

2018 Clear Lake Aquatic Weed Control Program

Prepared for

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

Prepared by

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Project Overview

This was Northwest Aquatic Eco-Systems (NWAE) seventh year providing aquatic weed control services for the Clear Lake LMD #4 district. Clear Lake has been actively involved with an intense program to eradicate noxious aquatic macrophytes from the system for several years. The Local Management District was formed to specifically address these issues. Targeted species include Eurasian watermilfoil and *Nymphaea odorata*. Densities of Eurasian water-milfoil plants have been reduced considerably and are now contained mainly to an area located by the public swimming area. Lily pad sites have been responding positively to prior years of treatment and this slow process will continue. Some residents living along the shoreline have requested that no herbicides be applied to their lakefront. Such requests have been respected. The entire lake's littoral zone currently supports a wide range of native plant species. Broadleaf pondweed currently is the most problematic species within the residential shoreline areas of the lake. Native weed growth extends outward beyond the 15 foot contour line and consumes much of the entire lake shoreline. These native plant stands also support sporadic single plant milfoil growth.

Resident native species continue to pose the same recreational problems often associated with the milfoil noxious species. Management practices of the lake have evolved over the past few years to incorporate the control of native species at acceptable levels while also monitoring and controlling single milfoil plants that may always remain within the system. The 2018 effort once again utilized the use of Aquathol K along troublesome shoreline areas and diquat within other shoreline sites. The use of both products as either individual applications or as a tank mix has resulted in far superior control during the 2016 & 2017 campaigns. 2018 proved to be a season consisting of explosive quick growth and questionable control associated with what appeared to be unsanctioned treatment.

This 2018 report contains information identified in earlier reports in an effort for reviewers to understand most all the activities undertaken at Clear Lake without requiring the review of each yearly report. Similar to past years' treatments, the public swimming beach was closed down prior to and for 24 hours post treatment during the 2018 submersed weed control component of the project

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.

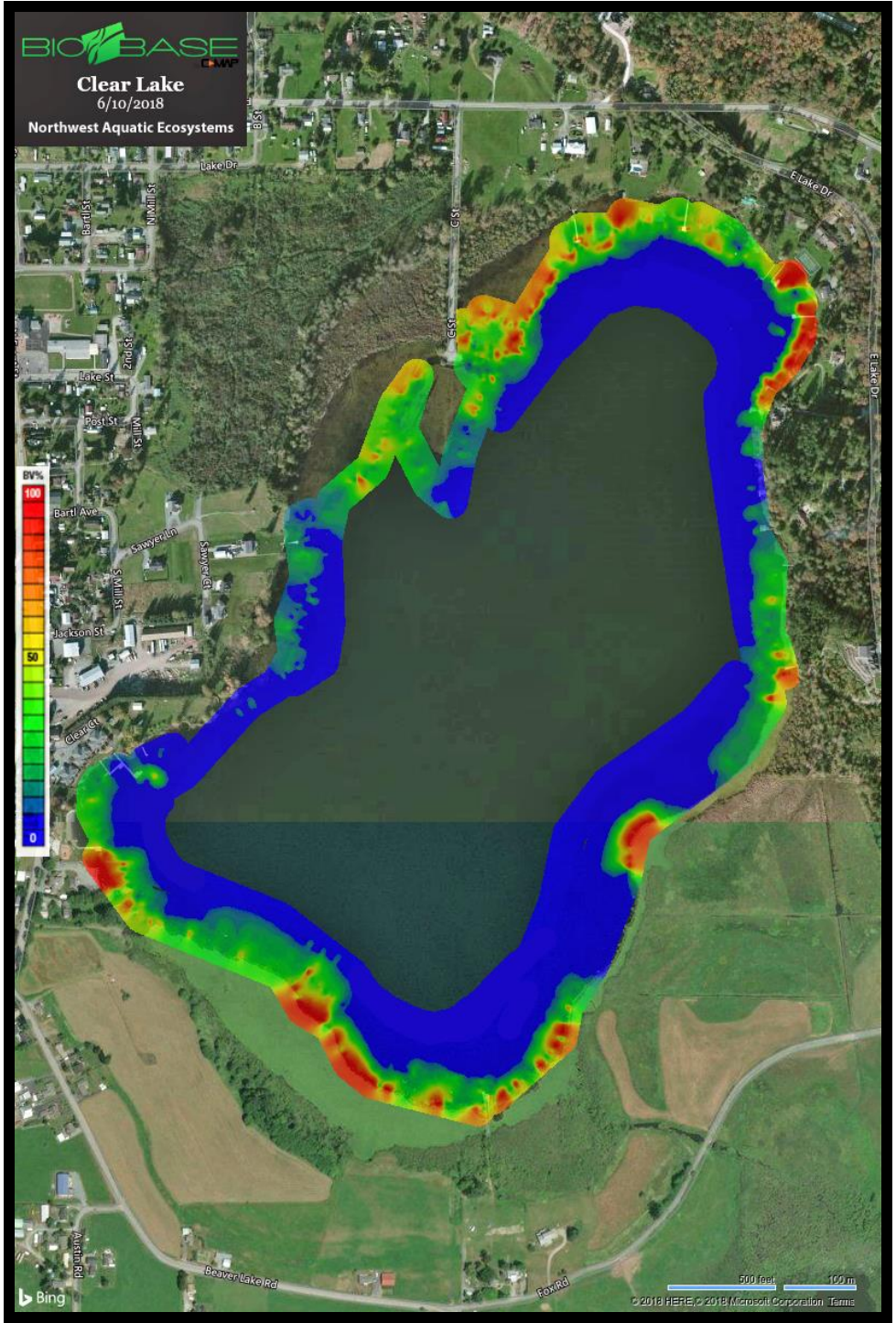
Since 2014 the survey protocol collected sonar data utilizing specific transducers and bottom scanning equipment. The survey boat traveled along pre-determined transect lines that were spaced approximately 100 feet apart. Once the entire lake's littoral zone

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 Lake Pre-Treatment Survey Results 6-10-2018

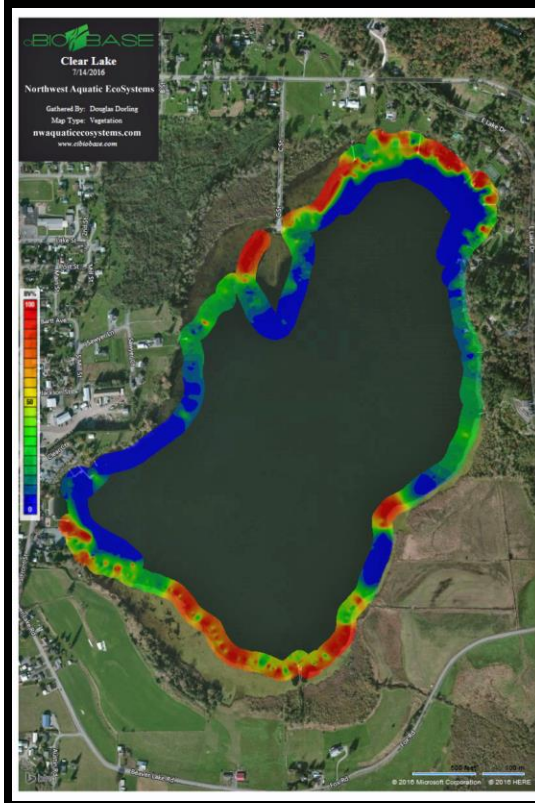
Clear Lake was surveyed on June 10, 2018, one day earlier than our 2017 survey. Water clarity was normal for this time of year with no noticeable green scum observed. As expected, milfoil was identified in the same lake areas as the noxious specie has historically been detected. No new plants were noted in any other lake areas. Plants were sporadic in nature with no plant infestations impacting lake use. Nearly 100% of the lake's shoreline was experiencing various degrees of native plant growth. There were no extended lake shoreline areas that were not experiencing some form of native plant growth. This survey produced similar results as were noted during past years' surveys with weed growth extending outward to the 20 foot contour line. Plant densities had decreased when compared with the 2017 survey. The 2018 survey identified the same native species present that have historically been observed lake wide. Weed densities appeared elevated to those noted in the past. Species identified would include *Potamogeton amplifolius*, *P. robbinsii*, *P. natans*, *P. gramineus*, *Vallisneria americana*, *Elodea canadensis* and *Utricularia vulgaris*. The most prolific pondweed was *P. zosteriformis* while the broad leaf pondweed *P. amplifolius* appears to be increasing in density and range within particular lake areas. *P. amplifolius* is dominant within the northeast residential shoreline area. Other noted thin leafed pondweeds could not be identified in the field. Similar to other lakes in the area, different shoreline sections of the lake were dominated by dissimilar submersed species.

A large segment of the shoreline is absent of residential dwellings. These shoreline areas are targeted to receive no native macrophyte treatment. Unfortunately, these untreated areas typically are 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.

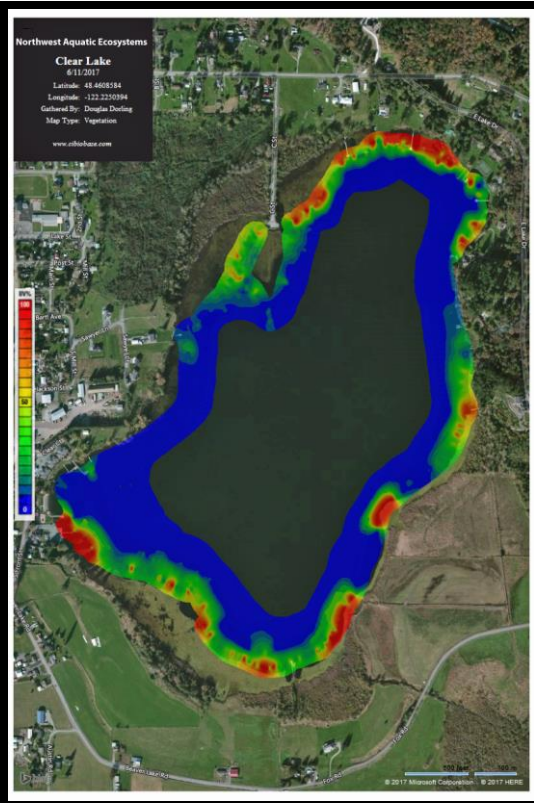


**Spring
Survey
2018**

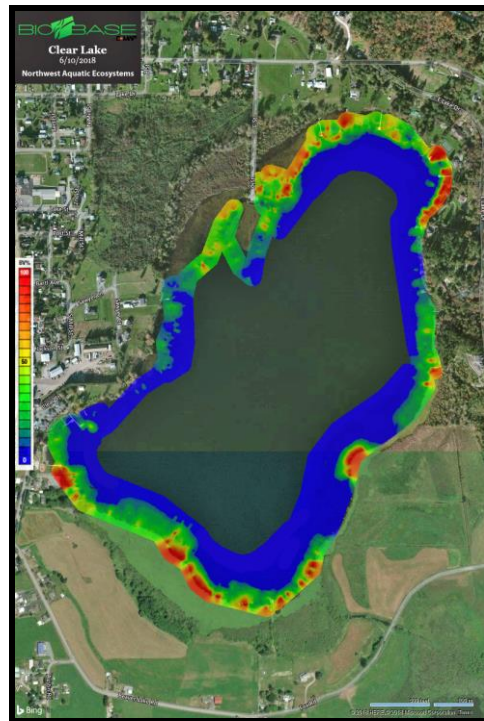
Red areas indicate 100 percent coverage
Blue areas indicate 0 percent coverage



7-14-2016

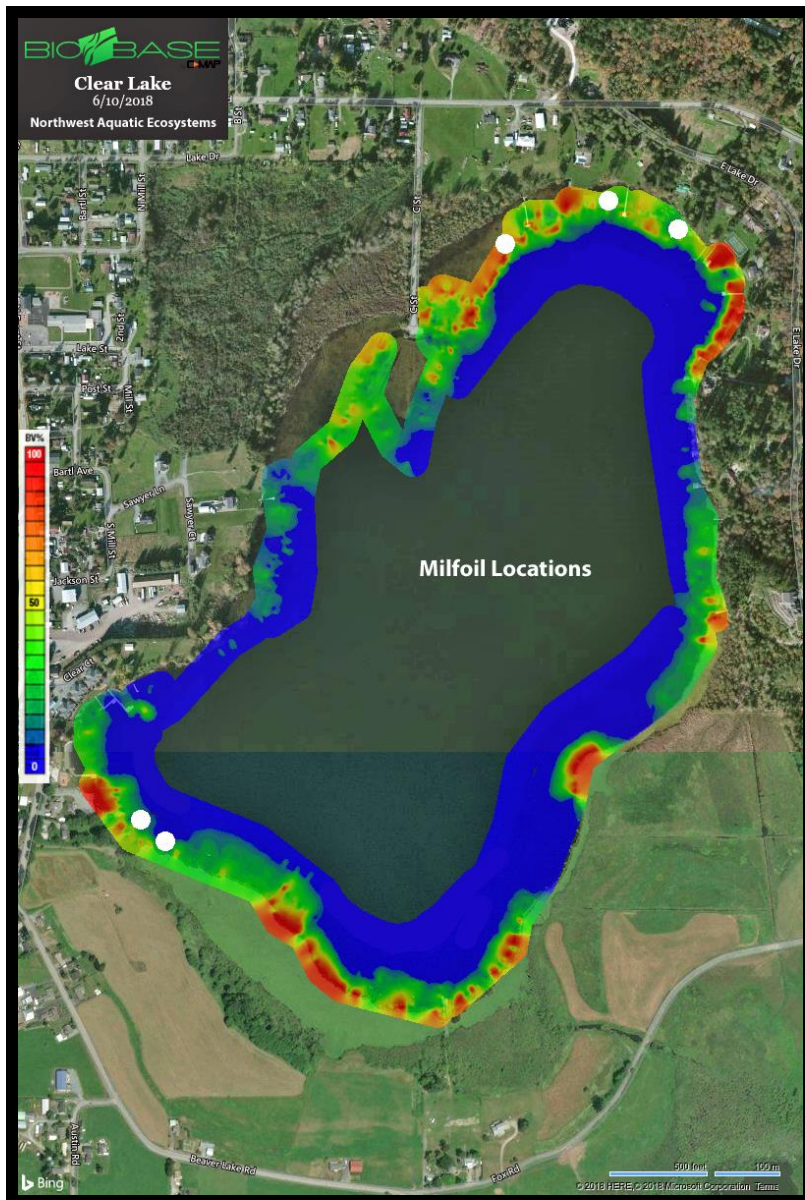


6-11-2017



6-10-18

Note general reduction in plant densities during the early part of the season over the last three years.



August 7, 2018 Treatment

Under current NPDES guidelines, native macrophyte control is limited to no more than 50% of the shoreline or approximately 6,300 feet. The permit also mandates that “the geographic area where the Permittee intentionally applies chemicals must remain the same for the entire length of the permit coverage up to the maximum percentage of the littoral zone allowed by the water body”. In essence, once native plant treatment sites within Clear Lake reach the 50% threshold level, no further expansion of the treatment areas are permitted. The new cycle period for the next permit began during 2016. With the establishment of the new permit cycle, changes in the treatment areas can be

evaluated and altered, if necessary, to conform to the fluctuating environmental conditions lake wide.

Our approach during 2018 was similar to past treatments. Provide lake property owners with an acceptable degree of native plant control while continuing the project goals of attacking milfoil infestations when identified. *In the past, much of the eastern residential portion of the lake shoreline was left untreated at the request of a family member. This family member represented himself as having jurisdiction over all of the parcels within this specific shoreline area and that no treatment was to occur. During 2017 we were notified by one of the family members that the person we had been talking with was not authorized to speak on behalf of the other family members and in fact, didn't own any of the parcels in question. These parcels were treated during 2017 and again during 2018. The main concern was lily pad issues.*

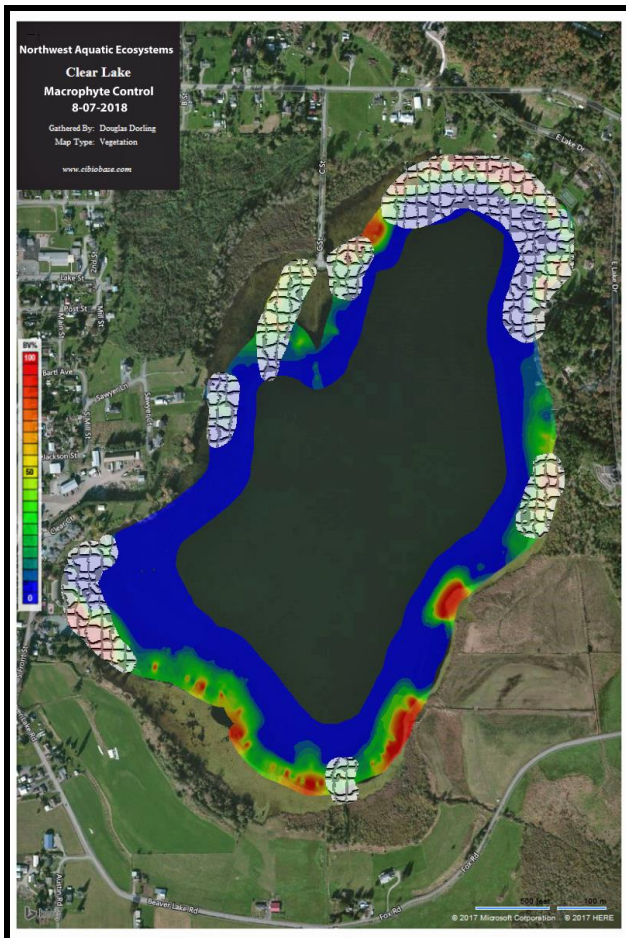


Shoreline posting was conducted on the day of treatment. A two-person crew initiated posting and treatment of the lake upon arrival in the early morning. Early site arrival was necessary in order to ensure that no public beach participants had arrived for daily site use. One of the treatment boats was utilized in posting the shoreline, public launch and swim area while the other treatment boat proceeded to treat areas that had been posted. Signage posted on the swim beach indicated that lake water use was closed during the treatment and for 24 hours post application. 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 glyphosate sprayed directly onto the floating leaves.

Yellow Flag Iris was also treated during this event. The same spray mixture used for the lily pad control was also incorporated into the iris control. Iris typically require a few weeks before showing signs of the application. The process is slow but the mixture used is very effective against iris.



**Targeted
Submersed
Weed Control
Sites**



Swim Beach Closure Sign

Unauthorized Treatment?

At the time of the initial treatment, large sections of the lake were experiencing thick dense floating filamentous algae growth in lake areas where floating pondweeds and lily pads appeared to have been sprayed. It is nearly impossible to determine what material was used that resulted in the “burning” of the floating pads and plant leaves. One can confidently conclude that the material was sprayed at too high of a concentration on a hot sunny day resulting in only the burning of the plants’ surface leaves. Pondweed subsurface leaves were still healthy and actively growing while floating pads, although damaged, still contained healthy green pad areas. None of the pads appeared to be severely sick but exhibited the typical response associated with spraying from the outer edges - not being able to extend into the middle of the infestation and spraying with the nozzle adjusted at a straight stream pattern instead of a more dispersed fan configuration.

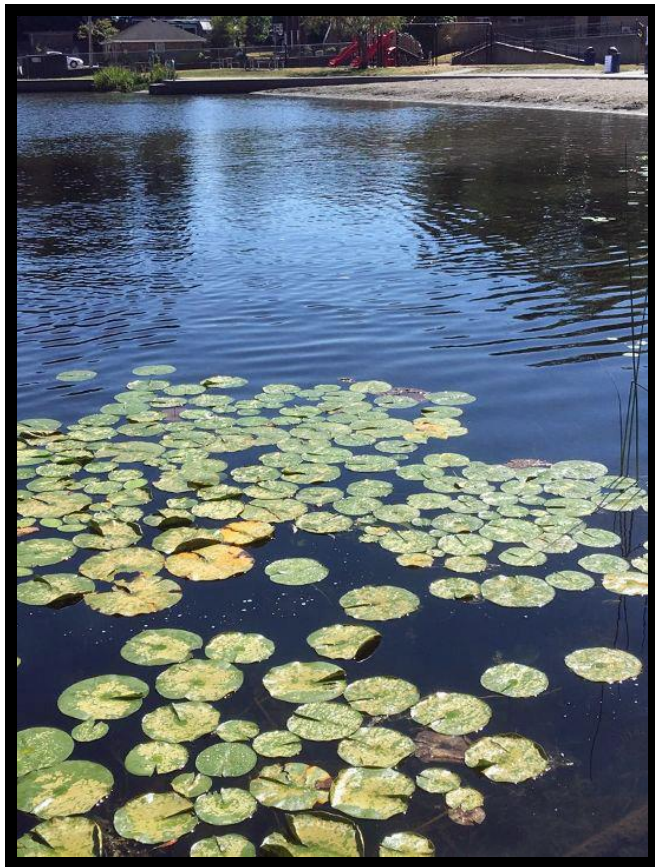
It is unlikely that these attempts to control the plants would have been successful; simply because the wrong material was used at an elevated concentration resulting in only the burning of the surface leaves while leaving limited, if any, impact on the submersed leaves. What the spraying did accomplish was to provide surface decaying vegetation that offered a nutrient source for algae growth that remained attached to the healthy stems and leaf components below the water’s surface. These problematic algae mats likely would

have remained throughout most of the summer if additional action was not taken to properly control the plants.



1. Brown curled floating leaves.
2. Attached filamentous algae growth.

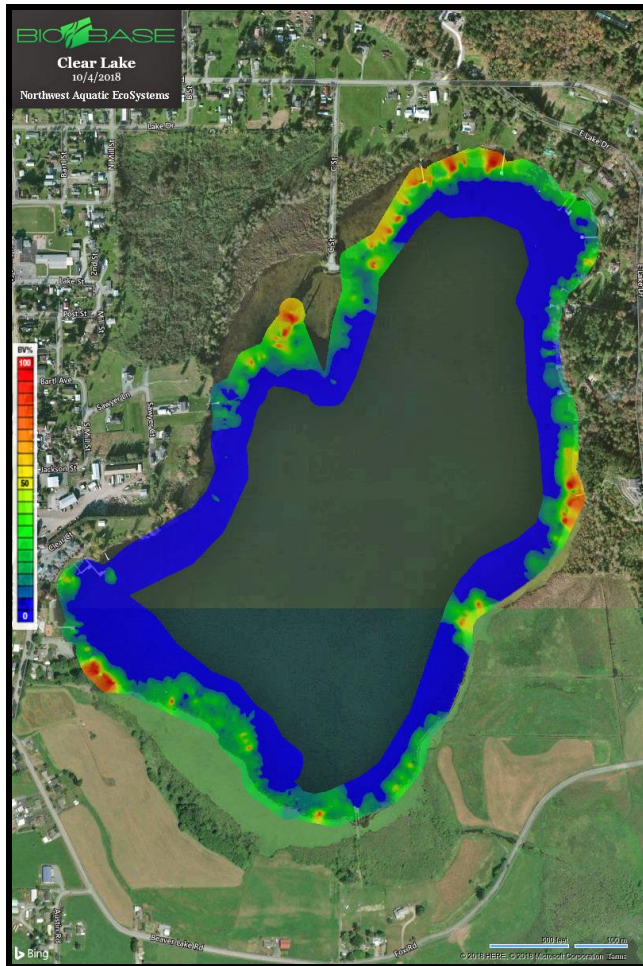




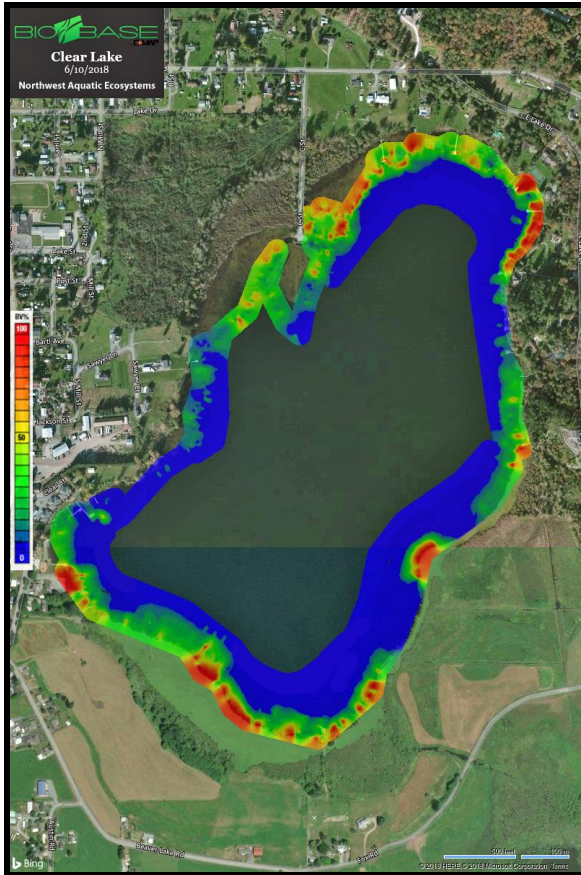
Clear Lake was inspected on August 19, 2018. All of the sites treated earlier in the year were responding to the treatment. All of the floating filamentous algae issues had been resolved.

Fall Survey 10-04-2018

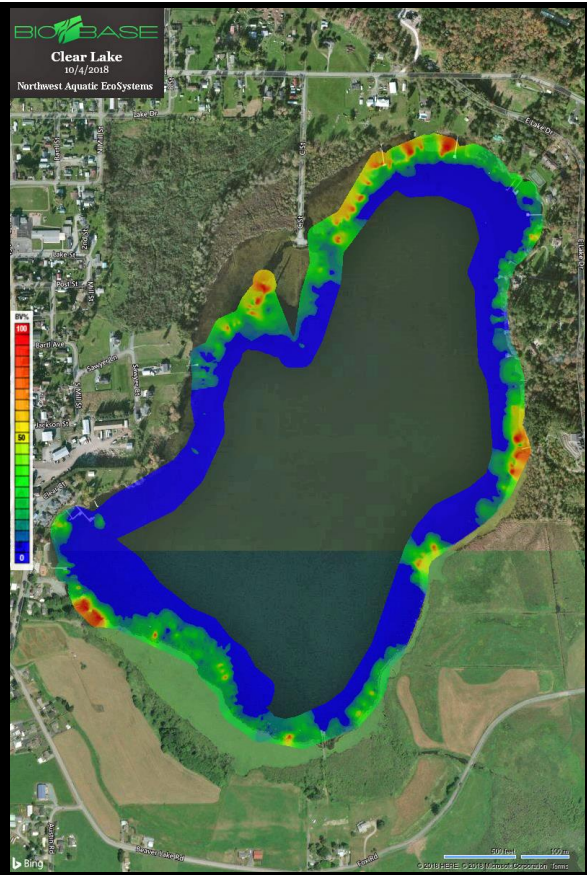
The fall survey was performed on October 4, 2018. Three milfoil plants were identified along the southwest shoreline east of the public swim area. Results within the individual treatment sites varied considerably from excellent to poor. Areas that had received treatment earlier in the season were noted consisting of macrophyte communities that were considerably reduced in density from those lake sections not treated. Boat passage through some of the non-treated shoreline areas was difficult.



Fall Survey



Spring 2018



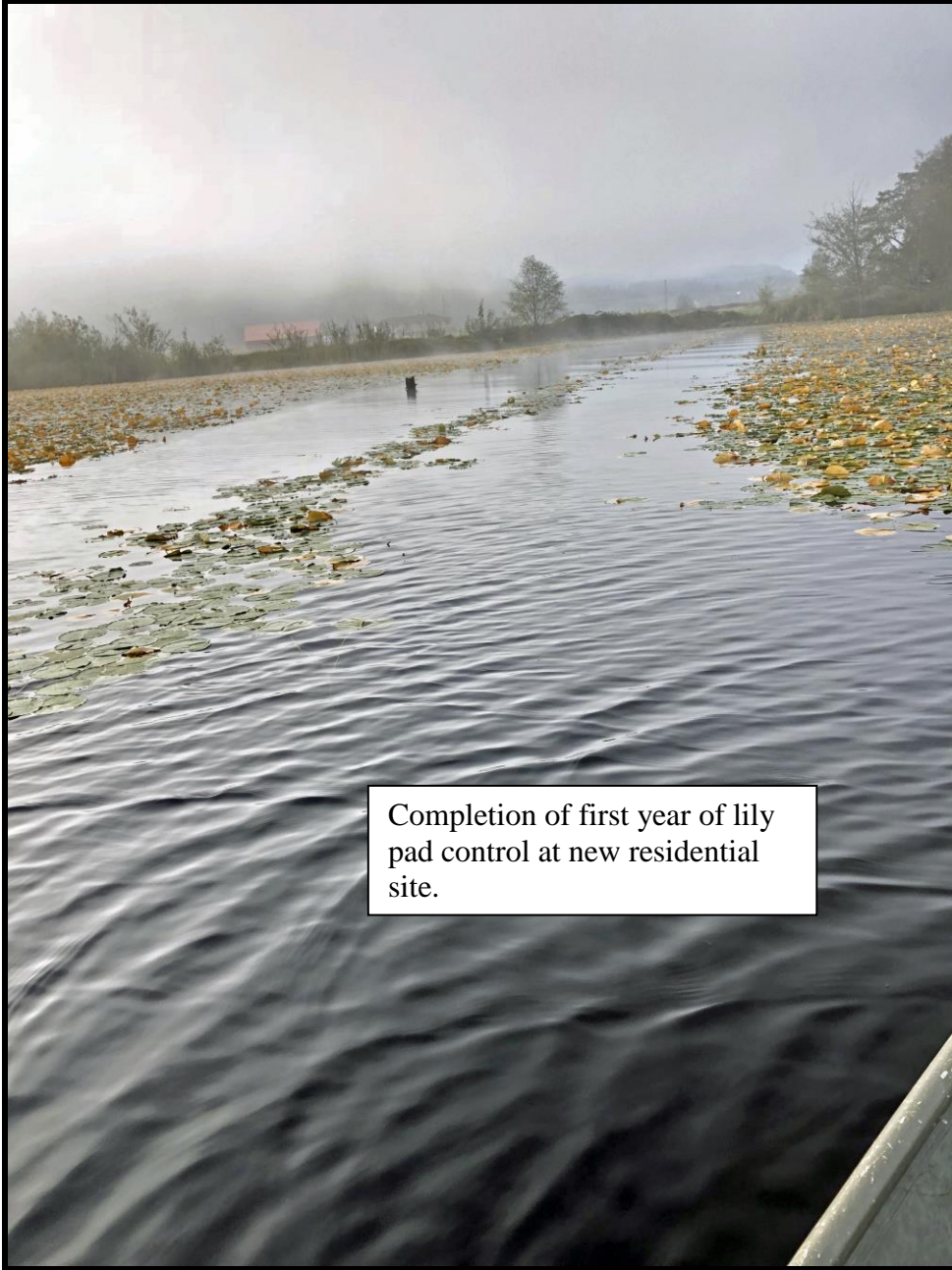
Fall 2018

Lily Pad Control

Lily pad control continues on a yearly basis. Since the onset of initiating lily pad control in 2007, large areas of the lake have been opened up for boat traffic. In particular, the boat launch area once provided for only a single lane of access. Now the site supports easy access from both sides of the launch site.



**South Side Boat
Access Lane**





2007

2017

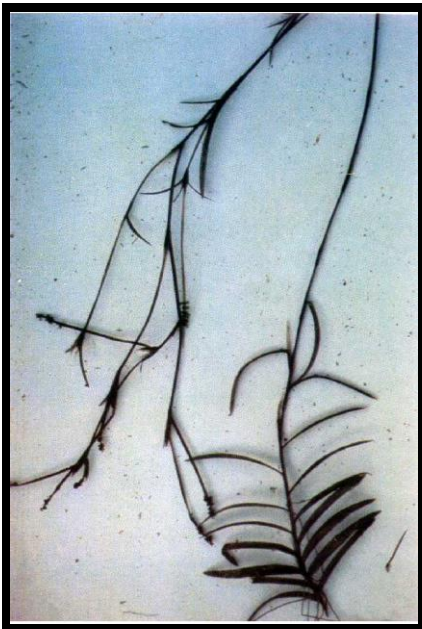
Recommendations

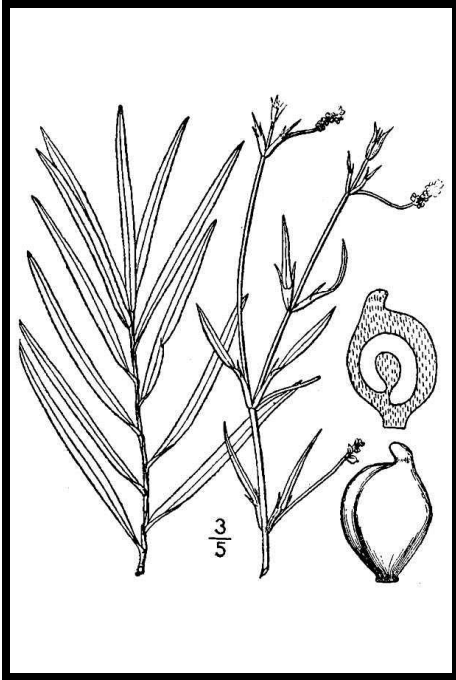
1. Clear Lake supports sufficient nonresidential shoreline areas that can adequately provide the required fisheries habitat without impacting residential recreational use. Current residential treatment acreages remain below the maximum permit requirement.
2. In the past, there has been only one native weed species that has proven to be difficult to control. *Vallisneria americana* (tape grass). This species continues to expand coverage lake-wide. Difficulties associated with the control of broadleaf pondweed proved to be an issue during 2018 because the granular formulation of Aquathol K was not available.
3. Use of Aquathol K and diquat should be continued into the 2019 season. Production of granular Aquathol K was initiated again toward the close of 2018 and will be available for the 2019 season. Although both the liquid and granular formulations of Aquathol K are more expensive products its use with diquat has 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 down into the plants root structure.
4. 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 species, 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. Such communication during 2018 resulted in the addition of a new lily pad treatment site to the project.

5. Noxious macrophytes appear to no longer represent the problematic species lake-wide. The range and location of milfoil plants have stabilized and not much expansion has been detected over the years. Only a few plants currently coexist in mixed stands of native species. Low density milfoil growth has been controlled with either contact herbicides or specifically targeted with systemic materials. How these 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.
6. 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, this survey will identify where successful control operations occurred and the need for any additional late season milfoil treatments.
7. Limited yellow flag iris control has occurred. Where infestations exist access is difficult.

Dominant Submersed Macrophyte Species

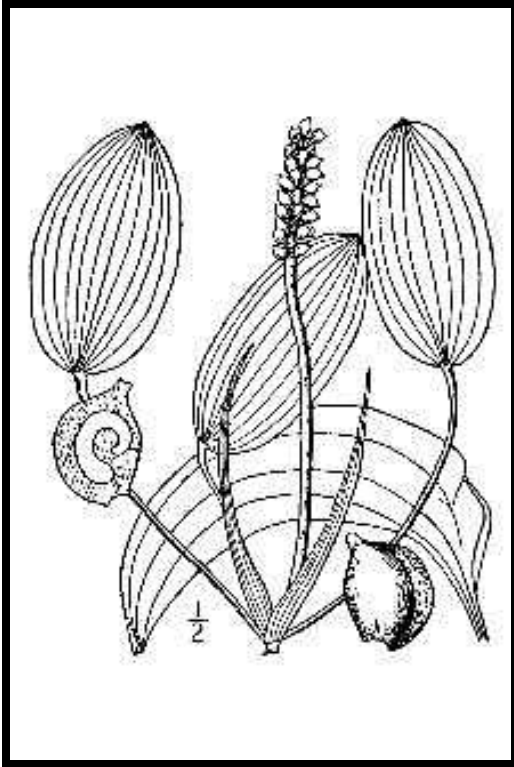
Potamogeton robbinsii





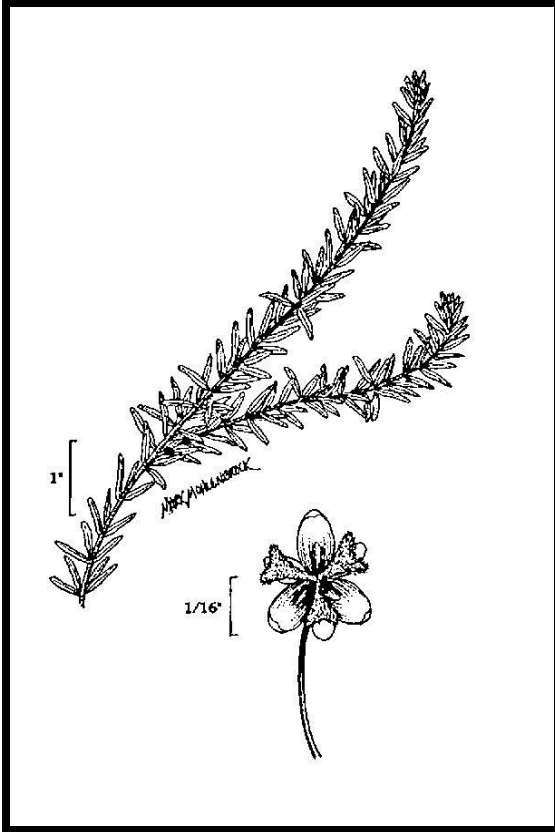
Potamogeton amplifolius





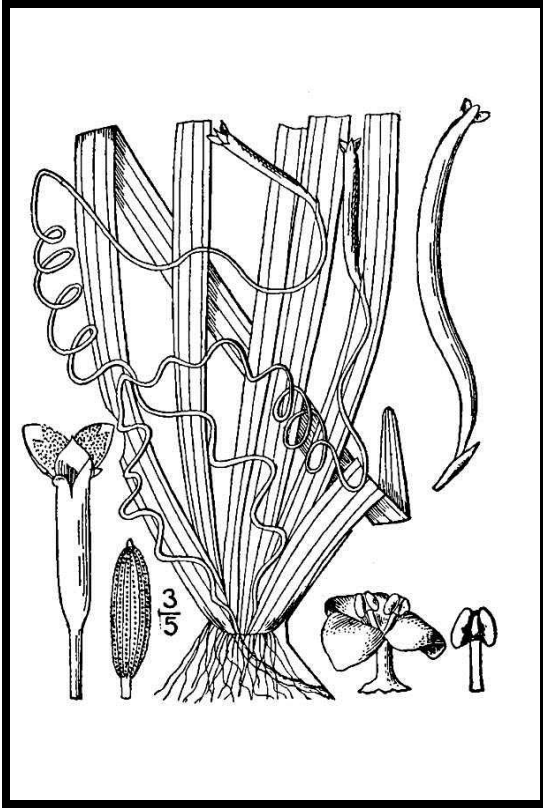
Elodea canadensis



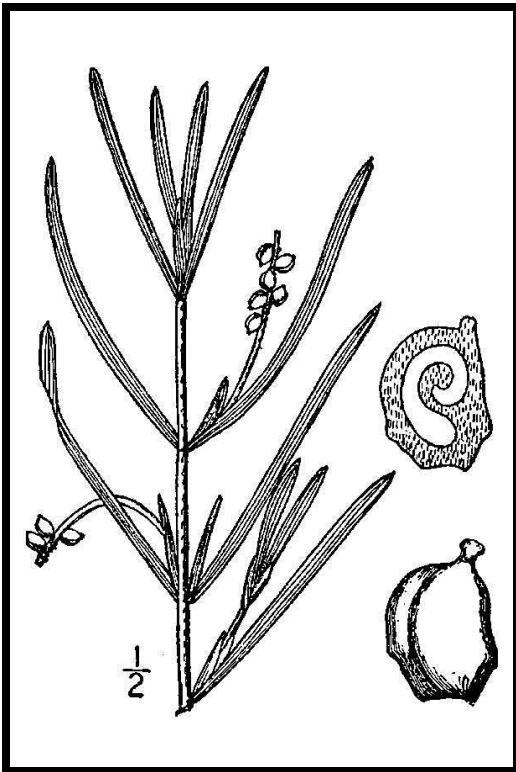


Vallisneria americana

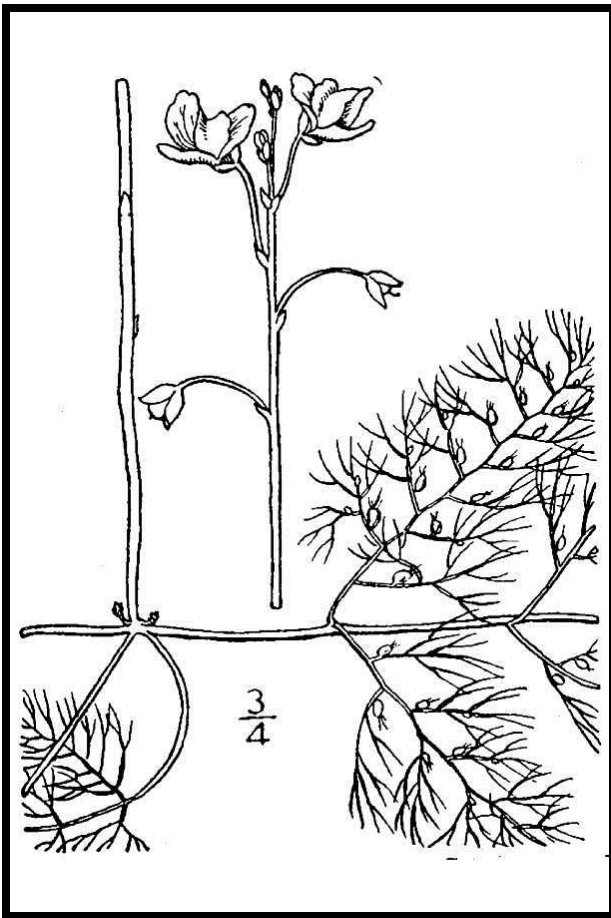




Potamogeton zosteriformis



Utricularia vulgaris



Potamogeton gramineus

