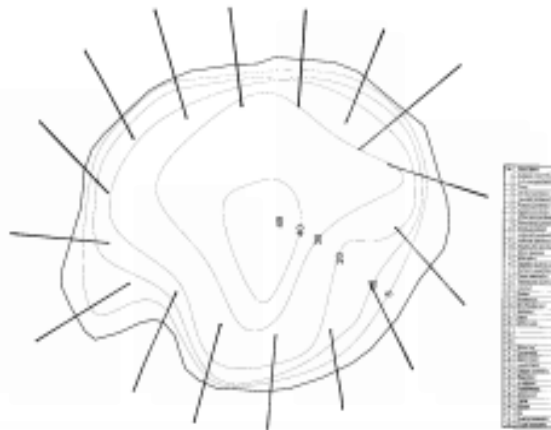
- 2009 - 26 lakes
- 2011 – 119 lakes
– 31 Counties
- 2016 – 218 lakes
– 37 Counties
- **2018 – 400+lakes**
– 43 Counties
(Known !)





Surveys

- AVAS Survey
 - EGLE approved survey technique, Document growth within every 300' shoreline
- Pre/post treatment surveys



Cover Code	Approximate Cover Range
a	1-2%
b	3-20%
c	21-60%
d	61-100%

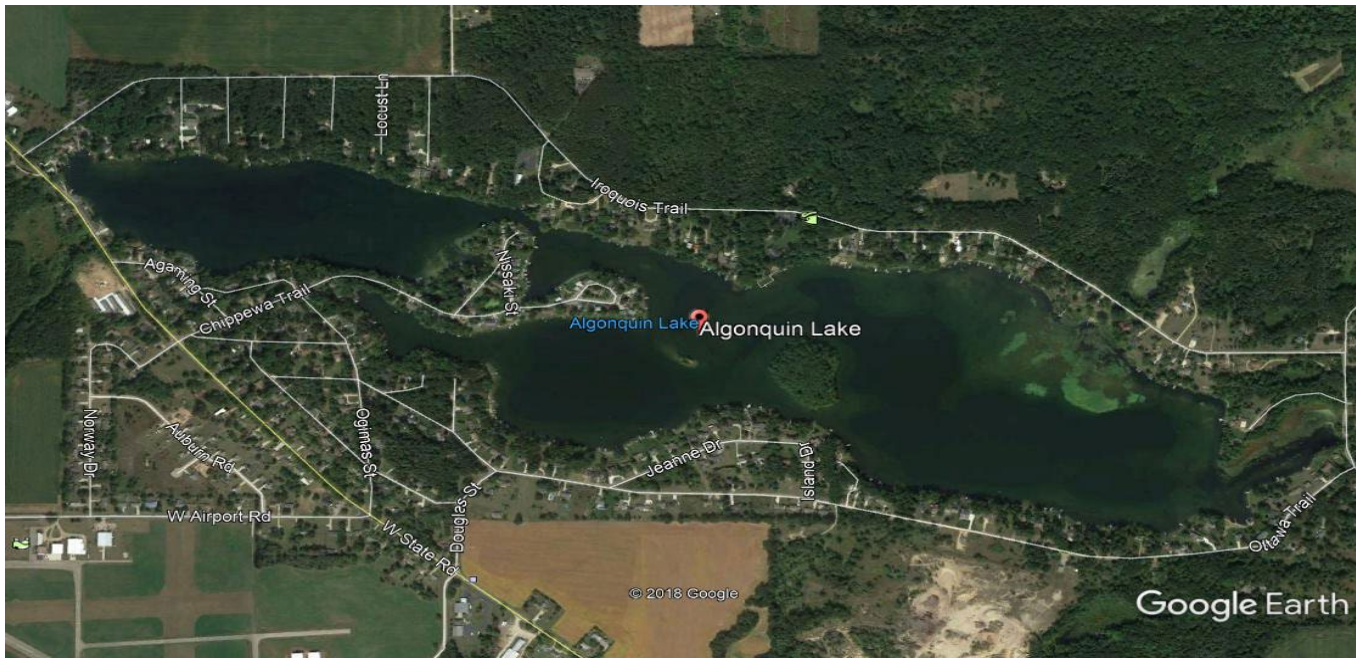
No	Plant Name
1	Eurasian watermilfoil
2	Curly leaf pondweed
3	Chara
4	Thinleaf pondweed
5	Flatstem pondweed
6	Robbins pondweed
7	Variable pondweed
8	White stem pondweed
9	Richardsons pondweed
10	Illinois pondweed
11	Large leaf pondweed
12	American pondweed
13	Floating leaf pondweed
14	Water stargrass
15	Wild celery
16	Sagittaria (submersed)
17	Northern watermilfoil
18	Green watermilfoil
19	Two-leaved watermilfoil
20	Coontail
21	Elodea
22	Bladderwort
23	Mini Bladderwort
24	Buttercup
25	Naiad
26	Brittle naiad
27	Sago Pondweed
30	Water Lily
31	Spatterdock
32	Water shield
33	Lemna minor
34	Greater duckweed
35	Watermeal
36	Arrowhead
37	Pickerelweed
38	Arrow arum
39	Cattail
40	Bulrush
41	Iris
42	Swamp loosestrife



Case Study

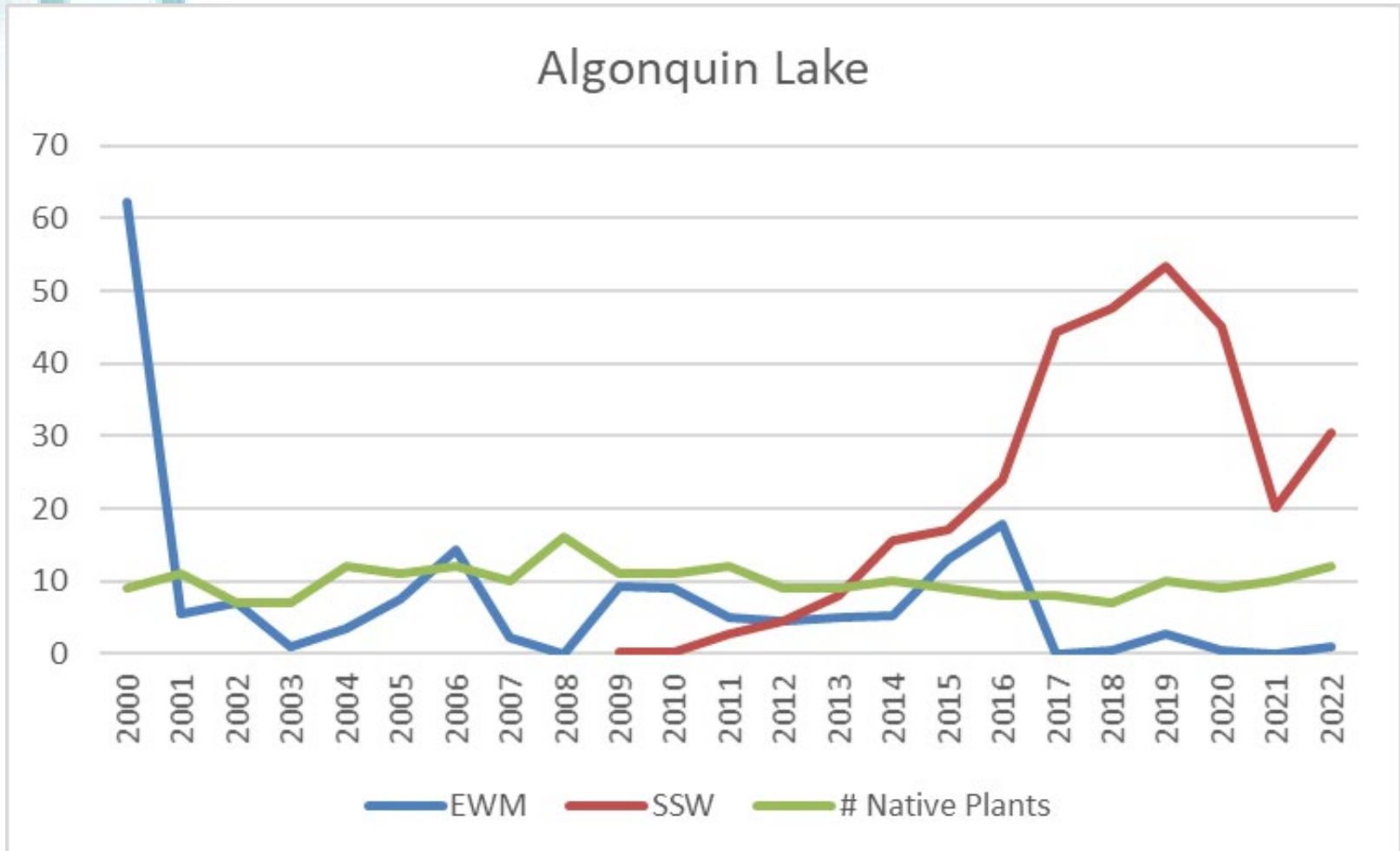
Algonquin Lake, Barry County

- 240 surface acres
- 140+ acre littoral zone
- Dam Structure
- Private access site
- Low retention time





Plant Trends





ProcellaCOR®

a.i., florpyrauxifen-benzyl

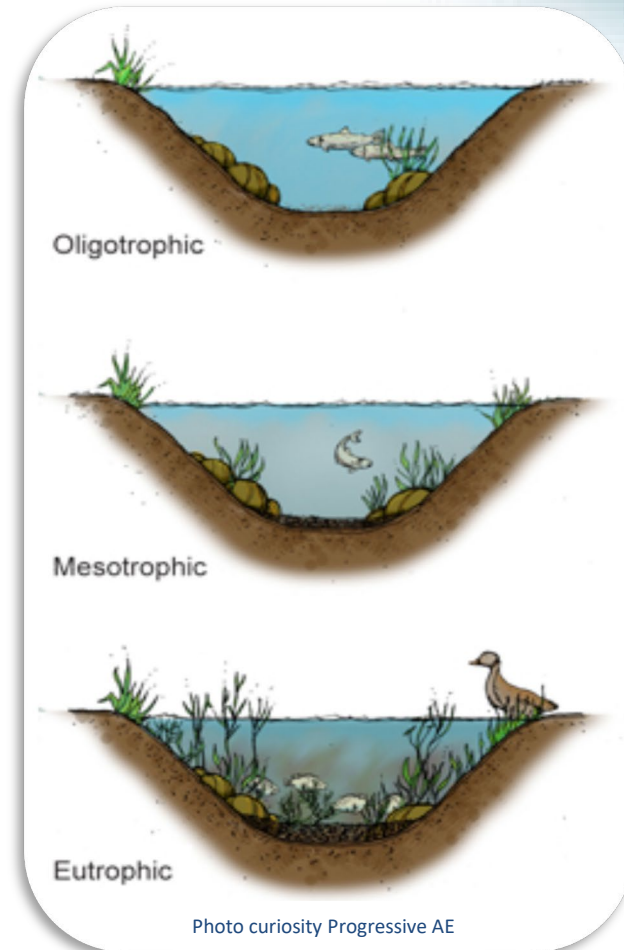
- **USEPA approval in late February 2018**
- **The first new herbicide active to have aquatic use with its initial registration in over 30 years.**
- **High selective, short-exposure - hrs to day(s) - systemic activity** on multiple major US weeds
- **EPA Reduced Risk Classification**
 - **100X or greater reduction in use rates** versus older herbicides
 - **Excellent environmental profile**
- **USEPA exemption from tolerances (crops) in Sept 2019**





Eutrophication

- Lakes naturally progress from oligotrophic to eutrophic, a process called eutrophication.
- Human activities dramatically speed this process by increasing input of nutrients (phosphorus and nitrogen) and sediment
- Prevention is far easier and less expensive than restoring lakes already damaged
 - Monitor phosphorus and nitrogen concentrations
 - Encourage BMP – Phosphorus free fertilizer, buffers, soil erosion, leaves, debris out of lake
 - Evaluate sources entering lake (Watershed study)





Characteristics Typical of Different Trophic States

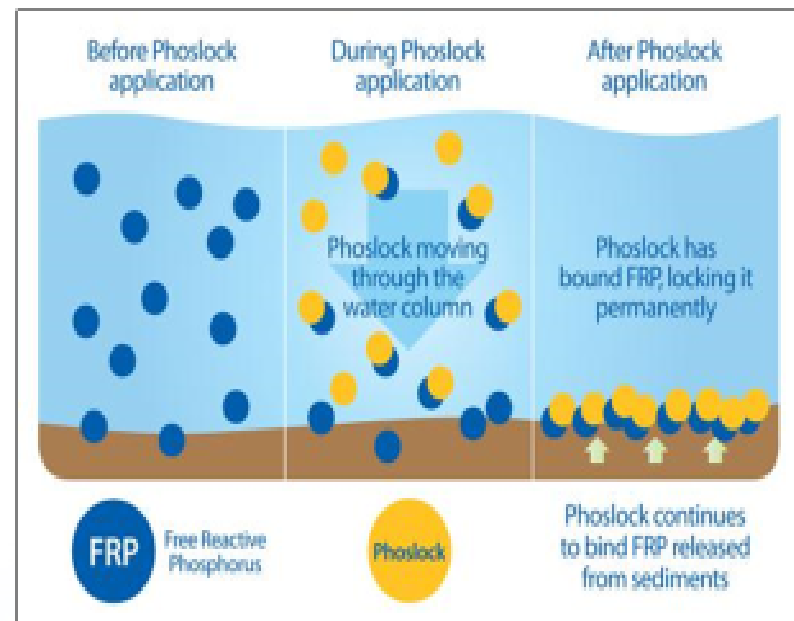
	Oligotrophic	Mesotrophic	Eutrophic	Hypereutrophic
Water Clarity	excellent	Good	fair-poor	very poor
Nutrients	low	Moderate	high	very high
Algae	few	Moderate	blooms likely	severe blooms probable
Plants	few	Moderate	abundant	few, in shallows
Fishery	cold water possible	cold water possible	warm water only	rough fish often dominate

Phoslock®

Phosphorus Locking Technology

A natural technology that inactivates bio-available phosphorus & restores water quality

- 95% Bentonite Clay
- 5% Lanthanum
 - “Element #57”
- 100 lbs. of Phoslock will bind 1 lb. of FRP
- 1 lb. of Phosphorus can support 500 lbs. of algae growth



NSF/ANSI 60

NSF / ANSI 60 certified for drinking water



Accelerating Water Resource Restoration

Case Study - Morrison Lake, MI



Morrison Lake is a 330-acre lake located near Clarksville, Michigan. The lake is impaired for phosphorus pollution and struggles with harmful algal blooms (HABs) and associated cyanotoxins that threaten human health, pets, and wildlife. Total Maximum Daily Load (TMDL) criteria were established for the lake in 2006 by the Michigan Department of Environment, Great Lakes and Energy (EGLE).

For more than 30 years, PLM Lake & Land Management Corp scientists and state-certified applicators have made it their priority to provide the highest quality service.

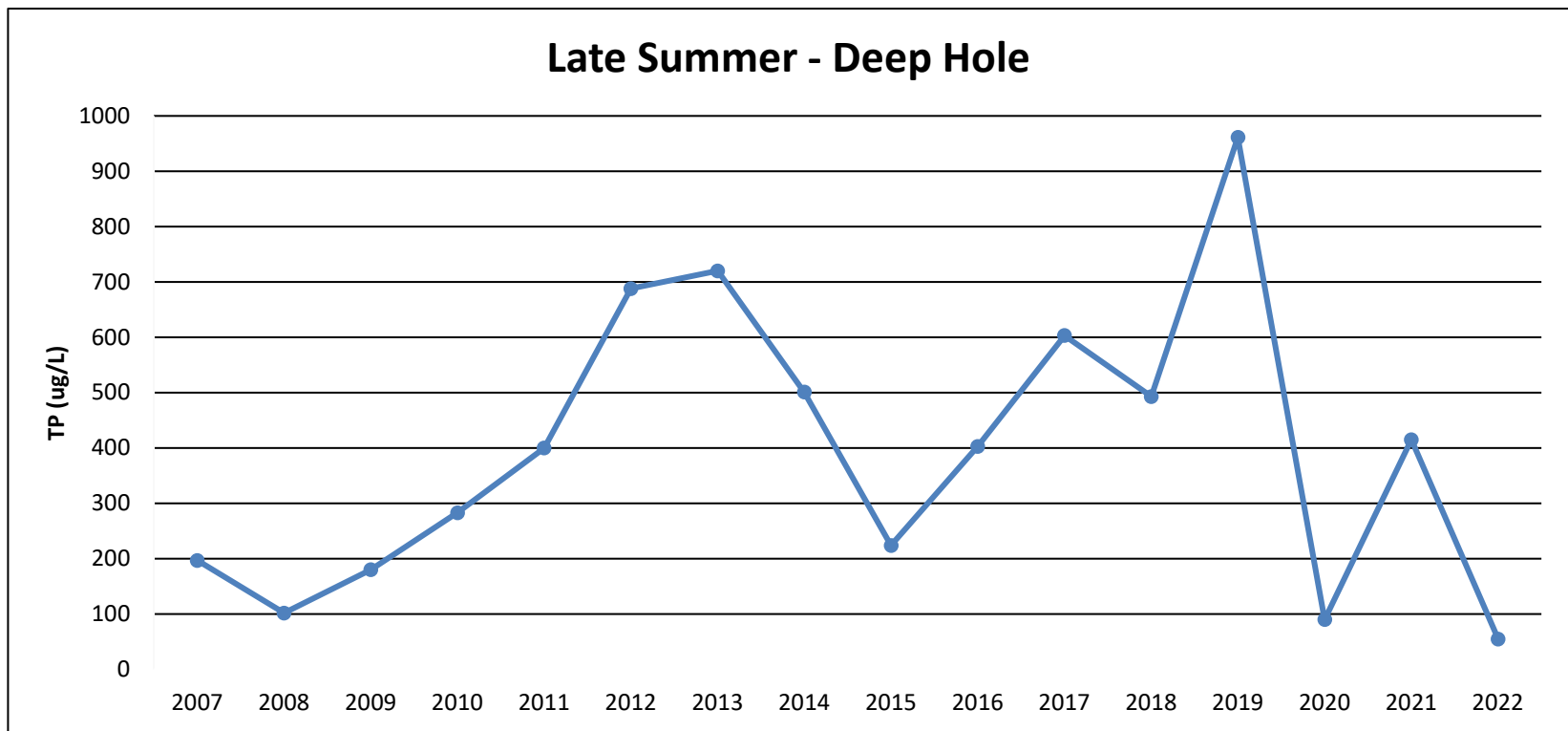


Implementation: 3 years, 30,000lbs/year, 6-8 application/year

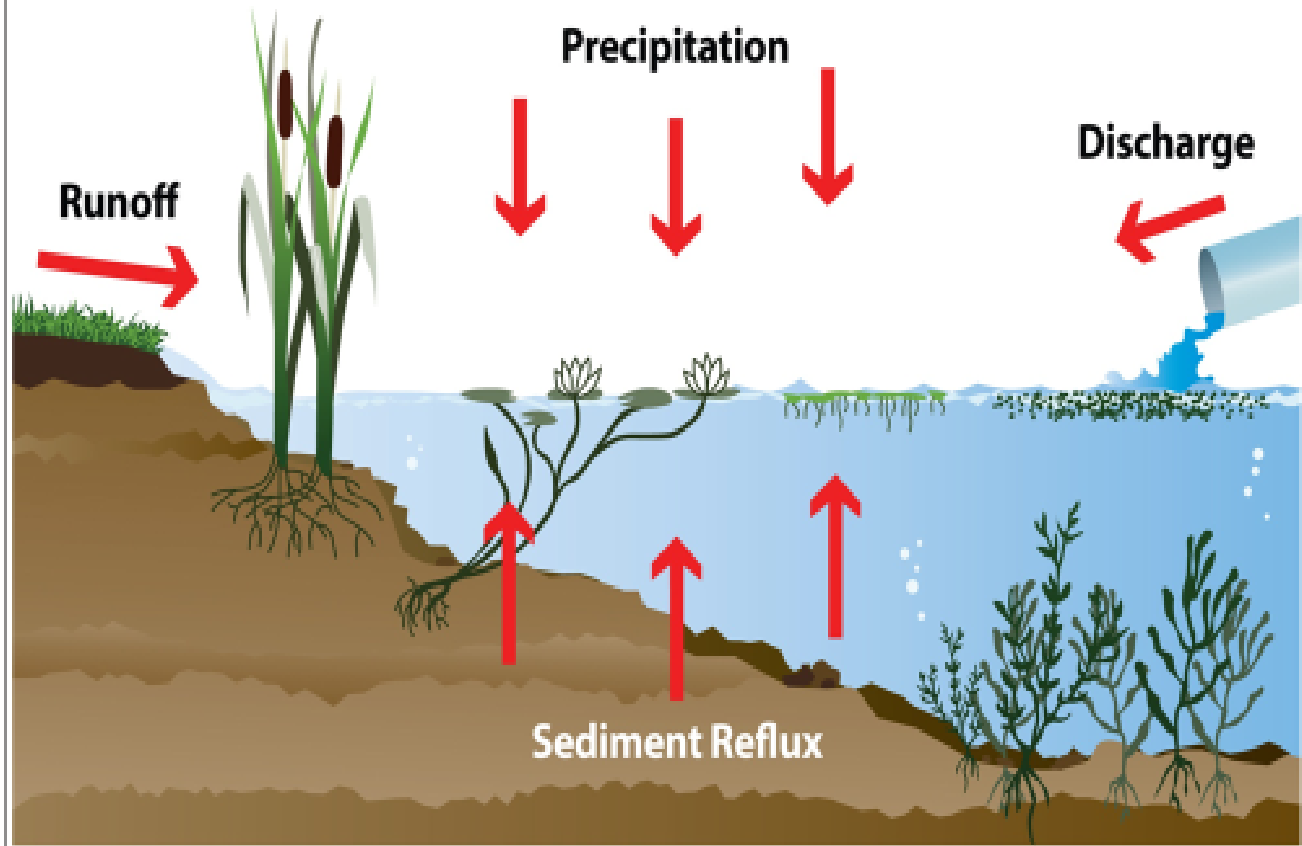




Morrison Lake – Historical Phosphorus



Sources of Phosphorus Loading



- We must protect our water resources, education, green belts, watersheds..
- Lake and pond bottoms are a sink for sediments and ultimately phosphorus
- Sediments are a significant annual source of available P to lake water column
- Sedimentation is a significant part of “Eutrophication”...

Phosphorus
Pollution Inputs

Precipitation

Nutrient Runoff



EutroSORB[®] F
Inert Phosphorus Adsorbent



EutroSORB SI
(Sediment Inactivation)

Sediment Reflux

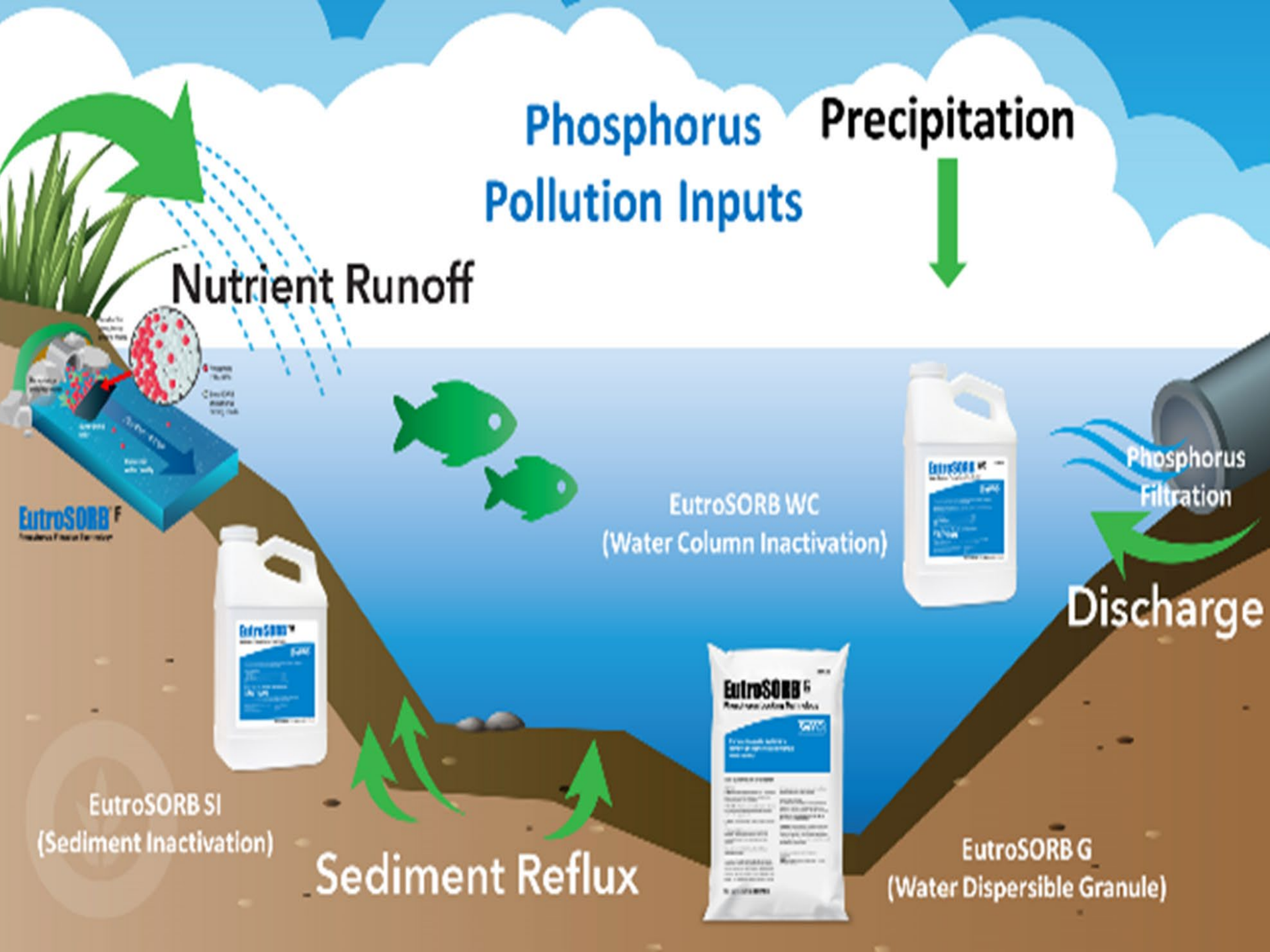
EutroSORB WC
(Water Column Inactivation)



EutroSORB G
(Water Dispersible Granule)

Phosphorus
Filtration

Discharge





STOP AQUATIC HITCHHIKERS!

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

THANK YOU, QUESTIONS!

- Know your environment, what is around you
- Ask questions
- Communicate
- Prevention is key
- Early detection, rapid response
- We can all do our part!
- Let's work together to protect your Lake!

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HELP STOP AQUATIC HITCHHIKERS!

To avoid spreading aquatic invasive species

BEFORE launching ... BEFORE leaving:

- Remove aquatic plants and aquatic animals
- Drain lake or river water away from landing
- Dispose of unwanted live bait in the trash

It's the Law... Do not:

- Transport aquatic plants, zebra mussels, or other prohibited species on public roads
- Launch a watercraft or place a trailer in the water if it has aquatic plants, zebra mussels or other prohibited species attached
- Transport water from infested waters

Michigan Department of Natural Resources



What can Residents do to protect Lower Straits Lake?

- Do not rake leaves into the lake. Decomposing leaves produce more muck.
- Do not feed waterfowl.
- Remove dog, geese and duck droppings from lawns, docks, etc. Excess feces will increase nutrients within the lake.
- Perforate lawn periodically and seed and mulch exposed soil (to prevent erosion).
- Remove aquatic plants, leaves/branches and other debris that washes up along the lakeshore so less decomposition occurs in or near the lake.
- Always use silt fences when building a new home or doing any yard-work that would cause erosion.
- Keep all burn piles and debris piles away from lake. Do not burn near the water. The ash is concentrated nutrients!
- Create a natural buffer close to the water's edge.
 - A natural setting will filter excess nutrients from entering the water
 - Decreases erosion
 - Deters geese from making a stop on your beach front. Geese do not like areas where they cannot see the predators coming towards them.





PLM Highlights

- Diversity of education, services and experience
- Leader in APM in Michigan
- Michigan based company for 43 years!
- Exponential Growth throughout Michigan (4 service locations)
- Guarantee of services
- Innovation and development of new products in Michigan
 - Sonar, Nautique, SeClear, ProcellaCOR and Phoslock
- References of long-term sustainable ecological programs
- Positive relationship with EGLE, Dept of Ag., Academia and Manufactures
- Committed to our clients and services we provide to protect and improve your lakes aquatic ecosystem

Invasive Plant Management

Protecting your
environment today
for tomorrow.



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Aquatic Vegetation Assessment

Prescribing a
Management Plan

Exotic Aquatic Plant
Management

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