

**NORTH LAKE
MANAGEMENT DISTRICT
2022 Annual Report**

Prepared by:

Environmental Services
Public Works Department
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ACKNOWLEDGMENTS

The City of Federal Way acknowledges the significant contribution provided by the North Lake Advisory Committee (NLAC) members and the entire lake community who contributed to the successful development of the North Lake Management District and the continued implementation of the aquatic plant management program. The Advisory Committee includes the following members:

- Lake Residents: Terry Thomas (Chair), Mary McClellan-Aronen, Darron Nash, Larry Flesher and Larry Zimmisky
- Industrial Realty Group (IRG), LLC: Josh Holmes
- Washington Department of Fish and Wildlife: David Heimer

1.0 EXECUTIVE SUMMARY

The North Lake Advisory Committee (NLAC) and the Environmental Services Division (ES) successfully implemented the following goals as described in the 2022 work plan (Appendix D):

- Identified noxious aquatic plants (Fragrant water lily (*Nymphaea odorata*) Class C, Yellow flag iris (*Iris pseudacorus*), Class C, Purple loosestrife (*Lythrum salicaria*) Class B, Narrow leaf cattail (*Typha angustifolia*) Class C).
- A comprehensive water quality monitoring program was implemented throughout the summer months to provide important data concerning the health of North Lake.

2.0 BACKGROUND

2.1 IAVMP Development and Ecology Grant Funding

Prior to annexation into the City of Federal Way in 2005, North Lake was within the jurisdictional boundary of unincorporated King County. Leading up to annexation, the lake community had been implementing an informal aquatic plant management program for a number of years. But starting in 2004, a more formal effort was undertaken when North Lake began coordinating with King County in the development of an Integrated Aquatic Vegetation Management Plan (IAVMP)—a comprehensive document that established all future goals and strategies for freshwater lake noxious weed management.

Anticipating that North Lake would soon be annexed into the city, ES staff began collaborating with King County to finalize the North Lake IAVMP (a document required by the Washington Department of Ecology for future grant funding). Consequently, North Lake was awarded a four-year Washington State Department of Ecology Aquatic Weed Management Fund (AWMF) grant in 2005 with ES designated as the administrator. The action plan outlined in the grant included a combined approach of annual surveys, treatment, control, and public education designed to begin eradication of the following noxious weeds: milfoil, fragrant water lily, purple loosestrife and yellow flag iris. The grant budget totaled approximately \$80,000, with up to 75% of the eligible project costs reimbursed by Ecology. The AWMF grant expired December 31, 2009.

2.2 Lake Management District

While the AWMF grant program was being implemented, city staff and residents began meeting with the intent to form a Lake Management District for North Lake as a means to provide a long-term funding mechanism. In 2010, a ten-year LMD was formed. Per RCW 36.61, annual assessments collected from LMD property owners fund the following programs: ongoing aquatic vegetation management, water quality monitoring, public education, and related lake improvement programs.

2.2.1 Lake Management District Renewal

On October 1, 2019, the City of Federal Way City Council adopted Ordinance 19-876 renewing the North Lake Management District for another ten-year duration. This Ordinance followed a lengthy process of updating boundary maps, creating a petition for renewal, coordinating a vote of affected property owners, and passing a variety of city resolutions in favor of renewing the LMD. The renewal process was finalized in March 2020 when City Council appointed members to serve on the renewed LMD's Advisory Committee.

The following Resolutions and Ordinances were adopted by the City of Federal Way City Council in regards to the renewal of the North Lake Management District (in order):

- Resolution 19-758: to reform the North LMD and set a public hearing on the proposal
- Resolution 19-764: to renew the North LMD and call for a vote by property owners
- Ordinance 19-876: to renew the North LMD and set a public hearing on assessments
- Resolution 19-773: to approve the assessment roll for the renewed North LMD
- Ordinance 20-884: to establish time of payment, interest, and penalties on assessments
- Resolution 20-778: to create the North LMD Advisory Committee for the renewed LMD

2.3 The Aquatic Weed Issue

Noxious freshwater aquatic weeds are plants that are not native to the State of Washington. They are generally of limited distribution, invasive, and pose a serious threat to our state's waterbodies (including Steel Lake) if left unchecked. Because noxious plants have few natural controls in their new habitat, they spread rapidly, out-compete and effectively destroy native plant and animal habitats. This can lead to a degradation of water quality and recreational opportunities. In addition, the presence of noxious freshwater weeds may lower values of lakefront properties (Ecology, 2014).

The Washington State Noxious Weed Control Board classifies noxious weeds based on each species' stage of invasion. This classification system is designed to: (1) prevent small infestations from becoming large infestations; (2) contain already established infestations to regions of the state where they occur; and, (3) prevent their movement to un-infested areas of Washington. The following three major noxious weed classifications are listed according to the seriousness of the threats posed to the state:

Class A Weeds: Non-native species with a limited distribution in Washington. Preventing new infestations and eradicating existing infestations is the highest priority. Eradication is required by law.

Class B Weeds: Non-native species presently limited to portions of the state. Species are designated for control in regions where they are not yet widespread. Preventing new infestations in these areas is a high priority. In regions where a Class B species is already abundant, control is decided at the local level, with containment as the primary goal.

Class C Weeds: Non-native weeds found in Washington. Many of these species are widespread in the state. Long-term programs of suppression and control are a County option, depending upon local threats and the feasibility of control in local areas.

3.0 NPDES AQUATIC PLANT & ALGAE PERMIT

In 2022, coverage for North Lake continued under the state of Washington Department of Ecology (Ecology) National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit (permit) for the management of aquatic plants and algae. Permit issuance complies with state law and maintains the state’s ability to regulate the use of herbicides in aquatic settings. The NPDES permit (issued under the authority of RCW 90.48) has been implemented by the City’s aquatic plant management contractor AquaTechnex, LLC. The permit governs activities such as: aquatic herbicide applications, residential postings/notifications, annual reporting, and records retention.

4.0 AQUATIC WEED MANAGEMENT CONTRACT

In the spring of 2018, a new AquaTechnex Professional Services Agreement (PSA) with the City of Federal Way was finalized, expiring December 31, 2027. The scope of the agreement includes: systematic aquatic plant surveys, implementation of control methods to target aquatic plants (diver hand pulling, hand cutting/raking, diver installation of bottom barriers, diver dredging, removal of floating water lily islands, treatment with Ecology-approved aquatic herbicides), post control surveys, mapping, reports, and attending meetings as required. ES staff will work renewing this PSA after this monitoring and treatment season.

5.0 2022 AQUATIC WEED MANAGEMENT ACTIVITIES

5.1 Systematic Survey – Noxious Plants

AquaTechnex completed the annual initial systematic aquatic plant survey of North Lake on July 6, 2022. During this survey, the boat passes around the lake in the shallow area, defined as 6 feet or less. The shallow area is easily checked from the surface for noxious weed species. Then the plant community is sampled, consisting of transects recorded at approximately 400-500-foot intervals around the shoreline with rake-toss samples taken in a line perpendicular to the shoreline at 5-foot depth intervals to determine the presence and abundance of the lake’s aquatic plant species. During the effort, the survey team mapped all submerged, floating, and emergent noxious weeds from a vessel (equipped with Global Positioning System [GPS] equipment), and recorded the location and extent of the plant communities discovered in and around the lake from the surface. A diver performed a more detailed underwater inspection of the littoral zone. The GPS information obtained in the field was later processed for map creation and analysis using ArcView GIS software. Plant location maps may be found in the AquaTechnex Initial Survey Report: *North Lake Management Review – 2022*, (Appendix A).

Noxious weeds found during the 2022 North Lake initial survey included:

- Fragrant water lily (*Nymphaea odorata*) Class C
- Yellow flag iris (*Iris pseudacorus*), Class C
- Purple loosestrife (*Lythrum salicaria*) Class B

-
- Narrow leaf cattail (*Typha angustifolia*) Class C

The following is a discussion regarding noxious weeds documented during the 2022 survey, as reported by AquaTechnex:

5.1.1 Fragrant Water Lily

When the lilies are flowering, their flowers are showy, white, and aromatic. Flowers of unusual color and shape are characteristic of hybrid water lilies. Their leaves float on the water's surface and are nearly circular in shape. The leaves are on the tops of long stalks that extend from long rhizomes in the mud. The stems are flexible so when the water level lowers, the plants don't stick up out of the water. Usually flowering occurs from June to October. After a lily has been fertilized the flower stalks curl like a corkscrew drawing the flower underwater and the seeds float back up to the surface and spread through water movement.

Fragrant Water Lily was spotted in a few patches during the initial survey.

5.1.2 Yellow Flag Iris

When flowering, Yellow Flag Iris is unmistakable along the edge of water and in wetlands. Its yellow-colored flowers bloom in late spring or early summer. This noxious aquatic plant (State of Washington Class C Weed) has a flower stalk that grows up to nearly five feet tall. Additionally, the rhizomes of this nonnative plant spread to form dense stands that exclude more desirable native wetland species.

The Yellow Flag Iris was present on the eastern shoreline.

5.1.3 Purple Loosestrife

Purple loosestrife has vivid purple-pink flowers and blooms in summer and early fall. This robust, square-stemmed noxious plant crowds out native wetland species to form dense stands in shallow water and wet soil. Purple Loosestrife is an invasive, rapidly-spreading European species that is a State of Washington Class B weed (Ecology, 2014).

Class B means controlling this noxious weed is state-mandated. Purple Loosestrife plants were observed during the initial survey on the eastern shoreline.

5.1.4 Narrow Leaf Cattail

“Nonnative, invasive Narrow Leaf Cattails are capable of displacing native plants, changing the genetic profile of native cattail stands, altering marsh habitat, and invading managed aquatic systems. Narrow leaf cattails are perennials that grow in fresh to slightly brackish wetlands, often emergent in water up to 1.5 meters deep. Stems are either vegetative or produce flowers. Cattail inflorescences are cylindrical spikes of small monoecious flowers, with male (staminate) flowers occurring above the female (pistillate) flowers, all directly on the main axis and intermixed with slender hairs. Size of the spike can vary depending on species. Fruits are small follicles, football-shaped, splitting longitudinally in water to release the seed. Seed counts per spike have been estimated ranging from 20,000 to 700,000 (NWCB, 2021).

This is a class C noxious weed, and it was found in a few locations during the initial survey.

5.2 Herbicide Treatments

The NPDES General Permit covers all noxious and quarantine-list weed control activities that discharge herbicides directly into surface waters of the state of Washington. Persons conducting herbicide applications must be covered by the General Permit for control activities in lakes, and the applicator must also comply with all herbicide label instructions and public notice procedures. In 2022, approximately 5.6 acres of the lake was treated on August 1, and recorded in the North Lake Spray report – 2022, (Appendix B).

5.3 Systematic Survey – Native Plants

The objective of the survey is to quantify the presence and location of all aquatic plant vegetation (native and non-native) on North Lake. According to AquaTechnex’s initial survey report, “There has been a steady decline in the aquatic plant volume present in the lake over the past few years. In 2019 the dominant species was Naiad, which is an annual species. Annual plants grow from seed each year, are prolific seed producers, drop those seeds and die back at the end of the year. The following years growth comes from the seed bank that is produced. It is probable that treating this growth when it was present at nuisance levels reduced the seed bank and that could explain the relative lack of problem growth this year. The submerged aquatic plant communities in 2022 can be defined as follows: The dominate specie noted in depths between 4 to 15 feet was the white stemmed pond weed. Elodea, Najas, and American Pondweed species were present in shallower waters.

5.4 Native Growth and Impacts to Beneficial Uses

The native plant community in North Lake has a level of diversity common for the lakes in this area. Additionally, the community exhibits a relative dominance of one species over all others: *Najas flexilis*. This plant is native to Washington but has the ability to grow to nuisance levels in an urban lake environment like North Lake. In recent summers, a small number of residents have complained about excessive *Najas* growth—an observation that is most probably linked to recently warmer spring and summers. The resulting extended growing season causes plant growth to peak towards the beginning of August, and increasing plant densities observed well into September.

When aquatic plant growth is excessive, it may impair beneficial uses for lake residents—for example, impairment to recreational activities (boating, fishing and swimming).

5.5 Blue-Green Algae

Blue-Green algae (cyanobacteria) are common in freshwater lakes, and they frequently form dense populations (blooms) in eutrophic (nutrient rich) waters. The main factors that may determine the development of algae blooms are: light, temperature, pH, and nutrients (nitrogen and phosphorous).

Blue-green blooms can pose a human health concern. Although most are non-toxic, some blue-green algae produce nerve or liver toxins. Toxicity is difficult to predict because a single species of algae can produce both toxic and non-toxic strains. Additionally, a bloom that tests non-toxic one day can turn toxic the next day. People may become ill after coming into contact with lake waters that are impacted with toxic blue-green algae. Humans may experience stomach pains,

vomiting, diarrhea, and skin rashes; and nerve and liver damage have been observed following long-term exposure (such as drinking impacted water). Although pets and wildlife have died after exposure to toxic blue-green algae in Washington lakes, there have been no confirmed human deaths reported worldwide (Ecology, 2014).

There were no reports of blue green algae on North Lake for 2022.

6.0 WATER QUALITY MONITORING

The King County Lake Stewardship Volunteer Monitoring Program for North Lake began in the 1980s and continued for several decades until budget cuts ended the program in 2005. Although the most recent data generated by this program (nine years prior to the date of this report) indicated that North Lake had been relatively low in primary productivity (borderline oligotrophic to mesotrophic) with very good water quality, a significant data gap exists between then and now.

The long-term objectives of the current North Lake Management District Water Quality Monitoring Program include: (1) continuation of the gathering of baseline data with the intent of assessing long-term trends; (2) defining seasonal and water column variability; (3) identifying potential problems, proposing possible management solutions when feasible, or pinpointing additional studies to be made; and, (4) educating lake residents, lake users, and policy makers regarding lake water quality.

Monitoring begins in early May. Samples were collected from the surface and near-bottom depths from the deepest part of the lake to define changes found in the vertical profiles of the parameters. A total of six monitoring events took place over the summer months (May – October). North Lake Monitoring report for 2022 can be found in Appendix C. Historical data can be found at: <http://green2.kingcounty.gov/SmallLakes/WQData.aspx>.

7.0 PUBLIC INVOLVEMENT AND PUBLIC EDUCATION

Public involvement and public education for North Lake incorporates elements and concepts presented in the 2004 Integrated Vegetation Management Plan (IAVMP). Using the IAVMP, the annual Work Plan strives to improve lake health through the promotion of lake stewardship and through the implementation of educational programs designed to help lake residents and lake users detect and prevent the spread of noxious aquatic plant species.

In 2019, North Lake began its participation with the Lake Observations by Citizen Scientist & Satellites (LOCSS) program funded by NASA with support from UNC, UW, and TTU. Lake level data submitted by citizen scientists is combined with lake surface area data from NASA satellites to determine how lake volumes evolve and respond to weather events overtime. On the week of June 10th, 2019, the lake level monitoring gauge was installed at Advisory Committee member Darron Nash’s dock because the dock is fixed and in a deeper area of the lake.

7.1 Public Involvement

The North Lake Public Involvement program for 2022 included the following:

7.1.1 North Lake Advisory Committee (NLAC)

The NLAC is charged with setting lake management priorities and providing input on the implementation of the annual Work Plan. Resolution No. 09-560, passed by the City Council in 2009, created the Advisory Committee for North Lake LMD Number 2. The duration for initial formation of North Lake LMD Number 2 was 10 years which expired 2019. As such, Ordinance No. 19-876, passed on by City Council on October 1, 2019, effective on November 3, 2019, the North Lake LMD Number 2 was renewed until December 31, 2029. The purpose of the NLAC is to provide lakefront property owner representation for the LMD. Resolution No. 20-778 regarding the creation of an Advisory Committee for the North Lake Management District Number 2 and establishing the duties thereof was passed by City Council on January 7, 2020.

Per Resolution No. 20-778, NLAC representation consists of:

- Five (5) individuals representing single family and/or vacant properties; one (1) representing Washington Department of Fish and Wildlife (public boat launch property); and one (1) representing IRG, who purchased the former Weyerhaeuser property.

Currently, the term for property owners is two years except for members representing Washington Department of Fish and Wildlife and two members representing single family properties have a term of three years. The 2022 NLAC members were:

Member	Representing
Terry Thomas	Committee Chair, Lake Resident
Larry Flesher	Lake Resident
Mary McClellan-Aronen	Lake Resident
Darron Nash	Lake Resident
Larry Zimnisky	Lake Resident
Josh Holmes	IRG
David Heimer	Washington Department of Fish & Wildlife

The following outline includes, but is not limited to, the responsibilities and duties of the NLAC:

- Assists in the development of an annual lake management Work Plan and budget;
- Participates in evaluation of aquatic plant control activities and helps to recommend annual control strategies; and,
- Participates in other community involvement/education strategies efforts as needed.

The NLAC met five times in 2022. Full detailed meeting notes and members who attended the meetings can be found in Appendix D.

7.1.2 Development of 2022 Work Plan

The goals and budget regarding the 2022 Work Plan are based upon Resolution Number 20-758 that reformed North Lake Management District Number 2. The following is a brief outline of the 2022 Work Plan approved by the NLAC:

Task 1: Aquatic Vegetation Control and Treatment: Identifies and describes the goals for effectively controlling and/or treating targeted noxious aquatic plant species. It also includes an estimate of all associated expenses necessary to accomplish the stated goals.

Task 2: Public Education: Describes public involvement and public education elements designed to help inform lake residents and users about the impacts of noxious aquatic weeds and the presence of non-native species in North Lake. Items in Task 2 may include: community meetings and Plant ID Workshop, quarterly newsletter (*The Lake View*), boater outreach program, printing and distribution of educational flyers and press releases, web site development, and development of an annual report.

Task 3: Hazardous Algae Bloom Management: Includes Harmful Algae Blooms (HAB) inspections and investigations conducted by ES staff.

Task 4: Water Quality Monitoring: Describes the water quality sampling plan designed to measure and track the health of North Lake.

Task 5: Canada Geese Management: Program to effectively manage Canada geese populations to reduce nutrient loading and public health risk.

Task 6: ES-Implemented 2020 LMD Efforts: Involves time invested by ES personnel.

A complete Work Plan/Budget for 2022 can be found in Appendix D.

8.0 2022 NORTH LAKE MANAGEMENT DISTRICT YEAR END FINANCIALS

North LMD Expenditure Totals by Task (2021 – 2022)

Work Plan Goals/Scope	2021 Actual Expenditures (includes taxes)	2022 Budget (includes taxes)	2022 Actual Expenditures (includes taxes)
TASK 1. Aquatic Vegetation Control/Treatment	\$4,766.43	\$6,500.00	\$8,769.20
TASK 2. Public Education	\$0.00	\$500.00	\$0.00
TASK 3. Hazardous Algae Bloom Management	(Included in task 7 if applicable)	\$500.00	(Included in task 7 if applicable)
TASK 4. Water Quality Monitoring	\$3490.50	\$3,000.00	\$3,611.25
TASK 5. Canada Geese Management	\$ 0.00	\$2,500.00	\$ 0.00
TASK 6. ES-Implemented LMD Efforts	\$2,394.78	\$5,000.00	\$981.99
TOTAL EXPENSES	\$10,651.71	\$16,000.00	\$13,362.44
TOTAL REVENUES	\$14,131.38	\$15,300.00	\$15,376.78
YEAR-END CARRYOVER BALANCE	\$3,551.58	\$6,660.33	\$7,272.08

North Lake Aquatic Plant Survey 2022

Introduction

The North Lake LMD was formed some years ago to facilitate noxious and nuisance aquatic plant management. At the start of the program, the shoreline was dominated by invasive emergent vegetation, primarily Purple Loosestrife and Yellow Flag Iris. There was also Eurasian Milfoil present in the lake at noxious levels.

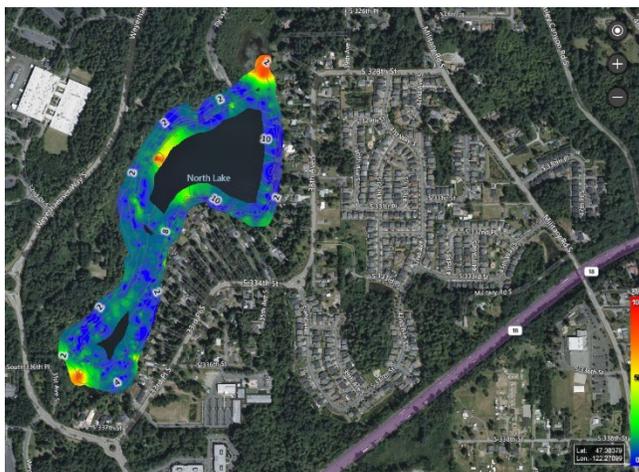
Treatment work throughout the life of the LMD have largely suppressed the noxious aquatic weed growth. Other species have started to fill in the littoral space and can be considered a nuisance to lake residents.

Survey

The survey of the lake was performed Wednesday July 6th. The littoral areas of the lake were surveyed with a combination of hydro-acoustic aquatic plant mapping and DGPS data logger and visual observation mapping. We also talked with University of Washington Fisheries Biologists who were also doing survey on the lake. In the past two years, our trucks have been vandalized while doing this survey work, this year no problems noted.

Results

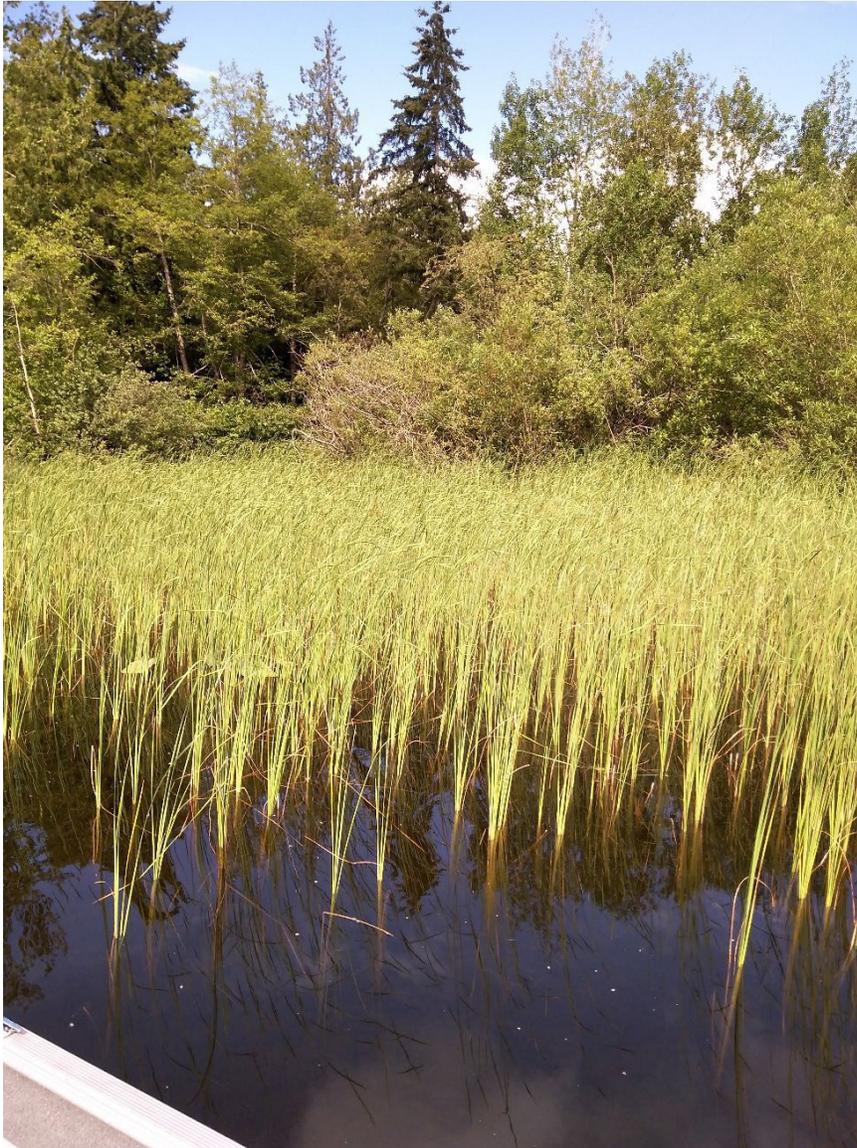
The littoral area of the lake was largely dominated by White Stem Pondweed, this plant was growing in depths of 4 to 15 feet. Elodea, Najas and American Pondweed species were present in shallower waters.



The HEAT map shows the relative levels of submerged aquatic vegetation present in the lake at the point of survey July 6th. The vegetation at this point was not largely problematic with a few exceptions that will be noted below. Green areas show locations where submerged aquatic vegetation fills the bottom third of the water column.

North Lake Aquatic Plant Survey 2022

Invasive Cattails are present in two locations on the lake. Narrow Leaf Cattail are on the Washington State Noxious Weed List ([Washington State Noxious Weed Control Board](#)). There is a well developed and expanding stand of these plants located adjacent to the Washington Department of Fish and Wildlife boat ramp. These could be targeted with Rodeo herbicide and contained. There are also two smaller patches on the east shoreline.



Purple loosestrife and Yellow Flag iris are two additional noxious aquatic weeds that in the past have been problematic on North Lake. These populations have been significantly reduced in the past few years via efforts by the LMD and our treatment programs.

We observed two Yellow Flag Iris plants as mapped on the eastern shoreline. These plants at this point are not problematic and are growing on a shoreline and part of the lawn of that home. It is probable that permission should be obtained prior to treating these. They could easily be removed by hand also.

North Lake Aquatic Plant Survey 2022

We observed one Purple Loosestrife plant on the eastern shoreline. It is probable that additional plants are present on the West and North shoreline areas that have not flowered and are not visible. These are often well back onto the shoreline and behind other vegetation.

White Water Lilies are also on the State Noxious Weed list. The population of this species have been largely reduced in the lake. There were a few very small patches noted and shown on the map. Targeting these during the treatment program could further reduce their presence on the lake. There are also healthy stands of the native water lily present, but they are not impacting the shorelines and should be preserved as habitat.

The developed shoreline areas in the past have been treated for Elodea and Naiad species. At the time of this survey there was very little of that growth present in the lake. American Pondweed however has started to form localized dense clumps of growth. Some members of the community have expressed a need to treat those plants.



Recommendations

The map attached shows the location of aquatic plant communities present and a proposed treatment program for consideration.

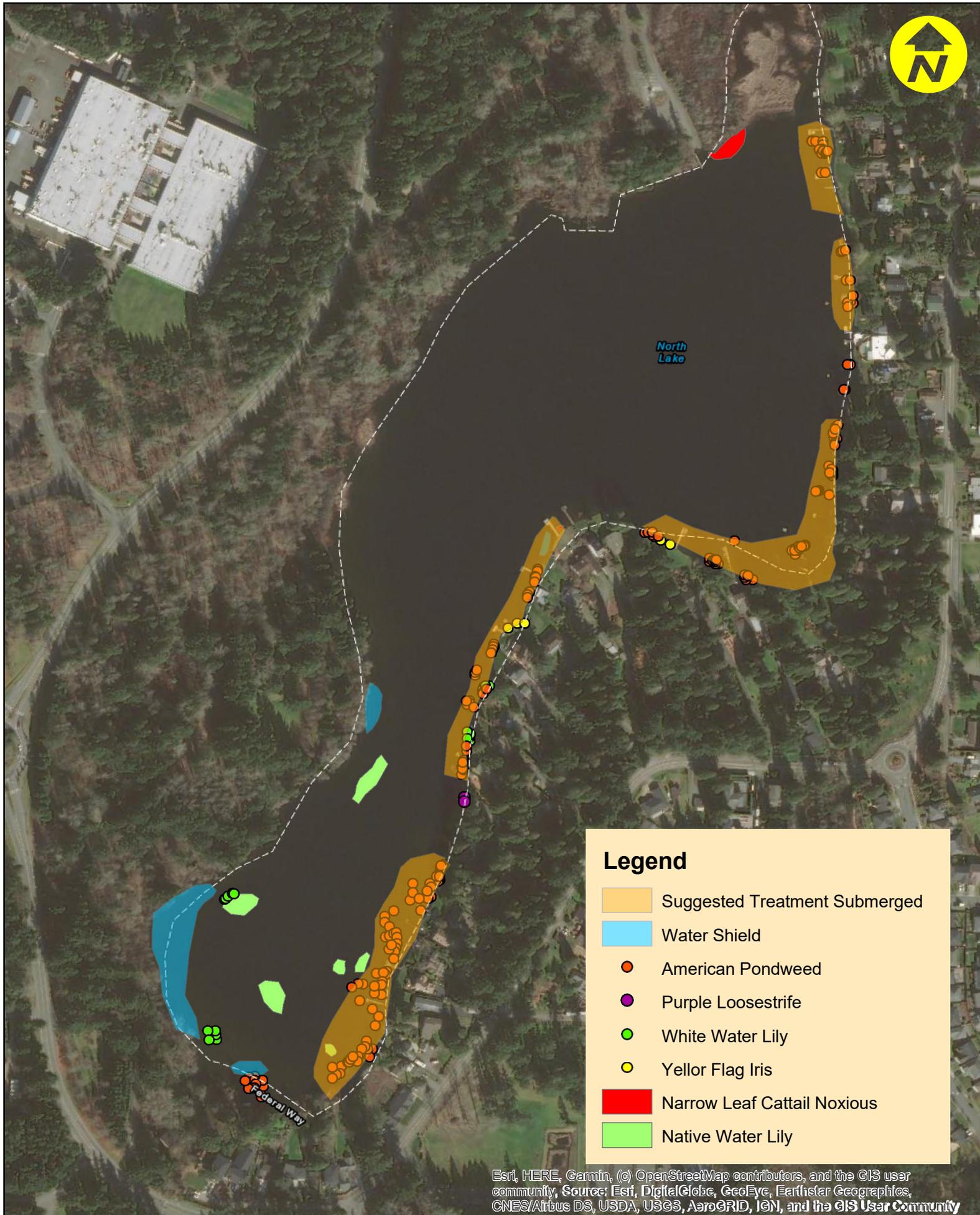
The Narrow Leaf Cattails at the boat ramp should be targeted, they have been aggressively expanding into the lake over the past few years. There is approximately a half acre that should be treated at this location and mapped in red. We would utilize Glyphosate and at rates outlined in our contract.

The American Pondweed areas that are dense are also shown on the attached map. The Steering committee should consider if there is a need for treatment of these plants. If so, there are six acres mapped that would benefit from treatment. American Pondweed would be treated with Aquathol K herbicide. The cost per acre for treatment is \$700.00 plus \$500.00 for Mobilization and the posting and mailing fees outlined in our contract.

The two Yellow Flag Iris plants we observed are on the edge of a lawn and treating them could result in some impact to the turf grass, we would suggest that the owner pulls these.

North Lake Aquatic Plant Survey 2022

We normally do the Purple Loosestrife work after the King County team performs their survey. In addition, in previous years the Washington Department of Fish and Wildlife staff have requested that the large wetland on the north end of the lake be treated for Loosestrife. We target the vegetation on the shoreline and that can be reached by boat. In the past the LMD has not wanted to pay the hourly rate for walking through the extensive wetland area there that is not lakeshore.



Legend

-  Suggested Treatment Submerged
-  Water Shield
-  American Pondweed
-  Purple Loosestrife
-  White Water Lily
-  Yellow Flag Iris
-  Narrow Leaf Cattail Noxious
-  Native Water Lily

Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

North Lake 2022 Recommendations

APPENDIX B



PESTICIDE APPLICATION RECORD (Version 1)

Washington State Department of Agriculture
Pesticide Management Division
PO Box 42560
Olympia WA 98504-2560
(877) 301-4555

NOTE: This form must be completed same day as the application and it must be retained for 7 years (Ref. chapter 17.21 RCW)

1. Date of Application - Year: 2022 Month: August Day: 1st Start Time: 8:30
Stop Time: 12:45

2. Name of person for whom the pesticide was applied: Emile Ancelet
Firm Name (if applicable): City of Federal Way
Street Address: 33325 8th Ave. South City: Federal Way State: WA Zip: 98119

3. Licensed Applicator's Name (if different from #2 above): Terry McNabb License No.: 7973
Firm Name (if applicable): AquaTechnex Tel No.: 360-330-0152
Street Address: P.O. Box 118 City: Centralia State: WA Zip: 98531

4. Name of person(s) who applied the pesticide (if different from #3 above): Braden O'Neil
License No(s). If applicable: 87689

5. Application Crop or Site: North Lake (Aquatic Weeds)

6. Total Area Treated (acre, sq. ft., etc.): 5.64 Acres

7. Was this application made as a result of a WSDA Permit? No Yes (If yes, give Permit No.) # _____

8. Pesticide Information (please list all information for each pesticide, including adjuvants (buffer, surfactant, etc.), in the tank mix):

a) Full Product Name	b) EPA Reg. No.	c) Total Amount of Pesticide Applied in Area Treated	d) Pesticide Applied/Acre (or other measure)	e) Concentration Applied
Littora	67690-53	11.28 gal	2 gal / Acre	
Aquathol K	70506-176	16.92 gal	3 gal / Acre	
Clearcast	241-437-67690	.15 gal	/	2%
Agri-Dex	5905-50094	.075 gal	/	1%
			/	

9. Address **or exact location** of application. NOTE: If the application is made to one acre or more of agricultural land, the field location must be shown on the map on page two of this form.

10. Wind direction and estimated velocity (mph) during the application: 0-7 mph WSW

11. Temperature during the application: 63-73 degrees

12. Apparatus license plate number (if applicable): _____

13. Air Ground Chemigation

14. Miscellaneous Information:

North Lake Monitoring 2022

North Lake Management District

Kevin Du

2/14/2023

Temperature 2014-2022

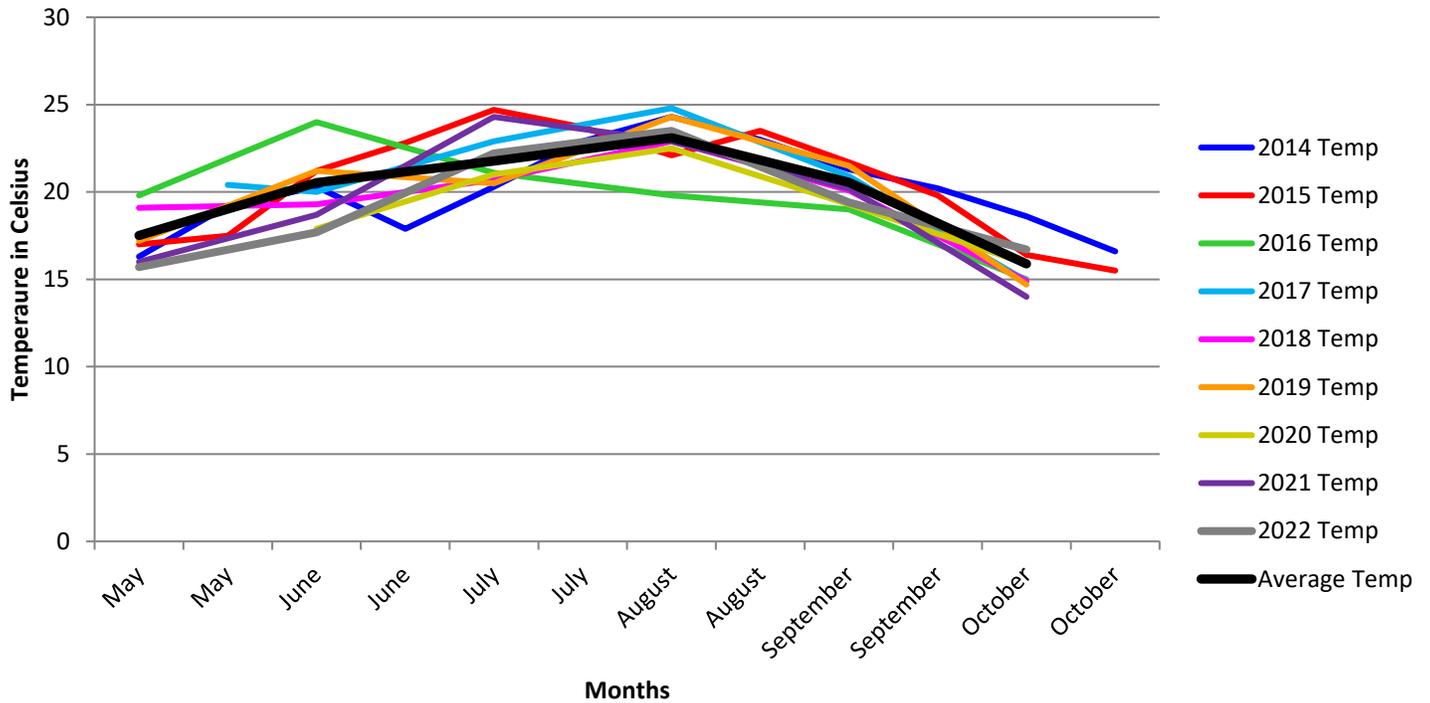


Figure 1: Surface temperatures are fairly stable. No significant differences between average temperature and individual years. Temperature criteria is 18°C due to presence of rainbow trout in the lake, however temperature measurements used in the graph is only surface temperature and is not representative of the rainbow trout's habitat in the water column. For 2022, temperatures were within expected range.

Secchi Disk 2014-2022

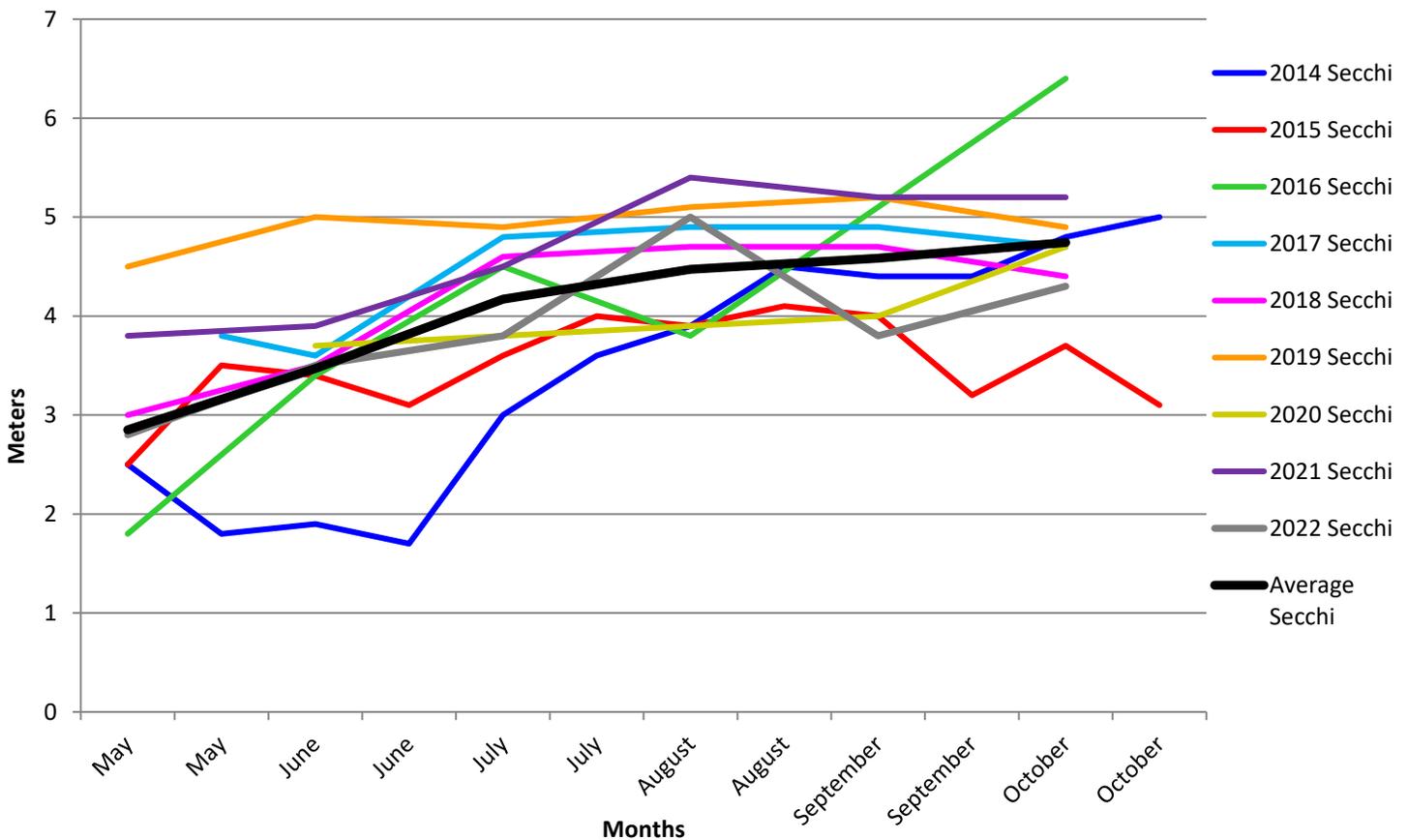


Figure 2: Clarity of North Lake varied during beginning of summer and stabilizes towards fall. Clarity generally increases towards end of summer/beginning of fall. Clarity of the lake for 2021 was high and was above the average for the whole year. In 2022, clarity of the lake was slightly lower overall compared to 2021.

Total Nitrogen 2014-2022

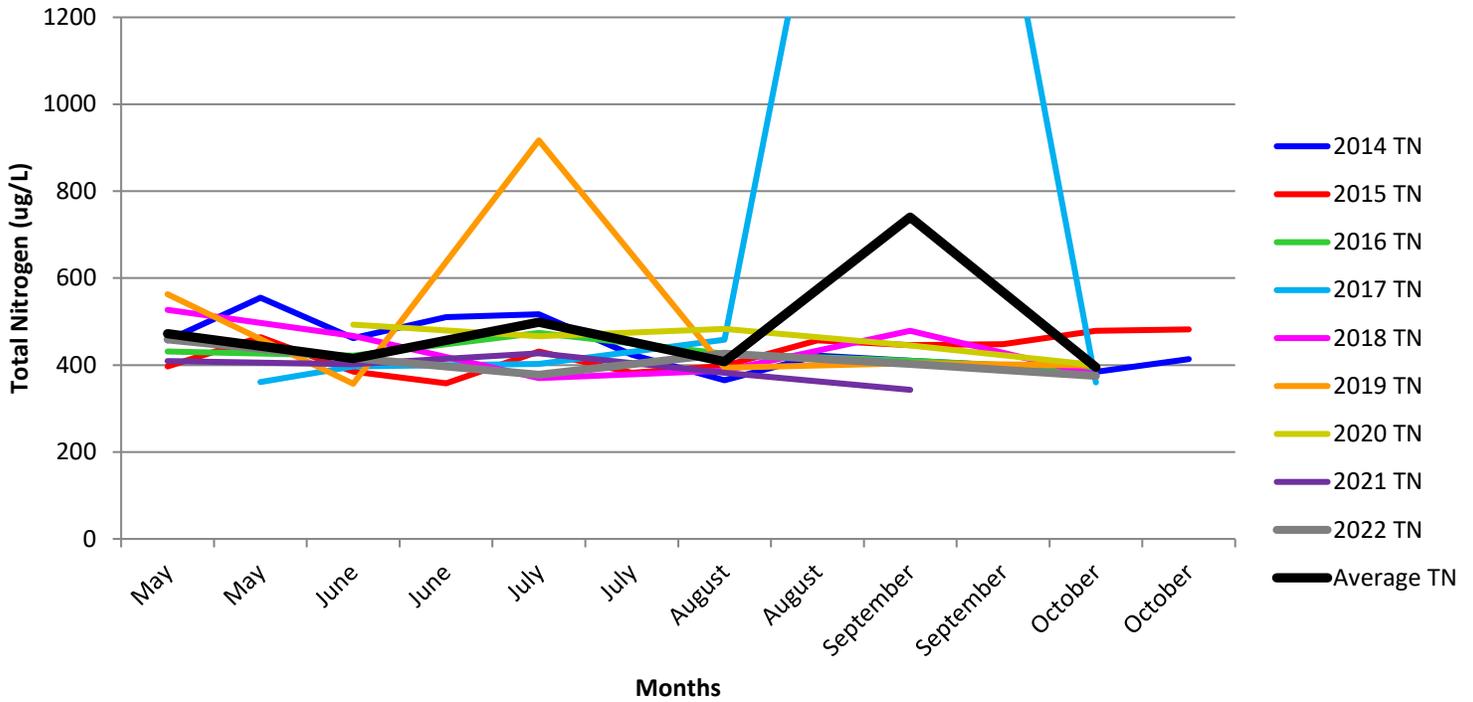


Figure 3: No criteria for total nitrogen. Generally, the lower the value the better. Total nitrogen levels are relatively stable except for a couple spikes during 2017 and 2019 which correlate with spike of total phosphorous seen below. 2022 total nitrogen stayed around 400 ug/L as expected.

Total Phosphorus 2014-2022

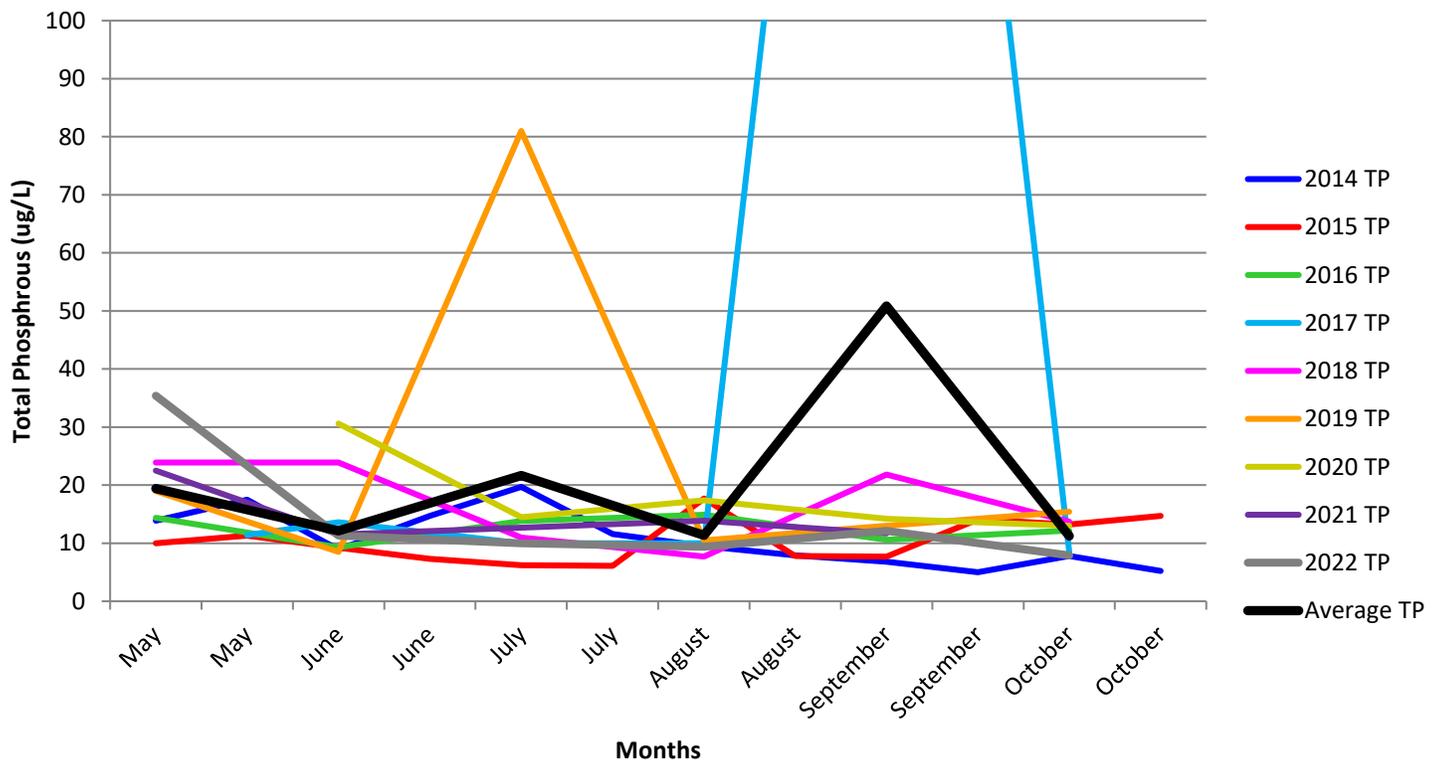


Figure 4: North Lake is within the Puget Lowlands ecoregion therefore its recommends to take action to study the lake if concentrations are greater than 20 ug/L. Majority of the data points are below the 20 ug/L action value, except for a few instances during 2017, 2018, 2019, and 2020. If outliers are removed the average trend line would be below the 20 ug/L. In 2022 concentrations are as expected with highest concentration in the first month or two and then starts to trend down.

Fecal Coliform 2015-2022

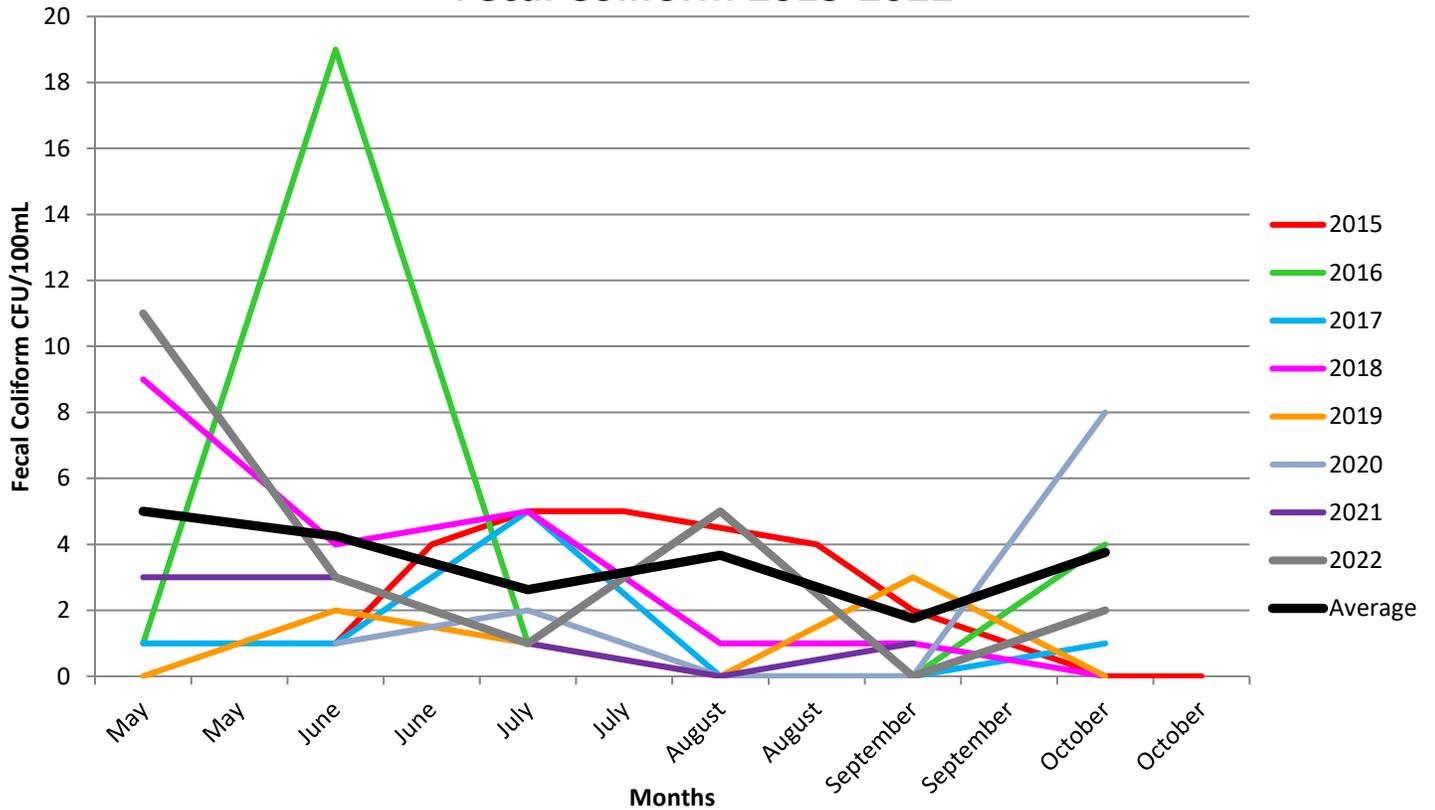


Figure 5: Criteria is 100 CFU/100mL and results are not close to reaching the 100 CFU/100mL threshold. 2022 measurements were higher in May than usual, but still well below the criteria.

Dissolved Oxygen by Depth 2022

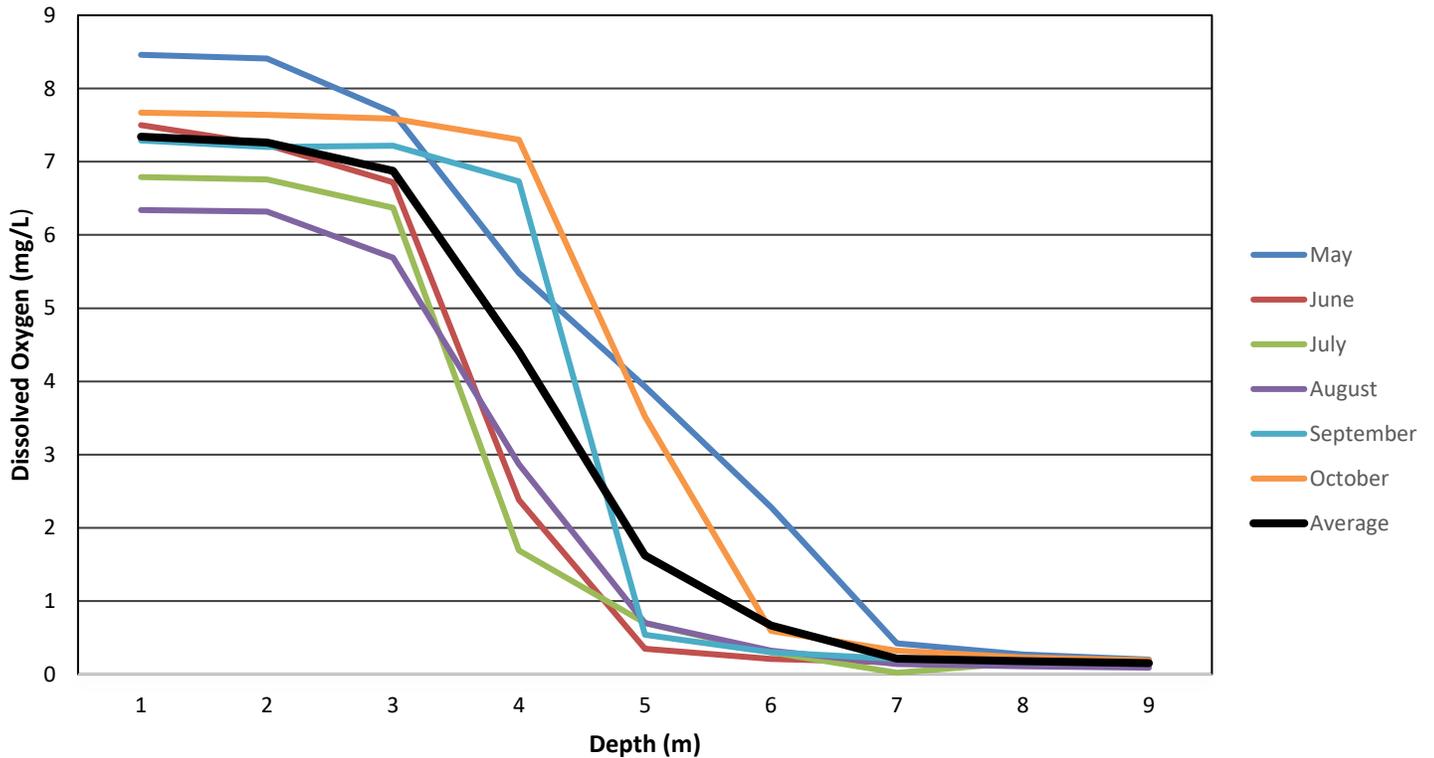


Figure 6: The concentration of dissolved oxygen drops significantly around the 4-meter mark. The criteria of dissolved oxygen for Redband trout a subspecies of rainbow trout lakes is 8 mg/L. Generally, the higher the dissolved oxygen the better. All DO measurements for North Lake 2019, 2020, 2021 were below the 8 mg/L concentration. For 2022 it is fairly similar to last years DO measurement.

Trophic State Index w/ Chlorophyll 2014-2022

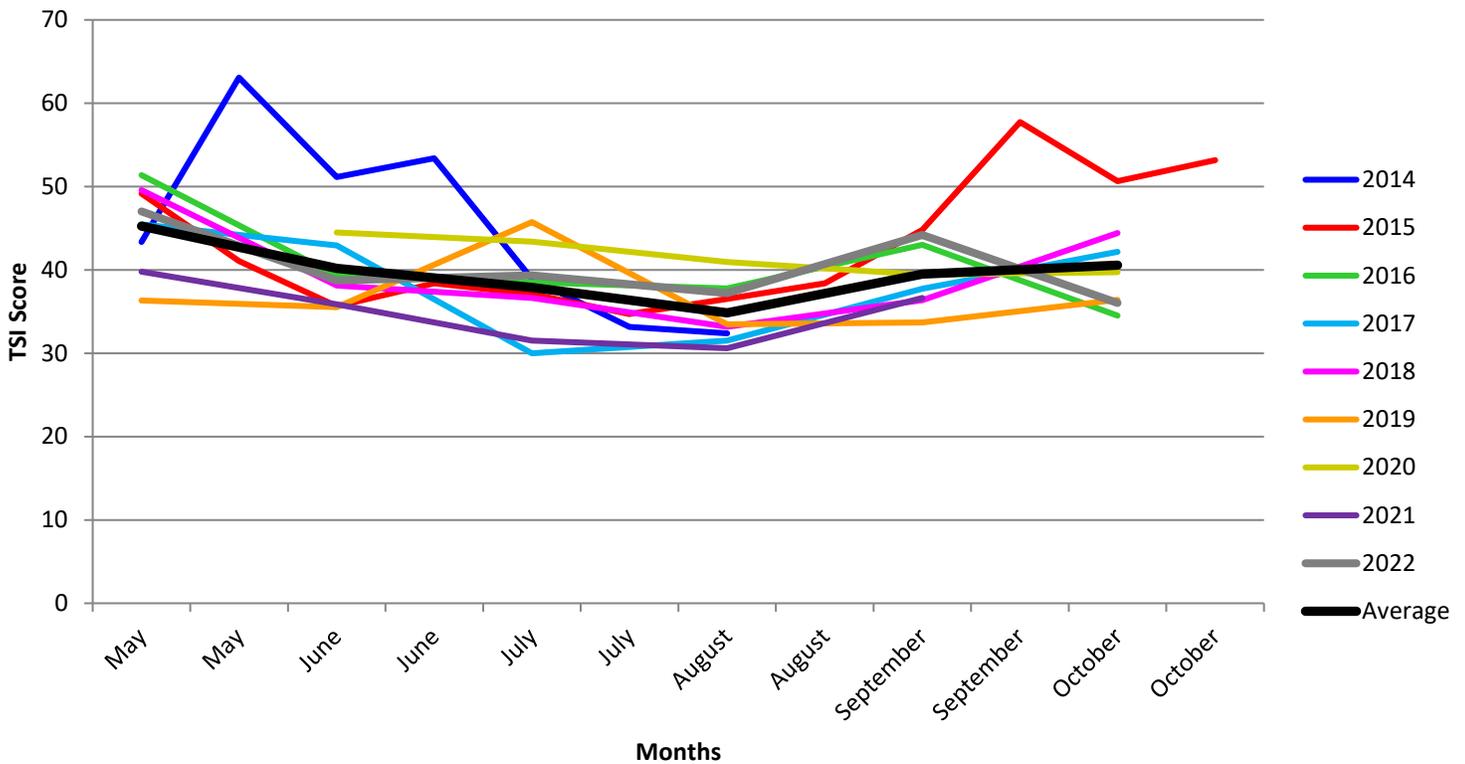


Figure 7: TSI based on Chlorophyll-a abundance. Chlorophyll-a is the most accurate representation of TSI score for the summer as noted by Carlson the developer of TSI value system. Average TSI score ranges between 35-58 which is considered to be mesotrophic/eutrophic. The 2022 TSI score ranges between 36-47 which is considered to be between oligotrophic and mesotrophic. Slightly higher range compared to 2021 TSI of 30-39.

Trophic State Index w/ Total Phosphorus 2014-2022

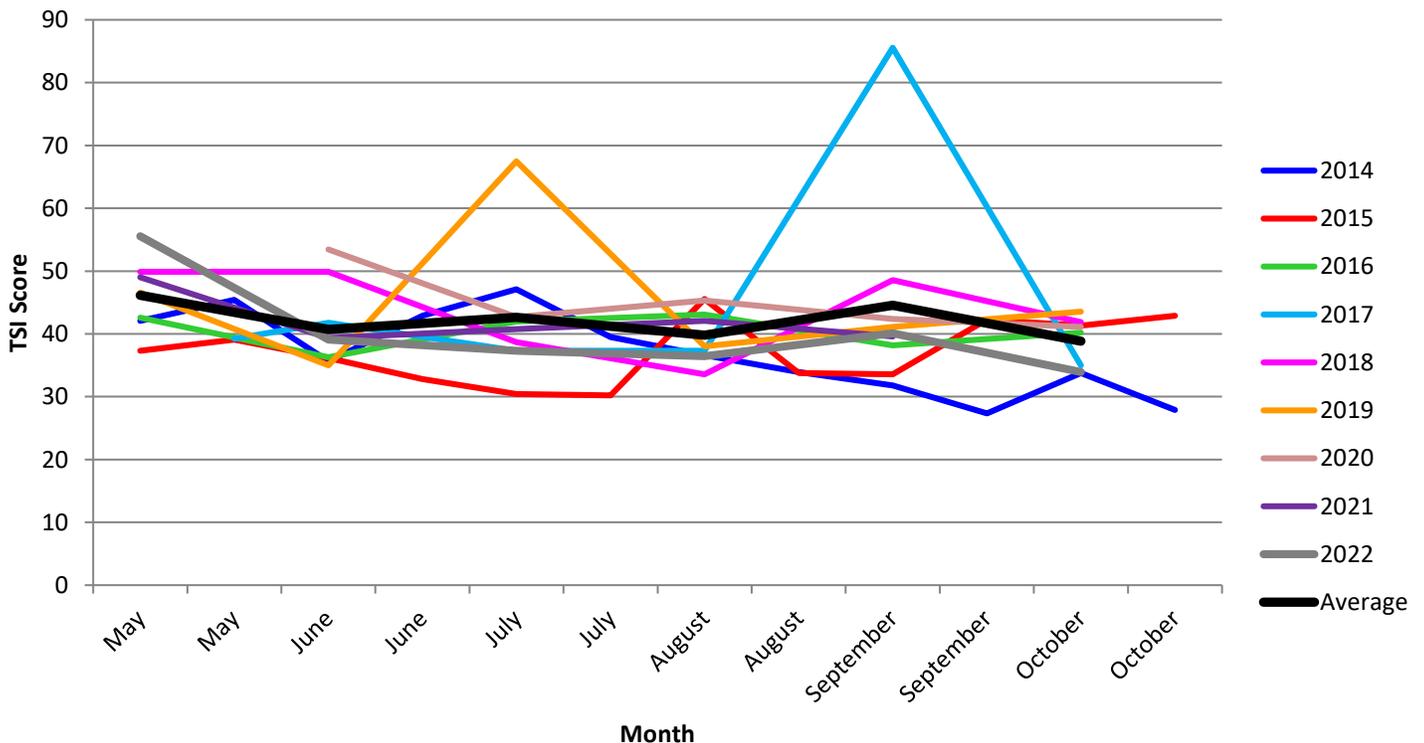


Figure 8: TSI based on total phosphorus. Average score ranges from 34-48 which means the lake is mesotrophic. 2022 TSI value ranged from 34-55 which indicates the lake is mesotrophic/eutrophic based on its total phosphorus concentration and is similar to last year.

Trophic State Index w/ Secchi Disk 2014-2022

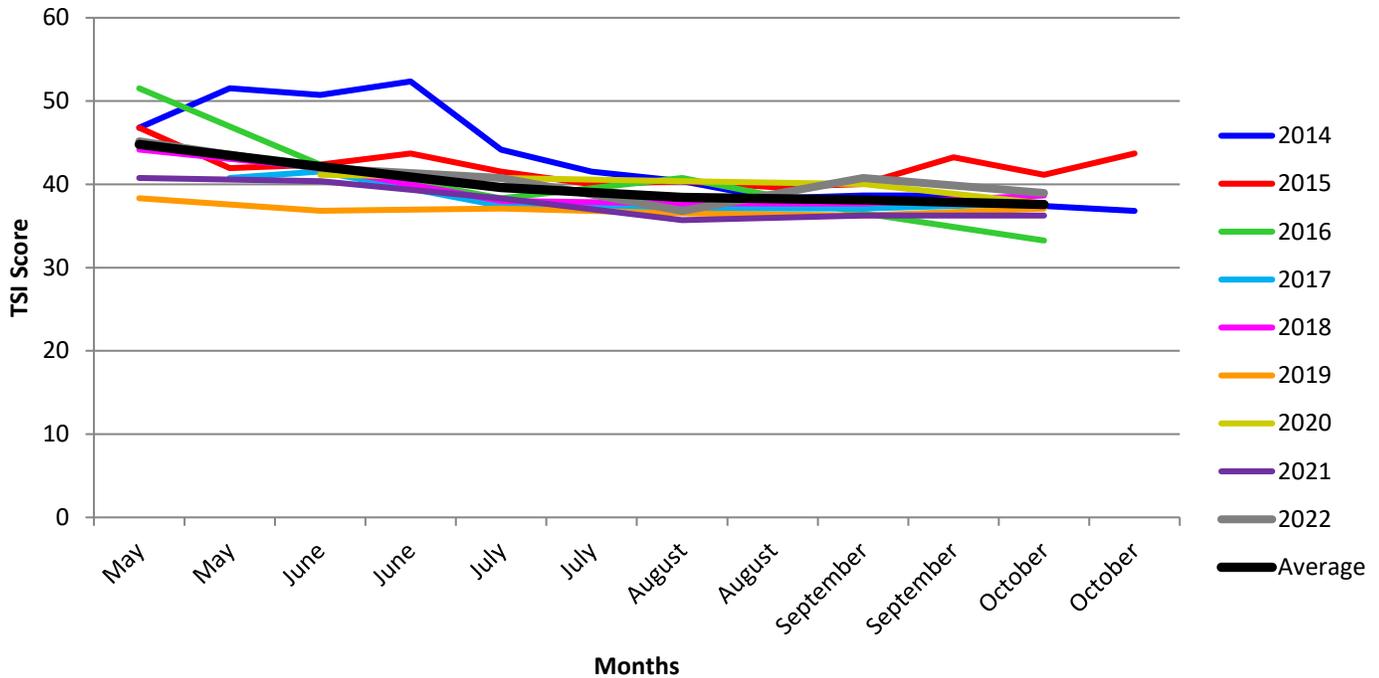


Figure 9: TSI based on secchi disk. Average TSI score ranges from 38-48 which means the lake is mesotrophic. 2022 TSI score ranged from 37-45 which means the lake is in between oligotrophic and mesotrophic and is roughly the same as last year.

TSI Table (Carlson, 1977)			
TSI Value	Attributes	Water Supply	Add fishing
<30	Oligotrophy: Clear water, oxygen throughout the year in the hypolimnion.	Water may be suitable for an unfiltered water supply.	Salmonid fisheries dominate.
30-40	Hypolimnia of shallower lakes may become anoxic.		Salmonid fisheries in deep lakes only.
40-50	Mesotrophy: Water moderately clear; increasing probability of hypolimnetic anoxia during summer.	Iron, manganese, taste, and odor problems worsen. Raw water turbidity requires filtration.	Hypolimnetic anoxia results in loss of salmonids. Walleye may predominate
50-60	Eutrophy: Anoxic hypolimnia, macrophyte problems possible.		Warm-water fisheries only. Bass may dominate.
60-70	Blue-green algae dominate, algal scums and macrophyte problems.	Episodes of severe taste and odor problem.	Nuisance macrophytes, algal scum and transparency may discourage swimming and boating.
70-80	Hypereutrophy: (light limited productivity). Dense algae and macrophytes.		
>80	Algal scums, few macrophytes.		Rough fish dominate; summer fish kills possible.

APPENDIX D

North Lake Management District
2023 Work Plan

Work Plan Goals/Scope	2021 Actual Expenditures (inc. taxes)	2022 Actual Expenditures (inc. taxes)	2023 Est. Expenditures (inc. taxes)
TASK 1. Aquatic Vegetation Control/Treatment	\$4766.43	\$8,769.20	\$9,000.00*
TASK 2. Public Education	\$0.00	\$0.00	\$250.00
TASK 3. Hazardous Algae Bloom Mgmt.	<i>(Included in task 7 if applicable)</i>	<i>(Included in task 7 if applicable)</i>	\$500.00
TASK 4. Water Quality Monitoring	\$3490.50	\$3,611.25	\$3,800.00
TASK 5. Geese Mgmt.	\$0.00	\$0.00	\$2600.00
TASK 6. City Staff LMD Efforts	\$2,394.78	\$981.99	\$1,300.00
TOTAL EXPENSES	\$10,651.71	\$13,362.44	\$17,450.00
TOTAL REVENUES	\$14,131.38	\$15,376.78	~\$16,678.33**
CARRYOVER FROM PREVIOUS YEAR	\$3,551.58	\$5,257.74	\$7,272.08

Expected Assessment Collection 2022	\$16,678.33 (Expected)	\$ 15,376.78 (Actual)
Carryover Balance ((C+R)-E)	2021 to 2022: \$5257.74	2022 to 2023: \$7,272.08
Estimated 2023 Budget (C+R)***	Expected 2023 Assessment: \$18,079.34	Expected Budget: ~\$25,351.42

* Treatment estimated assuming 2 surveys, 1 treatment, and annual permit fee of ~\$700.

** Should be slightly more if delinquents from 2022 pay their assessments.

*** Estimated by the sum of expected assessment collection plus carryover from 2022.

APPENDIX E

North Lake Advisory Committee

March 18, 2022 Minutes

Committee Attendance: Terry Thomas (Chair), Larry Fletcher, David Heimer (Sir Walken), and Darron Nash

Staff Attendance: Emile Ancelet

Call Meeting to Order

Meeting was called to order by Terry Thomas on March 18th, 2022 at 2:15.

2021 Year-End Financials & 2021 Assessment Billing:

- All line items look good and are staying on task.
- We surveyed and sprayed last year.
- We haven't been doing much education since Covid.
 - Do we want to start on education for 2022?
- Lake was measured for algae in 2021.
- No geese management needed in 2021.
- We have everything ready with Fish and Wildlife for geese management if needed.
- No need for geese round up unless you have 30 or more geese on the lake.
- North Lake Advisory Committee would vote whether to do geese management. Then, Fish and Wildlife comes out to the lake and surveys to see if it is necessary.
- After year end, the budget has 8K.

Review and Approve 2022 Work Plan:

- Everyone agreed and the motion passed to move \$2K from Geese Management to Aquatic Vegetation Control / Treatment.

Geese Management

- Most of the nests are not located on the lake as they arrive later. It was agreed not to addle the eggs this year and this will save money this year.
- Mid June/July is the time frame to do a geese round up, but it sounds like there is not enough geese to do this in 2022.

Water Quality Monitoring & Aqua Technex Updates

- Everything remains the same with a few minor items slightly out of range, but not of concern.
- May need vegetation control if this is a hot year. If we need this service, Aquatech is ready to go.

Review of 2020 Spray Report – David Heimer, CDFW

- It does take permission before your weeds will be treated
- Mainly spray the noxious weeds.

Questions / Misc.

- Question: With the record rainfall we had, how much did the lake raise?
 - Lake rose approximately a couple inches (40 mm higher) than the measuring device.
 - The lake is still high.
- Road modification (road by the tech center – widen to the East). If this happens, this would encroach by 9 to 10 ft on the lake side. Should widen the road towards the Tech Center and not the lake side.
- LMD as a board will start drafting a letter on March 19th at 1:00 pm at the Club House to work on providing a letter to the City with our concerns:
 - If you remove a source of water from the lake, what affect will that have on the lake height?
 - If you remove the aquafur, what will the affect have on the filtration of water that gets to the lake?
- Note: If you write a letter to LUTC or City Council, it may not be read out loud at the City of Federal Way meetings due to the amount of time it takes to read all the letters. The letters will still be reviewed and considered. You are encouraged to show up in person.

Action Items:

- Emile will be creating an annual report and it will be shared at the next mtg.
- Emile can put together an Newsletter and include a list of phone numbers to contact. In the newsletter lets describe what the charter is all about and what they can do and can't do. Our job concering water quality. Also, Include a list of phone numbers for updated contacts.

Next meeting will be June 13th, 3:30 to 5:00

Meeting was adjourned at 3:45pm.

North Lake Advisory Committee

June 13, 2022 Minutes

Committee Attendance: Terry Thomas (Chair), Larry Fletcher - zoom, David Heimer (Sir Walken) zoom, and Darron Nash

Staff Attendance: Emile Ancelet, Dan Stankopf, and Shelley Springer

Call Meeting to Order

Meeting was called to order by Terry Thomas on June 13th at 3:34 pm.

2021 Annual Report Review

- Annual report was reviewed. Emile will email the report after the meeting (draft copy) to be reviewed at the next meeting.

Aquatic Vegetation Survey:

- We need to vote if you want the survey completed this year for North Lake?
- Temperatures have been low this year, so the vegetation growth has been reduced. Should we pass on the Aquatic Vegetation survey this year?
- QUESTION: Can we spray the lake without having a survey?
 - MUST do a survey before they will spray for the weeds.
- Watershield lilies are the only concern currently on the lake now.
- Naiad (native weed) will break the surface soon. Pond weeds are already above the surface in some places.
- If we only have Aquatechnics treat the small lilies that are expanding, can it be at a realistic price?
- MOTION to vote for having the survey completed this year.
 - Terry motioned, Darron 2nd it and everyone agreed.
 - Survey will include a complete walk around the cove.
 - Survey crew must get out of the boat. Water is so high, you can get back there easily now to complete this area.

Summer Water Quality Monitoring Update

- Darron has done one sampling this year as the water is clearing up quickly. The water is high this year. Sampling is done one a month in the summer and it will be next week. Results will be back at the next meeting.

Health & Preservation of North Lake Watershed

- Concerns will be identified and reported to Code Enforcement.
- Emile volunteered to follow-up with Code Enforcement.

Questions / Misc. / Adjourn

- Can we have a follow-up on the letters we turned into the City regarding the opposition to expanding the roadway.
- We have to get contact phone numbers for who to call regarding the different areas/incidents.
- Emile will share the Newsletter after this meeting and it will have phone numbers included.
- If you see any dead geese, do not touch it. Call Fish and Wildlife as it may have Avian Flu and will need to be tested.

Next meeting will be _____

Meeting was adjourned at 4:15 pm.

North Lake Advisory Committee

3rd Quarter Minutes

August 30, 2022

4:00 to 5:30 pm

Federal Way City Hall ~ Hylebos Room

Committee Attendance: Terry Thomas (Chair), Mary McClellan-Aronen, Larry Fletcher, David Heimer (Sir Walken), Josh Holmes, and Darron Nash.

COFW Staff Attendance: Emile Ancelet and Shelley Springer

Call Meeting to Order

Meeting was called to order by Terry Thomas, Chairman on August 30, 2022 at 4:04 pm.

Aquatic Vegetation Survey Update / Spray Report:

- Emile shared the North Lake spray report. Spray was a little over 5.64 of the surface of the lake.
- Questions:
 - Was the cove treated outside of the boat? It is clear where the lake was treated and where it was not.
 - Were the native plants treated? It seems like the native plants have been dying. The native plants were impacted including the big lilies this year. The big lilies are all laying down.
- Whatever they treated must of drifted to other areas. Lake appears barron and the navite weeds are not around. Last 2 to 3 years the vegetation is all down.
- The globs of algae are big and everywhere on the lake.
- Ashley from KC will be going out to inspect the lake after spraying. We need the pros out there to take a look.
- Steel Lake has chosen not to do any spraying. Someone may want to volunteer to take a look at this lake and Darron volunteered.

Summer Water Quality Monitoring Update:

- Water samples are happening approximately 5 times per year.
- This process takes about 30 minutes and the samples are taken in the same spots.
- Oxygen percentage and saturation are completed at that time. Below 20 ft there is little oxygen in the lake.
- Samples are taken to the lab in Tacoma (possibly King County). Need to verify which lab.

Geese Management:

- No resident geese seem to be staying this year and this is not an issue this year.
- Contract will be renewed again this year for next year IF needed.

Status of LMD Assessments, Collections, and Delinquents / Current Financials:

- \$2,473 in delinquent assessments.
- Aqua Technics have invoice(s) for \$3450.
- Aqua Technics have not invoiced for the treatment. The total cost will be roughly \$8,500.00.
- Goal is to have Aqua Technics do the survey the second week of May.
- Emile will share the delinquent accounts by email.

Questions / Misc. / Adjourn

- Josh Homes has been here since February of last year.
- We can do our meetings for 2023 the first week of February, May, August, November (the 1st Wednesday of each month).

Next quarterly meeting TBD

Meeting was adjourned at 4:42 pm

North Lake Advisory Committee

Special Meeting Minutes

July 22, 2022

10:00 to 10:30 am

Federal Way City Hall ~ Hylebos Room and Zoom Virtual Conference Call

Committee Attendance: Terry Thomas (Chair), Mary McClellen-Aronen, Larry Fletcher, David Heimer (Sir Walken), Josh Holmes, and Darron Nash. **COFW Staff Attendance:** Emile Ancelet.

Call Meeting to Order

This is a special meeting to accept the North Lake Aquatic Plant Survey and vote on the 2022 treatment plan. Meeting was called to order by Terry Thomas on July 22, 2022 at 10:05 am.

Aquatic Vegetation Survey Update:

- Terry Thomas motioned to accept the survey and the aquatic treatment plan.
- Mary seconded the survey and the aquatic plan.

Questions / Misc. / Adjourn

- What is the cost of the treatment?
 - \$500 to \$700 per acre.
- Any invasive species in the wetland cove area located in the northeast corner of the cove?
 - We have treated this area in the past for purple loose strife and yellow flag iris.
- We have invasive cattails by the boat launch. Can these be treated?
 - Cattail treatment plan could be decided on at a later date and treated as late as the end of September.
- What is the total number of acres that need to be treated and the cost?
 - 5.6 acres are suggested to be treated. $\$700 \times 5.63 \text{ acres} = \$3,941$ (Approx. Cost).

Terry Thomas motioned to accept the Aquatic Vegetation Treatment plan for 2022 and to include the north cove to be spot treated for invasive species like the yellow flag iris and to treat the invasive species of cattails by the boat launch.

Mary McClellen-Aronen seconded the Aquatic Vegetation Treatment plan. Plan was accepted unanimously.

Emile will coordinate to get the plan in motion. Plan should be able to happen within a week or two.

Next quarterly meeting will be scheduled for August 2022.

Meeting was adjourned at 10:45 am.

North Lake Advisory Committee

4th Quarter Minutes

December 6, 2022

4:00 to 5:30 pm

Federal Way City Hall ~ Hylebos Room

Committee Attendances: Terry Thomas (Chair), Mary McClellan-Aronen, David Heimer, Darron Nash, Shelley Springer and Dan Sternkopf.

Call Meeting to Order

Meeting was called to order by Terry Thomas, Chairman on December 6th, 2022 at 4:05 pm.

Approve Q3 Meeting Minutes:

- Minutes were approved with the following 2 changes in italics:
 - **Under Aquatic Vegetation Survey Update / Spray Report**
 - Lake appears *barren* and the *native* weeds are not around.

Aquatic Vegetation Survey Update / Spray Report:

- Spray report seems to indicate a possible drift happening on the lake as plants are laying down. The quality of the vegetation is getting worse.
- Weeds fell down and was slimey after it was treated.
- The worst year ever for native weeds.
- Algae was bad.
- Treatment doesn't appear to be effective. Darron has photos showing the lake didn't change from 1 to 2 months after treatment.
- Watershield was the main priority and the weeds are still there.
- Sprayed the cattails by the boat launch.
- No vegetation at the bottom of the lake.
- Treatment has saline in it and nothing grows in salt – Need to follow-up on this.
- Treatment cost will be increasing by 50%.
- Goal is to try to schedule spraying earlier next year (earlier than July). What is the earliest that we can spray if necessary.
- No one has received a spray report. You must request this report if you don't receive it.
- Darron checks the lakes oxygen and water temperatures.
- We spent a little extra on the treatment and we didn't get what we paid for.

Summer Water Quality Monitoring Update:

- Do we have these reports yet? Kevin will have these reports on the first quarter 2023.

Geese Management:

- Geese have not been a problem this year on North Lake.

Status of LMD Assessment, Collections, and Delinquents / Current Financials

- KC sends out this information. Dan will follow-up on this from KC.

Questions / Comments

- How is the condition of Steel Lake?
- We need to receive a copy of the spray report. Would like to know the date the treatment occurred, possibly the end of July.
- Kevin will provide the water quality information at the next meeting
- Twin Lakes has many geese on the property and lakes.
- Set a base line for PH and check if any oil is in the water. People have gas motors and the lake has gas/oil on it periodically. All gas motors should be eliminated from the lake. No combustion engines.
- Fish and Game was asked if there was any funding to help with the dock?
 - No money at this time for the dock.
- Dan will provide the waterfront formula on how to access the cost of the LMD to property owners to Fish and Wildlife David Heimer

Next quarterly meeting February 14, May 16 (move this meeting earlier), August 15th, and November 14.

Meeting was adjourned at 5:15 pm.