

Spring Valley Lake Spring 2015 Baseline Data Collection



Prepared for
Spring Valley Lake Association

AquaTechnex,
LLC

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Introduction

Spring Valley Lake Association is in the fifth year of working under a water clarity improvement program and has requested we 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 18th, 2015. In addition, a water sample was 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 18th, 2015 to collect data on the potential presence and distribution of aquatic plant growth in the lake. In the previous spring mapping event, very minimal amounts of aquatic weeds were detected. Therefore, mapping was postponed by approximately one month to better to better effectively detect areas of plant growth. 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. Slight changes have occurred since the previous spring.



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



At this point in the spring of 2015, the general aquatic plant coverage in Spring Valley Lake is low to none. Very minimal growth was detected on the north shore and very sparse growth was found in the fingers. Overall, 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. This year's mapping event was performed over a year after last year's spring mapping event and shows similar results. This suggests that aquatic plants growth will pick up in the summer and the mapping should be performed then to have better picture of where the growth is likely to occur this year.

Water Quality Data

The Spring Valley Lake Association performs regular water quality monitoring work on the lake. It is important to check this work with a certified laboratory from time to time and one sample was collected from Spring Valley Lake and submitted for that purpose. The samples were also analyzed for algal composition and cell counts. This information is critical to understanding the health of the lake. The report is attached and summarized here.

In the past, cyanobacterial blooms have been a major issue at Spring Valley Lake. At the time of the sampling, these species were not present in the water samples. The green algae species identified here are generally beneficial and an important component of the food web. Cell counts levels are relatively low, giving the lake a very light green hue.

Phosphorous levels present in the water column fuel the algal blooms. Latest test results show a high amount of total Phosphorous, but a low amount of Free Reactive Phosphorous (FRP). FRP is a measure of the available Phosphorous for algae production. This level is low and indicates that short term algae growth could be relatively minor.

SeSCRIPT Analysis Report: *Spring Valley Lake 1*

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Project Name: Spring Valley Lake 1

Surface Area: 200 acres

Average depth: 8.5 feet

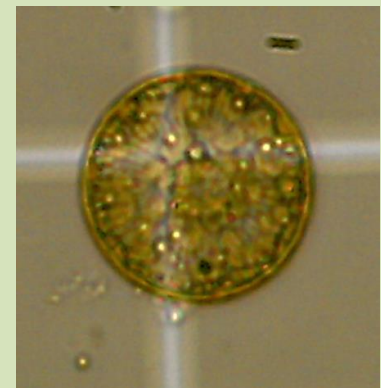
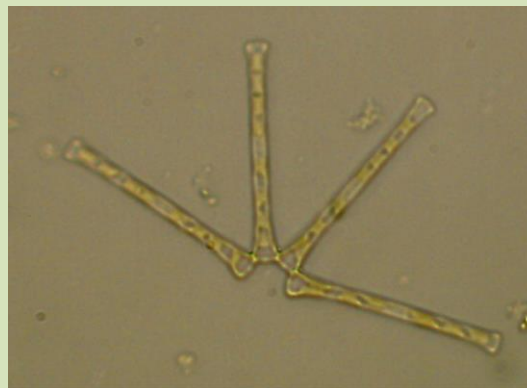
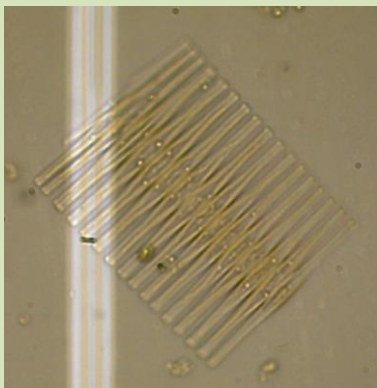
Date Sample Received: 5/19/15

SeSCRIPT Analysis Performed: Algae and Water
Quality Baseline Plus Bundle

Algae ID Results Spring Valley Lake 1

Identification	Classification	Description	Density (cells/mL)
<i>Fragilaria</i> sp. (co-dominant)	Bacillariophyta- Diatoms	Filamentous/single-celled, planktonic	1,840
<i>Pediastrum</i> sp. (co-dominant)	Chlorophyta- Green algae	Colonial, planktonic	1,800
<i>Cyclotella</i> sp. (some present)	Bacillariophyta- Diatoms	Single-celled, planktonic	900

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



Water Quality Results Spring Valley Lake 1

Analysis	Measurement	Description
pH (SU)	6.4	Near Neutral
Dissolved Oxygen (mg/L)	5.79	Acceptable for fish
Conductivity ($\mu\text{S}/\text{cm}$)	395	Typical freshwaters
Alkalinity (mg/L as CaCO_3)	20.3	Low buffered
Hardness (mg/L as CaCO_3)	93	Moderately hard
Turbidity (NTU)	7.2	Relatively low

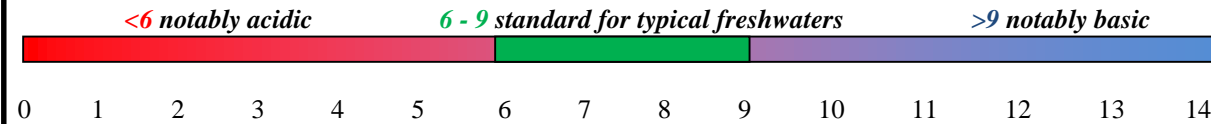
Nutrient Results Spring Valley Lake 1

Analysis	Measurement	Description
Total Phosphorus ($\mu\text{g}/\text{L}$)	33	High amount: eutrophic
Free Reactive Phosphorus ($\mu\text{g}/\text{L}$)	5.9	Low amount
Total Kjeldahl Nitrogen (mg/L)	3.43	Moderately high
Nitrates & Nitrites (mg/L)	0.543	Moderate
Total Nitrogen (mg/L)	3.97	Moderate
Chlorophyll <i>a</i> ($\mu\text{g}/\text{L}$)	9	Relatively low

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 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.