Beaver Lake
2012 Aquatic Plant Control Program

Prepared By
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Project Overview

This was Northwest Aquatic Eco-Systems (NWAE) first year of providing aquatic weed control services for the Beaver Lake LMD #4 district. Prior to any project work commencing, NWAE reviewed application records on file with the Department of Ecology and year end reports supplied to Skagit County from the previous 2010 and 2011 contract years. This information provided the baseline for our 2012 Beaver Lake weed control operations. Beaver Lake has been actively involved with a program to eradicate noxious aquatic macrophytes from the system. Targeted species include Eurasian watermilfoil and Nymphaea odorata. Native plant growth extends outward beyond the 15 foot contour line and consumes all of the entire lake shoreline. There are no immediate shoreline residential homes. A majority of the shoreline is used commercially as pasture for livestock. The lake supports limited swimming and recreational boating but does support a very healthy recreational fishery. Most all of the lake use is associated with fishing activities. Dense shoreline native macrophyte growth appears to not hinder current lake use.

2010 -2011 Data Review

Section S8 of the NPDES permit requires that each permit holder submit a pesticide/product application report to the Washington State Department of Ecology at

the close of each treatment season. This report must identify the dates that treatments occurred, products/amounts used and the acreage treated. The following data as submitted was reviewed for Beaver Lake.

	DATE	MATERIAL APPLIED	AMOUNT APPLIED	ACREAGE TREATED
2010	**No herbicides applied this year**			
2011	**7-22**	**Glyphosate**	**.25 gallons**	**1 acre**
	8-17	**Triclopyr**	**28 lbs.**	**2 acres**

In conjunction with the application records, NWAE also reviewed the year end reports submitted to Skagit County by the consultant for the years 2010 & 2011. The 2010 & 2011 reports text suggests that treatments took place but no maps identifying where the treatments occurred are identified. The 2011 report provides no treatment or survey maps for Beaver Lake. Text and findings for both the 2010 and 2011 Beaver Lake reports appear to be nearly identical.

Survey Protocol

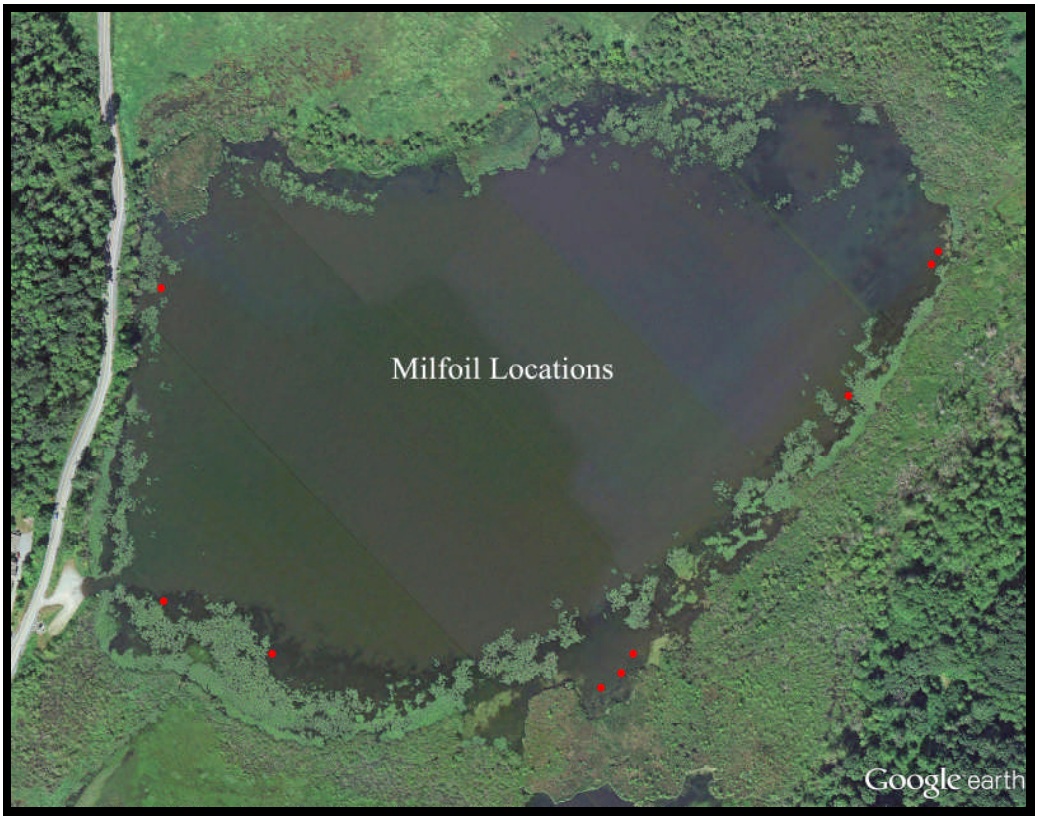
Survey techniques were typical of those considered as "standard protocol" throughout the industry. A late start in performing the survey occurred as a result of communication problems experienced between NWAE and Skagit County. Survey protocol during the initial summer survey was modified to take into account the favorable water clarity present during the time of the survey along with the need to expedite the survey as a result of the late start. Typically, 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 was thrown from the boat at various locations lake-wide. The rake was then drawn across the lake bottom, brought to the surface and into the boat. Plants attached to the rake were identified and confirmed as being the same species as noted visually through the water column. If the lake bottom was void of plants, no data was stored. The survey boat spent most of the day within 300 feet of the shoreline. The system produces sub meter accuracy and combined with the powerful Pathfinder Office and Terra Sync software, provides Beaver Lake processing of data in a Windows compatible format. The

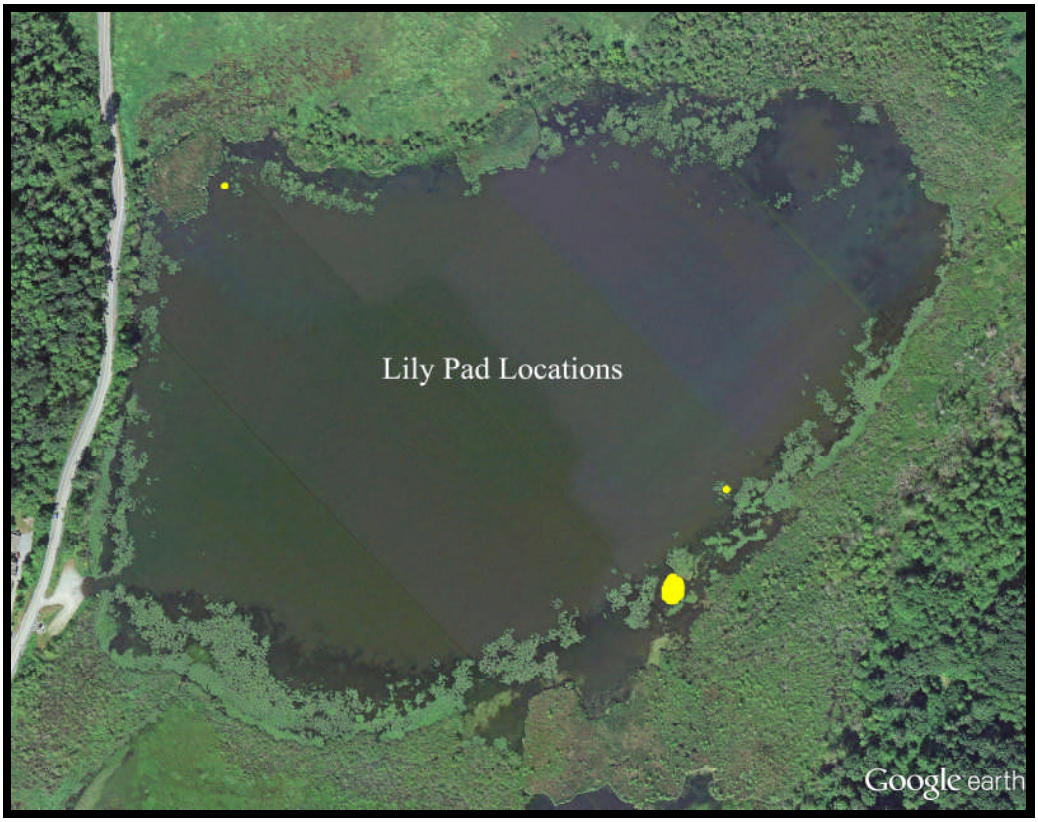
system automatically calculates and stores the position of every data point enabling the mapping of thousands of data points on a daily basis. Either single data points can be entered or features such as line boundaries can be recorded. Data points are then assembled as a map layer, which are then incorporated, into the project file.

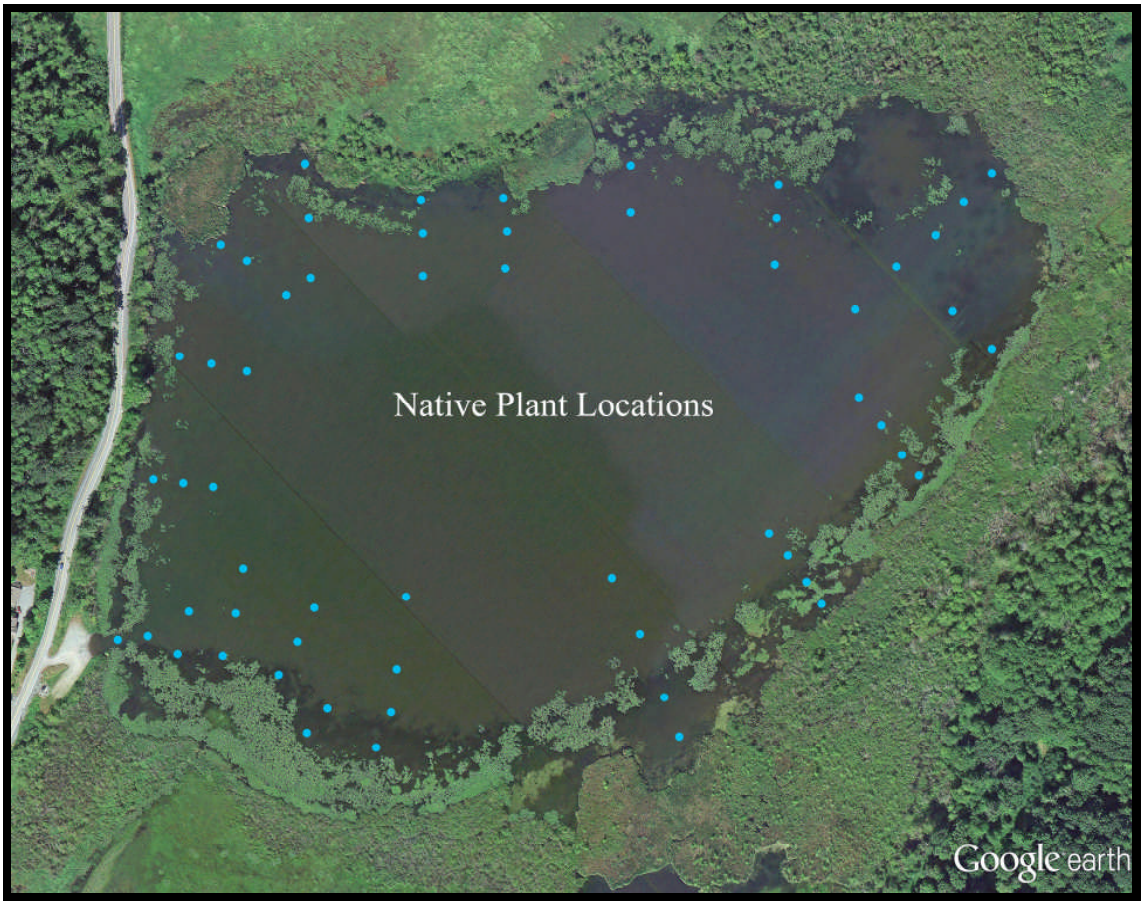
When submersed non-native species were identified, data was collected and stored on a Trimble Geo XT GPS system. The data dictionary consisted of species previously identified as being present in the lake, Eurasian watermilfoil and Brazilian elodea. Nymphaea odorata (Fragrant water lily) was not plotted. This particular species had been previously treated on a yearly basis so range expansion was not expected. Location of this species was accomplished using satellite imagery. The survey boat started collecting data circling the immediate shore. Once the initial shoreline pass was completed, the boat moved outward approximately 50 to 100 feet for each successive pass. The survey was completed once the boat obtained a 300 foot distance from the shoreline.

Beaver Lake Pre Treatment Survey Results

Beaver Lake was surveyed on July 15, 2012. Water clarity was excellent with visibility down to the bottom throughout most of the lake's littoral zone. Only eight single stemmed milfoil plants were identified during the survey. Plants were sporadic with all but one milfoil plant noted along the eastern shoreline of the lake. Three small areas of fragrant water lily were identified; two areas were approximately 400 square feet while the largest area was nearly 3,000 square feet. All of these three sites contained sparse plants with relatively smaller than normal leaf sizes. Native pondweeds dominated the survey throughout the littoral zone with both Elodea and Ceratophyllum species noted in sparse densities.


Milfoil Locations
Google earth


Lily Pad Locations
Google earth



Treatment

Beaver Lake received no treatment during 2012. Exceptionally high water levels raised concerns from one property owner that treatment may impact the ability for local farmers to graze livestock in pastureland that now have entry to the treated lake waters. Typically, grazing pastureland is fenced off preventing livestock access to the lake waters. NWAE contacted the local Fish and Wildlife representative for the area to confirm the 2012 seasonal high water level for Beaver Lake. Fish and Wildlife not only confirmed the high water levels but also noted that on several past visits to the site, livestock were noted grazing in the lake waters. Local fisherman using the lake on July 15 also affirmed the observations made by Fish and Wildlife stating that earlier in the year the entire boat launch area was under water. In an effort for the LMD to continue its relatively problem free relationship with local property owners, a decision was made to postpone treatment for the 2012 season until a thorough understanding of the lakes high water level issue was further reviewed. Following the review the LMD would then ascertain how future treatments could be accomplished while considering the concerns of the local farmers.

Fall Survey

The fall survey was performed on October 17, 2012. The survey resulted in no changes to the earlier locations of milfoil or fragrant water lilies. Native species had changed in density with some plants forming small surface mats while other native species had begun to enter their dormant stage. Lake water level had declined considerably but it was difficult to determine if the water had receded far enough to prevent livestock access to the water or if fencing that restricted livestock access was missing. Typically lake waters are fenced off to prevent livestock access and potential pollution of the lake.

Recommendations

1. Permit guidelines that mandate leaving 50% of the shoreline untreated for native vegetation control should never pose a problem simply because no residential homes exist on the lake and the lake is mainly used for fishing purposes. Good fisheries often consist of lake waters that maintain a wide distribution and variety of macrophytes. All of the noxious species present in Beaver Lake can be targeted with materials that are specific only to those species. Reducing native plant growth may prove to be an unpopular approach to the avid local fishermen. On both of NWAE visits to Beaver Lake fisherman raised those concerns. Most all fishermen were in favor of eradicating the noxious species. At some point in time, native weed control may be necessary due to the shallow nature of the water-body. The local fisherman and the Department of Fish and Wildlife could probably best evaluate when such an action may be warranted. Until native weed concerns are raised by lake users the LMD should avoid control alternatives targeting these species.
2. LMD officials or the consultant need to determine if the pasture lands abutting Beaver Lake are properly fenced off thereby preventing livestock access to the lake waters during normal years of rainfall. Abutting property owners adjacent to the lake need to ensure that established fence lines perform as designed during normal rainfall years. Typically early established fence lines may not presently prevent livestock from entering waters as they may once have. Some fence maintenance may be in order.
3. There remains a need to continue the efforts to eradicate noxious species from the lake. Current milfoil plants are extremely light in concentration and noted in only a few locations. Left untreated these isolated occurrences will eventually spread lake-wide. The shallow nature of the lake provides excellent habitat for this to occur rapidly. If high water levels prevent early season treatment then a late season application would appear to be in order. The amounts of material required to control the current infestations are extremely small. Dilution alone would probably result in

acceptable EPA concentrations along shoreline areas where livestock may be present.

4. Property owners and the LMD need to work together in an effort to ensure treatments occur and livestock is protected. Property owners need not simply adopt a "no treatment" philosophy without first considering the long term health of the lake. Property owners should coordinate pasture use with potential treatment schedules. At the very least those shoreline areas where no livestock access is possible should be available for treatment.
5. 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.
6. If high waters exist during the typical spring survey and fence lines are not free of encroaching lake waters then it is unlikely that an early treatment would occur and strategies should be made for an early fall treatment.
7. Most importantly as noted above, the grazing pasture use and treatment issues need to be resolved on an amicable basis. Documentation currently exists that supports both positions. However, it is clear that lake pollution associated with potential livestock excrement entering the lake is prohibited under both state and federal law.