Sweeney Lake water quality improvement project

April 8, 2020 BCWMC virtual open house via WebEx

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logistics

Meeting overview

- how to ask questions
  - chat feature now
  - email anytime after the presentation

- what we are not covering at this meeting
  - water levels
  - lake access
  - water surface use (boats, speed, hours)

outline

- project background—goals, partners, funding, timeline
- lake ecology, stratification, effects of phosphorus on water quality
- Sweeney Lake and Schaper Pond water quality; results of aeration study and carp monitoring
- aquatic plant assessment and treatment
- carp management
- alum treatment
- expected outcomes

past watershed milestones

- 2004: MPCA designated Sweeney Lake as impaired water for high nutrients
- 2011: BCWMC completed Sweeney Lake TMDL, including modeling of two years w/o aeration
- 2011/2017: Schaper Pond treatment modification and effectiveness monitoring
- 2018: Aeration study completed—recommended alum treatment and discontinuing aeration
- 2019: completed carp monitoring and received federal 319 grant through MPCA

background for water quality improvement project

Project goal, objectives and measurable outcomes

- reduce total phosphorus concentrations and meet Sweeney Lake water quality standards
  - curly-leaf pondweed control
  - carp management
  - alum treatment
- perform post-treatment monitoring to confirm intended results

background for water quality improvement project

Process and expected timeline

- stakeholder communication—ongoing
- aquatic plant assessment and curlyleaf pondweed management—spring and summer, 2020
- carp management actions—summer, 2020
- alum treatment
  - Phase I—fall, 2020
  - Phase II—fall, 2022

background for water quality improvement project

Project partners and funding

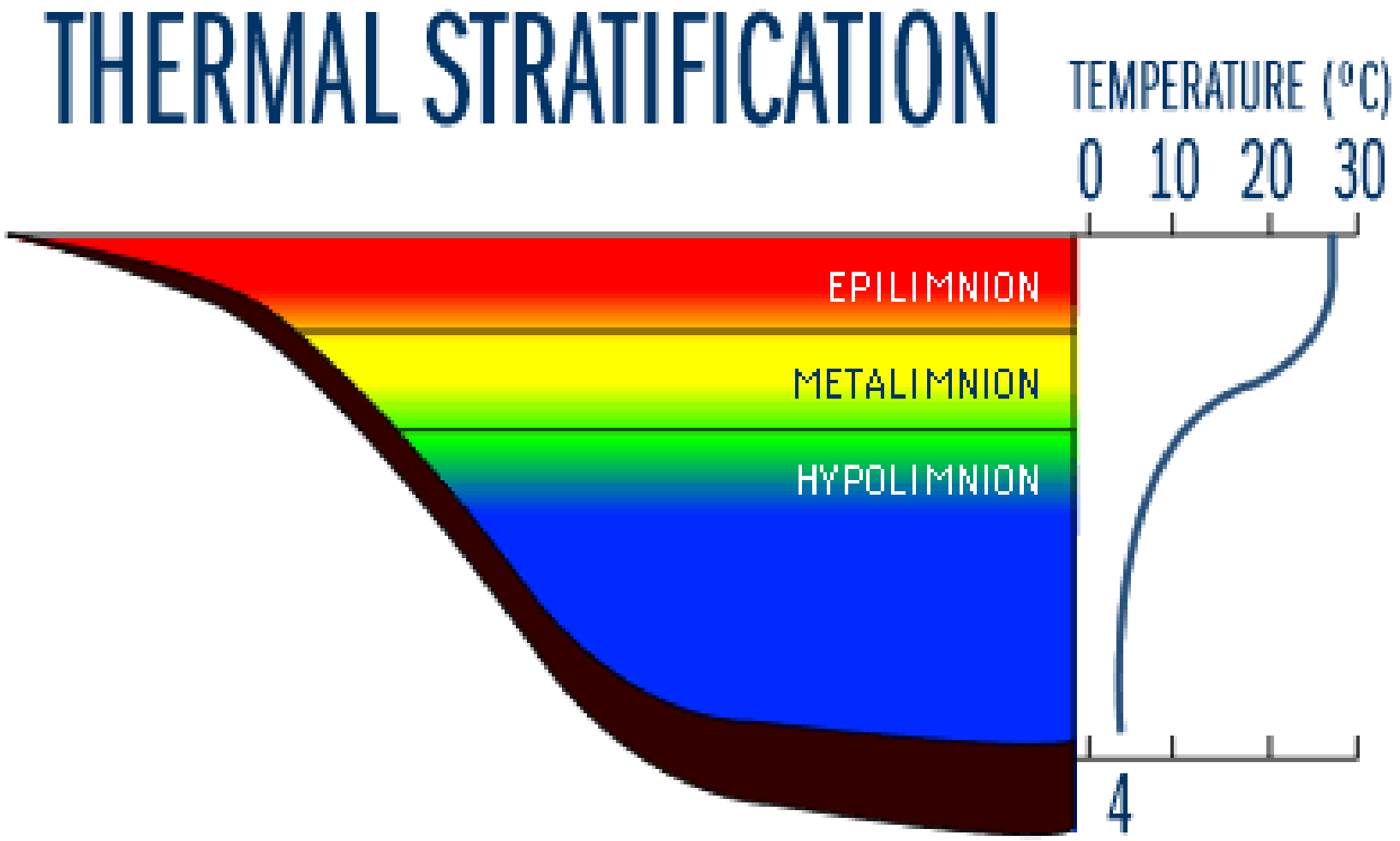
- Partners: BCWMC, City of Golden Valley, Sweeney Lake Association, MPCA
- $568,080 budget
  - $330,000 grant funding
  - $238,080 BCWMC Capital Improvement Program funds

lake stratification

epilimnion:
warmer, more light

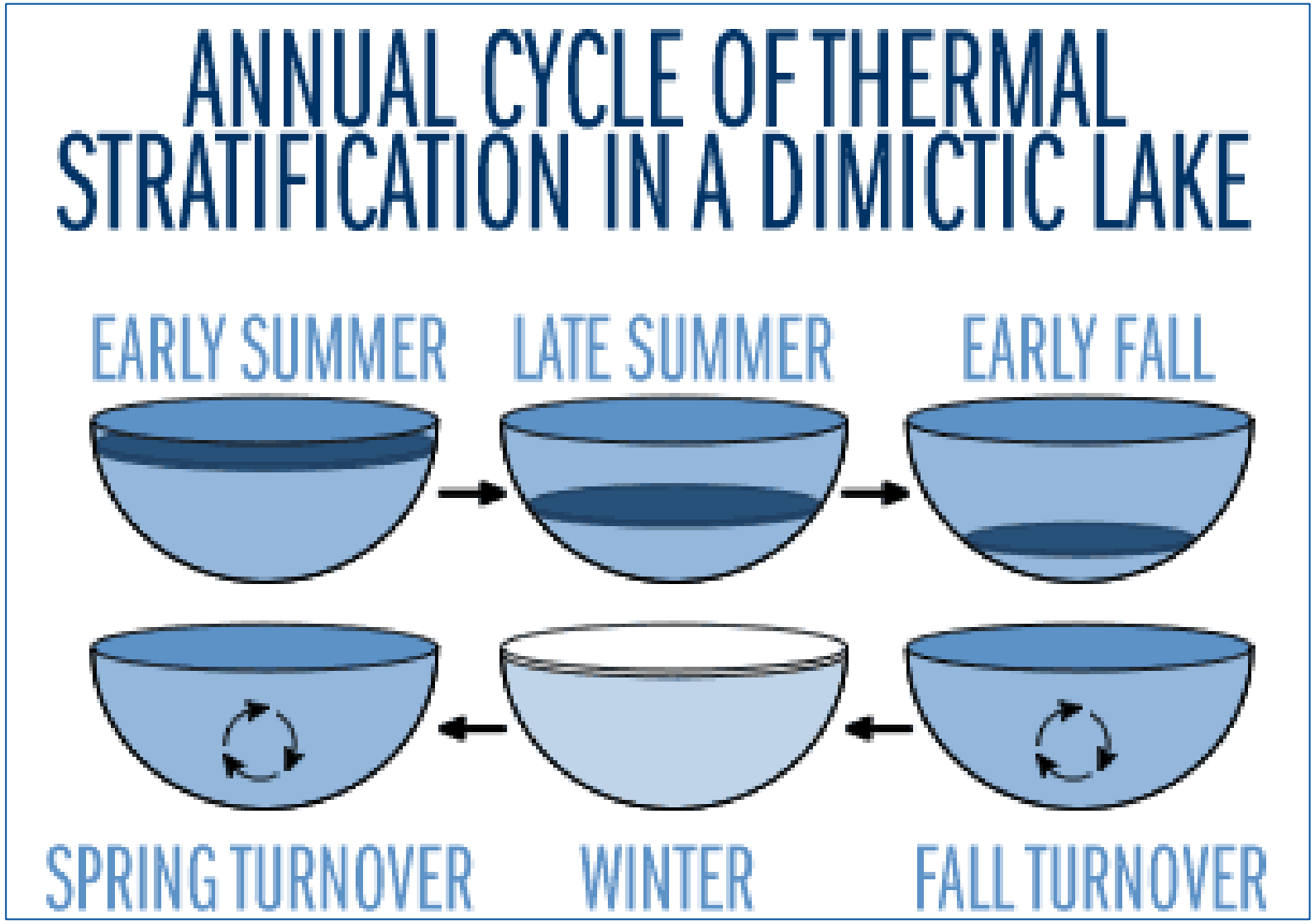
metalimnion:
transitional layer

hypolimnion:
cold, dense water, sometimes anoxic, phosphorus released



lake stratification

"dimictic" lakes mix twice per year



phosphorus is the key

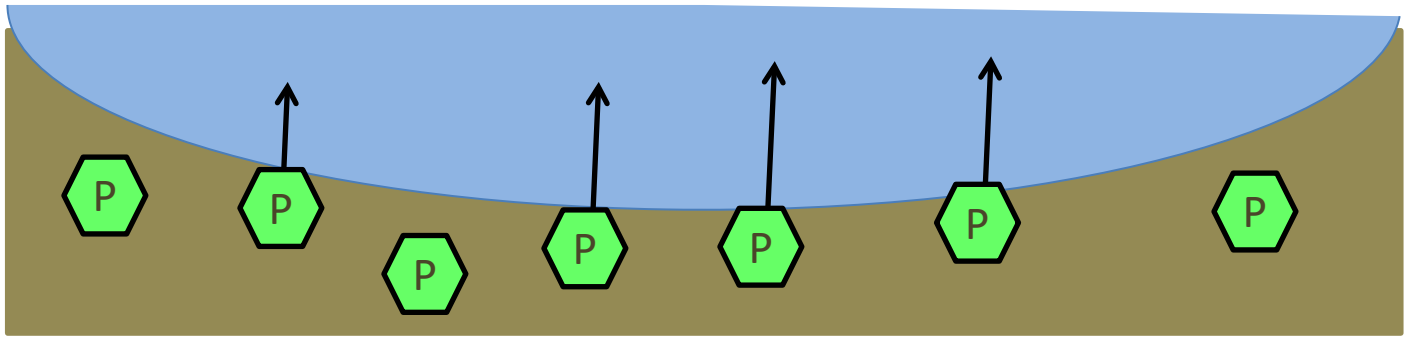
Excess phosphorus means poor water quality

- phosphorus feeds algae and causes algal blooms
- algae decreases water clarity
- algal decay depletes dissolved oxygen near the lake bottom

where does phosphorus come from?

Internal sources

- released from lake bottom sediments when oxygen levels are low
- released from lake bottom sediments with carp activities
- released into water column as curlyleaf pondweed dies off mid summer



where does phosphorus come from?

External sources

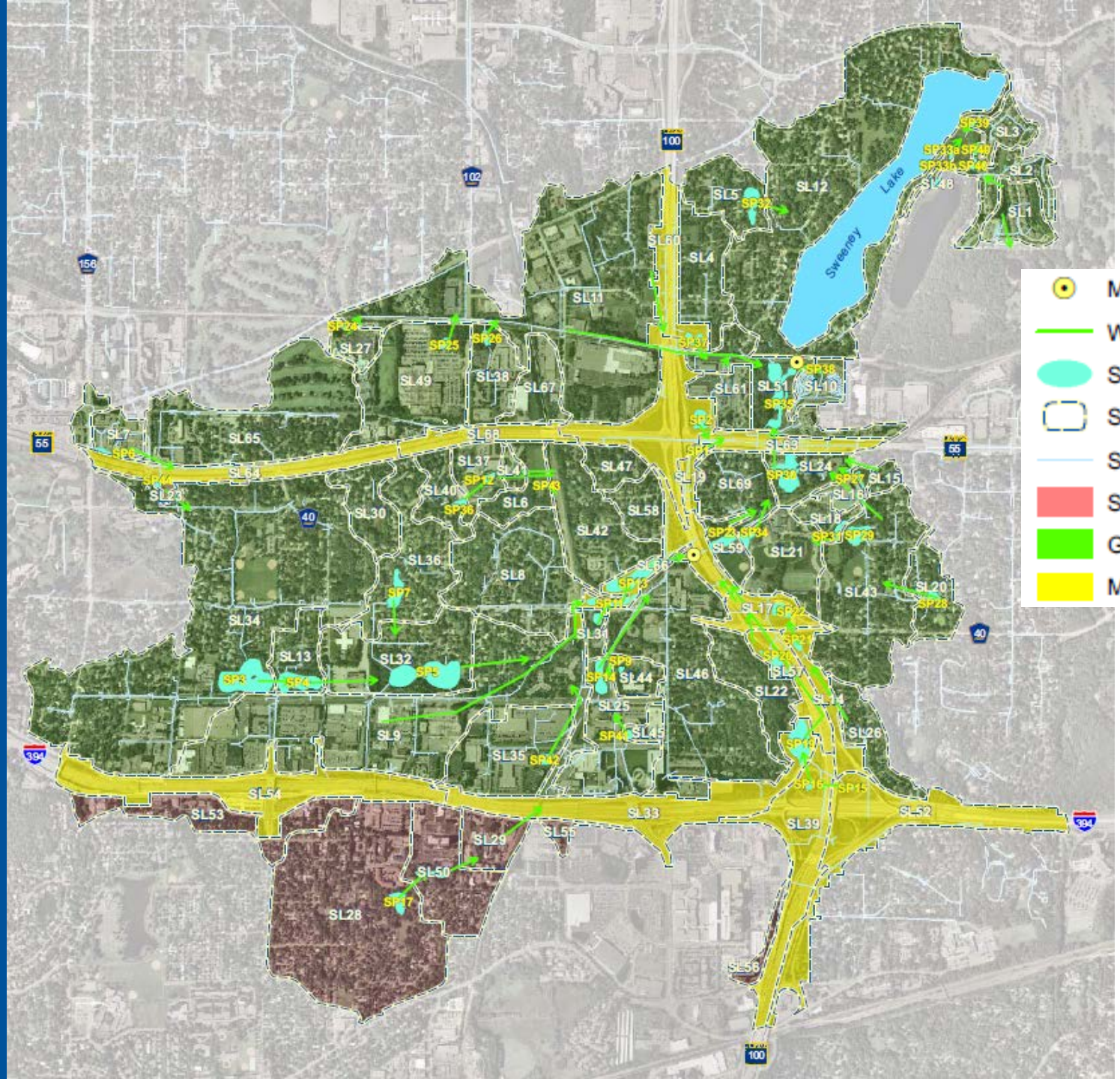
- runoff from hard surfaces – streets, driveways, parking lots
  - grass clippings
  - leaves
  - fertilizer

We all have waterfront property!

Sweeney Lake watershed

almost 2,400 acres

drain to lake



where does phosphorus come from?

External sources

- along the lakeshore
  - grass clippings
  - leaves
  - fertilizer

Shoreline buffers also improve habitat and reduce erosion!

Sweeney Lake Aeration Study 2017-2018

Schaper Pond Carp Studies 2018 - 2019

aeration study results

Conclusions

- internal phosphorus load is the most important source during summer
- aeration exacerbates summer water quality problems (10-30% increase in total phosphorus in upper layer of lake)
- in-lake alum treatment greatly improves water quality—meets goals
- aeration after an alum treatment may not provide significant benefits

BARR

aeration study results

Recommendations

- suspend aeration and plan for first phase of alum treatment
- monitor lake water quality and biota
- report results and reconsider aeration and/or other management actions

Schaper Pond

effects of carp in Schaper Pond

Schaper Pond and carp monitoring

Results

- water quality monitoring confirms increasing phosphorus concentrations as flow moves through pond
- confirmed large numbers of carp inhabit Schaper Pond and Sweeney Lake
  - five to ten times higher than management threshold
- spring movement between Schaper and Sweeney; upstream migration, as well
  - no movement from young of year carp—Schaper functions as a nursery

aquatic plant assessment and treatment

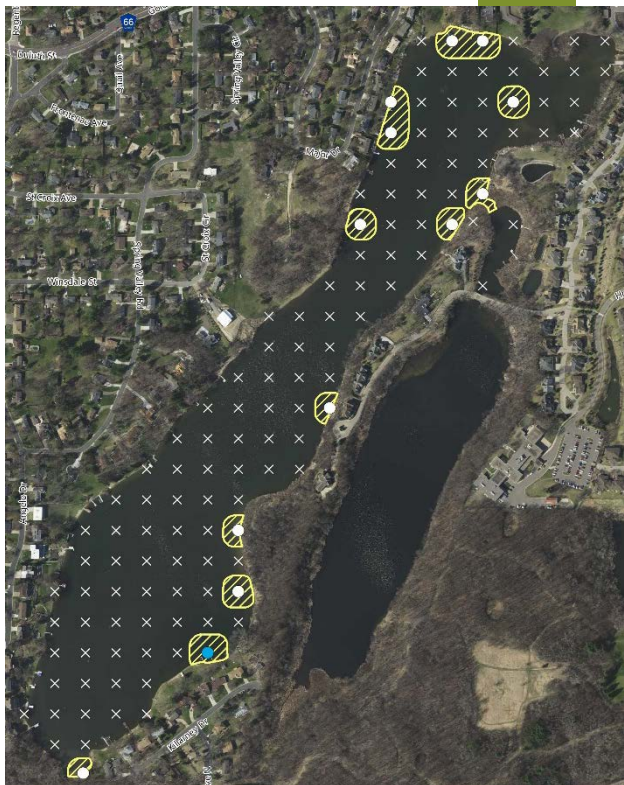
To inhibit CLP density after water clarity improves after alum treatment

- two plant surveys will be conducted—spring and summer, 2020
  - measure plant growth pre-project
  - find extent of curly-leaf pondweed (CLP)
  - measure plant growth after CLP treatment

aquatic plant assessment and treatment

To inhibit CLP density after water clarity improves after alum treatment

- up to 5.1 acres of curly-leaf pondweed (CLP) growth in Sweeney Lake will be targeted (and permitted) for herbicide treatment—spring, 2020
- timing/application method depend on temperature and herbicide; locations posted
- submersed application anticipated April 1st –May 15th



carp management

To improve Schaper Pond treatment capability and Sweeney Lake water quality

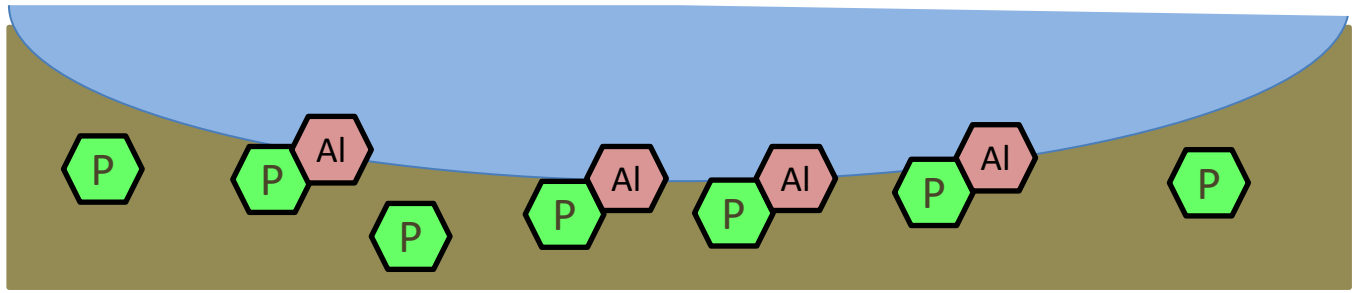
- two electrofishing surveys in Sweeney Lake and Schaper Pond—estimate carp abundance and removal efficiency
- carp removal with baited box nets (7 days each) in July and September – 3-5 nets throughout Sweeney, 2 in Schaper
  - drop biomass by more than half w/o impacting turtles
- document carp movement between Sweeney Lake and Schaper Pond through the end of 2020 – determine if barrier(s) are needed

alum treatments:

what is alum?

Aluminum sulfate

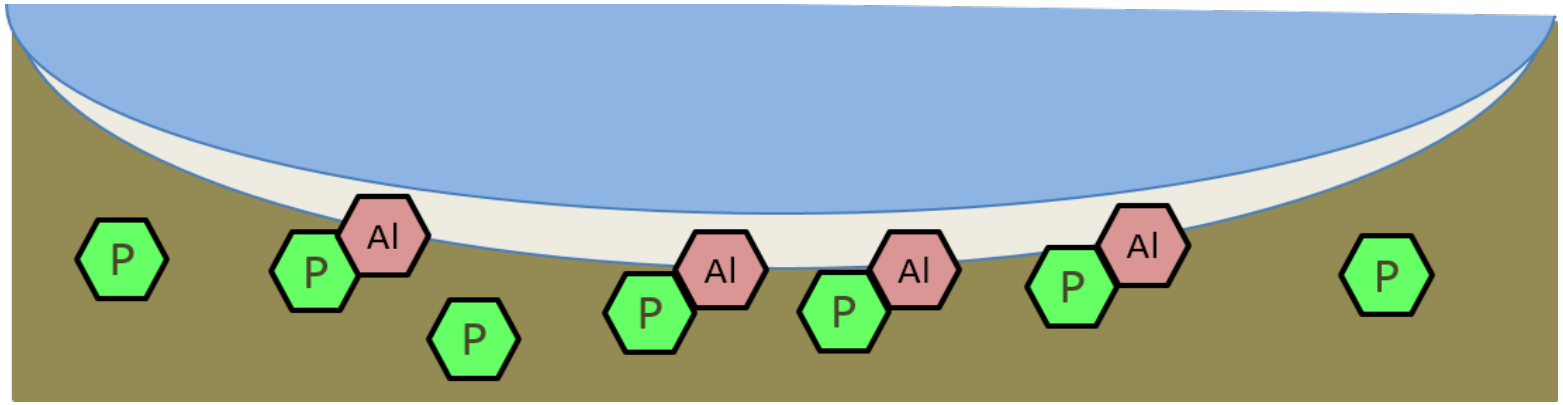
- chemical precipitant used in hundreds of lake treatments in the past 45 years
- safe, non-toxic, non-hazardous
- forms “floc” that sweeps phosphorus from the water column and locks phosphorus on lake bottom
- works regardless of oxygen conditions



how long do alum treatments last?

Typically maintains water quality improvements for 15 to 20 years

- aluminum reactivity remains for first couple of years
- long-term: slow but continual sedimentation adds phosphorus on top of alum floc layer, internal load will slowly return



alum treatment

How is alum applied? Other considerations

- applied at lake depths greater than 5’—targeting half dose each fall, 2020 & 2022
- coincides with cold temperatures; timing won’t conflict with recreation
- boating (incl. wake boats) will not adversely impact alum effectiveness (activities not limited year after application)

expected project outcomes

How will water clarity and algae levels change?

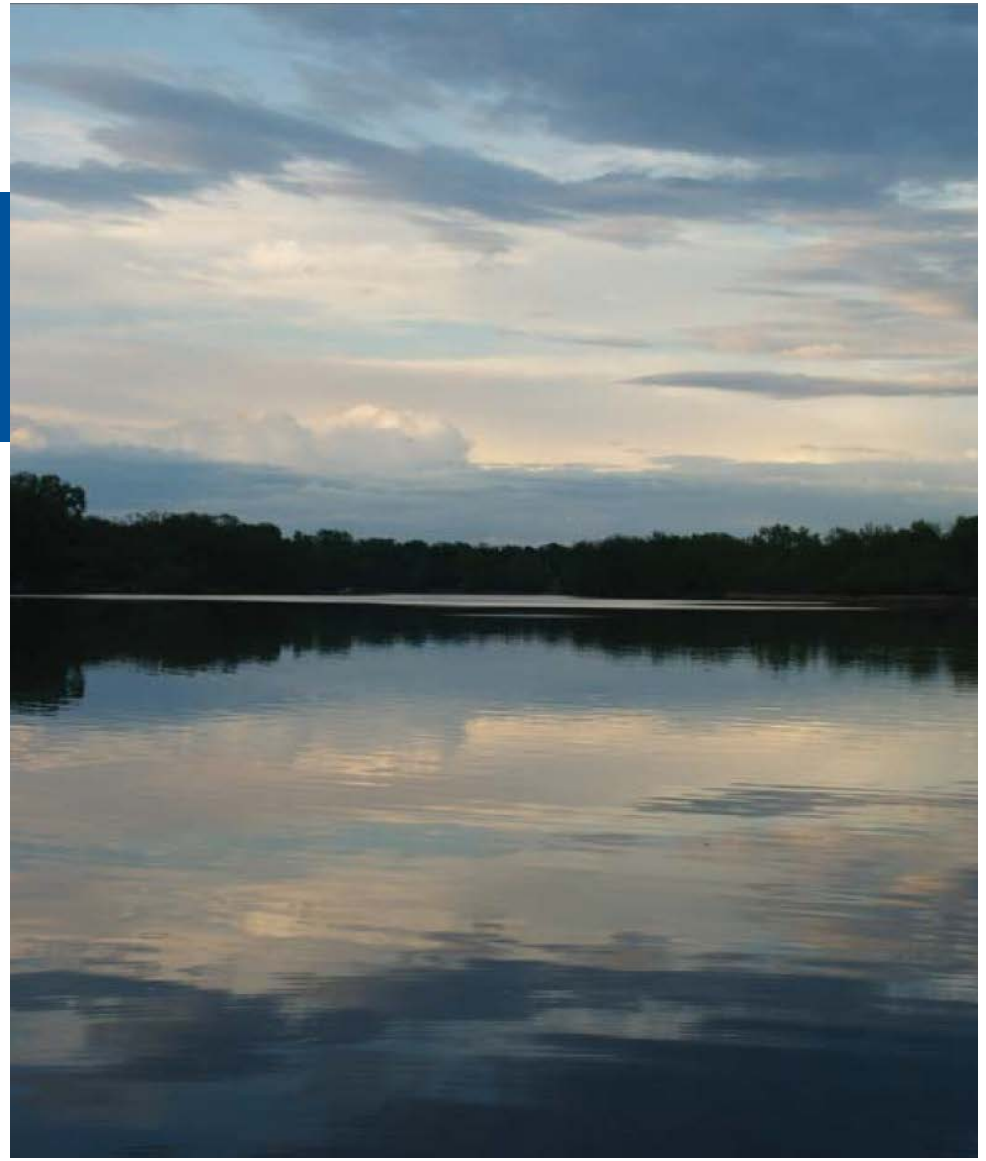
- algae and harmful algal blooms (HAB) levels will drop significantly following first phase of alum treatment
  - small fluctuations may follow in subsequent summers, based on climate
  - second phase will ensure longevity
- water clarity will improve in response to lower algae
  - expect 1 to 2’ increase in transparency

expected project outcomes

How will aquatic plant growth change?

- better water clarity allows more plants to grow at deeper depths, but extent is limited by lake characteristics –expect more plant growth at 10-15’ depths
- plants may grow at higher densities
- herbicide treatment intended to limit CLP, maintain health of native species
- lakeshore owners can address plants around docks on case-by-case basis with permits

Questions?



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