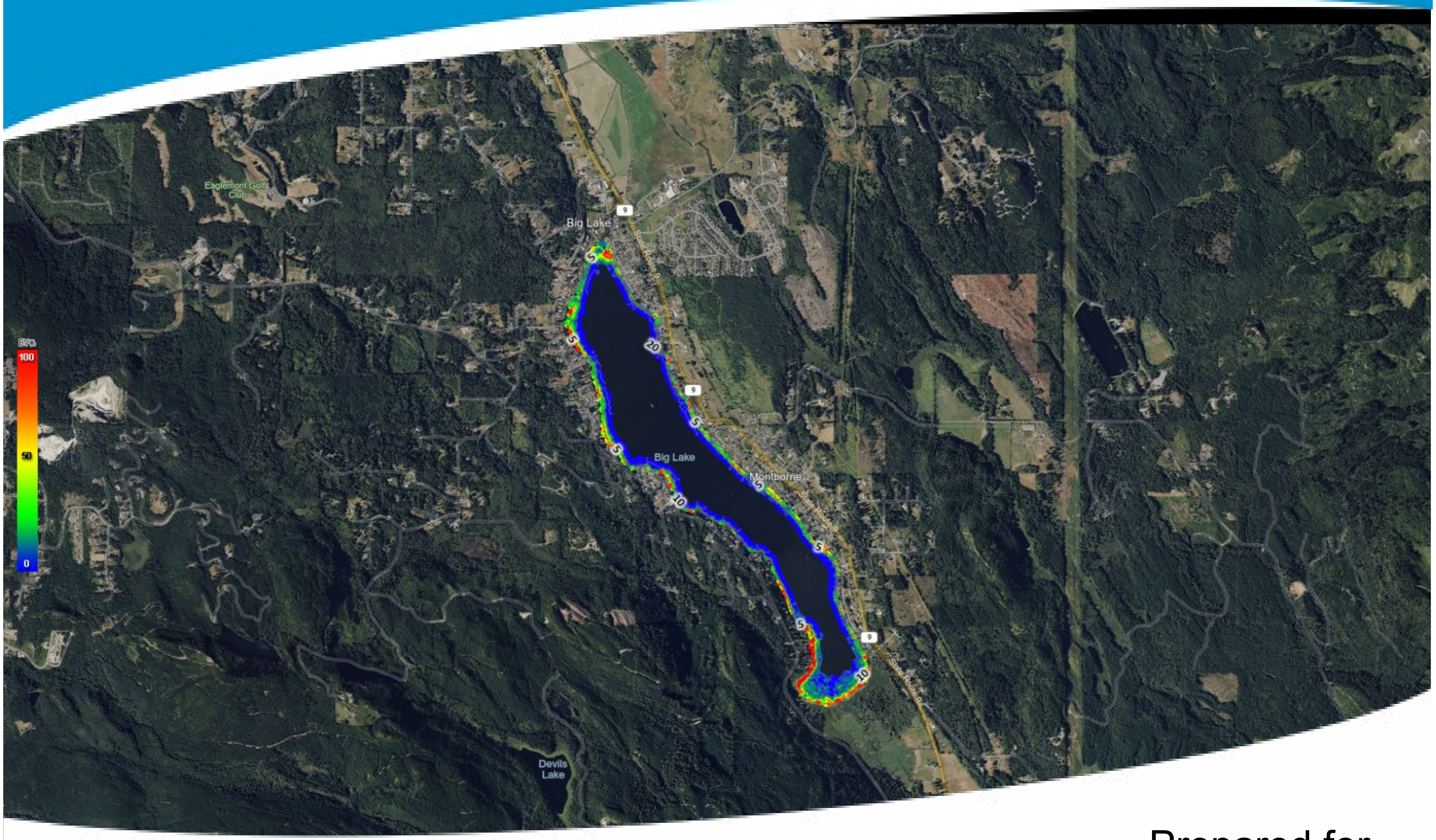
Big Lake Management District 2024 Annual Report on Aquatic Plant Management



Prepared for
Skagit County Noxious
Weed Board and LMD

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Introduction

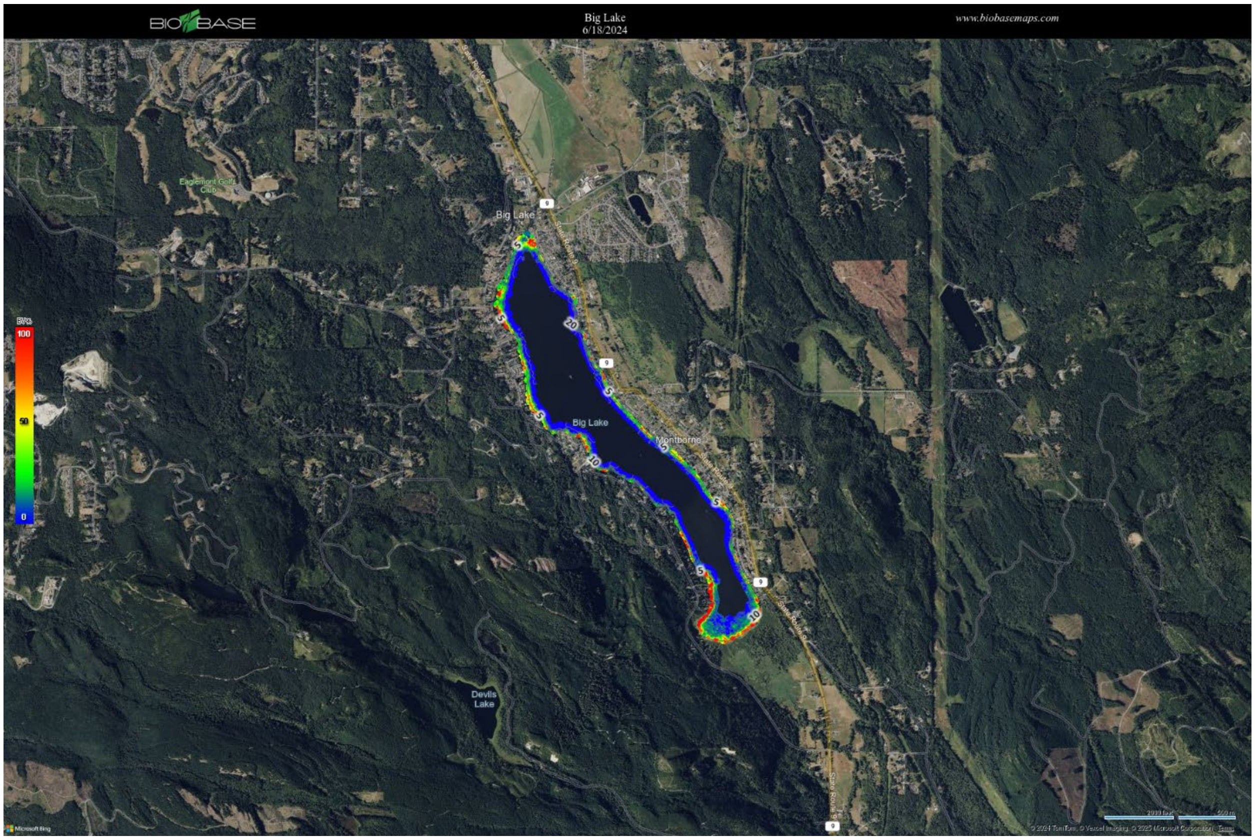
Big Lake is a 520-acre waterbody in Skagit County, WA. In the early 2000's the lake was heavily impacted by the invasive aquatic weed Brazilian Elodea. With the help of Aquatechnex biologists the community and the County obtained funding to develop an Integrated Aquatic Vegetation Management Plan (IAVMP) which we completed. That document was used to get Ecology Freshwater Grant to target and treat this invasive aquatic weed. Our team used a controlled release Sonar Herbicide pellet design, and the Brazilian Elodea was effectively removed from the littoral area of the lake.

The lake residents also formed a lake management district or LMD in that time frame. In the year since, the community has continued to manage noxious and nuisance aquatic weed growth in the lake. This spring Aquatechnex was selected to implement a survey and lake treatment program to assist the community in their objectives of protecting beneficial uses at the lake.

Survey

Big Lake was surveyed on June 18th. The team utilized a 17-foot LUND mapping vessel equipped with BioBase Hydro-acoustic submerged vegetation mapping systems and a Trimble TCI600 Data Logging DGPS receiver running Trimble TerraFlex mapping software. Forms were built in TerraFlex for collecting positions and attributes for species of floating leaf, submerged species, and emergent shoreline noxious weeds.

The team first circumnavigated the lake littoral area collecting Hydro-Acoustic submerged aquatic vegetation data. This system utilizes sonar signals to map the lake bottom and the height of aquatic plant growth in the water column and produces a HEAT map showing the location of aquatic plant beds. It also generates statistics on aquatic plant biovolume. The littoral area was set at the 20-foot depth contour. This survey covered 38.9% of the lake surface area or 204.17 acres. Aquatic vegetation was present in 80.9% of the survey area covering 163.2 acres.



The link to the BioBase data and report Vegetation Analysis Report (2024 June 22 - 18:08 (UTC)) and there is more information available there. The BioBase Map is shown here.

The dominate species present in the lake was *Elodea canadensis* or American Waterweed. Elodea was present in most of the survey areas where aquatic plant growth was detected. Other species noted were *Potamogeton praelongus* or White Stemmed Pondweed was also observed off the south shoreline.

The HEAT map on the following page shows the location of detected aquatic plant communities. The blue areas indicate that no vegetation is present at the time of survey, green to yellow areas in the color ramp shown on the left side of the image are in the mid-range growth filling the lower part of the water column, where red areas are present the entire water column is filled with vegetation.

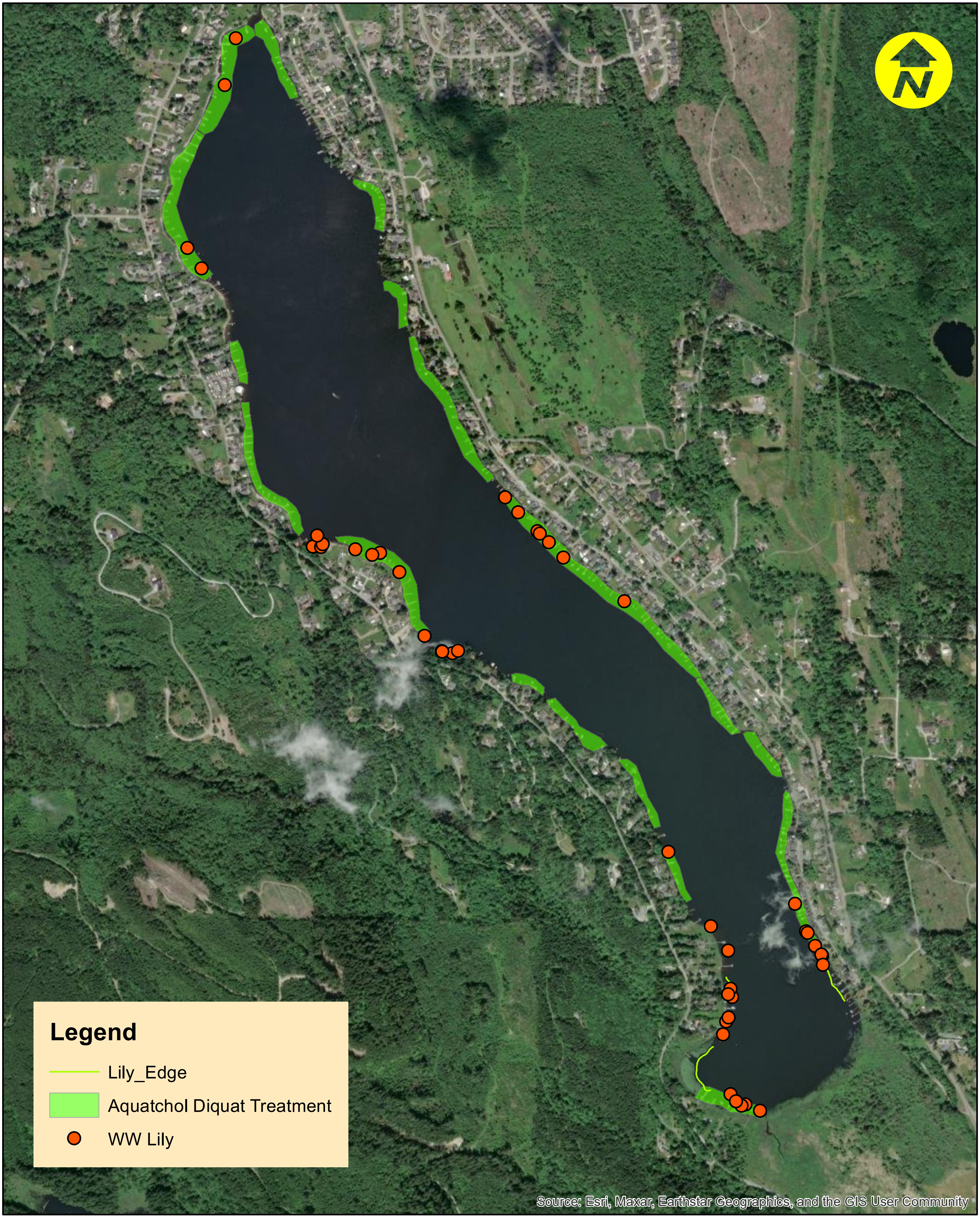
The primary noxious weed problems observed were *Nymphaea odorata* or White-Water Lily *and Iris pseudacorus* or Yellow Flag Iris. The map on the following page shows the extent of these two species presences around the margins of the lake.

The proposed treatment map is shown here. This was submitted to the Skagit County Noxious Weed Board for approval and as received we scheduled treatment.

2024 Aquatic Weed Control Efforts

Aquatechnex biologists performed the public notification required by the Washington Department of Ecology NPDES permit, a 10-day notice was mailed to all lake dwellings. We then planned and conducted an application targeting the problem submerged weed growth where mapped and the invasive White Water Lily growth. A tank mix of diquat and Aquathol herbicides were used to target the submerged vegetation.

The team utilized four spray boats and teams to post the day of treatment notices and perform the applications using precision guidance systems. Four boats were used to minamize our time on the water impacting other uses of the lake. The treatment mapis presented on the next page.



Suggested Treatment Zones for Big Lake

Water Quality

For the past few years there have been significant cyanobacteria blooms on the lake. Cyanobacteria are toxin producers that post a threat to pets, wildlife and human health. Under bloom conditions they can cause mortality for animals that injest water from the lake. Recent studies have shown that these toxins can also aersoilze and be carried downwind for some distance.

In August of this year, we started to receive a significant number of phone calls asking about treating algae under our contract, asking about water quality and concerned about conditions of the lake. We discussed with a number of them, and to address one question we received about dissolved oxygen, we stopped by on August 28th and conducted a dissolved oxygen and temperature profile collection. This is done with a sensor for those parameters on a cable, readings are collected from lake surface to the lake bottom at one foot increments. The lake had dissolved oxygen readings ranging from 8 to 9 millagrams per liter which is a healthy range for a lake. Trout start becoming stressed at about 5 mg/l. Water temperatures were isothermal from top to botton in the water column.

Managing cyanobacteria blooms can be done, there are treatment options to target and control these toxin producers. The entire lake however must be treated. Another approach would be target the phosphorus in the lake. Cyanobacteria thrive at elevated levels of phosphorus, removing that compound from the water column and lake sediments reduces the carrying capacity of the lake to produce cyanobacteria. There are treatments for that approach as well.

The is probably a need to address the concerns of the community in this regard and in order to do that we require some data. We proposed the following to the Noxious Weed Board this fall prior to the coordinator leaving that position.

This past year our contract had a budget of $77,000.00 and we consumed about $51,000.00 of that amount. I would like to suggest we proactively collect the information necessary to develop a phosphorus management plant for the in lake P and sediments. This would have the following components:

1. Create a bathymetric map using biobase technology to calculate the exact volume of water and conditions of the lake sediments. These maps are used to calculate the pounds of phosphorus present in the water column and the location and shape of organic sediment accumulation. Organic sediments are generally the highest contributor to summer algae blooms in terms of phosphorus budgets.
2. Collect five sediment samples for level 2 fractionation, and four sediment samples for level 3 fractionation. This will allow us to calculate the pounds of mobile phosphorus stored in the lake sediments that need to be targeted.
3. Collect baseline water quality data including total and free reactive phosphorus, nitrogen, pH, hardness, dissolved oxygen and temperature from three sampling stations are the surface and at depth.
4. Repeat this in the spring after the lake stratifies.

This would be used to develop the phosphorus management plan. As you know Campbell Lake recently went through a similar process. Much of the work on in that document is fairly irrelevant to the conclusion that water column and sediment phosphorus have to be targeted. Often these studies, while beneficial, cost a considerable amount of money that could be better used focusing on treatment.

The cost for this would be as follows:

1. Biobase bathymetry mapping, deploy two mapping vessels to the lake, collect sonar data from transects representative of the lake, process that sonar data to produce a bathymetry map with water volume calculation and a sediment composition map to be used in the placement of the sediment sampling sites. $3,000.00

1. Collect the sediment samples, Level 2 samples have a laboratory fee of $575.00 and level 3 have a laboratory cost of $1,000.00 for total cost for laboratory work would be $6,876.00.

2. First baseline water quality data collection would cost $750.00 for mobilization and sample collection and shipment to the lab, we would also collect the sediment samples on this visit after reviewing the biobase sediment map to select placement. The laboratory fees for six samples would be $399.00 per sample or $2,394.00.

3. Second water quality data collection, same as the first.

4. Sum of these costs would be $13,770.00

This would still leave funds in the treatment budget that could be moved to next year, it would show the community that we are proactively taking steps to address the questions they have, it would build the information necessary to develop a algae management plan.