
SUNDAY LAKE ALGAE CONTROL PLAN

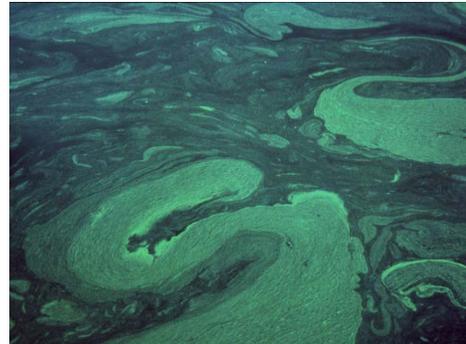
EXECUTIVE SUMMARY

JUNE 2020

THE PROBLEM

Sunday Lake is a 49-acre lake located 5 miles to the east of the City of Stanwood in Snohomish County. The lake provides opportunities for swimming, fishing, boating and aesthetic enjoyment. It also supports a diverse array of aquatic life. The lake health is threatened by excessive phosphorus pollution which causes:

- Low water clarity
- Extremely low dissolved oxygen levels that stress fish
- Chronic excessive algae growth including occasional blooms of toxin-producing blue-green algae



ALGAE BLOOM ON SUNDAY LAKE SHORELINE

THE EFFECT

Phosphorus pollution has caused relatively infrequent toxic algae blooms in recent years. However, toxic algae blooms make the lake unsafe for residents, pets, anglers, & swimmers. The lake was last posted with advisories in 2010, 2011, & 2012. The liver toxin, microcystin, has been the most prevalent toxin with detections over 8 times the state’s recreational guidelines. Even when not toxic, excessive algae leads to lower water clarity and depressed dissolved oxygen. The phosphorus pollution has led the WA State Department of Ecology to list the lake as “impaired”. Collectively, these factors have the potential to reduce property values.



RECREATIONAL ADVISORY FOR TOXIC ALGAE POSTED AT SUNDAY COMMUNITY ACCESS

FINDING SOLUTIONS

In 2018, Snohomish County Surface Water Management (SWM), together with the Sunday Lake community, began the algae control plan project. The project goal is to determine 1) the major sources of phosphorus pollution 2) the best alternatives to reduce pollution and 3) the Sunday Lake community’s preferred alternative for moving forward. The project is funded by SWM and a grant from Ecology.



PHOSPHORUS SOURCES

An estimation of the main phosphorus sources were developed based on an analysis of historic data, year-round monitoring of the lake, and sediment cores of the lake bottom. The key sources include:

- **Waterfowl** – Swans, geese, and ducks contribute 65% of the annual phosphorous pollution to the lake, the majority of which is from migratory swans that roost on the lake from November through March.
- **Lake sediments** – Pollution builds up from runoff and groundwater in the lake sediments and is recycled back into the lake each year, comprising 21% of the annual pollution to the lake. The level of phosphorous in Sunday’s sediments is very high.
- **Residential Pollution** – Stormwater runoff from pet/animal wastes, fertilizer, and dirt is carried into the lake by runoff when it rains. Groundwater also carries in pollution from residents’ septic systems. Together, these sources account for 14% of the annual pollution.

ALGAE CONTROL PLAN

After reviewing many options, two elements were found to meet the plan goal of reducing phosphorus and resultant toxic algae blooms in Sunday Lake as shown in the table below. These two elements will meet the project goal of preventing toxic algae by addressing the main phosphorus pollution sources.

Plan Element	Source Addressed	Description
Element 1: LakeWise Program	Residential Pollution	The County’s outreach program to help lake area residents prevent phosphorus pollution from lawns, yards and septic systems. Residents can complete a voluntary checklist of actions to have their property LakeWise certified. LakeWise supports residents through educational workshops, site visits, and technical resources.
Element 2: Alum Treatment	Lake Sediments	Alum is a chemical that permanently binds phosphorus in the lake water and sediments so it is no longer available to fuel algae growth. Commonly used in drinking water treatment, alum is safe for lake users and wildlife when applied properly. Options for application include: <ul style="list-style-type: none">• Option 1 - Multi-Year Treatments: Apply a large dose in year one followed by small annual treatments for 10 years to neutralize new pollution and extend treatment longevity• Option 2 – Alum Injection with Whole-Lake Aeration: Continuously inject Alum into the lake in conjunction with an artificial whole-lake aeration system Both options will need year-round lake monitoring to assess effectiveness and adaptively manage for the next year’s treatment.

EXPECTED OUTCOMES

Implementing Element 1, LakeWise, will not result in large-scale changes in lake health, but will help to prevent conditions from worsening in Sunday Lake. Implementing element 2, alum treatments, will significantly improve the health of Sunday Lake. There will be a major reduction in phosphorus resulting in less frequent and intense algae blooms benefiting lake recreation. Dissolved oxygen levels will increase benefitting fish and aquatic life. Water clarity will also improve and is typically associated with higher property values. It is important to know that Sunday Lake is naturally a productive lake and will continue to have plant growth which may actually increase in deeper areas with improved clarity.

COSTS AND FUNDING

The estimated costs of each control plan element are outlined in the table below in a 10-year timeframe. The funding required to implement the Algae Control Plan will require a long-term financial investment by the Sunday Lake community. Funding assistance from grants could help alleviate this financial burden. The most promising grant is the Department of Ecology Freshwater Algae Control Program grant which provides \$50,000 maximum awards with a 25% local match. Options for raising local funds include:

- Creation of a lake association with voluntary local fund collection
- Formation of a Lake Management District (RCW 36.61)
- Authorization of a lake property assessment through an extra Surface Water Management Service Charge designated for phosphorus reduction activities at Sunday Lake

ESTIMATED COSTS OF SUNDAY LAKE RESTORATION IN 2020 DOLLARS

Elements	Year 1	Years 2 - 9	Year 10	10-Year Total
Element 1: LakeWise	<i>currently funded by Snohomish County SWM</i>			
Element 2: Alum Treatment^{a, b}				
<i>Option 1: Multi-Year Alum Treatments</i>	\$325,000	\$90,000	\$100,000	\$1,145,000
Cost per lakefront parcel ^c	\$6,667	\$1,846	\$2,051	\$23,487
Cost per community parcel ^c	\$542	\$150	\$167	\$1,908
<i>Option 2: Alum Injection with whole-lake aeration^d</i>	\$385,000 - 835,500	\$108,000 - 178,500	\$118,000 - 188,500	\$1,367,000 - 2,452,000
Cost per lakefront parcel ^c	\$7,897 - 17,138	\$2,215 - 3,662	\$2,421 - 3,867	\$28,041 - 50,297
Cost per community parcel ^c	\$642 - 1,393	\$180 - 298	\$197 - 314	\$2,278 - 4,087

a. Year-round lake monitoring has an estimated annual cost of \$9,500. A portion of monitoring costs may be covered by County’s volunteer lake monitoring program pending annual budget approval.

b. A \$10,000 sediment core analysis is included for both options in year 10 (used to assess future treatment doses).

c. Cost represents one potential cost-share scenario estimated by the 39 lake shoreline parcels contributing 80% of total costs and 120 community parcels paying 20% of total costs.

d. Range in cost based on low and high end estimates for installation, maintenance, and operation.

RECCOMENDATIONS

The goal of the plan is to provide the community with a road map for reducing toxic algae. The following are the final five recommendations of the algae control plan for the community:

#1 Plan for Alum treatments

- Begin community planning for alum treatments including developing a funding plan and timeline. If sufficient community support, implement now. If not, delay planning and re-evaluate when toxic algae conditions worsen.

#2 Implement LakeWise

- Continue and increase participation in the LakeWise program to reduce phosphorus pollution and prevent conditions from worsening.

#3 Continue Volunteer Monitoring

- Continue volunteer lake monitoring to identify further changes in lake health. This includes resident reporting of toxic algae blooms.

#4 Preserve Native Plants

- Maintain the robust population of submerged native plants. They outcompete algae for phosphorus and are key to preventing more severe toxic algae blooms.

#5 Continue Invasive Lily Control with Caution

- If invasive lily control by community continues, conduct herbicides treatments on an incremental basis to minimize phosphorus release. If cutting, remove all plant material and compost far away from the lake.

The community was provided with an opportunity to review the plan and draft recommendations. The community was largely supportive of recommendations #2 through #5. However, the community was divided on recommendation #1. Initially, the recommendation was to delay alum treatments until conditions worsen. However, several community members disagreed and expressed a desire to begin planning and saving for alum treatments now. Therefore the final recommendation changed to begin planning for treatments.

The suggested next step is for interested community members to form a committee tasked with finalizing a community plan including the funding strategy and timing. The entire lake community would then need to collectively decide if the benefits of the implementation plan are worth the required financial and time investment. The full plan lays out additional details on next steps and funding sources to assist the community.

