

# Lake McMurray

## 2014 Aquatic Plant Control Program

Prepared By  
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### Project Overview

This was Northwest Aquatic Eco-Systems (NWAEC) second year of providing aquatic weed control services for the Lake McMurray LMD#2. Our 2014 efforts expanded aquatic weed control options performed during 2013 to incorporate both lily pad and nuisance submersed weed components into the program. Lake McMurray supports one registered potable water intake. The intake supplies potable water to a small community located just north of the boat launch. Treatments were restricted to those areas greater than one half mile from the intake.

Lake McMurray is 160 acres and is approximately 9 miles to the Southeast of Mount Vernon. The lake is the headwaters of the Nookachamps Creek, tributary of the Skagit River. Nearly 50% of the shoreline is developed with over 90% of the development occurring along the western and southern shorelines. Water skiing and high speed motor boat use are prohibited. Currently the Lake McMurray program format still emphasizes milfoil control but also includes fragrant waterlily and yellow flag iris control. Native plant communities have increased in densities throughout various shoreline areas of the lake, reducing recreational opportunities. Lake McMurray supports shoreline swimming, a healthy recreational fishery and small boat use.

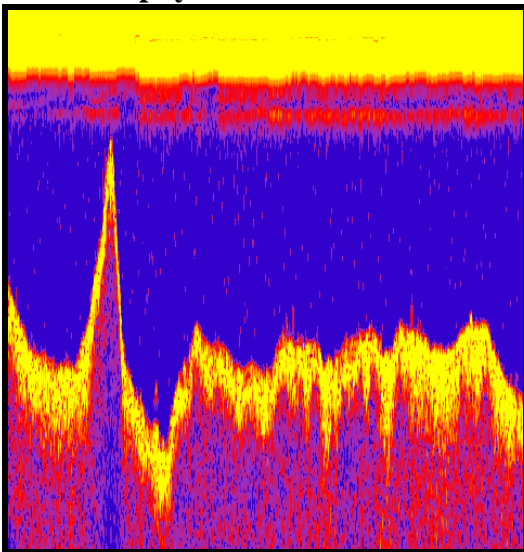
Under current state and federal law the application of aquatic herbicides to control submersed and floating plants requires the procurement of an NPDES permit. All of the necessary paperwork to secure the permit was submitted to the Department of Ecology

during 2013 -2014. Subsequently the permit was issued during the early spring of 2014 allowing anticipated treatments to proceed as scheduled.

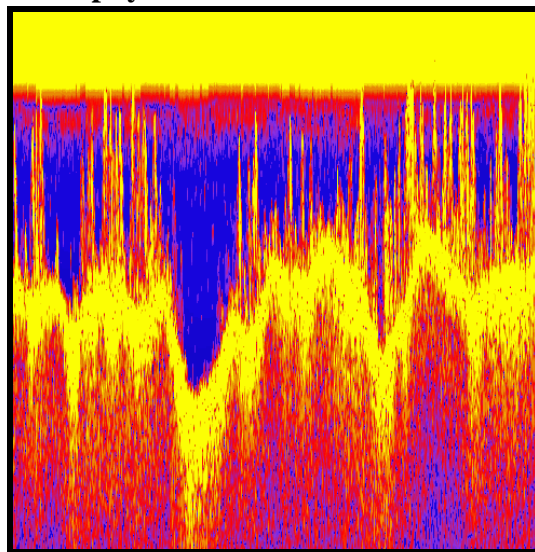
## **Survey Protocol**

2014 sonar data was collected similar to those noted during 2013. Electronic data was collected onto a chart recorder utilizing sonar and structure scan transducers. Milfoil, when identified, was recorded as a waypoint during the survey. Surveying was terminated once plants were no longer detected on the chart graph recorder's monitor.

**No Macrophyte Growth**



**Macrophyte Growth**



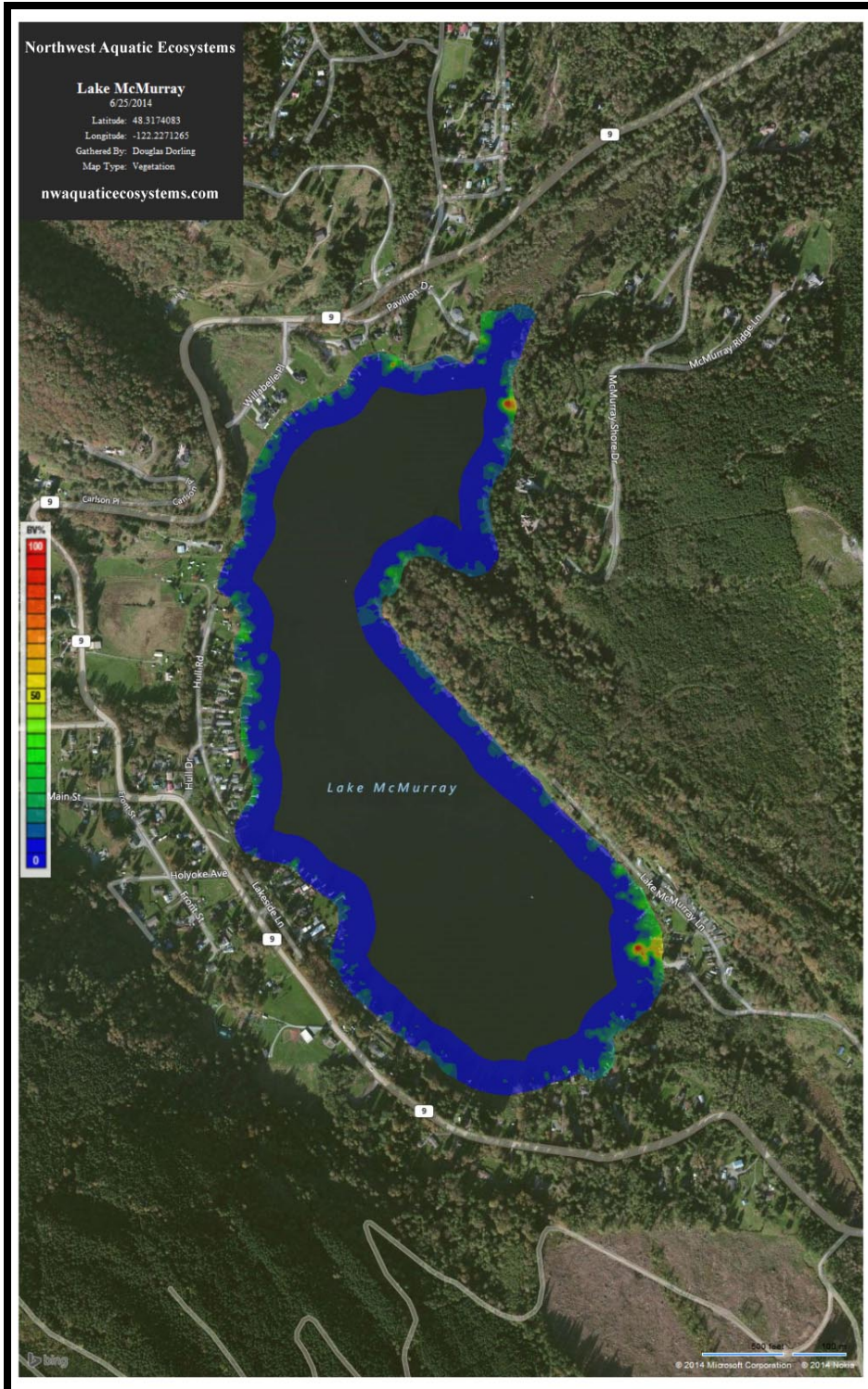
Once collected the SD card was uploaded via cloud based technology and the processing of the data was finalized. Not only is a well defined map produced but a sonar log of the survey is saved allowing a complete review and evaluation of the survey to occur in-house. The survey entails a surface vehicle transecting the lake along the littoral zone. Boat tracks are designed to be approximately 50 feet apart. 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 through the structure scan or visually through the water column. The system automatically stores the position of every transect data point enabling the mapping of thousands of data points on a daily basis.

The survey boat spent most of the day within 300 feet of the shoreline. In addition to marking the positioning of milfoil plants along the transect line, an on board Trimble Geo XT GPS system was also available to record individual plants. Final map production can then be transmitted to any GIS based system for storage.

## Lake McMurray Spring Survey Results

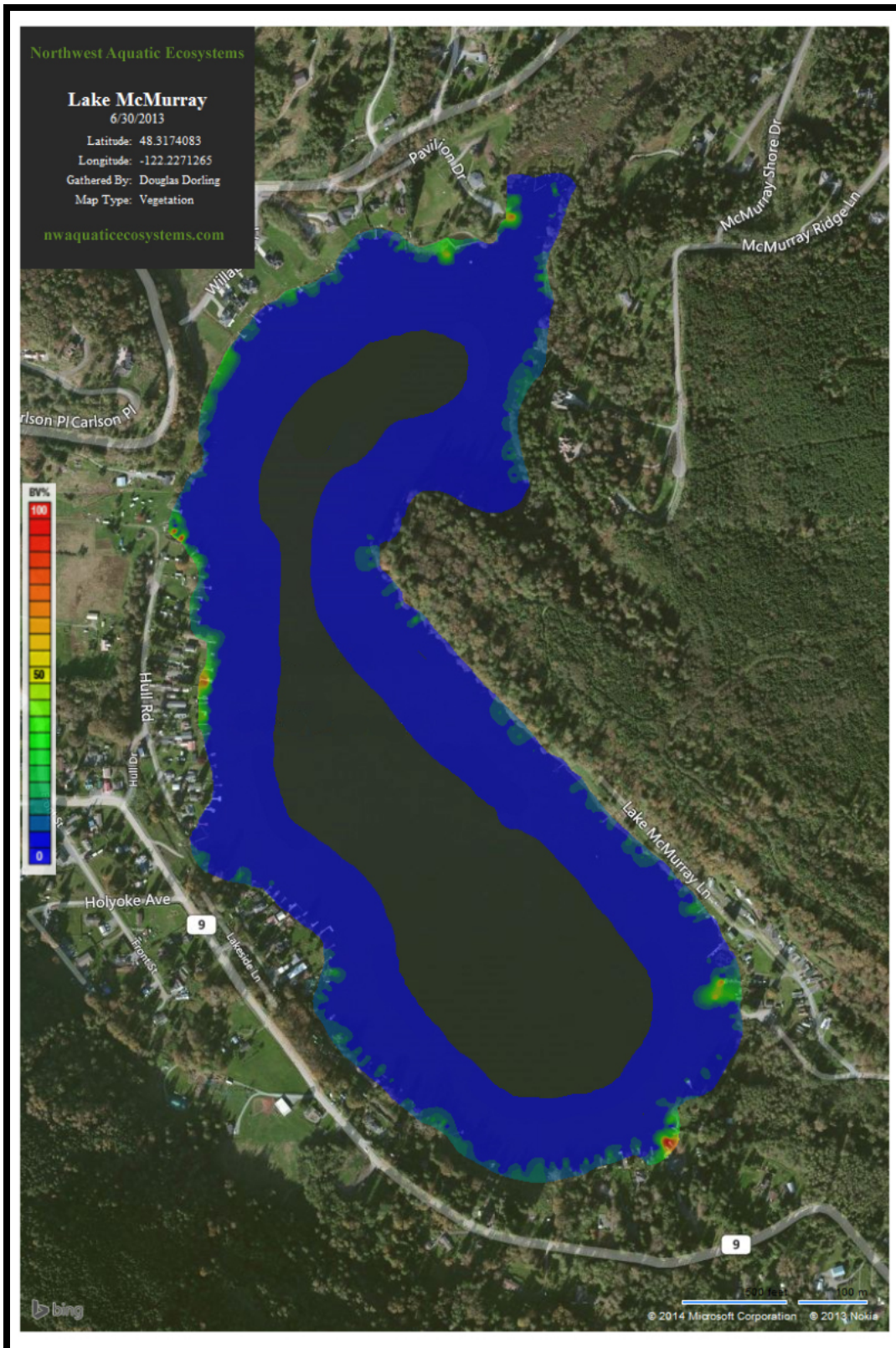


Lake McMurray was surveyed on June 22, 2014. Water clarity was excellent with secchi disc readings exceeding 20 feet. Bottom sediments were visible throughout most of the lake's littoral zone. No milfoil plants were identified. Results of the spring 2014 survey resulted in no unexpected growth patterns and conformed with similar survey findings. Yellow flag iris plants were identified sporadically along the shoreline at approximately 50 locations. Most infestations were less than 15 square feet in area. Fragrant water lily plants were noted lake wide with the largest infestations occurring in the outlet portion of the lake and in the southeast corner just north of the public boat launch. Native plant communities posing potential interference to lake users were noted along various residential shoreline areas of the lake. Pondweeds and elodea species dominated the lake's macrophyte composition.



**Blue areas indicate no submersed macrophyte growth.**  
**Green areas indicate moderate growth.**  
**Red areas indicate 100 % coverage**

*Note increased submersed weed coverage documented during the 2014 survey in comparison to 2013 survey results noted below.*



**Blue areas indicate no submersed macrophyte growth.**  
**Green areas indicate moderate growth.**  
**Red areas indicate 100 % coverage.**

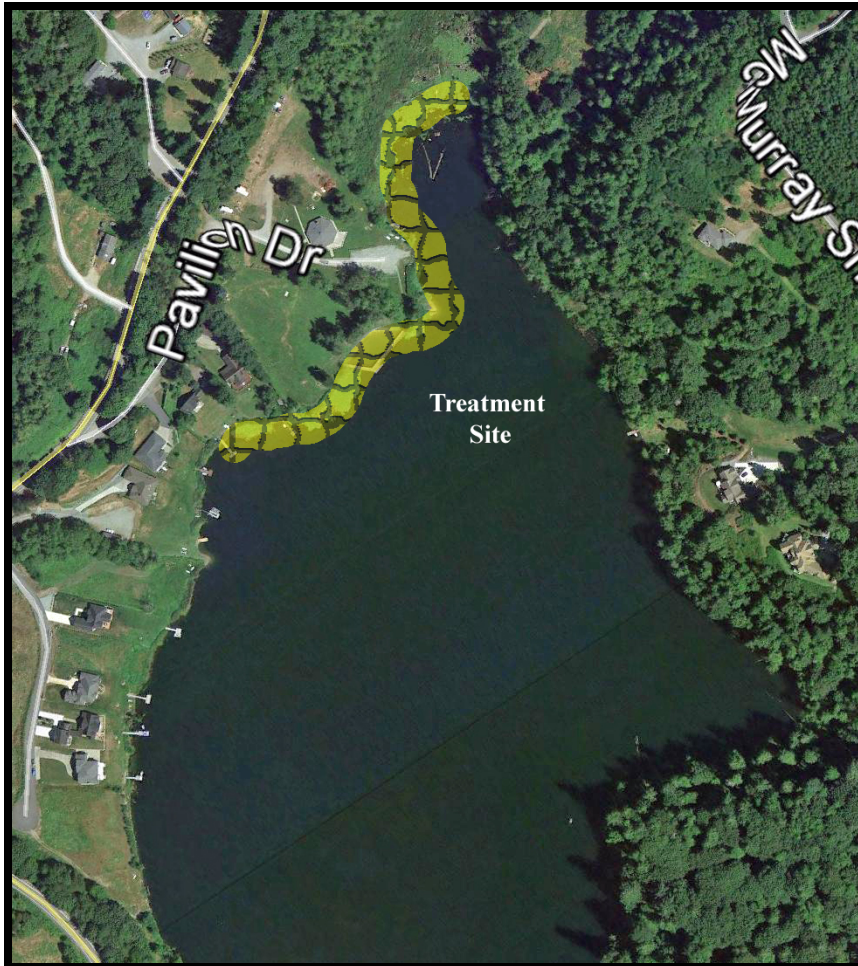


**Lily Pad Locations 2014**

## **Treatment**

Lake McMurray received treatment for lily pads, submersed weeds and yellow flag iris on August 11, 2014. Only infestations in excess of ½ mile of the McHaven potable water intake were targeted. The treatment was divided into two phases. The first phase consisted of a glyphosate application to both the iris and lily pads. At the completion of the initial phase the boat was refitted to accomplish the submersed weed control component of the project. An 18 foot aluminum boat equipped with one 25 gallon spray tank was utilized during this spray event. The 25 gallon tank was filled with lake water;

herbicide and surfactant were then added directly to the tank. Once mixed, the application boat drove along the shoreline identifying targeted emergent plants. The spray mixture was then discharged directly onto the targeted species' leaf structures using a spray gun. When emptied the tank was refilled and discharged as needed. Spray mixture consisted of a 1.5% solution of glyphosate.



Yellow Flag Iris and Lily Pad Control Zone

Once the glyphosate spraying was completed, the boat was refitted with a boom mounted injection system that was positioned to disperse herbicide just above the canopy of the weed beds. The 25 gallon tank was filled with a herbicide lake water mixture. Water was drawn from the lake and infused with the water herbicide tank mixture. The resulting mixture was then dispersed directly over the weed bed canopy. Herbicide mixture was applied at a rate of two gallons per surface acre.

At the time of the application no spraying occurred in or around the Friends of Norway facility located along the far northwest shoreline of the lake. This area was excluded from the treatment due to the presence of a large number of swimmers and boaters utilizing the site.



**Submersed Weed Control**

## **Monitoring**

Samples were collected on August 12, 2014 and August 16, 2014, stored in ice and delivered to Matrix Labs in Portland. Samples were analyzed for diquat dibromide and glyphosate. One sample was taken mid-basin adjacent to the McHaven development and the remaining sample was taken directly above the McHaven Inc. water intake. All samples were collected approximately three feet below the water surface.



## Sampling Stations



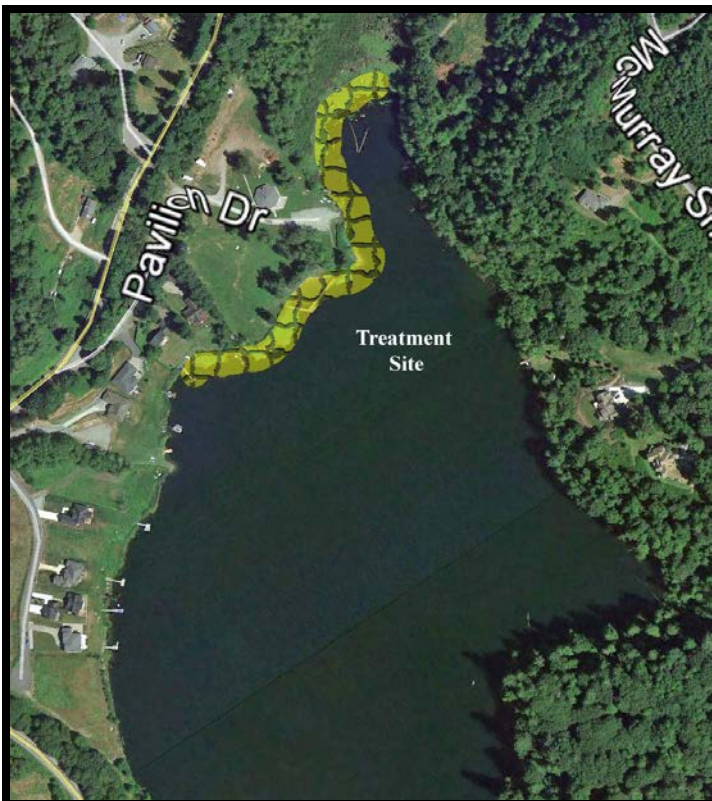
Sample Station	Glyphosate Concentration	Diquat Concentration
Inlake Sampling Site 8-12	N/D	.00717 mg/L
Intake Sampling Site 8-12	N/D	.0146 mg/L
Inlake Sampling Site 8-16	N/D	.00305 mg/L
Intake sampling Site 8-16	N/D	.00579 mg/L

There was no glyphosate detected at any of the sampling stations. Low levels of diquat were noted at both the intake and potable intake sampling stations. The EPA guideline for diquat concentrations within active potable systems is .02 mg/L. Although the half mile buffer zone failed to keep any diquat from entering the potable intake, the concentrations were below the EPA drinking water guidelines.

At the time of the August 12, 2014 sampling event, it was noted that the extreme northern portion of the lake was undergoing a slight algae bloom. These elevated levels appeared only in the northern basin. Visual observations of the water column appeared to indicate the occurrence of the bluegreen species *Microcystis* and *Anabaena*. During our second sampling event of August 16, 2014, algae was not only observed in the northern basin but also throughout most of the lake. An additional water sample was taken at the McHaven potable water intake and delivered to Water Management Laboratories for identification only. Microbiologist from WML identified the presence of both bluegreen species *Microcystis* and *Anabaena*. *Microcystis* and *Anabaena* are potentially toxin producing bluegreen species. Upon confirmation Skagit County Health, McHaven and Skagit County Public Works were informed of the findings. Apparently the low level bloom was short lived. Skagit County Health visited the site shortly afterwards and did not observe the presence of any bluegreen species.

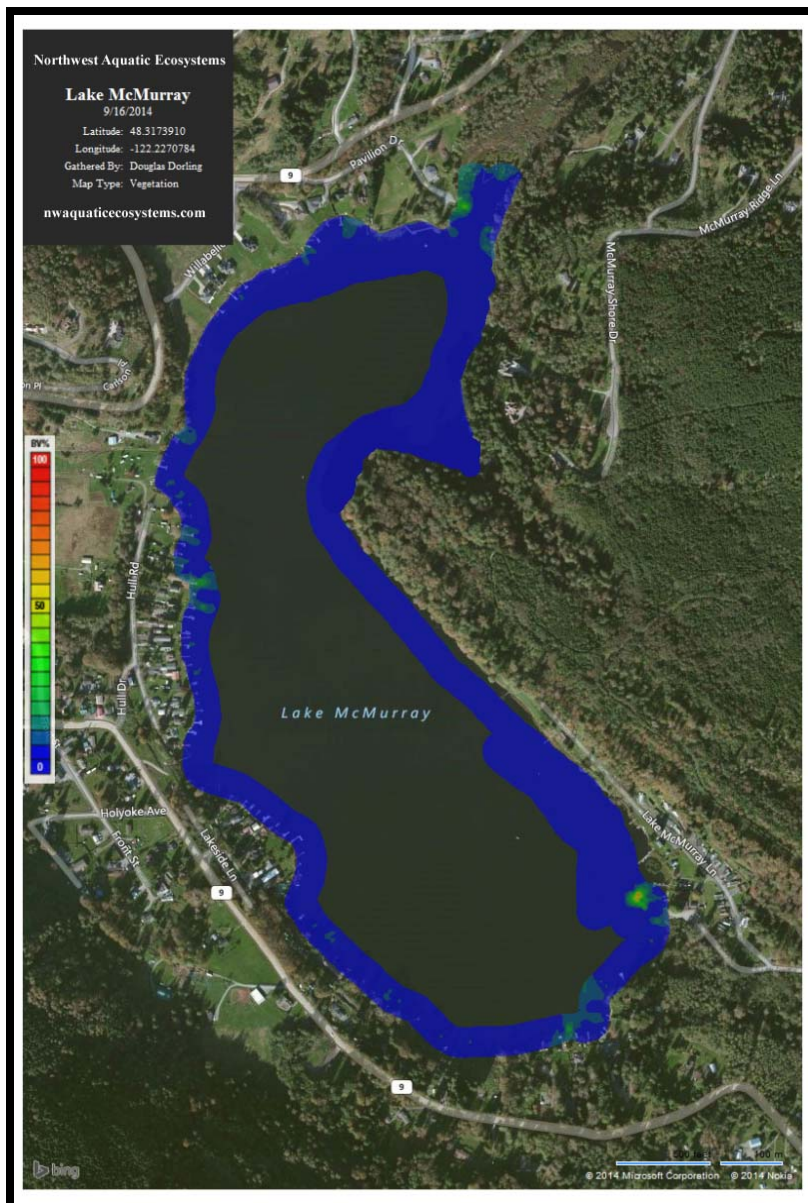
## **Treatment 9-16 -14**

Lake McMurray was revisited on September 16, 2014 to conduct the fall survey. At the time of the survey the Friends of Norway site received a glyphosate application targeting lily pads and yellow flag iris. The procedures and application rates utilized earlier in the year were once again adopted. The entire lake was not posted during this event; only those areas of the lake that received treatment were posted in addition to properties within 400 feet of the treatment site.



## Fall Survey

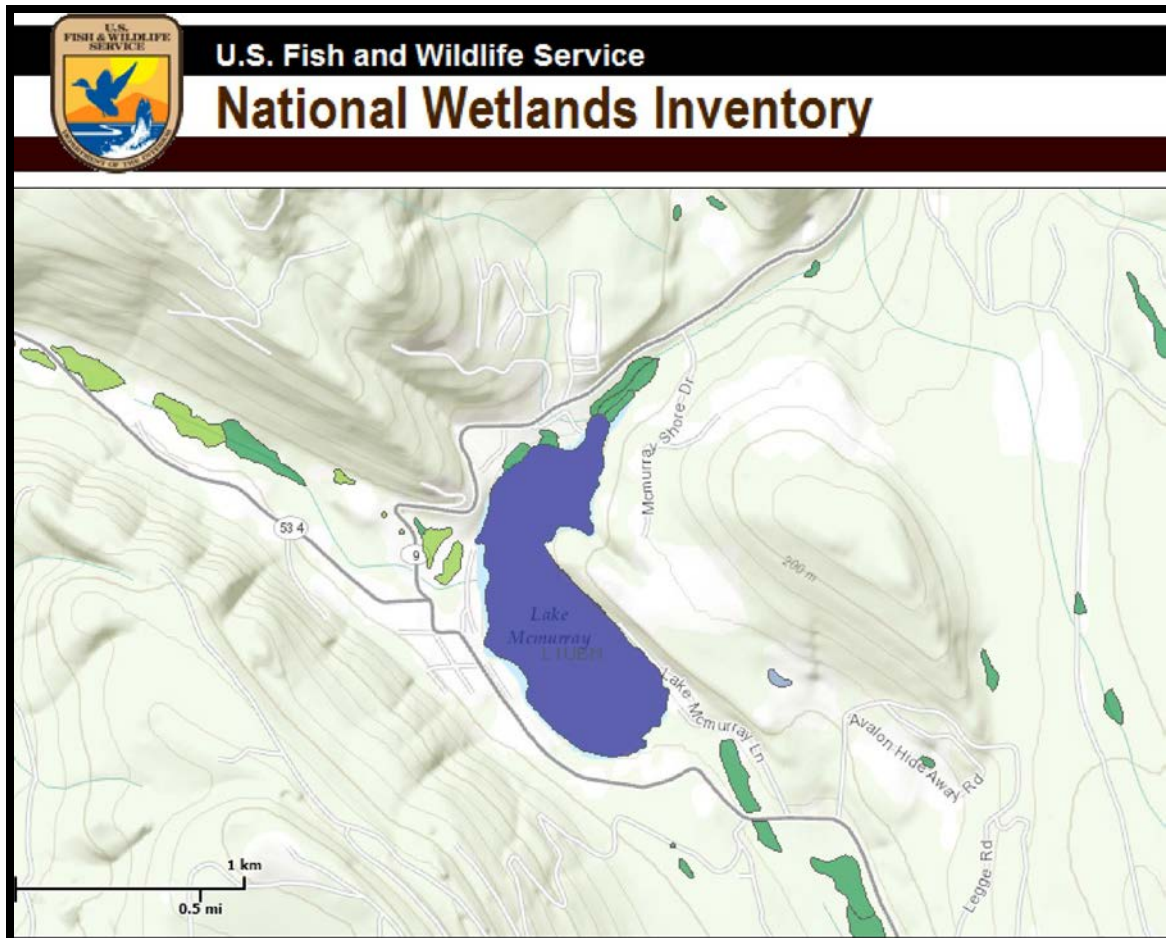
The fall survey was performed on September 16, 2014. The survey resulted in no milfoil documented lake wide. All targeted sites were clearly showing signs of herbicide damage. Lily pads had died back and new growth was small and limited in nature. Submersed weed control proved successful with the non-targeted species eel grass, showing no signs of damage. All pondweed species and elodea within targeted sites were reduced in density and location by over 90%. Low growing algae species were also not impacted and remained healthy and robust throughout the littoral zone of the lake.



Fall 2014 Survey

## Outlet Concerns

The outlet area has also been identified by the US Fish and Wildlife Service as a registered wetland. Removal or alterations made to any native species or fallen debris would require extensive permitting, mitigation and financial resources.



## Recommendations

1. LMD officials, the consultant and the McHaven Inc. (potable water right holder) need to continue to work in harmony in developing treatment protocol that will provide the greatest degree of control lake wide while ensuring the integrity of their water supply.
2. Sampling conducted during 2013 and 2014 has documented that the herbicide glyphosate has resulted in no active ingredient being detected at the communities potable water intake. Past water quality testing resulted in no sampling during the

application made to the Friends of Norway parcel. McHaven board approved the non-sampling event.

3. Diquat is the only material registered in Washington State that will control elodea, one of the dominant species identified in the lake. Diquat residues were detected at the McHaven potable water intake during 2014. Levels were below the EPA guidelines for potable systems, .02 mg/L. Such levels were not expected even with the ½ mile imposed no treatment zone.
4. Further use of diquat will need to be discussed if the goal of treatments is to ensure that no herbicide residue is detected at the McHaven potable intake.
5. Aquathol K can be used to control the pondweed species. Aquathol K requires a minimum 600 foot setback from potable water intakes. Potable water use is permitted when Aquathol concentration in the water is less than .1 ppm. Aquathol K degrades faster in the water than diquat.
6. Aquathol K does not control elodea.
7. Treatment for submersed weed control for the 2015 season should once again be limited to distances in excess of ½ mile from the McHaven water intake. Monitoring of any treatment should be incorporated into the treatment protocol.
8. Incorporate Aquathol K into the treatment protocol for pondweed control.
9. Continued use of glyphosate in the control of lily pads, yellow flag iris and loosestrife.
10. Consider reducing the no spray zone for glyphosate to ¼ mile with continued monitoring.
11. Continued use of the new mapping technology. Such technology will provide an easily understood macrophyte map. Mapping can then be used as baseline data in evaluating the success of future weed control activities.



1515 80th St. E.  
Tacoma, WA 98404  
(253) 531-3121

August 20, 2014

NW Aquatic Eco-Systems  
855 Trospen Road SW #108-313  
Tumwater, WA 98512  
Attn: Doug Dorling

Dear Sir:

Results of analysis of one drinking water sample taken by you on 08-16-14 at 11:30 a.m. and received on 08-18-14 at 1:20 p.m. are as follows:

**Sample Identification: McMurray Intake**

**Test**

Microscopic Exam

**Results**

1. Bluegreen algae  
*Microcystis aeruginosa*  
*Anabaena* species

Lab Number: 08990234

Sample was analyzed according to Standard Methods for the Examination of Water and Wastewater, 20<sup>th</sup> Edition and Algae in Water Supplies by C.M. Palmer.

Chain of custody record is enclosed.

Sincerely,

A handwritten signature in cursive script that reads "Diane DuMond".

Diane DuMond  
Microbiologist

DD:lcp  
Enclosure

R:\COMM\NWAQUATIC8-18

WATER MANAGEMENT LABORATORIES, INC.  
 1515 80TH STREET EAST, TACOMA, WA 98404  
 PHONE (253) 531-3121 FAX (253) 531-5287

\*\*\*\*\*  
**CHAIN OF CUSTODY**  
 \*\*\*\*\*

LAB USE	SAMPLE #	# OF CONTAINERS	TYPE OF SAMPLE			DATE TAKEN	TIME TAKEN	TAKEN BY (NAME)	SAMPLE IDENTIFICATION	TEST REQUESTED		LAB USE PRESERVED
			DRINKING WATER	WASTE	OTHER					ALGAE SPEC MICRO EXAM	90234	
	1	1				8-16-14	11:30am	DOUG DORLING	McMURRAY INTAKE		90234	NO
	2											NO
	3											NO
	4											NO
	5											NO
	6											NO
	7											NO
	8											NO
	9											NO

REPORT TO: DOUG DORLING  
 Company Name: NW AQUATIC ECO-SYSTEMS  
 Address: 855 TROSPER AVE SW  
TUMWATER WA 98512  
 Phone: (360) 352-3885 Fax: ( )

RELINQUISHED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_  
 RECEIVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_  
 RECEIVED FOR ANALYSIS BY: David DeM... DATE: 8-16-14 TIME: 1:20 pm

REMARKS / REJECT REASON: \_\_\_\_\_