Lake McMurray
2013 Aquatic Plant Control Program

Prepared By
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Project Overview

This was Northwest Aquatic Eco-Systems (NWAE) first year of providing aquatic weed control services for the Lake McMurray LMD#2. Prior to any project work commencing, NWAE reviewed application records on file with the Department of Ecology and year end reports supplied to Skagit County from the previous 2010, 2011 and 2012 contract years. This information provided the baseline for our 2012 Lake McMurray weed control operations. Lake McMurray was treated to control Eurasian watermilfoil during the year 2000. No milfoil has been detected in the lake for over five years and no herbicides have been applied in over five years.

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 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. Native plant growth recently has expanded its range throughout the lake. Native plant communities have increased in densities throughout various shoreline areas of the lake reducing recreational opportunities. Our 2013 program format anticipated control of yellow flag iris, fragrant water lily and minor treatment for native weeds. The lake supports shoreline swimming, a healthy recreational fishery and small boat use.

As consultants were changed for the 2013 season, it was discovered that the appropriate NPDES permit required to treat fragrant water lilies and native plant grow were never secured.

Before any treatment of in-lake native weeds and lily pad infestation are authorized, a state Department of Ecology issued NPDES permit needs to be secured. Treatment for yellow flag iris (shoreline emergent plants) infestations is possible through the Department of Agriculture NPDES noxious weed program.

2012 Data and Year End Report

No herbicides were applied to the lake during this timeline.
In conjunction with the application records, NWAE also reviewed the year end report submitted to Skagit County by the consultant for the year 2012. The 2012 report identifies surveys and recommendations.

Survey Protocol

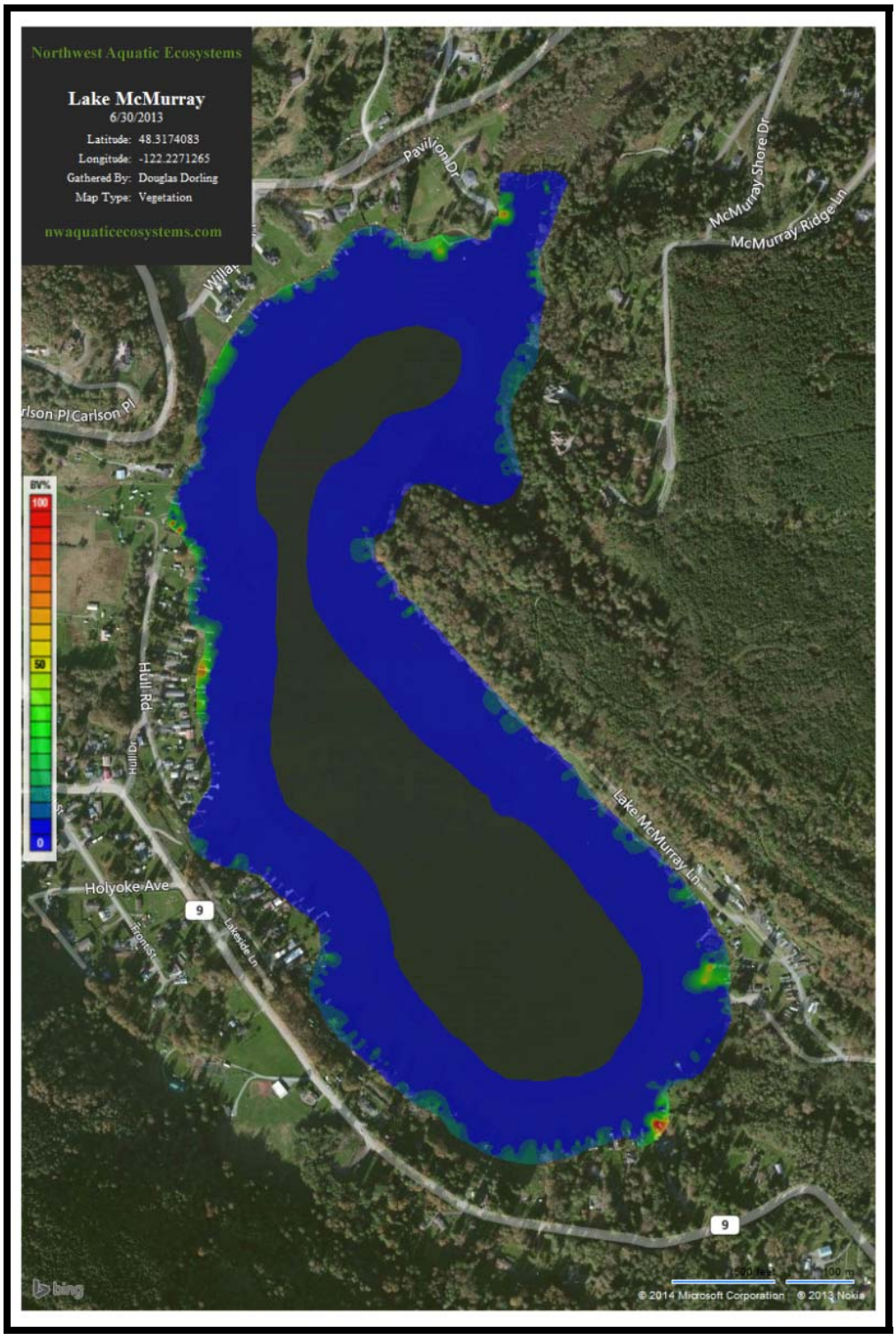
Survey techniques were typical of those considered as "standard protocol" throughout the industry. Survey techniques for 2013 differed slightly from past efforts in that new technology was incorporated into survey protocol. During 2013 sonar data was collected utilizing specific transducers and bottom scanning equipment. Once collected the SD card was uploaded via cloud based technology and the processing of the data was finalized. The resulting product is a color coded map of the lake bottom identifying weed growth areas and plant densities. 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 sonar log allows you the ability to view all plant growth along the boats survey track. Past Lake McMurray surveys consisted of manually retrieving weed samples from numerous locations lake-wide while observing growth through the water column. Although effective, individual bottom sampling can only identify plants within the immediate area sampled. This new protocol avoids the possibility of missing plants between bottom surveying data points. This updated protocol encompasses 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 calculates and 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. When individual milfoil plants were identified from the surface, points were added to the transect line.
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. The

system produces sub meter accuracy and combined with the powerful Pathfinder Office and Terra Sync software, provides Lake McMurray processing of data in a Windows compatible format. Data points can then be assembled as a map layer, which are then incorporated, into the project file.

Lake McMurray Spring Survey Results

Lake McMurray was surveyed on June 30, 2013. 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 2013 survey were similar to past 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 plants were also noted along various shoreline locations. Potential problematic plant densities were documented within a number of residential shoreline areas of the lake. Pondweeds and elodea dominated the lakes macrophyte composition.



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

Lily Pad Locations 2013

Treatment

Lake McMurray received treatment for yellow flag iris on September 13, 2013. Yellow flag iris along approximately 50% of the lake shoreline was targeted. Treatment initiated mid basin. An 18 foot aluminum boat equipped with one 25 gallon spray tank was incorporated into 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 and the spray mixture was then discharged using a spray gun. When emptied, the tank was refilled and dispensed as needed. Yellow flag iris received a 1.5% solution of glyphosate sprayed directly onto the leaf structures.

Yellow Flag Iris Control Zone

Lake McMurray supports one registered potable water intake. This intake supplies potable water to a small community located just north of the boat launch.

In an effort to ensure a safe water supply to the development, a detailed search was made to determine what materials could be considered for use, two materials surfaced as potential candidates, glyphosate and renovate.

Glyphosate must not be applied within ½ mile of an active potable intake. Application is permitted in and around intakes if the concentration of glyphosate at the point of the intake is less than .7ppm. Renovate requires no setback if the concentration applied is 2 quarts to the acre or less; while rates exceeding 2 quarts per acre require a minimum setback of 200 feet. Concentrations of either product directly in the water following application likely would not exceed the required mandatory setback. Both products work equally well on lily pads while glyphosate appears to be more effective against yellow flag iris. Since no lily pads were targeted for 2013, glyphosate was chosen for the 2013 project. Each product will require multiple applications per year, eradication will probably require two to three years of treatment.

Prior to application, Don Miller from McHaven Inc. (water right holder) was contacted to discuss the treatment plan. As a result of our discussions Don agreed to the treatment plan as long as the following protocol was followed:

1. No treatment within 1/2 mile of their intake.
2. Take water samples at one of the treatment sites
3. Take one sample 24 hours post treatment at their water intake.
4. Put nothing in the lake water anywhere without consulting with Don.
5. Send Don a copy of the label.

Samples were collected on September 14, 2013, stored in ice and delivered to Water Management Associates for analysis on the same day of collection. One sample was taken directly within the spray zone, one approximately 50 feet outward into the main lake basin and a final sample was taken directly above the McHaven Inc. water intake approximately three feet below the water's surface. All samples resulted in concentration levels far below the label requirement of .7ppm. No material was detected at the potable water intake.

Sample Station	**Concentration**
Treatment Site	**.183 ppm**
Treatment Site (plus 50 feet)	**.066 ppm**
Water Intake	**N/D**

Fall Survey

The fall survey was performed on November 6, 2013. The survey resulted in no changes to the summer survey. Once again no milfoil plants were noted. The main goal of this survey was to inspect the previous sprayed yellow flag iris sites and evaluate the control obtained. All targeted sites were clearly showing signs of herbicide damage.

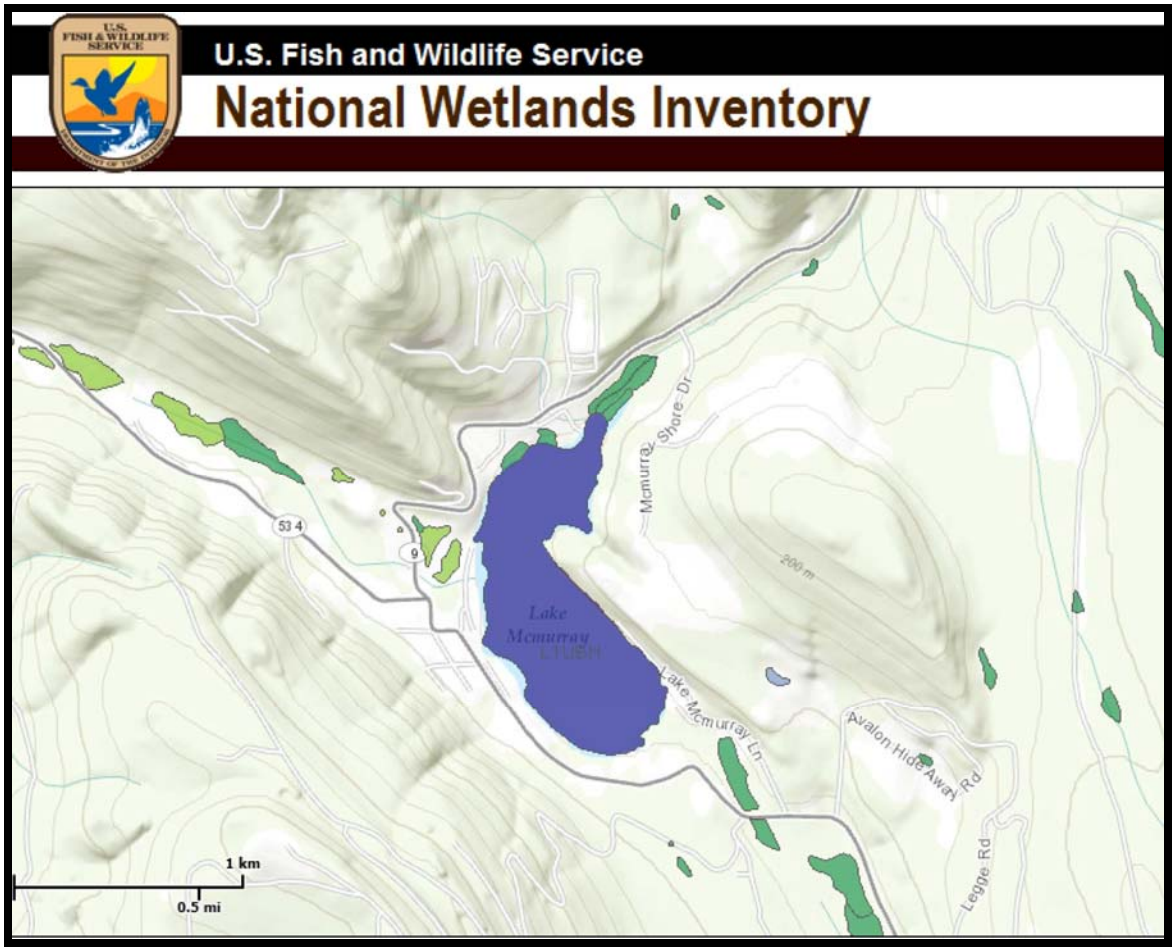
NPDES Update

Treatment of lily pads and native submersed vegetation at Lake McMurray will require securing an NPDES permit. NPDES are required when registered aquatic herbicides are used to control floating and submersed aquatic plants within any Washington State water body. After all of the appropriate documents are submitted to Ecology for processing the permit is generally issued in approximately 60 days. All of the appropriate documents will be submitted for review by February 15, 2013. A permit should be issued by April 15, 2013. One component of the NPDES process is the development of a Discharge Management Plan. Such plan has been completed and has been mailed out to all members of the Lake McMurray LMD #2 for review and comment. The required SEPA document will also be on file with the Department of Ecology after February15, 2013.

Outlet Concerns

Although the outlet contains both lily pads and yellow flag iris, water outflow is severely restricted as a result of logs and wetland bog type sediment islands. Even upon the eradication of all noxious species from the outlet area, outlet water flow will probably not be impacted. There is no defined outlet channel with outflowing waters migrating through a densely vegetated wetland environment.

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.

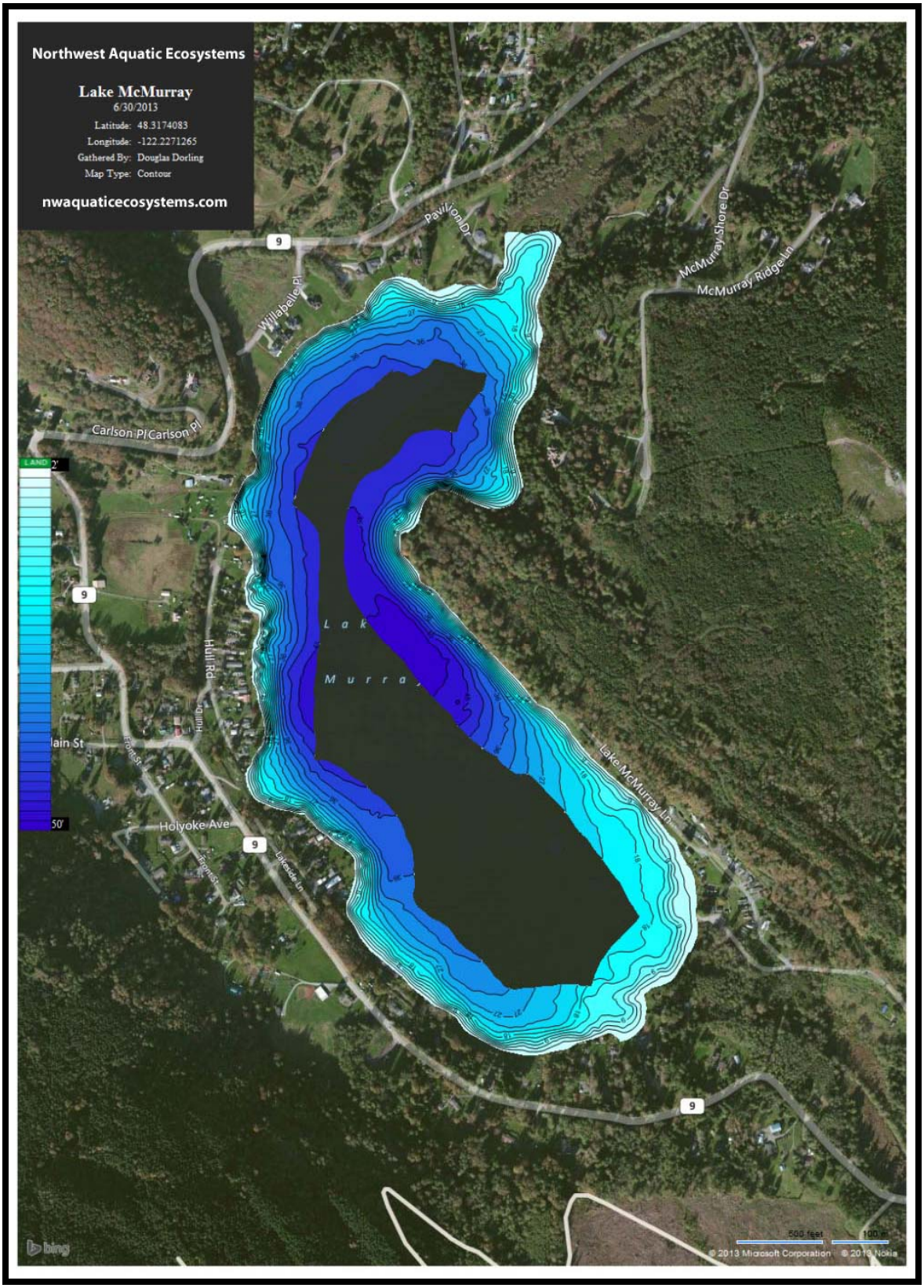


Recommendations

1. LMD officials, the consultant and the McHaven Inc. (potable water right holder) need to continue to work in harmony at developing a control program targeting noxious and problematic native species while ensuring the integrity of their water supply.
2. Sampling conducted during 2013 has documented that herbicides can be applied to the lake without interrupting potable water use. Materials that currently appear appropriate for the control of fragrant water lily and yellow flag iris are glyphosate and renovate. Before applications are made, treatment setback distances must be approved by McHaven Inc. During our 2013 treatment, concentrations of

glyphosate detected directly in the water column at the treatment site were below the drink water requirement.

3. Diquat is the only material registered in Washington State that will control elodea, one of the dominant species identified in the lake. Depending on concentrations applied to the lake a potable water restriction of 2-3 days will be required. These restrictions do not apply if the diquat concentration in the water column is less than .02 ppm.
4. 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.
5. Treatment for submerse weed control for the 2014 season should be limited to distances in excesses of ½ mile from the McHaven water intake. Monitoring of any treatment should be incorporated into the treatment protocol. Data collected during 2014 should then be used to determine setback distances for future treatment years.
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.
7. Mapping should be expanded to include the entire lake so that an up to date bathymetric contour of the lake bottom is available. The mapping will also produce a lake-wide sediment composition profile.


Northwest Aquatic Ecosystems
Lake McMurray
6/30/2013
Latitude: 48.3174083
Longitude: -122.2271265
Gathered By: Douglas Dorling
Map Type: Contour
nwaquaticecosystems.com
9
Willapelle Pl
Carlson Pl
Carlson Pl
McMurray Shore Dr
McMurray Ridge Ln
Lake McMurray Ln
Holyoke Ave
Forest St
Lakeside Ln
50'
500 feet
100 m
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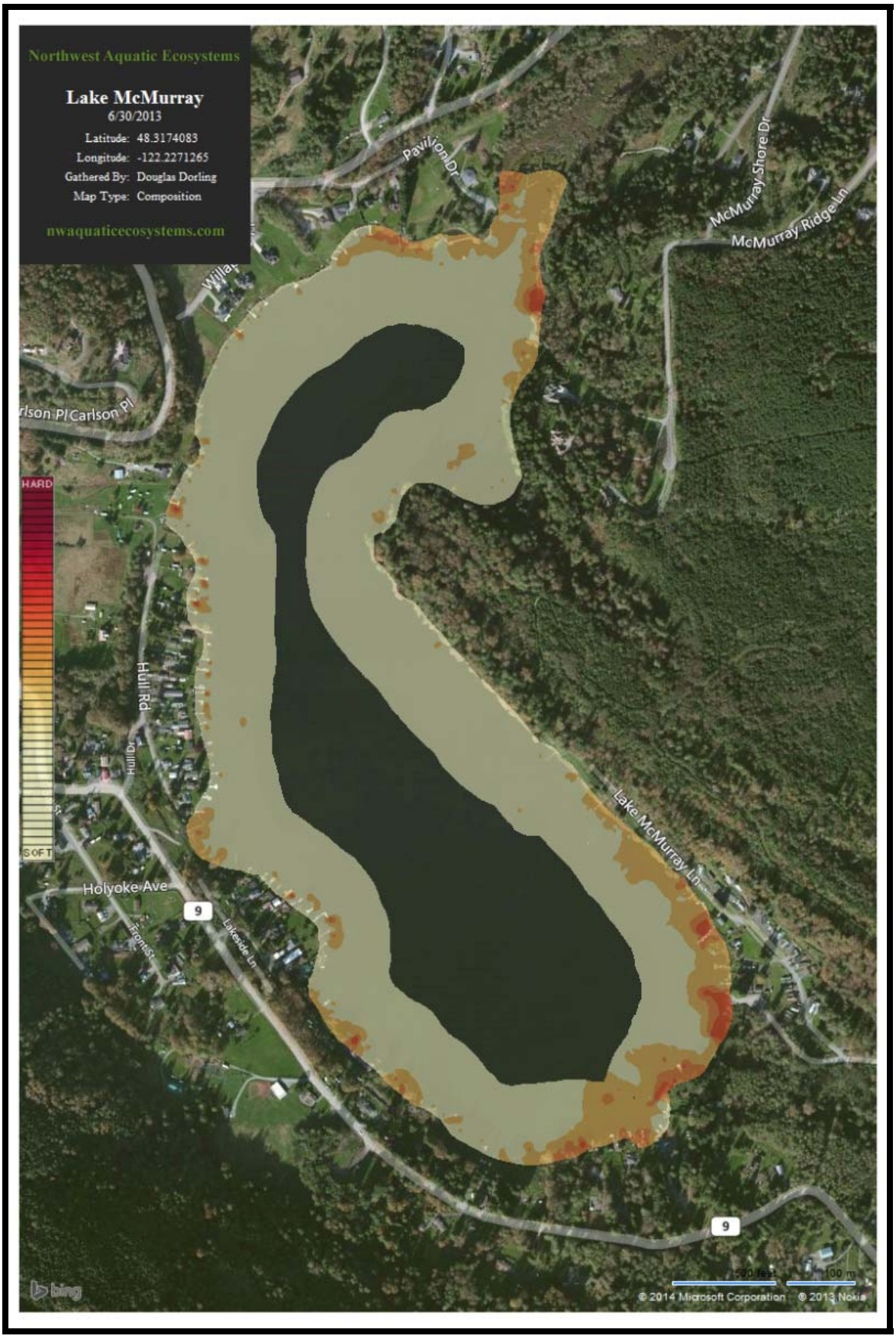
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nwaquaticecosystems.com
HARD
SOFT
Pavilion Dr
McMurray Shore Dr
McMurray Ridge Ln
Carlson Pl
Hull Rd
Holyoke Ave
Front St
Lakeside Ln
Lake McMurray Ln
9
bing
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