Lake McMurray, Skagit County Washington

Introduction and Project Overview

Lake McMurray is a 160 acre lake located approximately 9 miles to the Southeast of Mt.Vernon, Washington. The lake is located in the lower Skagit County WRIA 3 (Water Resource Inventory Area). The lake is at the headwaters of Nookachamps Creek tributary of the Skagit River. The average depth of Lake McMurray is 29 feet and there is a maximum reported depth of 52 feet. The area of the watershed draining into the lake is about 3.25 square miles. Approximately 50% of the total shoreline is developed, with the majority being along the western and southern shorelines.

During the 1990's aquatic weeds began to expand quite dramatically in the littoral areas of Lake McMurray. It was discovered that Eurasian Water Milfoil was the main concern and it is believed to have been introduced via the public access ramp. Skagit County began the process of developing an Integrated Aquatic Vegetation Management (IAVMP). It was noted in the document that Eurasian Milfoil control was the number one priority in Lake McMurray because of the deterioration of the original plant community and reduction in the overall health and value of the lake to the lakeside residents.

In 2000, a whole-lake treatment was performed to control the Eurasian Milfoil utilizing the aquatic herbicide Sonar (active ingredient Fluridone). Prior to this treatment the shoreline was largely dominated by this noxious weed. Post treatment surveys of the lake confirmed that the treatment was extremely successful and surveys continue to verify that the plant has been eradicated from the system. As is common in lakes following the removal of a noxious weed species such as Eurasian Milfoil the native plant community has rebounded significantly and very healthy stands have been developing throughout the littoral zone.

AquaTechnex has been providing survey and control services to Skagit County and the Lake McMurray Lake Management District (LMD) since the spring of 2000. This relationship began with the whole-lake Sonar treatment and has since continued with annual surveys to monitor and track the expansion and recolonization of the native plant community as well as to monitor for the reintroduction of Eurasian Milfoil or any other noxious weed species.

Survey Methods

The objective of this survey is to determine the extent and coverage of the aquatic plant community in Lake McMurray and to identify the locations and densities of any aquatic

plants currently on the state noxious weed list. The survey focuses on the littoral edge of the lake to map the extent of floating and submerged aquatic plants.

Our survey crew followed the protocol which has been in place for many years and has been successful. We maintain a file set up in ArcGIS mapping software that includes all the previous years' information and sampling locations. This information is kept on a Panasonic Toughbook in the field which is linked to a GPS receiver to display the location of the mapping vessel in real time. This method makes it very efficient to move from one sampling site to the next where data is collect from year to year.

The survey for Lake McMurray was completed on June 22nd. AquaTechnex biologists mobilized to the lakes to begin the season's work. To perform the survey, a 16 foot Lund mapping vessel equipped with ArcGIS mapping equipment including a Trimble ProXT GPS receiver and Panasonic Toughbook running Trimble GIS mapping software was mobilized to the lakes. The boat team navigated the shoreline mapping surveying transects at regular intervals around the lakes noting the conditions present. At these points the species collected were noted, overall dominance was determined, along with the estimated percent of bottom covered. This data was entered into the database at each data collection point. The survey team also noted the plant community characteristics throughout the lake as they moved from location to location. After the rake toss sampling points were all completed and the submerged plant community sampled, the shoreline was again traveled to survey for the presence of Eurasian Milfoil.

This field data was brought back to our offices, processed and used to create maps and a summary report for the County and District which documented the current conditions and listed recommendations for control. Key findings from this survey are noted below.

Survey Results

The following key findings were noted in Lake McMurray:

- No Eurasian Water Milfoil was located during the Survey. It was not noted visually or on any rake-toss samples.
- Native aquatic plant populations continue to expand around the lake.
- Fragrant Water Lily populations appear to be increasing in some locations.
- Dominant species include Elodea (*Elodea canadensis*), Najas (*Najas sp.*), and Chara (plant-like macro algae).

Prior to arriving at Lake McMurray, past mapping efforts were reviewed in order to gain an understanding of previous plant community composition. This is important so more useful observations during the survey can be made as to shifts in plant communities. Maps created from the surveys are located at the end of this document.

The first map shows the locations of the transect points where the vegetation was surveyed. Sampling points are located at the 5, 10, 15, and 20 foot depth contours around the lake. The second map shows the current extent of the Fragrant Water Lily populations spread around the lake. The points represent small groupings of lilies usually smaller than 10 foot diameter area. The polygons represent much larger stands of lilies.

Treatment Recommendations

There were no noted Eurasian Milfoil plants in Lake McMurray in 2009. Lake residents did however want the outflow for the lake surveyed and evaluated for possible treatment options. During the winter of 2008-2009 lake residents experiences some flooding in areas, and felt it may have been due in part because of the outflow area being congested with plant growth and logs. This area is highly impacted by the growth of Yellow-Flag Iris (*Iris pseudacorus*). This species of iris is typically found growing along the shoreline and can easily crowd out native emergent plant species. The ability of this plant to rapidly and completely invade an area is clearly noted at the outflow. In addition to this plant filling in the outflow area, it was noted that there was a significant buildup of logs and other debris in the area which may be the root cause of the flooding problem. This situation may require a more substantial effort to remedy.

Future Thoughts and Considerations

As mentioned above, the outflow of Lake McMurray is highly impacted by Yellow-Flag Iris but possibly more of an issue is the buildup of logs and other debris which may be reducing the lakes ability to flow out during a heavy set of rain events. It may be necessary to look into more extreme measures to open up the outflow as simply treating the plants may not have any impact on the outflow.

AquaTechnex has also partnered with the Mapping Network in order to produce high quality bathymetry maps at a very reasonable cost. This process involves collecting 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. This 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 across the entire lake. 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.

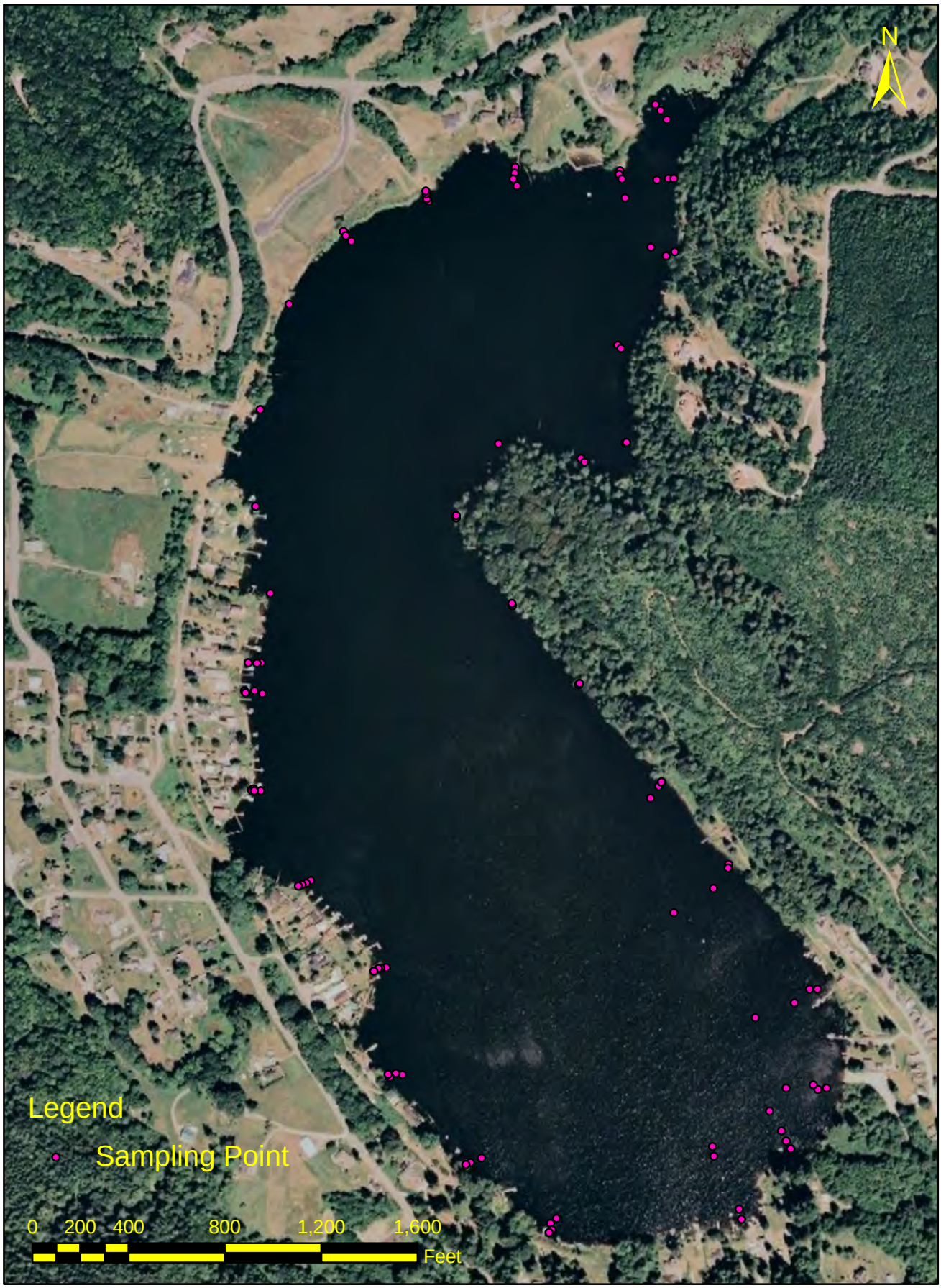
This process can be repeated at intervals that make sense to the community and the change of depths or sediment loading rate are then obvious and can be measured. These maps have value to lake managers to calculate exact water volume and to track sedimentation. They may also have value to lake residents 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 LMD.

Attached Documents

Survey maps created for Lake McMurray.

- Sampling point map displays the sampling transects which were used to sample the native plant community.
- Fragrant Water Lily map shows the locations of lilies in the lake. The polygons are large areas and the points represent small groupings to difficult to accurately create a polygon.

Lake McMurray Sampling 2009



Lake McMurray, June 2009