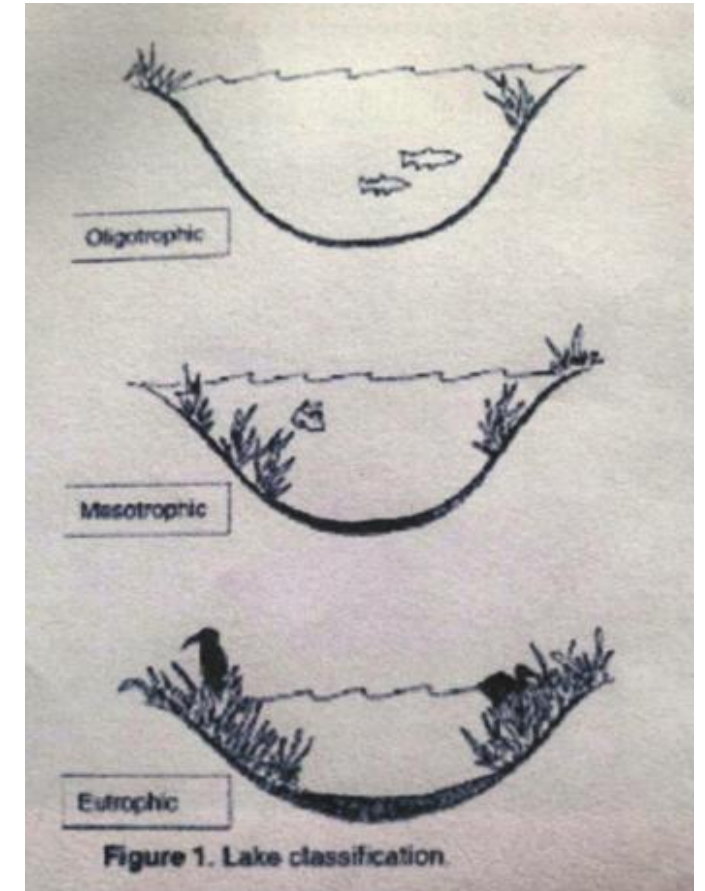


# Lake Preservation Program Overview:

(LPC Chairman - Terry Klaves)

- Natural Lake Aging, (Lake Eutrophication), is caused by the continuous addition of nutrients to the lake ecosystem.
- We are at stage 3 of 5, Lake Eutrophication, marked by heavy weed growth and biomass/sediment build-up
- Nutrient sources include dead leaves, pollen, dust, lawn and farm fertilizer runoff, and out-dated/ineffective septic tank/field leaching
- Nutrient build-up promotes plant and algae growth. They die and collect on the lake bottom as silt and muck.
- In Geologic time all lakes will fill with plant detritus to become wetlands, swamps, marshes and peat bogs without human intervention to slow or reverse Eutrophication



- Eutrophication
  - Battle against time, mother nature and Lake Eutrophication for past 30 years
- Nutrients
  - Lake was sterile when formed in 60's, no nutrients, weeds or sediment, no fish or biomass Aeration was needed to support fish.
  - With introduction of Nutrients, weeds and algae grew creating biomass and sediment plus sediment coming in from inlet
- Aeration
  - Adds DO
  - Supports fish and bacterial decomposition of biomass
  - Circulates water column
  - Was need before weeds developed in the lake. Weeds produce DO during the day, more weeds mean less need for aeration. May be needed in the future if, when weeds decline
  - Weeds and algae compete for nutrients. As weeds go dormant in fall, algae starts to grow causing cloudy water from Unicellular algae.

- History

- Purchased Hockney weed cutter in the 80's. Residents, (Todd Corey), would buy a 6 pack and cut weeds that would float to the shoreline and be raked up or they would take root. As the weeds spread, more time cutting, more beer.
- We were losing the battle against Eutrophication and weed growth and getting complaints about plugged propellers, we started herbicide treatments in 2010 to control both invasive and non-invasive weed spreading and growth and keep navigation lane navigable. The stunted weeds would fall to the lake bottom and plant detritus, (fertilizer) and we would have more weeds the following spring. Service providers, (so called biologists), were in the business of selling and applying herbicides, they never mentioned lake aging or long term health of the lakes they treated.
- Lake aging in deep natural lakes with stained flowing water is measured in centuries
- Lake aging in manmade shallow, inhabited lakes with sand bottoms and clear water can occur over several decades
- Through the 70's, lake was nutrient poor, few weeds or algae. Boating and swimming recreation value was perfect. Aerator system installed to add DO and support fish population
- Homes were built and the lake became populated. Growing evergreen and deciduous trees and lawn fertilizer runoff increased lake nutrient content along with sediment coming in from the inlet

- History

- Aquatic weeds took root and spread with the increasing nutrient content and produced DO supporting fish population, reducing the need for Aeration in the 1990's.
- Board purchased a commercial DO meter, you may have seen me measuring DO throughout the year. DO at saturation point all summer as more weeds produce more DO. If DO drops in winter from snow cover preventing sunlight from reaching lake weeds, Aerators have been turned on at 5mg/L of DO where fish start to stress.
- Continuing into the 2020's our lake water remains clear, dissolved oxygen levels are excellent all summer but excessive weed or algae growth continues to adversely affect our swimming, boating and fishing recreation as we enter phase 3 of 5 of lake aging, (Eutrophication).

- Present and Future

- If we allow Lake Aging to continue, we could find ourselves living on a marsh in another 60 – 100 years. I'm not worried about that, but I worry about my kids, grandkids and declining property values that we have worked so hard to build.
- The only logical means to slow and reverse lake aging, weed growth, muck and sediment deposition is to reduce lake nutrient levels.
- Weeds and biomass have absorbed nutrients, we have to remove weeds and biomass with the nutrients they contain rather than leaving them in the lake to provide fertilizer and future growth

- Weed Harvesting
  - Cuts and collects nutrient rich growing weeds and biomass to within six inches off the bottom which are deposited at the Henke farm, North of the lake.
  - Board Goal is to remove more weeds, biomass and the nutrients they contain than mother nature and man can add year on year, while keeping the navigation lane open. The new Shoreline Maintenance will add to weed and biomass removal while restoring swimming recreation. IT'S A BEAUTIFUL BUT EXPENSIVE THING!
  - First investigated in 2022 with contractor White River Flowage was a disaster. They struggled to get their commercial machine in and out of the lake. Didn't harvest many of the weeds they cut and damaged property on the lake, (boats and motors). The next year we had an explosion of weeds and had to do a full lake herbicide treatment.
  - David joined my clean water committee and started educating us about Eutrophication. We partnered with APM, Aquatic Plant Management for cutting/harvesting and DASH, Diver Assisted Suction and Harvesting of invasive weeds. Onterra for our spring weed survey.
  - We are making an educated guess about how much biomass must be removed to start seeing a reduction in weed/algae growth due to nutrient reduction. We are working within our means and do not want to disrupt the lake ecosystem.

# Lake Preservation Plan (2023-2026)

## **Preserving Property Values by Maintaining the Lake's Recreational Value**

Cutting or killing weeds without removing the remaining biomass provides a temporary recreational value improvement. Removing biomass along with the nutrients it contains from the lake ecosystem will, over time, reduce weed and algae growth and lake bottom muck accumulation.

Aeration mixes the water column and has a local limiting effect on muck deposition (it settles elsewhere). Plant growth is keeping our dissolved oxygen levels at/above 100% throughout the summer months. Dead plant and algae biomass falls to the lake bottom and decays over the winter months. Oxygen levels are monitored through the winter months and aerators can be activated to avoid fish kills.

Unicellular Algae compete with rooted plants and Chara-like algae, utilizing excess water-soluble nutrients to grow and multiply. Cloudy water, which we observe in the fall months, results when weeds stop growing. Clear water is the sign of a well-balanced lake ecosystem.

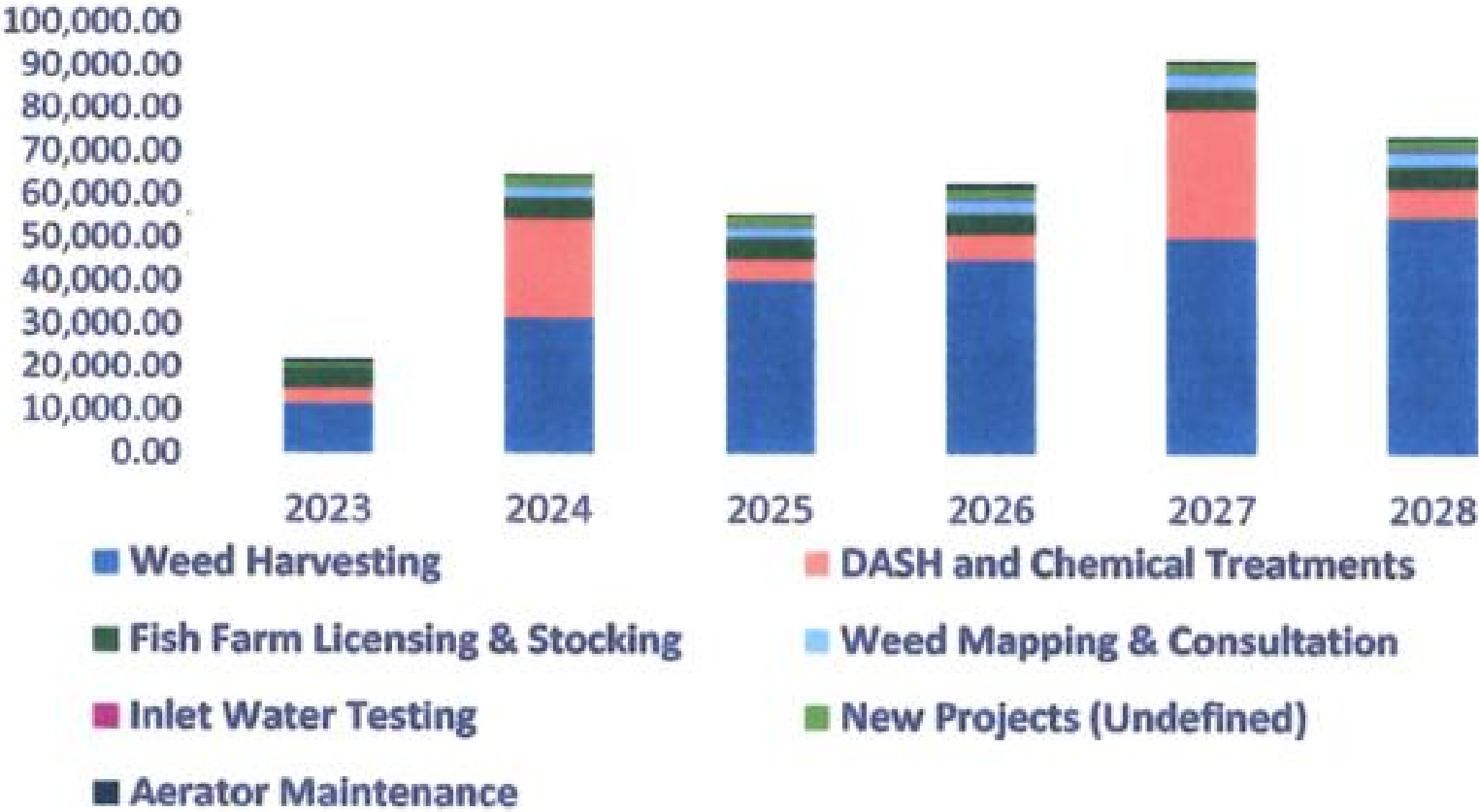
Capital improvement of the boat landing (launch ramp, pier, and access lane) was necessary to enable Weed Harvesting and other future Lake Preservation Program activities

Weed harvesting is cost effective (affordable) and Eco-friendly. With program adjustments, Weed Harvesting should be continued in perpetuity.

Starting in 2029, if the current weed harvesting program is having a limited effect on weed growth in specific 'problem areas', a targeted dredging program should be considered for silt and muck removal. This activity is in our financial plan. More work will be needed to define program requirements, scope, timing, and cost limitations.

After dredging near the inlet stream (our first 'target area'), and after a needs assessment, installing a sediment settling basin (on the easement property, ahead of the lake stream inlet) might be indicated, to reduce the amount of sediment coming into the lake at that location.

# Lake Preservation Program Costs



# Current Lake Preservation Program Elements:

Annual Invasive Weed Survey (Onterra): Mapping changing invasive and non-invasive weed growth patterns and providing expert recommendations for weed control. To date, continued lake-wide weed bed harvesting is recommended. Diver Assisted Suction Harvesting (DASH), was performed to remove invasives in 2024 and is now planned for 2027.

Annual Weed Harvesting: Aquatic Plant Management (APM) is conducting three (3) campaigns per year, one week in duration. The program has been adjusted in response to growth conditions with the general target of removing 30 truckloads of cut weed biomass and the nutrients they contain.

Dissolved Oxygen (DO) levels are monitored throughout the year and two aerators are maintained at the lake center for water column mixing.

Dissolved Phosphate and Nitrogen Concentrations in our lake inlet stream are being monitored to tell us whether it is a source of elevated chemical nutrients. We know that sediment flows into the lake during heavy gully washer rainfall.

## LPC Activity - 2023

- Launch Ramp and Pier Planning
- Required to facilitate getting a commercial harvester in and out of lake
- Weed Analysis and Mapping
- Identified and located weed colonies using boat and mapping software to get most bang for our buck with biomass removal
- Weed Harvester Evaluation
- We monitored efficiency of weed and biomass removal and learned how to improve

- Service Provider Selection
- Evaluated several pieces of equipment and providers, found that Aquatic Plant Management out of Minoqua provide best solution for our needs. They don't sell herbicide treatments and understand our long-term goal of removing biomass and nutrients to slow or reverse lake aging.
- Program Funding
- Lake associations dues were increased to support our plan initiatives
- Monitoring (clarity and dissolved oxygen)
- Nutrient levels were measured at the inlet and found to be “normal” for our type of lake.
- A commercial DO meter is used throughout the year.
- DO Levels throughout the Summer are at/above 100% saturation

## LPC Activity - 2024

- Onterra - Invasive Weed Mapping: Eurasian Water Milfoil (EWM) and Curly Leaf Pondweed (CLP)
- Aquatic Plant Management (APM) - Diver Assisted Suction Harvesting (DASH): 16 EWM & CLP weed beds removed
- APM - Weed Harvesting: Native weed species (Illinois Pond Weed (IPW) and Chara Algae
- Weed Harvesting Sessions - June, August, October
- >800 Cubic yards of nutrient biomass removed, 30 semi trailers per year harvesting
- Cut weeds are deposited at Henke's Farm
- Result: Excellent Navigation, Fishing, Water Clarity, and Oxygen

## LPC Activity - 2025

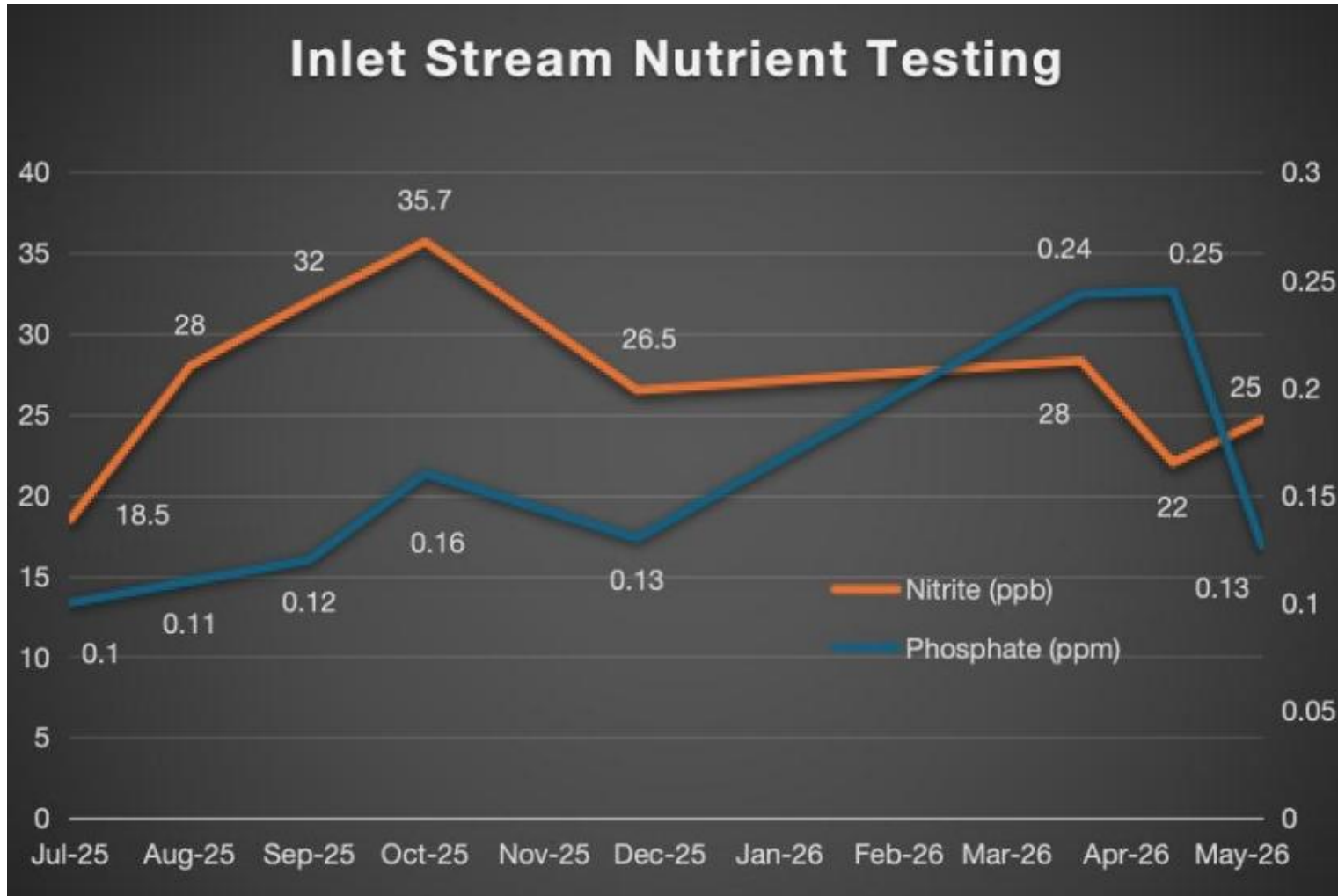
- Onterra - Invasive Weed Mapping: Eurasian Water Milfoil (EWM) and Curly Leaf Pondweed (CLP)
- Diver Assisted Suction Harvesting (DASH) is not required. DASH is budgeted for 2027.
- Aquatic Plant Management (APM) - Weed Harvesting: Weed Harvesting Sessions - June, August, September
- 30 Truckloads of nutrient biomass removed
- Significant LPC intervention was needed for APM targeting
- Weed growth was thinner and more widely dispersed
- Harvesting time was increased to offset lower harvest yields

## 2026 Lake Preservation Program

- 2026 Invasive Weed Survey Results:
- DASH Treatment Recommended (2027)
- Weed Harvesting: 3 Campaigns (APM)
- Continuing Aerator use for Water Turnover
- Aeration adds DO, not needed at this time, it also circulates water column above diffuser, increasing decomposition of biomass. Some sediment above the diffuser decomposes, the rest falls back to the bottom outside of the diffuser
- Inlet Stream - Chemical Nutrient Monitoring
- New Shoreline Maintenance Service Programs – Tony?

# Inlet Stream Phosphate and Nitrogen Testing

(LPC Member - David Lester)



The Mean Phosphate level for the SSL Inlet stream (0.15 ppm) is near the mid-range for uncontaminated lakes (0.03-0.22 ppm).

The Mean Nitrate level for the SSL Inlet stream (0.27 ppm) is in the lower 10% of the range for uncontaminated US streams (0.12-2.2 ppm)

This testing program will be discontinued after July, when the test reagents we own have been depleted

# Our inlet stream is not a source of Phosphates or Nitrates

- The Mean Phosphate level (0.15 ppm) is near mid-range for uncontaminated lakes (0.03-0.22 ppm).
- The (calculated) Mean Nitrate level (0.27 ppm) is in the low range for uncontaminated US streams (0.12-2.2 ppm)
- Human Contamination of US Streams and Lakes is indicated if Nitrate test values are  $>1$  ppm.
- Drinking water is considered safe if Nitrates are  $<10$  ppm.
- 92% of Groundwater tested has Nitrate levels  $>0.3$  ppm.

# Shoreline Maintenance Program Report:

(Tony Mainiero)

Last year our Lake Preservation Committte members developed two (2) new service provide programs, which will satisfy an unaddressed need expressed by residents for shoreline weed and muck removal (inside the Navigation Lane).

APM and Silver Mist are each offering new shoreline cleanup services, exclusively to pre-defined groups of Silver Springs Lake residents.

We hope that these services are satisfactory and that they will be available for everuone to consider for years to come

{Tony to provide Program Details}