AquaTechnex

"Advancing the Science of Lake Management"

Lake McMurray

2005 Aquatic Plant Survey

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Introduction and Project Overview

Lake McMurray is a 160 acre lake in the WRIA 3, the Lower Skagit Water Resource Inventory Area. The lake is in the headwaters of the Nookachamps Creek tributary to the Skagit River. The lake has a mean depth of 29 feet and a maximum depth of 52 feet. The lake is in a relatively small watershed with about 3.25 square miles of the surrounding landscape draining into the lake. There is some development in the watershed, but the majority of the shoreline remains in a natural state.

In the mid 1990's the residents of Lake McMurray became alarmed at the expanding populations of aquatic weeds that were choking the littoral areas of the lake. Eurasian milfoil had been introduced presumably from the public boat ramp. This invasive species will rapidly replace native aquatic plants and form dense colonies that impact a number of beneficial uses of a lake. This weed can also alter a number of water quality parameters critical to fish and wildlife. The Community approached Skagit County's Lake Stewardship Program for assistance in addressing this problem.

Skagit County staff and consultants, hired by the County, collected the information necessary to develop an Integrated Aquatic Vegetation Management Plan (IAVMP) for Lake McMurray. This plan was finalized in 1999. The plan described Eurasian milfoil as the primary problem noting that the weed has caused an excessive deterioration in the quality of the lake and its value to the community.

The IAVMP was used to secure funding to manage the aquatic vegetation problems present in the lake. The community used the findings of this plan as the basis to form a Lake Management District (LMD). The community voted to establish the LMD primarily to fund the implementation of the IAVMP.

The first step the community took was to perform a whole lake Sonar aquatic herbicide treatment in 2000 to target the Eurasian milfoil. This noxious weed dominated the littoral area of the lake prior to treatment. Eurasian milfoil generally replaces most native aquatic plants in the final stages of colonization. The weed grows much faster than most native plants and forms dense surface mats. These mats shade out slower growing native plants. Milfoil also competes effectively for space with native plants.

The objective of the Sonar treatment was to target and remove this noxious weed. Sonar performed very well in meeting that objective. The treatment was extremely successful and diver surveys over the next few years confirmed that this weed had been eradicated from the lake.

Since Eurasian milfoil dominated the littoral communities at Lake McMurray, the successful control of this weed reduced the aquatic plant community present to a large degree. During the years following a large scale Sonar treatment, native aquatic plants start to recover rapidly as they no longer have to compete with this noxious weed for space and light. At some point, these plants can become a nuisance as they begin to impact beneficial uses identified by the community.

Aquatechnex, LLC has been under contract on this project since 2000. The initial contract was to perform the Eurasian milfoil Sonar treatment, and monitor the lakes littoral area for any reoccurrence of this noxious weed in the years after treatment. There were to be two diver surveys of the lake each year. There are also provisions in these contracts to treat any Eurasian milfoil found in the lake.

During the 2005 summer season, two inspection missions were performed at Lake McMurray. The first of these was a full scale aquatic plant mapping mission. The second was a visual inspection for Eurasian milfoil.

Methods

The methods used in the 2005 summer's survey efforts were designed to locate and record the position of any Eurasian milfoil present in the system and to update the maps of the native aquatic plant communities in Lake McMurray.

The survey team used a Trimble GeoXT Differential Global Positioning System (DGPS) receiver and data logger to support the data collection mission. Prior to going into the field, a data dictionary was developed for this project. Using Trimble Pathfinder software, the Data Dictionary Editor function was used to build the Lake McMurray Data Dictionary. The data dictionary was constructed with the following pull down menus for use in the field:

Elodea	Pot 1	Pot 2	Eurasian Milfoil
F Water Lily	Pot 3	Pot 4	Coontail
No Plant			

Default feature settings were established for each feature on the Trimble GeoXT. The logging interval was set for one second. This function directs the receiver to collect a GPS signal at one-second intervals. The accuracy default was set for "code". The default minimum number of positions collected for each feature was set for 10. Display symbols and colors for the symbols were also selected and set.

Pull down menus for density attributes were attached to each feature. The Pot 1-4 features were established because a number of Potamogeton species were expected to be encountered during the survey. As these species were not known prior to the survey, each label would be assigned in the field to a particular species as the team moved around the lake.

The data dictionary (file name Lake McMurray.ddf) was then transferred to the Trimble GeoXT using the docking station and Pathfinder Data Transfer Utility. An image of Lake McMurray was also transferred using this utility to provide a visual reference of the survey team's location on the lake. The Coordinate System used was UTM, zone 10 North and datum NAD 1983 (Conus).

The survey was performed on June 17, 2005. Aquatechnex biologists traveled to the lake, launched the mapping vessel and prepared for survey operations. The Trimble GeoXT was initialized and the Terrasync software used for data collection was opened. A rover file was created for this project (R061708A) and the data dictionary and background image were opened and made ready for use.

The native plant survey was performed in the following manner. The boat crew established a grid across the littoral area of the lake using the GeoXT. At each survey point, the crew used a sampling rake and methodology developed by the Washington Department of Ecology to collect plant samples (Parsons, 2001). The GeoXT GPS unit has a Windows CE computer built into the system. Terrasync software allows for the display of a background aerial image of the lake, the location of the unit geographically referenced to the image and any data features collected. The boat operator used this view to navigate to the collection point. At the collection point, a sampling rake was thrown twice and retrieved. A double sided rake was used with a 50 foot rope. When the rake was retrieved, the species present were noted. Using the GeoXT and Terrasync software, a native plant feature was stored at the sampling location. Species attributes were then recorded for that point. The data logging system was set up to have five pull down menus with the species selection so that five species attributes could be established for each sampling point. The survey team recorded a species attribute for each species found at that point from this menu selection.

The last step was to perform a complete visual inspection of the areas in the lake between each sampling location. This qualitative assessment was designed to give the survey team a better overall view of the conditions present. The make up of the plant communities were noted in greater detail. The team looked for other plant species that were not present in the data collection as well.

The Trimble GeoXT was placed in the docking station and the Trimble Pathfinder software's data transfer utility was used to collect the rover file R062708A from the GPS receiver. Using the differential correction utility in Pathfinder, the rover file was converted to a corrected file with sub-meter accuracy. The Thurston County GIS facility community base station was used to obtain the correction file. Using the export utility in Pathfinder, the corrected data was converted to ESRI shape files and moved to Arc View GIS software for analysis.

Eleven maps were created using Arc View and are included in this report. They are:

- A map documenting the point location for each species sampled
- A map showing Fragrant Water Lily and Yellow Water Iris locations
- A map showing Potamogeton crispus locations
- Eight maps showing individual species and their locations

A second Eurasian milfoil survey will be conducted in mid September. Aquatechnex biologists will mobilized to the lake with mapping equipment and support vessel and diving equipment. A full day inspection of the littoral zone of the lake will be conducted looking for Eurasian milfoil.

Results and Discussion

There were two mapping tasks undertaken during the summer of 2005. The first of these was focused on the detection of Eurasian milfoil. The second was focused on developing a good understanding and establish a baseline for the native aquatic plants present in the lake.

Eurasian Milfoil

Lake McMurray remains free of Eurasian milfoil in the fifth year after the successful Sonar treatment was implemented. The aquatic survey covered the entire littoral area of the lake and no milfoil plants were observed. It is critical to maintain vigilance in this area. Eurasian milfoil spreads primarily by fragments being transported on boat trailers from lake to lake. As there are lakes within driving distance of McMurray with Eurasian milfoil populations, it is conceivable that this noxious weed will be reintroduced at some point in the future. Catching the weed early is one of the keys to limiting the impact and cost of recovery.

It is recommended that the yearly milfoil surveys remain a high priority of the district.

Other Invasive Species

There are three other aquatic plant species listed on the Washington State Noxious Weed List present in Lake McMurray.

Fragrant Water Lily is present at a number of locations throughout the littoral area of the lake. This species can form dense mats which pose a threat to swimmers and can impact fish habitat. With few exceptions, their populations are not yet problematic with respect to impacting developed parts of the lake. There were dense beds impacting some individual homeowners and the community park swimming beach on the north shore of the lake.

Yellow Water Iris is also well distributed along the margins of the lake. This plant replaces many native wetland species and limits species diversity. There are extensive beds of this weed in the area of the outlet to the lake and there may be some impact on water flow discharging from the lake at this location.

Potamogeton Crispus is present in a small area on the south east side of the lake. This plant has recently been added to the noxious weed list. Over the past few years, *Potamogetan crispus* has been expanding and has become a major problem in

Washington State waters. This plant has a unique growing habit in that it sprouts from turions formed by plants from previous generations in the late summer and fall. The majority of these plants grow about 6 inches and over winter in an evergreen state. In the early spring, these plants grow rapidly to the surface much earlier than many native aquatic weeds. They then form more turions and the plants then often drop from the water column adding these turions to the bank in the sediments to drive future growth. Over time, these plants form thick dense mats that impact beneficial uses and degrade water quality. The treatment strategy should be to target the plants and the turions. If left alone, this plant can become a major problem for an aquatic ecosystem.

Native Aquatic Plants

The maps in this report document the species and densities of native aquatic plants found in Lake McMurray. The determination of the species present was performed by a combination of rake collection at the sampling points present and boat observation. The species of native aquatic plants discovered in the lake were:

- *Elodea Canadensis*
- *Potamogeton foliosus*
- *Potamogeton nodosus*
- *Filamentous algae*
- *Chara spp.*
- *Najas spp.*
- *Ceratophyllum demersum*
- *Nuphar polysepalum*

There may be other species present at very low levels that were not detected because they did not occur on a transect, rake sample or were not visible from the boat. These are the dominant species present however.

The first map presented documents the point survey locations. The subsequent maps show the native plants and their locations in Lake McMurray. Aquatic plants were sampled at points throughout the littoral zone of the lake using a rake sampler. These points were established using the Trimble GeoEX GPS unit and the point file is available to return to these exact locations in future years to document any change over time.

The most dominant species present in Lake McMurray in the summer of 2005 was Elodea Canadensis. This plant formed extremely dense mats that reached the lake surface from depths of over 10 feet in many locations. Elodea was particularly dense along the west shoreline of the lake. Some of the resident's water front areas are heavily impacted by elodea growth to the point of impacting beneficial uses they may feel are critical. The community may also wish to consider implementing control strategies in these areas.

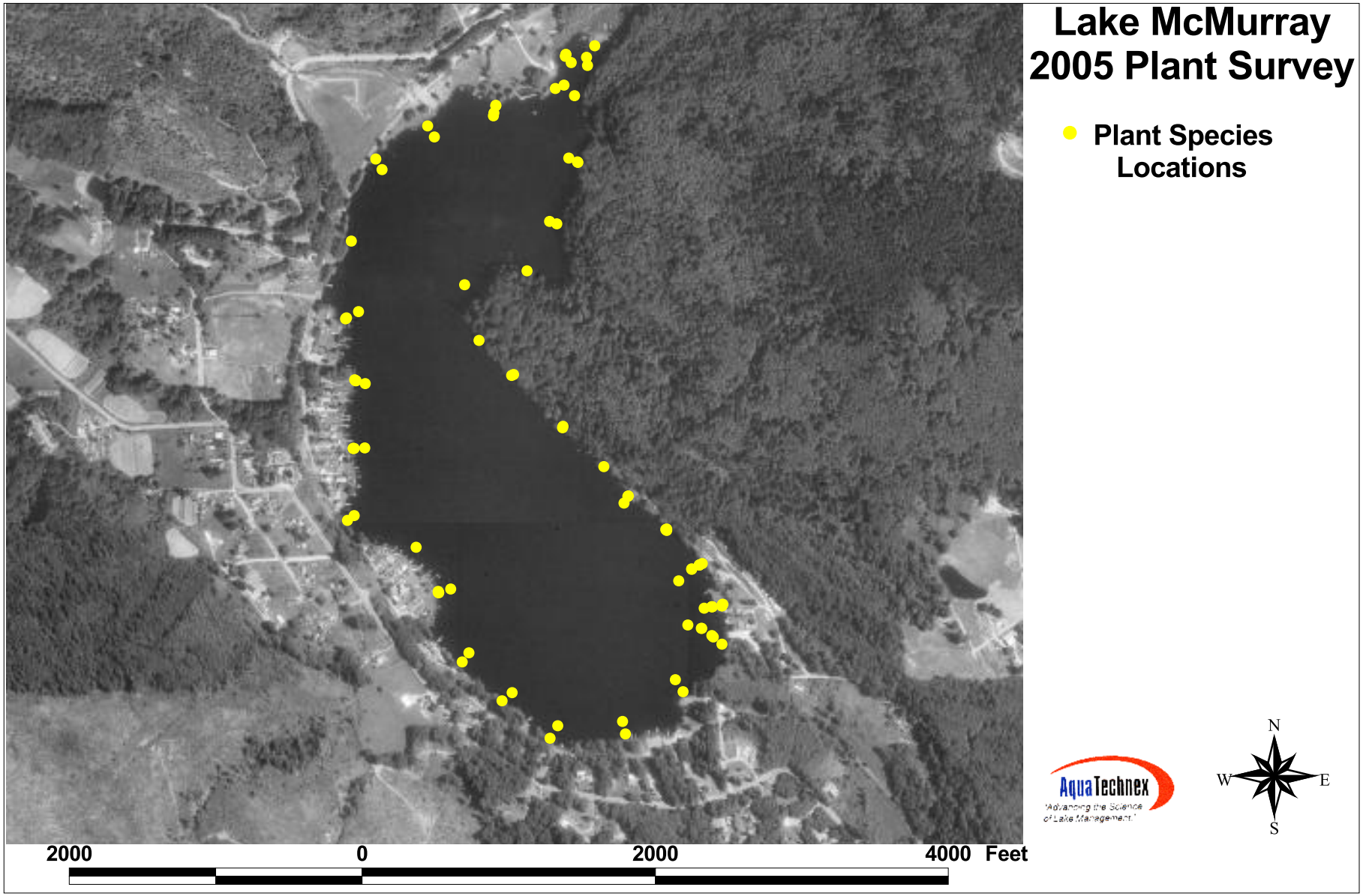
It is recommended that a community meeting be organized in the near future to present this information and answer questions that may arise from them.

References

Fasset, Wayne, 1969. A Manual of Aquatic Plants. University of Wisconsin Press. Madison, WI.

Parsons, Jennifer 2001. Aquatic Plant Sampling Protocols, Washington Department of Ecology Publication No. 01-03-017.

Washington Department of Ecology, 2001. An Aquatic Plant Identification Manual for Washington's Freshwater Plants, Washington Department of Ecology Publication No. 01-10-032.


Lake McMurray
2005 Plant Survey
Plant Species Locations
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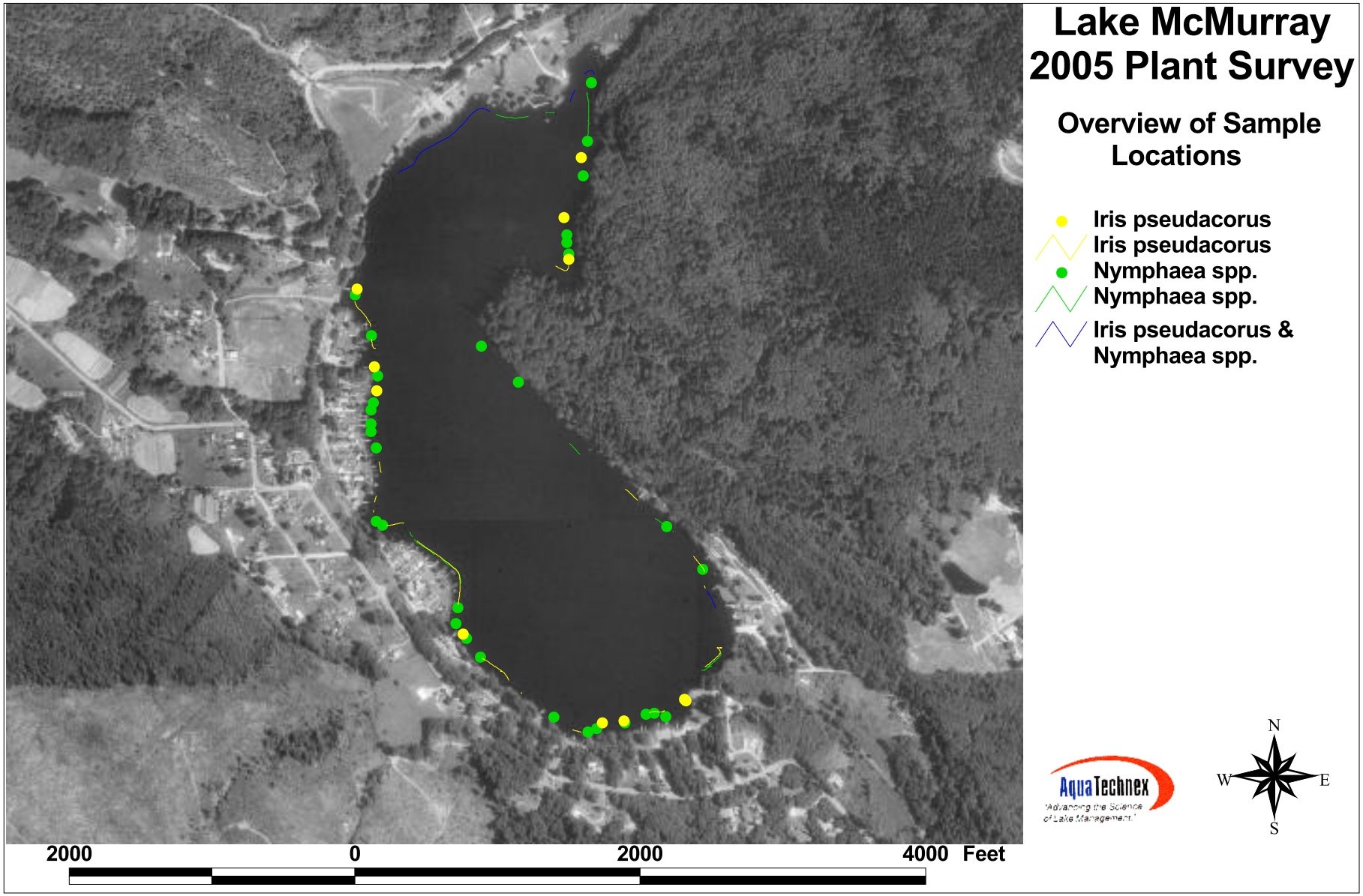
Lake McMurray
2005 Plant Survey
Overview of Sample Locations
Iris pseudacorus
Iris pseudacorus
Nymphaea spp.
Nymphaea spp.
Iris pseudacorus & Nymphaea spp.
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Lake McMurray
2005 Plant Survey

Plant Species Locations

- Potamogeton crispus

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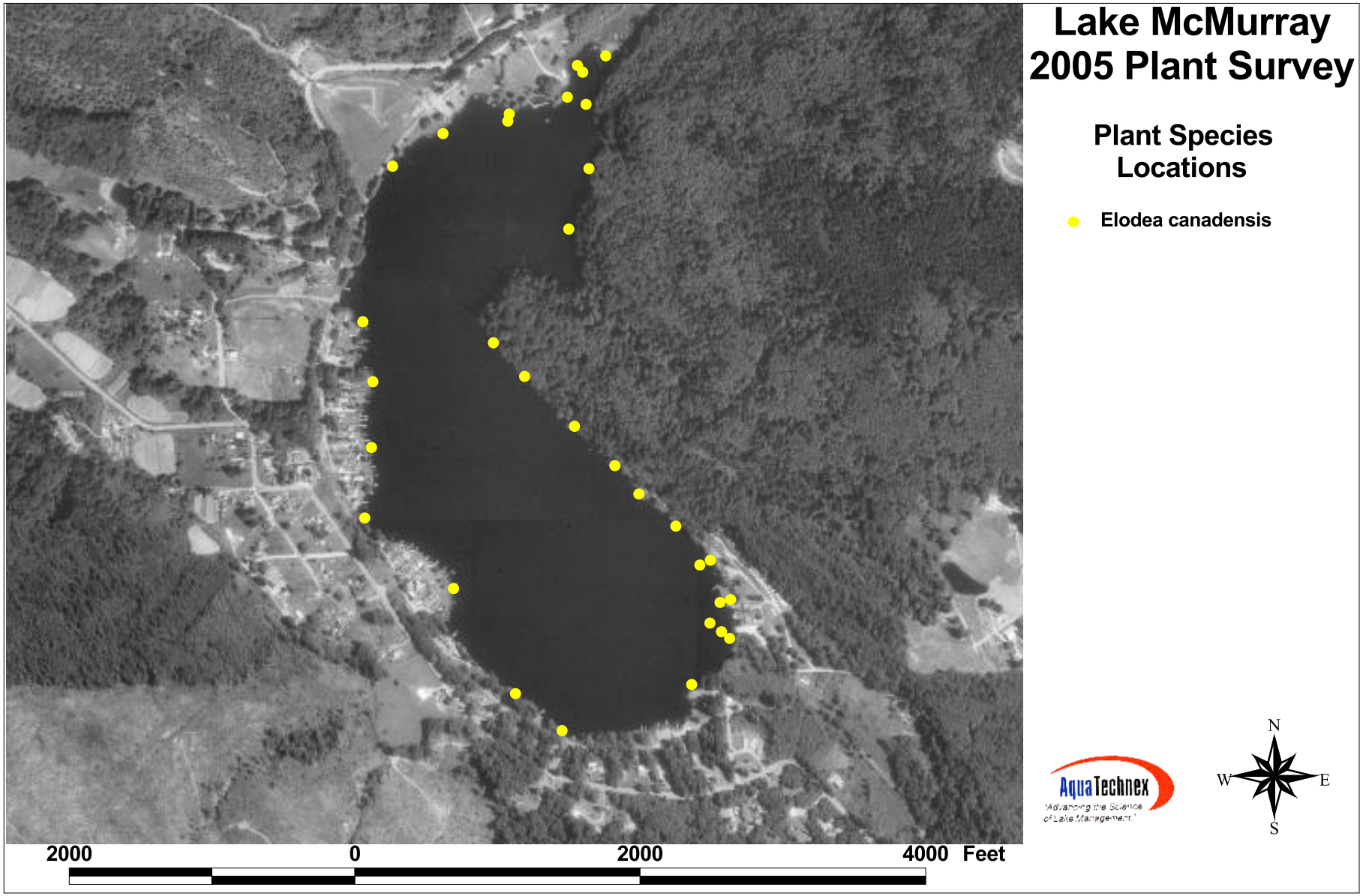
Lake McMurray
2005 Plant Survey
Plant Species
Locations
Elodea canadensis
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Lake McMurray
2005 Plant Survey

Plant Species Locations

- Potamogeton foliosus

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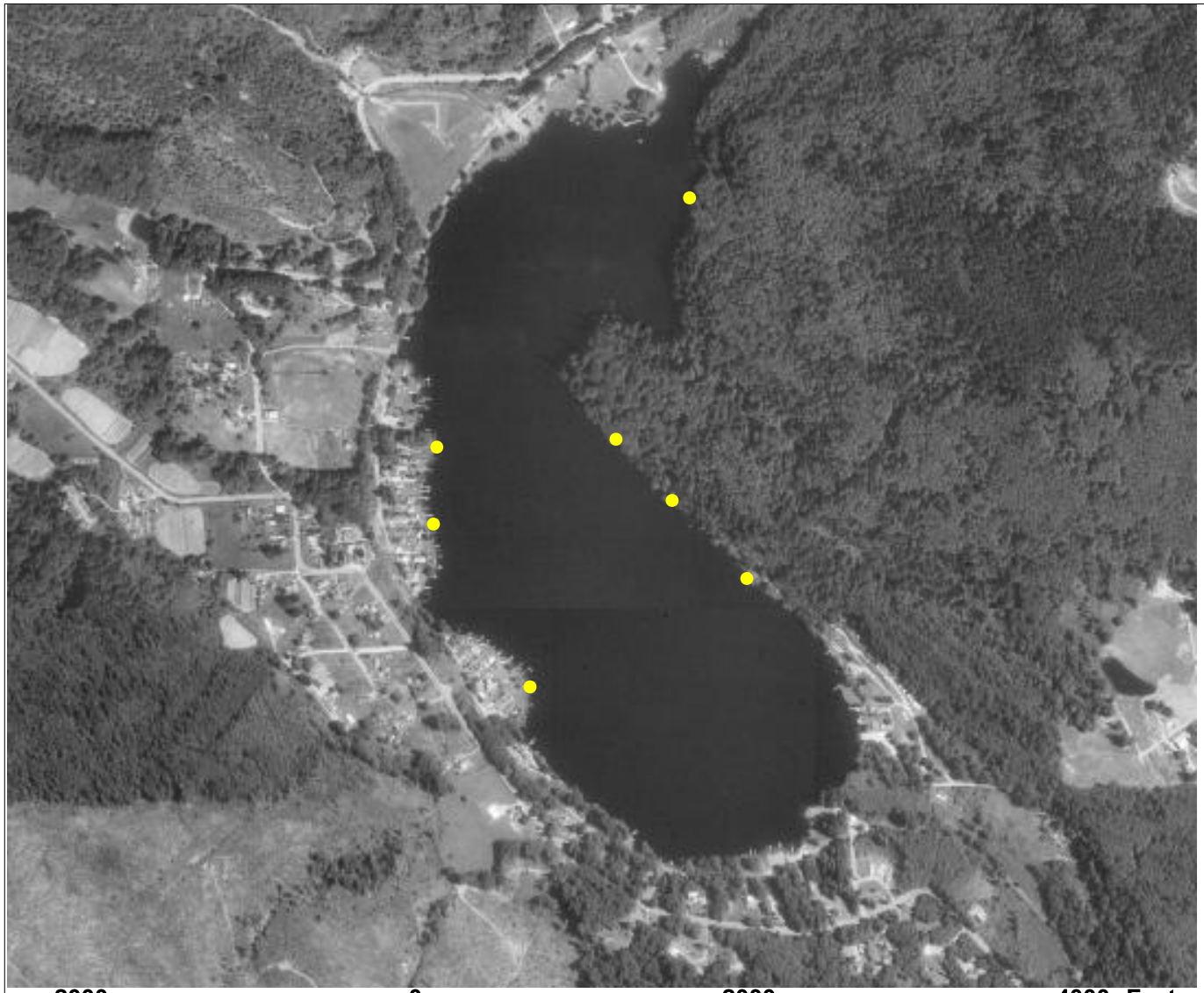

Lake McMurray
2005 Plant Survey

Plant Species Locations

- Potamogeton nodosus

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Lake McMurray
2005 Plant Survey

Plant Species Locations

- Filamentous algae

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Lake McMurray
2005 Plant Survey

Plant Species Locations

- Chara spp.

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Lake McMurray
2005 Plant Survey

Plant Species Locations

- Najas spp.

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Lake McMurray
2005 Plant Survey

Plant Species Locations

- Ceratophyllum demersum

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Lake McMurray
2005 Plant Survey

Plant Species Locations

- Nuphar polysepalum

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