Aquatechnex, LLC

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Clear and Beaver Lakes Aquatic Plant Management Year End Report

Skagit County and the Clear and Beaver Lake Management District

Clear and Beaver Lake Aquatic Plant Management Program

Year End Report

Introduction

Clear and Beaver Lake are located just east of Mt. Vernon, Washington. The communities around these lakes have been impacted by noxious aquatic weed growth for a number of years. Clear Lake is home to a Skagit County Park with a beach. The beach has had to be treated for *Myriophyllum spicatum* or Eurasian Milfoil on a number of occasions to maintain a safe swimming environment and to allow lifeguards to perform their work when necessary. By 2006, the entire littoral zone of the lake was dominated by this noxious weed and by *Nymphaea odorata* or White/Fragrant Water Lily. The residents of the lake have suffered from the impacts of this growth over the years. Beaver Lake is just south of Clear Lake and connected by a shallow channel. Beaver Lake does not have any homes on the shoreline, but does have a public access site and is a popular fishing lake. Eurasian Milfoil completely choked the entire surface area of this lake system by 2006. There was also one small patch of *Egeria densa* or Brazilian Elodea found in this lake.

The citizens and property owners of these two lakes approached Skagit County and their lakes program to seek assistance in restoring these lakes impacted by these invasive aquatic weed species. The County developed an Integrated Aquatic Vegetation Management Plan (IAVMP) to target these problem species in these lakes and used that document to help form a Lake Management District and to secure funding from the Washington Department of Ecology. Aquatechnex was selected to implement this program.

The work started in 2007 with whole-lake Sonar herbicide treatments designed to remove the Eurasian Milfoil and have some impact on the White Water Lily growth. Sonar is a systemic herbicide and is very effective against Eurasian Milfoil when used in a properly designed treatment strategy. Aquatechnex pioneered the use of this technology and has develop programs that have resulted in eradication of this invasive weed from a number of lakes. The key to this product is maintaining critical concentrations of the herbicide in the lake water column for six to eight weeks. The program in 2007 involved an initial treatment of both lakes at a target dose, sampling of the levels present at regular intervals and adding herbicide at two week intervals as necessary to maintain the target concentrations. This resulted in excellent control of the Eurasian Milfoil in both lakes at the end of 2007. White Water Lily treatments did not go forward in 2007 because the Sonar herbicide does have an impact on these plants and affects uptake of other herbicides.

This report will document the work performed on the lake during the 2008 season. The focus of this year's effort was continued monitoring of the plant communities to determine the one year post treatment results on the Eurasian Milfoil and to begin to target the problem lily growth in the lake.

2008 Management Efforts

Early Summer Survey

Normally aquatic vegetation starts to emerge from lake sediments in mid May in this region. This summer, conditions are such that plant growth has been delayed somewhat. The very cool and overcast spring and early summer delayed normal aquatic plant growth throughout the area. We did visit these lakes in May and determined it was too early to effectively survey them. A survey provides an indication of the conditions present on that day. As the primary objective of this survey was to determine if Eurasian Milfoil remained in the lakes and to document any recovery of native aquatic plants, performing this work at this point would have probably missed some vegetation that had not yet emerged.

Aquatechnex biologists performed aquatic plant mapping efforts on both Clear and Beaver Lakes in late June. We mobilized a mapping vessel to the lake equipped with a Trimble ProXT GPS system and data logger. This system links to ArcGIS mapping software on a Panasonic Toughbook computer system. We used this technology to record our findings on the water with submeter accuracy.

We used a combination of point intercept sampling to document species present at these locations and a littoral visual and diver survey where we mapped the plants and beds observed from the boat between sampling stations. This information was brought back to our Bellingham office for processing. A brief discussion of the conditions in the lake is presented here.

Noxious Water Lily Growth

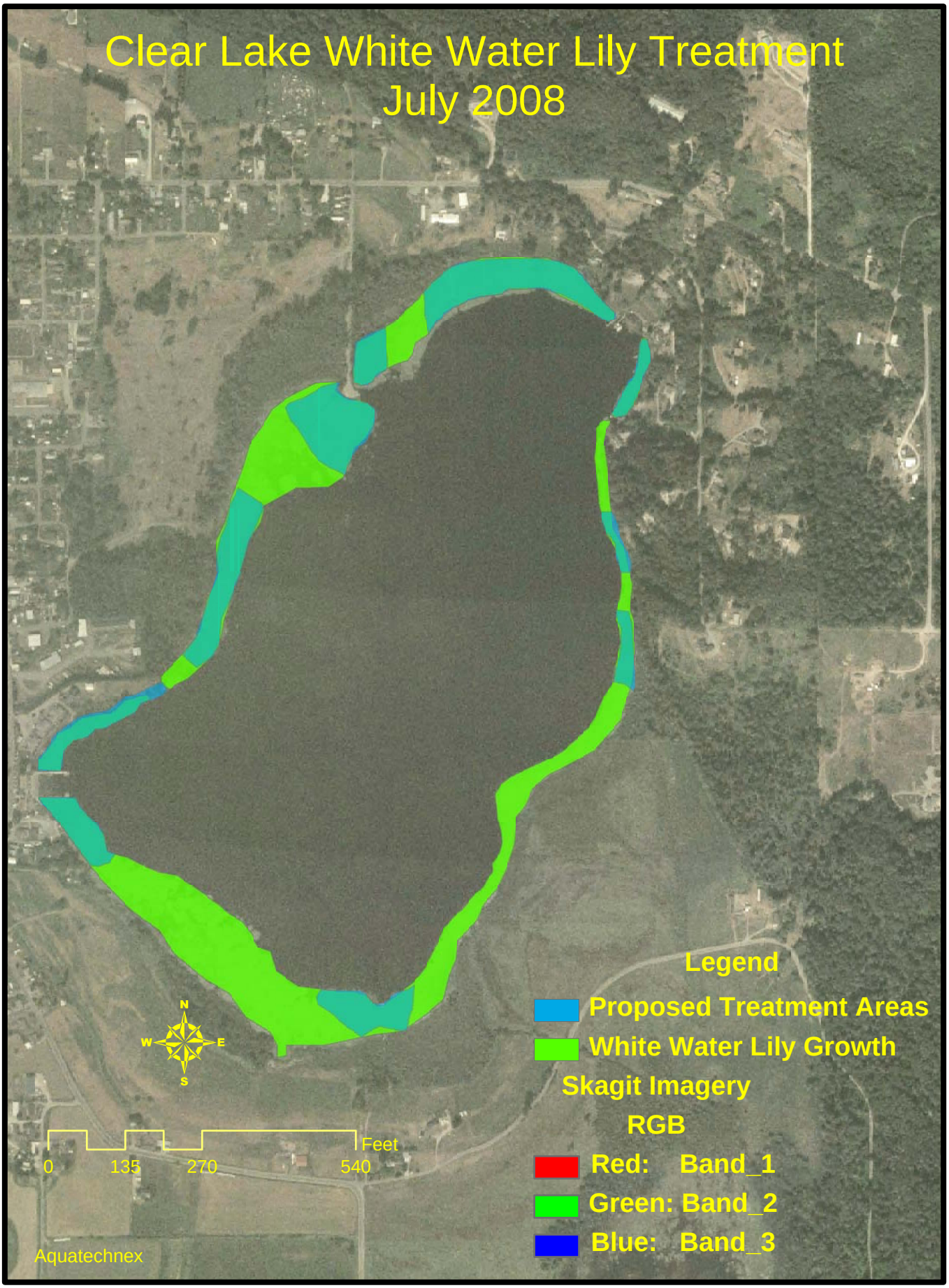
There was a dense monoculture of White Water Lily growth ringing the majority of the lake shoreline on Clear Lake. These plants were very dense and obviously impacting access by lake residents to the water. This species of lily can also be a threat to swimmers, there have been a number of occasions where swimmers have become tangled in the lily stems in recent years in Washington State. Beaver Lake also had lily growth present, but the dominant species there was *Nuphar sp*. or Spatterdock. Spatterdock is a native water lily and provides excellent habitat for a number of fish and waterfowl species. The attached map shows the noxious lily conditions present in Clear Lake with the recommended treatment areas as an overlay. This work will be discussed below.

Submerged Aquatic Plant Growth

Our biologists also repeated the point intercept sampling and visual inspections of the littoral areas of the lake. No Eurasian Milfoil was detected in either lake during this survey. Native aquatic plant life however was thriving in the absence of the milfoil canopy. In the shallower areas of Clear Lake (shoreline out to the 10 foot contour) there was a good mix of *Chara sp.* or Muskgrass and *Potamogeton richardsonii* or Richardson's Pondweed. These plant communities were filling in the littoral area and their growth is not dense or problematic,

Recommendations to the County and Treatment Performed

Based on these conditions, we recommended targeting the White Water Lily growth in Clear Lake as the primary treatment objective for 2008. Prior to this treatment, the permit requires a public notification process take place. Aquatechnex staff delivered


Clear Lake White Water Lily Treatment
July 2008
N
W
E
S
0
135
270
540
Feet
Aquatechnex
Legend
Proposed Treatment Areas
White Water Lily Growth
Skagit Imagery
RGB
Red: Band_1
Green: Band_2
Blue: Band_3

notification to all dwellings along the shoreline of these lakes. The first treatment was scheduled to begin in mid July.

White Water Lily treatments are generally performed using glyphosate based herbicides mixed with an aquatic surfactant or penetrating agent. This herbicide is extremely effective and is systemic meaning it will trans-locate and kill the roots of the targeted plants. The herbicide is applied to the lily pads that are on the lake surface. A surfactant is required as these plants have a heavy wax coating that helps them shed water. Spraying them without this surfactant results in the herbicide mixture running off just as water from wave action will rapidly bead up and run off the leaves. The surfactant breaks this surface tension and helps the herbicide penetrate through to the interior of the leaf where it can start to function. Lily treatments are performed a bit later in the summer to improve the long term effectiveness of the application. Earlier in the summer, the majority of the flow in the plant is focused on getting the lily pads to the lake surface and producing flowers. Once the plant has performed those functions, it starts to produce carbohydrates to store in the root system to overwinter. Targeting the herbicide at this point helps move it to the roots and increases the long term efficacy of the application. We generally perform a number of treatments during the summer months as the application boat needs to travel through these beds and can wash the herbicide off where is passes, wave and rain action can remove the herbicide and new lily pads can reach the lake surface after the first application. Second and third applications are designed to touch these areas up.

The first application was made on the lake July 16th. The team used a conventional boat for this application and made good progress, but had issues in some areas of extremely dense lily growth in terms of the outboard motor being able to move the team along. We mobilized an airboat from our southern Washington office to the lake on July 22nd and completed that first treatment round. Additional treatment visits were performed in August to touch up these areas. By the end of the summer, lily growth in these targeted areas was well under control and herbicide evidence obvious. The majority of those treated areas were clear of lily growth by September 1st.

Second Aquatic Plant Survey

The second aquatic plant survey of these lakes was completed on August 25th and 26th.

We mobilized a mapping vessel to the lake equipped with a Trimble ProXT GPS system and data logger. This system links to ArcGIS mapping software on a Panasonic Toughbook computer system. We used this technology to record our findings on the water with submeter accuracy.

We used a combination of point intercept sampling to document species present at these locations and a littoral visual and diver survey where we mapped the plants and beds observed from the boat between sampling stations. This information was brought back to our Bellingham office for processing.

Clear Lake remained free of Eurasian Milfoil plants as of this survey event. We continued to see healthy stands of Richardson's Pondweed in the littoral areas of the lake and sampled Chara growing in the deeper waters of the system. The survey in Beaver Lake turned up a few very sick Eurasian Milfoil plants as mapped here. These plants had blackened stems and very unhealthy leaf growth. Approximately seven small plants were located. Based on the condition of these plants, treatment was ruled out as they did not look like they were healthy enough to absorb or trans-locate herbicides.


Beaver Lake Eurasian Milfoil Plants
August, 2008 Survey
N
W
E
S
0
87.5
175
350
Feet
Aquatechnex
Legend
Eurasian Milfoil 08
Skagit Imagery
RGB
Red: Band_1
Green: Band_2
Blue: Band_3

These areas should be viewed early in 2009 as the plant growing season starts to see if they recover. Treatment would be appropriate at that time if necessary. While our sampling did not locate any sign of rooted Brazilian Elodea growth, we did observe one floating Brazilian Elodea fragment. This plant was completely black however and not living tissue. This is also something that future surveys should continue to be aware of and look for.

Thoughts for 2009

There should continue to be a program of monitoring and mapping aquatic vegetation in both of these lakes in the coming year.

The effort in Clear Lake should focus on detection of any remaining Eurasian Milfoil plants so that if found they can be targeted at once. This plant can be re-introduced at the public boat ramp at any time by an unsuspecting boater traveling from an infested lake. It is also possible that a few of the millions of milfoil root crowns present prior to treatment could produce some viable plants, but that probably would have been noted this season if it had occurred. White Water Lily growth should also be mapped and additional treatment if necessary implemented. The focus of this year's applications was to provide access to each home or shoreline access site on the lake. Touch up work might be necessary locally, but overall the areas treated in 2008 should remain largely lily free. This species of lily when rooted in soft organic soils can cause the lake bottom to lift free as the roots decay. As there was some evidence this might occur on this lake, we did not treat all of the lily growth present. Based on conditions, an expansion of the lily control may also be warranted. The survey should be discussed with the County and the lake representatives at that point and treatment recommendations approved.

Beaver Lake exhibited some very weak Eurasian Milfoil plants as noted above during the later summer survey. This portion of that lake should be reviewed in detail. If plants are found, spot treatment with Renovate Herbicide would be recommended. That herbicide can be used without treating the entire lake as is the case with Sonar herbicide. This herbicide is selective for Eurasian Milfoil and would not impact any other growth. We have done extensive monitoring of the area that had Brazilian Elodea growth present in previous years, but a combination of the Sonar whole lake treatment and a focused Reward herbicide treatment in 2007 had completely controlled that plant in that location. It was not observed rooted an any other portion of the lake during 2007 and 2008. As noted above, a black and very dead stem was seen floating in the lake during the second survey this summer, so additional exploration for that weed should be performed as well.

These lakes are well on the way to recovery from the grip of Eurasian Milfoil and other noxious aquatic weed growth. Clear Lake is free of that species and Beaver Lake has control over 99 percent. Continued monitoring and vigilance is critical to keeping these lakes free of these noxious species.

Cabela's Lake Mapping Program

Aquatechnex has been applied as the Cabela's Lake Mapping Partner for this region. This process involves travel to collect data from the lake and processing that information to create extremely accurate lake maps.

Aquatechnex biologists would travel to the lake with our bathymetry mapping vessel. The Cabela's system links a Trimble GPS data logger with sub foot accuracy with a

hydro acoustic depth sounding system with 0.2 cm accuracy. This system is calibrated to collect a GPS location and depth attribute every two seconds. A sampling protocol is followed, we travel on transects with approximately 20 foot spacing. On a project this size, this generates over 5,000 data points.

This data is then shipped back to Cabela's geographers for processing. They use ArcGIS mapping software and other technology to develop extremely accurate bathymetry maps and 3D models of the lake. They will also calculate the exact water volume for this system. Other measurements are also possible based on the needs of the client. The maps and a report will be created and supplied to the Community by Aquatechnex as the regional mapping partner. This process can be repeated at intervals that make sense to the community and the change of depths or sediment loading rate are then obvious and can be measured.

These maps have value to lake managers to calculate exact water volume and to track sedimentation. They may also have value to lake residents to help them understand structure and habitat to increase their enjoyment while fishing.

This mapping is something that is available and could be considered by the community.