

BARNES LAKE ANNUAL REPORT 2024

AQUATECHNEX, LLC.
P.O. BOX 118
CENTRALIA, WA 98531

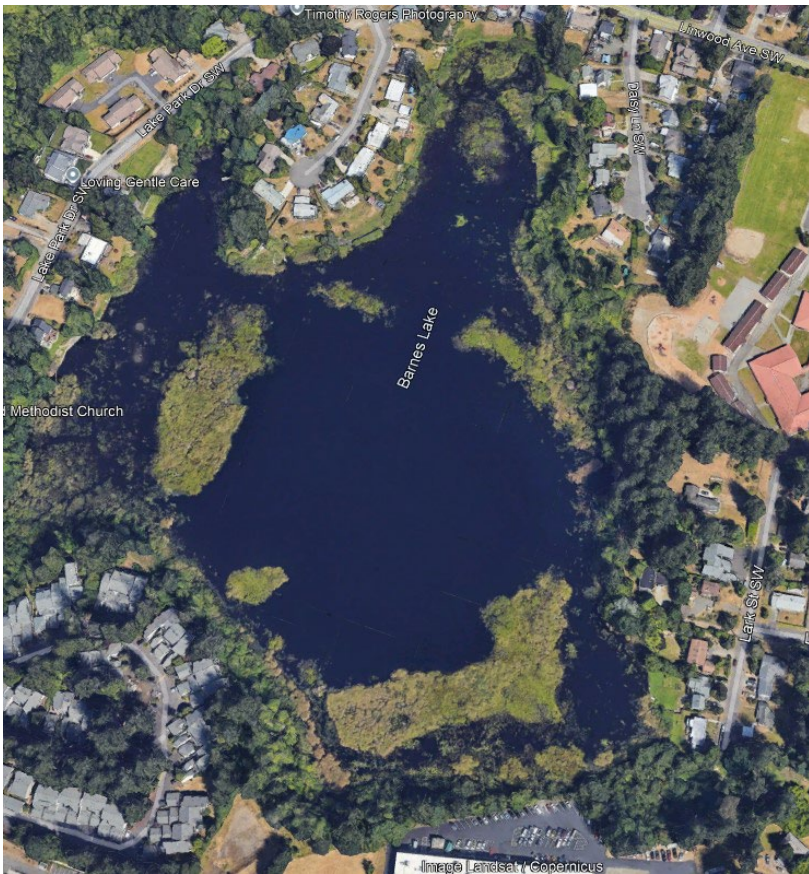




Table of Contents:

Table of Contents.....1

Introduction.....2

Spring Survey Discussion.....2

Biobase Maps and Discussions.....2-4

Drone Survey Discussion and Photos.....4-6

Vegetation Analysis.....7

Spring 2024 Invasive Species Map.....8

Treatment Discussion.....9

Recommendations for 2025.....9-10



Introduction

Barnes lake is a shallow basin located in Tumwater, WA. This basin has historically battled several invasive species including white water lily (WWL) and bladderwort. Additionally, nuisance native species, like watershield and cattails have been an issue for the lake residents. Lastly, low water levels and floating islands are other issues that are important to note in the Barnes Lake basin. The following report highlights the management efforts completed on Barnes Lake in 2024.

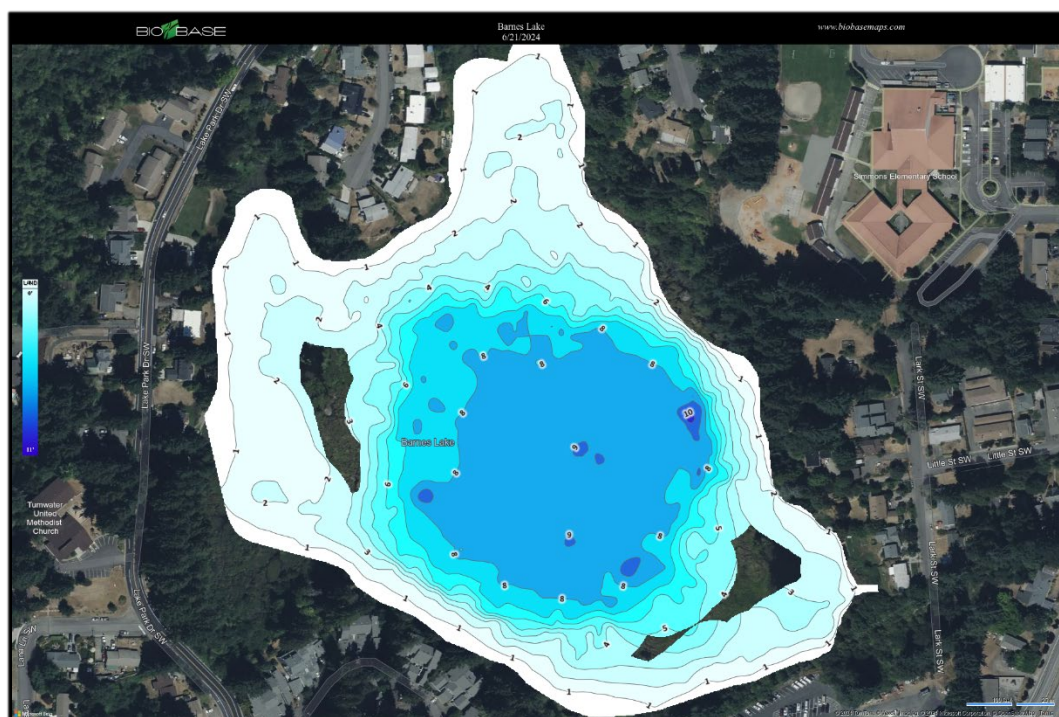
Spring 2024 Survey Discussion

In the spring of 2024, Aquatechnex Aquatic Biologist Scott Conrade (figure 1) and Aquatic Technician Ellie Karpf conducted a survey of the lake. Water resource specialist, Dave Kangiser (figure 1) from the city of Tumwater also joined the survey with the Aquatechnex team. This survey was completed using visual survey methods, Timble TDC600, along with Biobase hydro-acoustic mapping of the lake bottom. Due to the depth of the lake, extremely shallow areas were inaccessible during the survey. We hope to remedy this next season by being able to launch our airboat to access these shallower areas. Below are the results from the June 2024 hydro-acoustic survey.



Figure 1: Aquatic Biologist, Scott Conrade, and Water Resources Specialist, Dave Kangiser, surveying Barnes Lake.

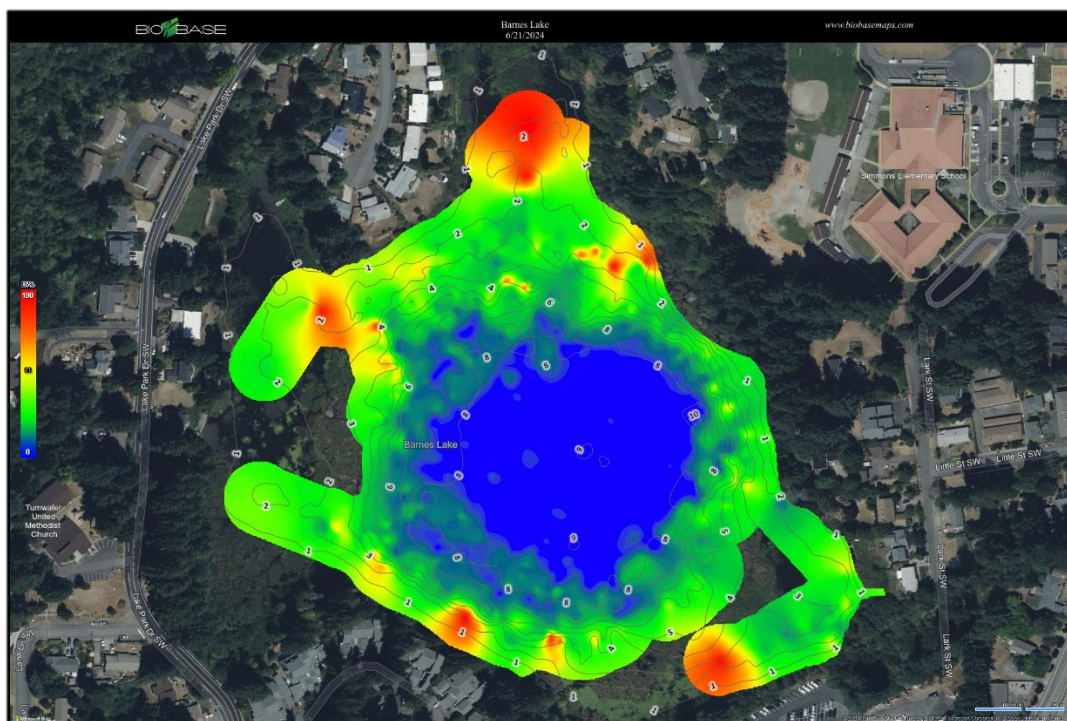
Barnes Lake Depth Map 2024





In the above map, we can see the depth contours of Barnes Lake. The lighter colors indicate shallower areas, where the darker colors indicate deeper areas. According to the hydro-acoustic mapping software, the max depth detected was around 12ft. This area is located near the eastern shoreline, where we can see the 10ft contour. The majority of the basin is below 3ft, which can be seen on the map by the lighter colors around the outer edge of the basin. This means that Barnes Lake has a large littoral area, where plants can grow.

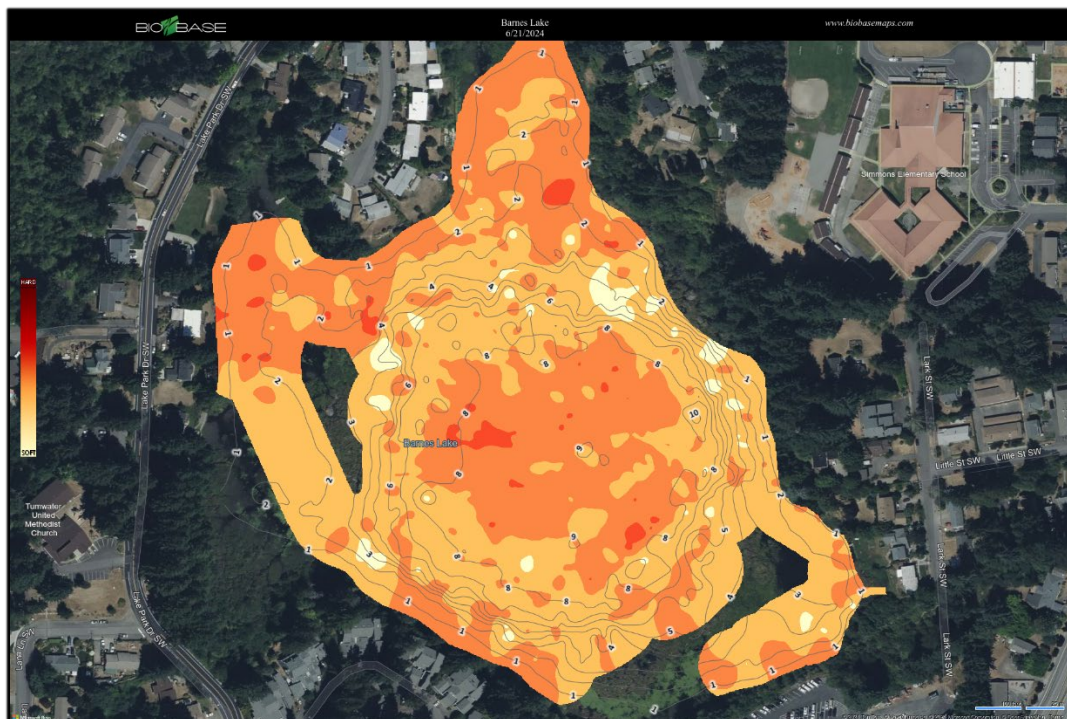
Barnes Lake Vegetation Heat Map 2024



The above map is the vegetation heat map that was taken during the hydro-acoustic survey. The colors indicate different levels of vegetation height that is taking up the water column. The hotter colors red, orange, and yellow indicate a high level of vegetation. The cooler colors green and blue indicate low levels of vegetation. The highest level of vegetation was in the northern part of Barnes Lake at the time of the survey. This area is also very shallow, which allows for vegetation to grow in. The middle of basin had little to no plant growth at time of survey. Purple bladderwort was observed floating around the middle of the basin during this survey.



Barnes Lake Bottom Composition Map 2024



The above map is the bottom composition map generated from the hydro-acoustic mapping survey. The hotter colors, red and dark orange, on this map indicate hard substrates. The cooler colors, cream and light orange, indicate soft substrates. It was unexpected that most of the lake bottom was not soft, especially in the northern area. With the amount of sedimentation occurring in this area, we would expect to see softer sediment types here. Due to the high vegetation, there could have been an error in the readings that took place. Also, the depth of that area was very shallow which could have caused a misreading of the bottom sediments.

Drone Surveys Discussion 2024

Additionally, prior to the survey on the lake, a drone was deployed to take aerial images of the lake. This drone was operated by Aquatechnex owner, Terence McNabb. During the survey, the drone flew a pre-programmed route that was uploaded. This resulted in 337 pictures being taken of the lake (figure 3). The following images provide the flight path, locations of each image, and an image of the consolidated images. Unfortunately, we were unable to fly the lake in the fall due to new restrictions that the manufacture put in place. These new restricted zones are shown in figure 4. These zones almost completely cover Barnes Lake, preventing a complete survey. We are hoping to remedy this for next season, to be able to provide pre and post treatment results from a higher point of view.



Figure 2: Flight Path of the Drone Survey

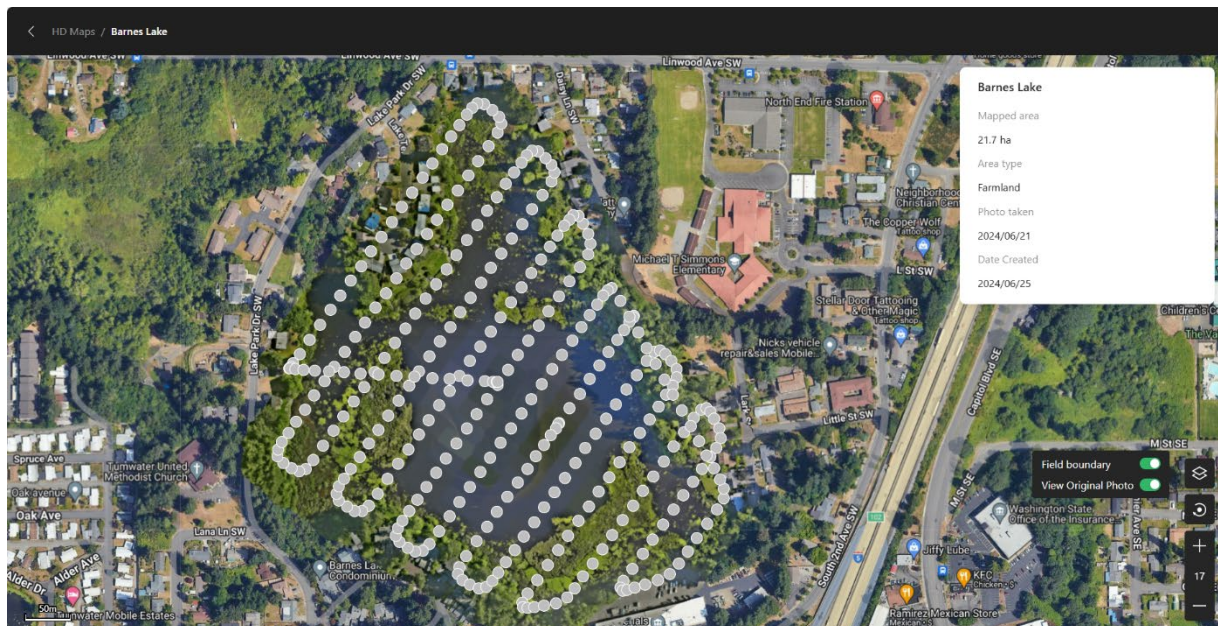


Figure 3: Mosaic of 337 Photos taken by the Drone

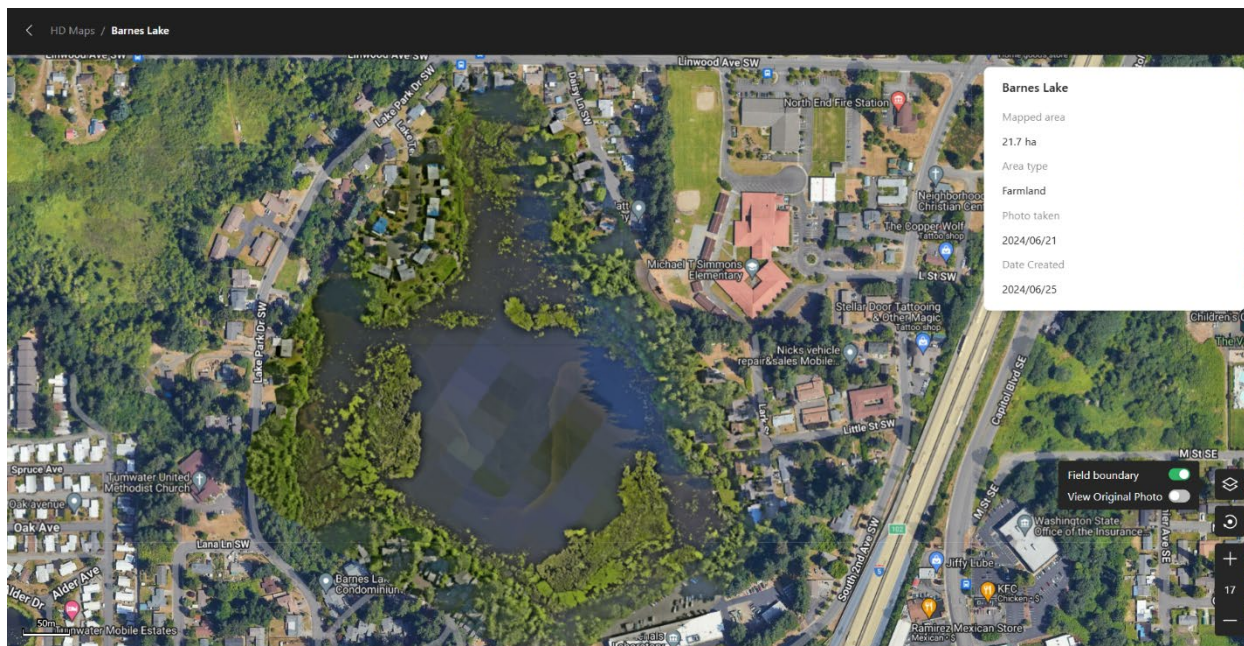
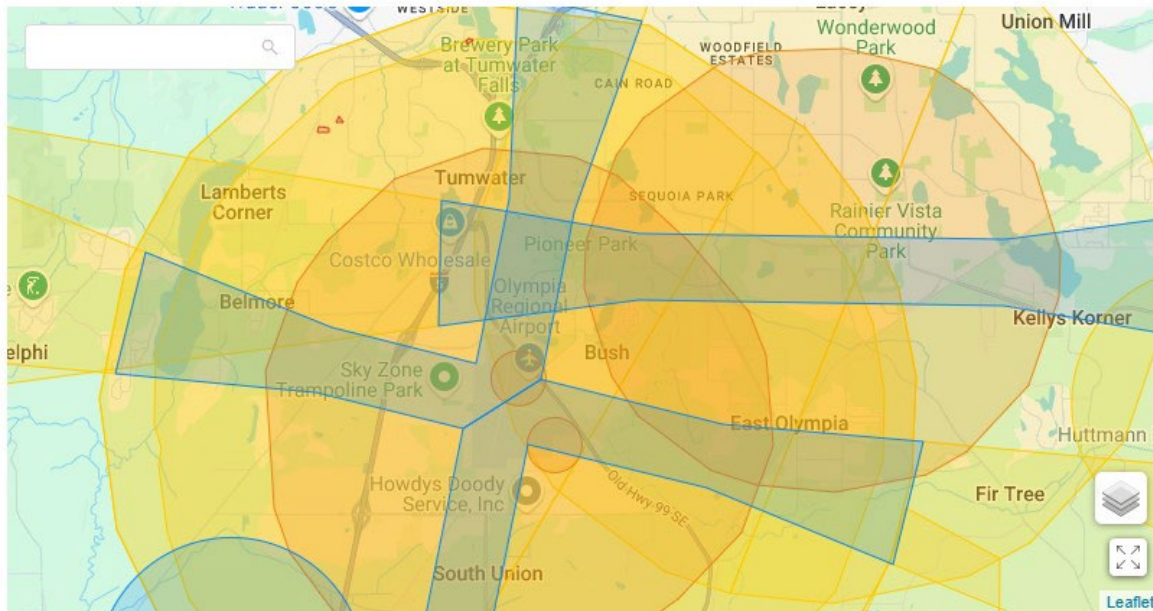




Figure 4: Restricted Zones Map

GEO Zone Map



[Report Incorrect Data](#)

* In compliance with the relevant laws, policies, and regulations, some Restricted Zones will not appear on this web map. Please refer to the DJI app for more GEO Zones in effect. Be noted that as it consumes too much time for mass data loading, all GEO Zones will be hidden when zoomed out to a certain extent.



Vegetation Analysis



Figure 5: Watershield and it's flower.

Barnes Lake is a healthy lake in terms of biodiversity within the lake. Several different species of aquatic macrophytes and algae were observed at the time of the surveys that occurred. The most dominant floating leaved species in the lake was watershield (*Brasenia schreberi*). This is a native species that thrives in warm, shallow waters. This species is often lumped into the same category as lilies; however, it is its own species. Watershield (figure 5) is characterized by its oval shaped leaf and purple flower. It can also have different colored leaves such as green, yellow, or red. This species does produce a flower (figure 5) that is pollinated via wind drift. This then produces a leathery fruit that contains seeds. In addition to watershield, the following species were observed in various densities:

- White water lily (*Nymphaea odorata*)
- Bladderwort species (*Utricularia sp.*)
- Slender naiad (*Naja flexilis*)
- Common waterweed (*Elodea sp.*)
- Benthic filamentous algae
- Thin leaf pondweed (*Potamogeton pusillus*)

The following riparian plants were observed at various densities around the shoreline of Barnes Lake.

- Cattails (*Typha sp.*)
- Water hemlock (*Cicuta maculata*)
- Himalayan blackberry (*Rubus armeniacus*)
- Pacific blackberry (*Rubus ursinus*)
- Peat moss (*Sphagnum flexuosum*)



Figure 6: Common Bladderwort flower found at Barnes Lake.

The following map shows the locations of the invasive species that were present at the time of the survey. These species are the white-water lily (figure 7) and bladderwort. Himalayan blackberry and water hemlock were not part of this survey; however, they were noted by the biologist on site as species of concern. A fall survey was conducted from shore due to the shallow depth of Barnes Lake. Due to this, points were not able to be taken to accurately represent the locations of the species of concern.

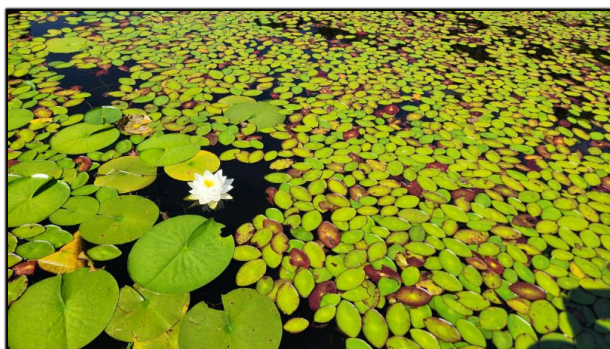
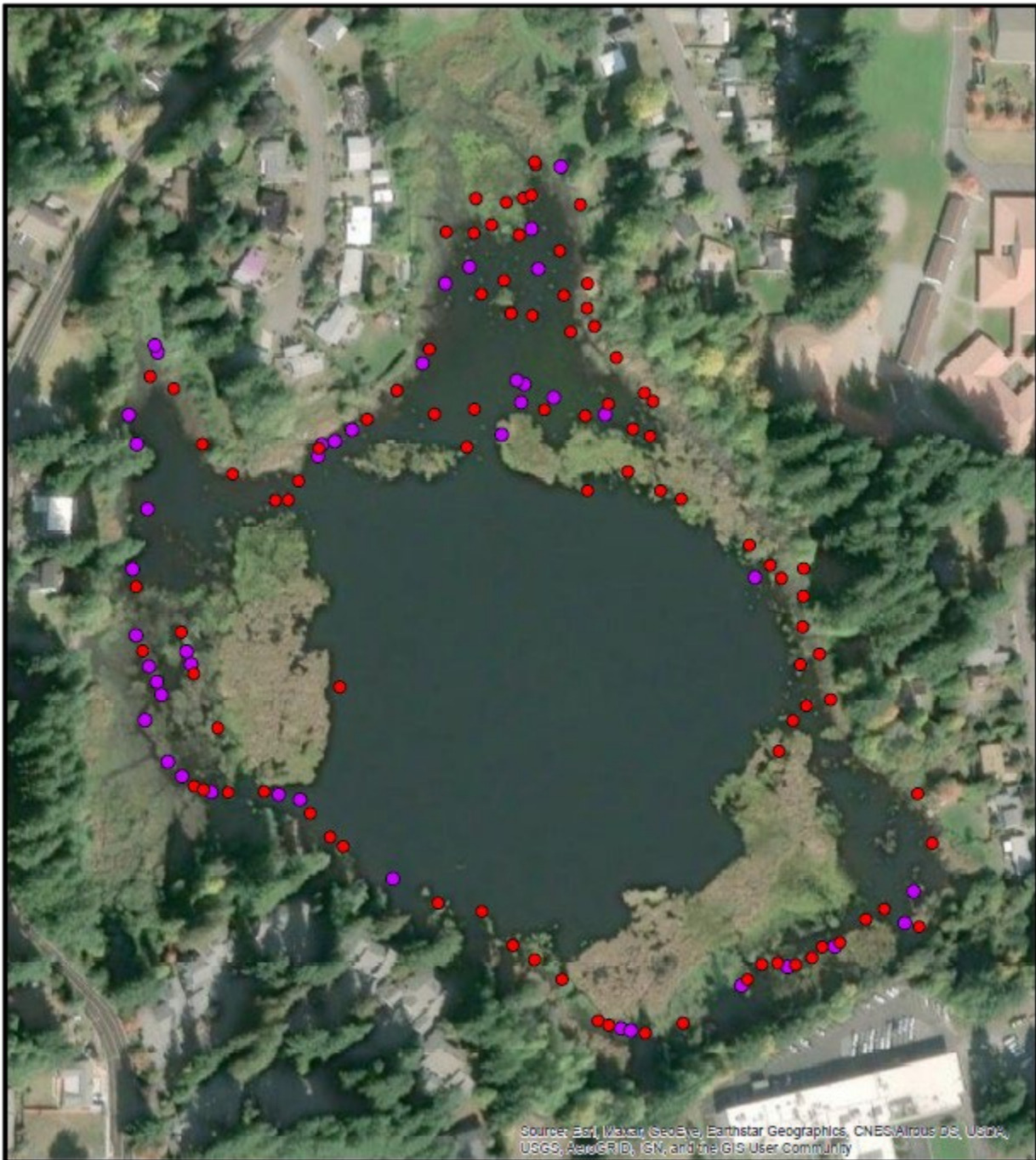


Figure 7: White water lily and watershield at Barnes Lake.



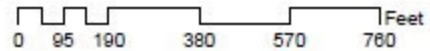
Spring 2024 Invasive Species Map



'24 Barnes Lake Invasive Species Map

Legend

- White Water Lily
- Bladderwort





2024 Treatment Discussion

During the 2024 season, Barnes Lake was treated twice. The initial treatment focused on the invasive plant species WWL and bladderwort. The treatments for bladderwort and WWL were completed on the same day, (August 9, 2024).

Aquatic Biologist Scott Conrade and Aquatic Technician Ellie Karpf were on site for the application. The treatment crew utilized a 10ft john boat, equipped with a 2.5 hp Yamaha motor. A Spotlyte treatment system was used to apply diquat to the bladderwort using a boom with drop hoses. The Spotlyte system was also utilized to apply Imazamox to treat the WWL, via a foliar application (figure 8). A surfactant was also added to the mix to help break through the cell walls of the lilies and help keep the product in place until it has entered the plant.

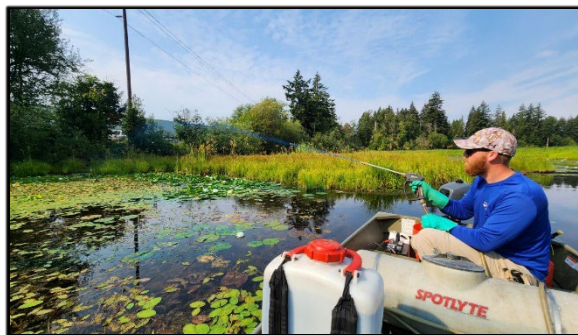


Figure 8: Aquatic Biologist, Scott Conrade treats WWL. (Not pictured) Aquatic Technician Ellie Karpf aids in the application.

The second treatment was requested by the homeowners of Barnes Lake. This treatment specifically focused on watershield and nuisance vegetation around the shoreline of the private homeowners. Aquatic Specialist, Braden O’Neil and Aquatic Biologist, Scott Conrade, performed the application. The treatment was conducted utilizing Dewalt electric backpack sprayers from the shore. This was the best option, due to the low water levels that were occurring at the time of the application. This application took place on October 29th, 2024. All private homeowners that requested applications were treated on that date.

Recommendations for 2025

As 2024 was our first year taking over the management of Barnes Lake, we learned a lot about Barnes Lake, and we have some recommendations to implement for 2025. In 2025, we recommend a full lake Sonar (fluoridone) application. This would systematically target the bladderwort that has become wider spread. This species of bladderwort produces a seed that drops during the season. Due to Bladderwort’s modes of reproduction and mobility, this aquatic plant will require multiple seasons to achieve control. Earlier season control prior to the Bladderwort’s seed production will be required.

If Sonar is not utilized, we recommend using Aquathol K vs. Diquat for the treatment of bladderwort. We recommend this chemistry because unlike diquat, it does not become inactivated once in contact with sediment and other particles that it could encounter prior to



entering the target species. This is highly important in Barnes Lake due to the shallow nature of the basin. With this product, we will achieve higher efficacy.

Additionally, we recommend utilizing Imazamox, also known as ClearCast, to treat the white-water lily (WWL) that is around the lake. Sonar may have some initial effects on the WWL that is present in Barnes Lake, however, it will rebound later in the season, once the concentration has decreased throughout the lake. Imazamox is an EPA register reduced risk herbicide, meaning that it is less harmful to the environment and humans than other older chemistries.

Monitoring the lake is very important and should be a cornerstone for the management of the waterbody. The City of Tumwater is doing an excellent job of this, and their monitoring should continue. We recommend adding phosphorous to the regiment of monitoring that is already in place. Monitoring for this should occur in the water column and in the bottom sediments as well. This is important to monitor because cyanobacteria have an advantage over less harmful species of algae when phosphorous levels are high. Additionally, algae samples should be taken monthly to understand the

Lastly, we recommend utilizing Muckbiotics to help reduce organic materials in the bottom of Barnes Lake. Muckbiotics are a blend of different bacteria's that naturally occur at the bottom of the lake that help to decompose organic materials. These pellets boost the populations of these beneficial bacteria's and can help to increase the depth of the lake. According to the label, they can also help to get rid of floating islands at high rates as well.