

2022 Clear & Beaver Lake Aquatic Weed Control Program

Prepared for

Clear & Beaver Lake
LMD #4
Skagit County Public Works
Mount Vernon, Washington

Prepared by

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Project Overview

Clear and Beaver Lakes LMD4) have been actively involved with aquatic plant management for over ten years. Consultants retained to perform management services vary on a year to year basis. Northwest Aquatic Ecosystems was selected to provide services during the 2022 season but was not involved with the management of either lake during 2021. The Local Management District was formed to specifically address these issues. Targeted species include Eurasian watermilfoil and *Nymphaea odorata*. As milfoil control was achieved, native pondweeds soon became the problematic species at Clear Lake and control efforts to control these plants along residential shoreline areas were incorporated into the program. Beaver Lake continues to only target noxious species since the shoreline consists of no residential homes and the lake is considered a fishing ecosystem. Milfoil was not identified in Clear Lake during 2021 but was observed in Beaver Lake. Because of access issues related to water levels and dense native plant growth access was restricted to some Beaver Lake areas. These areas likely harbor milfoil plants that provide plant fragments that enter the main lake area. Beaver Lake historically has supported single plant milfoil locations. Some residents living along the Clear Lake shoreline continue to request that no herbicides be applied to their lakefront. These requests have been respected. Both lakes' entire littoral zones support varying degrees of submersed weed growth ranging in a broad range of densities. Broadleaf pondweed remains to be the most problematic species within the residential shoreline areas of Clear Lake while Beaver Lake supports a wide range of submersed pondweeds and elodea species.

Resident native species continue to pose the same recreational problems often associated with the milfoil noxious species. Management practices at Clear Lake continue to evolve so that native species can be maintained at acceptable levels while also monitoring and controlling single milfoil plants. Beaver Lake is managed solely for noxious plant growth, specifically milfoil and fragrant water lily. There is no need to control native species since Beaver Lake is managed as a recreational fishery that does not support water skiing or jet skis. The lake's main use in conjunction with fishing is canoeing and paddle boarding. Parking and large boat access is difficult.

Similar to years' past, the public swimming beach was closed down and posted at Clear Lake prior to and for 24 hours following the initial submersed weed control operation.

Survey Protocol

As has been utilized in the past, NWAE continued to incorporate state of the art electronic surveying equipment to produce a survey that could easily be understood by all reviewers.

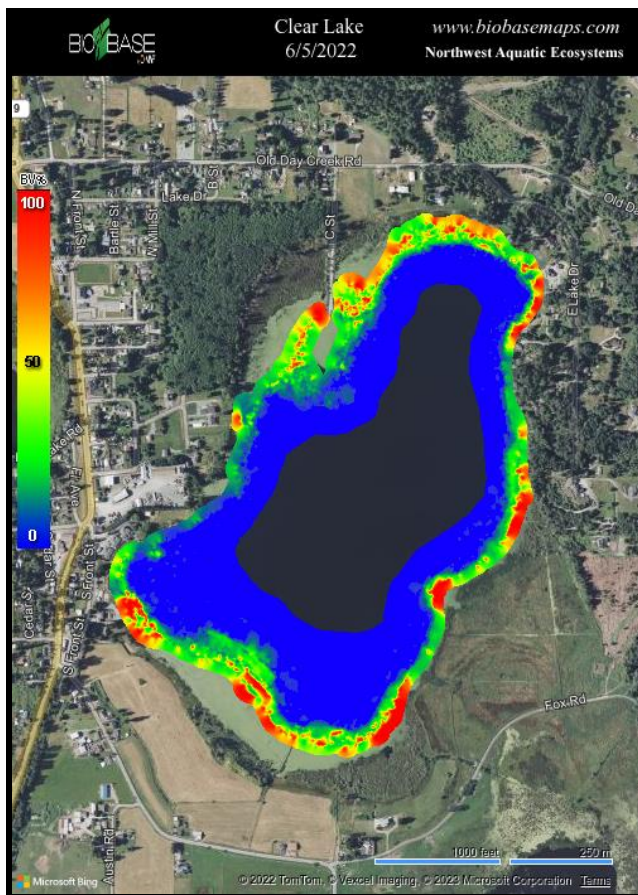
Since 2014 the survey protocol collected sonar data utilizing specific transducers and bottom scanning equipment. The survey boat traveled along pre-determined transect lines that were spaced approximately 100 feet apart. Once the entire lake's littoral zone had been traveled and no vegetation appeared on the chart recorder, the survey was terminated. Data collected on the SD card was then uploaded via cloud based technology and the processing of the data was finalized. The resulting work product is a color-coded map of the lake bottom identifying weed growth areas and plant densities. Not only is a well-defined map produced but a sonar log of the survey is saved allowing a complete review and evaluation of the survey to occur in house. The sonar log allows you the ability to view all plant growth along the boat's survey tracks. When nonnative milfoil species were identified, a milfoil specific data point was added to the transect line. To ensure the integrity of the survey, bottom sampling was conducted at various locations along the transect lines.

Clear & Beaver Lake Pre-Treatment Survey Results 6-05-22

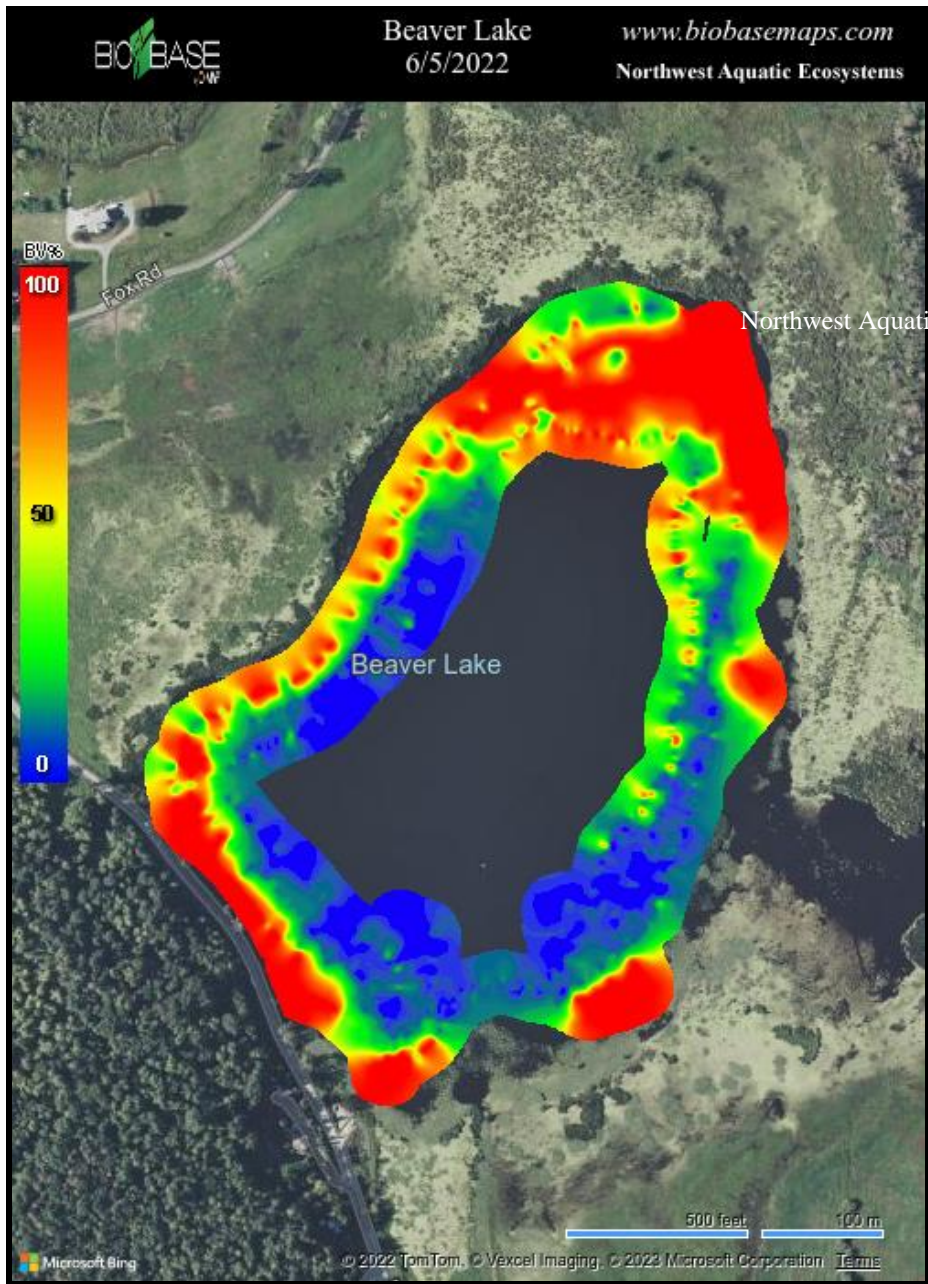
Clear & Beaver Lake were surveyed on June 5, 2022. Both surveys occurred during the same timeframe as our past surveys in an effort to maintain what had been established in the past. Water levels at both lakes appeared to be normal in comparison to previous years when lake levels were high and made launching problematic but possible. Suspended algae did not create water clarity issues associated with the survey. There were no milfoil plants identified in Clear Lake while only two plants were noted in Beaver Lake. Milfoil plants in Beaver Lake were identified in an area of the lake that historically was difficult to access. Nearly 100% of both lake shorelines were experiencing various degrees of native plant growth. Survey results were similar to past surveys performed at this time of the year for both lakes. The littoral zone of Beaver Lake extend outward to the 10 foot contour line while Clear Lake vegetation was noted out to approximately the 15- 20 foot contour line. Potamogeton amplifolius continues to increase in density throughout Clear Lake while other species *P. robbinsii*, *P. natans*, *P. gramineus*, *Vallisneria americana*, *elodea canadensis* and *P. zosteriformis* were still noted throughout the lake. One species did not comprise the dominant species lake-wide. Different sections of the lake supported different prevailing species.

Beaver Lake's native pondweeds dominated the survey while elodea, najas, and ceratophyllum species exhibited dominance in specific locations lake-wide.

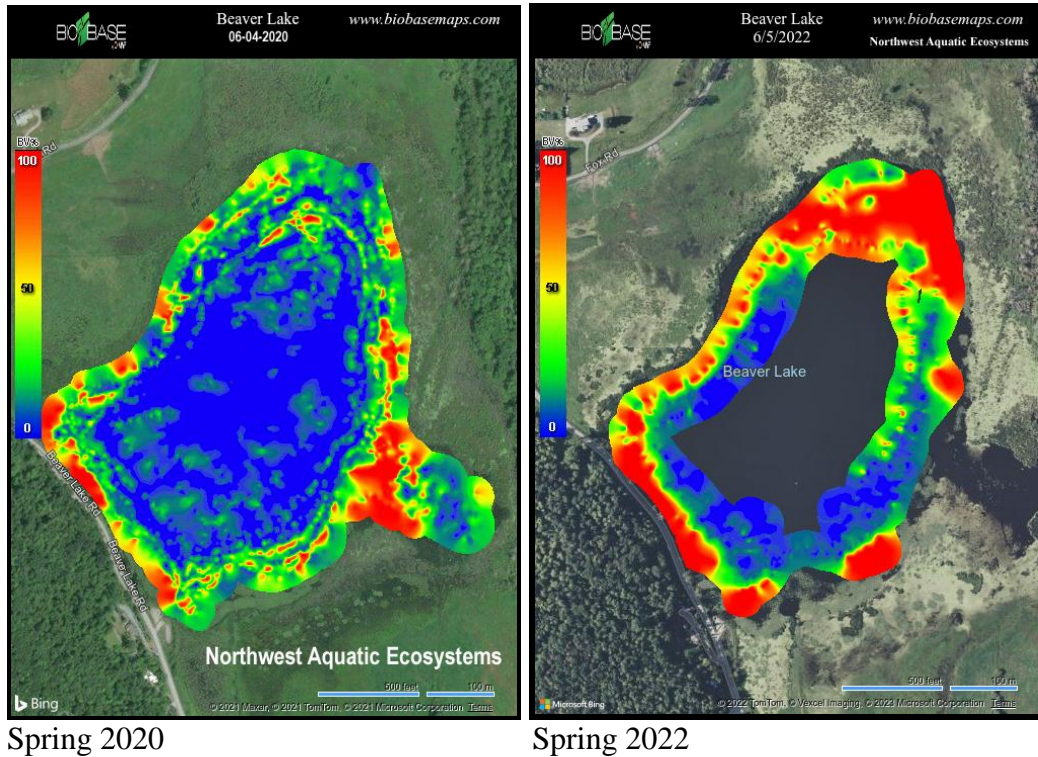
Shoreline areas of Clear Lake that are absent of residential dwellings have never been and continue to not be targeted for native plant treatment. Unfortunately, these untreated areas are typically those sites that produce seed heads and are the source of sustained yearly seed production. Such seed production is eventually deposited lake-wide through the waterfowl population and wind.



Our Beaver Lake survey resulted in only two milfoil plants growing within the entire lake. These plants were hand removed at the time of the survey. A small Ekman sediment sampler was dropped over the plants and engaged. The sampler removed sediment and the root system of the plants. The remainder of the survey was similar to past spring surveys with no unusual changes in the macrophyte composition or distribution. Yearly historical density decline was not apparent during the 2022 spring survey. Data suggests that Beaver Lake densities had increased from previous years. Fluctuations in plant densities within a shallow water body are not uncommon and expected. Native plants have never been targeted for control and the materials used for milfoil control are specific toward milfoil only.



Changes in Plant Composition From Spring 2020- Spring 2022



Aquatic Weed Control 7-15-2022

Beaver Lake was briefly inspected in an effort to determine if milfoil treatment would be required. No new milfoil plants were identified requiring treatment or manual removal. The non existence of milfoil was expected since the lake was treated during 2021 with ProcellaCOR. ProcellaCOR is marketed by SePRO stating that if applied according to their guidelines the product is guaranteed to provide three years of milfoil control. The consultant managing Beaver Lake during 2021 was an authorized ProcellaCOR agent.

Our approach for the 2022 season at Clear Lake was similar to past treatments. Treatments targeted only residential shoreline areas, the county swimming beach and public boat launch. Once again two parcels located along the eastern shoreline received no treatment per their request.

Shoreline posting was conducted on the day of treatment. The Skagit County swimming beach was posted with a large sign even though the park was closed for the day. Material was offloaded from a locked truck container and transferred into two 25 gallon spray tanks mounted on the application boat. Containers were triple rinsed on site and returned empty, back into the truck. Material was applied utilizing an 18 foot Airgator airboat. Lake water was drawn into the boat through intake ports located in the hull of the boat. Herbicide was then metered into the lake water via an injection manifold. Once the herbicide was injected, the water was then discharged back into the lake. Weighted hoses were used to place the material at the appropriate depth in the water column. Prior to treatment, a lake treatment map, identifying treatment plots was downloaded into the onboard GPS system. The boat utilized the onboard GPS to identify treatment site boundaries. Tanks were refilled and dispensed as needed. Submersed weeds were treated with Diquat at a rate of two gallons per surface acre in waters over three feet deep and one gallon per acre in waters less than 3 feet in depth. NWAEE utilized both Aquathol K and diquat in the northern shoreline areas of the lake. The mixture was applied as a tank mix.

Upon completion of the submersed weed component of the project, the onboard spray equipment was converted to support the surface spraying of lily pads. The 25 gallon tanks were filled with lake water, herbicide, and then surfactant was added directly into the tank. Once mixed, the application boat drove along the shoreline identifying targeted floating plants and the spray mixture was then discharged using a spray gun. When emptied, the tank was refilled and dispensed as needed. Lily pads received a 1.0% solution of triclopyr sprayed directly onto the floating leaves. A new spray nozzle was utilized this year that exhibited a larger spray swath that eliminated the number of passes required to complete the task and provided better coverage. Approximately 2.5 acres of lily pads were targeted.



Clear Lake Submersed Weed and Lily Pad Treatment Sites

Lily Pad Weed Control 8-02-2022 & 8-23-2022

A second and third lily pad treatment at Clear Lake occurred on 8-02 and 8-23. Both applications consisted of approximately five acre treatment sites. The public swim beach was not included in these dates.



Access Path 8-09-22 North of Boat Launch

Fall Survey 09-24-22

Both Beaver and Clear Lakes were surveyed on 9-24-22. Water clarity at Clear Lake was average with algae noted in the water column. Beaver Lake was experiencing a problematic algae bloom with moderate to heavy scum observed along most of the shoreline zones. Examination of Beaver Lake was difficult because of the seasonal fall algae bloom and dense weed growth that was present. What was surprising was the occurrence of milfoil in sections of the lake that had been targeted with ProcellaCOR during 2021. Zone #1 as identified in the 2021 report is approximately 8 acres.

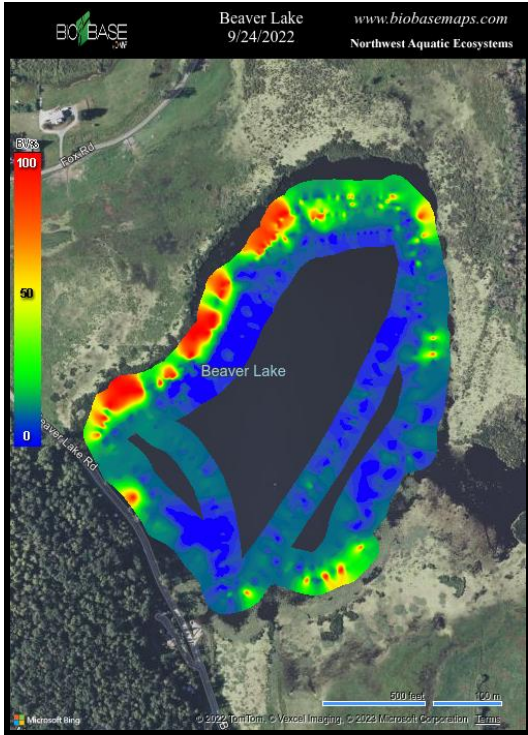


Procellacor Treatment Sites 2021



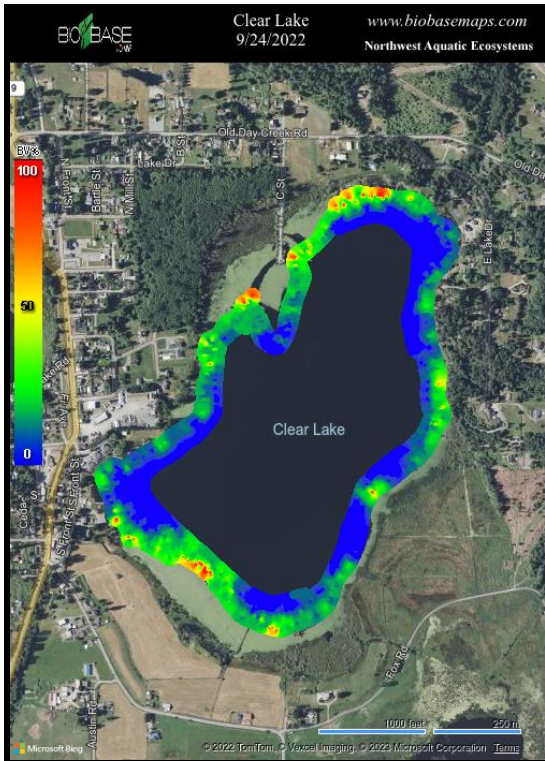
Milfoil Waypoints September 2022



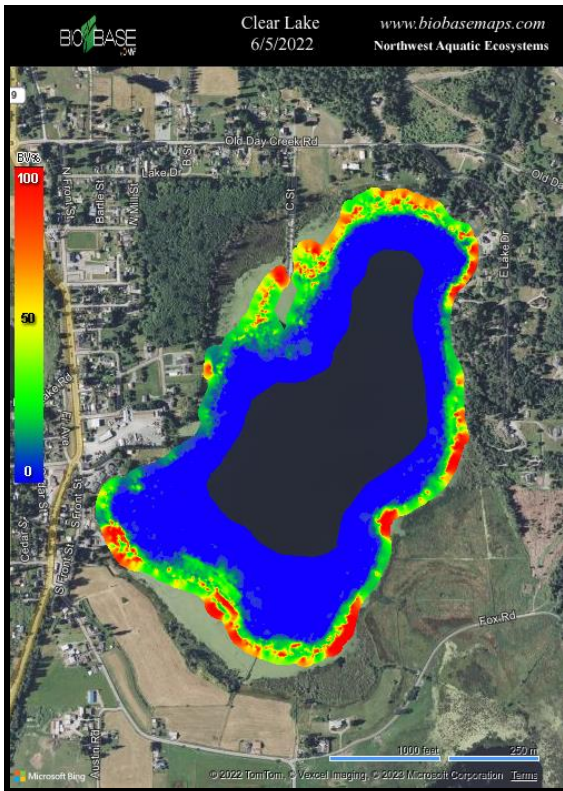


Fall Survey Beaver Lake
9-24-2022

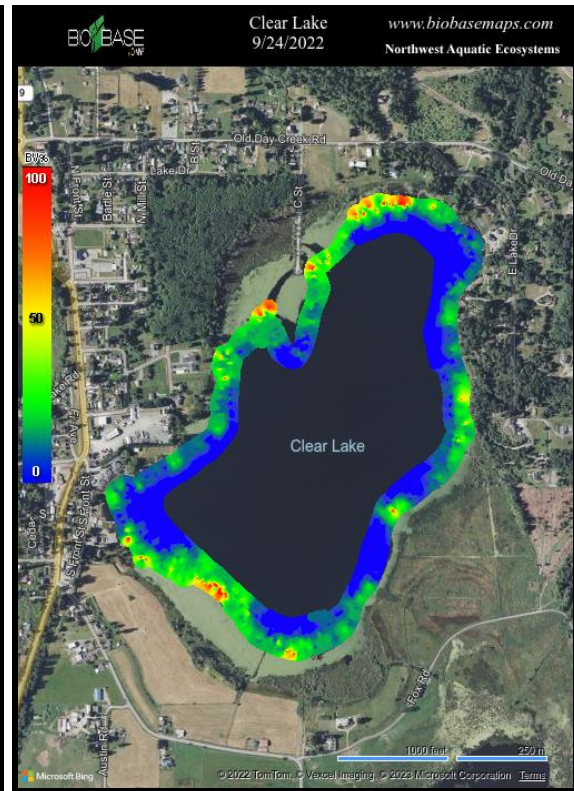
No milfoil plants were observed at Clear Lake during the survey. Broad leaf pondweed was exhibiting regrowth throughout most of the prior treatment zones. In an effort to start reducing the occurrence and densities of the broad leaf pondweeds, a second application targeting this plant should be conducted during late summer. There was approximately a 50% reduction in biomass from the zero to nine meter contour line pre and post treatment.



Fall Survey 2022
Clear Lake

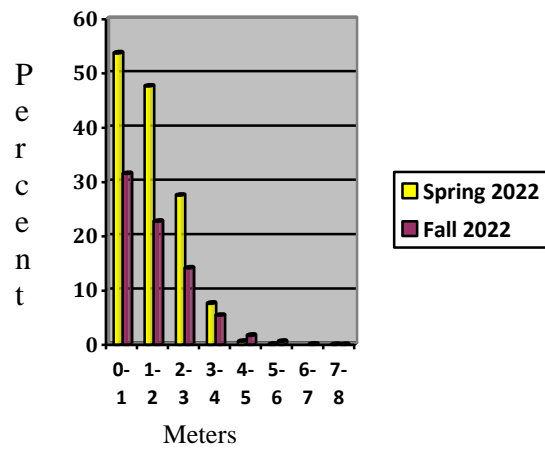


Spring Survey 2022



Fall Survey 2022

**Percent Biomass within
Clear Lake Water Column**



Recommendations

Our Clear Lake recommendations for 2023 are similar to those that were proposed for 2020. Beaver Lake will require further milfoil control within those areas of the lake where the ProcellaCOR application failed to deliver anticipated results.

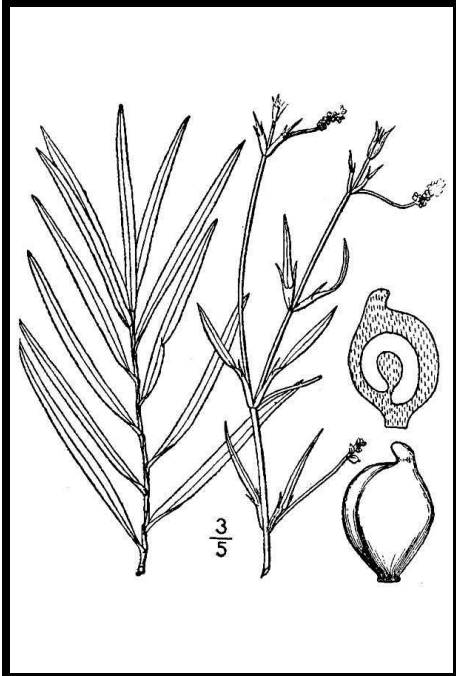
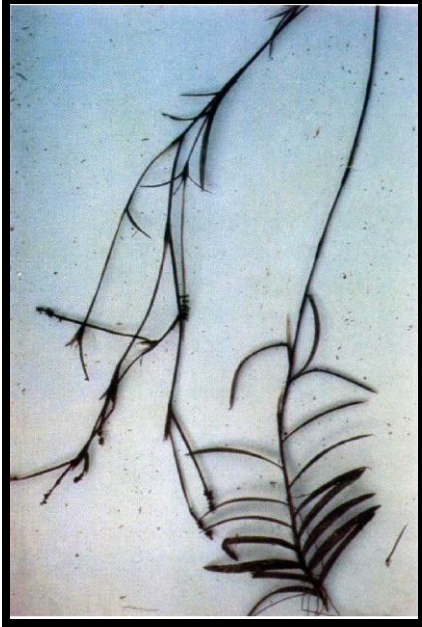
1. Current residential treatment acreages remain below the maximum permit requirement. The southeast quadrant of the lake supports a large wetland ecosystem that exhibits no development within over 500 feet of the shoreline.
2. Use of Aquathol K and diquat should be continued into the 2023 season targeting nuisance native plants. Both the liquid and granular formulations of Aquathol K are more expensive products. Its use with diquat has historically resulted in better control in those areas susceptible to soft, light organic soils. Aquathol K has also been shown recently to exert some of the same properties of other herbicides that are translocated into the plants root structure.
3. A second September broad leaf pondweed treatment should be budgeted.
4. Possible use of granular herbicide formulations to control lily pad growth was considered during 2022 as a result of the sporadic limited growth in some areas of the lake. With the pads sporadic and small the use of granular formulations in conjunction with liquid surface spraying likely will reduce the possibility of runoff. Our use of a newly designed spray nozzle resulted in the herbicide mixture drying faster on the plants avoiding potential wash off.
5. Continue communication between residents and the consultant in an effort to keep property owners informed of the current weed growth conditions, what species are native and noxious, what plants are targeted for control and what plants cannot be controlled. More dialogue between the consultant and the homeowners may result in a better understanding as to the homeowners' concerns. This approach would probably result in a more effective treatment format.
6. Noxious non-native macrophytes (milfoil) at Clear Lake continue to no longer present to be a problematic species. No plants were documented present within the waterbody during 2021 and 2022. How specific species are controlled and what materials should be applied requires evaluation following the spring survey. Actions that may or may not be implemented will probably change on a year to year basis. One year native and noxious weeds may be targeted with a contact herbicide while during other years only milfoil may be targeted with systemic products.
7. The spring survey should be considered the more important of the two scheduled surveys. This survey will determine what plants are targeted and what materials will be used during any treatment year. The late summer survey is performed too late in the season to direct any further native weed control operations. In general the late season identifies where successful control operations occurred and the need for any additional late season milfoil treatments.
8. Limited yellow flag iris control has occurred. Where infestations exist, access is difficult.
9. Early summer and fall surveys should continue in an effort to ensure that if an unexpected increase in milfoil is observed, a quick response can be initiated.
10. Beaver Lake will require budgetary resources during 2023 in an effort to impede future milfoil expansion. These additional resources may reduce the acreages that have been historically treated at Clear Lake for native plant control.
11. The shallow dense weed areas at Beaver Lake prohibit access with outboard powered craft. These areas have historically been neglected when surveying the lake. An airboat type vehicle or other non-outboard vehicle should be required to access and survey these lake zones during 2023.

Budget 2023

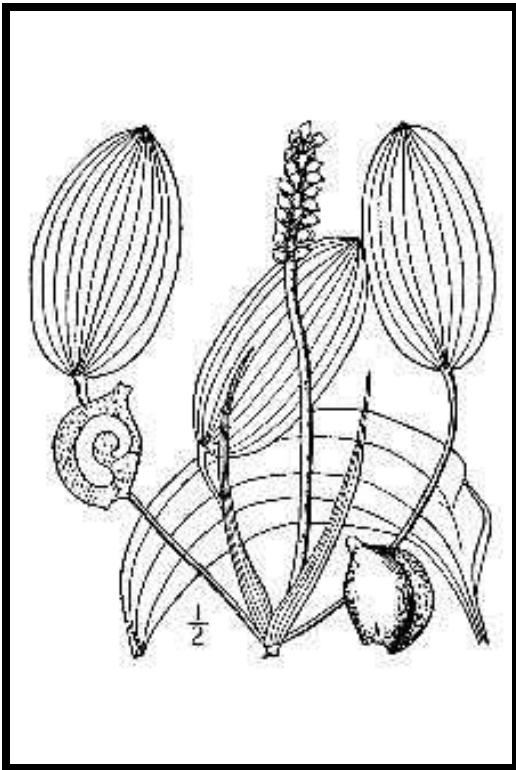
Pre Treatment Survey	2@	\$1,000.00	\$2,000.00
Post Treatment Survey	2@	\$1,000.00	\$2,000.00
Ecology NPDES Permit	2@	\$ 725.00	\$1,500.00
Treatment Mailings	39@	\$ 5.00	\$ 195.00
Weed Control Clear Lake	20@	\$ 300.00	\$6,000.00
Weed Control Clear Lake	5@	\$ 750.00	\$3,750.00
Secondary Weed Control Clear Lake	15@	\$ 350.00	\$5,250.00
Milfoil Control Beaver	10@	\$ 500.00	\$5,000.00
Lily Pad Control Clear	10@	\$ 230.00	\$2,230.00
Annual Project Reports	1@	\$ 650.00	\$ 650.00
Communication			\$ 450.00
Total			\$29,025.00

Noted Native Submersed Macrophyte Species

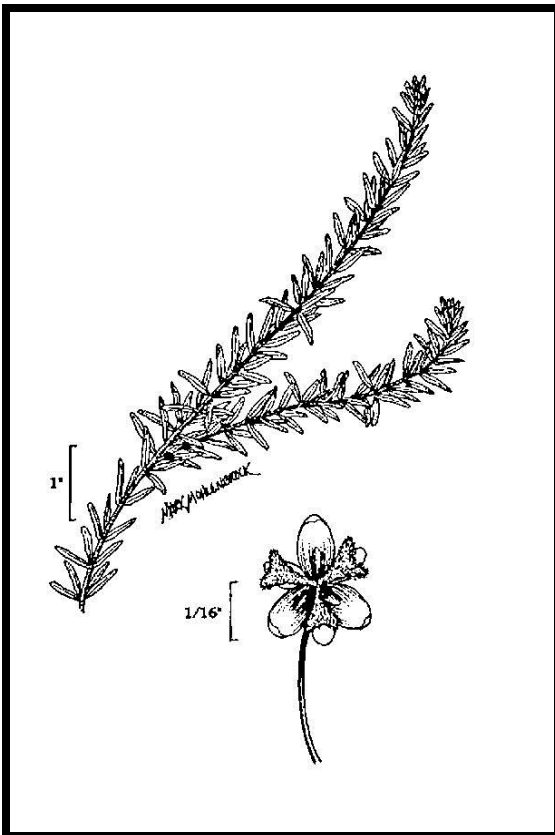
Potamogeton robbinsii



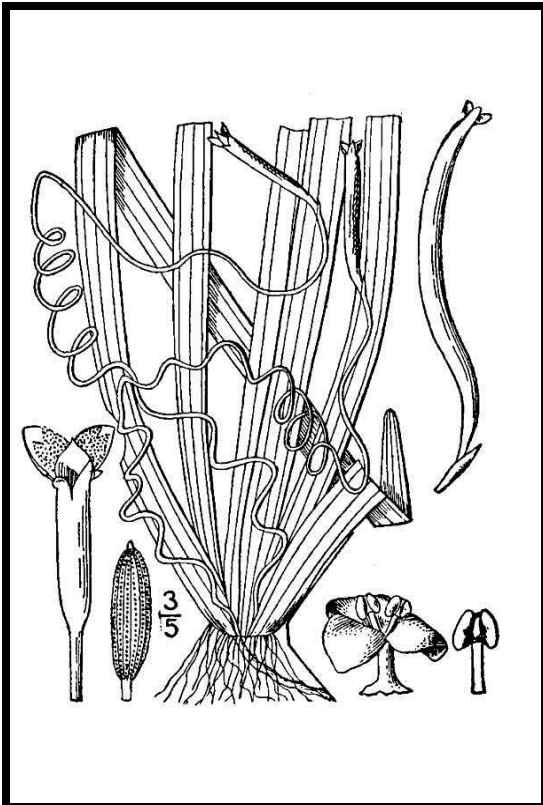
Potamogeton amplifolius



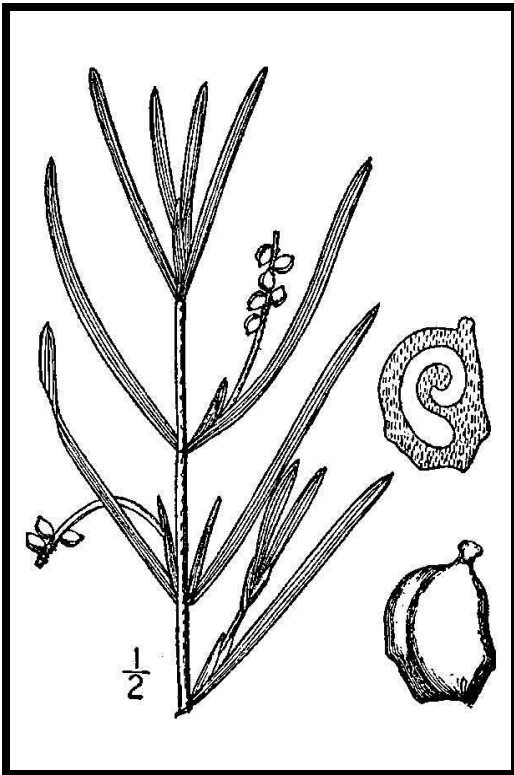
Elodea canadensis



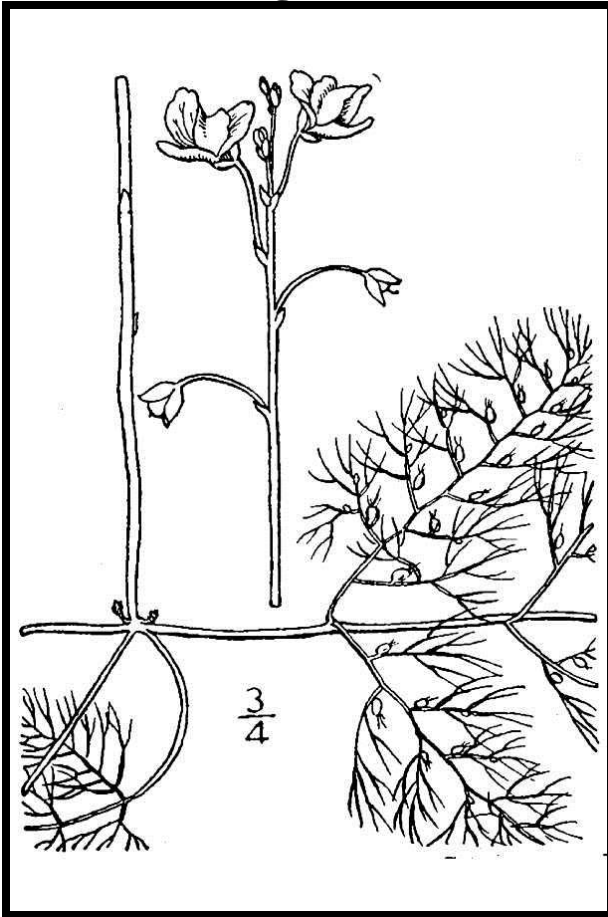
Vallisneria americana



Potamogeton zosteriformis



Utricularia vulgaris



Potamogeton gramineus

