

Lake McMurray

2015 Aquatic Plant Control Program

Prepared By
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Project Overview

This was Northwest Aquatic Eco-Systems (NWAE) third year of providing aquatic weed control services for the Lake McMurray LMD#2. Our 2015 efforts expanded aquatic lily pad and yellow iris control to within ¼ mile of the McHaven potable water intake. No nuisance submersed weed control was undertaken as a result of the species present and materials available to control that particular plant. Use of diquat (the material with the ability to control this problem) during 2014 produced residual drift that reached the McHaven intake. McHaven is the only registered potable water intake. This intake supplies potable water to a small community located just north of the boat launch.

There appeared to be confusion between LMD board members, county officials and the consultant as to the implementation of a manual lily pad cutting program. Such a program would have provided the remaining property owners within the ¼ mile no treatment zone the ability control non-native lily pad growth. No cutting was implemented during 2015.

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

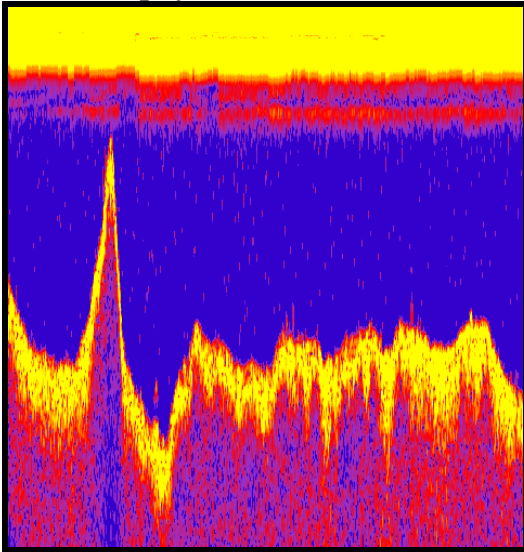
lake, reducing recreational opportunities. Lake McMurray supports shoreline swimming, a healthy recreational fishery and small boat use.

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.

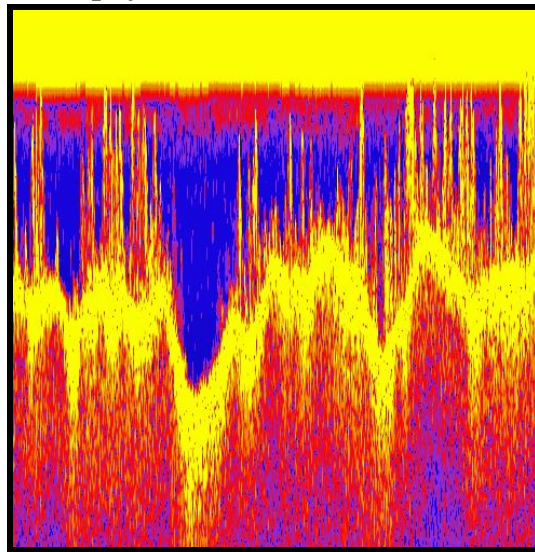
Survey Protocol

2015 sonar data was collected similar to those noted during 2013 & 2014. Electronic data was collected on 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



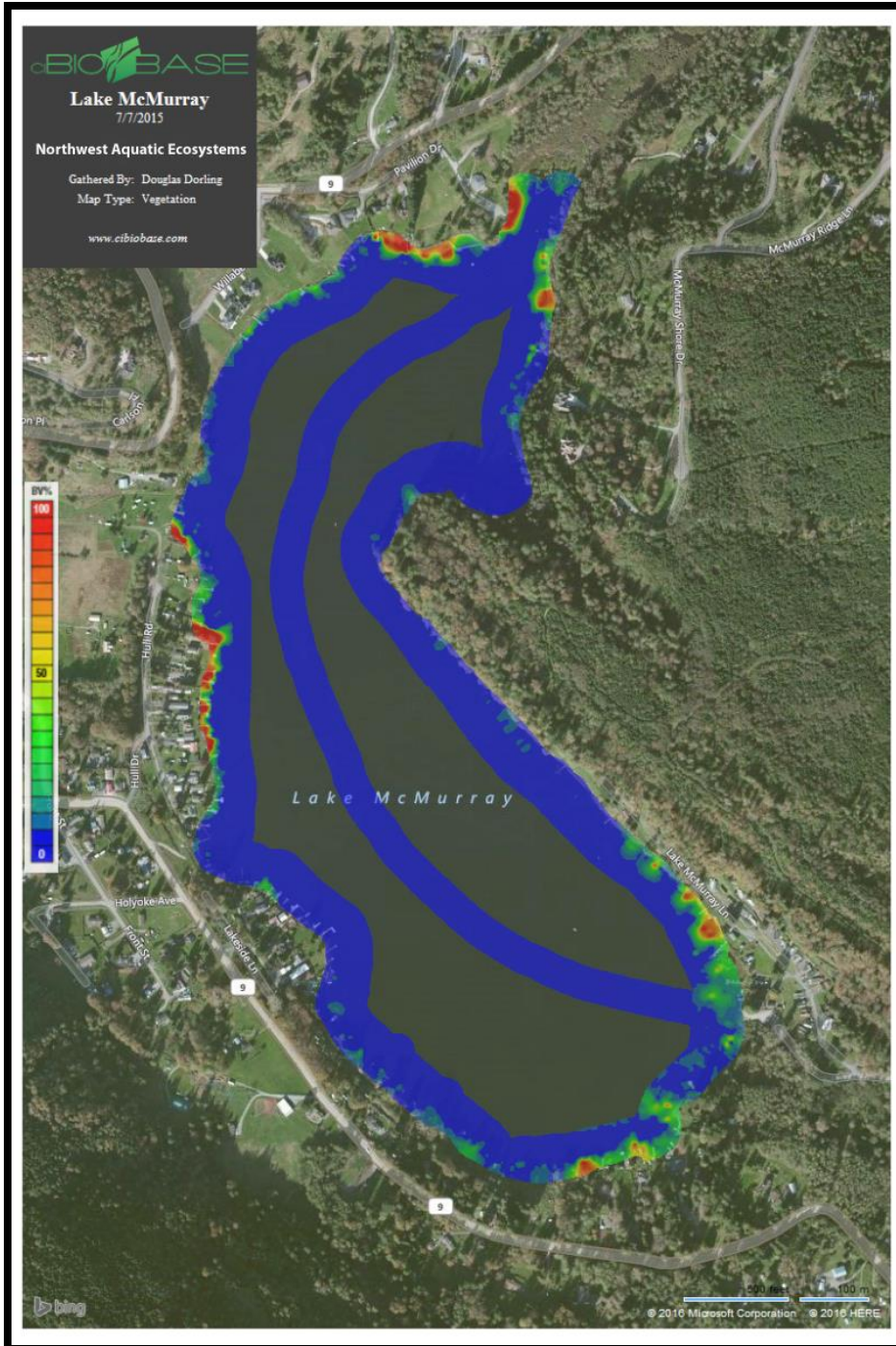
Once collected the SD card was uploaded via cloud based technology and the processing of the data was finalized. Not only is a well defined map produced but a sonar log of the survey is saved allowing a complete review and evaluation of the survey to occur in-house. The survey entails a surface vehicle 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.

Lake McMurray Spring Survey Results

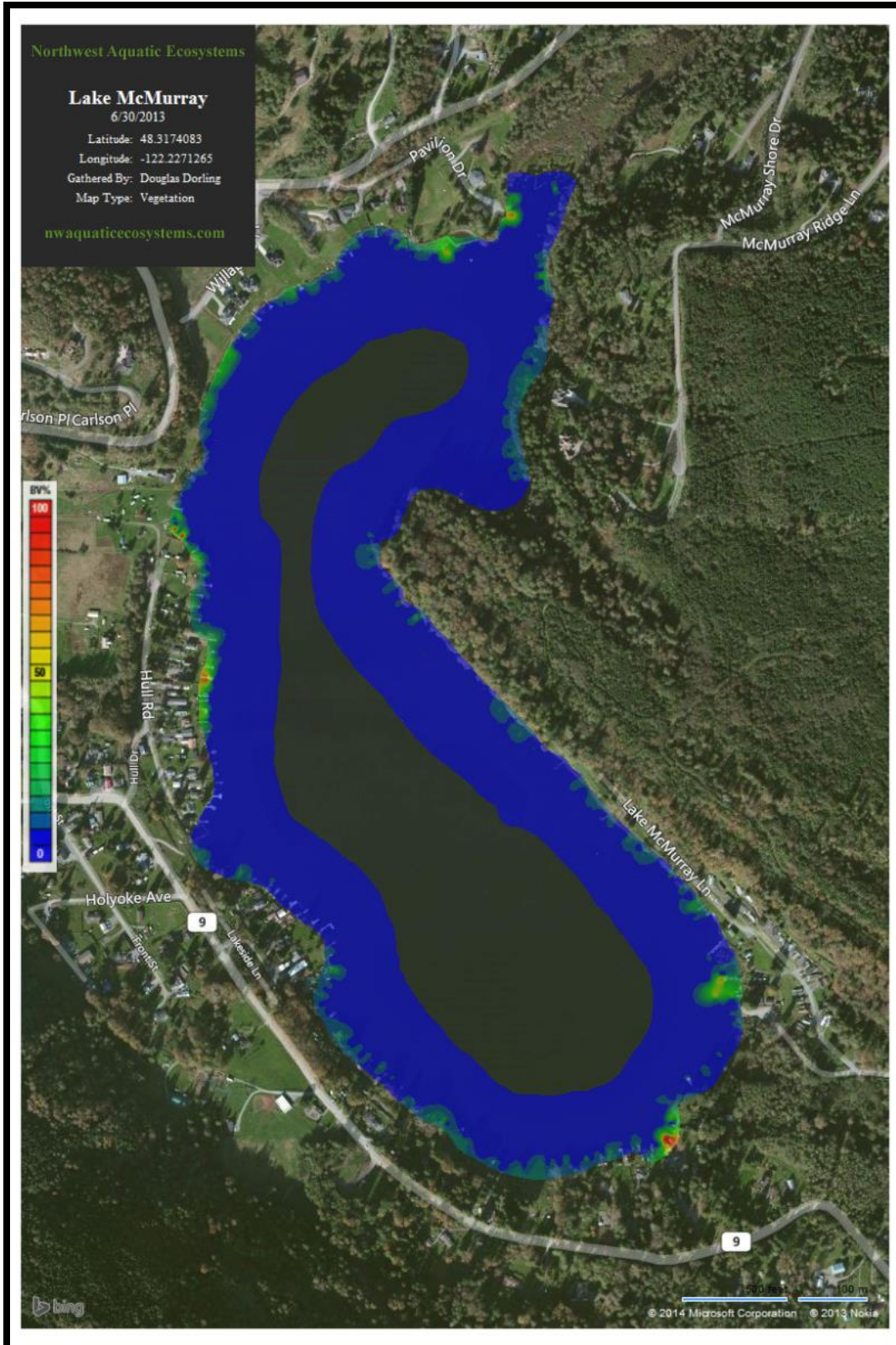


Lake McMurray was surveyed on July 07, 2015. Water clarity as expected was excellent with secchi disc readings exceeding 20 feet. Bottom sediments were visible throughout most of the lake's littoral zone. No milfoil plants were identified. Results of the spring 2015 survey resulted in elevated growth of the submersed species elodea along residential shoreline areas located adjacent to the northwestern portion of the lake. Growth of this species appears to have been accelerated in relation to the few pondweed patches noted. Yellow flag iris plants appear not to have increased in range and were identified sporadically along the shoreline at approximately 50 locations. Most infestations were small less than 15 square feet in area. Fragrant water lily plants were noted lake wide with the largest infestations occurring at the outlet portion of the lake and in the southeast corner just north of the public boat launch. This species is no longer increasing in range as past glyphosate applications have been successful. 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 2015 survey in comparison to 2013 survey results noted below.





Lily Pad Locations 2015

Treatment

Lake McMurray received treatment for lily pads and yellow flag iris on August 06 and September 18, 2015. Only infestations in excess of 1/4 mile of the McHaven potable water intake were targeted. 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. Glyphosate and surfactant were then added directly to the tank. Once mixed, the application boat drove along the shoreline identifying targeted species. The spray mixture was then discharged directly onto the plants 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.

This year's lily pad and yellow iris spraying events resulted in elevated control over last year's results with spraying activities visibly starting to show noticeable results. Regrowth of reoccurring pads has been reduced with surface floating pads reduced in size (diameter) and density.

Monitoring

Samples were collected on August 6 & 9 2015 and again on September 18 & 21, 2015. Samples were stored in ice and delivered to Water Management Laboratories in Tacoma. Samples were analyzed for glyphosate. Our sampling objective for the two treatment dates was modified from our previous years of sampling. Originally our initial treatment sampling effort was to more closely define the drift zone to within a few hundred feet of the original treatment site. Sampling was conducted directly in the treatment site and then again 200 feet from the site. Unfortunately all samples were not analyzed.

Our second treatment sampling event incorporated past protocol by collecting one sample directly above the potable water intake and a second sample mid-basin adjacent to the McHaven development. All samples were collected approximately three feet below the water surface except for the sample taken at the treatment site. This sample was recovered at the water's surface within the lily pad growth area.

Sampling Stations



Sample Station	Glyphosate Concentration
Treat Sampling Site 8-6	101 ug/L (Treatment area)
Intake Sampling Site 8-6	*
Treat sampling Site 8-9	*
Intake sampling Site 8-9	*

- **Samples were not analyzed, technical problems**

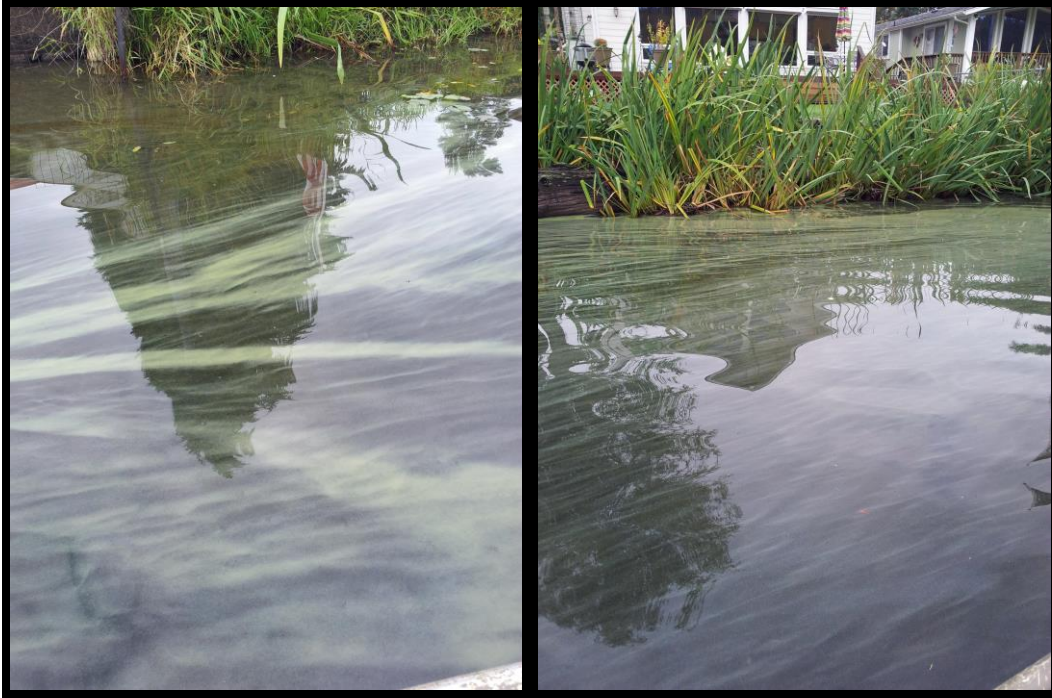
Intake Sampling Site 9-18	N/D
Mid Sampling Site 9-18	N/D
Intake Sampling Site 9-21	N/D
Mid sampling Site 9-21	N/D

There was no glyphosate detected at any of the sampling stations except for the sample taken directly in the treatment site located in the northern portion of the lake.

Our sampling objective for the two treatment dates was modified from our previous years of sampling. Originally our initial treatment sampling effort was to more closely define the drift zone to within a few hundred feet. Sampling was conducted directly in the treatment site and then again 200 feet from the site. Unfortunately all samples were not analyzed.

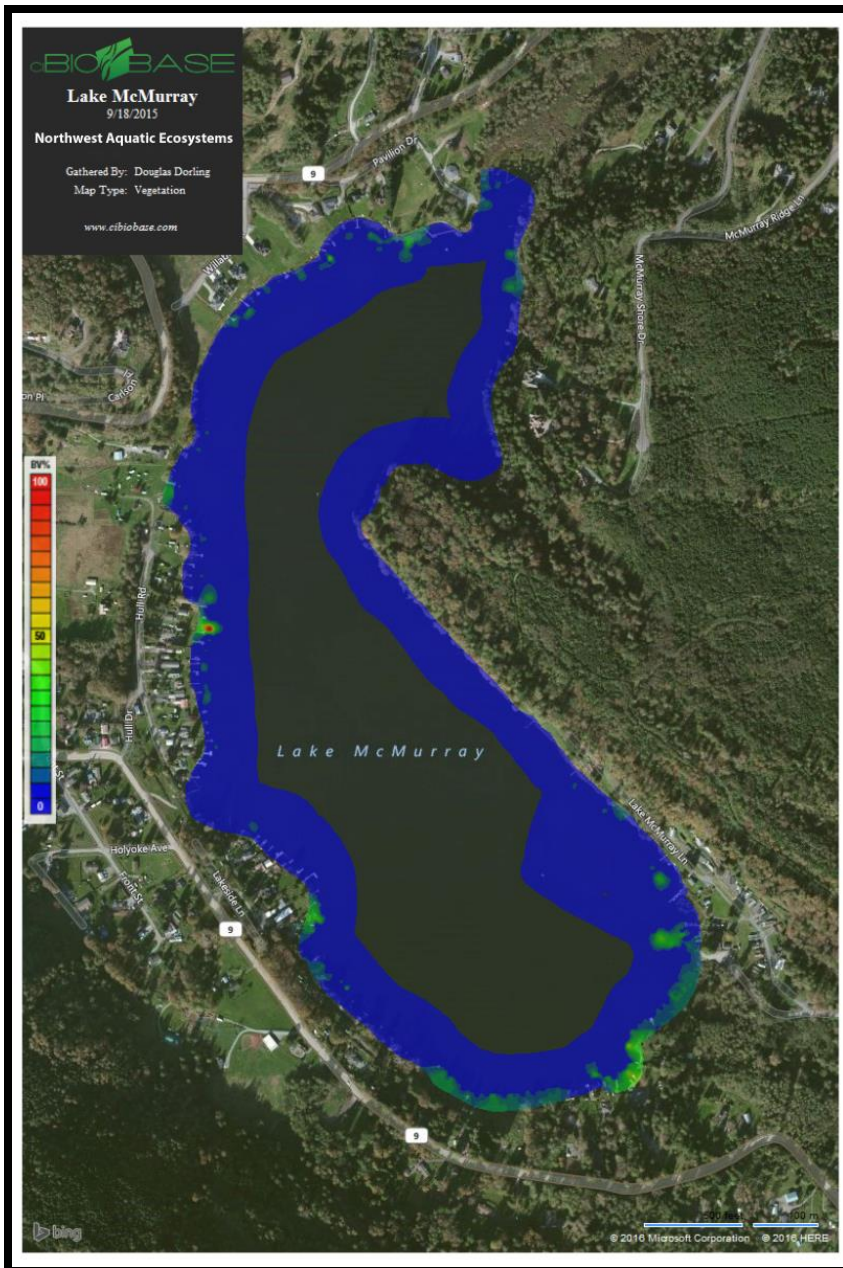
Our second treatment sampling event incorporated past protocol by sampling the potable intake directly and then again a few hundred feet from the intake.

At the time of the September 18, 2015 site visit it was noted that the lake was undergoing a moderate algae bloom that was creating surface scum along much of the northeastern shoreline. Visual observations clearly indicated that a bloom was in progress. Laboratory analysis of the water by Skagit County revealed that the bloom was not of the toxic nature. The site was again visited on September 21, 2015 and no scum formation was observed lake wide.



Fall Survey

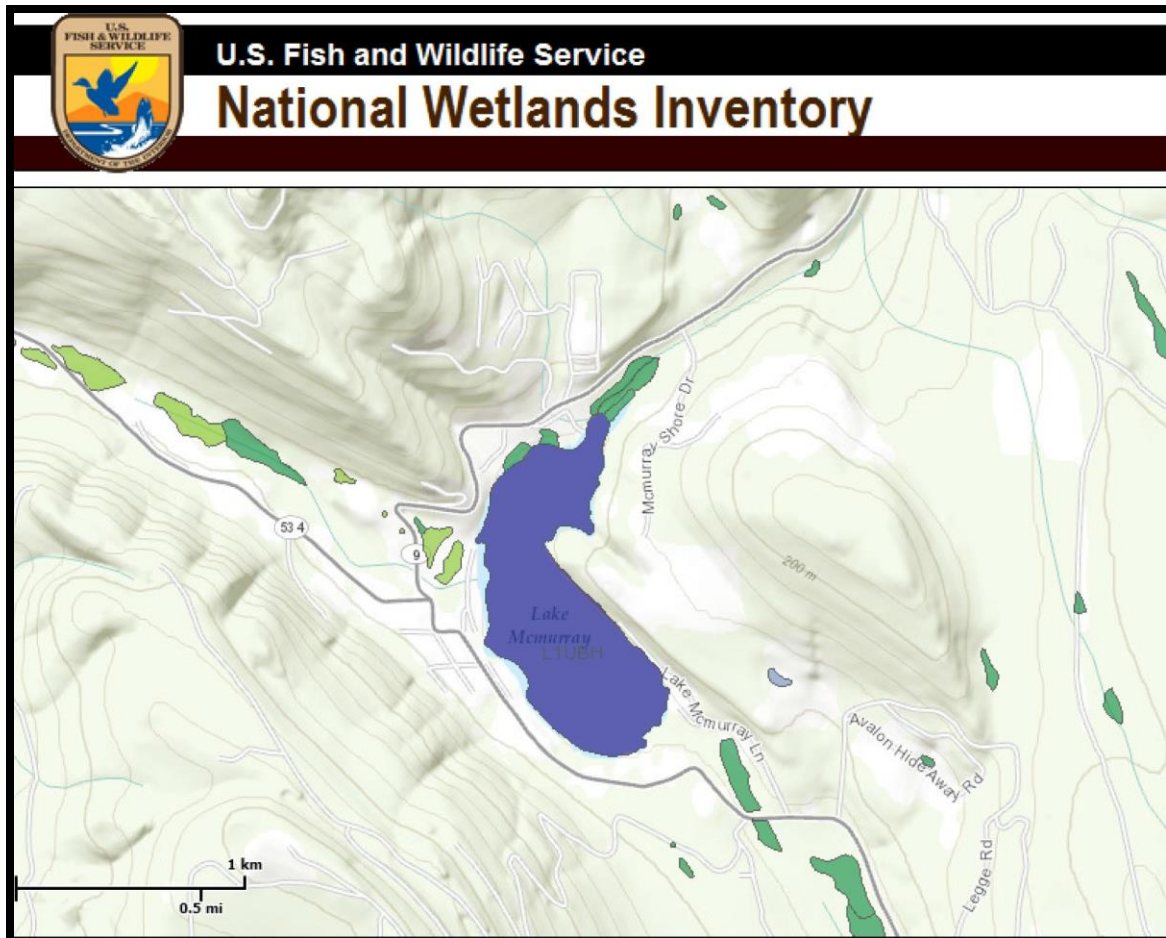
The fall survey was performed on September 18, 2015 prior to the lily pad application. The survey resulted again in no milfoil documented lake wide with a noted decrease in the submersed weed species. There were no means to identify why this decrease in weed density had occurred but possible scenarios could include, bacteria, viral or insect associated environmental conditions. All targeted lily pad sites were clearly showing signs of herbicide damage. Lily pads had died back and new growth was small and limited in nature.



Fall 2015 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. During 2015 the no spray zone for lily pads and yellow iris was reduced from $\frac{1}{2}$ mile to $\frac{1}{4}$ mile of the McHaven water intake. Discussions should continue to further reduce this distance. Sampling conducted during 2013, 2014 and 2015 has documented that the use of the herbicide glyphosate resulted in no active ingredient being detected at the community's potable water intake.

2. Diquat is the only material registered in Washington State that will control elodea, 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. Further use of diquat will need to be discussed, if the goals of treatments are to ensure that no herbicide residue is detected at the McHaven potable intake then future diquat use for elodea control is not possible.
3. Aquathol K can be used to control only the pondweed species found in the lake. Since the pondweeds are a component of the elodea population control of the pondweeds only would not bring about relief to property owners because the elodea species would still be problematic. It is for this reason Aquathol K was not utilized during 2015. If pondweeds were the only species present then Aquathol K would be a potential control agent. Aquathol K requires a minimum 600 foot setback from potable water intakes. Potable water use is permitted when Aquathol concentration in the water are less than .1 ppm. Aquathol K degrades faster in the water than diquat.
4. Continued use of glyphosate in the control of lily pads, yellow flag iris and loosestrife.
5. Reevaluate the use of manual control for lily pads within the no spray zone. During 2015 there appeared to be confusion over this method of control.
6. 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

**SYNTHETIC ORGANIC CHEMICALS (SOC's) ANALYSIS REPORT
EPA TEST METHOD - EPA 547
WA DOH TEST PANEL: GLYPH**

System ID No.: N/A		System Name: N/A	
Lab/Sample No.: 08984430		Date Collected: 08/06/15	
DOH Source No.: N/A		Multiple Source Nos.: N/A	
Sample Type: N/A		Sample Purpose: I	
Date Received: 08/07/15		Date Analyzed: 08/18/15	
Analyst: ALI		Date Reported: 08/25/15	
Supervisor:		County: N/A	
Group: N/A		Sample Location: McMurray Lake - Spray Site	
Send To: Northwest Aquatic Ecosystems 855 Trosper Rd SW #108-313 Tumwater, WA 98512		Remarks:	

DOH #	ANALYTES	RESULTS	UNITS	SRL	TRIGGER	MCL	EXCEEDS	
EPA REGULATED							Trigger?	MCL?
152	Glyphosate	101	ug/L	6	6	700	YES	NO

NOTES:

SRL (State Reporting Level): Indicates the minimum reporting level required by the Washington Department of Health (DOH).
 Trigger Level: DOH Drinking Water response level. Systems with compounds detected at concentrations in excess of this level are required to take additional samples. Contact your regional DOH office for further information.
 MCL (Maximum Contaminant Level): If the contaminant amount exceeds the MCL, immediately contact your regional DOH office.
 NA (Not Analyzed): In the RESULTS column indicates this compound was not included in the current analysis.
 ND (Not Detected): In the RESULTS column indicates this compound was analyzed and not detected at a level greater than or equal to the SRL.
 <: Indicates less than.

Comments :

**ALI Lab No.: 125 64087
Method 547: Glyphosate**



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EPA TEST METHOD - EPA 547
WA DOH TEST PANEL: GLYPH**

System ID No.: N/A		System Name: N/A	
Lab/Sample No.: 08984613		Date Collected: 09/18/15	DOH Source No.: N/A
Multiple Source Nos.: N/A		Sample Type: N/A	Sample Purpose: I
Date Received: 09/23/15	Date Analyzed: 10/02/15	Analyst: ALI	
Date Reported: 10/08/15		Supervisor: <i>Amj</i>	
County: N/A		Group: N/A	
Sample Location: McMurray Intake			
Send To: NW Aquatic Eco Systems, Attn: Doug Dorling 855 Trospen Rd SW #108 - 313 Tumwater, WA 98512			Remarks:

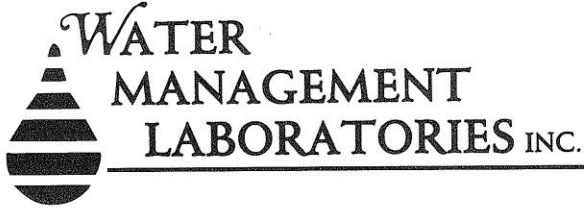
DOH #	ANALYTES	RESULTS	UNITS	SRL	TRIGGER	MCL	EXCEEDS	
EPA REGULATED							Trigger?	MCL?
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Comments :

**ALI Lab No.: 125 66373
Method 547: Glyphosate**



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SYNTHETIC ORGANIC CHEMICALS (SOC's) ANALYSIS REPORT
EPA TEST METHOD - EPA 547
WA DOH TEST PANEL: GLYPH

System ID No.: N/A		System Name: N/A	
Lab/Sample No.: 08984612		Date Collected: 09/18/15	DOH Source No.: N/A
Multiple Source Nos.: N/A		Sample Type: N/A	Sample Purpose: I
Date Received: 09/23/15	Date Analyzed: 10/02/15	Analyst: ALI	
	Date Reported: 10/08/15	Supervisor: <i>ms</i>	
County: N/A		Group: N/A	
Sample Location: McMurray A			
Send To: NW Aquatic Eco Systems, Attn: Doug Dorling 855 Trosper Rd SW #108 - 313 Tumwater, WA 98512			Remarks:

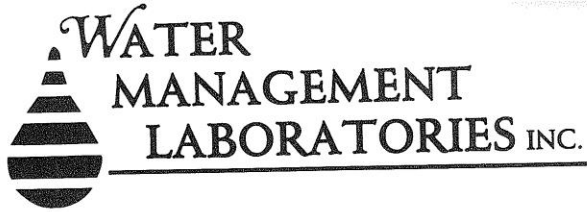
DOH #	ANALYTES	RESULTS	UNITS	SRL	TRIGGER	MCL	EXCEEDS	
EPA REGULATED							Trigger?	MCL?
152	Glyphosate	ND	ug/L	6	6	700	NO	NO

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Comments :

ALI Lab No.: 125 66372
Method 547: Glyphosate



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EPA TEST METHOD - EPA 547
WA DOH TEST PANEL: GLYPH

System ID No.: N/A		System Name: N/A	
Lab/Sample No.: 08984614		Date Collected: 09/21/15	
Multiple Source Nos.: N/A		DOH Source No.: N/A	
Date Received: 09/23/15		Sample Type: N/A	
Date Analyzed: 10/02/15		Sample Purpose: I	
Date Reported: 10/08/15		Analyst: ALI	
County: N/A		Supervisor: <i>ALI</i>	
Sample Location: McMurray Intake		Group: N/A	
Send To: NW Aquatic Eco Systems, Attn: Doug Dorling 855 Trospen Rd SW #108 - 313 Tumwater, WA 98512		Remarks:	

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Comments :

ALI Lab No.: 125 66374
Method 547: Glyphosate



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Tacoma, WA 98404
(253) 531-3121

SYNTHETIC ORGANIC CHEMICALS (SOC's) ANALYSIS REPORT
EPA TEST METHOD - EPA 547
WA DOH TEST PANEL: GLYPH

System ID No.: N/A		System Name: N/A	
Lab/Sample No.: 08984615		Date Collected: 09/21/15	DOH Source No.: N/A
Multiple Source Nos.: N/A		Sample Type: N/A	Sample Purpose: I
Date Received: 09/23/15	Date Analyzed: 10/02/15	Analyst: ALI	
Date Reported: 10/08/15		Supervisor: <i>ms</i>	
County: N/A		Group: N/A	
Sample Location: McMurray A			
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Comments :

ALI Lab No.: 125 66375
Method 547: Glyphosate