Clear Lake
2013 Aquatic Plant Control Program

Prepared By
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Project Overview

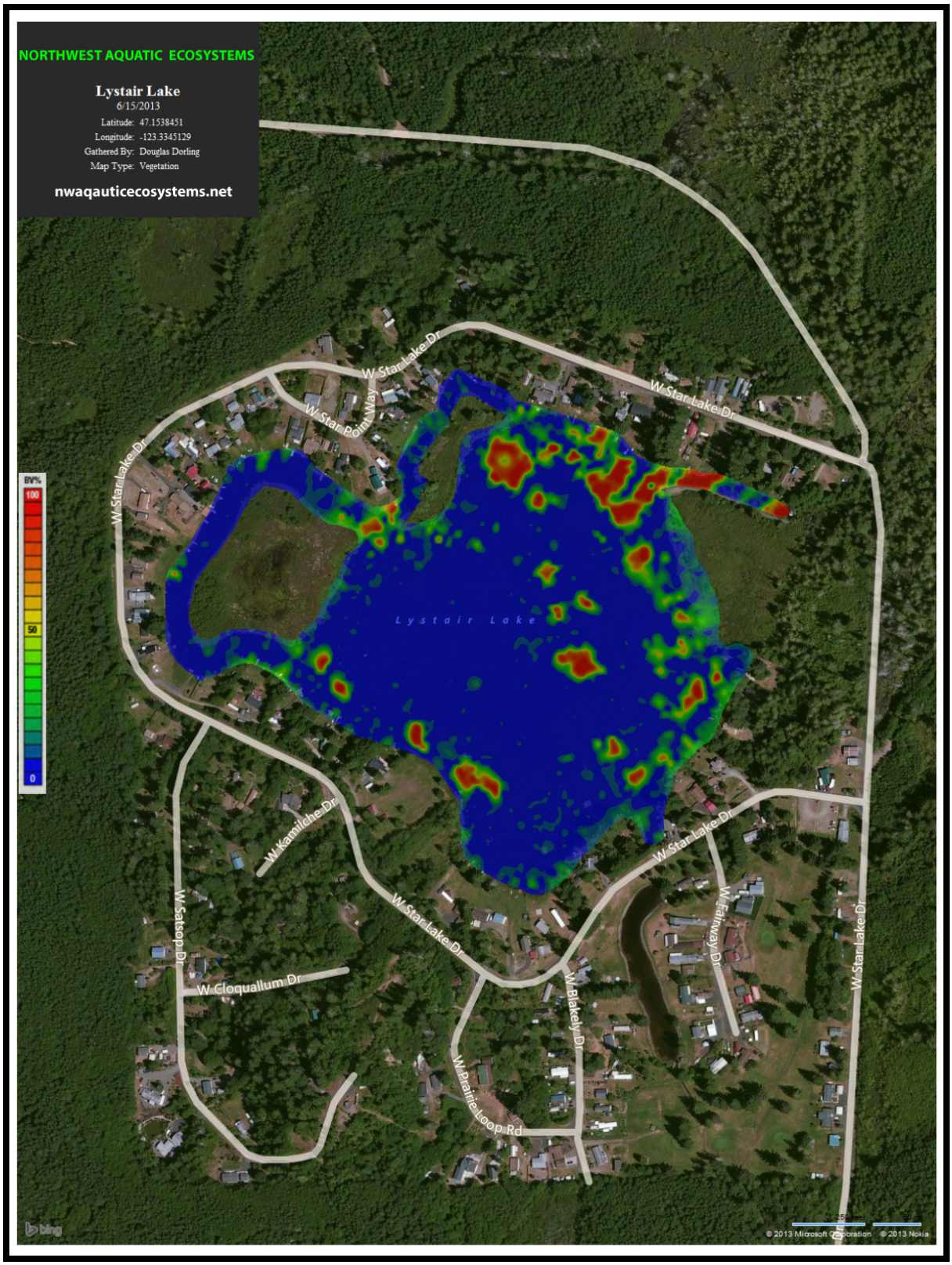
This was Northwest Aquatic Eco-Systems (NWAE) secondt year of providing aquatic weed control services for the Clear Lake LMD #4 district. Clear Lake has been actively involved with an intense program to eradicate noxious aquatic macrophytes from the system. Targeted species include Eurasian watermilfoil 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 are responding positively to years of prior treatment and this slow process will continue. All of the lakes littoral zone currently supports a wide range of native plant species. This 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 now pose the same recreational problems often associated with the milfoil noxious species. Management practices of the lake have evolved to incorporate control of native species at acceptable levels while also monitoring and controlling single milfoil plants that may always remain within the system.

This 2013 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.

Survey Protocol

Survey techniques were typical of those considered as “standard protocol” throughout the industry. This year however NWAE incorporated new state of the art surveying equipment in an effort to produce a survey that could easily be understood by all reviewers Typically, past sampling consists of manually retrieving weed samples from numerous locations lake-wide while observing growth through the water column. Although effective, individual bottom sampling can only identify plants within the immediate area sampled. Visual observations when water clarity permits is a far superior method for plant inventory since it allows for inspection of the entire lake bottom wherever the survey boat operates. This avoids the possibility of missing plants between bottom surveying data points. The procedure employed encompasses a surface vehicle shadowing the weed bed borders and collecting data points corresponding to small or large occurrences of plants. To ensure the efficacy of the survey, a bottom sampling rake is thrown from the boat at various locations lake-wide. The rake is then drawn across the lake bottom, brought to the surface and into the boat. Plants attached to the rake are identified and confirmed as being the same species as noted visually through the water column. If the lake bottom is void of plants, no data is stored. The survey boat typically spends the entire survey within the lakes littoral zone while completing the task. The system produces sub meter and automatically calculates and stores the position of every data point enabling the mapping of thousands of data points on a daily basis. Either single data points can be entered or features such as line boundaries can be recorded. Data points are then assembled as a map layer, which are then incorporated, into the project file.

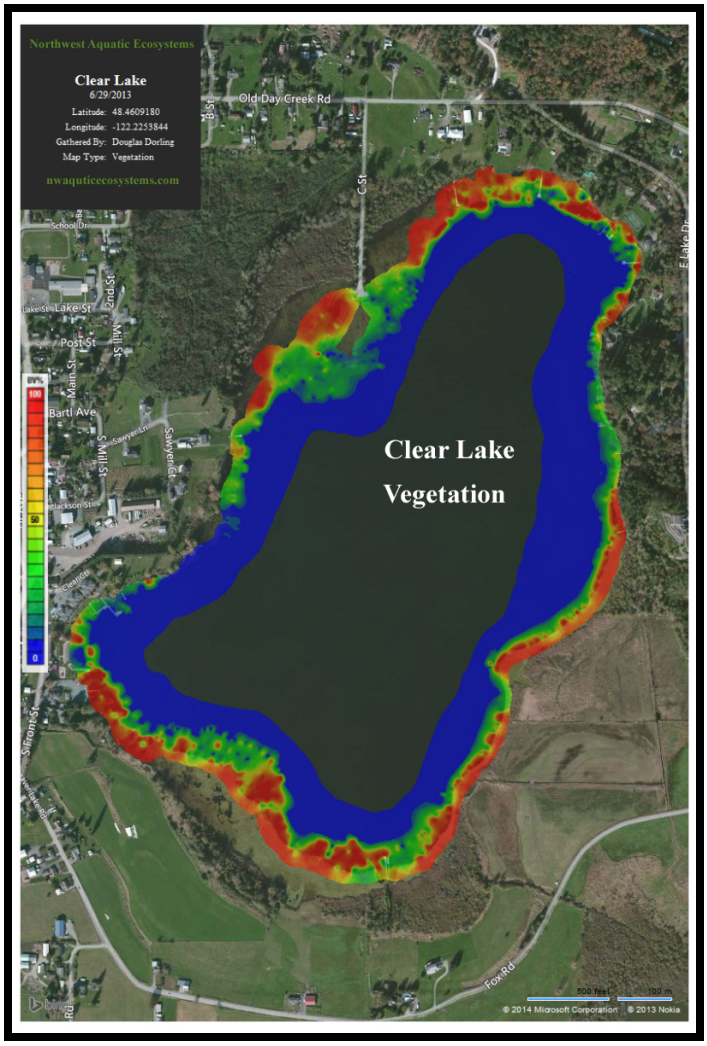
During 2013 sonar data was collected utilizing specific transducers and bottom scanning equipment. Once collected the SD card was uploaded via. cloud based technology and the processing of the data was finalized. The resulting product is a color coded map of the lake bottom identifying weed growth areas 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 boats survey track. When non native milfoil species were identified a milfoil specific data point was added to the transect line.



Lystair Lake Shelton WA. vegetation survey

Clear Lake Pre Treatment Survey Results

Clear Lake was surveyed on June 29, 2013. Water clarity was good with visibility reaching nearly to the bottom throughout most of the lake's littoral zone. Milfoil was present but was only noted as very sporadic single plants within one area of the lake. Much of the 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. To a large extent, most of the dense growth extended just beyond the dock areas The NWAE survey identified a number of native species present Potamogeton amplifolius, P. robbinsii, P. natans, P. gramineus, Vallisineria americana, Elodea canadensis and Utricularia vulgaris. The most prolific pondweed was P. zosteriformis while there were other thin leafed pondweeds that 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.



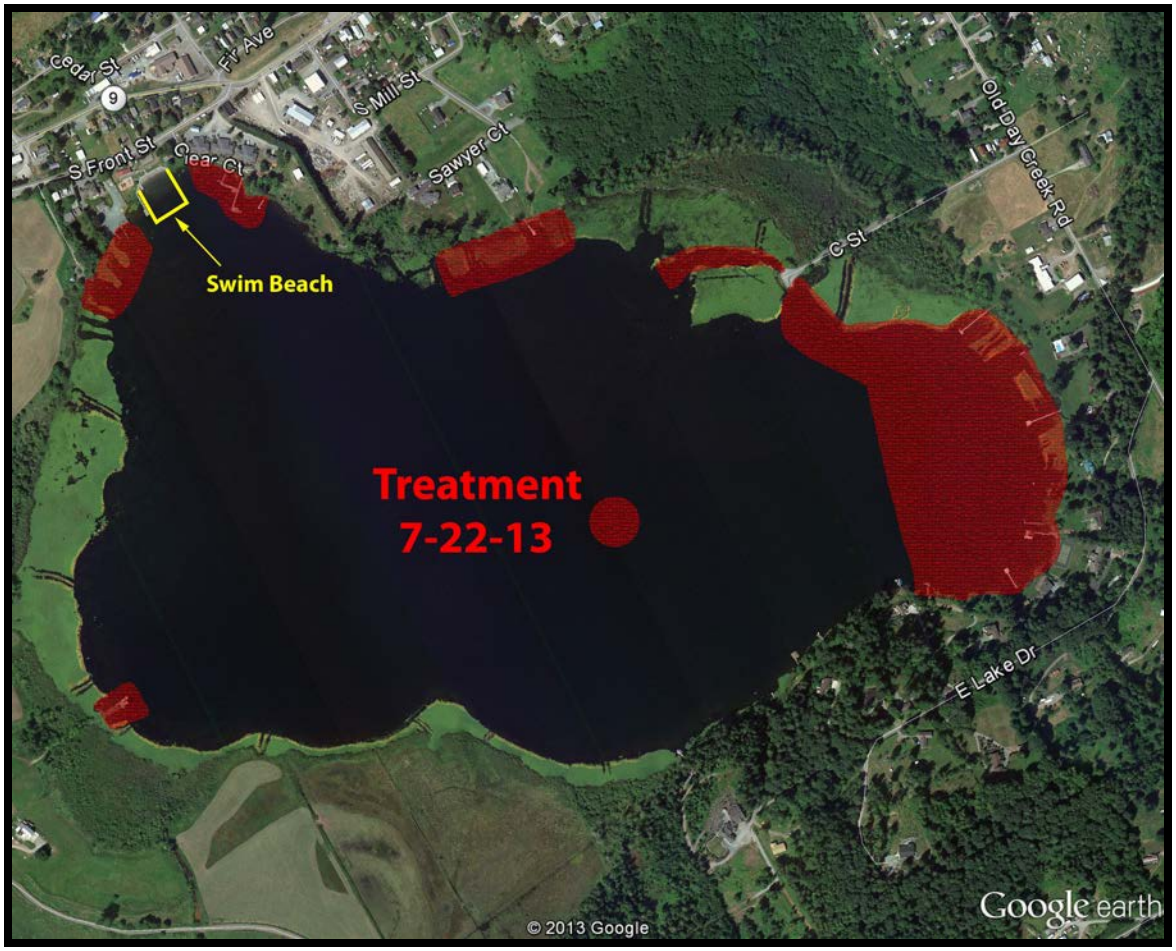
Red areas indicate maximum plant biomass occupying the entire water column.
Blue areas indicate no plant biomass, green 50% coverage

July 22 Treatment

Clear Lake is 200 acres with a shoreline length of 2.4 miles. Under current NPDES guidelines, native macrophyte control is limited to no more than 50% of the shoreline or approximately 6,336 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 and the areas treated cannot be changed until 2016.

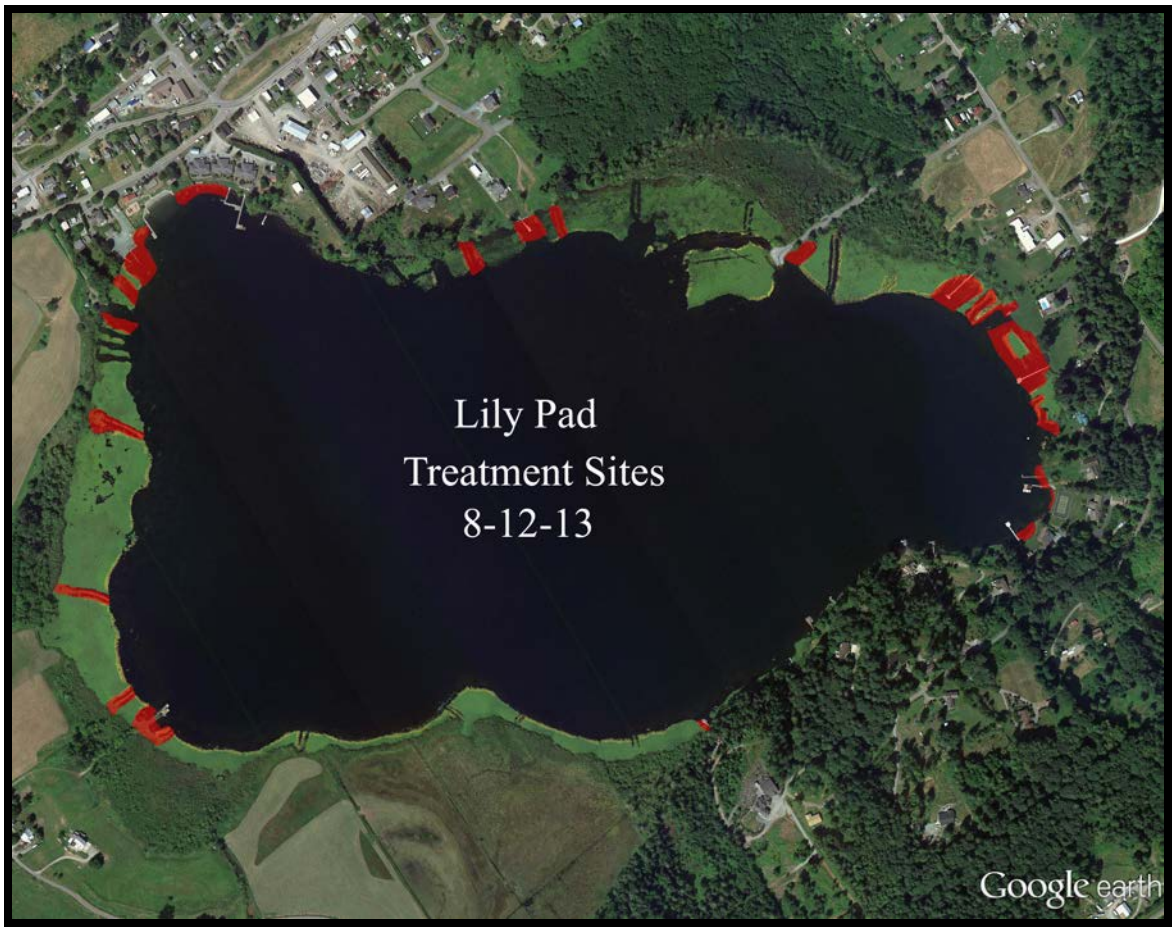
Our approach during 2012 was to initiate native plant control operations and to ensure compliance with current permit regulations while also affording lake property owners an acceptable degree of control. Since most of the residential areas are located along three basic shoreline areas, development of a compliant treatment model proved to not be an issue. The treatment model was designed to adhere to the 50% rule.

Shoreline posting was conducted on the day of treatment. A two person crew initiated posting of the lake upon arrival in the afternoon and treatment began approximately one hour later as the application vehicle shadowed the posting vessel. 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 then 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. All of the targeted submersed and floating plant sites were treated on July 22. Once mixed, the application boat drove along the shoreline identifying targeted sites and the spray mixture was then discharged using a spray gun. Tanks were refilled and dispensed as needed. One boat driver and two sprayers were used during this phase of the project. 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.



August 12 Treatment

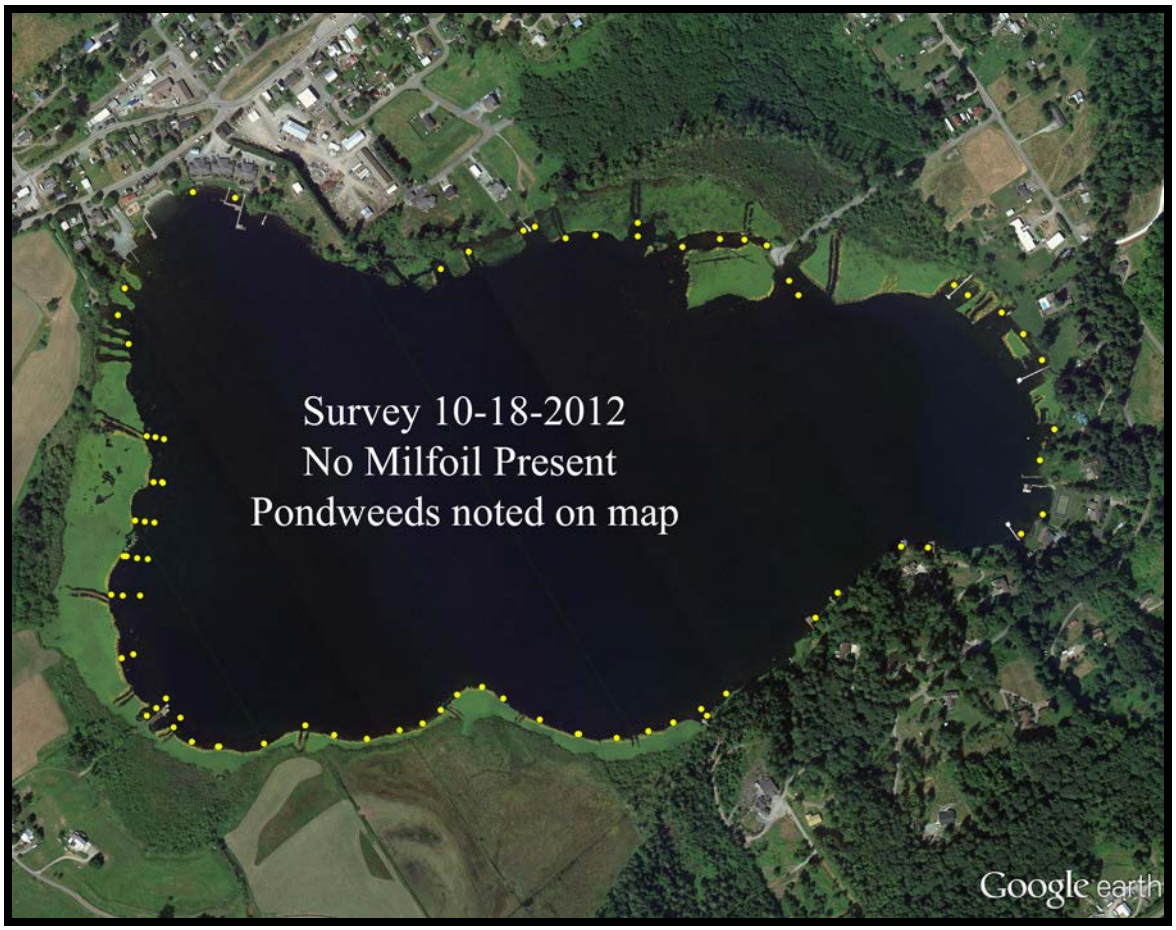
Lily pads within the residential shoreline areas of the lake were treated. Prior to treatment, shoreline posting was completed. During this spray event a 16 foot aluminum gas powered vehicle was utilized. Once mixed, the application boat drove along the shoreline identifying targeted sites and the spray mixture was then discharged using a spray gun. Tank was refilled and dispensed as needed. One boat driver and one applicator were used during this phase of the project. Once again the spray mix was blended on board in a 25 gallon tank and then discharged through a hand held spray nozzle directly onto the lily pad floating leaf surfaces. Pads were sprayed with a 1.5 % solution of glyphosate. In the course of this spray event it was noted that some of the previous areas targeted during past treatment seasons had created floating lily pad root mats. This occurrence is not unusual when large lily pad infestations are targeted for eradication. Future treatments will need to recognize this developing concern. Mats dislodged from the bottom typically drift throughout the lake with some mats eventually coming to rest residing along residential shorelines.



Fall Survey

The fall survey was performed on October 18, 2012. No milfoil was identified throughout the littoral zone of the lake. Many of the pondweeds had already decomposed however patches of Potamogeton robbinsii were evident. All of the targeted native sites remained virtually weed free and were exhibiting safe recreational lake waters from the shallow immediate shorelines extending outward to the 15 foot contour line.

It was apparent that native plant biomass had been reduced considerably and that there were no diquat problems associated with wave or wind action. Clear Lake appears to be more of fishing and swimming resource then one used heavily for water skiing and boating. Targeted lily pads throughout the lake responded well to treatments. Obvious visual discrepancies existed between those sites targeted for control and those left untreated.



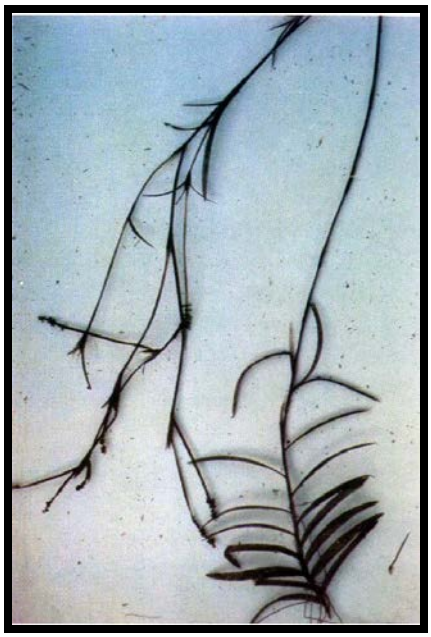
Recommendations

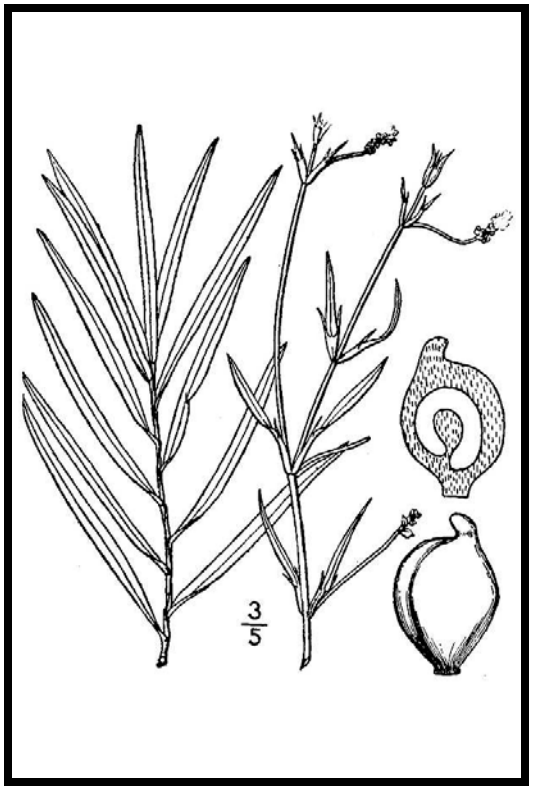
1. Permit guidelines that mandate leaving 50% of the shoreline untreated for native vegetation control has been achieved. The 2012 treatment format still allows for approximately an additional 1,000 feet of shoreline to be incorporated into the program if necessary before achieving the 50% threshold. Clear Lake supports ample nonresidential shoreline areas that will adequately provide the required buffer without impacting residential recreational use.
2. There is only one native weed species that will prove to be difficult to control when necessary. Vallisneria americana (tape grass). Presently this species is not one of the dominant weeds lake-wide but is noted sporadically throughout the lake.
3. During all of our appearances on the lake, problems associated with wave and/or wind action did not influence or impact treatments.

4. Contract terms should be limited to no less than two years. A one year contract does not afford the consultant the ability to implement changes to a treatment scenario or revisit the site during the season in an effort to improve the efficacy of the treatment. One year contracts discourage consultants from seeking alternatives that might improve on past years practices.
5. Residents need to be informed of the current weed growth conditions and what species are native and noxious species, what plants are targeted for control and what plants cannot be controlled. The NWAE team had contact and correspondence with approximately twelve homeowners many exhibited an eagerness to learn more about the process. 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 species 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. Plants currently coexist in mixed stands of native species. Low density milfoil growth can now seasonally be controlled with either contact herbicides or specifically targeted with systemic materials. How these species are controlled and what materials should be applied requires evaluation preceding 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. The apparent growth of the milfoil during the non-treatment year of 2010 to 2011 supports this approach.
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 this survey will identify where successful control operations occurred and the need for any additional late season milfoil treatments.

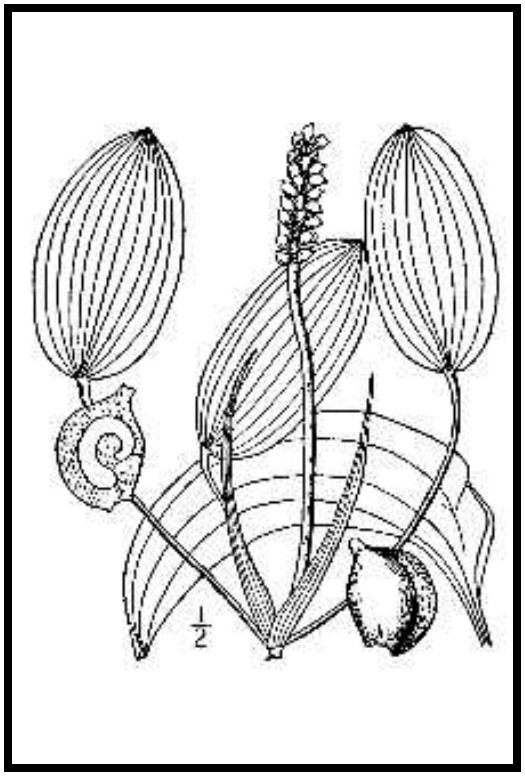
Dominant Submersed Macrophyte Species

Potamogeton robbinsii





Potamogeton amplifolius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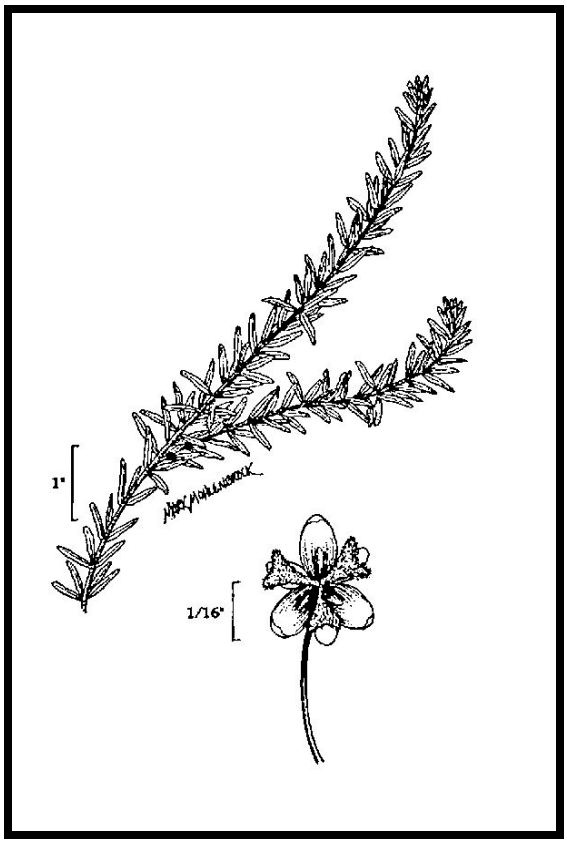
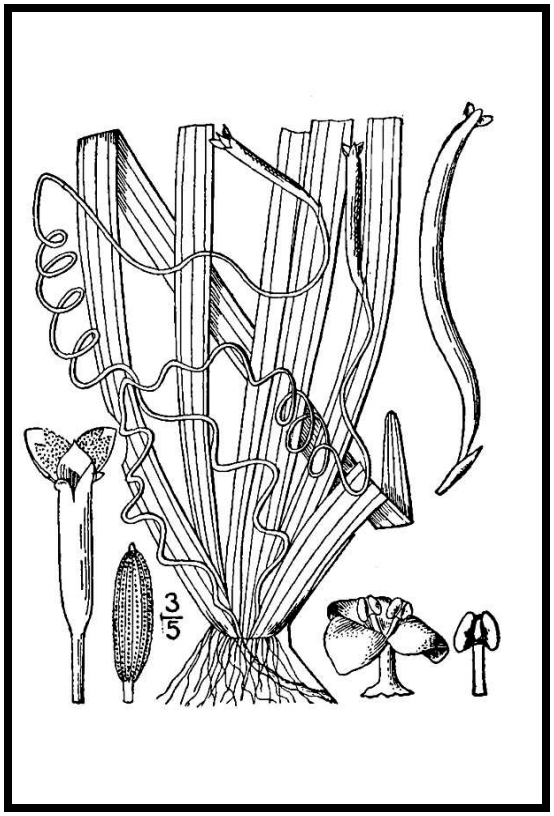
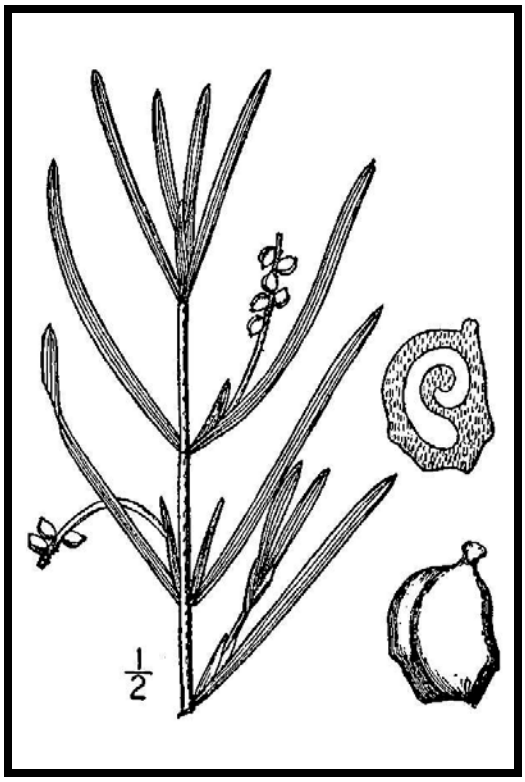
Elodea canadensis



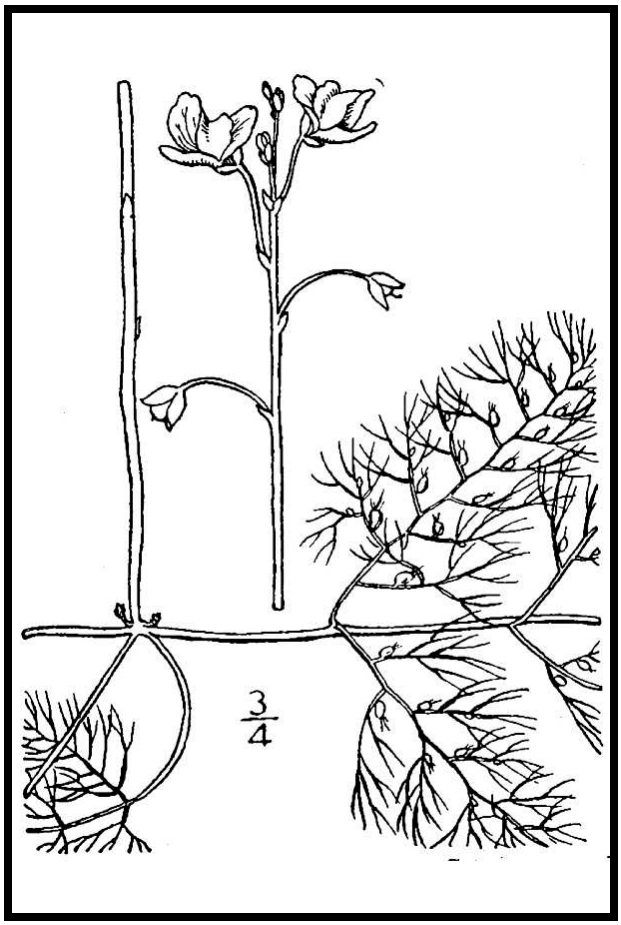
Vallisneria americana



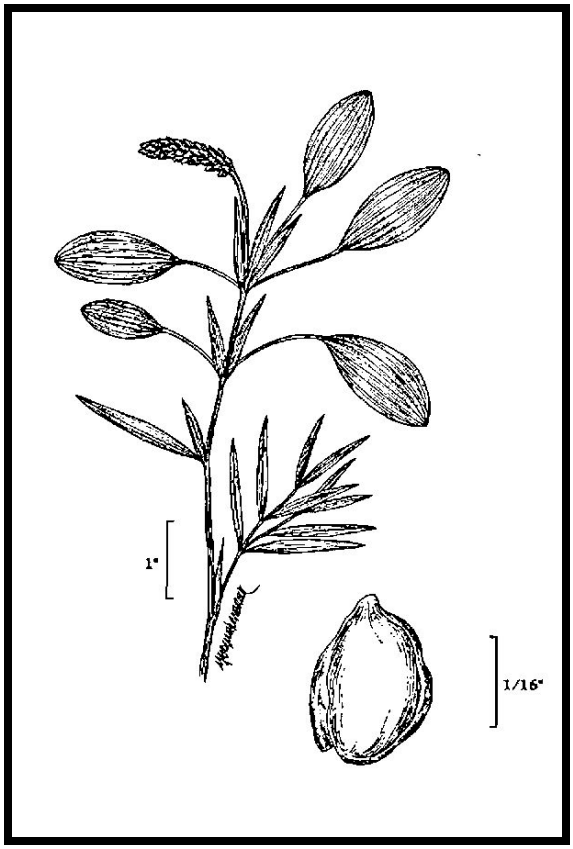
Potamogeton zosteriformis



Utricularia vulgaris



Potamogeton gramineus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