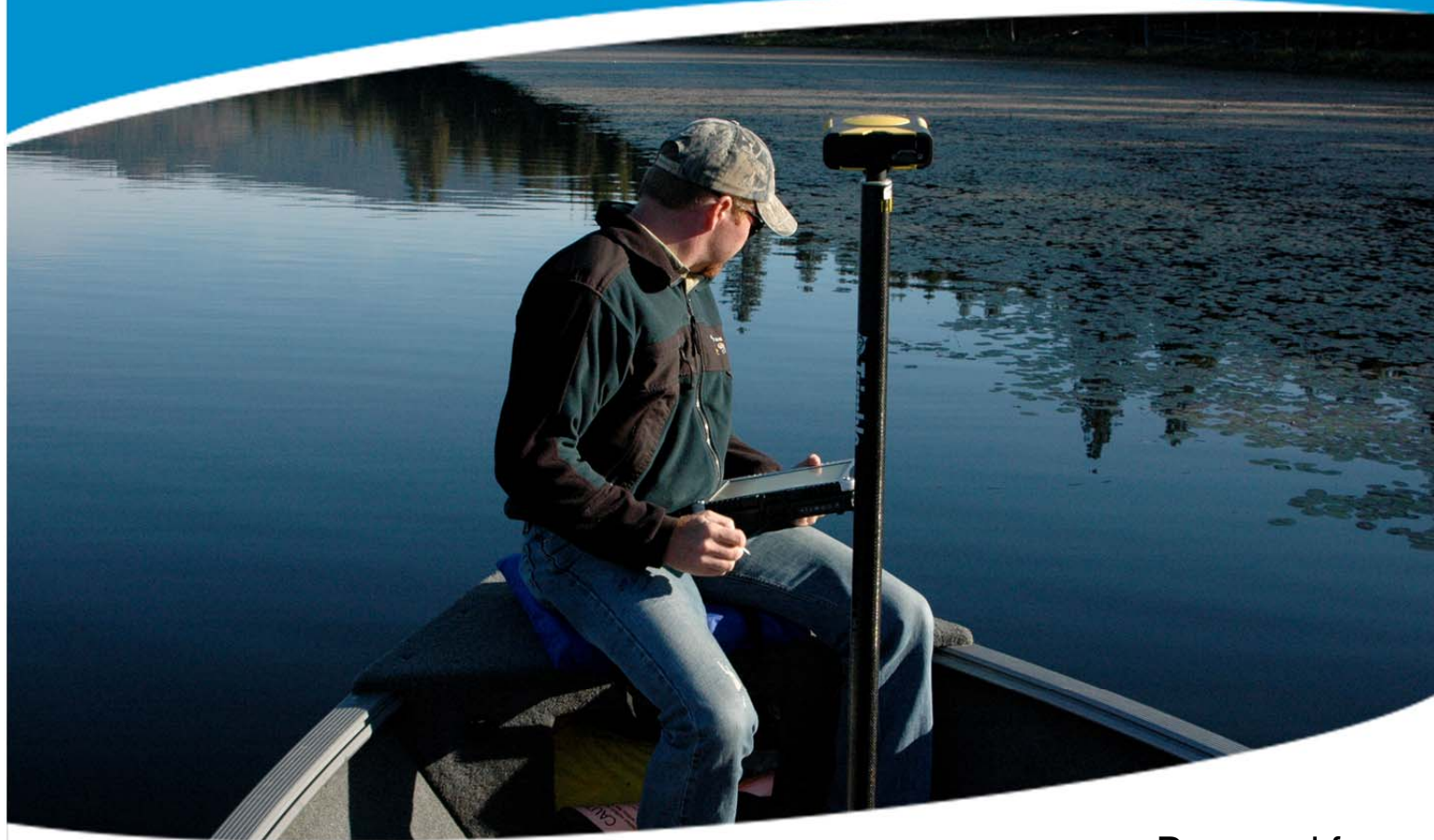




**AquaTechnex**

# Spring Valley Lake Spring 2014 Baseline Data Collection



Prepared for  
Spring Valley Lake Association

**AquaTechnex,  
LLC**

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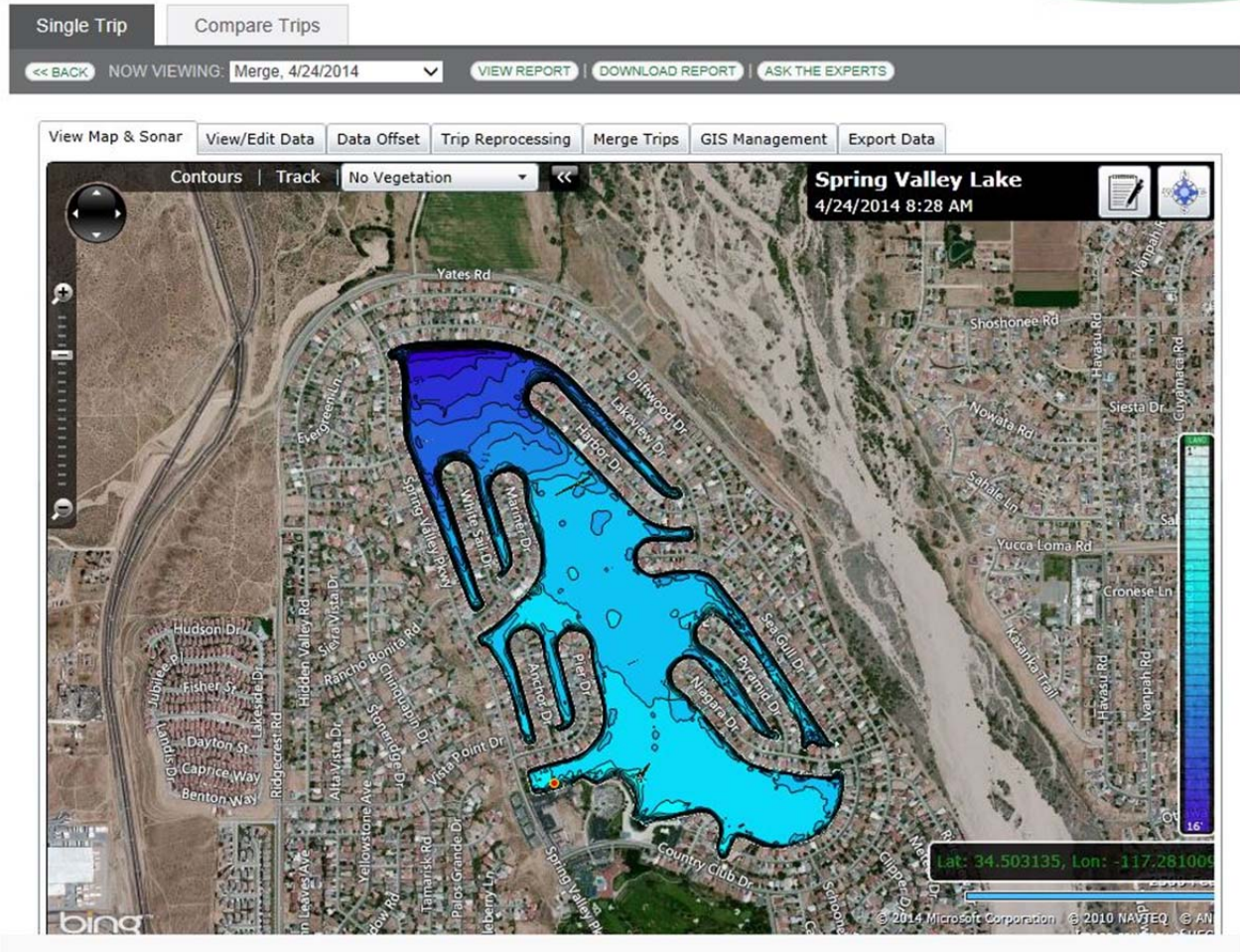
## Introduction

Spring Valley Lake Association is in the fourth year of working under a water clarity improvement program and has requested we perform a number of monitoring tasks to support this work. The first of these missions was undertaken the last week in April, 2014. The objective of the mission was to collect baseline data on aquatic plant coverage as well as have water samples analyzed for a number of water quality parameters and algae species identification. This report will summarize these findings.

## Hydro-Acoustic Mapping

Aquatechnex mobilized a hydro-acoustic mapping vessel to the lake the last week in April to collect data on the potential presence and distribution of aquatic plant growth in the lake. The mapping vessel traveled survey transects across the lake at regular intervals providing complete coverage of the water body. The sensing equipment collects a GPS point linked to hydro-acoustic soundings and this data is processed using algorithms to map bathymetry, aquatic plant bio-volume and sediment hardness. The resulting maps are presented here.





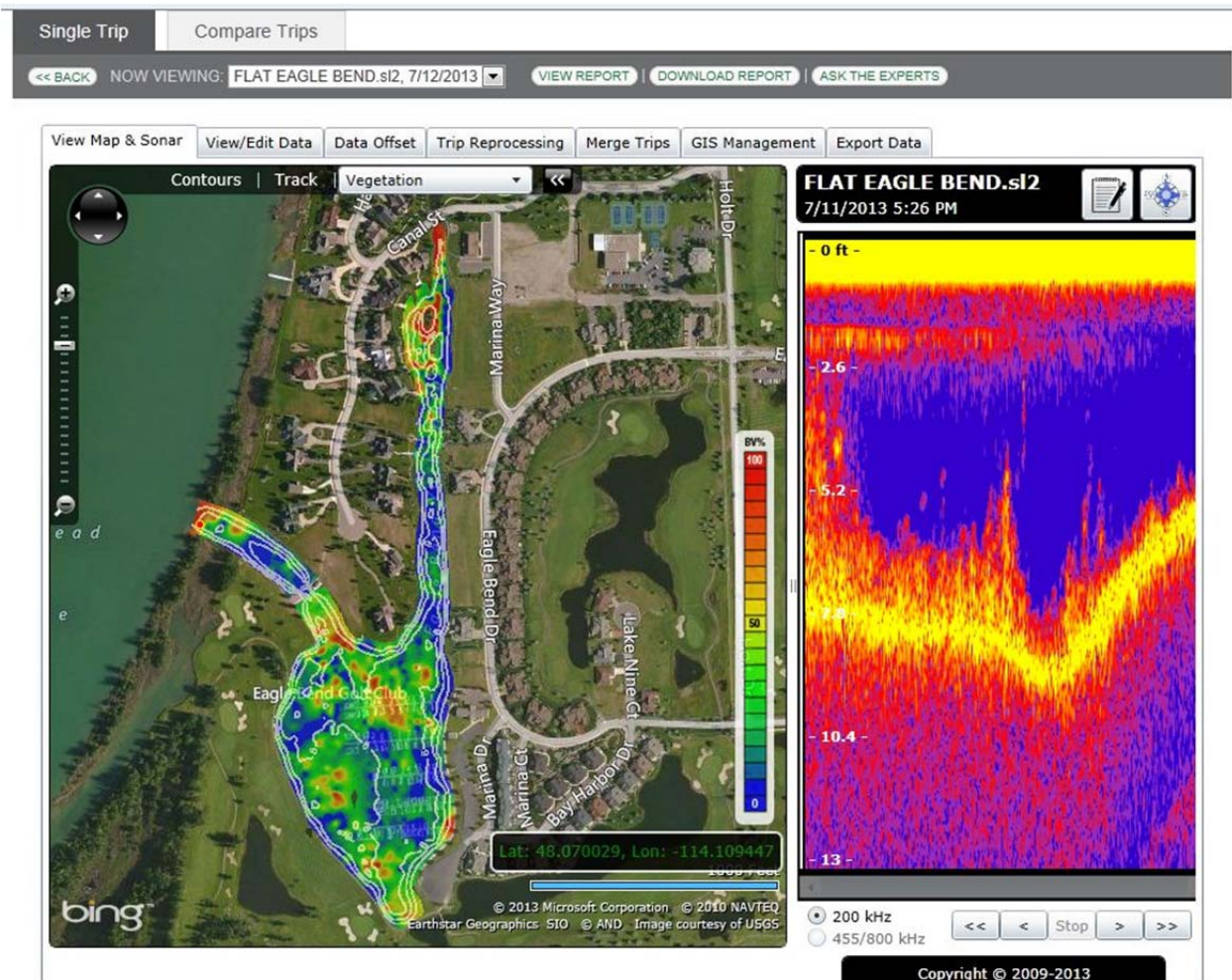
These two images show the current bathymetry of Spring Valley Lake.



This map shows the current bottom sediment hardness present in the lake. The legend bar on the left shows the graduated scale.



At this point in the spring of 2014, the general aquatic plant coverage in Spring Valley Lake is minimal. This has been an issue for a number of years, water clarity issues can limit light penetration into lake systems and plants have a hard time establishing. This could be a function of the time of year, this work will be repeated during the summer and fall of 2014 under the current plan and changes in the aquatic plant community will be recorded. The image below is from a marina off Flathead Lake, MT and shows how aquatic plant bio-volume appears in a situation where aquatic vegetation is present.



Aquatic plant biovolume is a measure of the percent of the water column filled with aquatic plant growth. The blue areas are void of vegetation, the greens areas exhibit less than 50 percent of the water column filled with aquatic plant growth and the reds show areas where close to 100 percent of the water column is impacted with aquatic vegetation.

The summer and fall mapping efforts will catch and map any plant life that emerged from the lake sediments. This April mapping work should be consider baseline data and used for comparison to future mapping efforts. .

## Water Quality Data

The Spring Valley Lake Association performs regular water quality monitoring work on the lake. It's important to check this work with a certified laboratory from time to time and two samples were collected from Spring Valley Lake and submitted for that purpose. We also ran these samples for Algae identification and cell counts. This information is critical to understanding the health of the lake. The two sample reports are attached and are summarized here.

A couple of observations at this point in the season.

In the past, cyanobacteria blooms have been a major issue at Spring Valley Lake. At this point in the season, these species were not present in the water column as sampled. Cyanobacteria can pose a significant health threat when blooms are extensive. The green algae species identified here are generally beneficial and an important component of the food web. Cell count levels are generally low and water transparency as measured by Secchi Disc was approximately 36 inches at the time of sample collection.

Phosphorus levels present in the water column are the fuel that drives excessive algae blooms. At this point the total phosphorus level are in a range that is considered to be on the lower end of the Eutrophic range. The second key metric is for the Free Reactive Phosphorus, this measures the dissolved and readily available phosphorus for algae production. This level in both samples was relatively low and indicated that algae growth in the short term could be relatively minor.

As the summer progresses, these key measurements will be monitored again and change noted.

## SeSCRIPT Analysis Report: *Spring Valley Lake 1*

**Company:** AquaTechnex, LLC

**Address:** P.O. Box 30824, Bellingham, WA 98228

**Contact Person:** Ian Cormican

**Phone:** 760-272-5842

**Email:** ian@aquatechnex.com

**Project Name:** Spring Valley Lake 1

**Surface Area:** 200 acres

**Average depth:** 8.5 feet

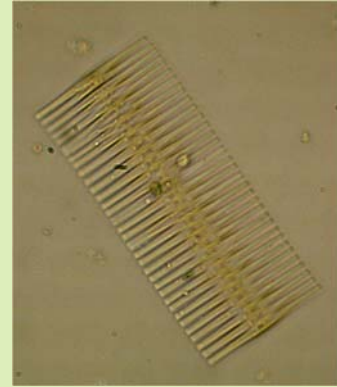
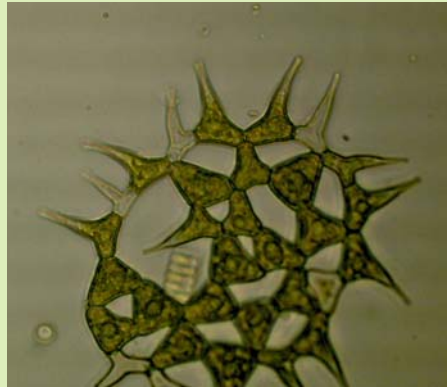
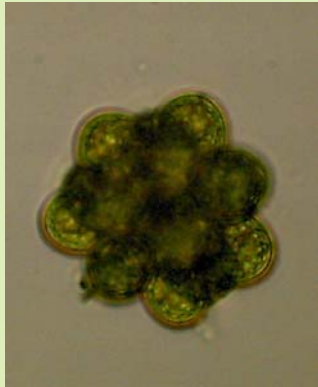
**Date Sample Received:** 4/25/14

**SeSCRIPT Analysis Performed:** Algae and Water  
Quality Baseline Bundle

### *Algae ID Results* Spring Valley Lake 1

Identification	Classification	Description	Density (cells/mL)
<i>Desmodesmus</i> sp. (co-dominant)	Chlorophyta- Green algae	Colonial, planktonic	10,100
<i>Coelastrum</i> sp. (co-dominant)	Chlorophyta- Green algae	Colonial, planktonic	6,400
<i>Fragilaria</i> sp. (some present)	Bacillariophyta- Diatoms	Colonial/single-celled, planktonic	3,700

Other algae in the sample, at lower densities, include: *Pediastrum*, *Tetraedron*, *Closterium* (Chlorophyta)





*Water Quality Results*  
**Spring Valley Lake 1**

<b>Analysis</b>	<b>Measurement</b>	<b>Description</b>
pH (SU)	6.3	Near Neutral
Dissolved Oxygen (mg/L)	9.06	Acceptable for fish
Conductivity ( $\mu$ S/cm)	336	High range of freshwaters
Alkalinity (mg/L as CaCO <sub>3</sub> )	104.7	Buffered
Hardness (mg/L as CaCO <sub>3</sub> )	89.8	Moderately hard
Turbidity (NTU)	4.36	Relatively low

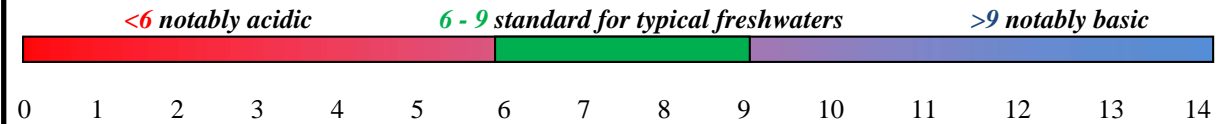
*Nutrient Results*  
**Spring Valley Lake 1**

<b>Analysis</b>	<b>Measurement</b>	<b>Description</b>
Total Phosphorus ( $\mu$ g/L)	33.2	High amount: eutrophic
Free Reactive Phosphorus ( $\mu$ g/L)	8.2	Low amount

## Water Quality Analysis Explanation

These water quality parameters are essential to document the condition of a water body and design custom treatment prescriptions to achieve desired management objectives.

**pH:** Measure of how acidic or basic the water is ( pH 7 is considered neutral).



**Hardness:** Measure of the concentration of divalent cations, primarily consisting of calcium and magnesium in typical freshwaters.    *0-60 mg/L as CaCO<sub>3</sub> soft; 61-120 moderately hard; 121-180 hard; > 181 very hard*

**Alkalinity-** Measure of the buffering capacity of water, primarily consisting of carbonate, bicarbonate and hydroxide in typical freshwaters. Waters with lower levels are more susceptible to pH shifts.  
*≤ 50 mg/L as CaCO<sub>3</sub> low buffered; 51-100 moderately buffered; 101-200 buffered; > 200 high buffered*

**Conductivity-** Measure of the waters ability to transfer an electrical current, increases with more dissolved ions.  
*< 50 uS/cm relatively low concentration may not provide sufficient dissolved ions for ecosystem health; 50-1500 typical freshwaters; > 1500 may be stressful to some freshwater organisms, though not uncommon in many areas*

**Dissolved Oxygen-** amount of diatomic oxygen dissolved in the water.  
*< 2 mg/L likely toxicity with sufficient exposure duration; < 5 stressful to many aquatic organisms; ≥ 5 able to support most fish and invertebrates*

**Phosphorus:** Essential nutrient often correlating to growth of algae in freshwaters.

**Total Phosphorus (TP)** is the measure of all phosphorus in a sample as measured by persulfate strong digestion and includes: inorganic, oxidizable organic and polyphosphates. This includes what is readily available, potential to become available and stable forms.

*<12 µg/L oligotrophic; 12-24 µg/L mesotrophic; 25-96 µg/L eutrophic; > 96 µg/L hypereutrophic*

**Free Reactive Phosphorus (FRP)** is the measure of inorganic dissolved reactive phosphorus (PO<sub>4</sub><sup>3-</sup>, HPO<sub>4</sub><sup>2-</sup>, etc). This form is readily available in the water column for algae growth.

**Nitrogen:** Essential nutrient that can enhance growth of algae.

**Total N** is all nitrogen in the sample (organic N<sup>+</sup> and Ammonia) determined by the sum of the measurements for Total Kjeldhal Nitrogen (TKN) and ionic forms.

**Nitrites and Nitrates** are the sum of total oxidized nitrogen, often readily free for algae uptake.

*< 1 mg/L typical freshwater; 1-10 potentially harmful; >10 possible toxicity, above many regulated guidelines*

**Chlorophyll a:** primary light-harvesting pigment found in algae and a measure of the algal productivity and water quality in a system.

*0-2.6µg/L oligotrophic; 2.7-20 µg/L mesotrophic; 21-56 µg/L eutrophic; > 56 µg/L hypereutrophic*

**Turbidity-** Measurement of water clarity. Suspended particulates (algae, clay, silt, dead organic matter) are the common constituents impacting turbidity.

*< 10 NTU drinking water standards and typical trout waters; 10-50 NTU moderate; > 50 NTU potential impact to aquatic life.*

## SeSCRIPT Analysis Report: *Spring Valley Lake 2*

**Company:** AquaTechnex, LLC

**Address:** P.O. Box 30824, Bellingham, WA 98228

**Contact Person:** Ian Cormican

**Phone:** 760-272-5842

**Email:** ian@aquatechnex.com

**Project Name:** Spring Valley Lake 2

**Surface Area:** 200 acres

**Average depth:** 8.5 feet

**Date Sample Received:** 4/25/14

**SeSCRIPT Analysis Performed:** Algae and Water  
Quality Baseline Bundle

### *Algae ID Results* **Spring Valley Lake 2**

Identification	Classification	Description	Density (cells/mL)
<i>Fragilaria</i> sp. (co-dominant)	Bacillariophyta- Diatoms	Colonial/single-celled, planktonic	5,300
<i>Desmodesmus</i> sp. (co-dominant)	Chlorophyta- Green algae	Colonial, planktonic	4,800
<i>Coelastrum</i> sp. (co-dominant)	Chlorophyta- Green algae	Colonial, planktonic	2,100

Other algae in the sample, at lower densities, include: *Pediastrum*, *Sphaerocystis*, *Chlamydomonas* (Chlorophyta); *Aulacoseira* (Bacillariophyta)



*Water Quality Results*  
**Spring Valley Lake 2**

<b>Analysis</b>	<b>Measurement</b>	<b>Description</b>
pH (SU)	7.1	Near Neutral
Dissolved Oxygen (mg/L)	9.47	Acceptable for fish
Conductivity ( $\mu\text{S}/\text{cm}$ )	338	Acceptable for freshwaters
Alkalinity (mg/L as $\text{CaCO}_3$ )	94.2	Moderately buffered
Hardness (mg/L as $\text{CaCO}_3$ )	90.9	Moderately hard
Turbidity (NTU)	3.68	Relatively low

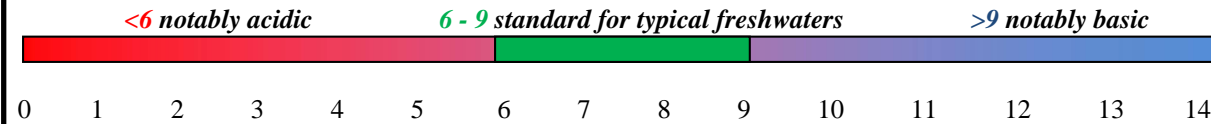
*Nutrient Results*  
**Spring Valley Lake 2**

<b>Analysis</b>	<b>Measurement</b>	<b>Description</b>
Total Phosphorus ( $\mu\text{g}/\text{L}$ )	25.9	High amount: eutrophic
Free Reactive Phosphorus ( $\mu\text{g}/\text{L}$ )	7.4	Low amount

## Water Quality Analysis Explanation

These water quality parameters are essential to document the condition of a water body and design custom treatment prescriptions to achieve desired management objectives.

**pH:** Measure of how acidic or basic the water is ( pH 7 is considered neutral).



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**Turbidity-** Measurement of water clarity. Suspended particulates (algae, clay, silt, dead organic matter) are the common constituents impacting turbidity.

*< 10 NTU drinking water standards and typical trout waters; 10-50 NTU moderate; > 50 NTU potential impact to aquatic life.*



**Chain of Custody: 2014-22066-00**

**LABORATORY REPORT**

Page 1 of 2 Total

**Customer Company**

Company Name: Aquatechnex LLC-Main  
Address: Po Box 30824  
Bellingham, WA 98228

**Customer Contact**

Contact Person: Terry Menabb  
E-Mail Address: tmcnabb@aquatechnex.com  
Phone:  
Fax:

**Waterbody Information**

Waterbody: Spring Valley Lake - CA      Waterbody Size (acres): 200      Depth Average: 8.5

**Sample Information**

Lab ID	Sample Location	Test Method	Results	Sampling Date	Sampling Time	Temp at Receipt (C)
27432	SVL 1			04/24/2014	12:30	10.0
		<b>ID of algae and enumeration</b>	<b>complete</b>			
		<b>Alkalinity (mg/L as CaCO3)</b>	<b>104.7</b>			
		EPA 310.2				
		<b>Conductivity (µS/cm)</b>	<b>336</b>			
		EPA 120.1				
		<b>Dissolved Oxygen (mg/L)</b>	<b>9.06</b>			
		EPA 360.1				
		<b>Free Reactive Phosphorus(µg/L)</b>	<b>8.2</b>			
		EPA 365.3				
		<b>Total Hardness (mg/L as CaCO3)</b>	<b>89.8</b>			
		EPA 130.1				
		<b>pH (SU)</b>	<b>6.3</b>			
		EPA 150.1				
		<b>Total Phosphorus (µg/L)</b>	<b>33.2</b>			
		EPA 365.3				
		<b>Turbidity (NTU)</b>	<b>4.36</b>			
		EPA 180.1				
27433	SVL 2			04/24/2014	12:30	10.0
		<b>ID of algae and enumeration</b>	<b>complete</b>			
		<b>Alkalinity (mg/L as CaCO3)</b>	<b>94.2</b>			
		EPA 310.2				
		<b>Conductivity (µS/cm)</b>	<b>338</b>			
		EPA 120.1				
		<b>Dissolved Oxygen (mg/L)</b>	<b>9.47</b>			
		EPA 360.1				
		<b>Free Reactive Phosphorus(µg/L)</b>	<b>7.4</b>			
		EPA 365.3				
		<b>Total Hardness (mg/L as CaCO3)</b>	<b>90.9</b>			
		EPA 130.1				

**Original**



**Waterbody Information**

Waterbody: Spring Valley Lake - CA      Waterbody Size (acres): 200      Depth Average: 8.5

**Sample Information**

Lab ID	Sample Location	Test Method	Results	Sampling Date	Sampling Time	Temp at Receipt (C)
		<b>pH (SU)</b>	<b>7.1</b>			
		EPA 150.1				
		<b>Total Phosphorus (µg/L)</b>	<b>25.9</b>			
		EPA 365.3				
		<b>Turbidity (NTU)</b>	<b>3.68</b>			
		EPA 180.1				

**ANALYSIS STATEMENTS:**  
**SAMPLE RECEIPT /HOLDING TIMES:** All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.  
**PRESERVATION:** Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted in the report.  
**QA/QC CRITERIA:** All analyses met method criteria, except as noted in the report with data qualifiers.  
**ACCREDITED METHODS:** This laboratory is not accredited for the tests marked "‡"  
**COMMENTS:** No significant observations were made unless noted in the report.

**Laboratory Information**

Date Received: 04/28/2014      Date Analysis Performed: 04/30/2014  
 Time Received: 11:00  
 Date Results Sent: 04/30/2014

*Disclaimer: The results listed within this Laboratory Report relate only to the samples tested in the laboratory. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a dry weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the exclusive use of SRTC Laboratory and its client. This report shall not be reproduced, except in full, without written permission from SRTC Laboratory. The Chain of Custody is included and is an essential component of this report.  
 This entire report was reviewed and approved for release.*

*[Signature]*  
 Reviewed By: SRTC Laboratory Manager

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