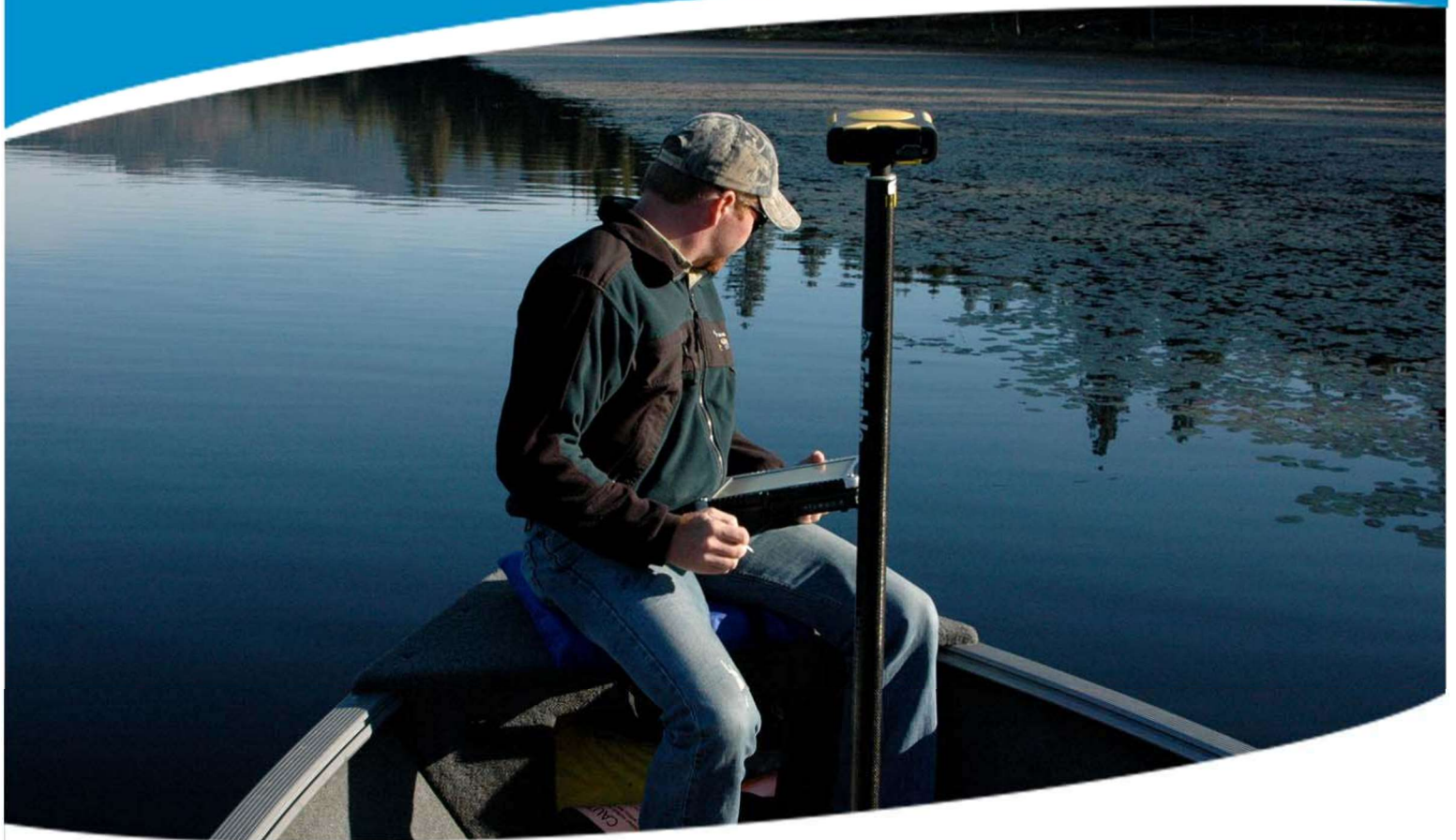


Spring Valley Lake Spring 2017 Baseline Data Collection



Prepared for
Spring Valley Lake Association

AquaTechnex,
LLC

www.aquatechnex.com

Headquarters
Bellingham, WA 98228
360-527-1271

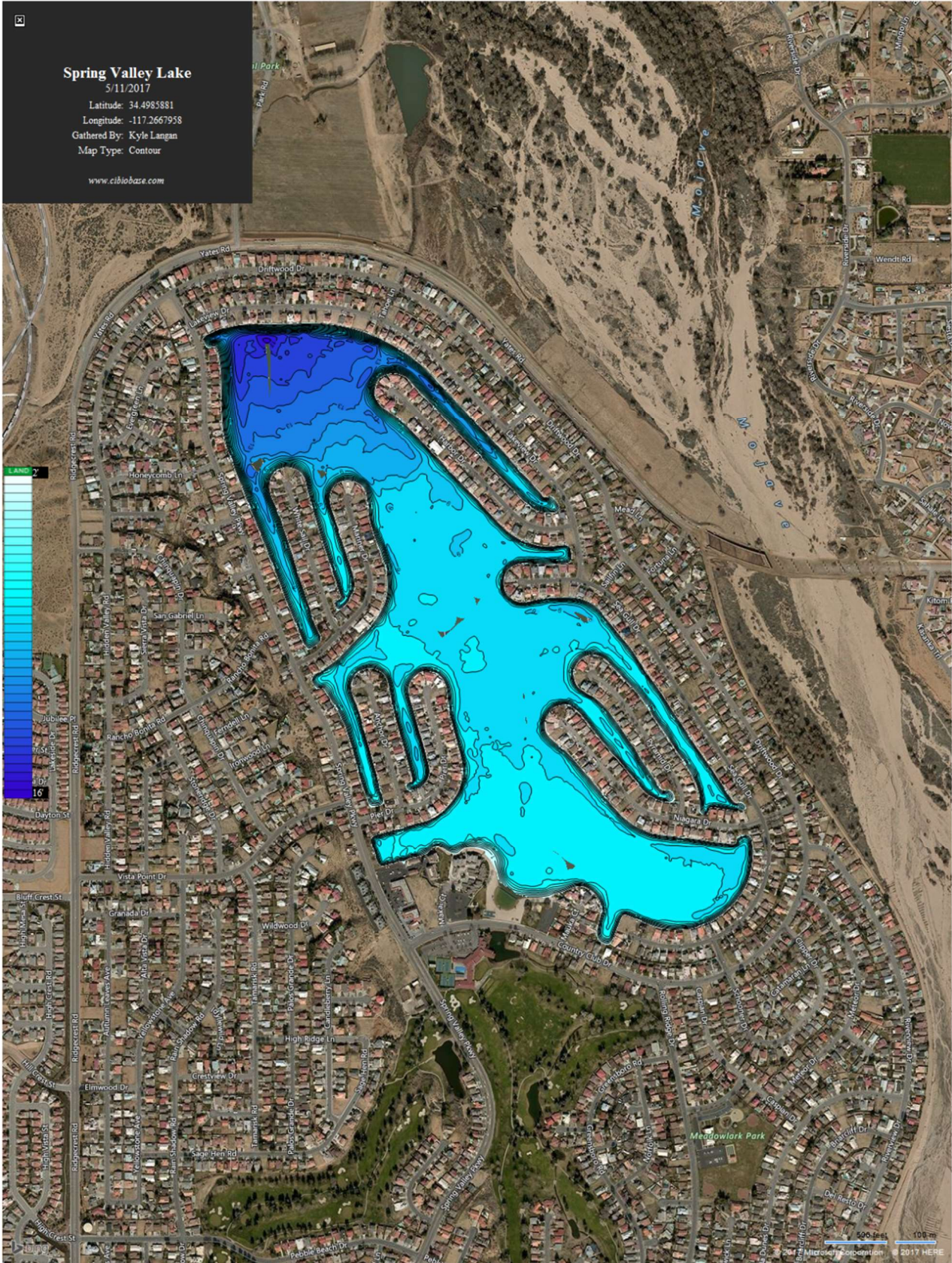
Regional Office
Santa Ana, CA 92705
760-636-8267

Introduction

Spring Valley Lake Association is in the sixth year of working under a water clarity improvement program and has requested Aquatechnex to perform a number of monitoring tasks to support this work. In continuation of previous mapping projects performed at Spring Valley Lake, a hydroacoustic mapping event was performed on May 11th, 2017. In addition, two water samples were analyzed for a number of water quality parameters and algae species identification. This report will summarize these findings.

Hydro-acoustic Mapping

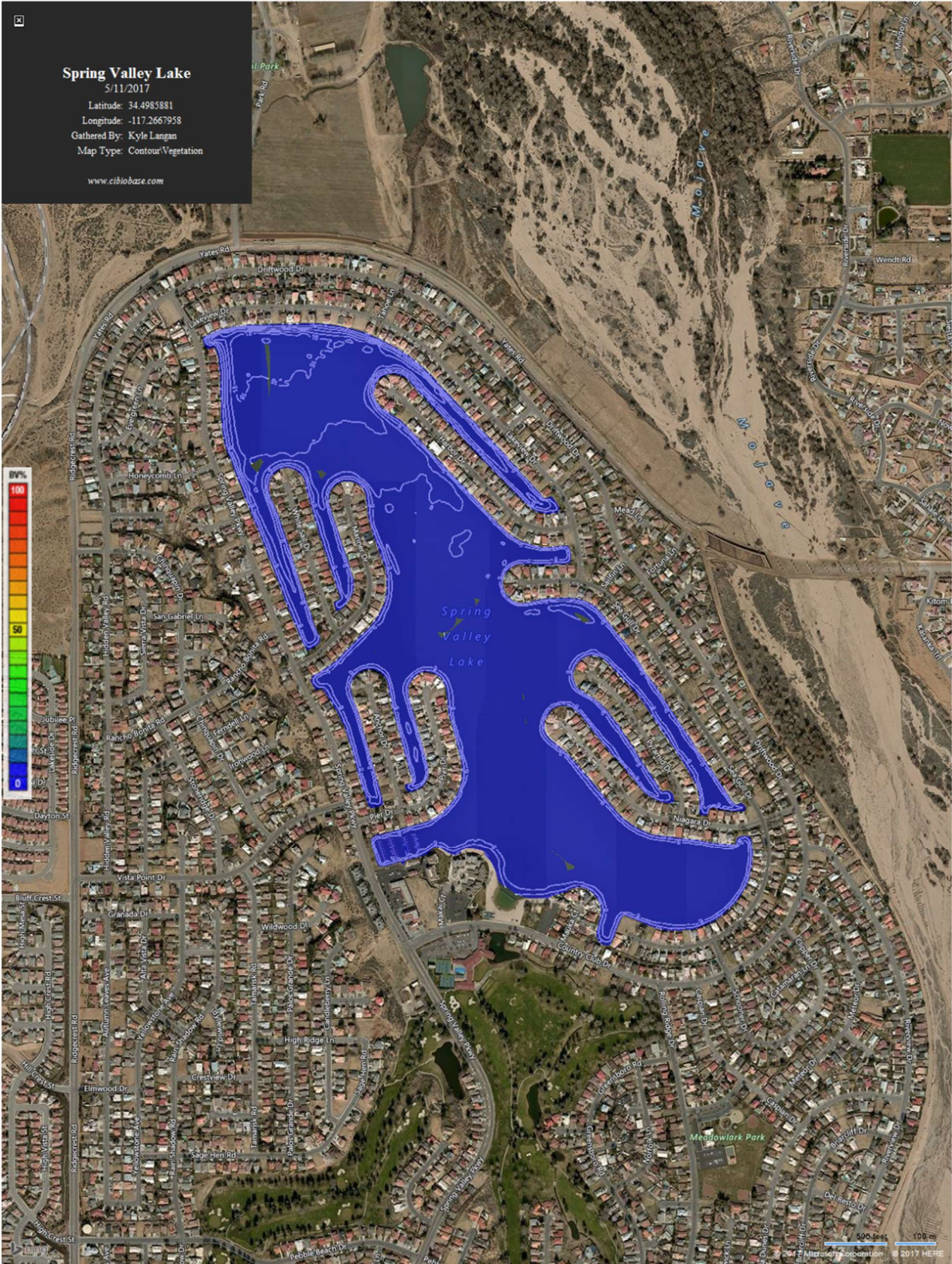
AquaTechnex mobilized a hydro-acoustic mapping vessel to the lake on May 11th, 2017 to collect data on the potential presence and distribution of aquatic plant growth in the lake. In the previous fall mapping event, very minimal amounts of aquatic weeds were detected. The mapping vessel traveled across 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 in the following pages.



This image shows the current bathymetry of Spring Valley Lake. Almost no change was detected since the previous mapping last fall.



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



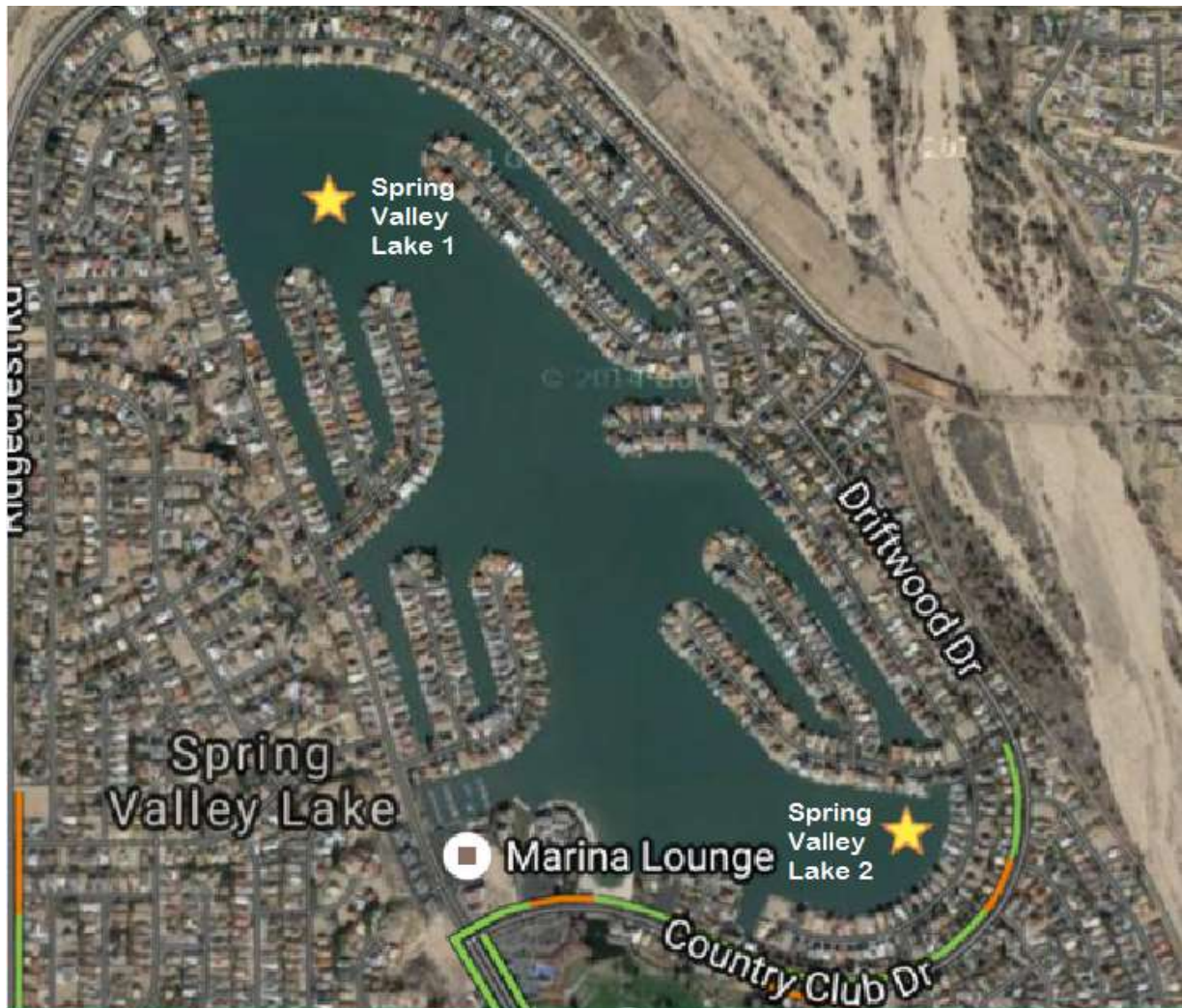
Spring Valley Lake 2015 Spring Mapping 5

At this point in the spring of 2017, the aquatic plant coverage in Spring Valley Lake is almost none detected. Any plant growth that was detected was in the back of fingers in very shallow water. The past few years have shown this type of sparse growth pattern. This pattern is not unusual with Spring Valley Lake. Water clarity can limit light penetration into the lake bottom and plants have a hard time establishing.

Water Quality Data

Two water samples were collected around 10AM on 6/2/17. Samples were collected in the North and South portions of the lake indicated on the map below. The samples were analyzed for a variety of water quality data and algae identification. Below is a summarization of the data.

The water samples taken show very small amounts of Planktonic Green-Algae and Planktonic Diatoms. They cell counts were under 1,000 cells/mL. In both samples, the total and free reactive phosphorus numbers were down from last Fall. Nitrogen levels and Chlorophyll levels were also down from last fall. Spring Valley Lake exhibits a satisfactory level of clarity, which is measured by turbidity.



Above: map showing sample locations and sample name

SeSCRIPT Analysis Report: *Spring Valley Lake*

Company: AquaTechnex, LLC

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

Contact Person: Cody Appling

Phone: 760-636-8267

Email: Cody@aquatechnex.com

Project Name: Spring Valley Lake North

Surface Area: 200 acres

Average depth: 10 feet

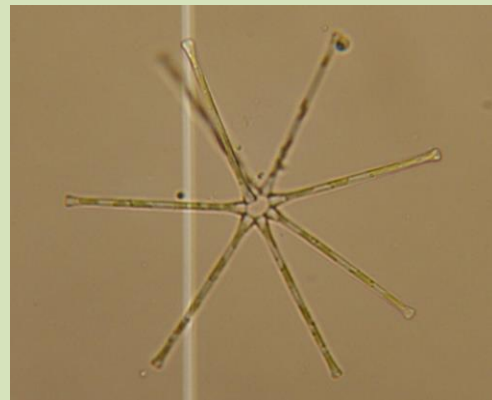
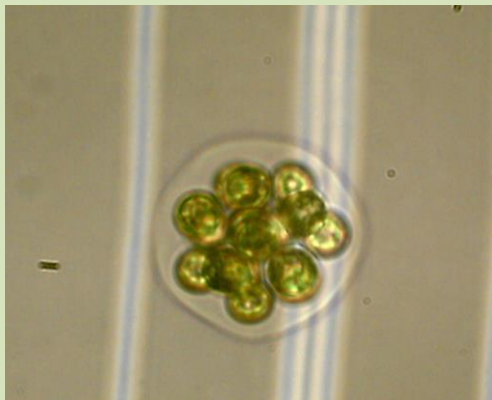
Date Sample Received: 6/6/17

SeSCRIPT Analysis Performed: Algae and Water
Quality Baseline Plus Bundle

Algae ID Results Spring Valley Lake (North)

Identification	Classification	Description	Density (cells/mL)
<i>Coelastrum</i> sp. (some present)	Chlorophyta- Green algae	Colonial, planktonic	2,400
<i>Asterionella</i> sp. (some present)	Bacillariophyta- Diatoms	Colonial, planktonic	600

Other algae in the sample, at lower densities, include: *Oocystic*, *Dictyosphaerium* (Chlorophyta); *Amphora*, *Stauroneis*, *Fragilaria*, *Amphipleura* (Bacillariophyta); pine pollen observed



Water Quality Results
Spring Valley Lake (North)

Analysis	Measurement	Description
pH (SU)	8.3	Near neutral
Dissolved Oxygen (mg/L)	8.2	Acceptable for fish
Conductivity ($\mu\text{S}/\text{cm}$)	319	Typical freshwaters
Alkalinity (mg/L as CaCO_3)	97.4	Moderately buffered
Hardness (mg/L as CaCO_3)	78.8	Moderately hard
Turbidity (NTU)	3.5	Relatively low

Nutrient Results
Spring Valley Lake (North)

Analysis	Measurement	Description
Total Phosphorus ($\mu\text{g}/\text{L}$)	69.2	High amount: eutrophic
Free Reactive Phosphorus ($\mu\text{g}/\text{L}$)	17	Moderate
Total Kjeldahl Nitrogen (mg/L)	3.9	Moderately high
Nitrates & Nitrites (mg/L)	0.1	Moderate
Total Nitrogen (mg/L)	4	Moderate
Chlorophyll <i>a</i> ($\mu\text{g}/\text{L}$)	< 10	Low

SeSCRIPT Discussion

The algae and water sample collected from **Spring Valley Lake (North)** was received on 6/6/17. Based on results from the water quality and algae analyses, proposed treatment recommendations for control of the problematic algae and nutrient management in **Spring Valley Lake (North)** were determined (see below).

Follow all product label instructions. Check with the appropriate local and state agencies for product restrictions and permit regulations prior to use.

SeSCRIPT Treatment Guidance

Spring Valley Lake (North)

ALGAE MANAGEMENT

In order to control the targeted algae at this site, apply:

Captain algaecide at a rate of 0.6 gallons/AF (0.2 mg Cu/L)

Contact your SePRO Aquatic Specialist for further guidance on final application rate selection, technique and frequency based on project objectives, site conditions, algae location and density at treatment time.

PHOSPHORUS MANAGEMENT

Analysis of the water quality parameters in this pond revealed this system is **eutrophic**. Based on these site specific water parameters, consider implementing one of the following Phoslock phosphorus removal solutions to restore water quality in your water body.

Recovery Solution: Improve water quality by incorporating strategic applications of Phoslock to remove free reactive phosphorus from the water column. Apply Phoslock to target water column phosphorus removal based on the sample analyzed. Integrate with SePRO algaecide applications as needed to control algae and achieve desired water quality objectives.

Reset Solution: A more comprehensive solution to water quality restoration. Reset the ecological clock and restore water quality in your pond by implementing a Reset application strategy customized by water body. This Phoslock solution targets and permanently removes free reactive phosphorus in the water column and accumulated in water body sediments over time. A sediment sample is ideal for this prescription.

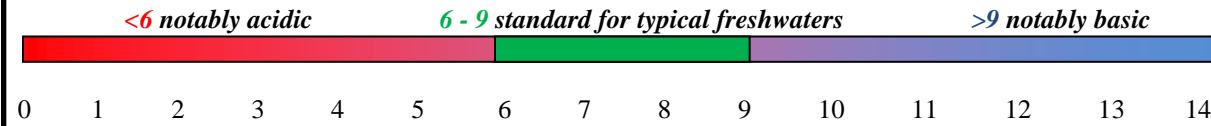
Contact your SePRO Aquatic Specialist for additional guidance on development of a custom Phoslock prescription based on site conditions and water quality management objectives.

Scott Shuler, SePRO Regional Sales Manager-West
Phone: 317-388-3316 Email: scotts@sepro.com

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 CaCO₃ 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 CaCO₃ 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 (PO₄⁻³, HPO₄⁻², 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⁺ and Ammonia) determined by the sum of the measurements for Total Kjeldahl 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*

Company: AquaTechnex, LLC

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

Contact Person: Cody Appling

Phone: 760-636-8267

Email: Cody@aquatechnex.com

Project Name: Spring Valley Lake (South)

Surface Area: 200 acres

Average depth: 10 feet

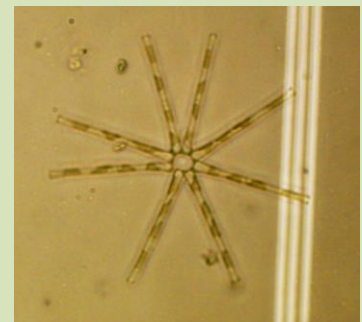
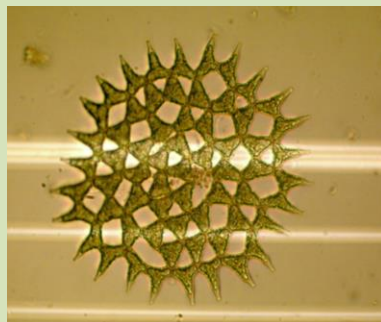
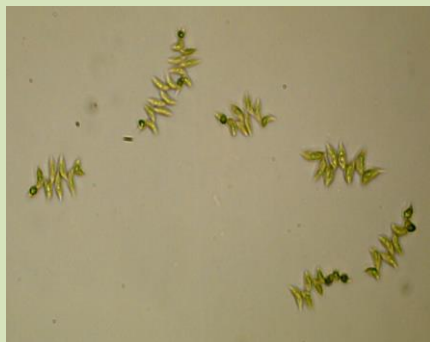
Date Sample Received: 06/06/17

SeSCRIPT Analysis Performed: Algae and Water Quality Baseline Plus Bundle

Algae ID Results Spring Valley Lake (South)

Identification	Classification	Description	Density (cells/mL)
<i>Asterionella</i> sp. (some present)	Bacillariophyta- Diatoms	Colonial, planktonic	900
<i>Pediastrum</i> sp. (some present)	Chlorophyta- Green algae	Colonial, planktonic	300

Other algae in the sample, at lower densities, include: *Tetraedron*, *Scenedesmus* (Chlorophyta);
Achnanthes (Bacillariophyta)



Water Quality Results
Spring Valley Lake (South)

Analysis	Measurement	Description
pH (SU)	8.4	Near neutral
Dissolved Oxygen (mg/L)	8.2	Acceptable for fish
Conductivity ($\mu\text{S}/\text{cm}$)	327	Typical freshwaters
Alkalinity (mg/L as CaCO_3)	98.7	Moderately buffered
Hardness (mg/L as CaCO_3)	80.6	Moderately hard
Turbidity (NTU)	5.7	Low

Nutrient Results
Spring Valley Lake (South)

Analysis	Measurement	Description
Total Phosphorus ($\mu\text{g}/\text{L}$)	42.4	High amount: eutrophic
Free Reactive Phosphorus ($\mu\text{g}/\text{L}$)	16	Moderate amount
Total Kjeldahl Nitrogen (mg/L)	0.8	Low
Nitrates & Nitrites (mg/L)	0.1	Moderate
Total Nitrogen (mg/L)	0.9	Low
Chlorophyll <i>a</i> ($\mu\text{g}/\text{L}$)	< 10	Low

SeSCRIPT Discussion

The algae and water sample collected from **Spring Valley Lake (South)** was received on 6/6/17. Based on results from the water quality and algae analyses, proposed treatment recommendations for control of the problematic algae and nutrient management in **Spring Valley Lake (South)** were determined (see below).

Follow all product label instructions. Check with the appropriate local and state agencies for product restrictions and permit regulations prior to use.

SeSCRIPT Treatment Guidance

Spring Valley Lake (South)

ALGAE MANAGEMENT

In order to control the targeted algae at this site, apply:

Captain XTR algaecide at a rate of 0.3 gallons/AF (0.1 mg Cu/L)

Contact your SePRO Aquatic Specialist for further guidance on final application rate selection, technique and frequency based on project objectives, site conditions, algae location and density at treatment time.

PHOSPHORUS MANAGEMENT

Analysis of the water quality parameters in this pond revealed this system is **eutrophic**. Based on these site specific water parameters, consider implementing one of the following Phoslock phosphorus removal solutions to restore water quality in your water body.

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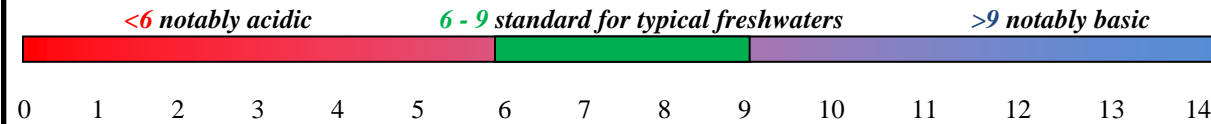
Contact your SePRO Aquatic Specialist for additional guidance on development of a custom Phoslock prescription based on site conditions and water quality management objectives.

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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 CaCO₃ 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 (PO₄⁻³, HPO₄⁻², 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⁺ and Ammonia) determined by the sum of the measurements for Total Kjeldahl 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.



16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC1491 **LABORATORY REPORT**

Customer Company Customer Contact

Company Name: Aquatechnex LLC-Main	Contact Person: Cody Appling
Address: 2124 Grant St., Bellingham , WA 98225	E-mail Address: cody@aquatechnex.com
	Phone: 208.559.8737

Waterbody Information

Waterbody:	Spring Valley Lake - CA
Waterbody size:	200
Depth Average:	8.5

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM4867-1	South	Turbidity (NTU)	EPA 180.1	5.7	06/02/2017
		Conductivity (uS/cm)	EPA 120.1	327	
		Free Reactive Phosphorus (ug/L)	EPA 365.3	16	
		Dissolved Oxygen (mg/L)	EPA 360.1	8.2	
		Chlorophyll a (ug/L)	EPA 445	<10	
		Total Phosphorus (ug/L)	EPA 365.3	42.4	
		Alkalinity (mg/L as CaCO3)	EPA 310.2	98.7	
		Total Hardness (mg/L as CaCO3)	EPA 130.2	80.6	
		Total Nitrate (mg/L) and Nitrite (mg/L)	Campbell et al 2004	0.1	
		Nitrite (mg/L)	Campbell et al 2004	<0.02	
		Nitrate (mg/L)	calculated	0.1	
		Total Kjelaahl Nitrogen (mg/L)	EPA 351.2	0.8	
		Total Nitrogen (mg/L)	calculated	0.9	
		pH	EPA 150.1	8.4	
CTM4868-1	North	Turbidity (NTU)	EPA 180.1	3.5	06/02/2017
		Conductivity (uS/cm)	EPA 120.1	319	
		Free Reactive Phosphorus (ug/L)	EPA 365.3	17	
		Dissolved Oxygen (mg/L)	EPA 360.1	8.2	
		Chlorophyll a (ug/L)	EPA 445	<10	
		Total Phosphorus (ug/L)	EPA 365.3	69.2	
		Alkalinity (mg/L as CaCO3)	EPA 310.2	97.4	
		Total Hardness (mg/L as CaCO3)	EPA 130.2	78.8	
		Total Nitrate (mg/L) and Nitrite (mg/L)	Campbell et al 2004	0.1	
		Nitrite (mg/L)	Campbell et al 2004	<0.02	
		Nitrate (mg/L)	calculated	0.1	
		Total Kjelaahl Nitrogen (mg/L)	EPA 351.2	3.9	
		Total Nitrogen (mg/L)	calculated	4	

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.

COMMENTS: No significant observations were made unless noted in the report.

MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information

Date / Time Received: 06/06/17 11:00 AM

Date Results Sent: 06/28/2017

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.



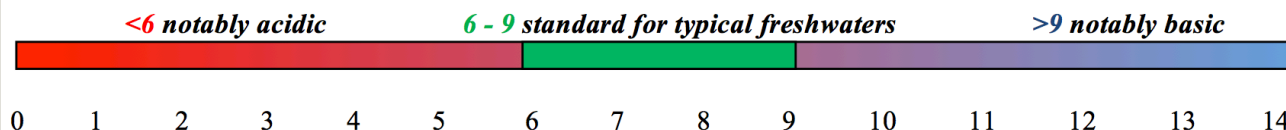
Reviewed By: *Quality Assurance Officer*

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