

Lake McMurray

2016 Aquatic Plant Control Program

Prepared By
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Project Overview

This was Northwest Aquatic Eco-Systems (NWAE) fourth year of providing aquatic weed control services for the Lake McMurray LMD#2. Our 2016 efforts were similar to those noted during 2015. Lily pad and yellow flag iris chemical weed control was performed outside of a ¼ mile radius of the McHaven potable water intake. This distance once again provided for water analysis results exhibiting no herbicide near the McHaven potable water intake. 2016 was the first year manual lily pad removal was provided to approximately twelve lakeshore residents and the McHaven development. All of these parcels have not historically participated in any of the spraying events nor have they been part of any LMD sponsored event supporting lily pad control alternatives. No nuisance submersed weed control was undertaken as a result of the plant species present and materials available to control that particular plant. Use of diquat (material with the ability to control this problem) during 2014 produced residual drift that reached the McHaven intake. With the unfavorable drift results obtained during 2014 no further use of diquat is permitted. McHaven is the only registered potable water intake lake wide. This intake supplies potable water to a small community located just north of the boat launch. The McHaven system has the ability to store water on site for a few days, depending on water usage.

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

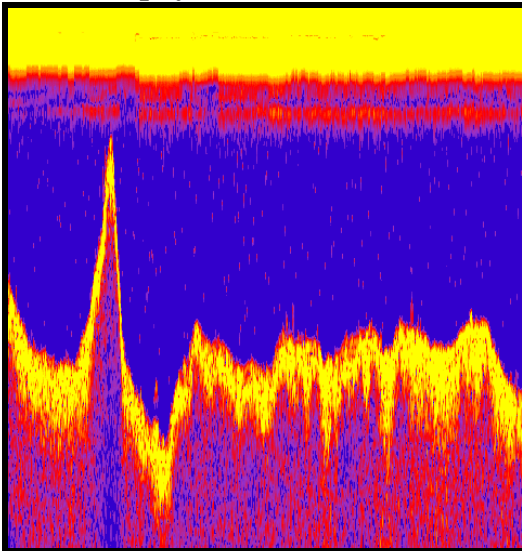
occurring along the western and southern shorelines. Water skiing and high speed motor boat use are prohibited. Currently the Lake McMurray program format still emphasizes milfoil control but also includes fragrant waterlily and yellow flag iris control. Native plant communities have increased in densities 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.

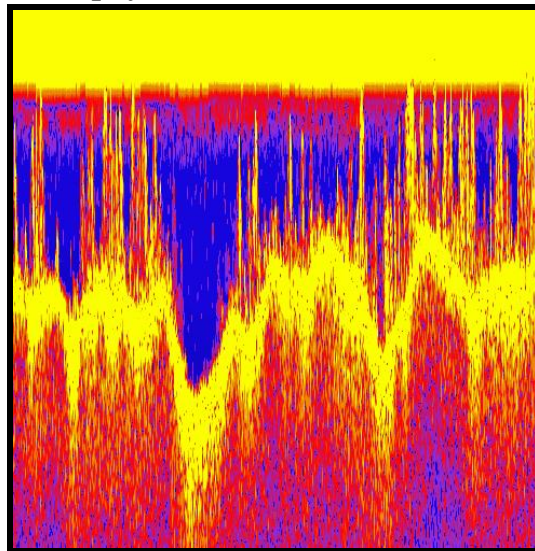
Survey Protocol

2016 sonar data was collected similar to those noted during 2014 & 2015. Electronic data was collected on 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

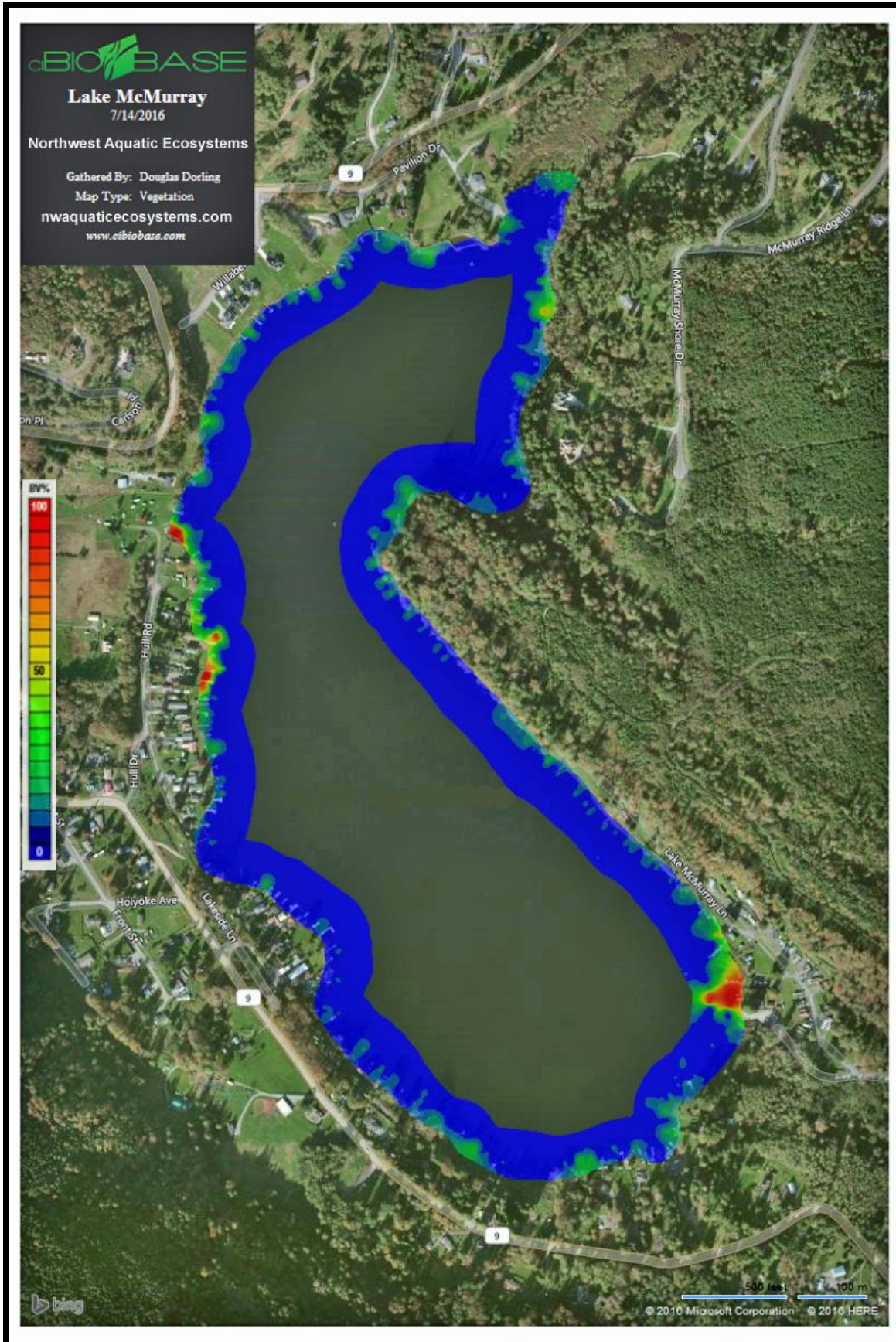


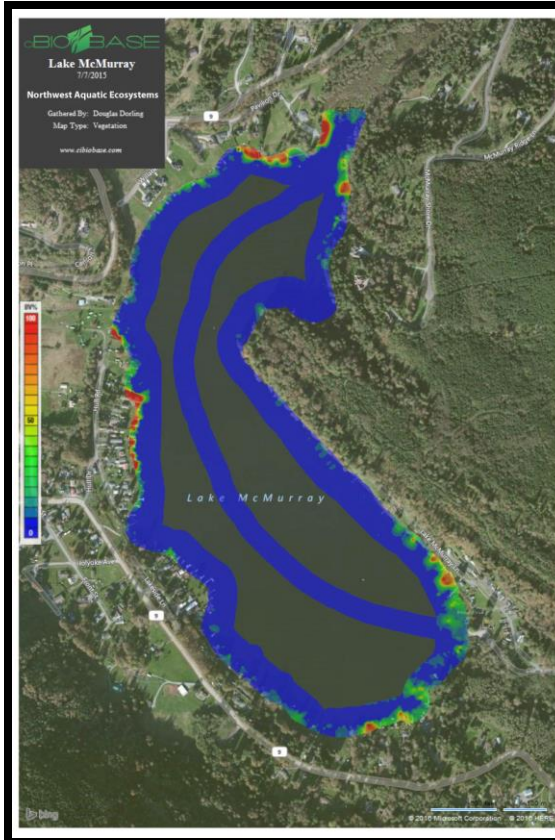
Once collected the SD card was uploaded via cloud based technology and the processing of the data was finalized. Not only is a well defined map produced but a sonar log of the survey is saved allowing a complete review and evaluation of the survey to occur in-house. The survey entails a surface vehicle transecting the lake along the littoral zone. Boat tracks are designed to be approximately 100 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.

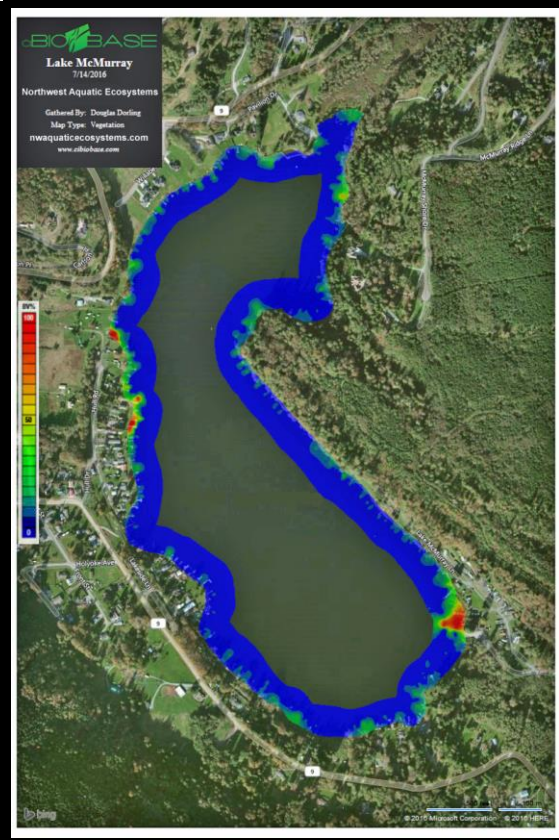
Lake McMurray Spring Survey Results

Lake McMurray was surveyed on July 14, 2016. Water clarity, as expected, was excellent. Bottom sediments were visible throughout most of the lake's littoral zone. No milfoil plants were identified as was similar to years past. Results of the spring 2016 survey resulted in growth of the submersed species elodea and pondweeds along residential shoreline areas similar to those identified during 2015. Growth appeared to be less dense than in 2015 as noted by the decreased "red" areas on the 2016 survey map. 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.





2015 Macrophyte Survey



2016 macrophyte Survey

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



**Major
 Lily
 Pad
 Locations**

Treatment

Lake McMurray received treatment for lily pads and yellow flag iris on July 21, 2016. 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% solution of glyphosate.

During the spraying event, it was noted that the diameter of the pads sprayed in prior years were notably smaller than those pads not ever receiving spray. Density of the infestations had also decreased.

Monitoring

Samples were collected on July 21 & 26 2016. Samples were stored in ice and delivered to Water Management Laboratories in Tacoma. Samples were analyzed for glyphosate. Our sampling objective for all prior treatment dates was modified from our previous years of sampling. Originally our treatment sampling effort was designed to try and closely define the drift zone to within a few hundred feet of the original treatment site.

During 2015, the sampling event incorporated past protocol by collecting one sample directly above the potable water intake, one sample mid-basin adjacent to the McHaven development and one sample at the water's surface within the lily pad treatment zone. Except for the treatment site sample, all other samples were collected approximately three feet below the water surface.

Sampling Stations



Sample Station

**Glyphosate
Concentration**

| | |
|----------------------------------|-----------------------------------|
| Treat Sampling Site 7-21 | 26.7 ug/L (Treatment area) |
| Intake Sampling Site 7-21 | N/D |
| Treat sampling Site 7-26 | * |
| Intake sampling Site 7-26 | N/D |

- **Sample was not analyzed, technical problems**

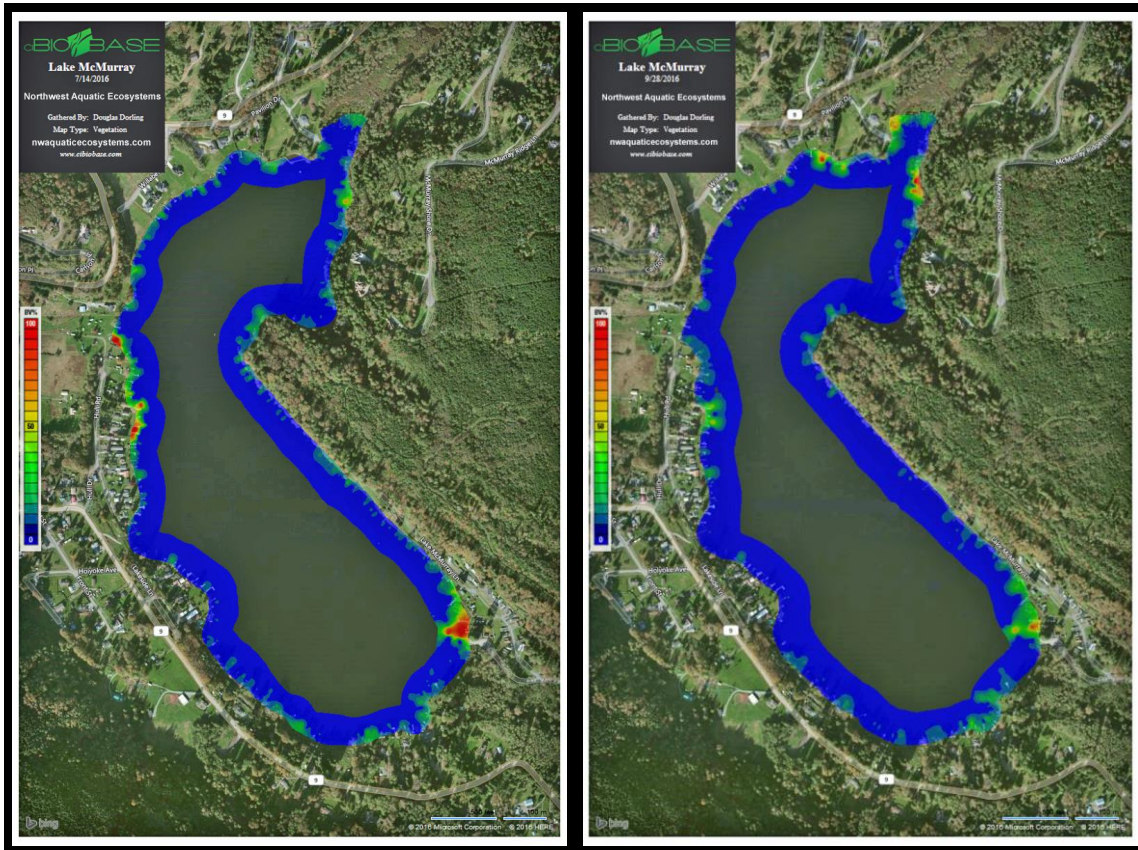
There was no glyphosate detected at the McHaven water intake during any of the sampling events.

Our sampling objective for the treatment date was modified from our previous years of sampling.

Our treatment sampling events incorporated past protocol by sampling the potable intake directly and the treatment site only. There is no anticipation that the ¼ mile treatment buffer will be reduced in future years.

Fall Survey

The fall survey was performed on September 28, 2016. The survey resulted again in no milfoil plants identified lake wide with a noted decrease in the submersed weed species. The noted decrease was similar to the one observed during the 2015 season. Once again there were no means to identify why this decrease occurred but possible scenarios could once again include bacterial, 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.



Spring 2016

Fall 2016

Lily Pad Manual Removal

Lily pad manual removal occurred on July 1 & 2, 2016. Our July 1st date addressed approximately 14 shoreline residences while July 2nd was dedicated solely to the McHaven site. Removal at the McHaven site was accomplished with a three person crew cutting, loading pads into a small boat and offloading to a dump site provided by the McHaven development. The process was slow and labor intense. One person with a gas cutter cut the pads approximately four feet below the water's surface while the others collected for disposal. The McHaven site took approximately thirteen hours to complete. Unfortunately approximately 20-25 % of the pads had resurfaced seven days after the cutting.

The shoreline residential removal consisted of a four person crew that cut and collected the pads. Pads were then placed into a boat and transported back to the launch site where they were then loaded into the bed of a pickup truck.





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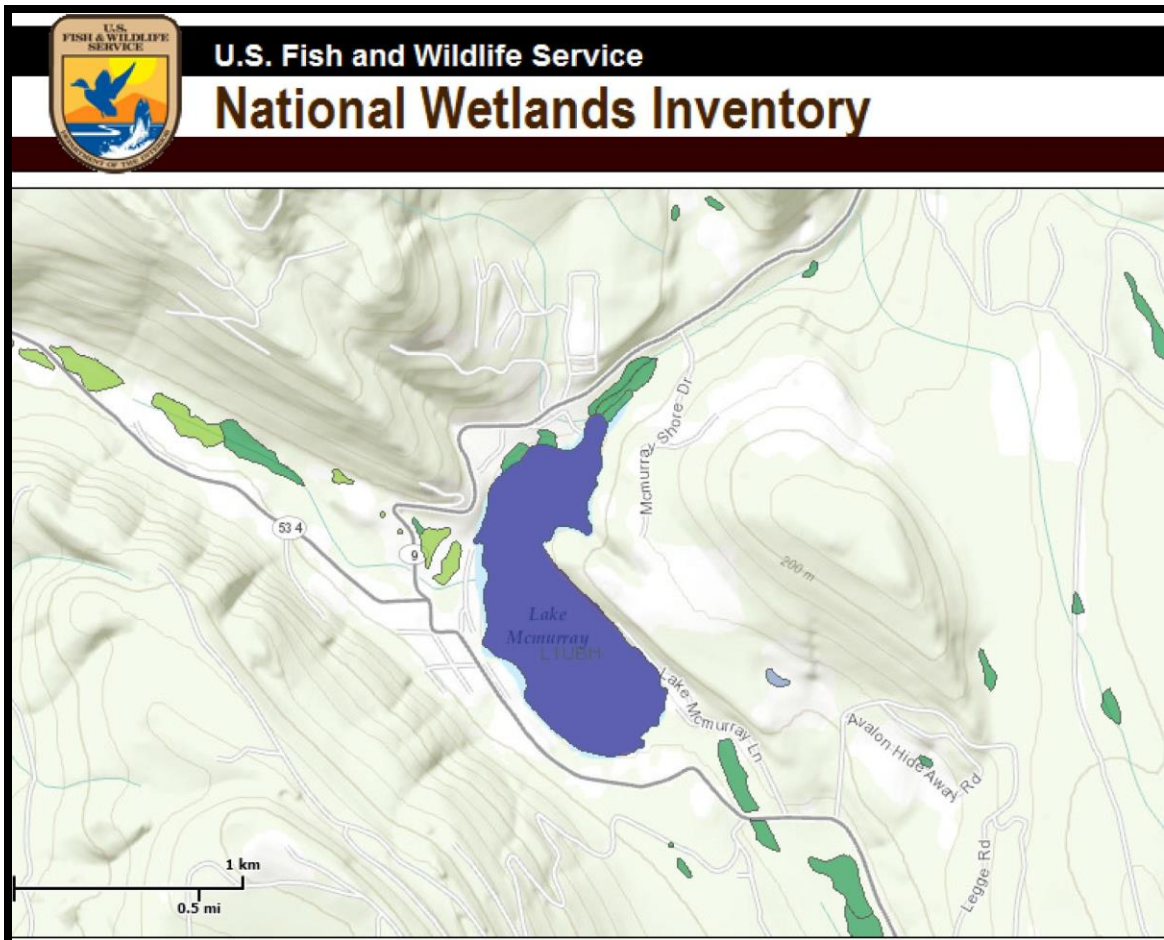
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Outlet Concerns

The outlet area has been identified by the US Fish and Wildlife Service as a registered wetland. Conversation has been directed at the potential means to remove debris and clear the outlet area in an effort to provide a more efficient lake outflow pattern. Removal or alterations made to any native species or fallen debris within the outlet area 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 the McHaven water supply. During 2016 the no spray zone for lily pads and yellow iris was reduced to ¼ mile of the McHaven water intake. Sampling conducted during 2013, 2014, 2015 and 2016 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. The established criterion for the use of any herbicide within the waters of Lake McMurray is to ensure the McHaven population that **NO** herbicide is detected at the community's water intake. Diquat was eliminated from further use on Lake McMurray during 2015.
3. Aquathol K can be used to control only the pondweed species found in the lake. In the past, the pondweeds were a component of the elodea population. Control of the pondweeds in these portions of the lake would not bring about relief to property owners because the elodea species would still be problematic. It is for this reason that Aquathol K was not utilized during 2015 and 2016. There are now some shoreline areas of the lake where the only species present are pondweeds and Aquathol K could be a potential control agent. The same approach related to water testing following treatment would be required. The Aquathol K label requires a minimum 600 foot setback from potable water intakes. Aquathol K degrades faster in the water than diquat with byproducts consisting of only carbon, hydrogen and oxygen.
4. Continued use of glyphosate in the control of lily pads, yellow flag iris and loosestrife.
5. Re-evaluate the use of manual control for lily pads within the no spray zone. During 2016 regrowth was faster than anticipated. However, the pads that resurfaced were smaller in diameter. In order for the manual removal to benefit the system, a secondary cutting following the initial cutting would need to be undertaken approximately 7-14 days post with a third cutting occurring 14-21 days following the second cutting. This method is a labor intense approach. Without a long term commitment to continue cuttings throughout the season a single cutting event would not be worthwhile.
6. Continue 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 8321A
WA DOH TEST PANEL: GLYPH**

| | | | |
|--|-------------------------|--------------------------|----------|
| System ID No.: N/A | | System Name: N/A | |
| Lab/Sample No.: 08985078 | | Date Collected: 07/21/16 | |
| DOH Source No.: N/A | | Sample Type: N/A | |
| Multiple Source Nos.: N/A | | Sample Purpose: B | |
| Date Received: 07/26/16 | Date Analyzed: 07/29/16 | Analyst: ALI | |
| Date Extracted: 07/28/16 | Date Reported: 08/16/16 | Supervisor: <i>ms</i> | |
| County: N/A | | Group: Private | |
| Sample Location: Lake McMurry - 230° SW (4th House) | | | |
| Send To: Northwest Aquatic Eco-Systems, Attn: Doug Dorling 855 Trospen Rd SW #108-313 Tumwater, WA 98512 | | | Remarks: |

| DOH # | ANALYTES | RESULTS | UNITS | SRL | TRIGGER | MCL | EXCEEDS | |
|-------|------------|---------|-------|-----|---------|-----|----------|------|
| | | | | | | | Trigger? | MCL? |
| 152 | Glyphosate | 26.7 | ug/L | NA | NA | NA | | |

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.: 160727056-002
Method 8321A: Glyphosate



**WATER
MANAGEMENT
LABORATORIES INC.**

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EPA TEST METHOD - EPA 8321A
WA DOH TEST PANEL: GLYPH**

| | | | |
|--|--|---------------------------|----------|
| System ID No.: N/A | | System Name: N/A | |
| Lab/Sample No.: 08985077 | | Date Collected: 07/21/16 | |
| DOH Source No.: N/A | | Multiple Source Nos.: N/A | |
| Sample Type: N/A | | Sample Purpose: B | |
| Date Received: 07/26/16 | | Date Analyzed: 07/29/16 | |
| Analyst: ALI | | Date Extracted: 07/28/16 | |
| Date Reported: 08/16/16 | | Supervisor: <i>MB</i> | |
| County: N/A | | Group: Private | |
| Sample Location: Lake McMurry - Water Intake | | | |
| Send To: Northwest 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 | NA | NA | NA | | |

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Comments :

ALI Lab No.: 160727056-001
Method 8321A: Glyphosate



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**SYNTHETIC ORGANIC CHEMICALS (SOC's) ANALYSIS REPORT
EPA TEST METHOD - EPA 8321A
WA DOH TEST PANEL: GLYPH**

| | | | |
|--|--|--------------------------|--|
| System ID No.: N/A | | System Name: N/A | |
| Lab/Sample No.: 08985079 | | Date Collected: 07/26/16 | |
| DOH Source No.: N/A | | Sample Type: N/A | |
| Multiple Source Nos.: N/A | | Sample Purpose: B | |
| Date Received: 07/26/16 | | Date Analyzed: 07/29/16 | |
| Date Extracted: 07/28/16 | | Date Reported: 08/16/16 | |
| County: N/A | | Analyst: ALI | |
| Sample Location: McMurray Intake | | Supervisor: <i>AMS</i> | |
| Send To: Northwest Aquatic Eco-Systems, Attn: Doug Dorling 855 Trospen Rd SW #108-313 Tumwater, WA 98512 | | Group: Private | |
| Remarks: | | | |

| DOH # | ANALYTES | RESULTS | UNITS | SRL | TRIGGER | MCL | EXCEEDS | |
|---------------|------------|---------|-------|-----|---------|-----|----------|------|
| EPA REGULATED | | | | | | | Trigger? | MCL? |
| 152 | Glyphosate | ND | ug/L | NA | NA | NA | | |

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 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.
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Comments :

**ALI Lab No.: 160727056-003
Method 8321A: Glyphosate**