LAKE SPOKANE ANNUAL SUMMARY REPORT

2015 Baseline Water Quality Monitoring Results

Prepared for

AVISTA

SPOKANE, WASHINGTON

PREPARED BY:

Tetra Tech, Inc.

316 W. Boone Avenue, Suite 363
Spokane, WA 99201

January 2016

(This Page Intentionally Left Blank)

TABLE OF CONTENTS

List of Appendices

List of Tables

List of Figures

ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
µS/cm	micro Siemens per centimeter
AHOD	areal hypolimnetic oxygen deficit
Avista	Avista Utilities
chl	chlorophyll a
DNR	Department of Natural Resources
DO	dissolved oxygen
Ecology	Washington Department of Ecology
EWU	Eastern Washington University
HED	Hydroelectric Development
MDL	Method detection limit
N	nitrogen
N+P	nitrogen plus phosphorus
ND	non-detect
NO_3+NO_2	Nitrate+nitrite
P	phosphorus
QAPP	Quality Assurance Project Plan
RM	river mile
SRP	soluble reactive phosphorus
TMDL	total maximum daily load
TN	total nitrogen or total persulfate nitrogen
TN:TP	total nitrogen to total phosphorus ratio
TP	total phosphorus
TSI	trophic state index

(This Page Intentionally Left Blank)

1. INTRODUCTION

Water quality problems in Lake Spokane due to eutrophication have been investigated on several occasions since the 1960s. Studies by the Washington Department of Ecology (Ecology) and Eastern Washington University (EWU) provided much of the background data for a waste allocation analysis by Harper-Owes in the 1980s (Patmont 1987). The EWU studies defined the extent of algal blooms and hypolimnetic anoxia, which led to 85% of total phosphorus (TP) removal from the City of Spokane wastewater starting in 1977. Phosphorus removal from wastewater greatly improved water quality in the reservoir. During the 1970s to 1980s, the EWU group, headed by Dr. R.A. Soltero, produced 14 reports documenting water quality problems before and after wastewater phosphorus removal. This work showed the direct links between phosphorus input and algal blooms on the one hand, and the effect of that algal production on reservoir dissolved oxygen (DO) on the other (Soltero et al. 1982).

The degree of water quality improvement that occurred in the past is important to recognize in assessing the reservoir's water quality today. For example, chlorophyll a (chl) decreased from a June-October average of 20.5 micrograms per liter (µg/L) before phosphorus removal (5 years of data) to 11.1 µg/L after (7 years of data). That was in response to inflow TP decreasing from a June-October mean of 86 to 25 µg/L. Minimum, volume-weighted hypolimnetic DO increased from an average of 1.4 mg/L before (5 years of data) to 3.6 mg/L after (7 years of data) (Patmont 1987).

Improvement in water quality continued during the subsequent 15 to 20 years. By 2010 – 2014, minimum DO increased 80% and chl decreased 40% as inflow TP declined 40% to 15 µg/L over a 5-year period (Welch et al., 2015). These further improvements were probably attained during the 1990s. These long-term improvements will be compared with current water quality conditions determined in 2015.

This report describes the monitoring effort by Tetra Tech in 2015, under contract to Avista Corporation, that includes *in situ* profiles of temperature, DO, pH, and conductivity, as well as, discrete sampling for nutrients, chl, phytoplankton and net zooplankton.

1.1. Report Purpose

Avista Corporation (Avista) owns and operates the Long Lake Hydroelectric Development (HED) on the Spokane River. Long Lake Dam created a reservoir, Lake Spokane, in a 23-mile stretch of the Spokane River that was, at one time, free flowing. Portions of the river, including Lake Spokane, experience seasonal patterns in DO concentrations, some of which do not meet Washington State's water quality standards.

Table 1 lists the state water quality criteria for DO that apply to the Spokane River and Lake Spokane. In addition, the Spokane River has the following specific water quality criteria, per WAC 173-201A-130, from Long Lake Dam (RM 33.9) to Nine Mile Bridge (RM 58.0), which encompasses all of Lake Spokane:

The average euphotic zone concentration of total phosphorus (TP) shall not exceed 25 µg/L during the period of June 1 to October 31.

Table 1. Designated Aquatic Life Uses and DO Criteria for the Spokane River as Defined in the 2006 Water Quality Standards.

Portion of the Waterbody	Aquatic Life Uses	DO Criteria
Spokane River (from Nine Mile Bridge to the Idaho Border)	Migration/Rearing/Spawning	DO shall exceed 8.0 mg/L. If "natural conditions"[a] are less than the criteria, the natural conditions shall constitute the water quality criteria.
Lake Spokane (from Long Lake Dam to Nine Mile Bridge)	Core Summer Habitat	No measurable (0.2 mg/L) decrease from natural conditions.

[a]Washington water quality standards (WAC 173-201A-020) defines "natural conditions" or "natural background levels" as "surface water quality that was present before any human-caused pollution. When estimating natural conditions in the headwaters of a disturbed watershed, it may be necessary to use the less disturbed conditions of a neighboring or similar watershed as a reference condition."

Ecology has been working, along with several stakeholders, to address these impairments through the development and implementation of a water quality improvement plan, or Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load (DO TMDL) (Ecology 2010).

The DO TMDL relies on the CE-QUAL-W2 hydrodynamic and water quality model to assess the capacity of the Spokane River and Lake Spokane to assimilate oxygen-demanding pollutants (i.e., phosphorus, carbonaceous biological oxygen demand, and ammonia) under varying conditions (DO TMDL, page vi). Unlike point- and non-point source discharges, Avista does not discharge nutrients to either the Spokane River or Lake Spokane. Thus, it was not assigned a wasteload allocation or a load allocation. However, since the presence of the Long Lake HED increases the residence time (average amount of time it takes water to flow through Lake Spokane) the DO TMDL process assigned Avista a "proportional level of responsibility" for depressed DO levels in Lake Spokane through a water quality modeling scenario. This responsibility is reflected in Table 7 of the DO TMDL, which was subsequently corrected (Ecology 2010; Appendix B). Table 7 in the TMDL is based on a comparison of CE-QUAL-W2 model runs for the 2001 model year.

Ecology, with Avista, conducted a 2-year baseline sampling effort that began in May 2010 and extended through October 2011 at six lake stations and two river stations. The main purpose was to gather more recent data to verify the baseline water quality conditions in 2001, which were used in the TMDL development process, and to account for any changes in water quality in the lake. Ecology and Avista collaborated on a monthly sampling routine extending from June through September in 2010 and 2011 in order to expand the frequency of observations at the six lake monitoring stations. To do that, Avista contracted with Tetra Tech.

Beginning in 2012, Avista took over monitoring of the six lake stations in Lake Spokane and will continue that effort through 2016. Ecology will continue to provide water quality data for the three

river stations (54A090, 55B070, and 54A070). In 2016, Avista will evaluate the results and success of monitoring baseline nutrient and DO conditions in Lake Spokane and will work with Ecology to define future monitoring goals for the lake. This may include assessing whether the monitoring parameters, locations, duration, and frequency should be modified.

2. MONITORING PROGRAM

Water quality samples were collected and *in situ* profiles were determined once per month in May and October and twice per month from June through September 2015 at the six in-lake locations (LL0, LL1, LL2, LL3, LL4, and LL5) (Figure 1). Station LL0 is located farthest downstream in the reservoir with a depth of 48-50 m. Station LL1 is located across from the Lake Spokane Campground and Boat Launch (formerly operated by the Department of Natural Resources (DNR)) at a depth of about 34 m. Station LL2 is down-reservoir from the City of TumTum and Sunset Bay at a depth of about 26 m. Station LL3 is just up-reservoir from Willow Bay at a depth of about 19-20 m. Station LL4 is across from Suncrest Park and boat launch at about 9 m depth. Station LL5 is the farthest up-reservoir, slightly up-reservoir from the Nine Mile Recreation Area on the north side of the river at about 6 m depth.

Longitudinally, the reservoir can be divided into three zones representing varying morphometric characteristics. The upper portion of the reservoir is considered to be the riverine zone where depths are shallow and the reservoir has morphological characteristics similar to a large river. Station LL5 is within this riverine zone. Stations LL4 and LL3 are located within the transition zone of the reservoir, where the reservoir is changing from a riverine environment to a more lacustrine environment. Within the transition zone, depths are greater than in the riverine zone but the littoral areas are still similar to those in the riverine zone. Station LL3 is approximately 19-20 m deep and has a very small hypolimnion during stratification. Stations LL0, LL1, and LL2 are located in the lacustrine zone of the reservoir where there is both littoral and pelagic (shallow and deep water) environments. Water depths in the lacustrine zone are much deeper than the rest of the reservoir and that zone stratifies into three layers; the epilimnion, metalimnion, and hypolimnion, during summer.

The vertical structure of Lake Spokane is set up by thermal, or density, stratification, largely determined by its inflow rates and temperature, change in storage, climate, and location of the powerhouse intake. Within Lake Spokane's lacustrine zone, thermal stratification creates three layers (the epilimnion, metalimnion, and hypolimnion) that are generally present between late spring and early fall. The epilimnion is the uppermost layer, and the warmest due to solar radiation. The metalimnion contains the thermocline and is the transition layer between the epilimnion and the hypolimnion that is influenced by both surface and interflow inflows. The hypolimnion is the deepest layer and is present throughout the lacustrine zone. An important characteristic of reservoirs is that inflowing water tends to plunge beneath the thermocline into the metalimnion and/or hypolimnion, depending on the flow rate and temperature (density) of the inflow.

The 2015 sampling schedule is summarized in Table 2. Discrete depth samples were collected at each lake sampling location (Table 3) and were shipped to Aquatic Research Inc. for analyses. In 2013 an additional sample depth at Station LL4 was added at 4 m. This additional depth was also sampled in 2015. Water samples were analyzed for nitrate plus nitrite, total persulfate nitrogen (TN), soluble reactive phosphorus (SRP), total phosphorus (TP), and chl. Samples were collected in accordance with methods and procedures outlined in Avista's *Quality Assurance Project Plan for Lake Spokane Baseline Nutrient Monitoring* (QAPP), which was approved by Ecology and

submitted to FERC in February 2014. This QAPP is a revised version of an earlier QAPP written by Ecology for the 2010 and 2011 monitoring efforts and amended in 2012.

Water temperature, DO, pH, and conductivity were determined *in situ* at each of the six sampling locations by lowering a Hydrolab® multi-parameter water quality meter from the boat. The *in situ* measurements were determined at prescribed depths through the water column. The measurements were determined in accordance with the methods and procedures outlined in the QAPP (Tetra Tech 2014). The water quality meter was calibrated according to manufacturer's directions and standard measurement procedures were followed.

Volume-weighted DO and TP concentrations for each station were determined for sampling dates using CE-QUAL-W2 model segment volumes, which corresponded to 2015 monitoring stations. Volumes for model segments were obtained from Avista and Golder Associates. The monitoring stations correspond to model segments as follows:

- Station LL0: Model Segment 188, Reservoir Zone: Lacustrine
- Station LL1: Model Segment 181, Reservoir Zone: Lacustrine
- Station LL2: Model Segment 175, Reservoir Zone: Lacustrine
- Station LL3: Model Segment 168, Reservoir Zone: Transition
- Station LL4: Model Segment 161, Reservoir Zone: Transition
- Station LL5: Model Segment 157, Reservoir Zone: Riverine

Water samples for phytoplankton were collected at 0.5 m depth at each of the six sampling locations. These samples provided information on phytoplankton abundance seasonally and also longitudinally at several locations throughout the reservoir. Zooplankton were collected with a vertical haul at each of the six sampling locations from 1 m off the bottom through the water column. Both phytoplankton and zooplankton samples were sent to EcoAnalysts, Inc. in Moscow, ID for analysis. Previous phytoplankton and zooplankton analyses were performed by WATER Environmental Services, Inc.

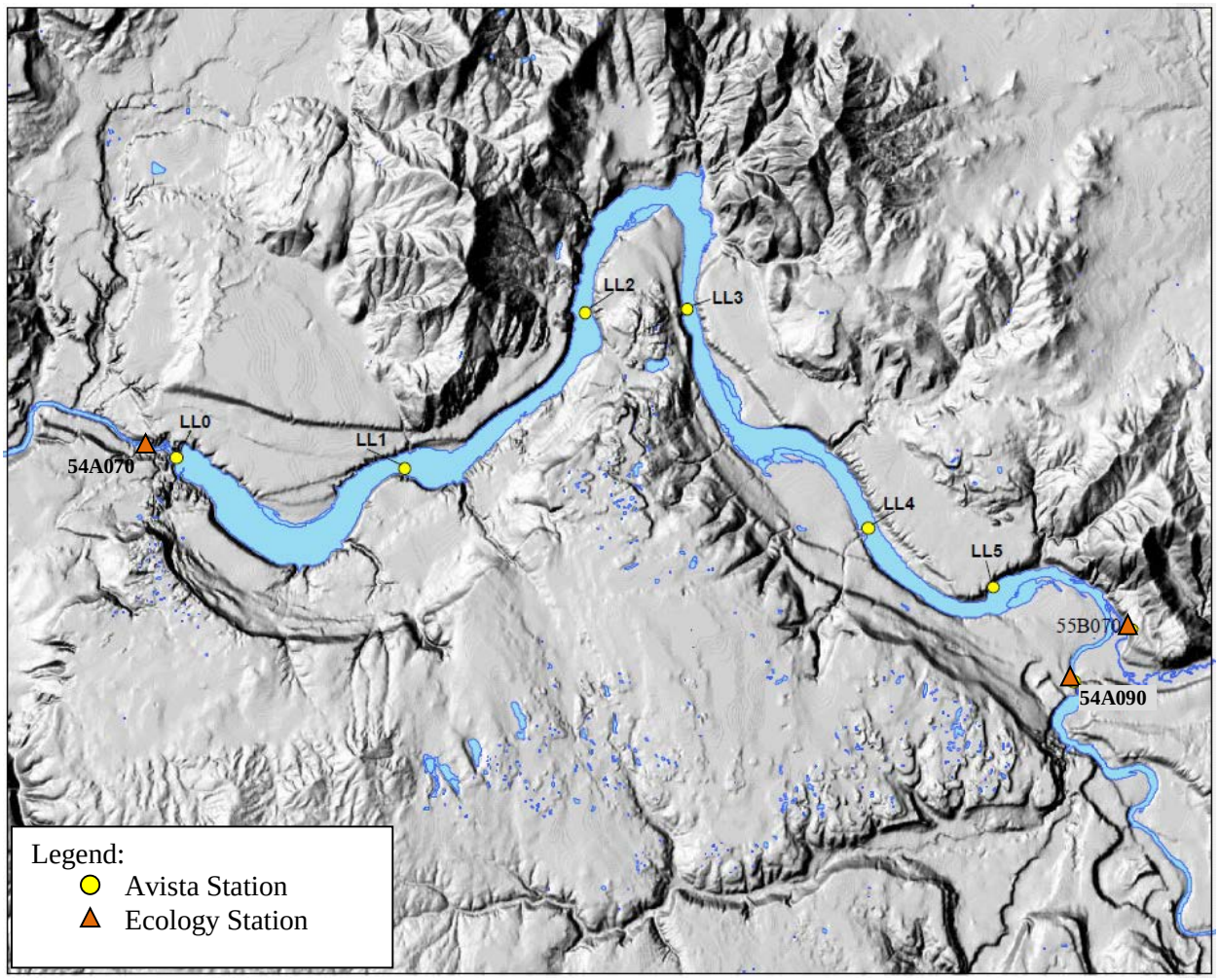

Figure 1. Lake Spokane Sampling Locations

Table 2. Lake Spokane Monitoring Schedule during 2015

Sample Date	Type of Samples Collected
May 13 – 14, 2015	Discrete Depth, *In situ*, Phytoplankton, and Zooplankton
June 9 – 10, 2015	
June 23 – 24, 2015	
July 7 – 8, 2015	
July 21 – 22, 2015	
August 4 – 5, 2015	
August 23 – 24, 2015	
September 8 – 9, 2015	
September 23 – 24, 2015	
October 13 – 14, 2015	

Table 3. Discrete Depth Samples for Stations Monitored in Lake Spokane during 2015(1)

	LL0	LL1	LL2	LL3	LL4	LL5
Depths (m)	0.5	0.5	0.5	0.5	0.5	0.5
	5	5	5	5	4	B-1
	15	20	15	10	B-1	
	30	B-1	B-1	B-1		
	B-1					

(1) B-1 is 1 m off the bottom.

3. RESULTS

This section presents a summary of water quality constituents determined *in situ*, as well as nutrient, chl, phytoplankton, and zooplankton data from grab samples at discrete depths. The *in situ* data are presented in tabular form in Appendix I. All data from water samples collected in 2015 are presented in tabular form in Appendix II. Phytoplankton results are presented in Appendix III, and zooplankton results are in Appendix IV.

The section also presents a brief summary of the water quality conditions of the primary inflows and outflows to/from Lake Spokane as well as a description of general hydrologic and climatic conditions for 2015.

3.1 Hydrologic and Climatic Conditions

Weather conditions during 2015 differed greatly from the 30-year norms reported at Spokane International Airport, with lower than normal air temperatures at the start of the year and in September, and higher than normal temperatures in February, March, May through August, and October. Precipitation was below normal for most of the year. Temperatures ranged from a high of 105°F (40.6°C) on June 28 to a low of 2°F (-16.7°C) on December 31 as shown in Figure 2. The annual cumulative rainfall total was 14.08 inches (35.8 cm), which is below the normal for the Spokane International Airport (Figure 2). The year began with about normal precipitation in January which was followed by slightly drier than normal conditions in February. Precipitation in March was above normal with a total of 2.43 inches (6.2 cm), which is 0.82 inches (2.1 cm) greater than normal. This is in contrast to early spring conditions in 2013 when March rainfall was only 0.82 inches (2.1 cm) but similar to 2014 March rainfall which was 2.88 inches (7.3 cm). May had below normal precipitation with only 0.85 inches (2.2 cm) of rainfall which is just over half of normal rainfall for May of 1.62 inches (4.1cm). June was the driest month of the year with only 0.07 inches (0.2 cm) of precipitation which is 1.18 inches (3.0 cm) below normal. This is in contrast to June 2014 which had above normal precipitation with the maximum recorded in one day; 1.01 inches (2.6 cm) on June 17. June 2015 was also the warmest June on record with an average temperature of 71.4°F (21.9°C). The Spokane International Airport recorded a high temperature of 105°F (40.6°C) on June 28 setting a new record for the month of June.

Drought conditions continued through July which was also the hottest month of the year with an average temperature of 74.2°F (23.4°C), and continued through August. The warm and dry conditions combined with the ongoing drought and a lightning storm resulted in numerous new fires over northeast Washington in August. Closer to normal precipitation occurred in September along with cooler than normal temperatures. October was much warmer than normal with an average temperature of 54.3°F (12.4°C) which is 6.7°F (3.7°C) above the normal average temperature of 47.6°F (8.7°C). October 2015 was in fact the second warmest October on record. Temperatures at the Airport did not reach the freezing mark for the entire month of October, similar to conditions in 2014 which was the first time since 2005. November started and ended with lower temperatures than normal but had a period of higher than normal temperatures in the middle of the month. On November 3 temperatures finally dropped below the freezing mark for several days for the first time in 2015. Minimum temperatures remained below freezing following the warm spell

in the middle of the month. Precipitation in November was well below normal with 0.77 inches (2.0 cm) which is 1.53 inches (3.9 cm) below normal. December was slightly warmer than normal with an average monthly temperature of 30.7°F (-0.7°C) despite very cold temperatures towards the end of the month (Figure 2). December was also much wetter than normal with a precipitation total of 4.45 inches (11.3 cm), 2.15 inches (5.5 cm) above normal, and a total snow accumulation of 24.1 inches (61.2 cm). It was the fourth wettest December on record for Spokane.

Figures 3 and 4 show inflows and outflows, respectively, for Lake Spokane during 2015. Inflows include all incoming water as calculated by Avista using midnight to midnight lake elevation and daily average outflow at midnight as recorded at Long Lake Dam. As expected, the inflows and outflows for Lake Spokane are very similar. Usually there are slight differences between inflow and outflow that occur during the early part of the year during the annual drawdown. That was not the case in 2015. Maximum inflows to Lake Spokane typically occur during March, April, and May due to spring runoff. Inflows to Lake Spokane in 2001, which was the 7Q10 for the DO TMDL, are also shown in Figure 5 for comparison purposes. Peak flows in 2015 were significantly smaller than those observed in 2011 and 2012, but slightly greater than in 2013 and 2010, and similar in magnitude to in 2014 (Figure 5). Peak flow in 2015, however, occurred in February with a second peak at the beginning of April, approximately two months earlier than normal. This is evident when comparing peak flows in 2015 with those in 2001.

Both the Spokane River and the Little Spokane River had average to higher than average flows during January, February, and March (Figures 6 and 7). The peak flow in the Spokane River occurred much earlier, (February vs late May) in the year than historically recorded (Figure 6). During May, during the historical peak, flows in the Spokane River in 2015 were much lower than average with an average monthly flow of 4,134 cfs (Figure 6). Flows in the Spokane River from the middle of April through the middle of October were well below the historical median (Figure 6). Flows in the Little Spokane River were also below the historical median from March through the summer (Figure 7). On June 1 there was a very large storm event which was responsible for the peak flow on June 2 on the Little Spokane River (Figure 7). During that storm, an area north of Nine Mile Falls might have received 5 inches or more of precipitation as indicated by radar when the thunderstorm stalled near a range of hills just north of the Little Spokane River (Spokesman Review 2015a, 2015b).

Whole lake water residence time during 2015 (June through October) in Lake Spokane was higher than previous years at 70.1 days (Table 4). For comparison purposes, the average whole lake water residence time during June through October for 2010 through 2014 was 25 days. Including the 2015 whole lake residence time brings the average up to 32.7 days for the past six years (2010 through 2015). Residence times in the transition and riverine zones averaged 4.7 days in 2010 – 2014, but was much higher in 2015 at 13.2 days (Table 4). Bloom development would be limited in these zones during normal years, especially in the spring, but more able to develop during low flow in August – September of most years. Bloom development during 2015 was most likely not limited by residence time in the riverine/transition zones due to extremely low flows. Table 5 provides inflows and water residence times in Lake Spokane during 2010-2015, however utilizes the seasonal timeframes consistent with the DO TMDL. Using the DO TMDL seasonal timeframe of July through September, the whole lake residence time was calculated at 84.8 days in 2015.

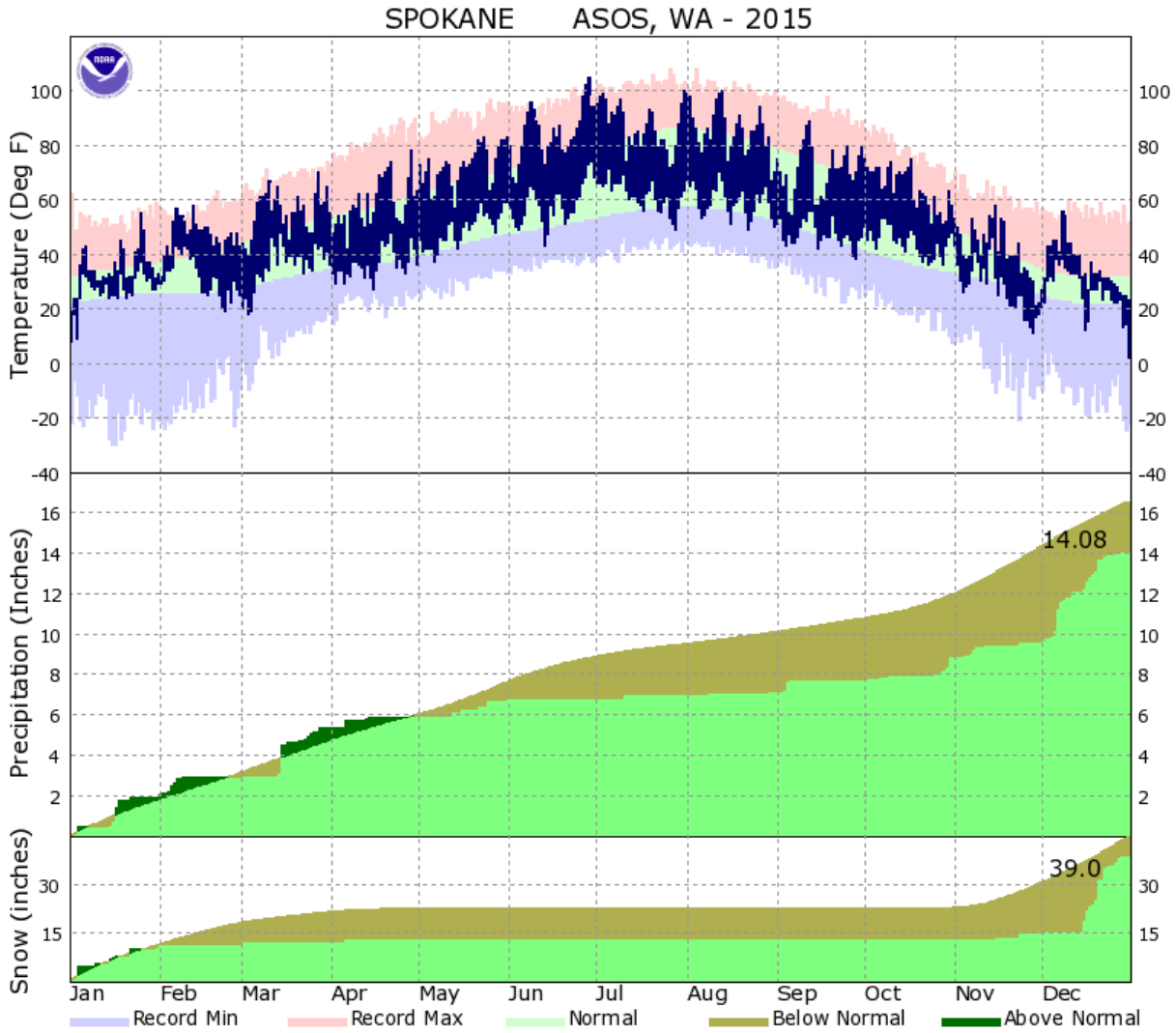

Figure 2. Temperature and Precipitation at Spokane International Airport for 2015

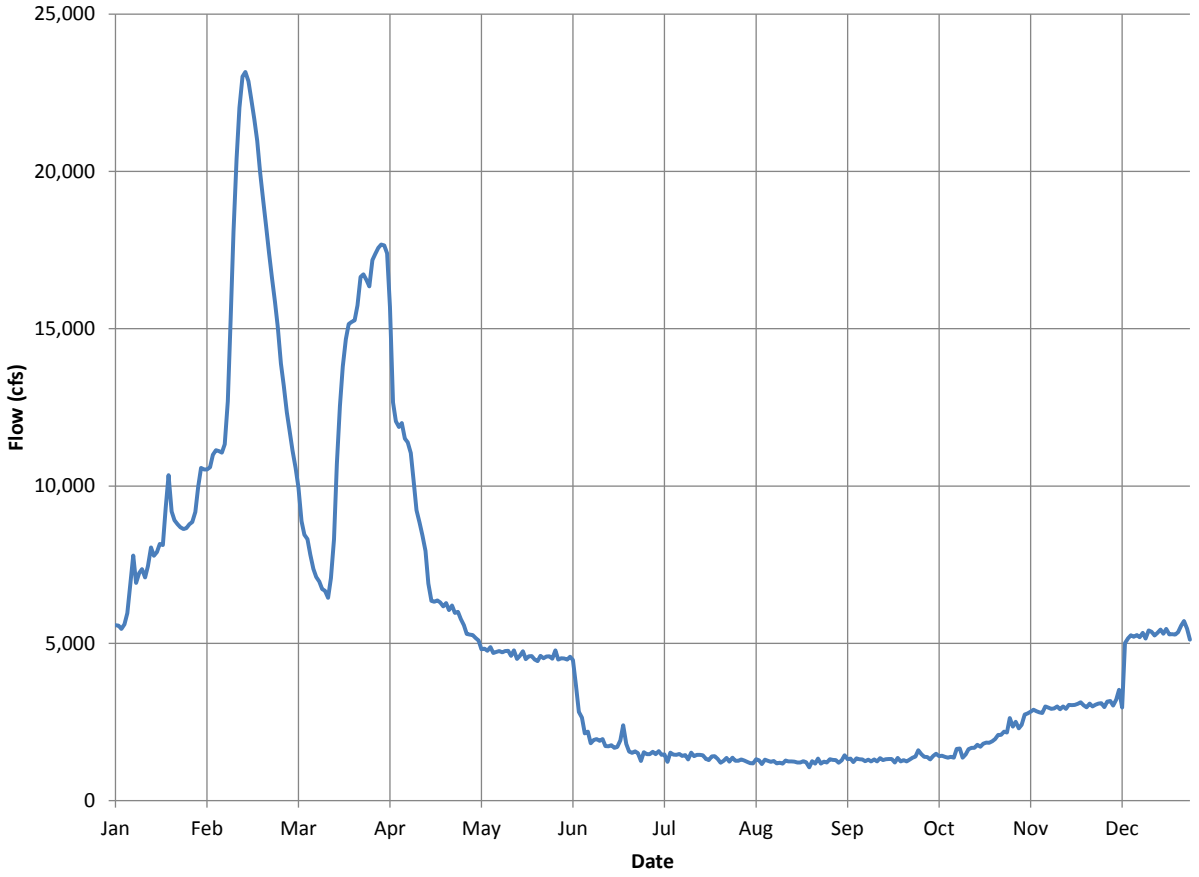

Figure 3. Total Inflow into Lake Spokane, 2015
(Inflows calculated based on midnight to midnight lake elevation and day average outflow at midnight as recorded at Long Lake Dam)

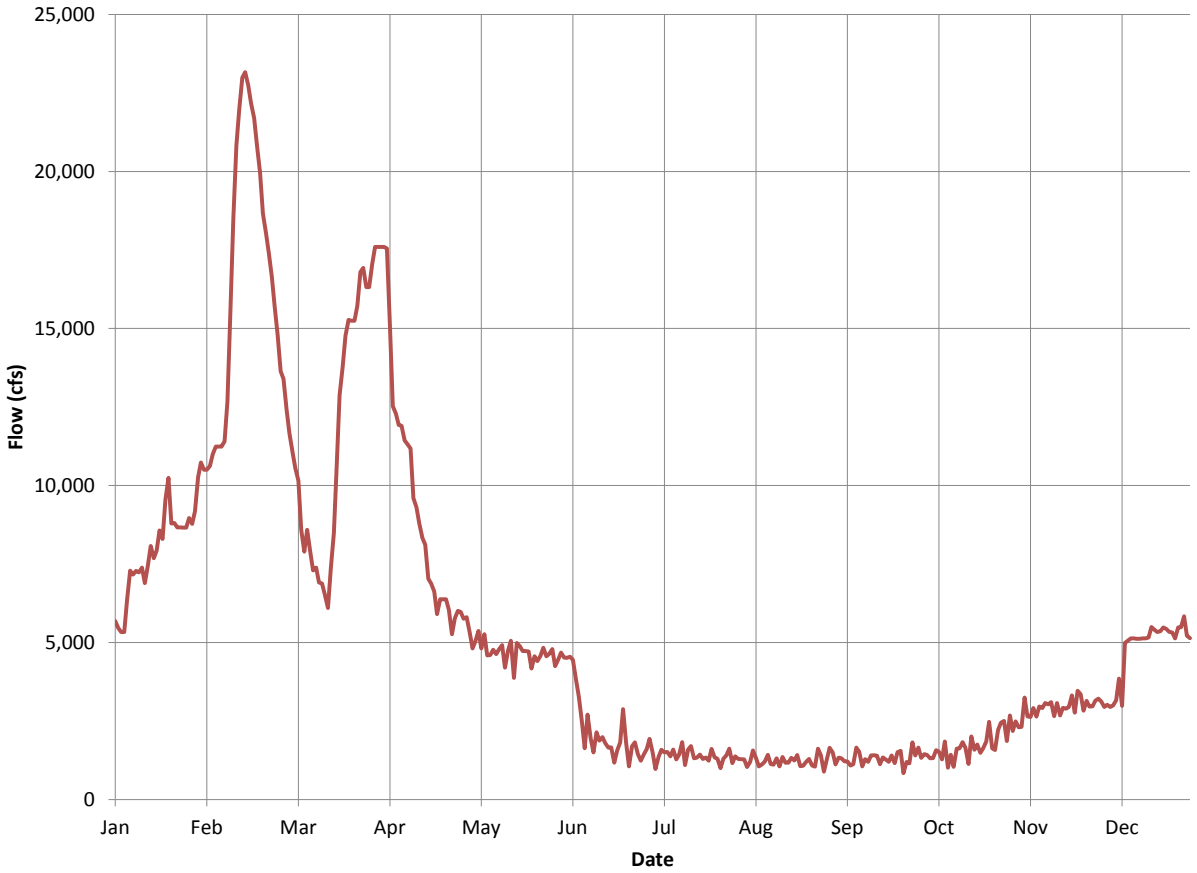

Figure 4. Total Outflow from Lake Spokane, 2015
(Outflows as reported at Long Lake Dam at midnight daily)

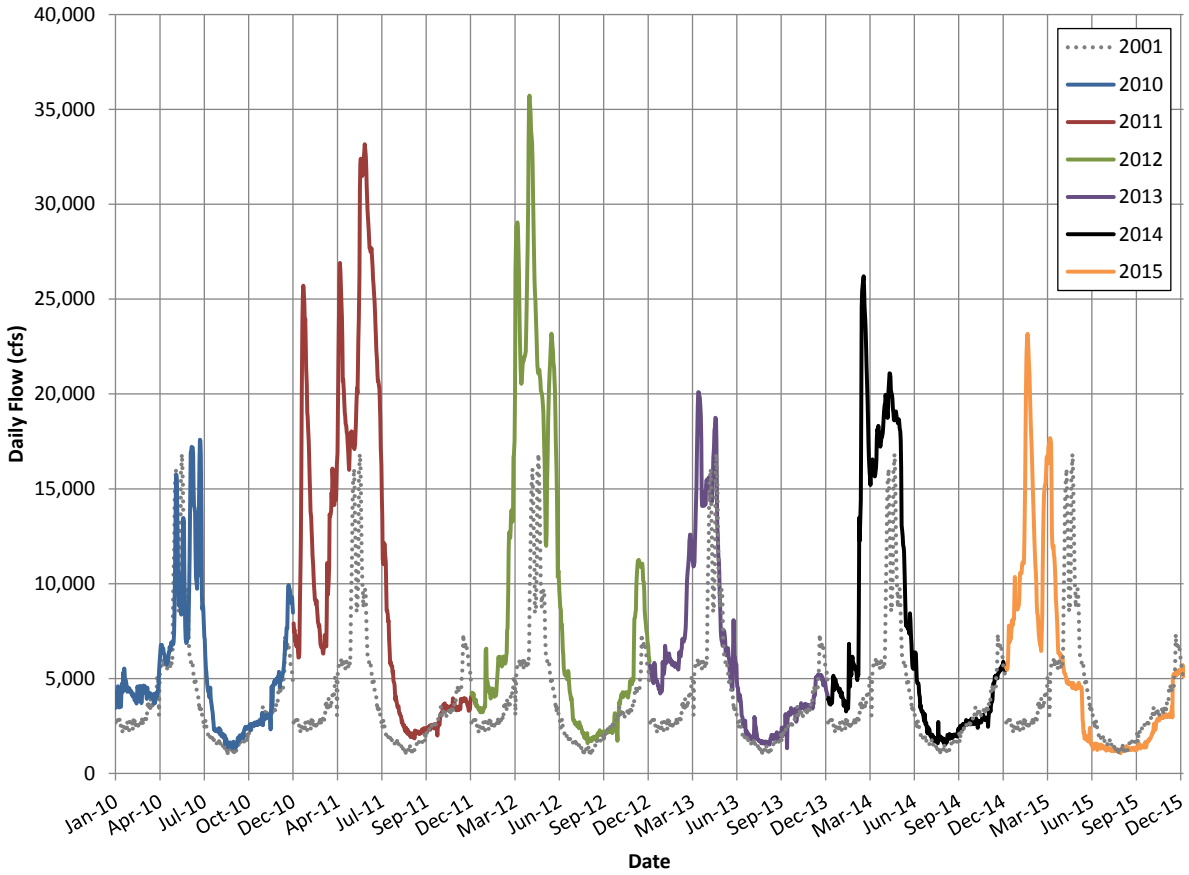

Figure 5. Total Inflows into Lake Spokane 2010-2015
(Inflows calculated based on midnight to midnight lake elevation and day average outflow at midnight as recorded at Long Lake Dam)

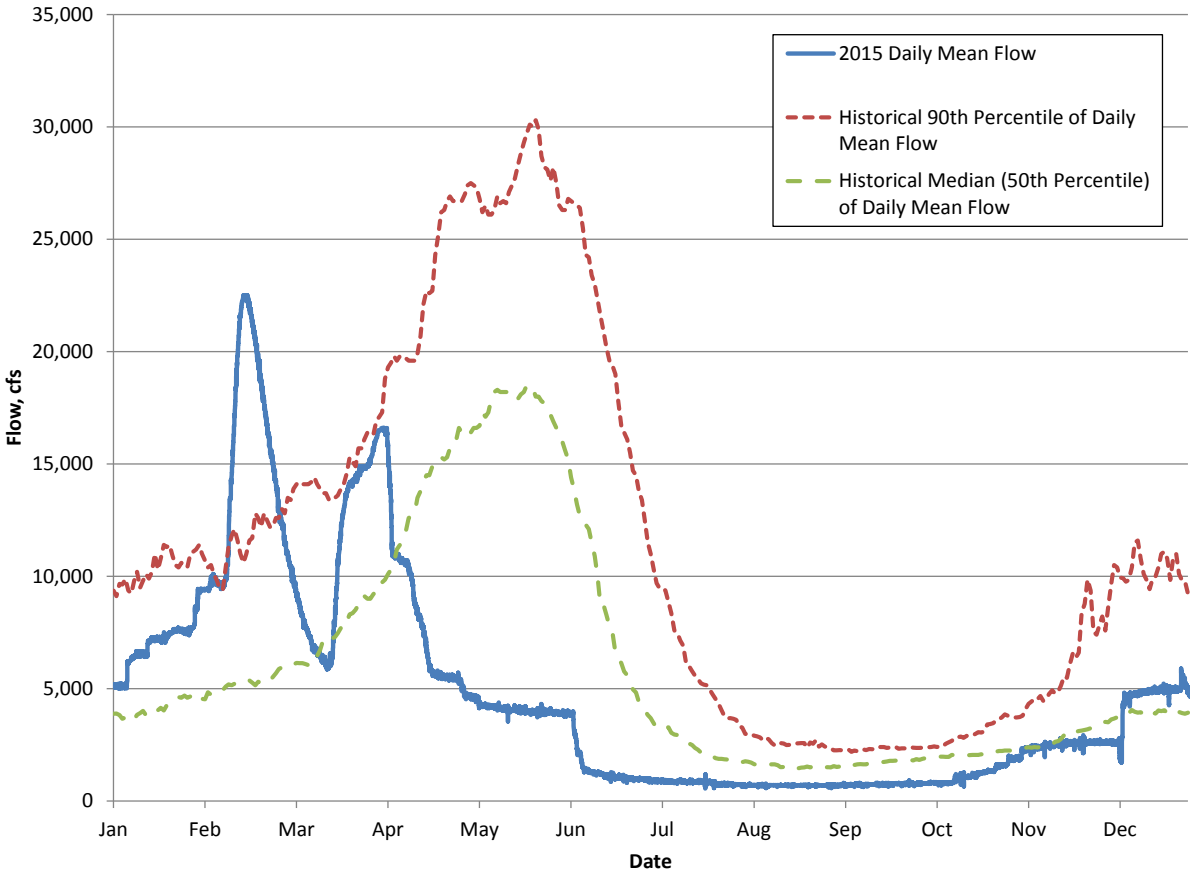

Figure 6. Spokane River at Spokane (USGS Gage # 12422500) Daily mean flow, 2015 compared to Historical Daily Mean Flow

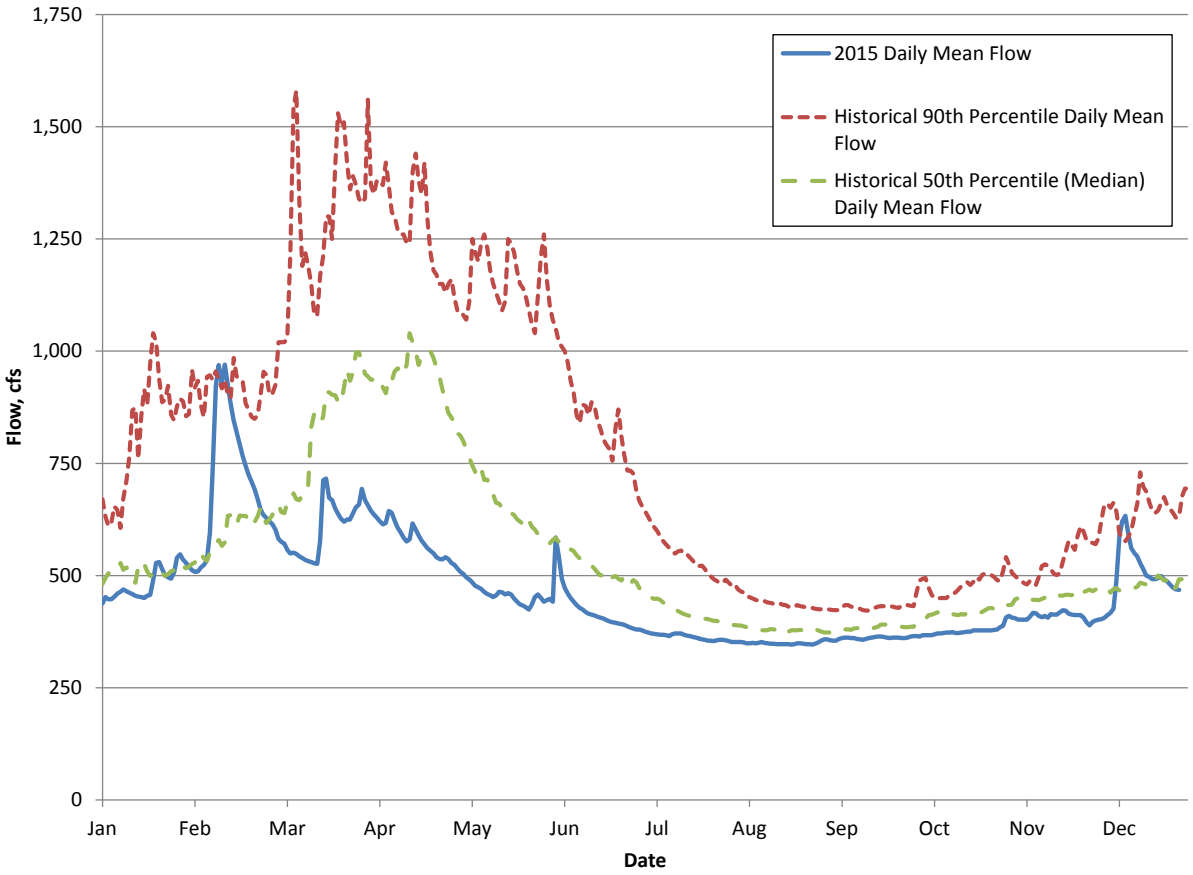

Figure 7. Little Spokane River near Dartford (USGS Gage # 12431500) Daily mean flow, 2015 compared to Historical Daily Mean Flow (Data is through December 28th, 2015)

Table 4. Inflows and water residence times in Lake Spokane during 2010-2015. Residence times are for June through October.

Year	Total Annual Flow Volume (cf x10^6)	Annual Mean Daily Flow (cfs)	Mean Daily Summer (June-October) Flow (cfs)	Residence Time[1] Whole Lake (days)	Residence Time[1] Transition/Riverine Zones (days)
2010	167,113	5,299	4,671	23.9	4.5
2011	337,576	10,704	7,828	14.4	2.7
2012	293,971	9,296	5,768	19.4	3.6
2013	189,846	6,020	3,035	36.8	6.9
2014	234,999	7,452	3,581	31.3	5.9
2015	171,137	5,427	1,595	70.1	13.2

[1]residence time = lake volume/outflow

Table 5. Daily flows and water residence times in Lake Spokane during 2010-2015, using DO TDML seasonal timeframes.

Year	Mean Daily Summer Flow (cfs)				Residence Time[1] Whole Lake (days)				Residence Time[1] Transition/Riverine Zones (days)			
	May	June	July – Sept.	Oct.	May	June	July – Sept.	Oct.	May	June	July– Sept.	Oct.
2010	10,036	13,297	2,550	2,620	11.2	8.4	43.8	42.7	2.1	1.6	8.2	8.0
2011	25,596	24,323	4,232	2,538	4.3	4.6	26.5	44.1	0.8	0.9	5.0	8.3
2012	23,667	17,333	3,092	2,520	4.8	6.5	36.1	44.4	0.9	1.2	6.8	8.3
2013	9,037	5,956	2,133	2,884	8.5	18.7	52.5	38.8	1.6	3.5	9.8	7.3
2014	19,127	8,243	2,373	2,657	5.9	13.6	47.2	41.9	1.1	2.6	8.9	7.9
2015	4,724	2,360	1,317	1,678	23.8	47.5	84.8	66.6	4.5	8.9	15.9	12.5

[1]residence time = lake volume/outflow

3.2 Water Quality Conditions

3.2.1 TEMPERATURE

The maximum temperature at the surface in 2015 reached 26°C in the upper reservoir and 25°C in the lacustrine zone during early July (Figures 8 through 13); similar maximums (25°C) also occurred in 2014 but in August. Surface water was slightly cooler in August 2015 when maximum temperature was only 23°C in both the upper reservoir and lacustrine zone. Temperature was usually at or below 20°C at depths greater than 10 m in the lacustrine zone during 2015, as was the case in 2013 and 2014.

Thermal stratification was evident the first sampling event in May at stations LL0, LL1, LL2, and LL3. Surface temperatures were slightly higher (+0.3°C) than the rest of the water column at LL4 and LL5 in May, however, stratification had not developed. Temperatures near the bottom in the lacustrine zone were slightly cooler than in 2014 (9.5 vs. 10.5°C). Lacustrine temperatures at the surface in May averaged about 2°C higher in 2015 than in 2014, due to an unseasonably warm spring. At station LL0 surface temperature in May was slightly more than 3°C warmer in 2015 than 2014.

Stratification had developed at all stations by the first sampling event in June. The water column at LL4 remained stratified through the monitoring period. Stratification at station LL5 was present from the first sampling event in June through the beginning of September, which is unusual for this location. In 2014, the water column at LL5 was stratified only during the month of August and in 2013 stratification was sporadic and brief (end of July, end of August, and beginning of September). The unusually high air temperature in 2015 had a marked effect on water column temperature and density stratification.

Depth of mixing, which defines the epilimnion, varied through the summer, being around 4 to 6 m at the three most down-reservoir stations during most of the summer, but deepened to around 9 m in September. This deepening was most likely related to surface water cooling at these three stations that reduced energy needed to mix the water column by wind. A similar pattern of shallow mixing occurred at station LL3. Mixing depths at LL4 were more consistent over the summer at 3 to 4 m, but did not deepen in September when surface water cooled. Mixing depths at LL5 were very shallow over the summer at 1 to 2 m with complete mixing occurring during late September. Stratification was more pronounced (temperature gradient) and persisted longer at LL4 and LL5 in 2015 than during the other five years monitored.

The extent of the metalimnion and depth of the hypolimnion varied throughout the summer, which is typical in reservoirs that are strongly affected by river inflow and plunging interflows. The metalimnion is the layer with greatest temperature change with depth – typically 5 to 10 meters in Lake Spokane. Depth of the hypolimnion can be taken from roughly the inflection point, where rate of temperature change with depth begins to slow, - about 10 m during the summer months, to the bottom (Figures 8 through 10). For most dates the hypolimnion depth began at about 10 m, becoming shallower in June and deepening later in the summer as the thermocline erodes. That variation is due to the river inflow plunging to different depths consistent with inflow density

(temperature and conductivity). Conductivity profiles show the pattern of plunging inflows, which cause much of the temperature variation in the reservoir.

The water column at all stations, except LL5, during the October sampling event were still stratified. The deepening of the epilimnion at these stations in October indicates that the turnover process had begun. This pattern was similar to that observed in 2014, although the period of stratification was longer in 2015.

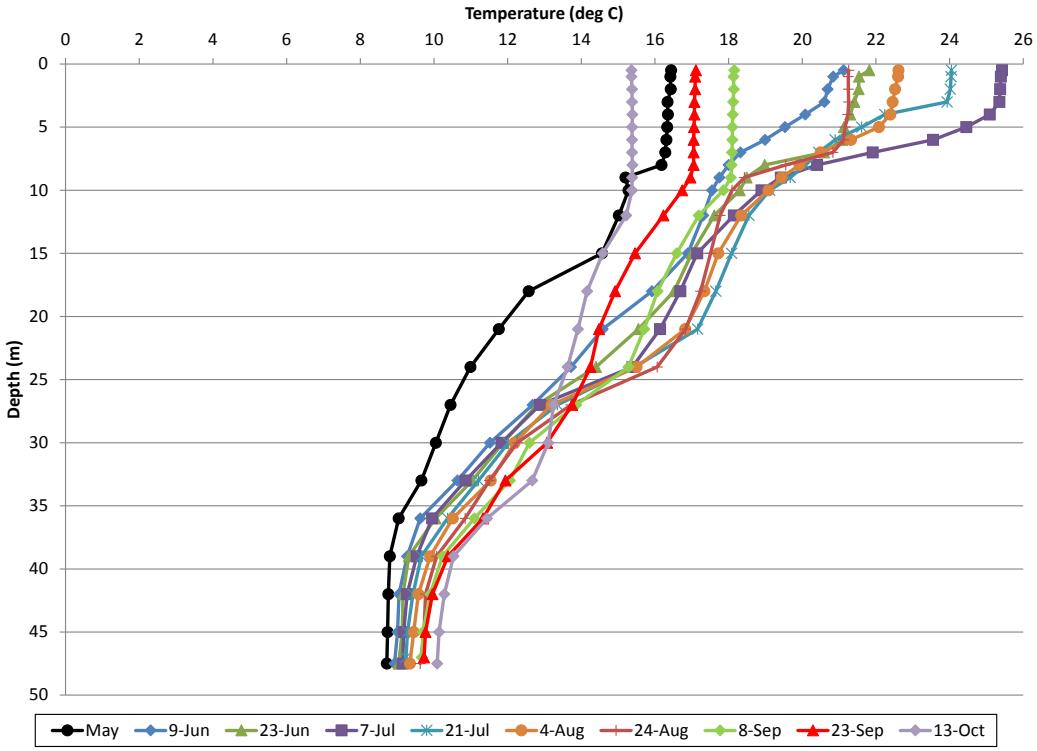

Figure 8. Temperature Profiles for Station LL0, May-October 2015

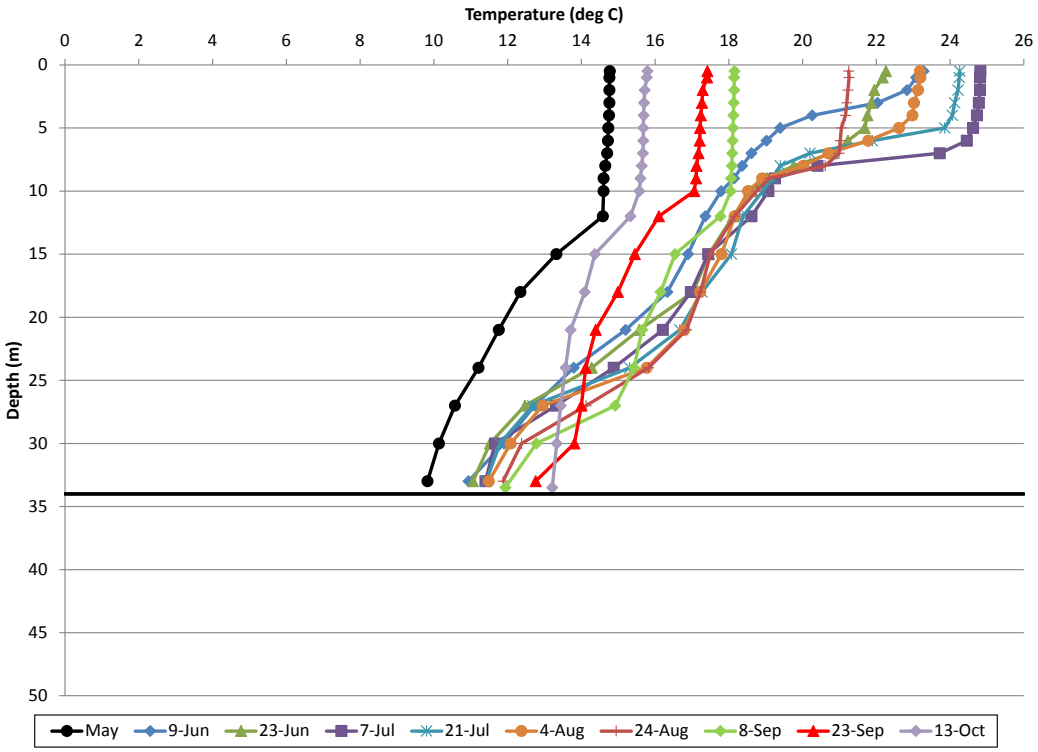

Figure 9. Temperature Profiles for Station LL1, May-October 2015

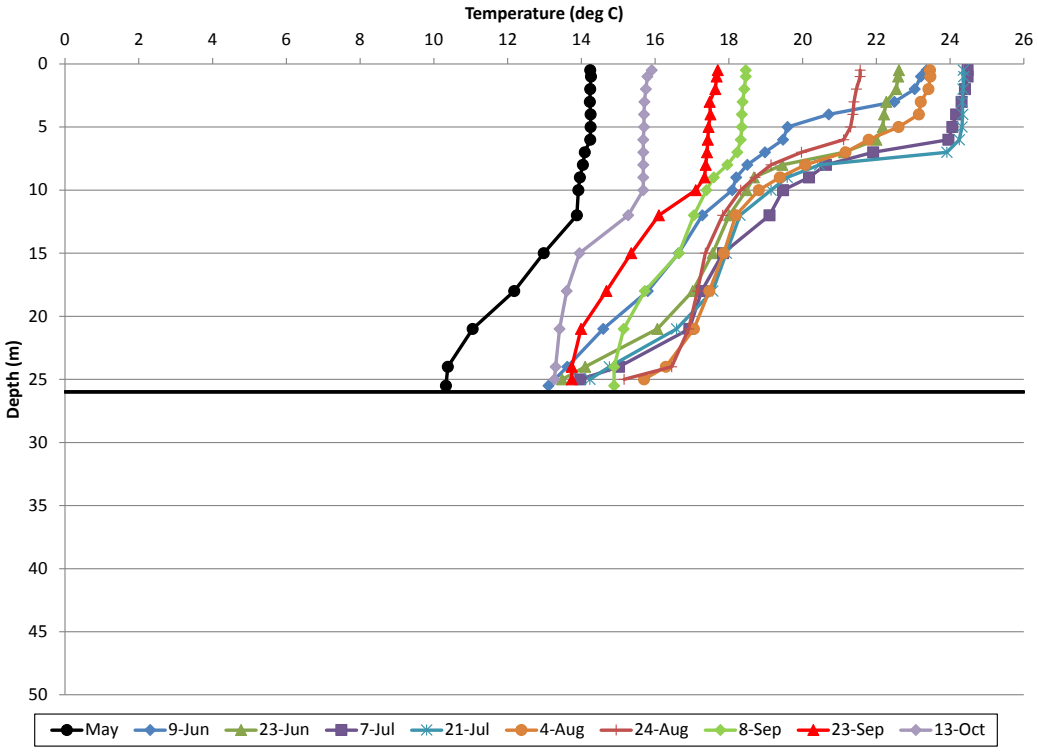

Figure 10. Temperature Profiles for Station LL2, May-October 2015

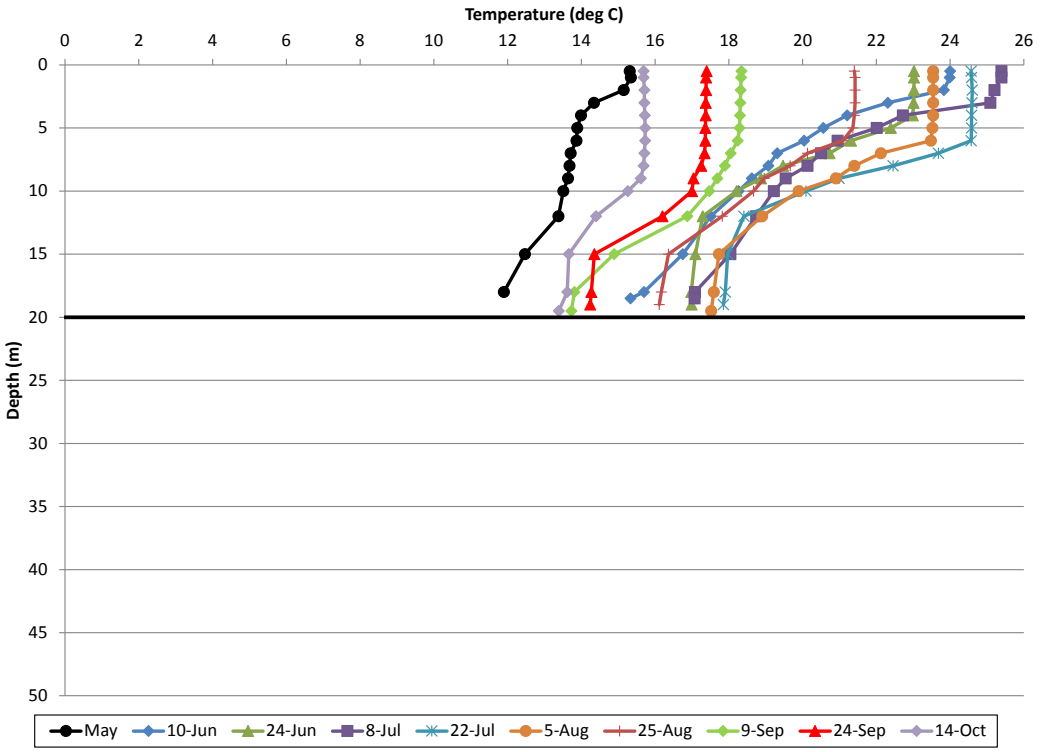

Figure 11. Temperature Profiles for Station LL3, May-October 2015

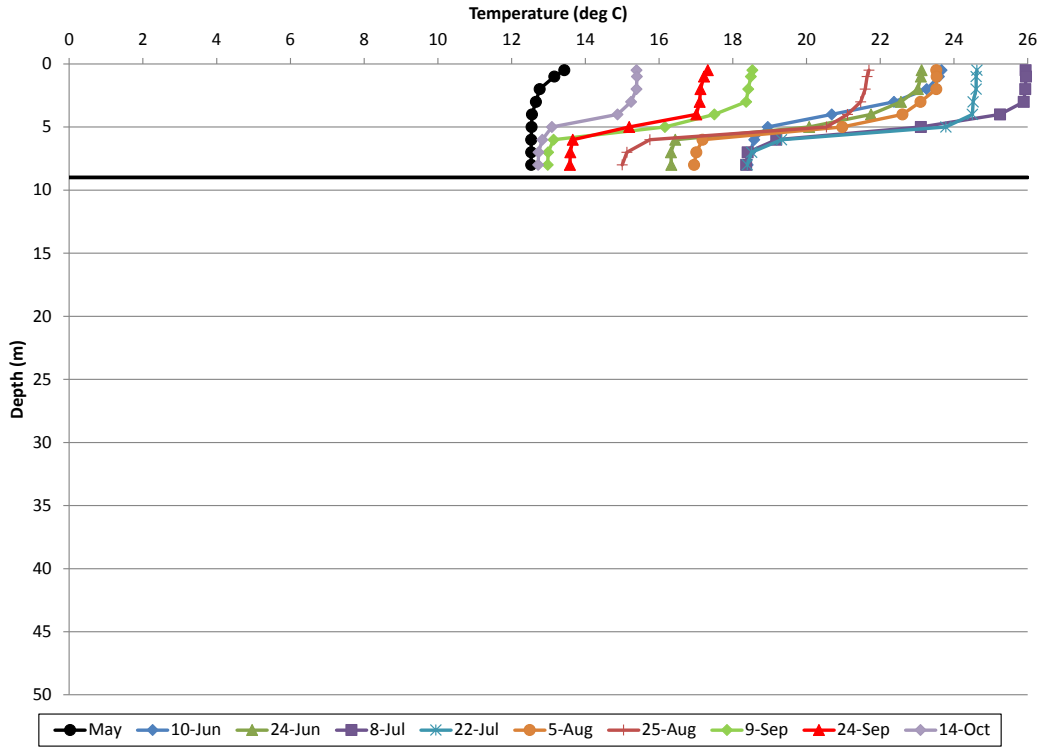

Figure 12. Temperature Profiles for Station LL4, May-October 2015

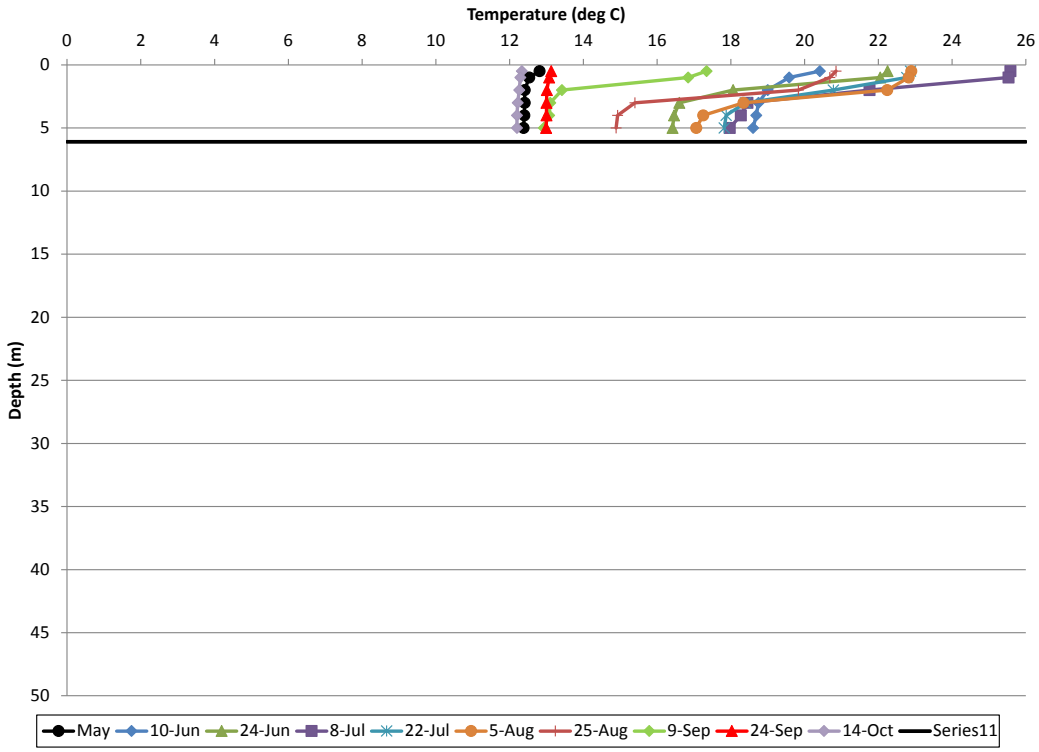

Figure 13. Temperature Profiles for Station LL5, May-October 2015

3.2.2 CONDUCTIVITY

Conductivity ranged from about 106 to 290 micro Siemens/cm (µS/cm) throughout the reservoir (Figures 14 to 19). Conductivity is a conservative constituent, because it largely represents the major ions (Ca, Mg, etc.) that are usually not influenced by gains and losses due to physical (sedimentation) or biological processes. It also represents the contribution of dissolved solids to density. Conductivity throughout the reservoir in 2015 was higher than in 2014 when it ranged from 69 to 270 µS/cm. This is due to a concentration effect of the lower river flows in 2015. During May and early June, when river flows are normally relatively high, conductivity is low due to dilution with inflow of low conductivity. In 2015, May and June conductivities were mostly uniform throughout the water column at the deeper stations and were lower than during the rest of the summer, but much higher than in May and June in 2014. As river flow continued to decrease, inflow conductivity increased to 273 µS/cm on July 22 at LL5 and peaked at 289 µS/cm on September 24 (Figure 19). Water with increased conductivity, starting in June at around 150 µS/cm, reaching a maximum of 280 µS/cm, comprised the interflow zone that extended from about 5 to 18 m at stations LL3 to LL0 in June and expanded to 36 m at LL0 in October as higher conductivity water plunged and moved through the reservoir at those depth intervals.

The high conductivity water (250-280 µS/cm) in late September and October moved along the reservoir bottom from LL5 to LL2, where depths were greater than or equal to 25 meters and entered the deeper reservoir portion between 10 and 25 m. Below 30 m, conductivity was usually

less than 150 µS/cm. This pattern results in much of the metalimnion in the lower reservoir being composed of interflow. Conductivity in bottom waters at LL0 below 35 m had increased only slightly (106 to 124 µS/cm) from May until October. River inflows in 2015 were still too low in September and October to mix higher conductivity water to the deepest portions of the reservoir and raise conductivity, as was the case in the past years of monitoring.

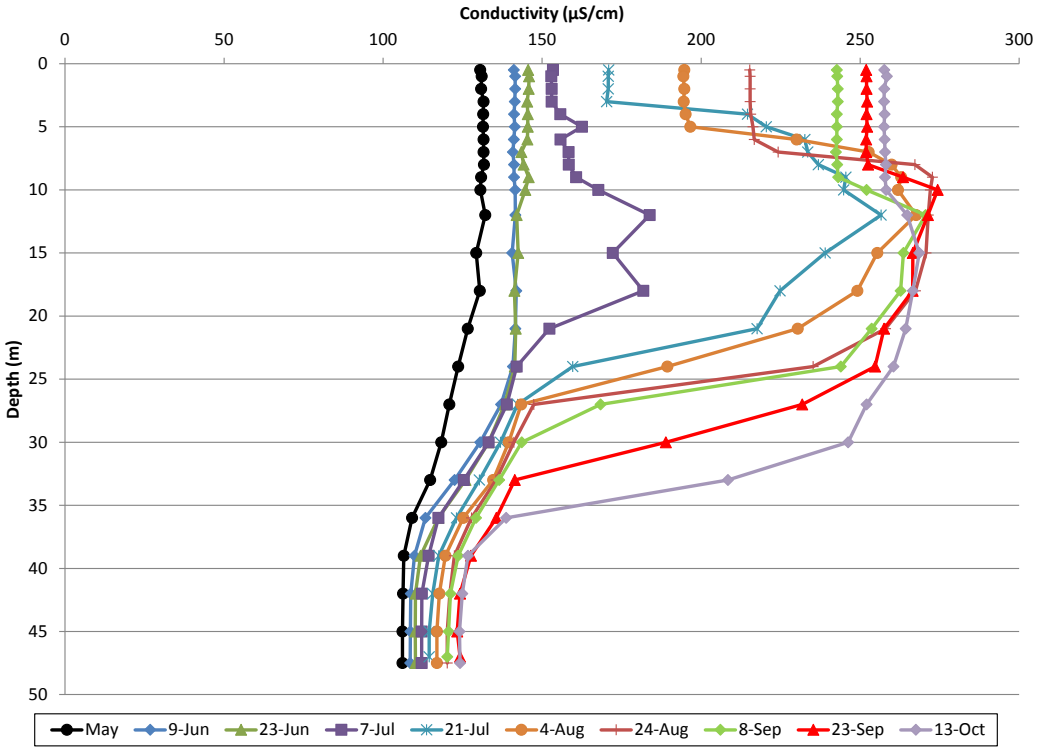

Figure 14. Conductivity Profiles for Station LL0, May-October 2015

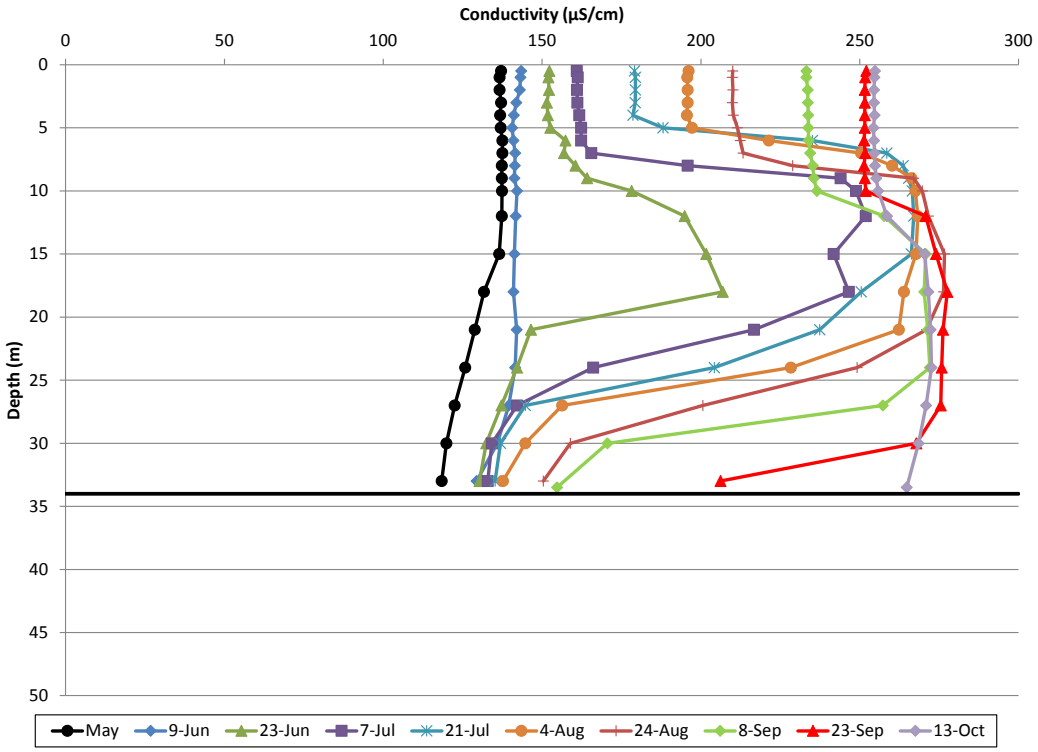

Figure 15. Conductivity Profiles for Station LL1, May-October 2015

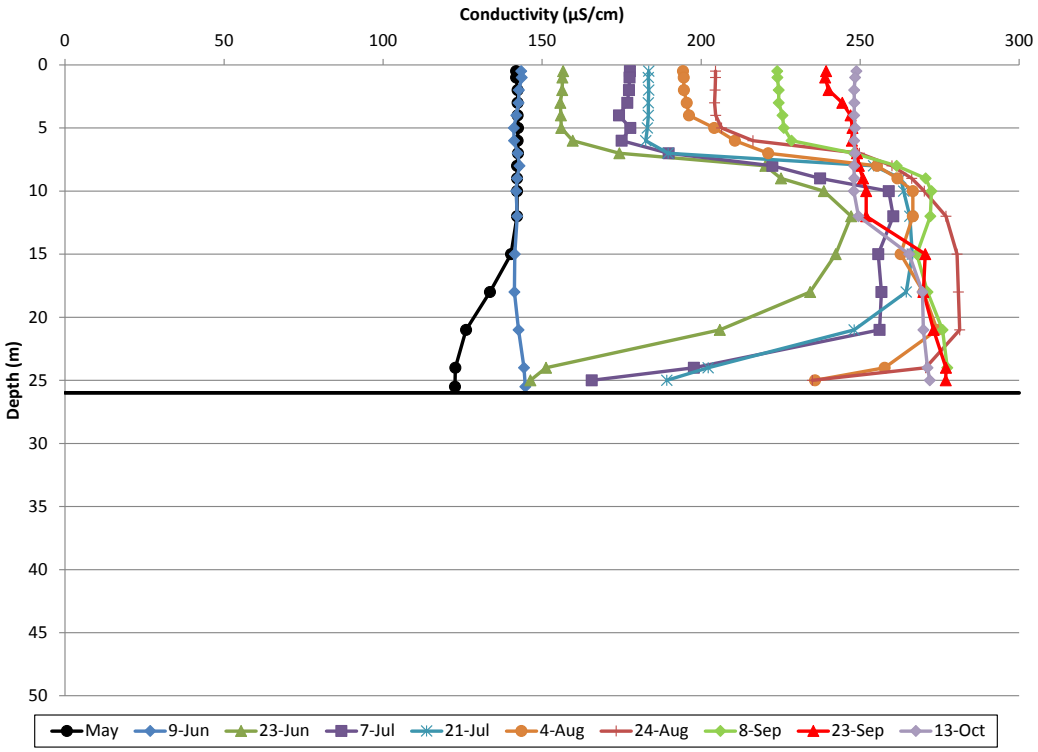

Figure 16. Conductivity Profiles at Station LL2, May-October 2015

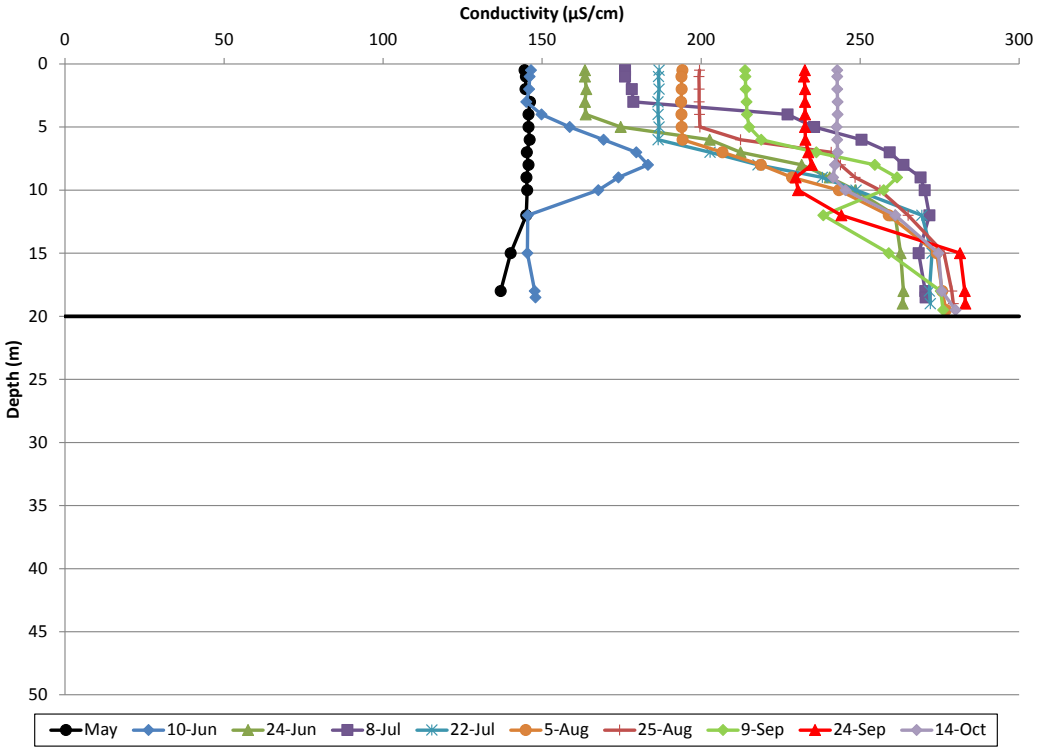

Figure 17. Conductivity Profiles at Station LL3, May-October 2015

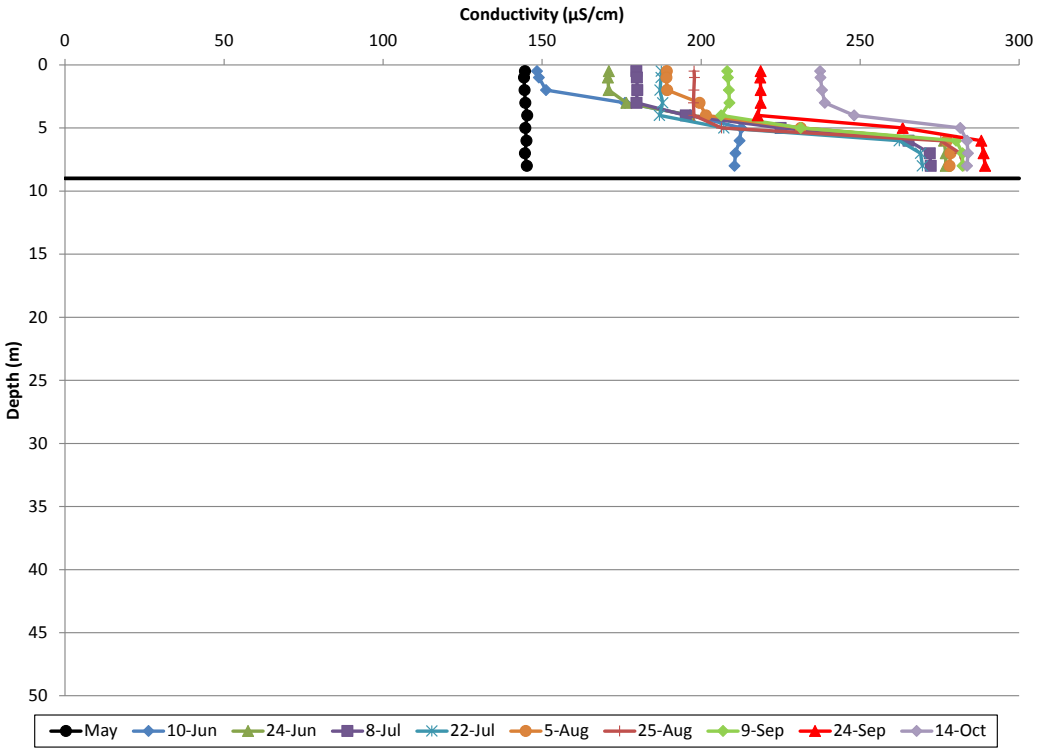

Figure 18. Conductivity Profiles at Station LL4, May-October 2015

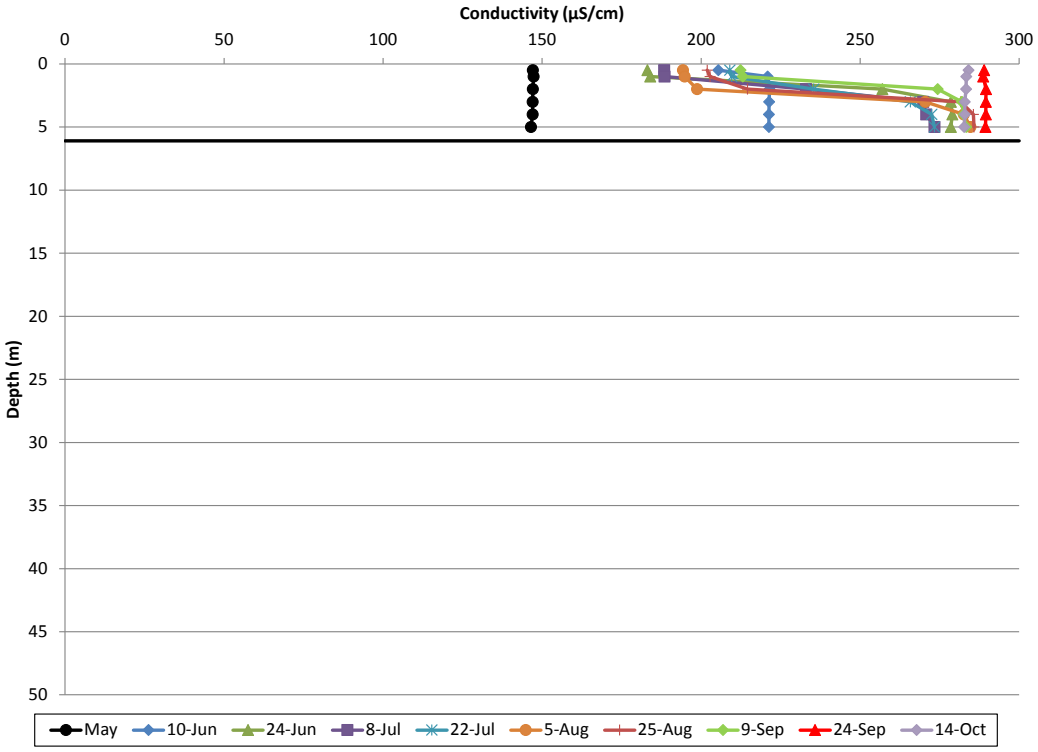

Figure 19. Conductivity Profiles at Station LL5, May-October 2015

3.2.3 DISSOLVED OXYGEN

Maximum epilimnetic DO concentrations ranged from 11.4 to 14.5 mg/L at the six stations, with higher values occurring in the lacustrine zone (Figures 20 to 25). Maximum epilimnetic DO concentrations ranged from 10.7 to 14.5 mg/L in 2010, 11.9 to 12.4 mg/L in 2011, 11.4 to 12.5 mg/L in 2012, 11.6 to 13.4 mg/L in 2013, and 12.0 to 14.1 mg/L in 2014. Concentrations were especially high between 4 and 7 m in July at station LL0, likely due to photosynthetic activity (Figure 20). High concentrations at LL0 similarly occurred in July in 2013 and August in 2014.

During the 2015 monitoring period, minimum DO concentrations (0.0 mg/L) occurred near the bottom at the three deepest stations LL0, LL1, and LL2 (Figures 20 – 22). Concentrations in the hypolimnion below 25 m declined with time (proportionally at LL0) at these three sites. The hypolimnetic volume at these sites was probably not exchanged appreciably by the interflow (especially at LL0), as evidenced by conductivity profiles (Figures 14 – 16), allowing DO to gradually deplete. Mixing of the bottom waters at stations LL1 and LL2 began in September but at station LL0, mixing of the hypolimnion and disruption of DO profiles, had not yet occurred in October.

Minimum DO concentrations in 2010 – 2014 also occurred at the two deepest stations (LL0 and LL1), but in 2011 minimums were substantially higher (3.2, 6.9 mg/L) at those sites than observed in 2015 (all zero mg/L), in 2014 (all zero mg/L), in 2013 (zero and 0.9 mg/L), in 2012 (1.6, 0.5 mg/L), or in 2010 (0.13, 2.3 mg/L). Minimum DOs in 2013 through 2015 were the lowest observed of the six years. Average water column DO in 2015 ranged from 7.1 to 10.9 mg/L, with the lowest values at the two deepest stations.

The effect of interflow on DO depletion, as indicated by conductivity, was most pronounced during late July, August and September at stations LL0, LL1, and LL2 in the lacustrine zone, and to a limited extent at LL3 in the transition zone. The DO depletion in the interflow zone (approximately 10 – 20 m) in August and September in 2015 was very similar to that in 2014. DO depletion in the metalimnion to levels less than 6 mg/L occurred during August and September in 2014 and 2015, but only during one September event in 2013. This pattern persisted until October at LL0, as was the case in 2013 and 2014, but unlike in 2013 and 2014, DO in the hypolimnion were not higher than in August and September.

The pattern of the plunging interflow affecting DO is further shown in Figure 26 by combining profile data from the low-flow, high inflow conductivity summer period for the lacustrine zone. The marked decline in DO in the metalimnion below about 6 m corresponds with high conductivity water that plunged into the interflow, usually between 6 to 25 m, likely carrying organic matter from the productive transition and riverine zones that provide DO demand. These composite profiles are similar to those in 2014, despite double the water residence time in 2015.

Volume weighting the DO concentrations is a method that provides an average DO concentration throughout the water column. Volume-weighted DO concentrations for each station and sampling date were calculated using DO concentrations from 9 m and deeper and CE-QUAL-W2 model segment volumes below 8.5 m, provided by Avista and Golder Associates (Table 6). The purpose

was to be consistent with the method Ecology used to produce Table 7 in the DO TMDL report. More specifically, the calculation was completed by the following procedure.

> *At each station, for each sampling day, measured DO concentrations from 9 m and deeper were multiplied by their associated volumes of water, summed, and then divided by the total volume of water at each station from 8.5 m and deeper. The volumes of water were obtained from the CE-QUAL-W2 model segment volumes identified in the DO TMDL.*

The lacustrine zone average DO includes concentrations from LL0, LL1, and LL2 but not the very small portion of the hypolimnion at station LL3.

Table 6. Volume-Weighted hypolimnetic DO concentrations in Lake Spokane, during May-October 2015, using DO concentrations determined from 9 meters and deeper

Station	Volume-Weighted DO (mg/L)									
	May 13-14	June 9-10	June 23-24	July 7-8	July 21-22	August 4-5	August 23-24	September 8-9	September 23-24	October 13-14
LL0	10.6	7.9	6.9	6.2	5.7	4.7	3.8	3.4	3.5	5.1
LL1	10.3	7.6	6.6	6.2	5.3	4.7	4.7	6.4	7.1	7.7
LL2	9.9	7.6	8.1	7.3	5.8	7.7	6.9	6.9	8.4	8.8
LL3	9.4	7.1	9.7	7.1	9.2	10.0	8.9	8.1	9.7	9.9
LL4	--									
LL5	--									
Lacustrine Zone only Average (LL0, LL1, LL2)	10.3	7.7	7.2	6.6	5.6	5.7	5.1	5.6	6.3	7.2

Using the same procedure, the volume-weighted DO concentrations for the hypolimnion from 15 m and deeper were also calculated using the model segment volumes (Table 7). The lowest volume-weighted hypolimnetic DO (2.6 mg/L) observed below 15 m in 2015 was during the September 8-9 sampling event at station LL0 (Table 7), which was 0.7 mg/L lower than in 2014, and approximately 1.3 mg/L lower than in 2013 at that site. The minimum average volume-weighted hypolimnetic DO in the lacustrine zone was 4.5 mg/L during late July and late August and was substantially lower than in 2014 (6.0 mg/L) and 2013 (5.8 mg/L). Water residence times in 2013 and 2014 were about half that in 2015. However, timing of the minimum average hypolimnetic DO in 2015 was similar to that in 2014 (late July/early August) and in 2013 (late August).

While DO conditions have improved in Lake Spokane since 1977, when 85% of point-source effluent phosphorus was removed from the river, data collected in 2015 indicate DO levels were

slightly lower than in 2013 and 2014 and still do not meet the surface water quality standard in the hypolimnion during portions of the summer critical season.

Table 7. Volume-Weighted Hypolimnetic DO concentrations in Lake Spokane, during May-October 2015, using DO concentrations determined from 15 meters and deeper

Station	Volume-weighted DO (mg/L)									
	May 13-14	June 9-10	June 23-24	July 7-8	July 21-22	August 4-5	August 23-24	September 8-9	September 23-24	October 13-14
LL0	10.1	7.8	6.6	5.5	5.0	4.2	3.4	2.6	3.1	4.2
LL1	9.7	7.1	5.7	4.8	4.1	3.7	3.7	5.6	6.8	7.2
LL2	9.3	6.8	6.7	6.0	4.2	7.9	6.6	8.1	8.5	8.5
LL3	8.7	5.6	9.6	5.4	8.8	10.3	9.2	9.1	9.6	9.8
LL4	--	--	--	--	--	--	--	--	--	--
LL5	--	--	--	--	--	--	--	--	--	--
Lacustrine Zone only Average (LL0, LL1, LL2)	9.7	7.2	6.3	5.4	4.5	5.3	4.5	5.4	6.2	6.6
Whole Hypolimnetic Average (LL0, LL1, LL2, LL3)	9.4	6.8	7.1	5.4	5.5	6.5	5.7	6.3	7.0	7.4

Average lacustrine, volume-weighted DOs were somewhat similar from 9 m and deeper and from 15 m and deeper, usually differing by only 0.5 mg/L on any one date, and the average difference was essentially zero (Tables 6 and 7). In late June and July, average DOs were slightly higher using concentrations from 9 m and deeper; this was a similar pattern as was observed in 2014. Average lacustrine, volume-weighted DOs from 9 m and deeper in 2015 averaged 1.4 mg/L less than those in 2014. The largest difference in DOs between 2014 and 2015 was during the early spring-summer period (May through July) when average volume-weighted DOs in 2015 ranged from 1.1 to 2.5 mg/L less than those observed in 2014. This was also the case for average lacustrine, volume-weighted DOs from 15 m and deeper, that averaged (volume-weighted) 1.9 mg/L less in 2015 than those observed in 2014 with the largest differences occurring in May through July.

The rationale for including depths between 9 and 15 m for the TMDL was to apparently include DOs in the metalimnion that are lower at times than in the hypolimnion, due to the influence of the interflow zone.

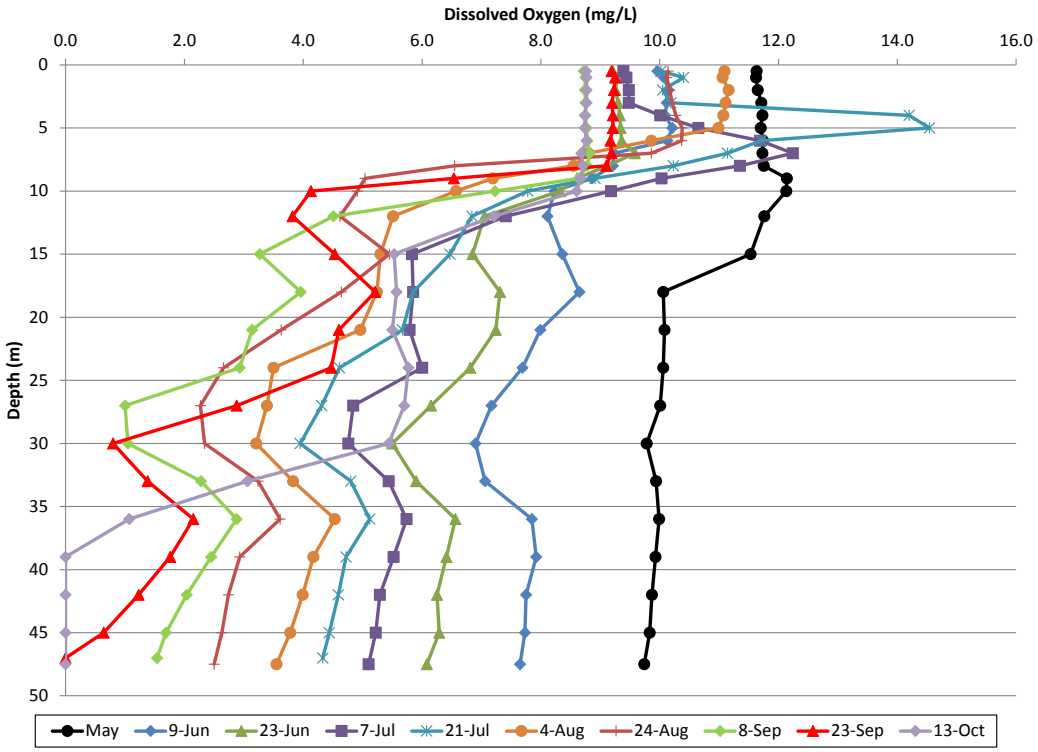

Figure 20. DO Profiles for Station LL0, May-October 2015

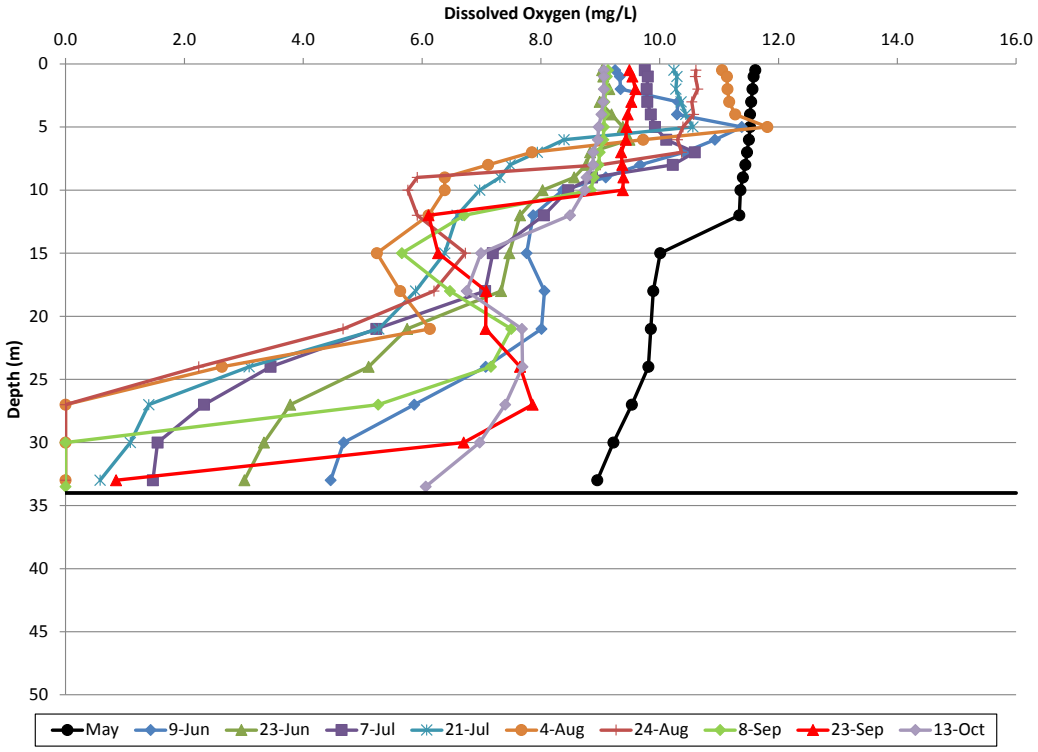

Figure 21. DO Profiles for Station LL1, May-October 2015

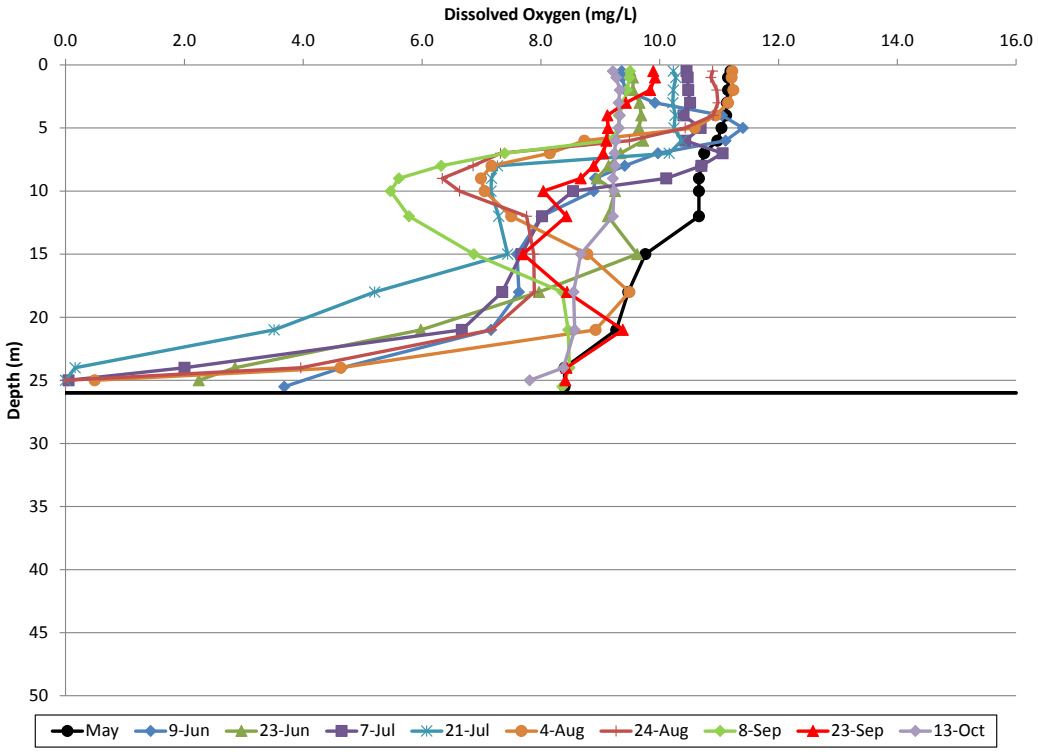

Figure 22. DO Profiles at Station LL2, May-October 2015

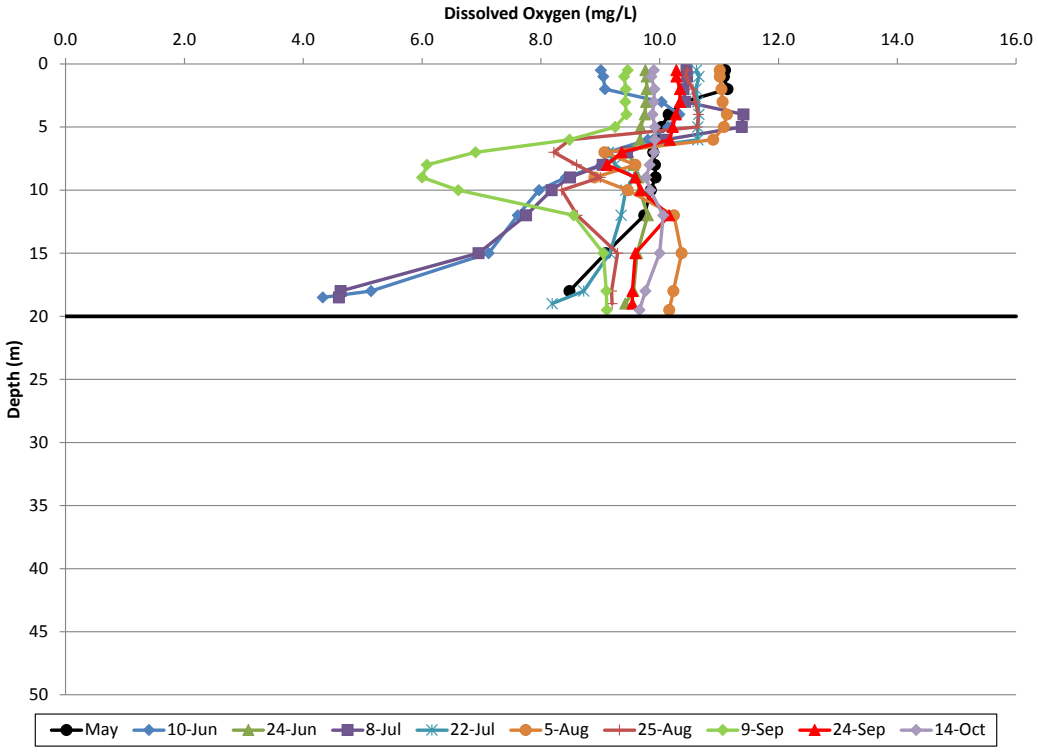

Figure 23. DO Profiles at Station LL3, May-October 2015

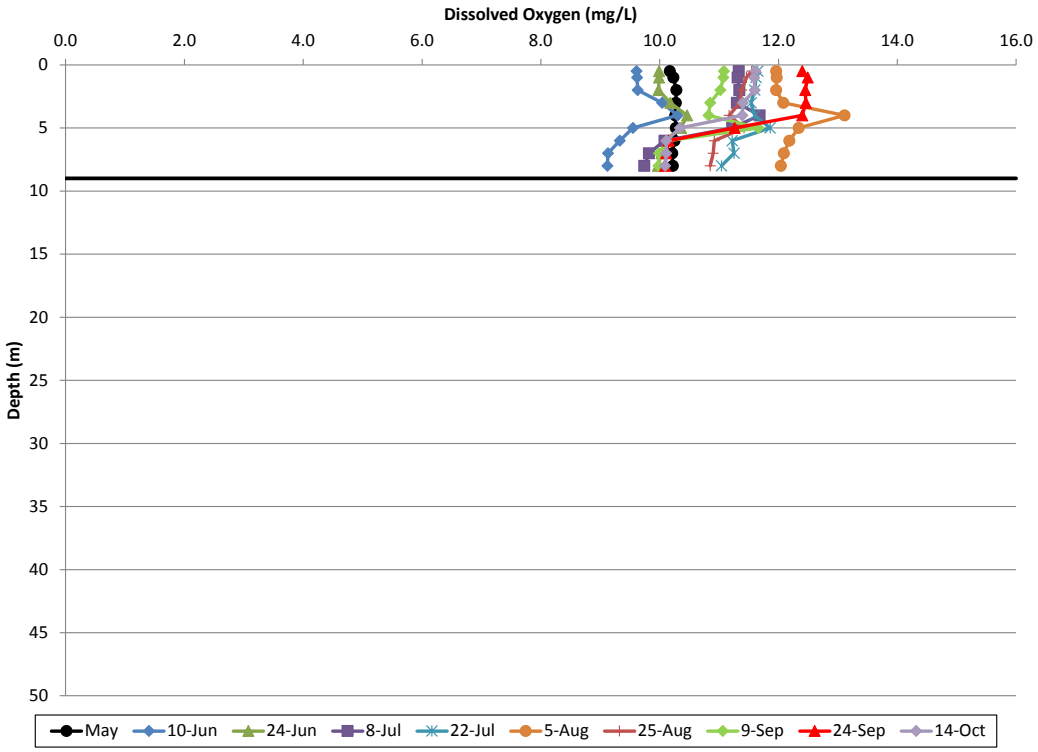

Figure 24. DO Profiles at Station LL4, May-October 2015

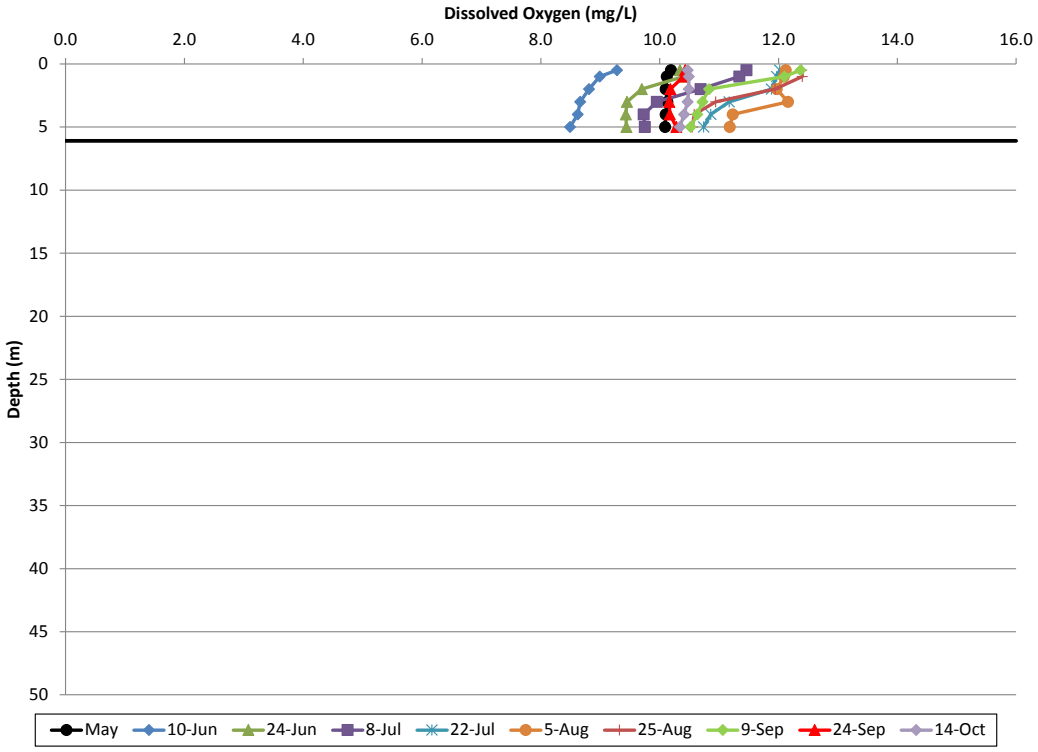

Figure 25. DO Profiles at Station LL5, May-October 2015

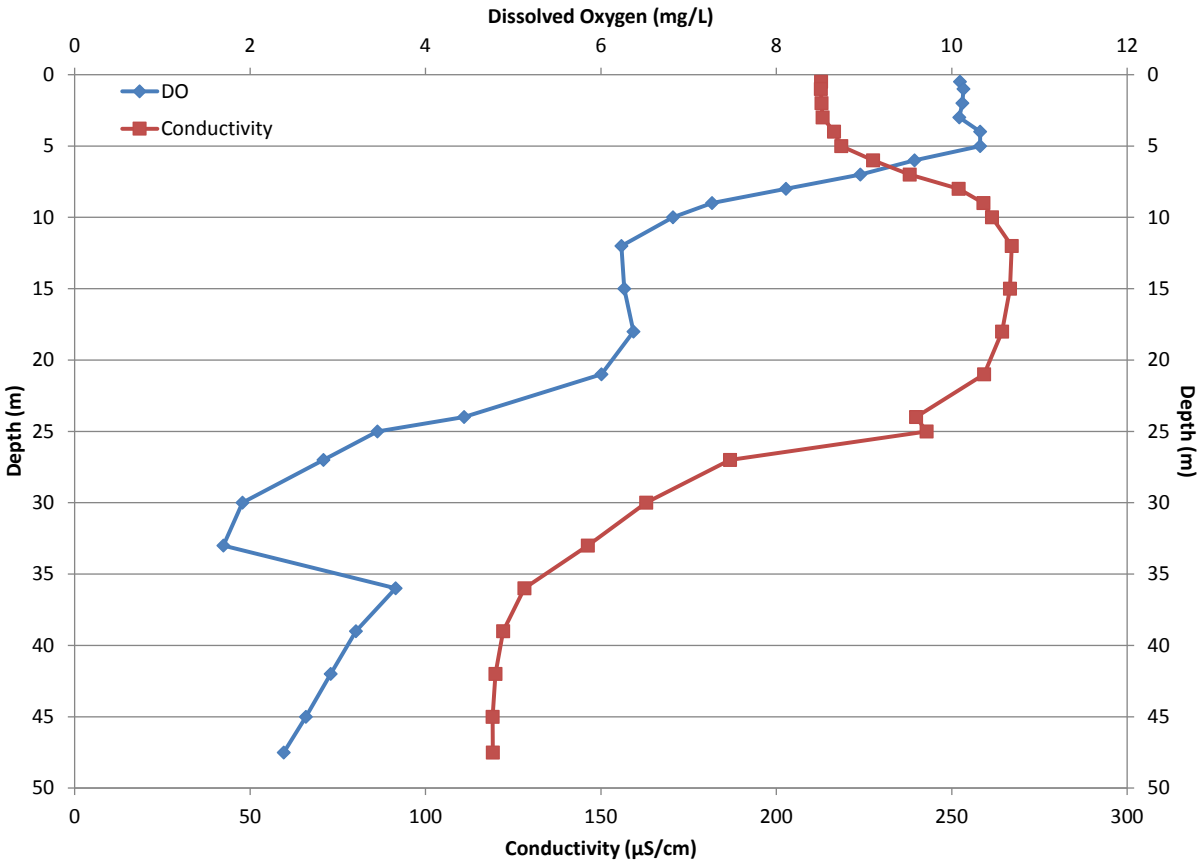

Figure 26. Average DO and Conductivity Profiles for Stations LL0, LL1, and LL2 from July 21st through September 24th, 2015.

3.2.4 pH

The water column profiles for pH showed a range of 6.8 to 9.3 at the six stations during 2015 (Figures 27 through 32). Water column averages were narrower, ranging one pH unit, 7.6 to 8.6. The highest pH values occurred in the epilimnion during late July and August at the deeper stations and during July through September at stations LL4 and LL5. The highest pH values were in the epilimnion and likely due to photosynthetic activity of phytoplankton. Intense phytoplankton photosynthesis can raise pH to levels above 10, although that has not occurred in Lake Spokane during the past five years. Values of pH above the water quality criteria of 8.5 usually occurred within the top 10 m at all stations, and throughout the water column on occasion (mostly July and August) at stations LL4 and LL5.

Residence time was exceptionally long in 2015, ranging from 2 to nearly 5 times as long as during 2010-2014. That allowed more time for photosynthetic activity, which in turn likely contributed to the elevated pH values, above the 8.5 water quality criteria, during 2015. Similarly, in 2014 maximum pH levels (9.0 to 9.2) occurred in the top 4 to 6 m at all stations, even at station LL5 in the riverine zone during low flow and longer water retention time. This was also the case in 2013

when residence time was slightly longer than in 2014, especially in late summer, allowing more time for photosynthetic activity, with pH reaching 9.1, above the 8.5 water quality criteria. Conditions observed in 2012 indicate a few data points in August at LL5 that were slightly above the water quality criteria, with the highest at 8.6.

Chlorophyll at LL5 in 2015 was elevated (5.9 to 11.7 µg/L) from the beginning of July through early September which corresponded with pH levels greater than 9.0 at the surface. Chlorophyll in 2014 at LL5 peaked on August 21 at 18.2 µg/L and corresponded with the peak in pH of 9.2. This was also the case in 2013 when chl at LL5 peaked on September 10 at 9.6 µg/L and corresponded with the peak in pH.

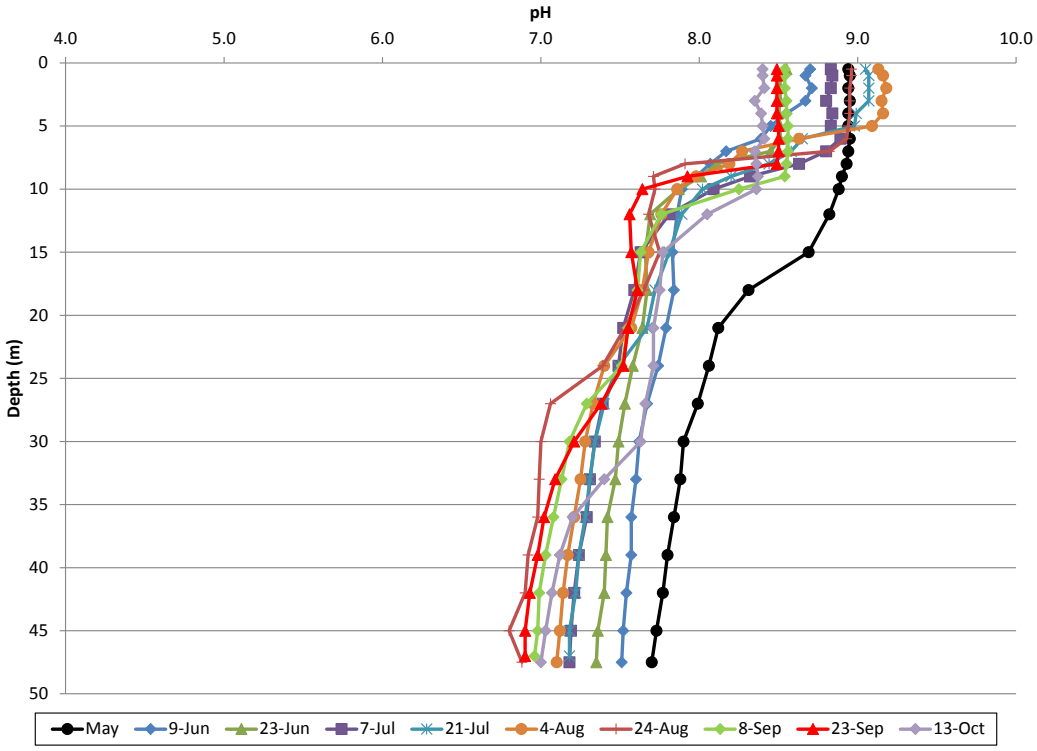

Figure 27. pH Profiles for Station LL0, May-October 2015

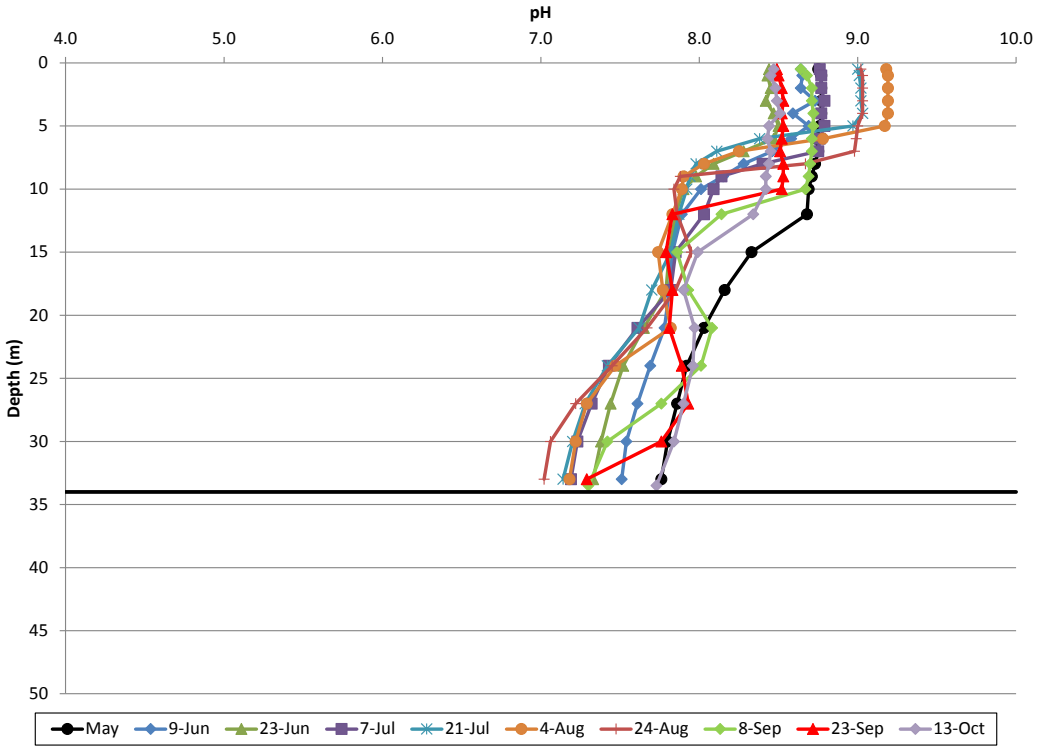

Figure 28. pH Profiles for Station LL1, May-October 2015

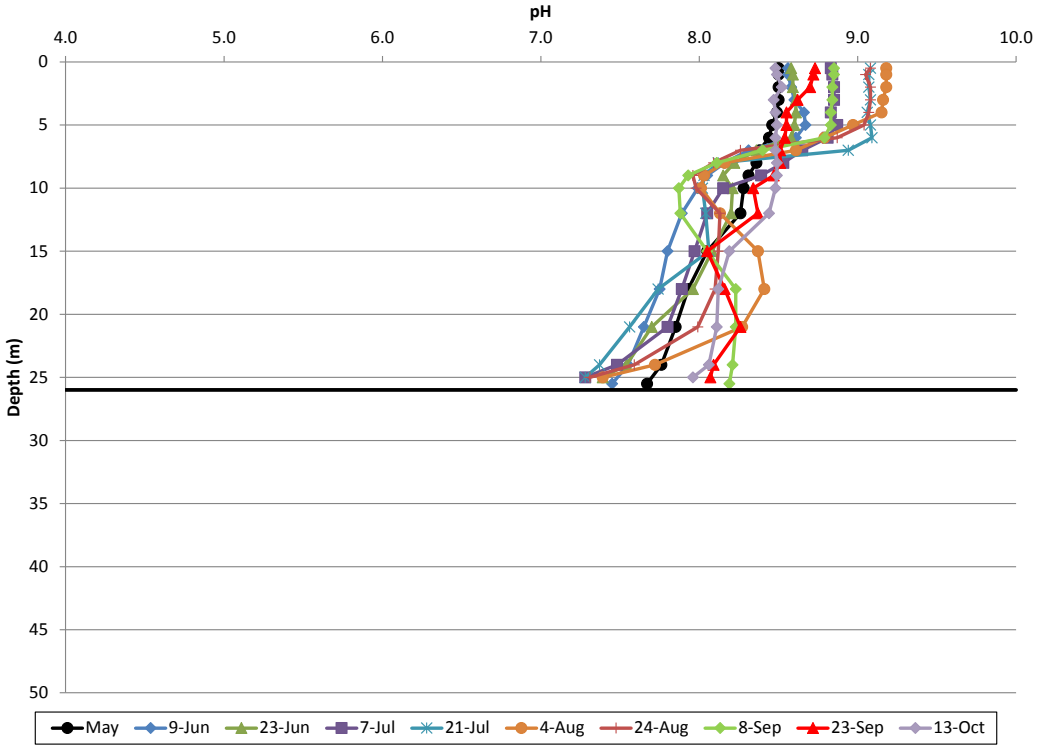

Figure 29. pH Profiles at Station LL2, May-October 2015

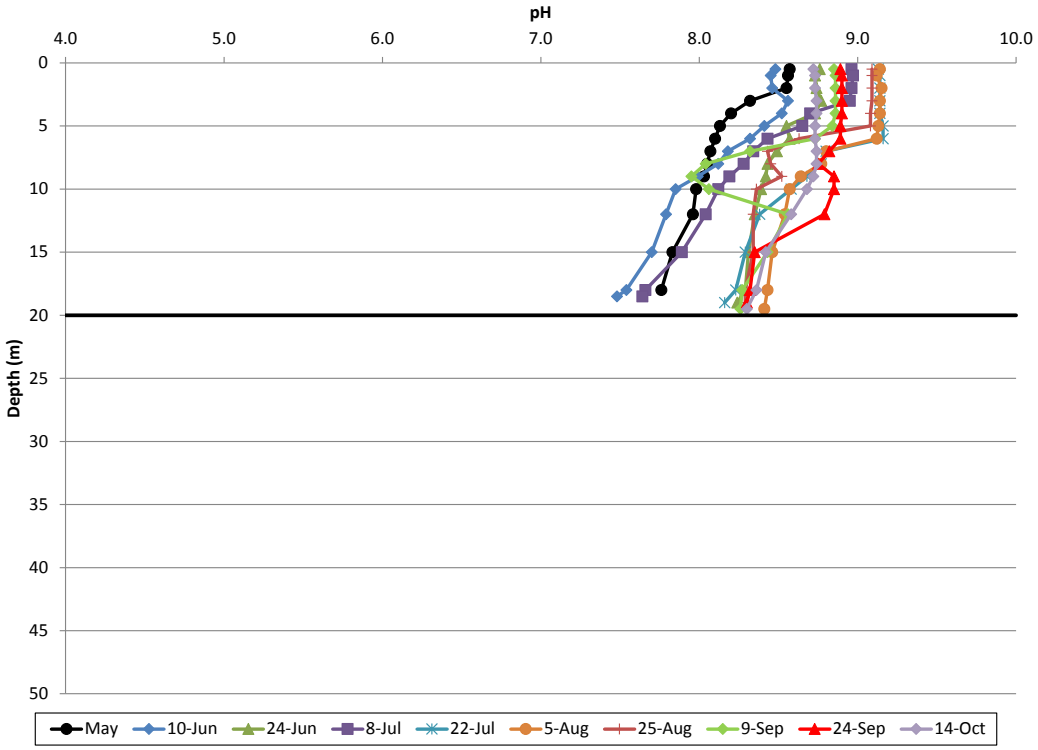

Figure 30. pH Profiles at Station LL3, May-October 2015

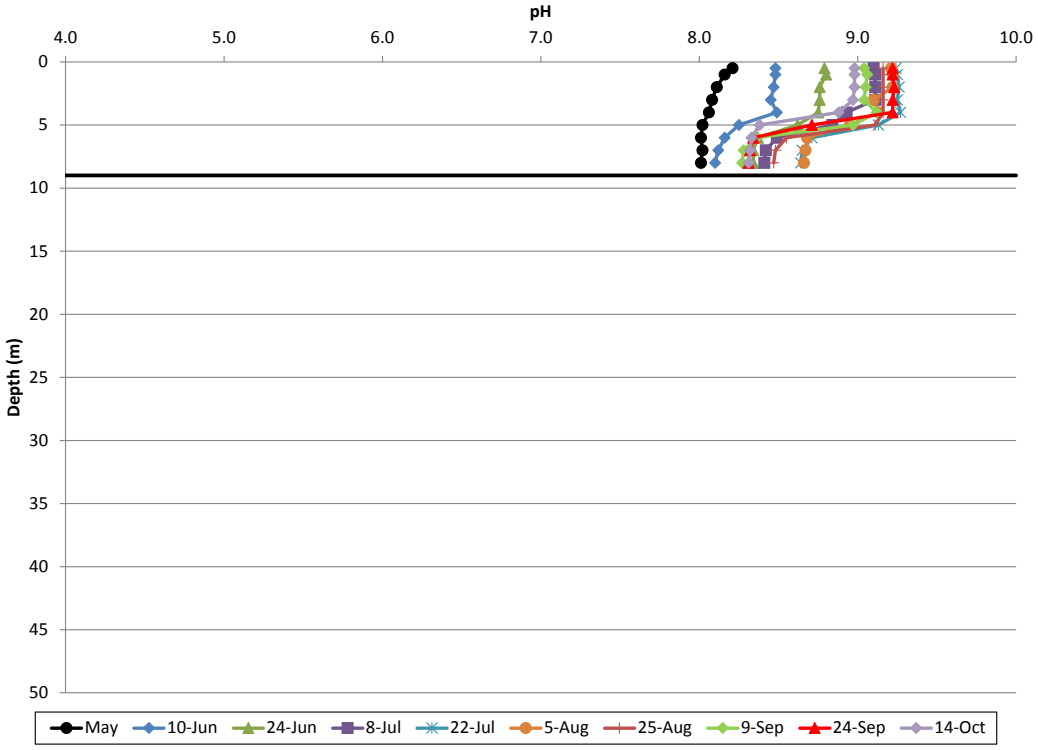

Figure 31. pH Profiles at Station LL4, May-October 2015

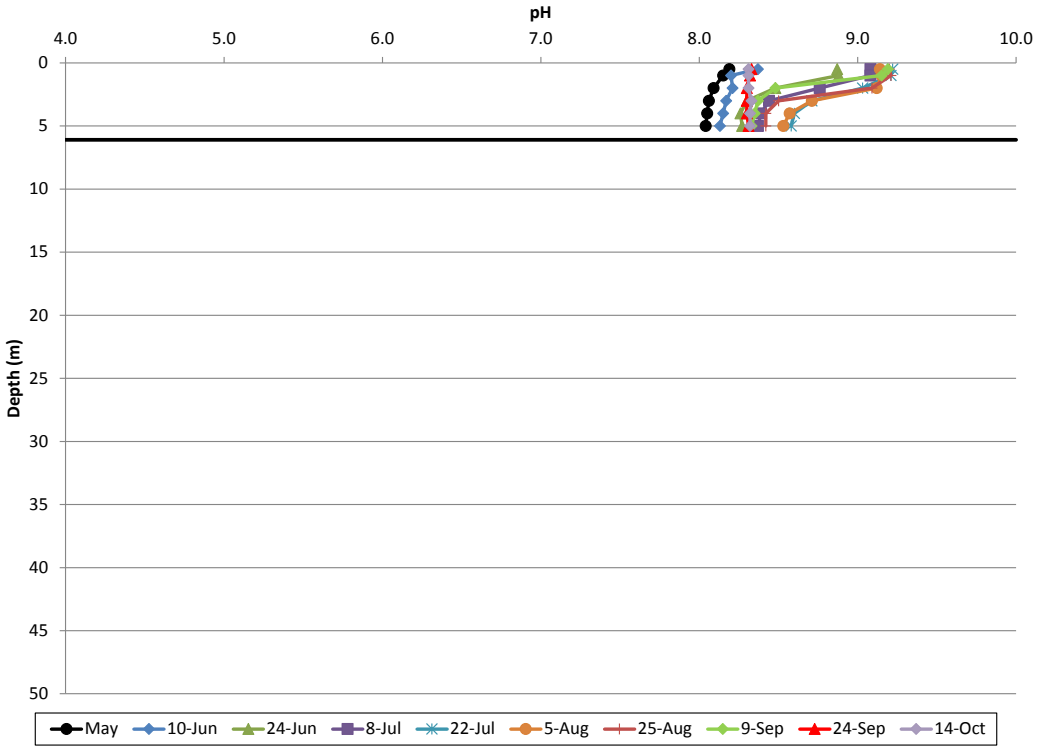

Figure 32. pH Profiles at Station LL5, May-October 2015

3.2.5 NUTRIENTS

Phosphorus

Concentrations of TP ranged from about 3.1 to 59 µg/L during 2015. Soluble reactive phosphorus (SRP) concentrations ranged from about 1.0 (non-detect [ND]) to 53 µg/L. Total phosphorus and SRP were usually highest at stations LL0, LL1, and LL2 in the hypolimnion (15 m and deeper) with higher levels usually starting in July (Figures 33 through 38). The highest TP concentration (59 µg/L) was at station LL1 at one meter off the bottom in late August. At LL0, the highest TP occurred at a shallower depth (30 m). At the four down-reservoir stations, TP was consistently higher in bottom waters.

Bottom TP concentrations at stations LL0 and LL2 were slightly lower than in 2014, but less variable in 2015. Maximum bottom TP at station LL1 was similar between 2014 and 2015, however, the high TPs lasted for the majority of the summer in 2015 compared to 2014 when they decreased sharply after peaking in late July.

Total phosphorus concentrations at the bottom and 30 m at station LL0 showed a much different pattern than observed in previous years. From late July until late September, TP at 30 m was usually higher than at one meter from the bottom, and continued to increase at a greater rate than bottom TP until late August when TP declined to levels less than at the bottom. Total phosphorus at LL0 at 30 m followed the same pattern as TP at the bottom of station LL1 indicating that the high TP at 30 m at LL0 was influenced greatly by water with high concentrations at the bottom of

LL1. Also, the pattern indicates that the water column below 30 m at LL0 was isolated from overlying water and water moving at depth down reservoir during the 2015 monitoring period. That is shown by the temperature and conductivity profiles (Figures 8 and 14). There was also a consistent pattern with high bottom TP and SRP concentrations at stations LL1 and LL2 and low DO.

Epilimnetic (surface) and metalimnetic TP concentrations at the lacustrine stations were fairly consistent over the monitoring period with occasional peaks at 5 m at stations LL0 and LL1. At station LL0, TP at the surface, 5 m and 15 m were almost always below 10 µg/L. At LL1, TP at the surface, 5 m, and 20 m ranged from about 5 µg/L to a peak of 31 µg/L, which occurred at a depth of 5 m. At the surface, 5 m, and 15 m at station LL2, TP was almost always below 15 µg/L and rather consistent.

The patterns for SRP at stations LL0, LL1, and LL2 were similar to those for TP, although SRP content was much lower than TP in surface waters. The highest bottom SRP occurred coincident with low DO. In early August, there was a sharp decline in bottom SRP at station LL2, which may have been the result of a mixing event. A peak SRP of 53 µg/L occurred at the bottom of station LL1 in late August, and corresponded to a DO of zero mg/L. Minimum bottom DOs ≤ 2 mg/L, occurred on numerous occasions in bottom water in 2015; in September and October at LL0, July through September at LL1, and July and August at station LL2. The highest TPs occurred at the bottom in 2014, but there was no consistent pattern with DO. In fact, TP declined when bottom DOs were lowest in August – September that year, even with anoxia at LL0 and ≤ 2 mg/L at LL1. The pattern was similar for SRP in 2014. Minimum DOs of ≤ 2 mg/L occurred more often in 2013 than in 2014; on three occasions at LL0, two at LL1 and never at LL2. However, peak SRP occurred earlier in July prior to minimum DO at all three sites.

At station LL3, TP and SRP concentrations were usually higher at the bottom of the water column (Figures 39 and 40). This is similar to 2014 and 2013. A peak in TP was observed at station LL3 in late July at 5 m and 10 m with a corresponding decrease in TP at the bottom. This could have been due to a wind mixing event and/or change in flow direction/magnitude that mixed the water column. This event is also consistent with an increase in DO at LL3 in late July throughout the water column.

Total phosphorus at LL4 was highest at 0.5 m in July at a maximum of 44 µg/L (Figure 41). Total phosphorus at 4 m peaked in late June and again in early September and was higher than surface TP in September and October. Bottom TP was usually lower than at 0.5 m and 4 m with lower concentrations at all depths at the beginning of the monitoring period (May and June) and slightly higher concentrations from July through October (Figure 41). In 2014, peak TP did not occur until early September. Peak TP occurred at 4 m in early August and late September in 2013, and bottom concentrations were usually lower in both years (2013, 2014) than in 2015.

The increased TP at 0.5 m in July to above 40 µg/L corresponded to a large increase in chl to 12.3 µg/L. An increase in TP at 4 m again in early September also corresponded to a large increase in chl at 4 m to just over 18 µg/L. In 2014, increased TP at 0.5 and 4 m in August and September (also near 40 µg/L) corresponded to a large increase in chl to 20 µg/L. Peaks in TP and chl also

occurred at LL4 in September 2013. Soluble reactive phosphorus at LL4, was almost always below 8 µg/L, with a peak of 12 µg/L at the bottom in early August (Figure 42). During 2013 and 2014, SRP concentrations at LL4 were very stable, almost always below 5 µg/L.

Total phosphorus at station LL5 was highest at the surface in July (35 and 42 µg/L) and early September (52 µg/L) (Figure 43). Comparatively, bottom TP concentrations were relatively stable throughout the monitoring period ranging from 7 to 16 µg/L (Figure 43). The pattern was very different than in 2014 when both surface and bottom concentrations were stable, with only one small peak in August to just under 30 µg/L, which is much lower than peaks in 2015 of 42 and 52 µg/L. In 2013, there was a peak at 0.5 m of 65 µg/L in August. Volume-weighted water column TP concentrations in 2015 at LL5 ranged from 7 to 38 µg/L with a mean of 19 µg/L for the monitoring period. In 2013 and 2014, volume-weighted TP concentrations at LL5 were less than in 2015, usually around 15 µg/L or less. Soluble reactive phosphorus at LL5 was usually less than 5 µg/L in 2015, with the exception of a small increase in SRP in late September and October (Figure 44). In 2013 and 2014, SRP at LL5 was also usually 5 µg/L or less.

Epilimnetic TP concentrations in the lacustrine zone (LL0, LL1, LL2) varied some in 2015, but were usually less than or equal to about 10 µg/L (Figure 45). This is similar to concentrations in 2014. Seasonal patterns and concentration ranges have been rather consistent over the six year period averaging a little less than 10 µg/L during June-September. Transition and riverine zone (LL3, LL4, and LL5) TP was often greater than 10 µg/L and occasionally above 20 µg/L, especially at LL5 where TP was above 20 µg/L at 0.5 m on 4 sampling events. Why TP was so much greater at 0.5 m than at the bottom at LL5 is unclear. Soluble reactive phosphorus was usually less than 5 µg/L in the epilimnion at all sites.

Volume-weighted water column TP concentrations at the six stations were fairly similar for most of 2015 with the exception of some peaks at LL4 and LL5 (Table 8; Figure 46). Total phosphorus at stations LL4 and LL5 were higher than at down-reservoir stations during two distinct time periods; late June through July and late August through September (Figure 46; Table 8). Volume-weighted TP concentrations for all stations were below 40 µg/L and for most of the period below 30 µg/L. The generally higher water column TPs at LL4 and LL5 during August and September in 2015 were similar to 2014 and 2013, which is in contrast to the pattern in 2012.

Table 8. Volume-Weighted Water Column TP Concentrations for Monitoring Stations in 2015

2015 Sampling Event	Volume Weighted Water Column TP (µg/L)					
	LL0	LL1	LL2	LL3	LL4	LL5
May 13-14	10	12	15	14	13	13
June 9-10	6	7	9	11	10	16
June 23-24	4	10	10	9	18	12
July 7-8	13	11	10	15	29	28
July 21-22	13	16	14	25	33	34
August 4-5	15	22	10	18	16	15
August 24-25	18	14	13	17	24	19
September 8-9	18	12	13	15	25	38
September 23-24	13	8	10	14	22	7
October 13-14	10	7	11	13	19	11
Mean	12	12	12	15	21	19
Summer Mean (Jun-Sep)	12	13	11	16	22	21

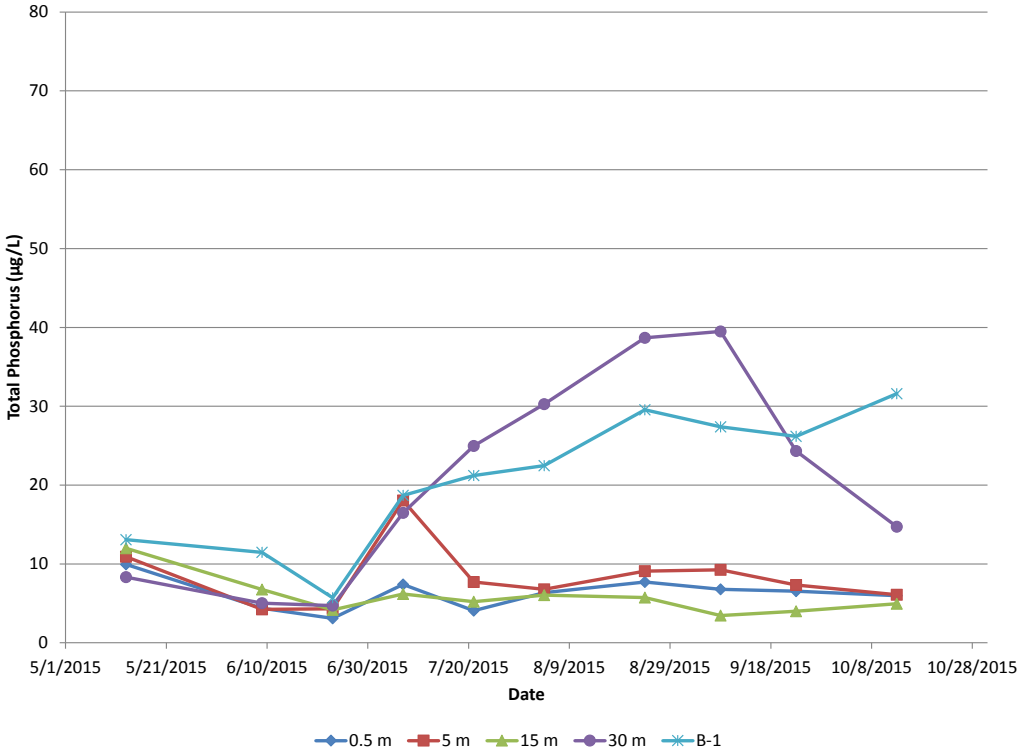

Figure 33. TP Concentrations (µg/L) at Station LL0, May-October 2015

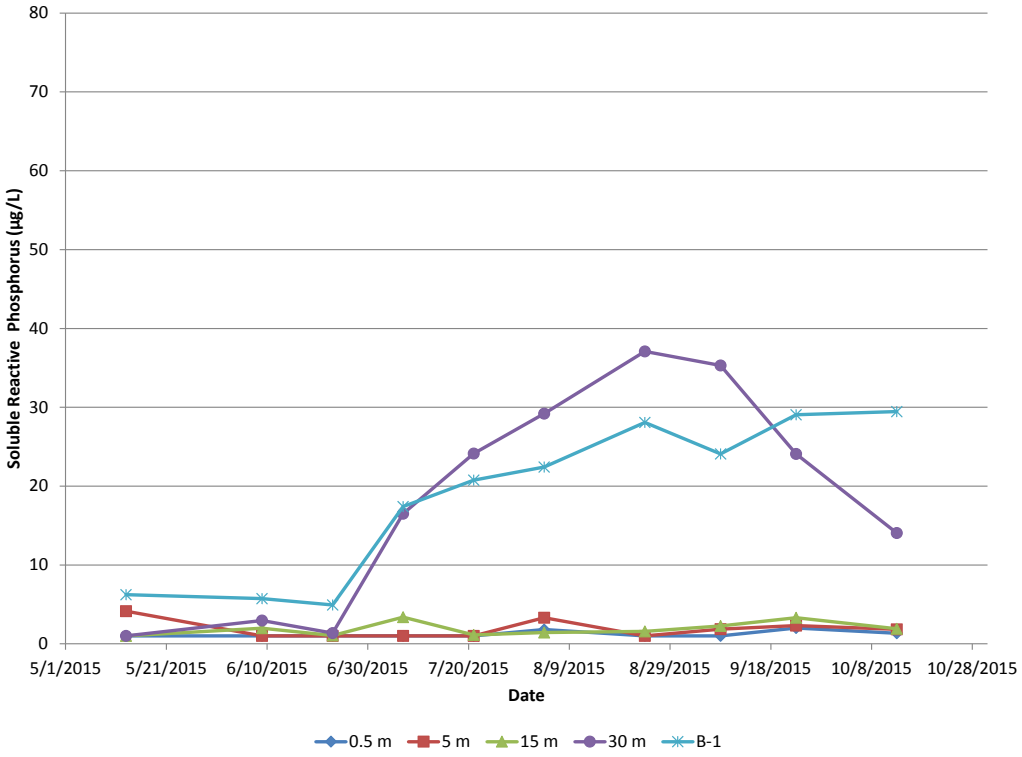

Figure 34. SRP Concentrations (µg/L) at Station LL0, May-October 2015

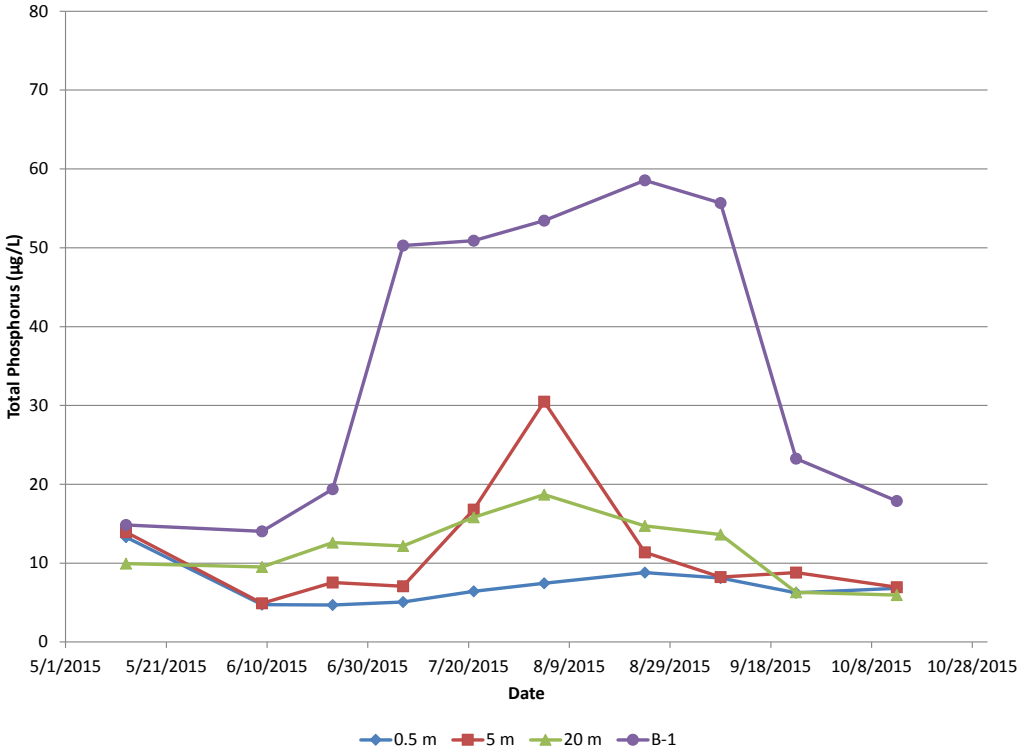

Figure 35. TP Concentrations (µg/L) at Station LL1, May-October 2015

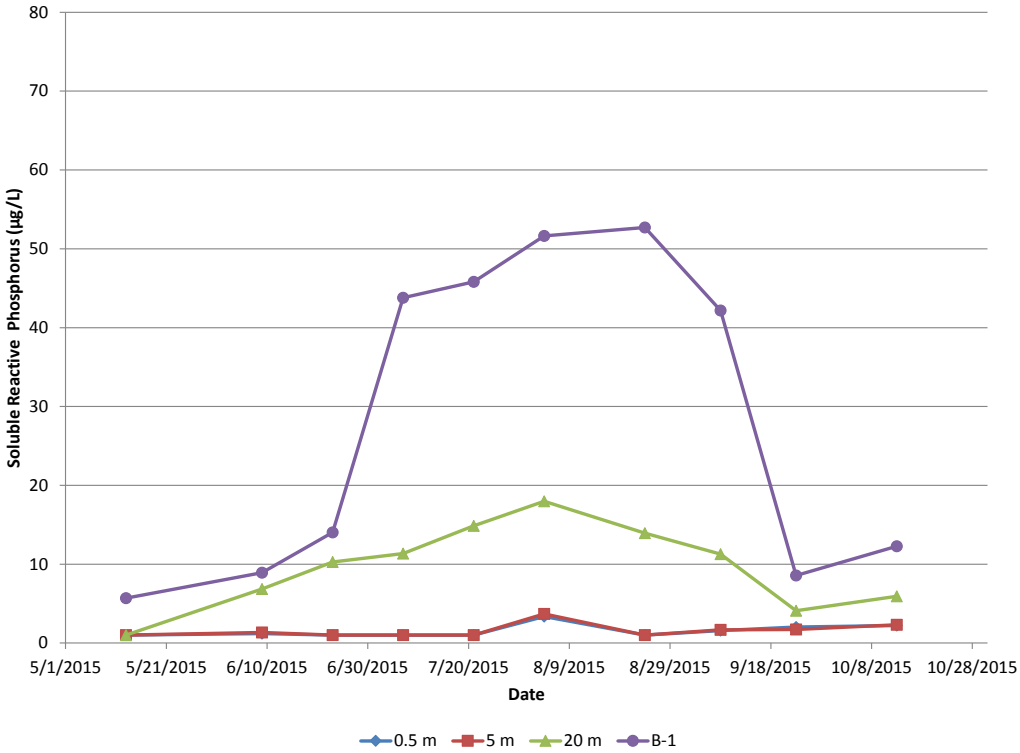

Figure 36. SRP Concentrations (µg/L) at Station LL1, May-October 2015

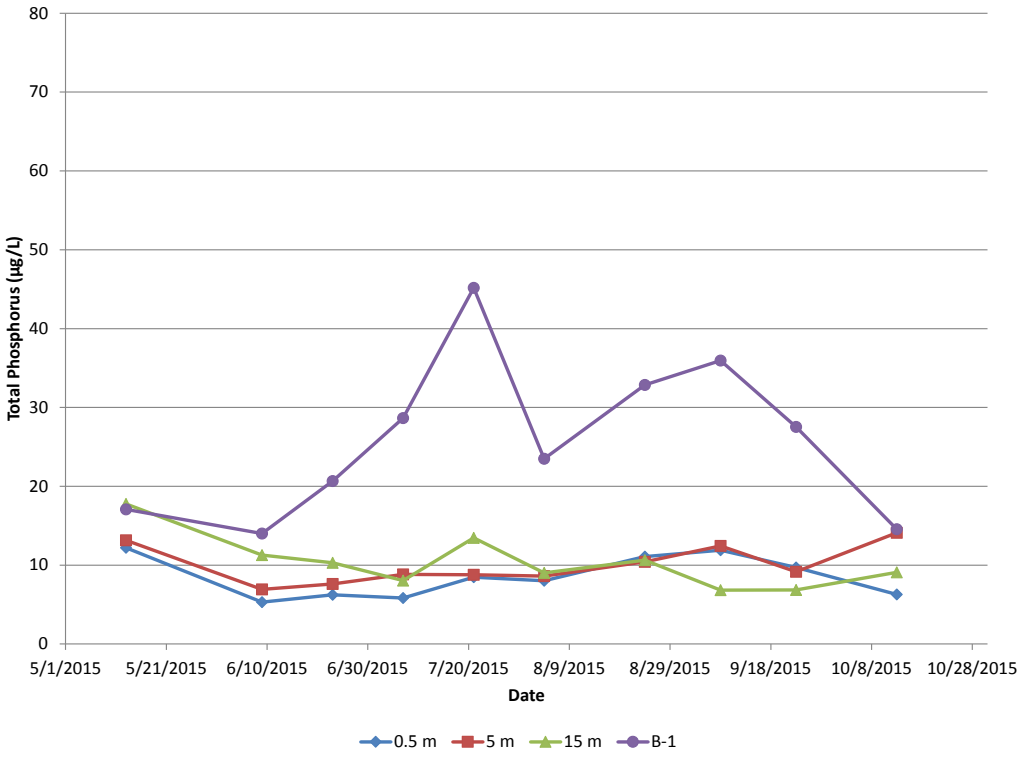

Figure 37. TP Concentrations (µg/L) at Station LL2, May-October 2015

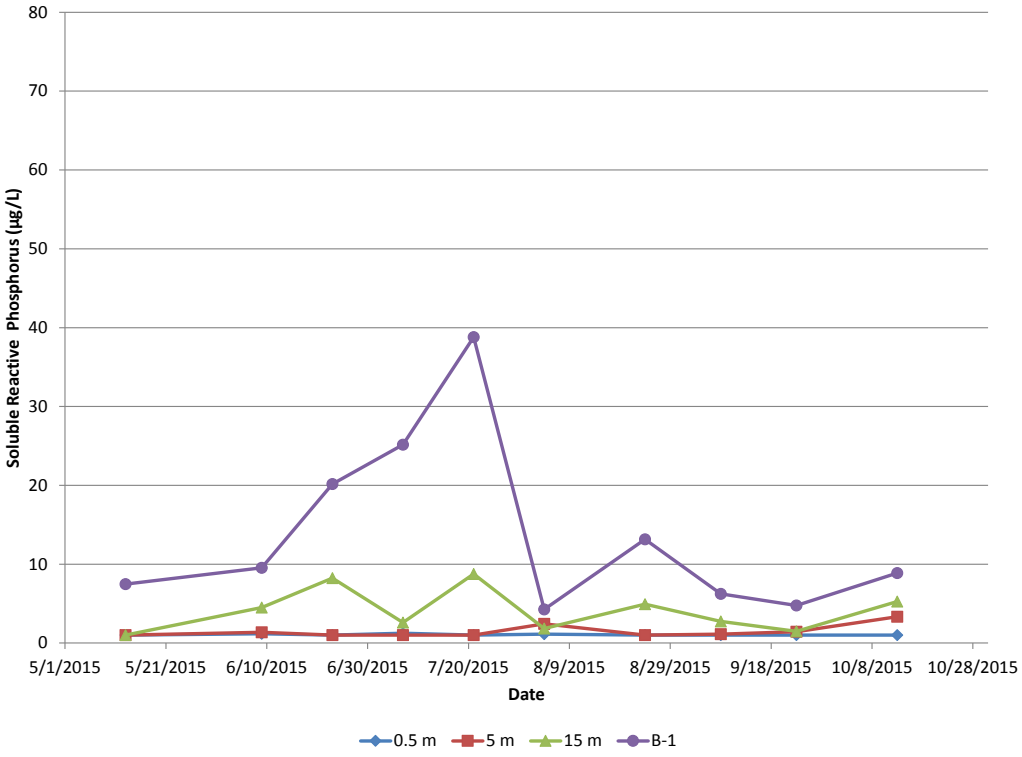

Figure 38. SRP Concentrations (µg/L) at Station LL2, May-October 2015

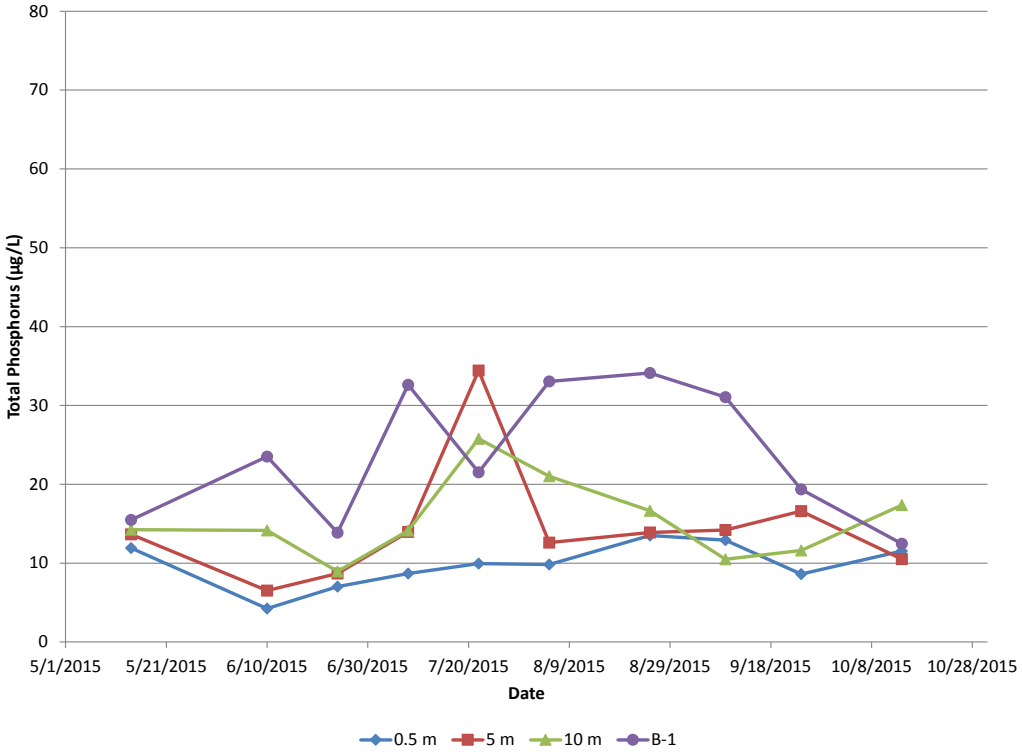

Figure 39. TP Concentrations (µg/L) at Station LL3, May-October 2015

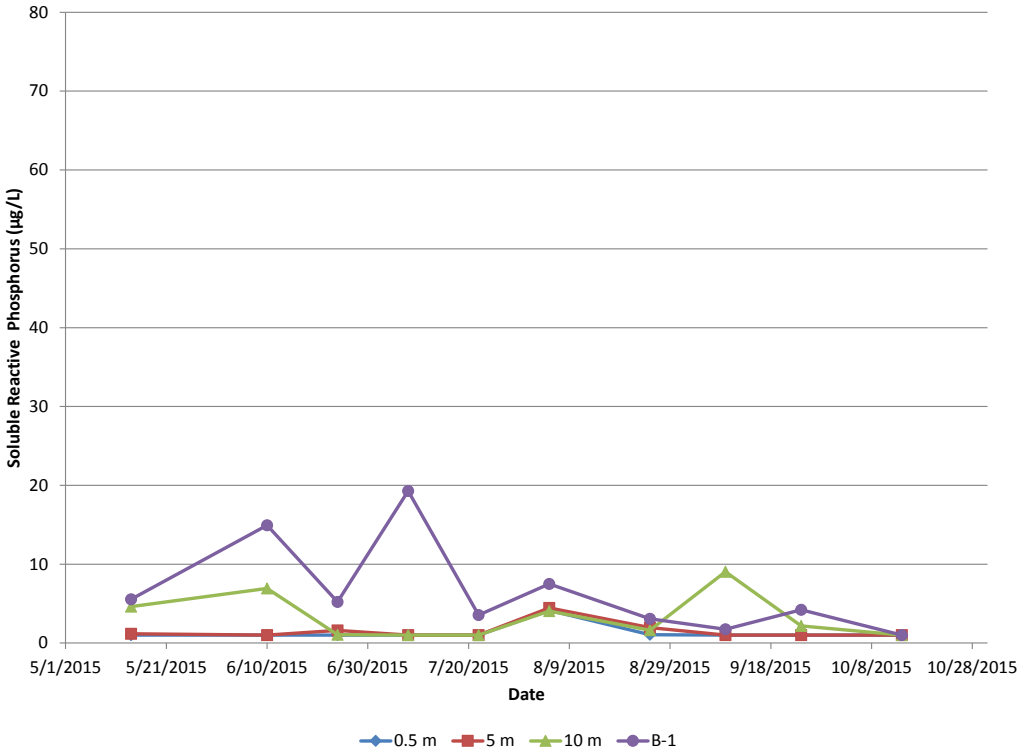

Figure 40. SRP Concentrations (µg/L) at Station LL3, May-October 2015

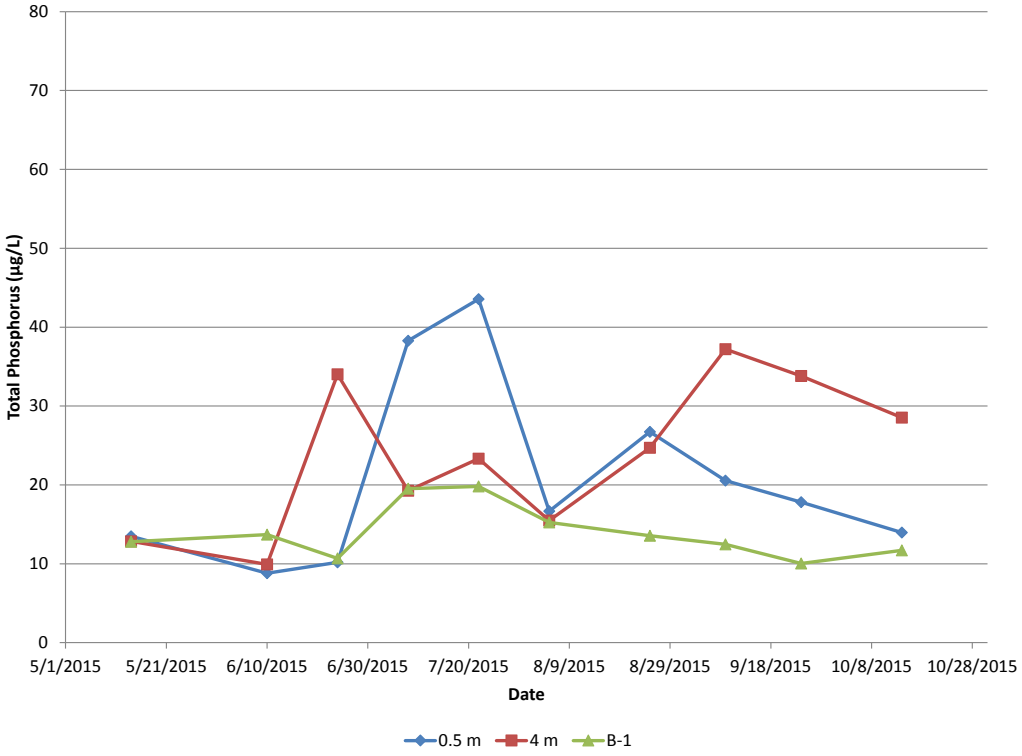

Figure 41. TP Concentrations (µg/L) at Station LL4, May-October 2015

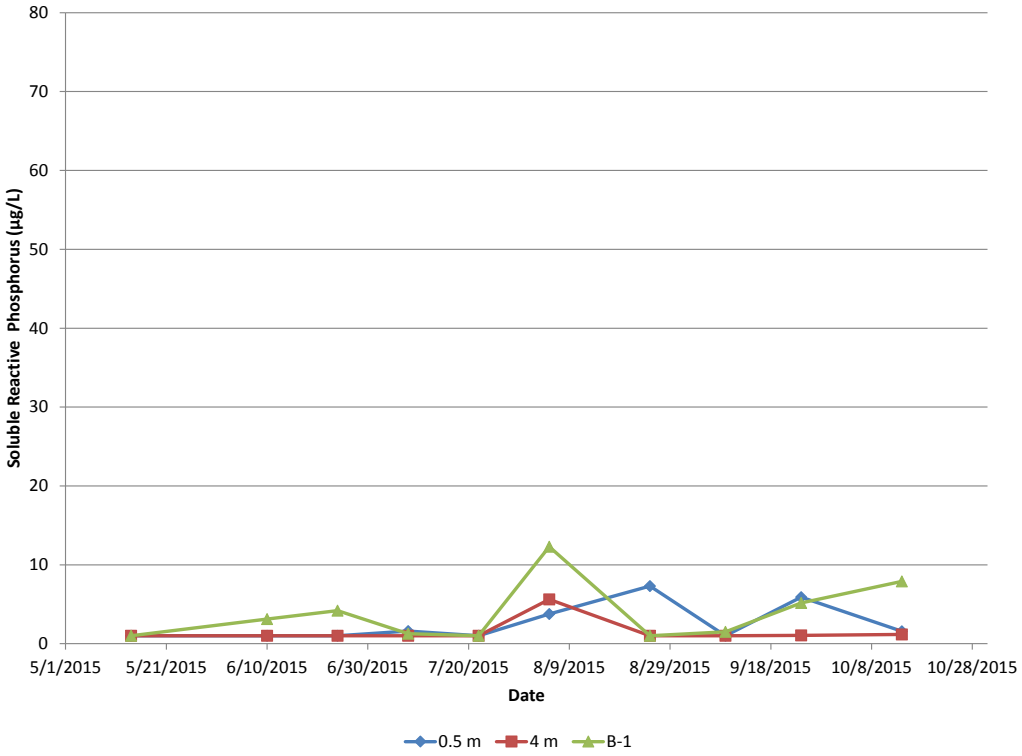

Figure 42. SRP Concentrations (µg/L) at Station LL4, May-October 2015

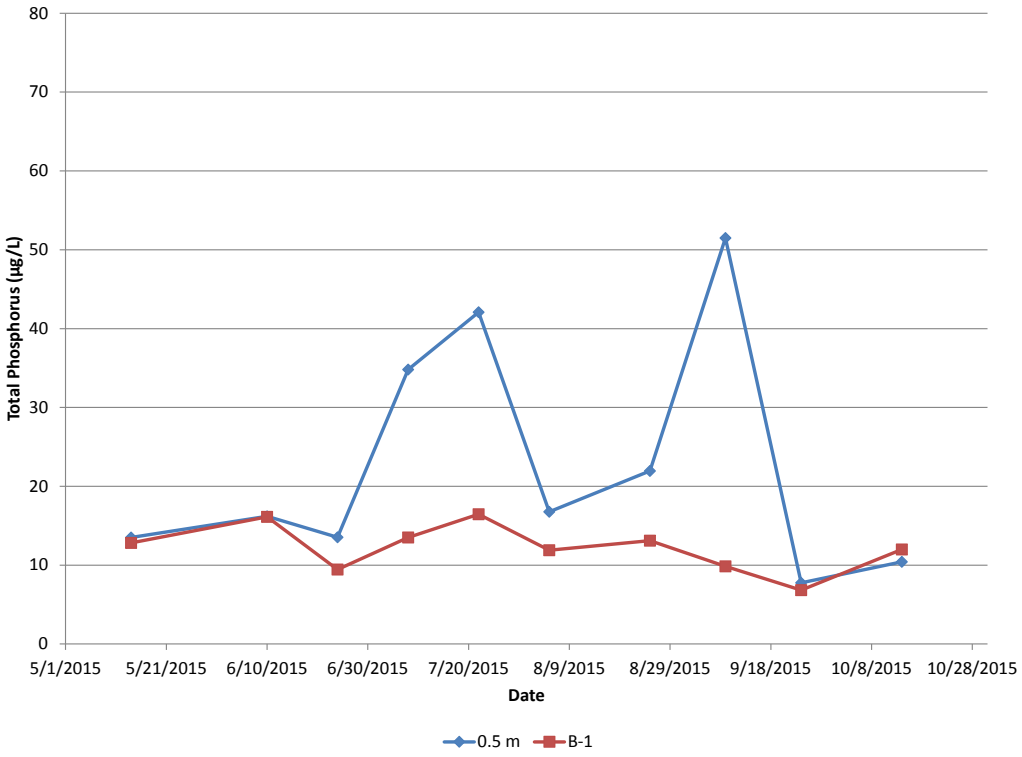

Figure 43. TP Concentrations (µg/L) at Station LL5, May-October 2015

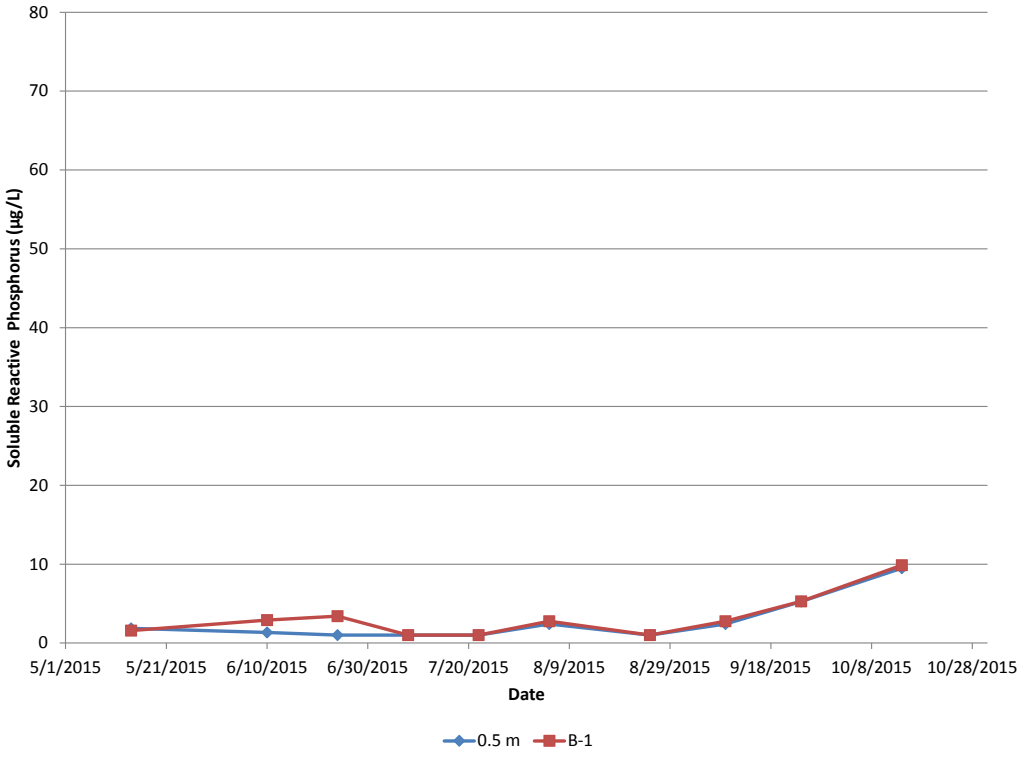

Figure 44. SRP Concentrations (µg/L) at Station LL5, May-October 2015

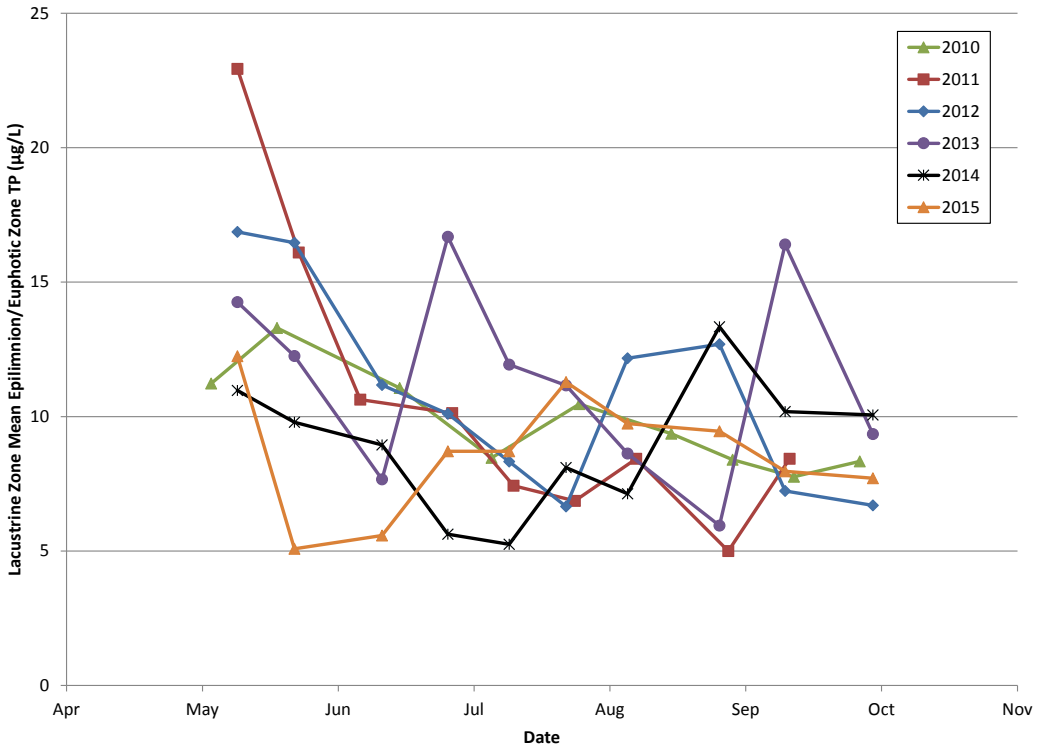

Figure 45. Mean Epilimnion TP Concentrations in the Lacustrine Zone in Lake Spokane, 2010-2015

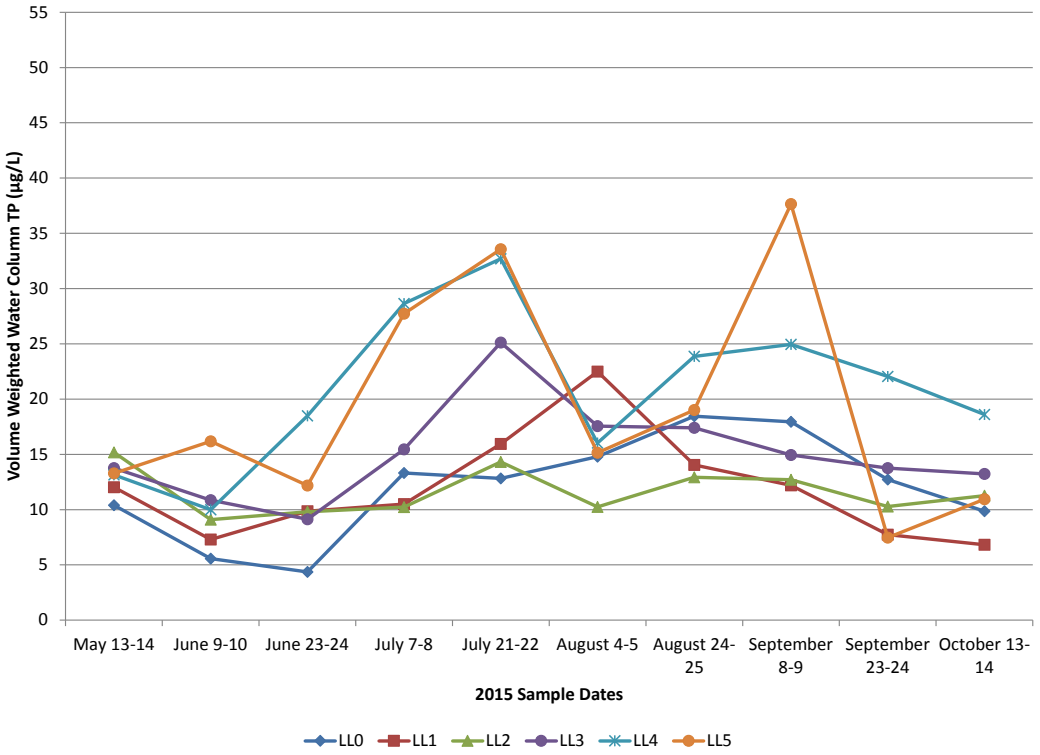

Figure 46. Volume-Weighted Water Column TP Concentrations, 2015

Nitrogen

Total nitrogen (TN) at all six stations ranged from about 470 to 2300 µg/L over the monitoring period. Total nitrogen was lower in 2014, ranging from 250 to 2000 µg/L. Nitrate+nitrite N (NO_3+NO_2-N) ranged from about 220 to 2040 µg/L in 2015. Thus, most of the TN is nitrate+nitrite. Average lacustrine epilimnetic TN and NO_3+NO_2-N concentrations during June-September were 871 and 686 µg/L, respectively. In 2014 average lacustrine epilimnetic TN and NO_3+NO_2-N concentrations during June – September were lower at 606 and 480 µg/L, respectively.

Both TN and nitrate-N were highest at intermediate depths (15 – 20 m) at LL0 – LL1, and at both intermediate (10 – 15 m) and bottom at LL2 – LL3, but only at the bottom at LL4 – LL5. This pattern indicates that high nitrogen water entering the reservoir moved near the bottom through the riverine and transition zones plunging, due to greater density, to the intermediate depths in the lacustrine zone.

Nitrogen tended to increase at most sites, especially near or at the bottom (Figures 47 through 58). Starting in July, concentrations in the metalimnion and upper hypolimnion increased more than in the epilimnion at most sites. Higher concentrations were generally observed in the hypolimnion and bottom water at all stations, except at station LL0 where levels at the bottom were much lower than concentrations observed at 15 and 30 m. Bottom concentrations at LL0 increased in October when the water column began to mix. This pattern was similar to that in 2013.

The increased hypolimnetic and metalimnetic concentrations in late summer may be due to the plunging of river inflow, with some additional input from internal loading in the upper reservoir. Late summer hypolimnetic and metalimnetic nitrogen concentrations were roughly equal to those at the bottom at LL3 – LL5, which represent the plunging inflow. Most of the high inflow nitrogen may be due to the importance of groundwater as a source of nitrate+nitrite during late summer low flow when dilution of groundwater decreased (see 3.2.9). The increase in bottom TN to about 2,000 µg/L at LL4 corresponds to the increase in river TN at Nine Mile Bridge (see 3.2.9). These higher nitrogen concentrations at the bottom of the up-reservoir sites, along with the highest concentrations occurring in the hypolimnion at the lacustrine sites (LL0, LL1, LL2), suggests that plunging river inflow is more likely the main source of hypolimnetic nitrogen than internal loading.

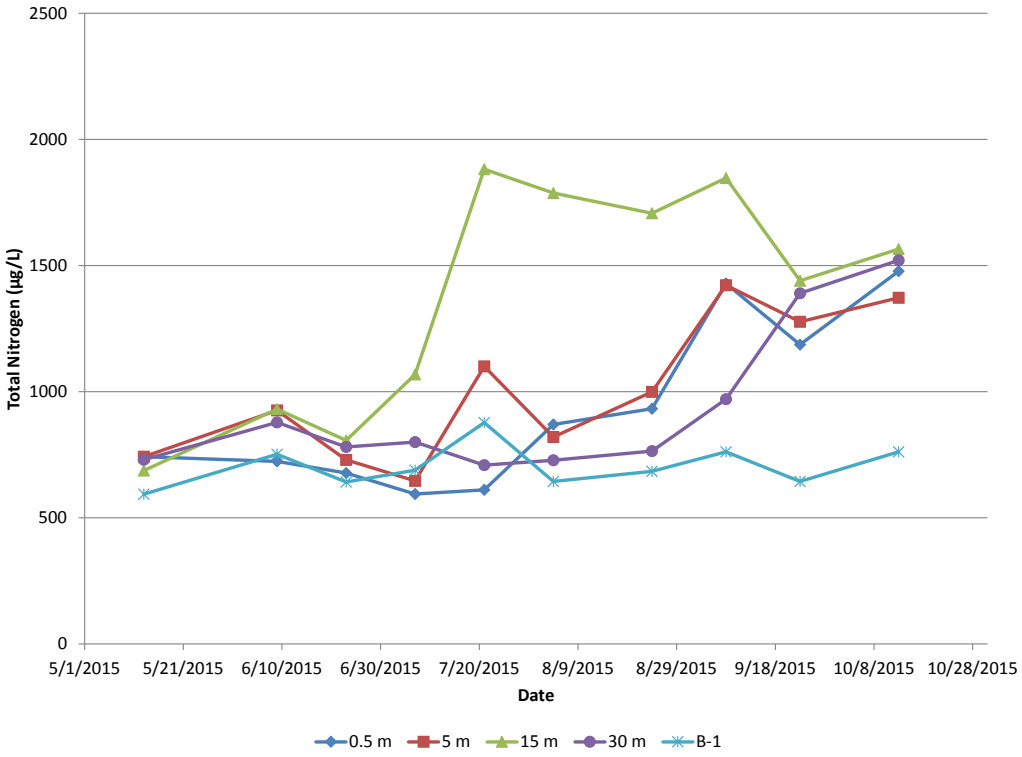

Figure 47. TN Concentrations (µg/L) at Station LL0, May-October 2015

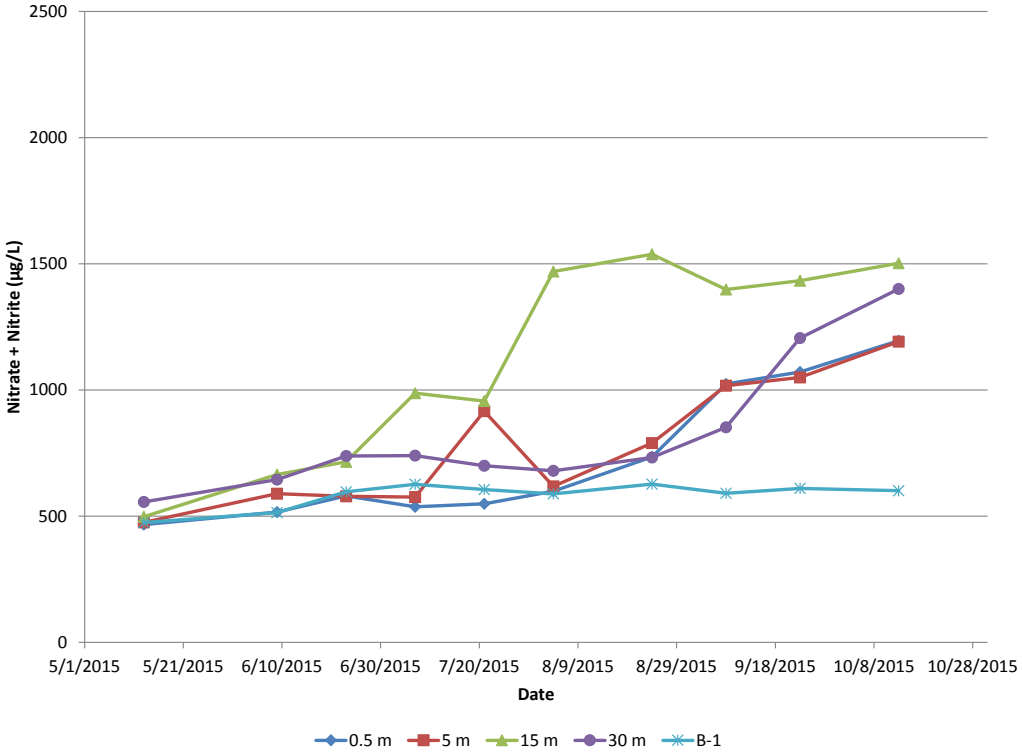

Figure 48. NO_3+NO_2 Concentrations (µg/L) at Station LL0, May-October 2015

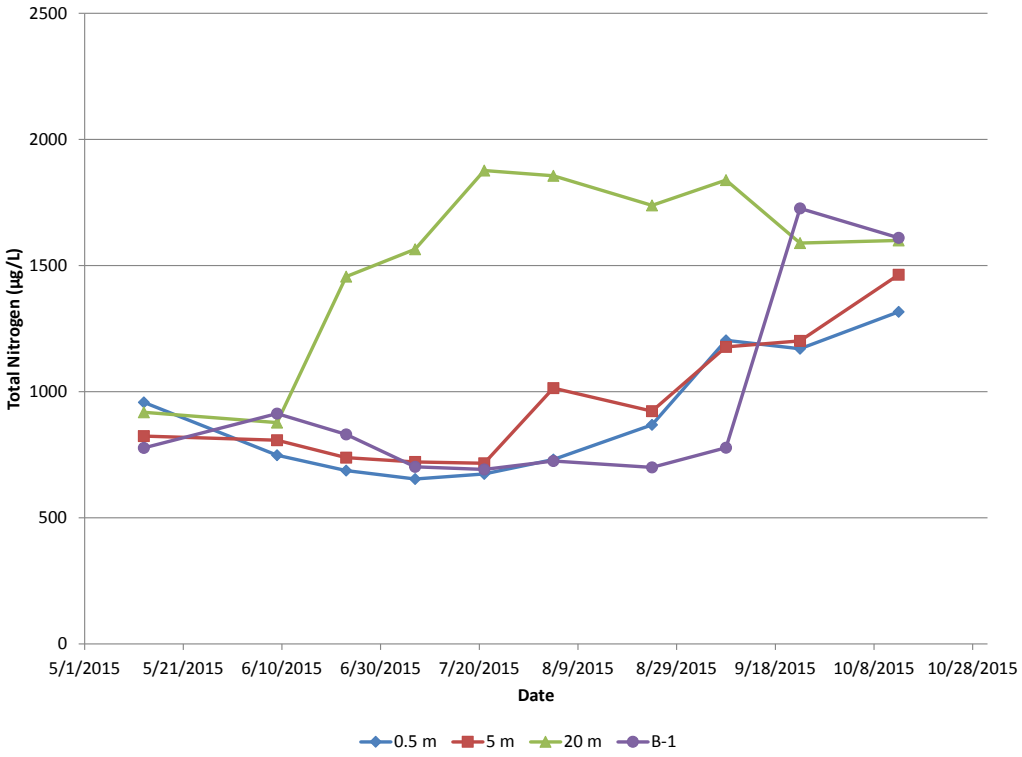

Figure 49. TN Concentrations (µg/L) at Station LL1, May-October 2015

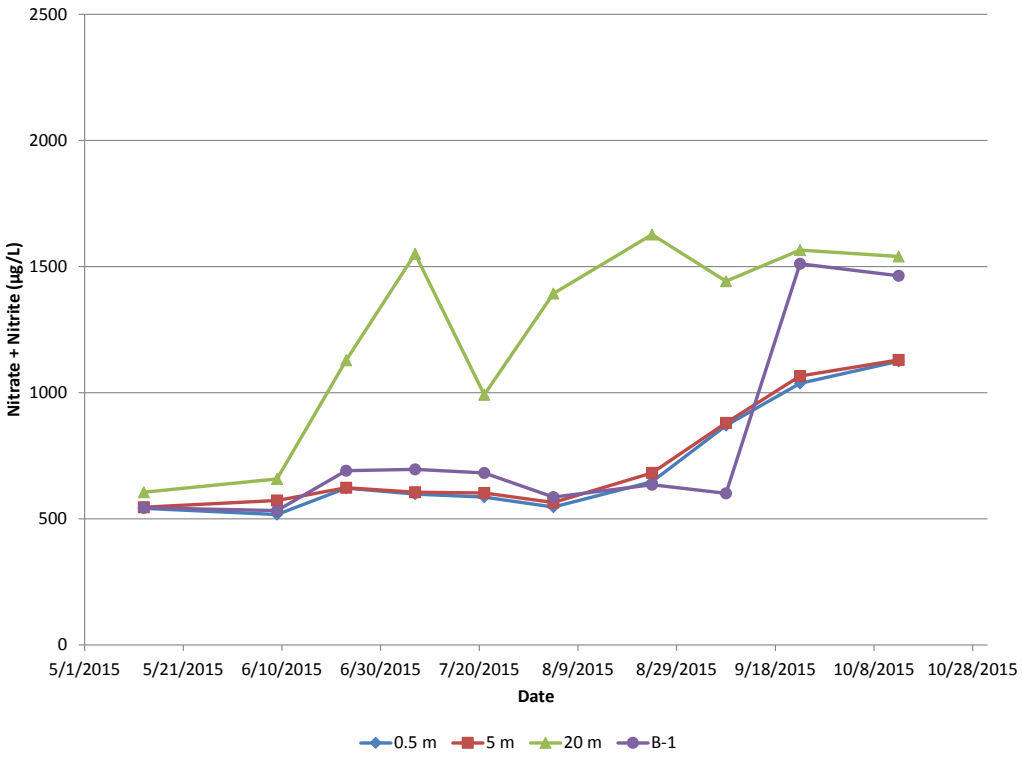

Figure 50. NO_3+NO_2 Concentrations (µg/L) at Station LL1, May-October 2015

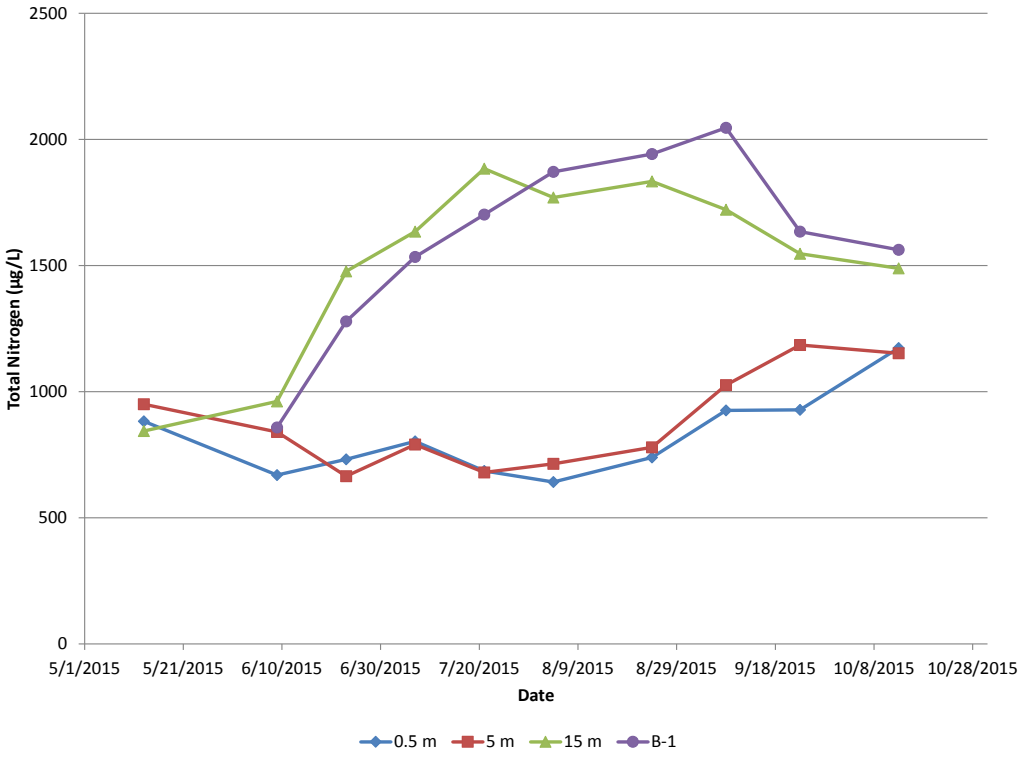

Figure 51. TN Concentrations (µg/L) at Station LL2, May-October 2015

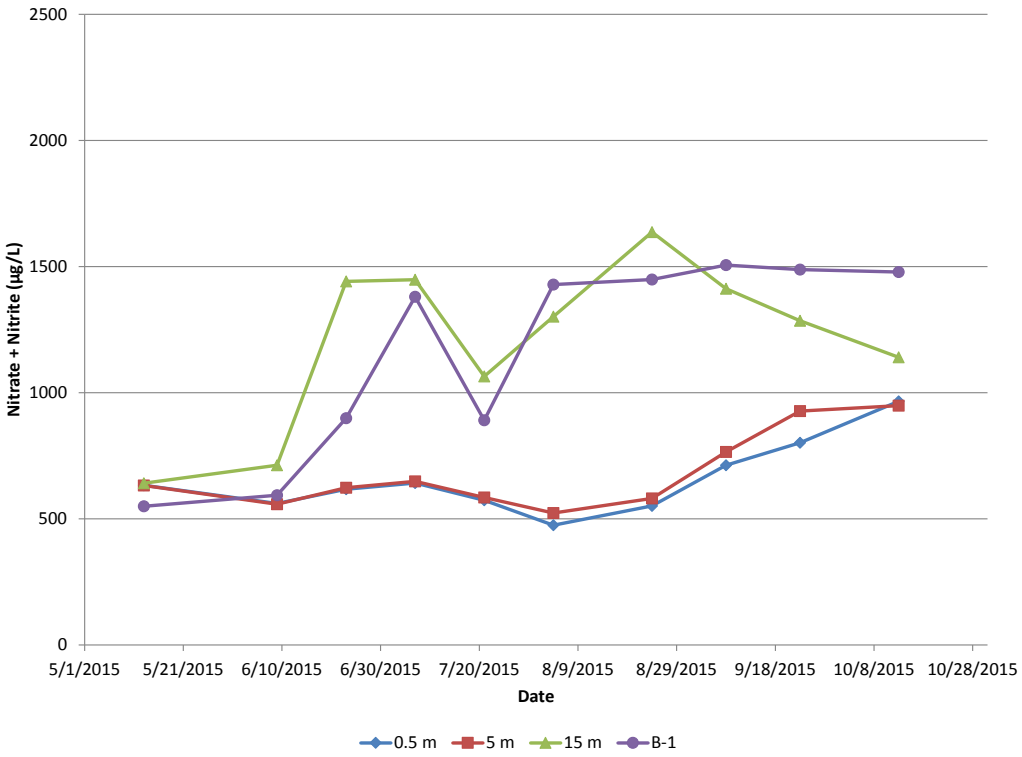

Figure 52. NO_3+NO_2 Concentrations (µg/L) at Station LL2, May-October 2015

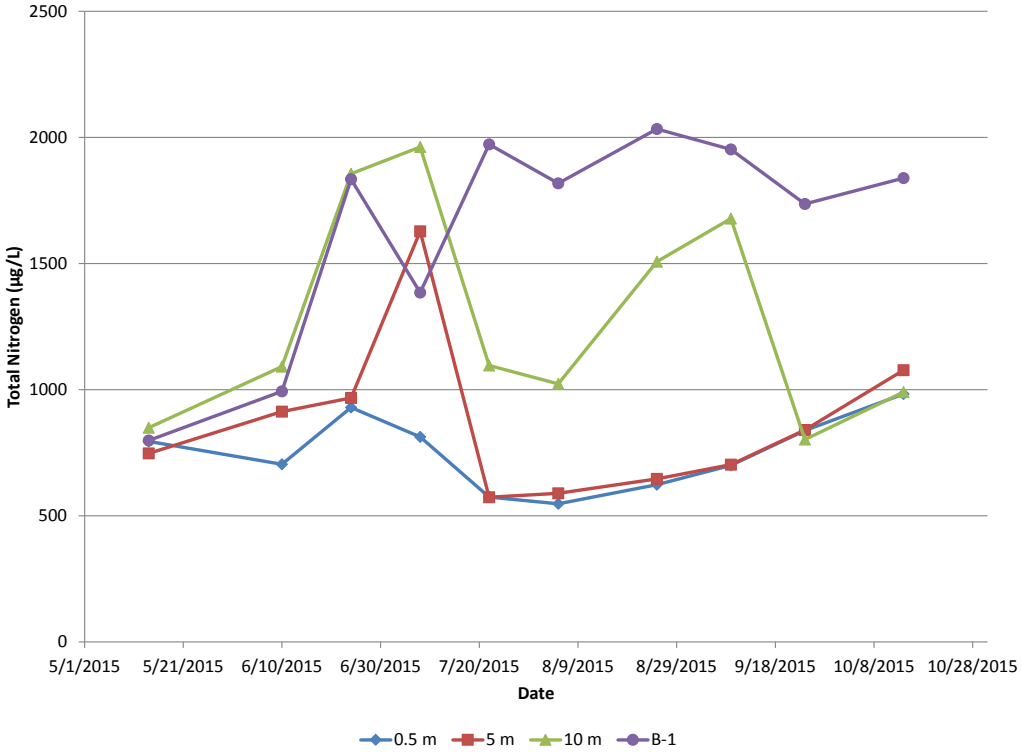

Figure 53. TN Concentrations (µg/L) at Station LL3, May-October 2015

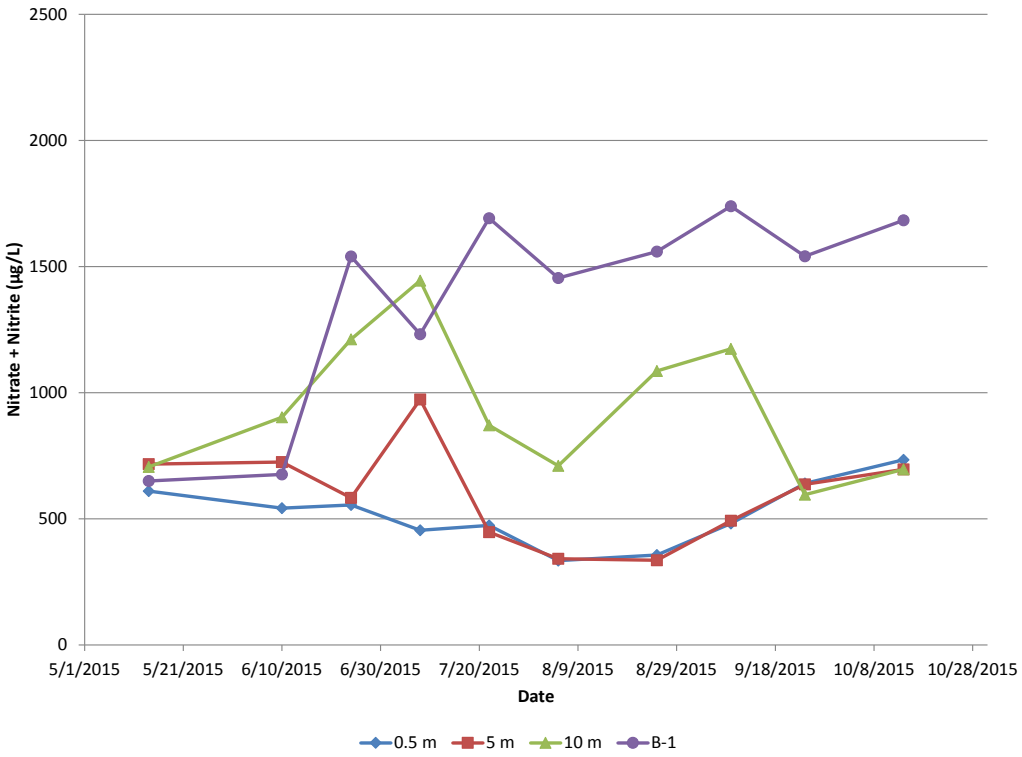

Figure 54. NO3+NO2 Concentrations (µg/L) at Station LL3, May-October 2015

Figure 55. TN Concentrations (µg/L) at Station LL4, May-October 2015

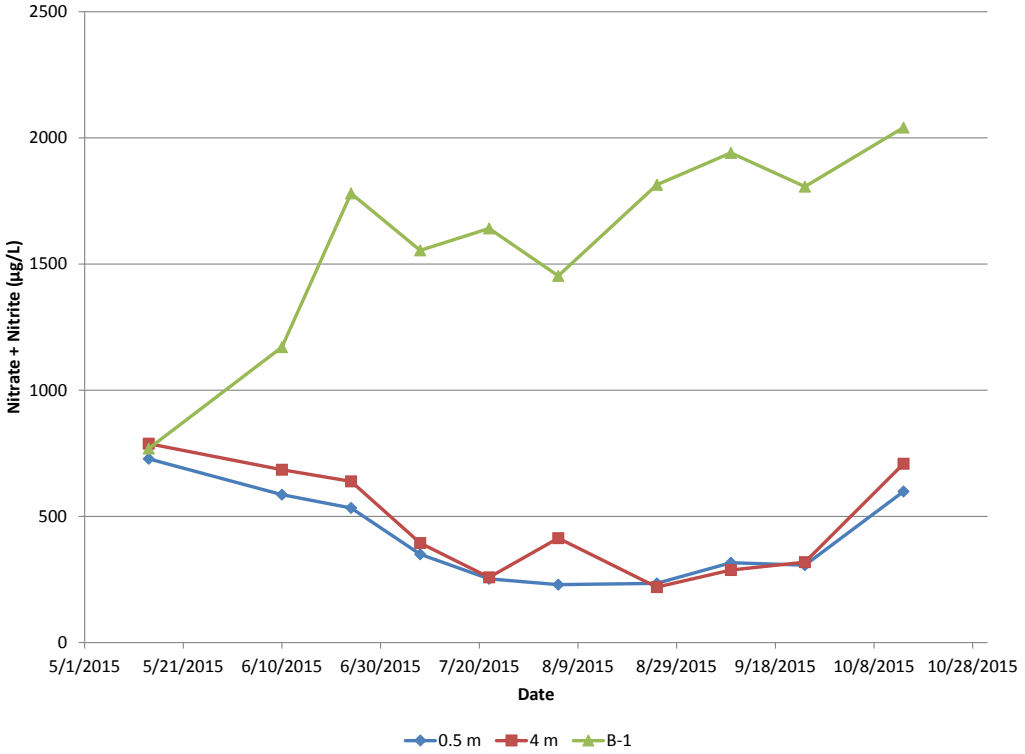

Figure 56. NO_3+NO_2 Concentrations (µg/L) at Station LL4, May-October 2015

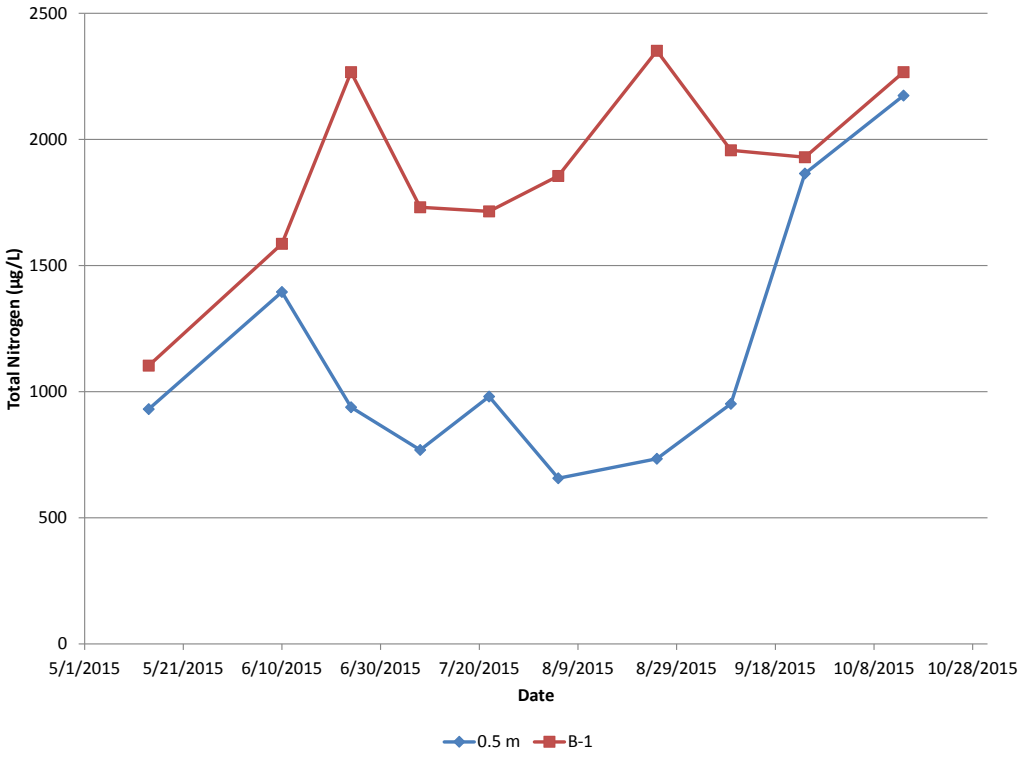

Figure 57. TN Concentrations (µg/L) at Station LL5, May-October 2015

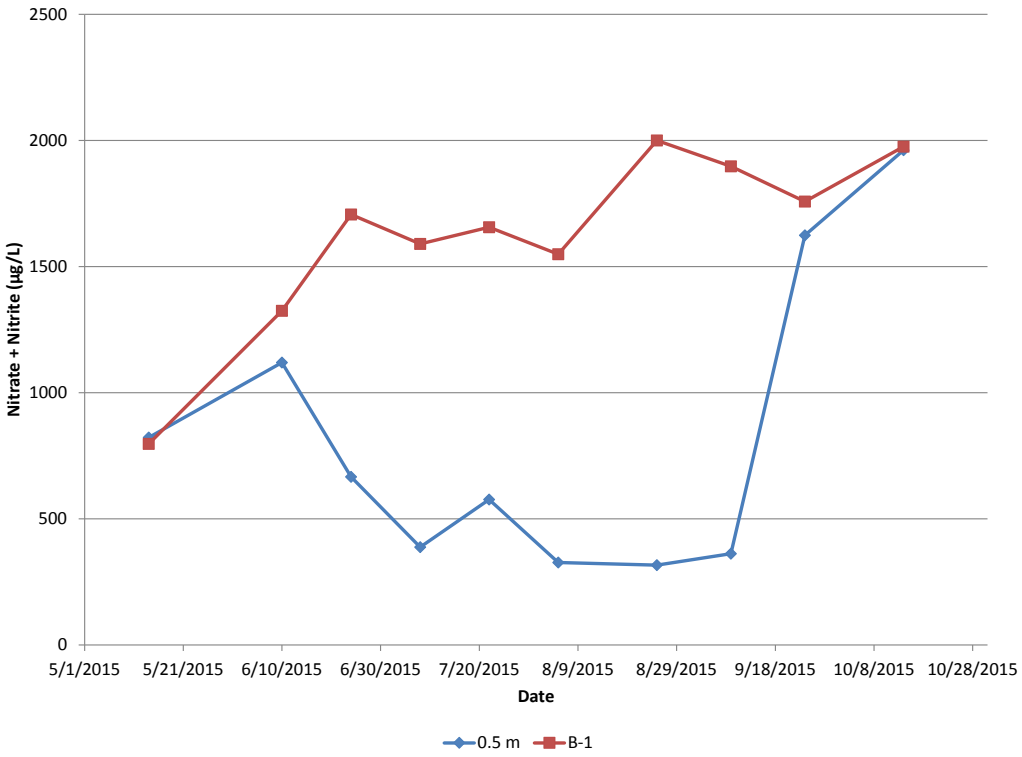

Figure 58. NO_3+NO_2 Concentrations (µg/L) at Station LL5, May-October 2015

3.2.6 PHYTOPLANKTON

Chlorophyll concentrations at the six stations ranged from 0.2 to 18.2 µg/L in 2015. In 2014, chl concentrations were ranged from 0.5 to 25.4 µg/L. Maximums at lacustrine sites were slightly higher in 2015 than in 2014 while maximums at the transition and riverine zone sites were lower. Maximums in 2014 at most sites were also higher than in 2012 or 2013. Chlorophyll was often highest at the 5 m depth (or 4 m depth at LL4) in 2015, which was the case in 2012, 2013, and 2014. (Figures 59 through 64). However, chl differed more seasonally than with depth at the three up-reservoir sites, where sizable blooms occurred in July, August, and September, similar to conditions during both 2013 and 2014. The maximum chl concentration observed (18.2 µg/L) in 2015 was at 4 m at LL4 during early September.

Chlorophyll was higher in May-June at the two deepest stations (LL0 and LL1) than at the shallower, up reservoir stations where there were lower levels in the spring and higher in summer (Figures 59 through 64). This is similar to chl patterns observed in 2014. The higher summer levels in 2015 corresponded with TP concentrations reaching 37 µg/L at LL4 in September (Figure 41). Chlorophyll at LL4 increased sharply in late July to around 12 µg/L and remained elevated through early September when the maximum of 18 µg/L was observed, the same maximum as in 2013. Chlorophyll reached a peak at LL4 in 2014 that was even slightly higher than in 2015 and lasted for about the same time period or slightly later, into August and September. The pattern at LL5 in 2015 was similar to those observed in 2012, 2013, and 2014 but the maximums occurred in late July and late August. These chl peaks corresponded to the dates in which the water column at LL5 was stratified and residence time was high allowing time for algal biomass to accumulate. In 2015, unlike previous years, the water column at LL5 was stratified for the majority of the summer (June through early September). Also, surface water temperatures at LL5 in summer 2015 were much higher than in previous years, which facilitated water column stability. Chlorophyll concentrations at LL5 also followed the surface TP concentrations very closely with peaks in late July followed by a decrease and another peak in early September.

The sharp increase in chl at LL4 and LL5 in late July corresponded to the water column at both sites having a very green color and low transparency, which persisted at both sites through September. This was the case in 2014 but it occurred in late August. Algal scums were observed just downstream of LL5 and in between LL4 and LL5 starting in early August. This contrasts with 2014 when no scums were observed even though there was a large bloom. Conditions in 2015 are similar to those in previous years (2010 and 2012), in which a thick scum of accumulated algae (primarily cyanobacteria) occurred up-reservoir of LL4, just down-reservoir from the Nine Mile Resort boat launch, as well as at LL5. In 2015, samples collected near LL4 (Suncrest Park) were positive for the cyanobacteria toxin microcystin at levels above the state guidelines. These samples were collected on three dates; July 27, August 4, and August 31. The persistence of scums may have been due to greater water column stability and water residence time.

Composition of the phytoplankton showed that diatoms (*Chrysophyta*) were dominant at all stations during the spring, based on both cell counts and biovolume (Figures 65-76). Cyanobacteria increased numerically (cells/ml) at all sites in July and August, but were represented by significant biovolume at LL5 only in late July and late August. In 2014 cyanobacteria followed

a similar pattern but were represented by significant biovolumes at both LL4 and LL5 in August. In 2013, cyanobacteria were not strongly represented at any site. The 2014 and 2015 pattern is similar to 2012 when diatoms dominated during the spring at all sites, but cyanobacteria dominated cell counts at all sites in summer (early summer in 2015 and late summer in 2012 – 2014). Diatoms and green algae represented the greatest biovolume at all sites in 2015, although *Pyrrhophyta* and *Euglenophyta* at station LL5 were also high in late July and early September, respectively.

The percent of biovolume represented by cyanobacteria at the upper reservoir stations (LL4 and LL5) was much greater in 2015 than in 2012 or 2013 (Table 9). Yet, percent cyanobacteria was much greater at all stations in 2014 than in previous years, as well as in 2015. Also, phytoplankton biomass was much greater at all stations in 2015 than in previous years (Table 9). It should be noted however, that there were substantial differences between standard cell biovolumes used by the two laboratories, which may account for some of the higher biovolumes in 2015 that do not seem to correspond to higher chl concentrations.

The difference in phytoplankton composition, biovolume and chl, among the years may also be related to the markedly different water residence times for the whole lake (70 days) and transition/riverine (13 days), which were much greater than for both whole lake (37 and 31 days) and the transition/riverine zones (6.9 and 5.9 days) in 2013 and 2014 or 2012 (19 and 3.6 days). Phytoplankton density and biovolume were much greater at all stations in 2015 than the other years (Table 9) consistent with the much longer residence time (although differences in laboratory techniques may be accountable for some differences between 2015 and previous years). However, cyanobacteria comprised a larger percent of the biovolume in 2014 than in 2015 (Table 9). Cyanobacteria were also more abundant at LL4 and LL5 in 2013 and 2014. Cyanobacteria would be expected to dominate the algal community with longer residence times, because cyanobacteria are slower growing and less tolerant of short residence times. In general, residence times <10 days begin to limit biomass accumulation (Welch and Jacoby 2004).

Table 9. Average phytoplankton biovolume and percent cyanobacteria at the six stations during 2012-2015. Phytoplankton samples collected in 2012 – 2014 were analyzed by Water Environmental Services, Inc. and samples collected in 2015 were analyzed by EcoAnalysts, Inc.

Station	Mean Summer Phytoplankton (mm^3/L)				Mean Summer % Cyanos by Volume				Max Summer % Cyanos by Volume			
	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015
LL0	0.57	1.77	1.06	2.44	0.68	0.28	8.73	1.86	1.79	1.27	24.1	10.2
LL1	0.69	1.13	1.07	7.33	1.56	0.67	7.62	1.27	7.76	2.48	20.8	4.44
LL2	0.77	1.20	1.19	6.15	0.68	0.56	6.75	0.93	1.79	1.51	18.6	1.76
LL3	0.82	2.16	1.87	8.28	1.01	0.57	7.75	1.28	4.18	2.47	37.4	4.82
LL4	0.93	3.07	3.73	7.44	2.80	1.24	8.72	4.44	11.9	8.62	39.5	18.5
LL5	0.67	2.62	2.33	19.5	0.31	0.64	16.7	8.60	0.72	1.61	81.3	45.0

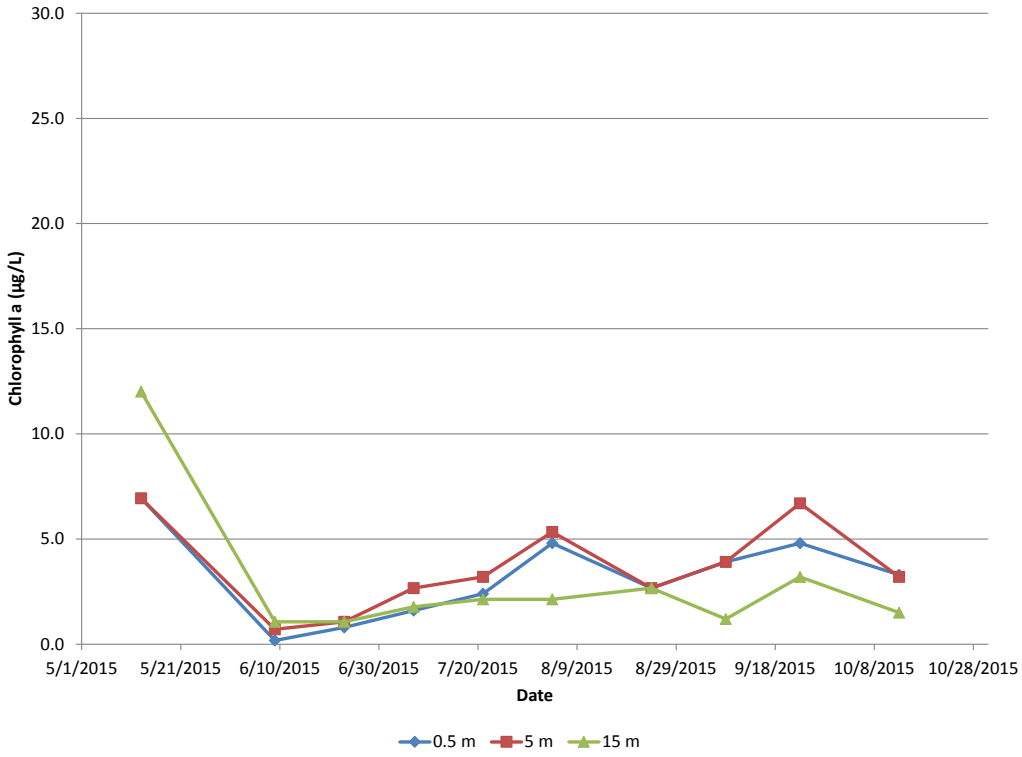

Figure 59. Chl Concentrations (µg/L) at Station LL0, May-October 2015

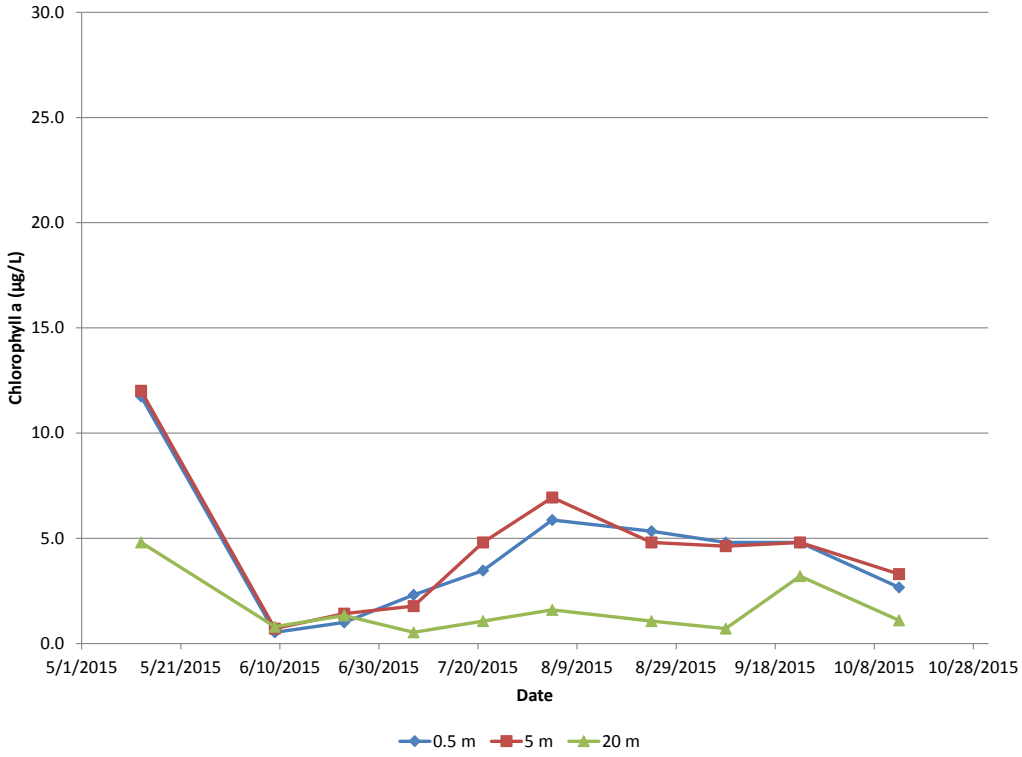

Figure 60. Chl Concentrations (µg/L) at Station LL1, May-October 2015

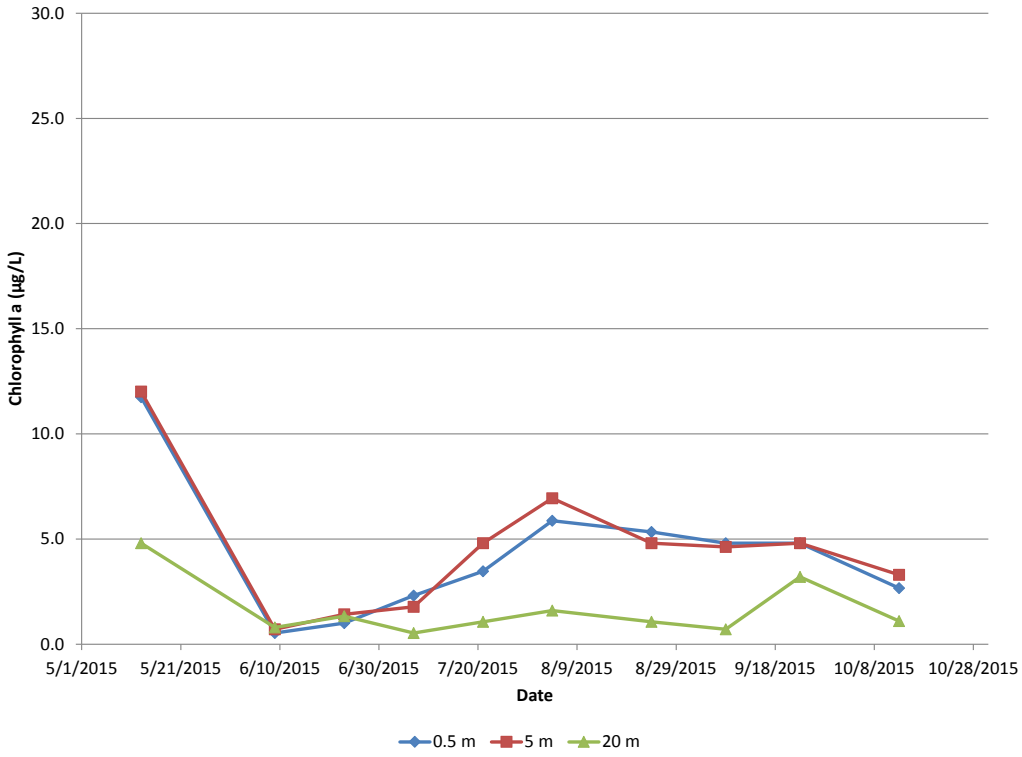

Figure 61. Chl Concentrations (µg/L) at Station LL2, May-October 2015

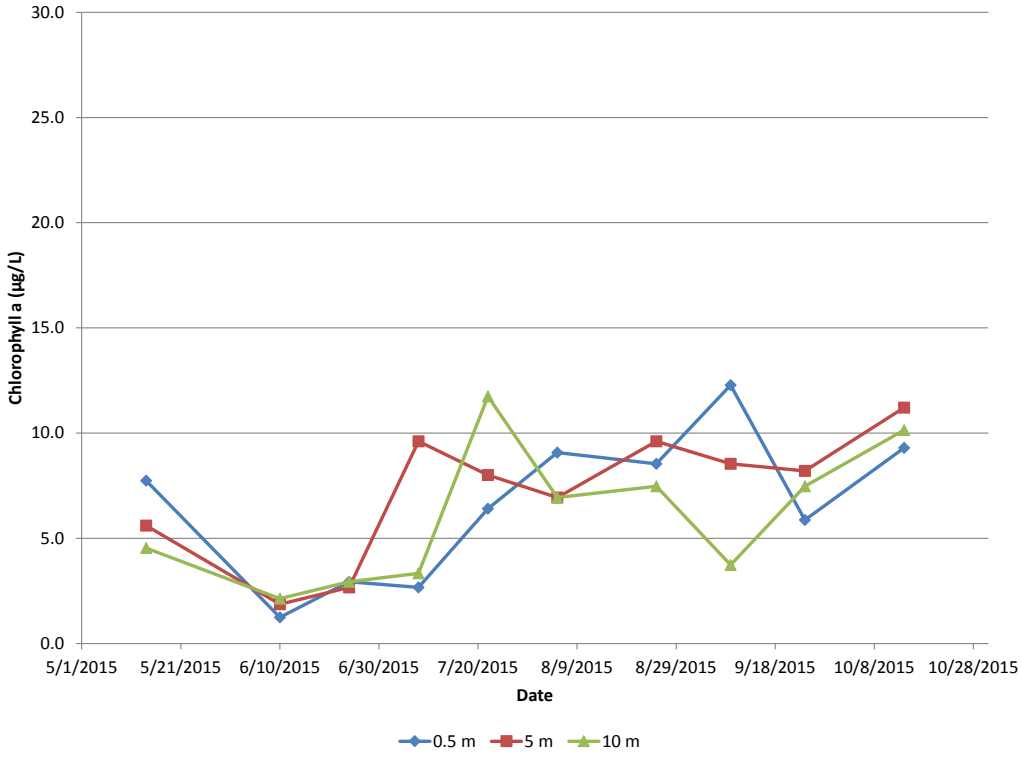

Figure 62. Chl Concentrations (µg/L) at Station LL3, May-October 2015

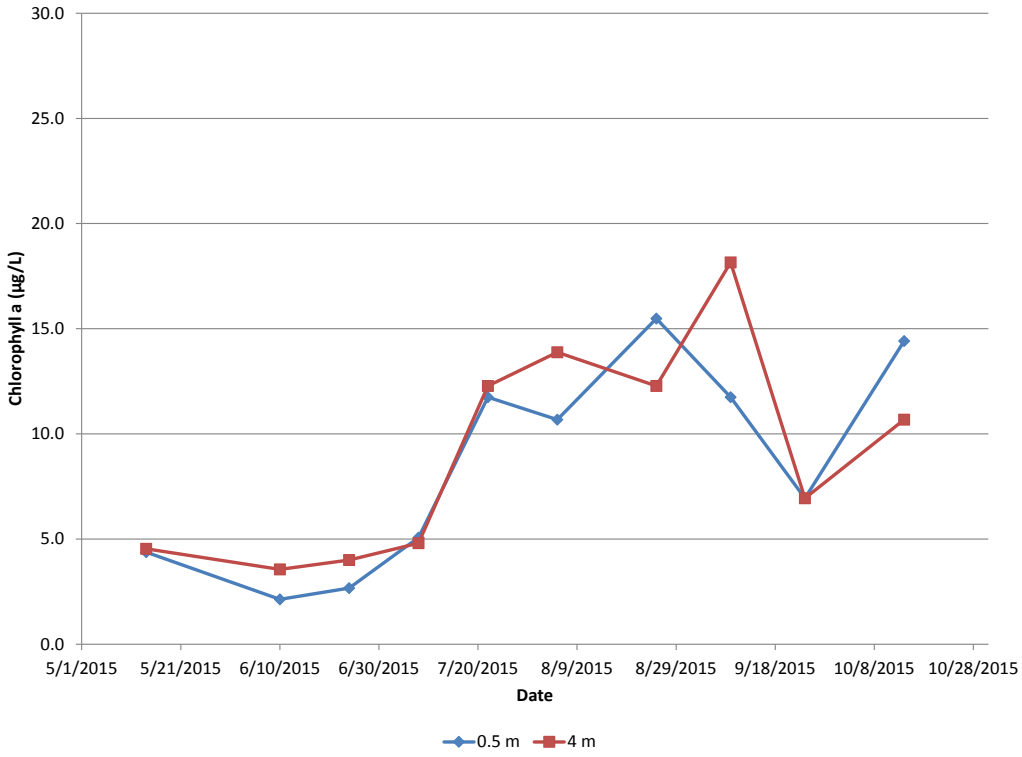

Figure 63. Chl Concentrations (µg/L) at Station LL4, May-October 2015

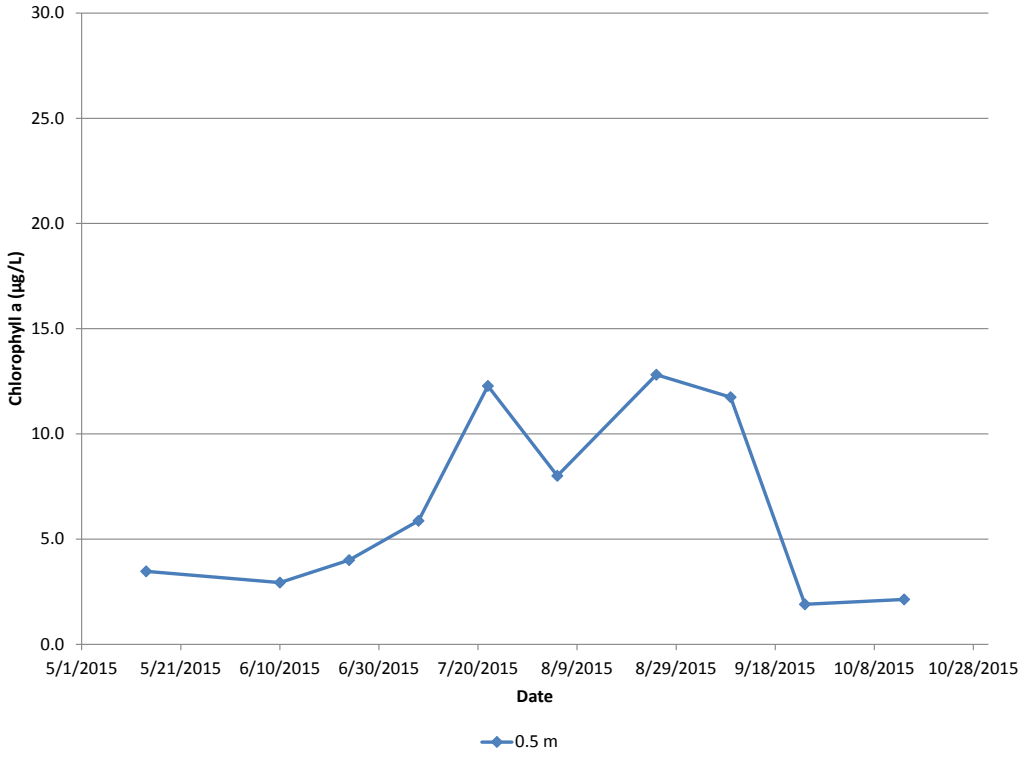

Figure 64. Chl Concentrations (µg/L) at Station LL5, May-October 2015

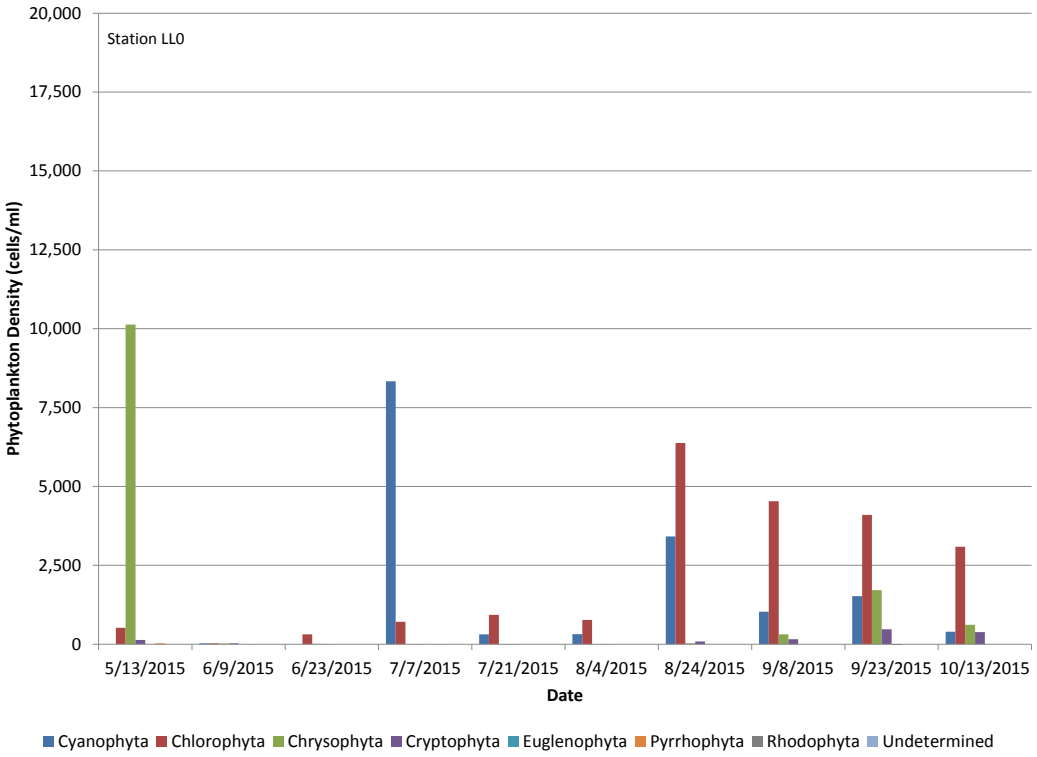

Figure 65. Phytoplankton Density (cells/ml) at Station LL0, May-October 2015

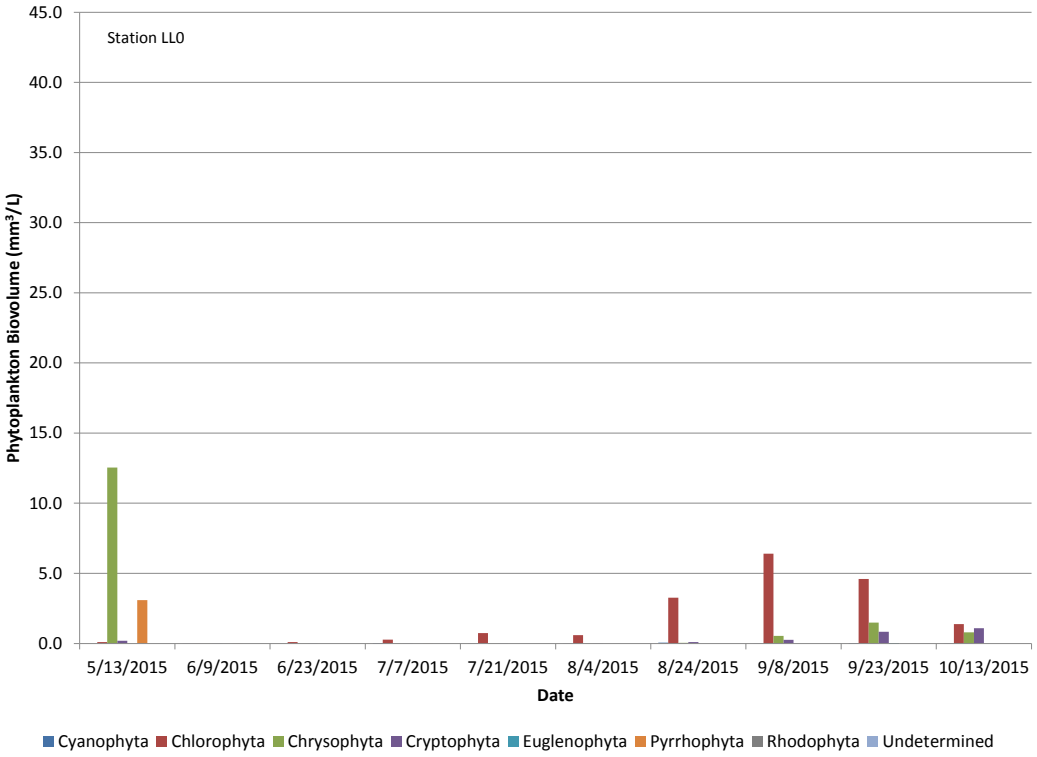

Figure 66. Phytoplankton Volume (mm^3/L) at Station LL0, May-October 2015

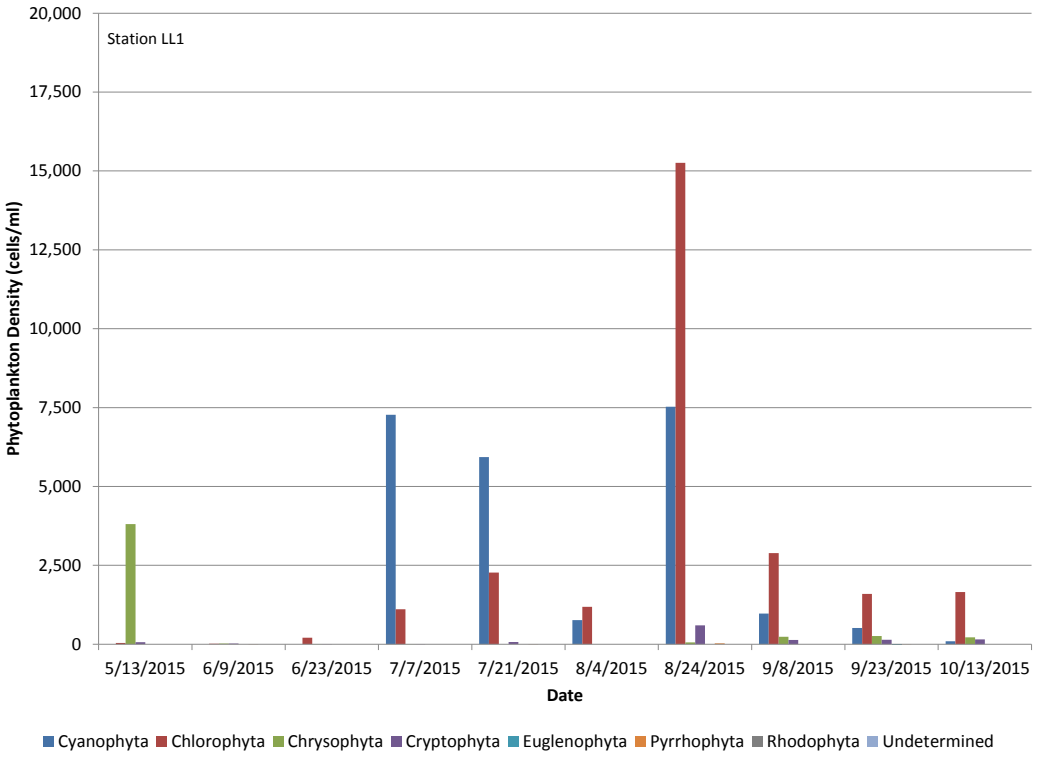

Figure 67. Phytoplankton Density (cells/ml) at Station LL1, May-October 2015

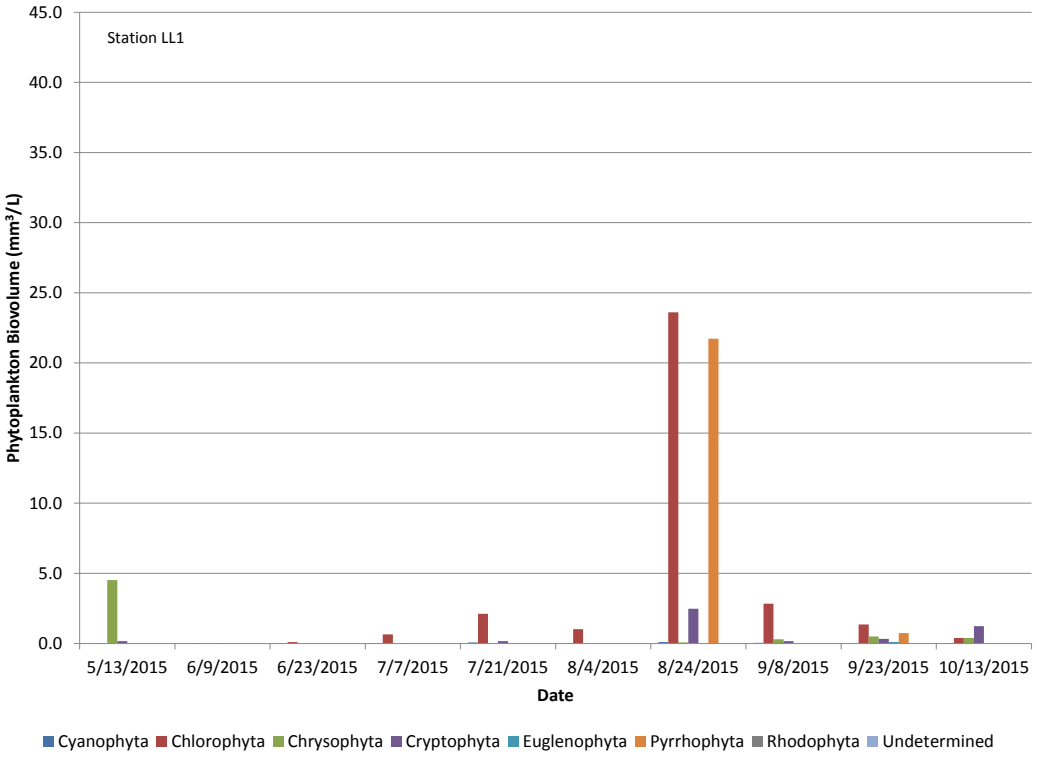

Figure 68. Phytoplankton Volume (mm^3/L) at Station LL1, May-October 2015

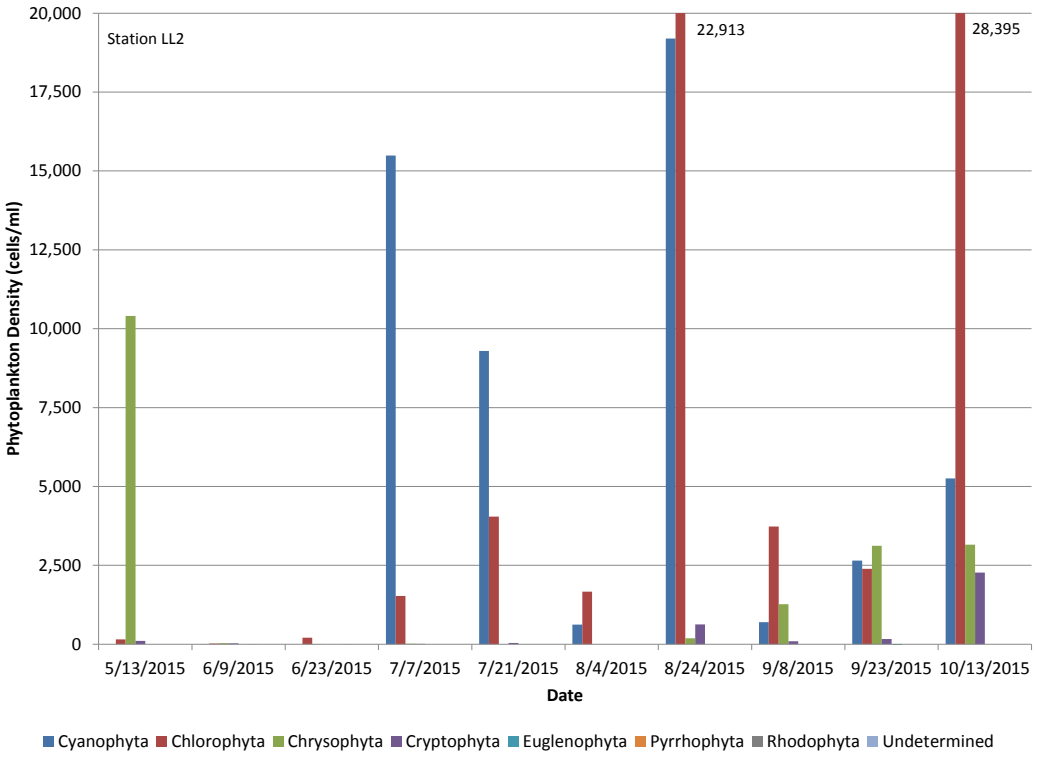

Figure 69. Phytoplankton Density (cells/ml) at Station LL2, May-October 2015

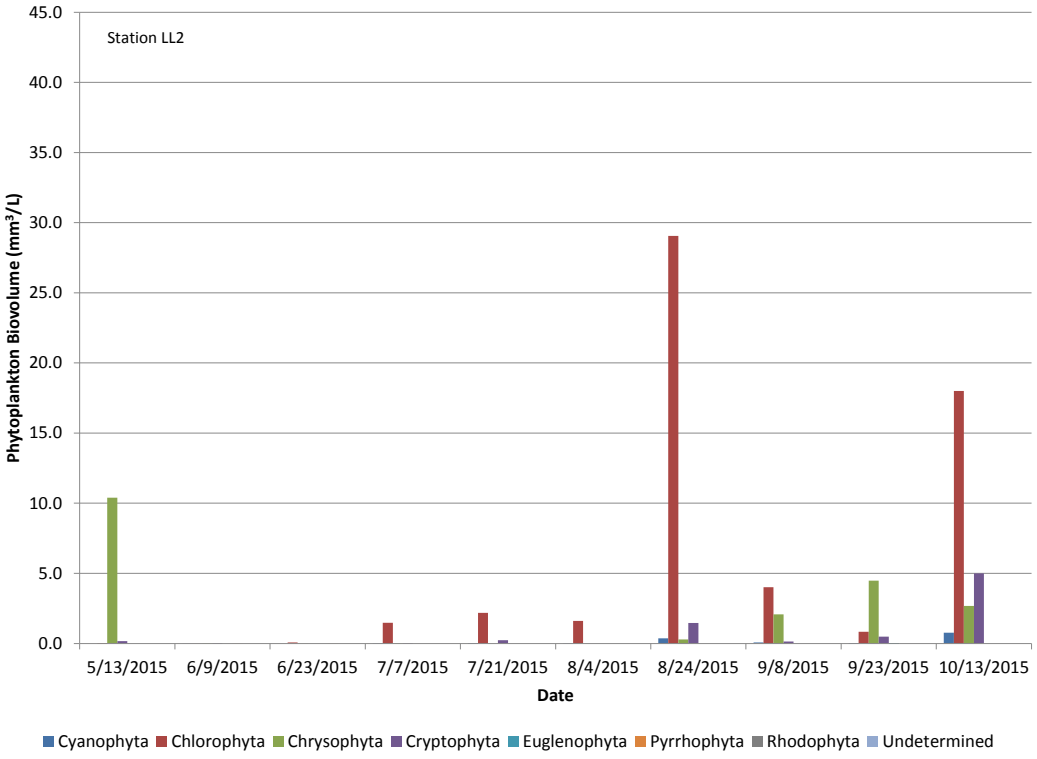

Figure 70. Phytoplankton Volume (mm^3/L) at Station LL2, May-October 2015

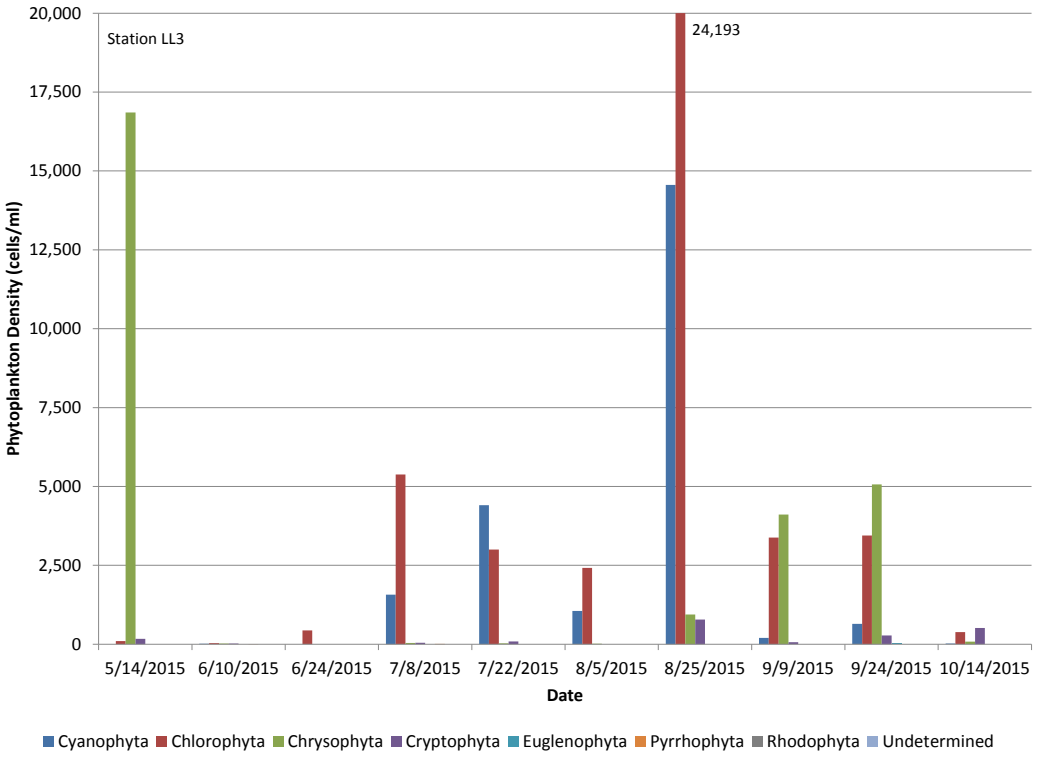

Figure 71. Phytoplankton Density (cells/ml) at Station LL3, May-October 2015

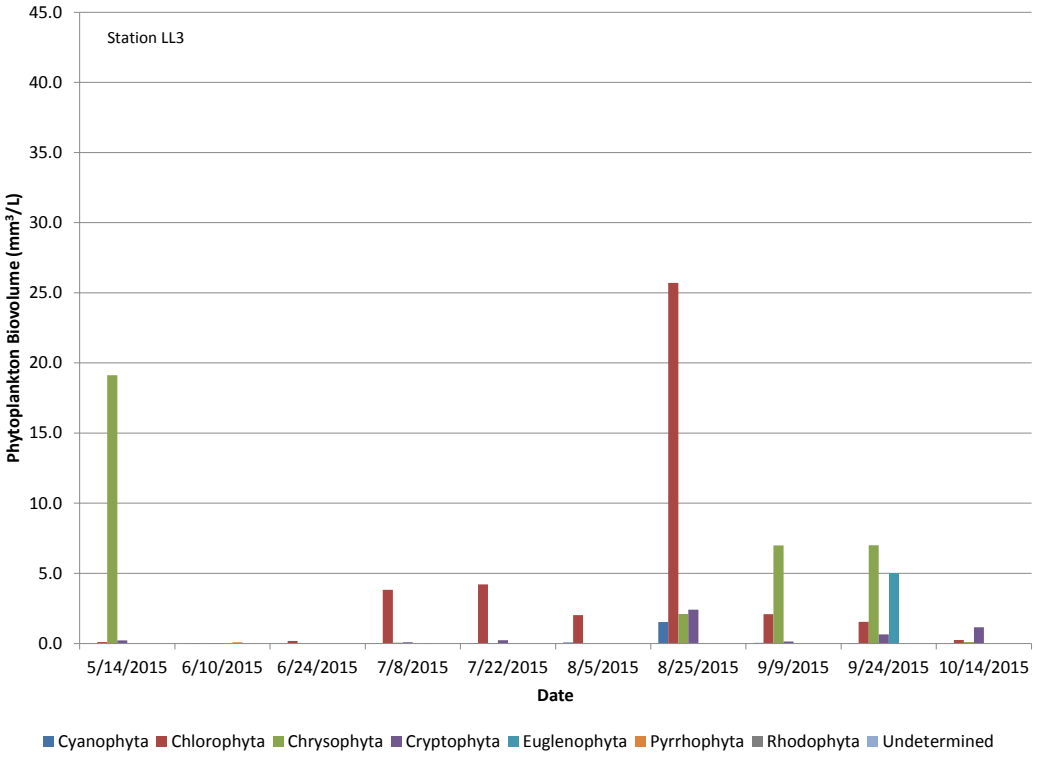

Figure 72. Phytoplankton Volume (mm^3/L) at Station LL3, May-October 2015

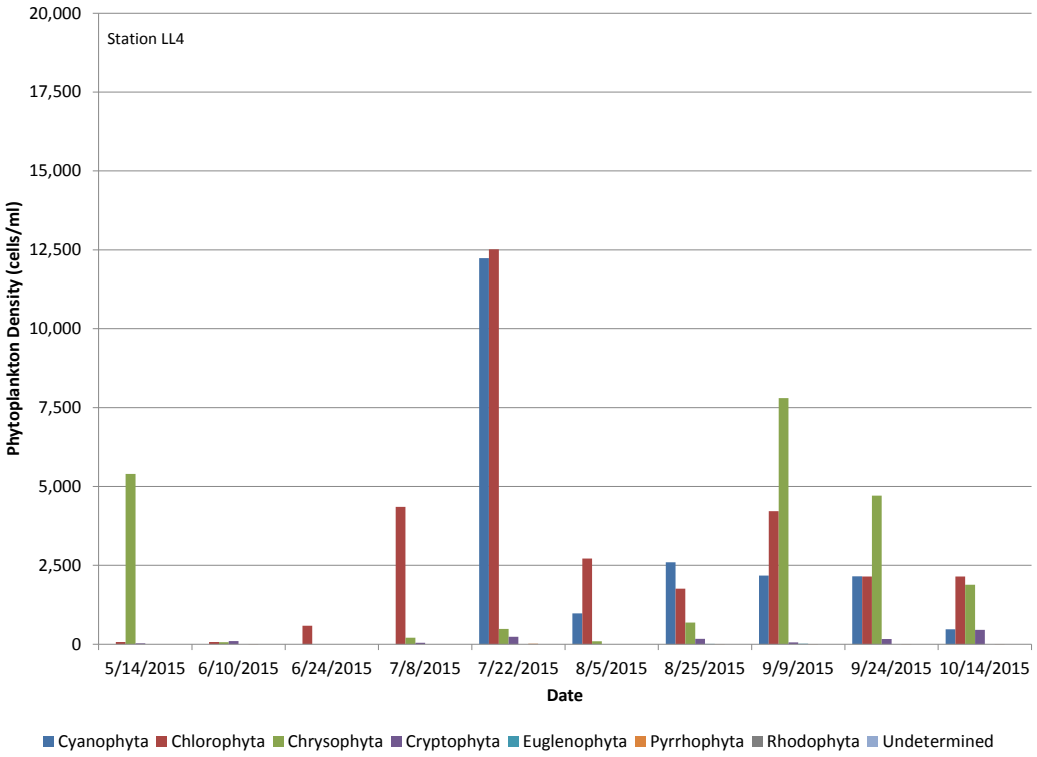

Figure 73. Phytoplankton Density (cells/ml) at Station LL4, May-October 2015

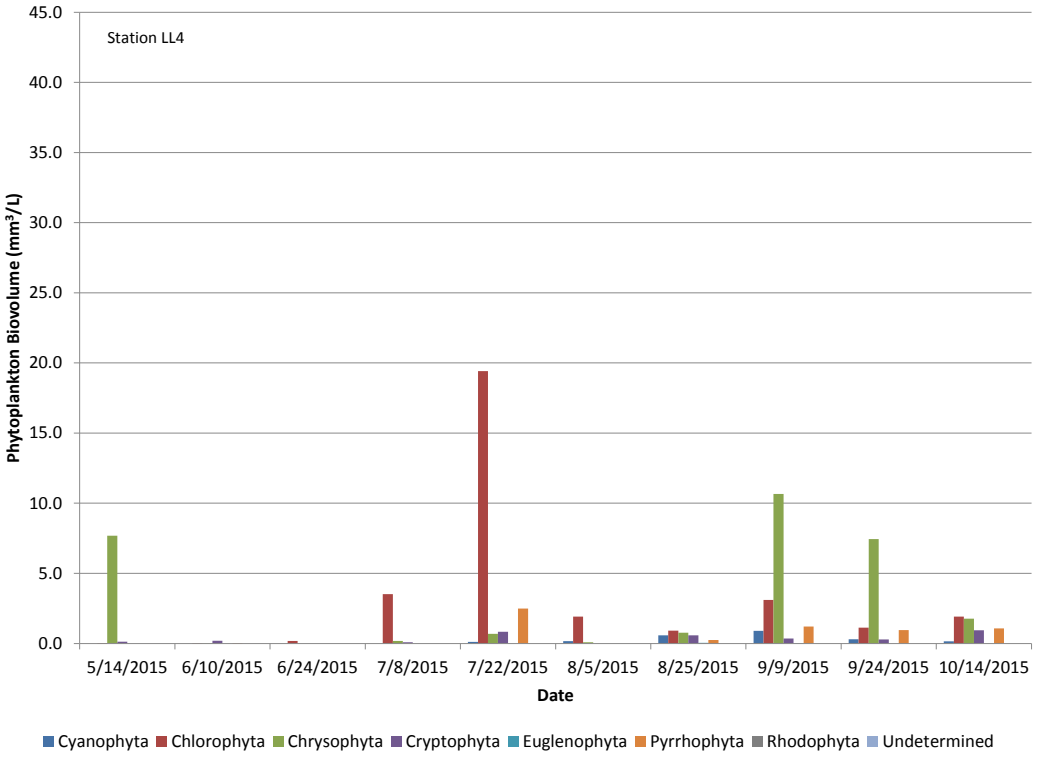

Figure 74. Phytoplankton Volume (mm^3/L) at Station LL4, May-October 2015

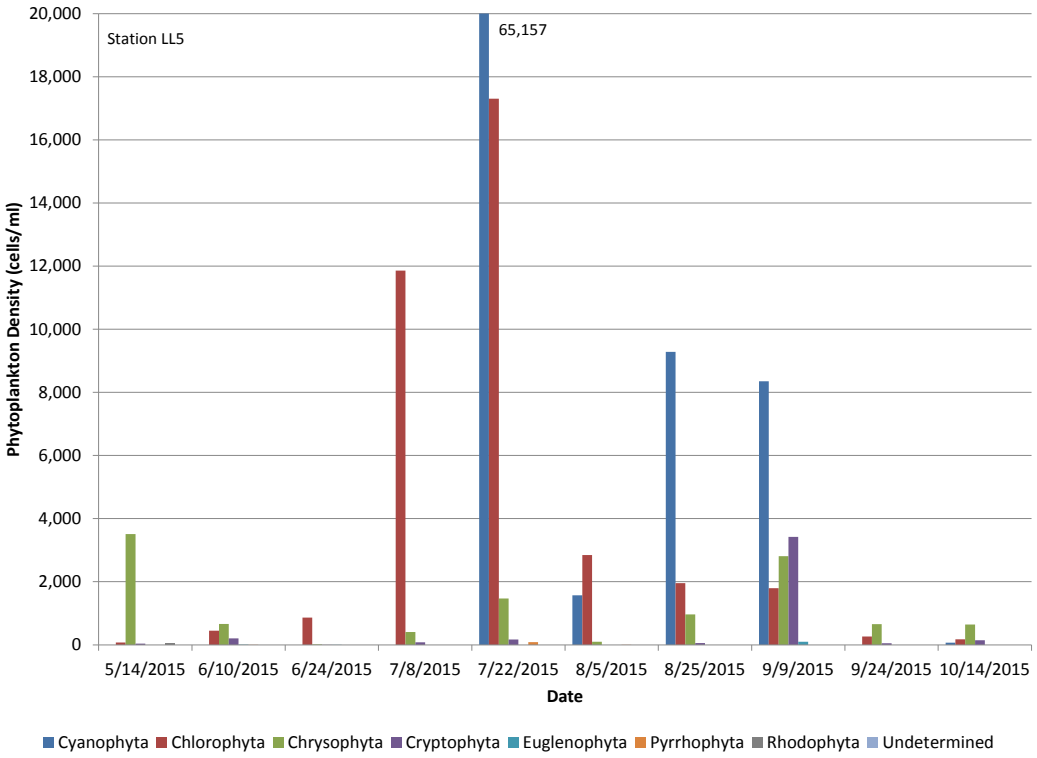

Figure 75. Phytoplankton Density (cells/ml) at Station LL5, May-October 2015

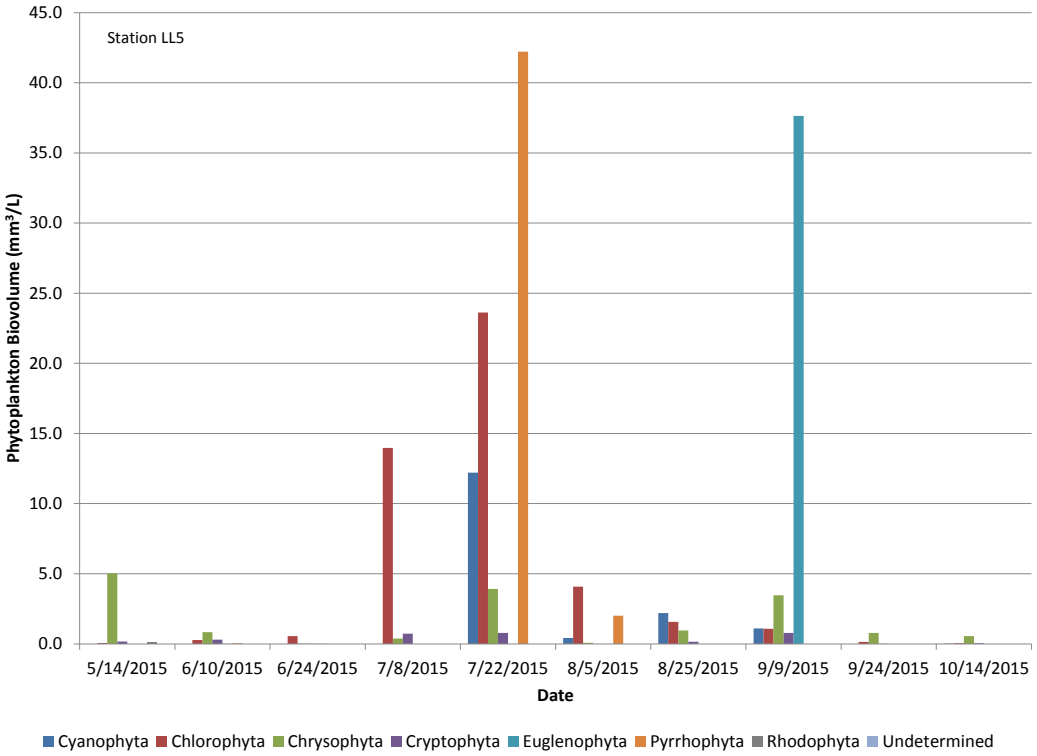

Figure 76. Phytoplankton Volume (mm^3/L) at Station LL5, May-October 2015

3.2.7 TRANSPARENCY (SECCHI DISK DEPTH)

Transparency ranged from 1.2 to 9.9 m throughout the reservoir during 2015 (Figures 77 through 82). The maximums occurred at different times, depending on the station, but were coincident with low chl concentrations. The minimums for most stations were in May when inflow was high and light attenuation was affected by non-algal particulate matter, although similar minimums occurred at LL4 and LL5 during a phytoplankton bloom in late July, August and early September. There were lower transparencies at the other stations during this time as well. Transparency was determined largely by phytoplankton except during May.

Transparency increased down-reservoir with greatest transparency occurring in the lacustrine zone. Much of that trend was likely due to longer water retention time and greater loss of particulate matter through settling, as well as plunging inflows that tend to isolate the lacustrine epilimnion allowing even more settling time from the upper layer.

Whole-lake, area-weighted mean transparency during June-October of 2010-2015 was 4.8 ± 0.35 m. In contrast, mean transparency during that period in 1971-1977, before phosphorus reduction, was 2.4 ± 0.44 m, and after reduction, 3.3 ± 0.39 m.

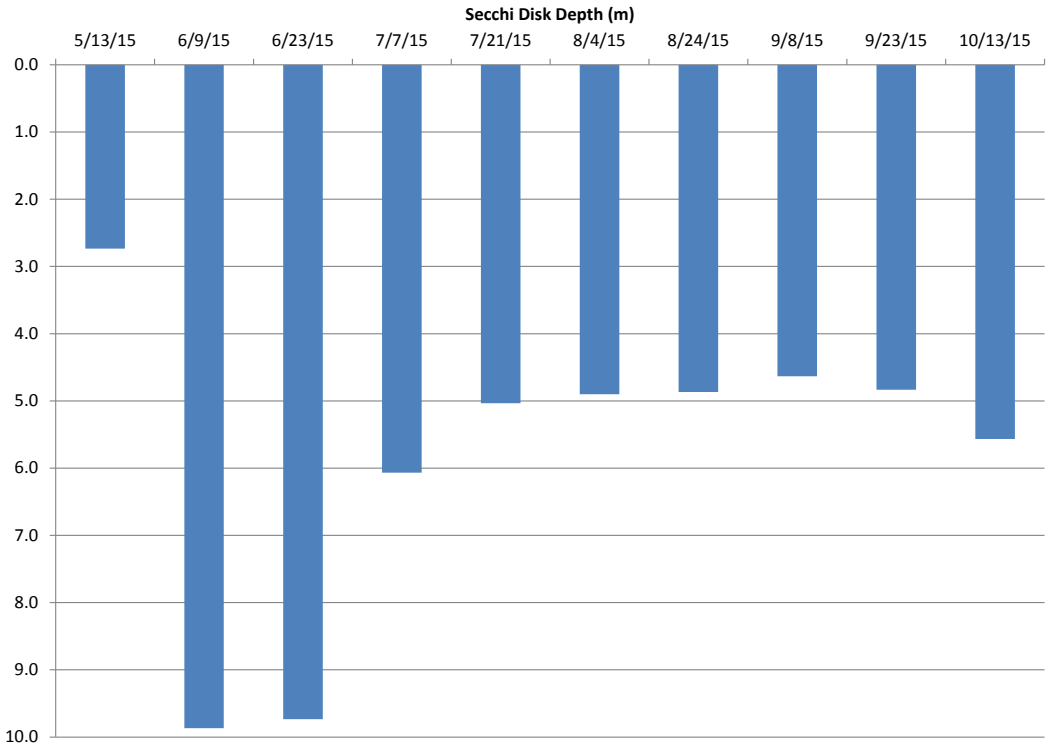

Figure 77. Secchi Disk Depths (m) for Station LL0, May-October 2015

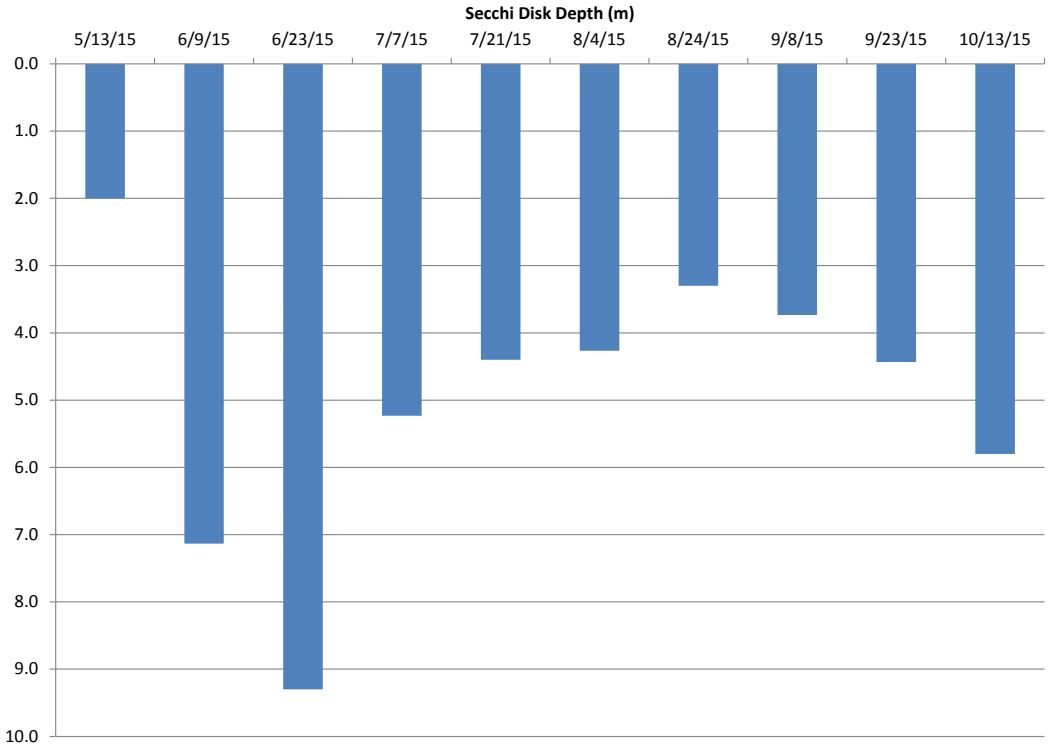

Figure 78. Secchi Disk Depths (m) at Station LL1, May-October 2015

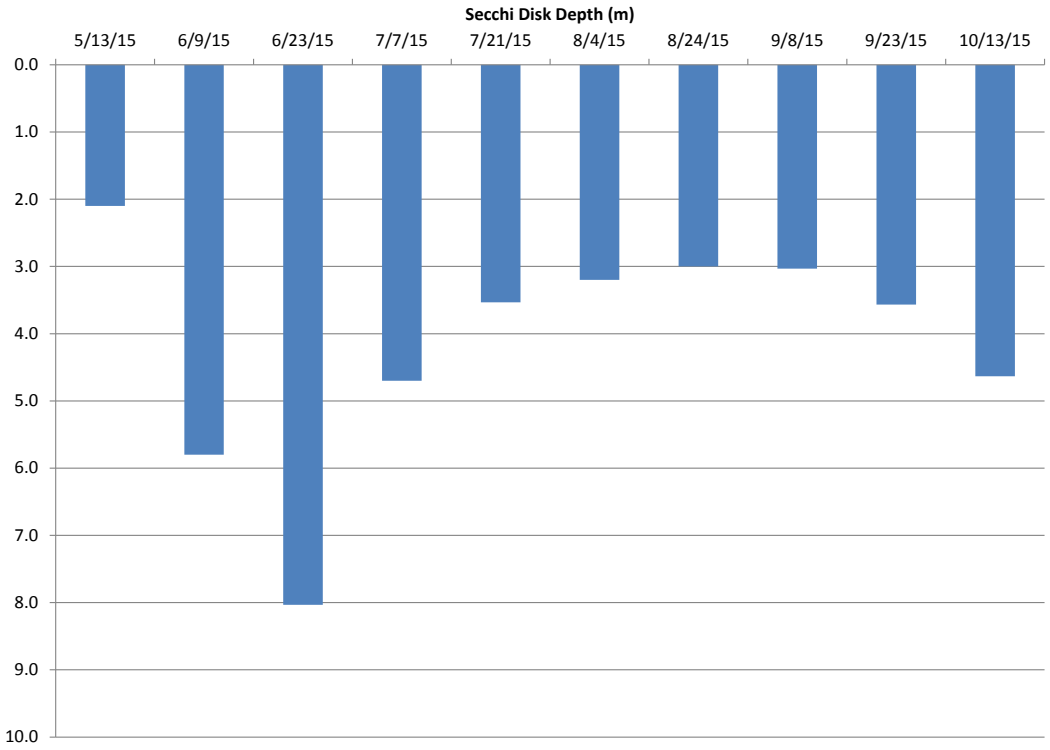

Figure 79. Secchi Disk Depths (m) at Station LL2, May-October 2015

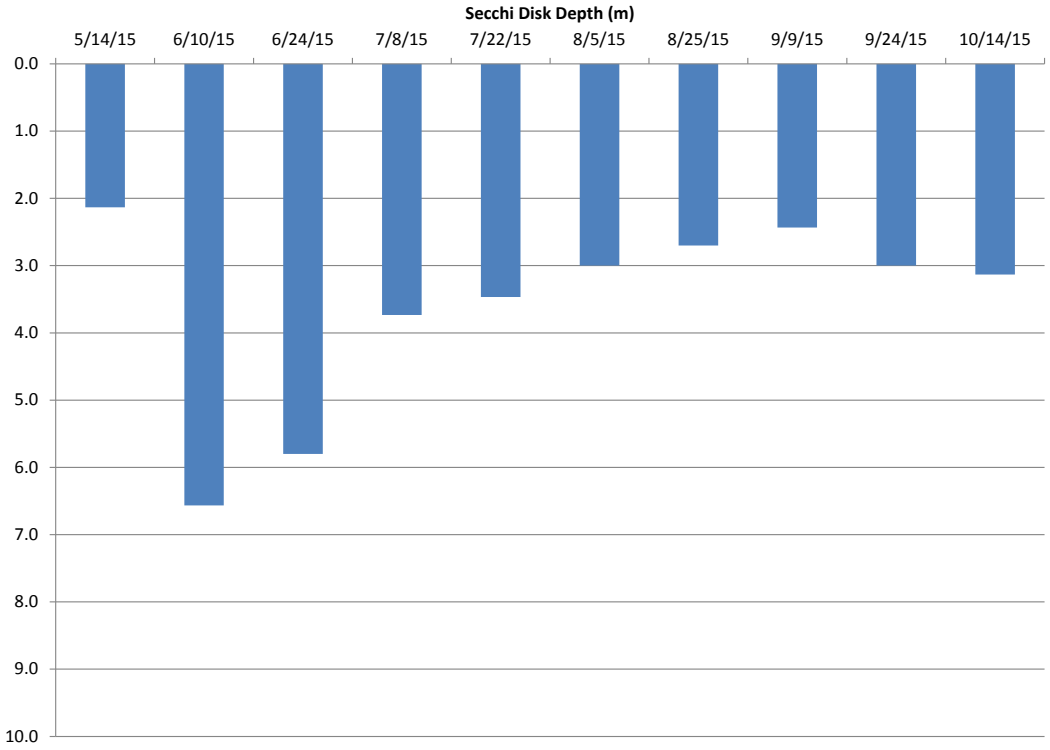

Figure 80. Secchi Disk Depths (m) at Station LL3, May-October 2015

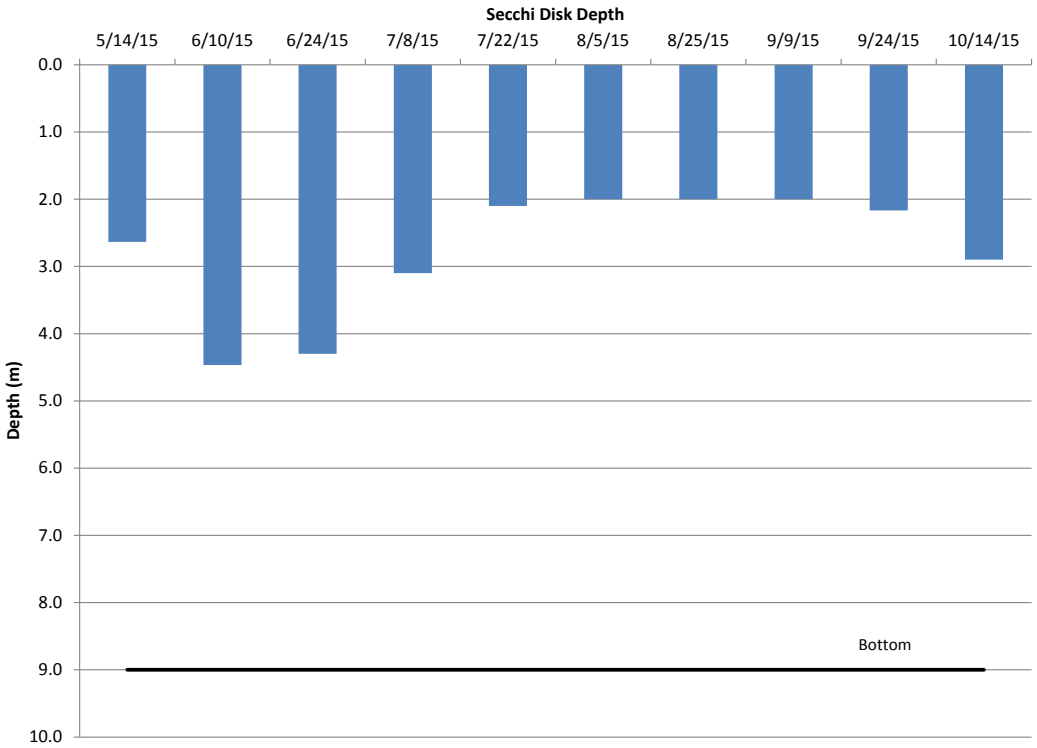

Figure 81. Secchi Disk Depths (m) at Station LL4, May-October 2015

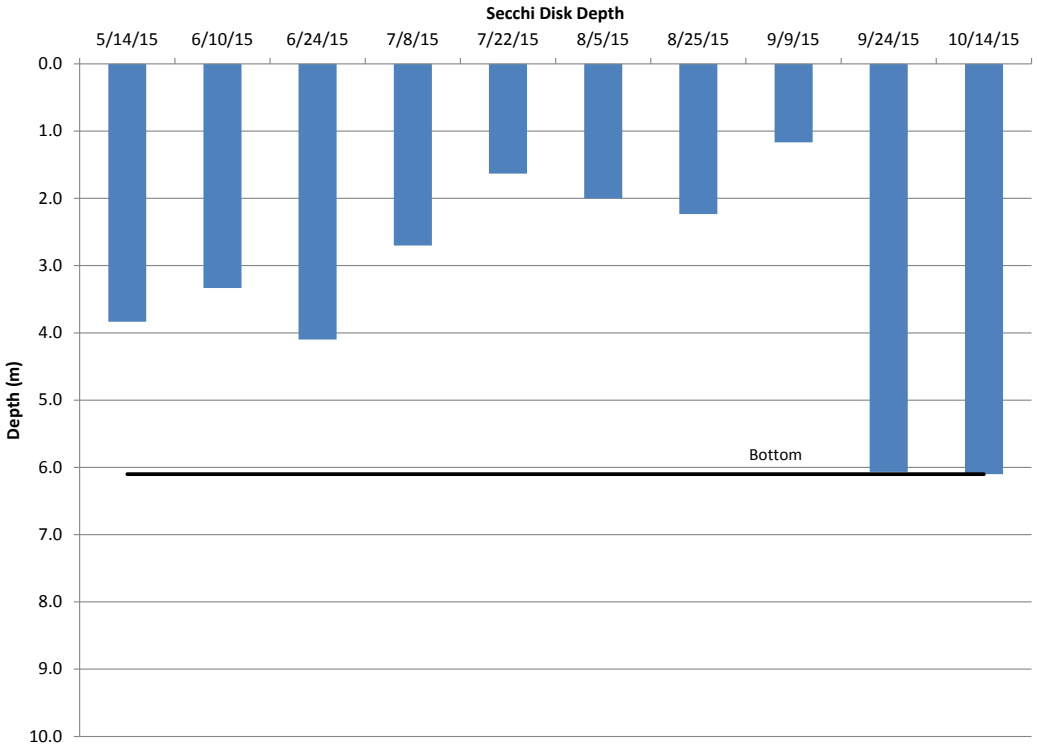

Figure 82. Secchi Disk Depths (m) at Station LL5, May-October 2015

3.2.8 ZOOPLANKTON

Rotifers and Nauplii usually dominated the zooplankton density (abundance) at most stations (Figures 83 through 94). Rotifers were more abundant in May and then again later in August and September, especially in the upper reservoir. However, they are relatively small and did not dominate biomass. Nauplii were more abundant during the summer and into the fall. Similar to Rotifers, Nauplii did not dominate biomass at any stations during 2015. Rotifer densities were usually higher in spring in 2015 at the deeper sites, but greatest at LL3 – LL5 in late summer. This was also the case in 2013 and 2014. That may be due to rotifers being detritus and bacteria eaters; abundance of such particles may occur at high concentrations in the upper hypolimnion and lower metalimnion and account for high densities despite the dilution effect of deep net hauls. Rotifer densities were higher at LL4 and LL5 in August and September, as well as late July at LL5, than at any other stations (75 to 178 #/L). Rotifer density, as well as other zooplankton species, declined dramatically at station LL5 in late September and October, although population densities remained high at LL4. The decline at LL5 corresponded to destratification of the water column and a decrease in water residence time with the start of higher inflows.

Cladocerans (*Cladocera*) are the largest zooplankters and they dominated biomass at all stations for most of the period. *Calanoid* copepods were relatively unimportant in contrast to natural lakes in which they usually dominate in the spring. *Calanoid* copepod biomass was high during the summer and into fall at LL4, but declined at LL5 with increased inflow and reduced retention time. Density and biomass of cladocerans, as well as other groups, were probably artificially reduced at the deeper lacustrine stations because animals were sampled by net hauls from approximately 1 m off the reservoir bottom. Large mobile zooplankton are much less likely to occur in the hypolimnion where food particles, especially phytoplankton, are scarce. That was especially apparent at LL4 and LL5 with very high maximum densities of 10-30/L and much lower densities at LL0 – LL3 with net hauls of 19-47 m. Biomass of cladocerans was also often near or over 100 µg/L at LL4 – LL5.

Multiplying concentrations by net haul depth, giving density and biomass per surface area, tends to even out the station differences (Tables 10 – 13). Although depth-corrected average seasonal cladoceran concentrations were still higher at LL3 – LL5 than other sites in 2015 (52-104 $x10^3/m^2$; Table 10), they were even higher in 2013 (92-281 $x10^3/m^2$) at LL4 – LL5 (Table 12). Thus, part of the reason for low cladoceran density and biomass at deep sites is likely a dilution effect with greater net haul depths.

There was a shift in cladoceran density and biomass among upper reservoir sites (LL4 – LL5) over the past four years. Densities were highest in 2013, averaging 26 and 56/L and over 200,000/m2 at LL4 – LL5. Maximum densities were lower in the transition and riverine zones (LL4 – LL5) in 2012 (10 and 6.2/L), and were similar to the highest means in 2014 (6.2 and 9.2/L), which were at LL3 – LL4 (Tables 12 and 14). In 2015, maximum densities were similar to both 2012 and 2014 at LL4 – LL5 with 13 and 10.3/L (Table 10). Mean densities at LL4 – LL5, corrected for net-haul depth (no/m2), were much lower in 2012, 2014, and 2015 than in 2013. Season (June-October) average water residence times may explain some of the differences in density among the years; 2012 and 2014 with less density had shorter residence times, at 3.6 and 5.9 days, than 2013 (6.9

days) with the high densities, although the difference of only 1 day between 2013 and 2014 is probably not significant. While, water residence time in 2015 was the longest out of all monitored years, mean density at LL4 was actually lower than in 2013 (103,820 vs. 205,800/m^2). The lowest mean density corrected for depth of any of the four years and sites occurred at LL5 in 2014 with an average residence time of 5.9 days. Water residence time is definitely an important factor to both phytoplankton and zooplankton, even more so for zooplankton, due to their slower growth rate. However, average seasonal residence time is probably not always a good indicator in the upper reservoir due to variability in hydraulic conditions. For example, all zooplankton populations were thriving well at LL5 during most of the dry, low inflow summer, but were greatly depleted in late September and October when inflows increased.

Compared to 2013, cladoceran density at all stations in 2015 was significantly less and similar to densities in 2012 and 2014 (Tables 10 – 13). The highest summer mean cladoceran density observed in 2015 was at station LL4 with nearly 104,000/m^2, corrected for net haul depth. In 2013 at station LL0 summer mean *Cladocera* density was over 254,000/m^2 or nearly 7 times that in 2015, and 5 times that in 2014. The largest difference was observed at station LL5 where cladoceran density in 2012 was slightly over 13,000/m^2 and in 2013 the density was nearly 281,000/m^2 (Tables 11 and 12). In 2015 at station LL5 cladoceran density was second highest of the four years at 51,600/m^2 (Table 10). Cladocerans (including *Daphnia*) also had the largest biomasses during summer at all sites, with maximums reaching 184 µg/L in 2015 at LL4. In 2014 maximum cladoceran biomass was 150 µg/L, or more at LL3 and LL4. These maximums were lower than in 2013 at LL4 and LL5 with biomass well over 200 µg/L. In August 2012, biomass maximums averaged only about 80 µg/L. Variability in cladoceran abundance from year-to-year has been quite large. The reason for this variability is not clear, but such is not unusual with dynamic plankton populations responding to sometimes rapidly changing environmental conditions.

Because of their large size, cladocerans are usually the most important grazers, with *Daphnia* being the largest and most efficient. *Daphnia* size at LL4 has ranged from 0.7 to 2.8 mm, mostly between 1.0 to 2.1 mm. At that size they are the favorite food for visually-feeding, planktivorous fish. Moreover, *Daphnia* usually had "helmets" throughout the summer in 2014. Helmets usually indicate low predation. *Daphnia* were helmeted in 2012 and 2013 as well. It is unknown whether *Daphnia* had helmets in 2015 due to a change in laboratory and counting procedures/reporting. The presence of helmets may not be due to fish predation in this case, because a large number of catchable size trout were stocked in the lake beginning in June of 2014 (155,000) as well as in May of 2015 (155,000), with no such intensive stocking in 2012 or 2013. Although temperatures in the top 5 m were above optimum during July-August, suitable temperatures for fish predation existed below that depth.

The trophic state, or degree of enrichment, of a lake can be judged by the amount of zooplankton consumer production relative to that of phytoplankton production. The transfer of food energy from one trophic level (producers) to the next (zooplankton consumers) is nominally 10%. That is, 10% of carbon produced gets to the next level, or the transfer is 10% efficient. If biomass turnover rate were the same at each trophic level, then the ratio of zooplankton dry biomass to phytoplankton dry biomass would be one tenth, assuming all phytoplankton are edible and all

zooplankton are eating algae. However, productivity, or turnover rate, of producer levels is usually greater than at consumer levels. Cyanobacteria are largely inedible, but their maximum percent of the phytoplankton biomass averaged only 4.7 and 3.0 in 2012 and 2013, but increased to 37% in 2014 and decreased again in 2015 at 14%. These fractions are relatively low in the earlier two years but surprisingly high in 2014. As a lake becomes more eutrophic, the fraction of inedible cyanobacteria increases and the zooplankton:phytoplankton ratio decreases. Some studies suggest the percent cyanobacteria begins to increase around 30 µg/L TP or more (Downing et al. 2001). Total phosphorus concentrations were not higher in 2014 – only 12 µg/L, so the reason for the higher cyanobacteria fraction is not clear. Also, cladocerans are large and usually the major consumers, and they have averaged 66% of total zooplankton biomass over the past four years. Over 90% of cladocerans have been *Daphnia*, which can have very high growth rates and are capable of consuming all the algae produced per day under ideal conditions (Welch and Jacoby, 2004).

The zooplankton:phytoplankton biomass (dry-weight) ratio in a 15 m water column was determined by converting phytoplankton biovolume to dry weight, assuming cells are 85% water. In Lake Spokane the ratio has ranged from a three-year (2012 – 2014) per site average of 0.3 to 0.59, with an overall mean of 0.44, which would indicate nearly half the phytoplankton are apparently being consumed, assuming biomass turnover rates were the same for each trophic level. In 2015, the ratio was dramatically lower than the 2012 – 2014 averages, ranging from 0.03 to 0.17. The low ratios in 2015 were likely due to higher phytoplankton biovolumes due to differences in average cell biovolumes used by the different laboratories (WATER Environmental Services and EcoAnalysts, Inc.) and not due to a large biovolume of inedible cyanobacteria. This is supported by the relatively low contribution from cyanobacteria to overall biovolume throughout the period (see Table 9).

Table 10. Summer Mean Density of *Cladocera* at the Six Stations in 2015 Corrected for Depth of Net Haul to Aerial Units

Station	Net Haul Depth (m)	No./L	No./m^3	No./m^2
LL0	47.5	0.78	781	37,115
LL1	33	1.00	1003	33,104
LL2	25	1.30	1301	32,537
LL3	19	3.54	3544	67,332
LL4	8	12.98	12977	103,820
LL5	5	10.31	10313	51,567

Table 11. Summer Mean Density of *Cladocera* at the Six Stations in 2012 Corrected for Depth of Net Haul to Aerial Units

Station	Net Haul Depth (m)	No./L	No./m^3	No./m^2
LL0	48	1.70	1,702	81,695
LL1	33	1.14	1,143	37,733
LL2	25	1.86	1,861	46,525
LL3	18	2.98	2,984	53,714
LL4	8	9.97	9,967	79,737
LL5	5	6.22	6,223	31,117

Table 12. Summer Mean Density of *Cladocera* at the Six Stations in 2013 Corrected for Depth of Net Haul to Aerial Units

Station	Net Haul Depth (m)	No./L	No./m^3	No./m^2
LL0	47	5.41	5,413	254,388
LL1	33	4.14	4,136	136,483
LL2	25	4.33	4,331	108,265
LL3	18	5.09	5,085	91,533
LL4	8	25.7	25,726	205,804
LL5	5	56.2	56,154	280,768

Table 13. Summer Mean Density of *Cladocera* at the Six Stations in 2014 Corrected for Depth of Net Haul to Aerial Units

Station	Net Haul Depth (m)	No./L	No./m^3	No./m^2
LL0	47	1.21	1,210	56,892
LL1	33	2.39	2,393	78,959
LL2	25	2.87	2,869	71,735
LL3	19	6.17	6,166	117,150
LL4	8	9.19	9,187	73,497
LL5	5	2.63	2,629	13,147

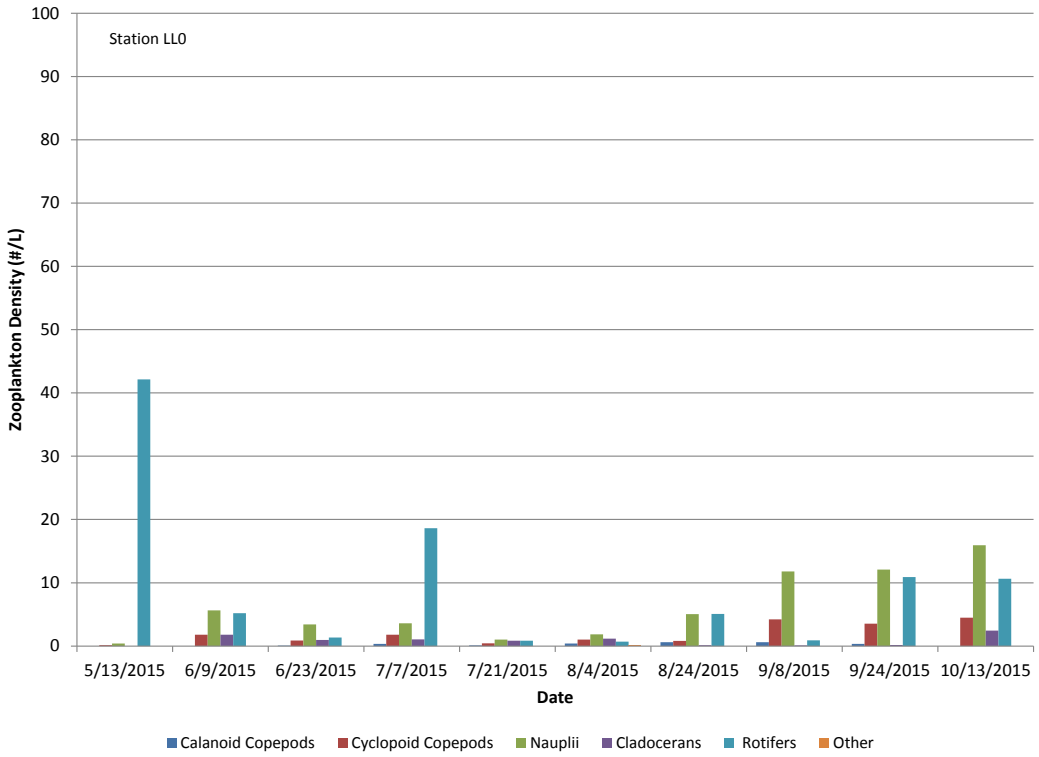

Figure 83. Zooplankton Density (#/L) at Station LL0, May-October 2015

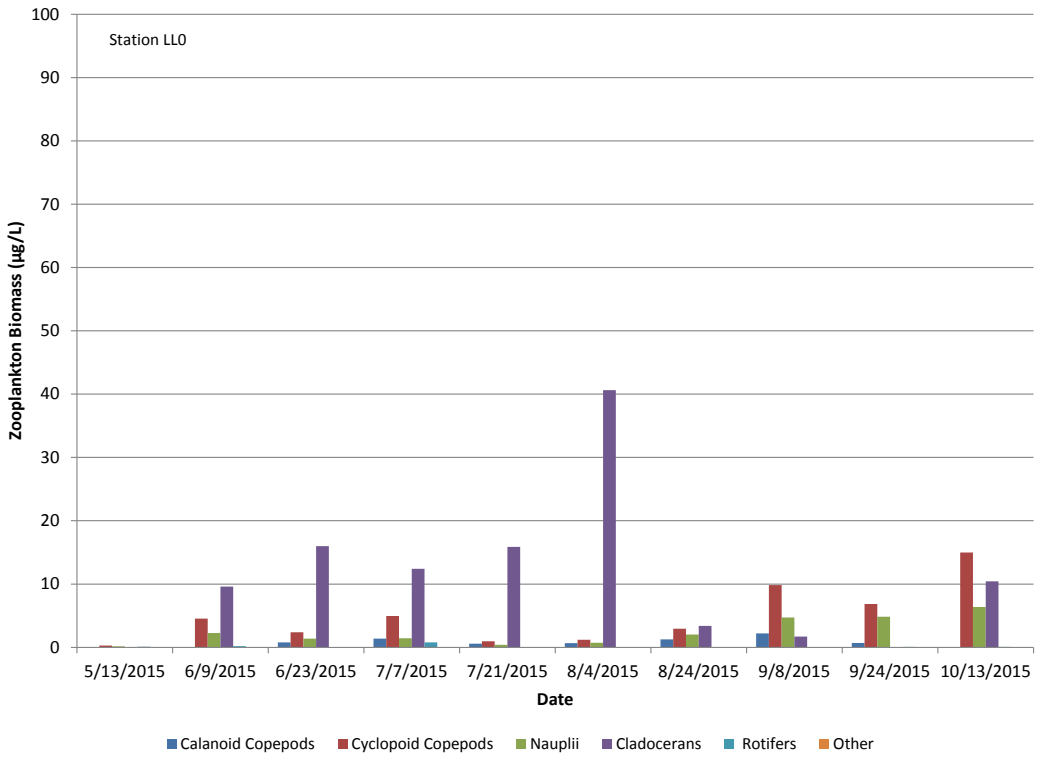

Figure 84. Zooplankton Biomass (µg/L) at Station LL0, May-October 2015

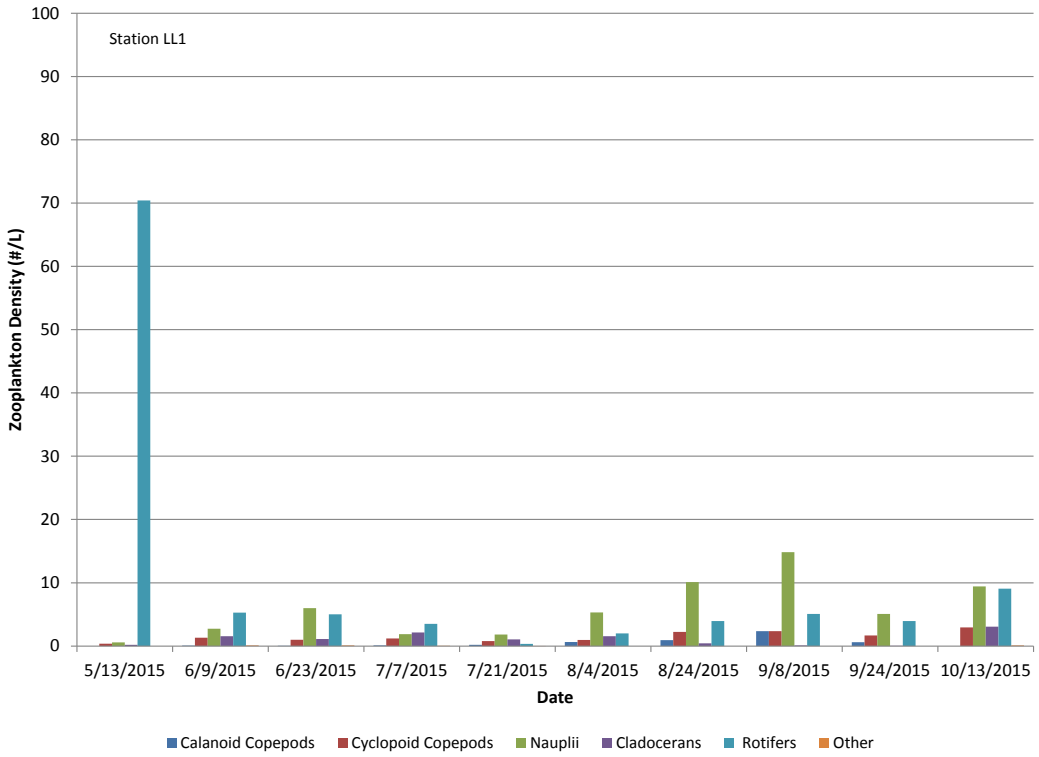

Figure 85. Zooplankton Density (#/L) at Station LL1, May-October 2015

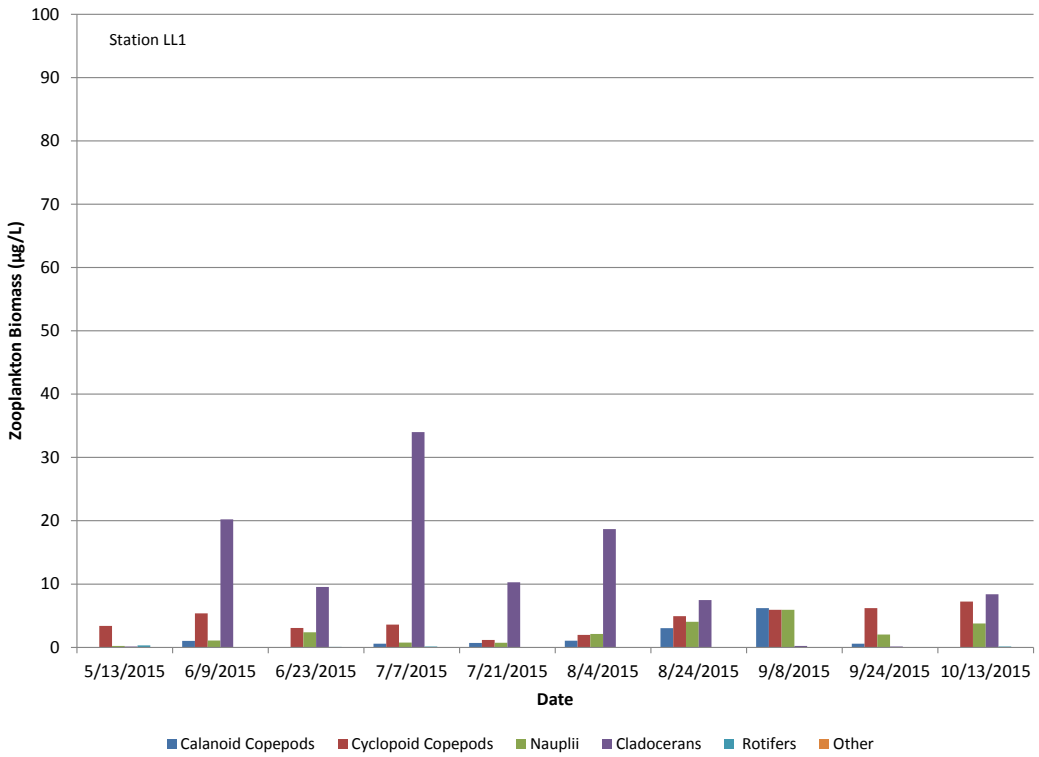

Figure 86. Zooplankton Biomass (µg/L) at Station LL1, May-October 2015

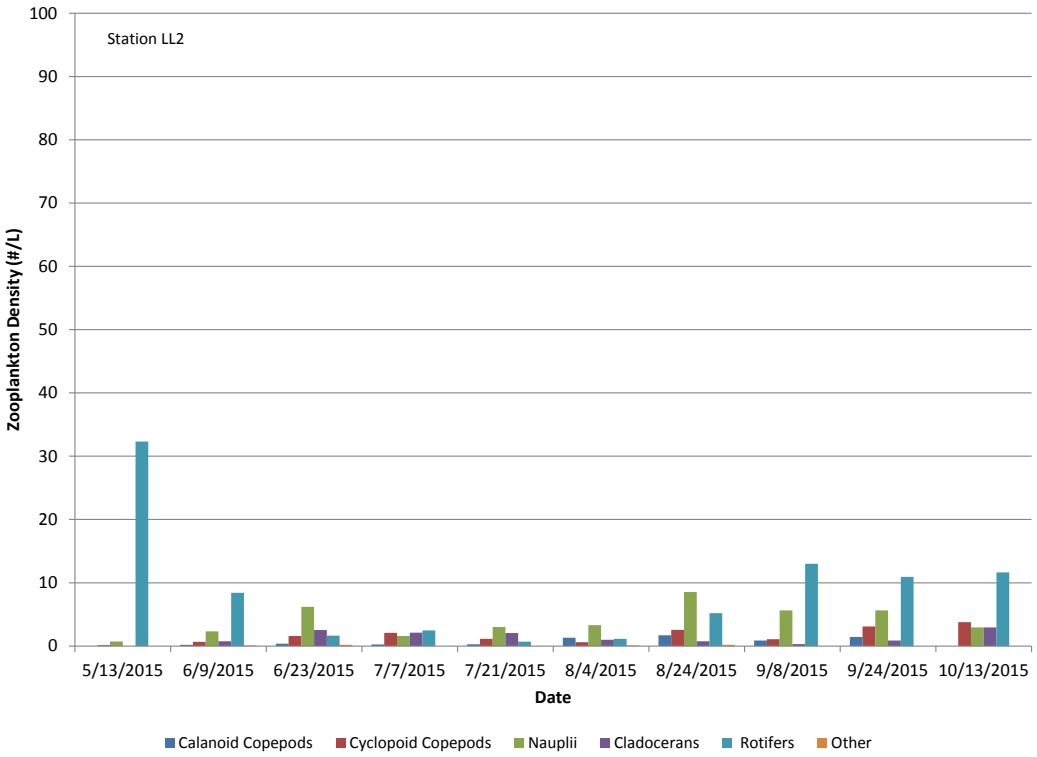

Figure 87. Zooplankton Density (#/L) at Station LL2, May-October 2015

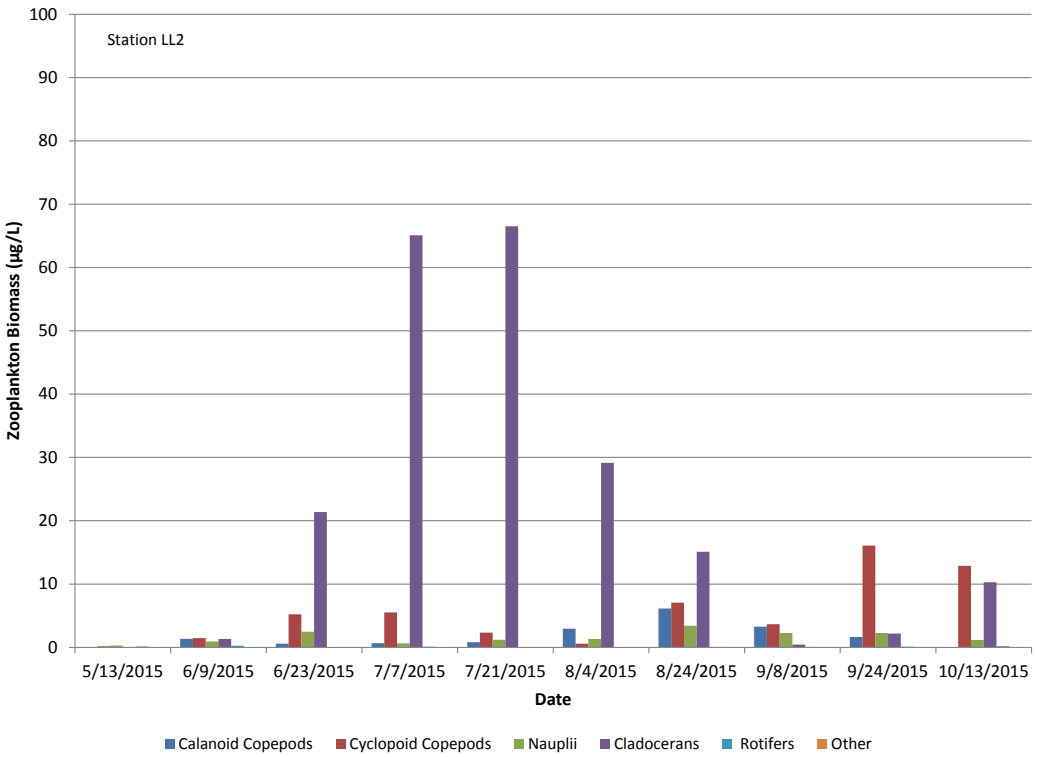

Figure 88. Zooplankton Biomass (µg/L) at Station LL2, May-October 2015

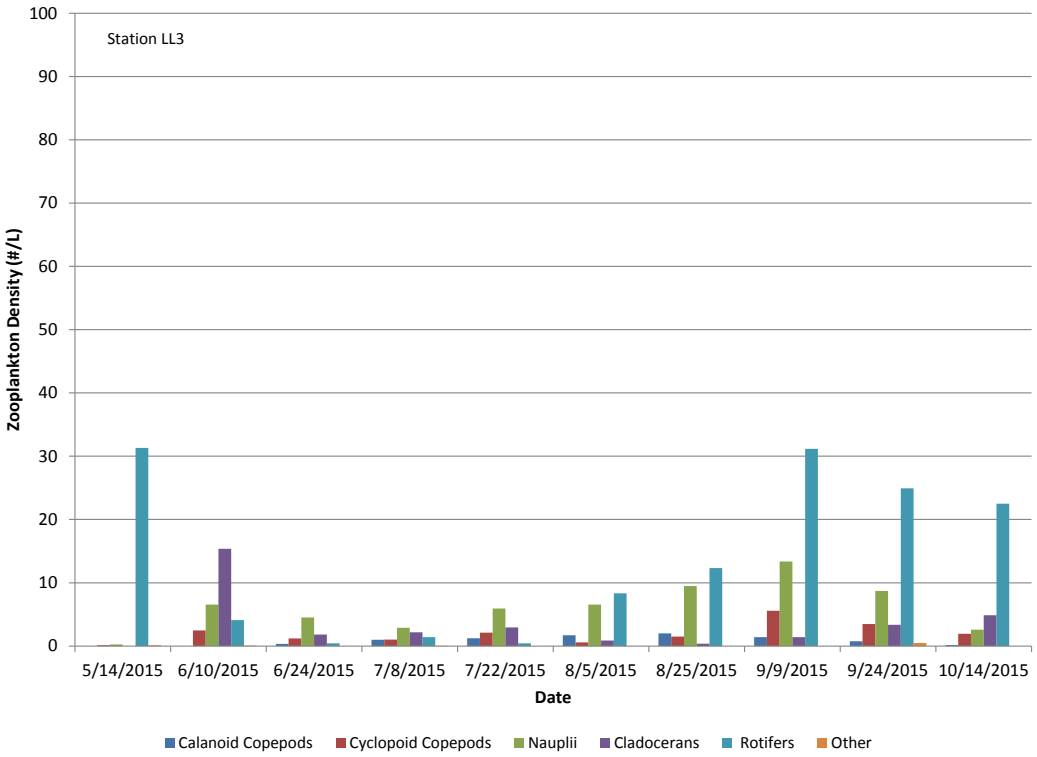

Figure 89. Zooplankton Density (#/L) at Station LL3, May-October 2015

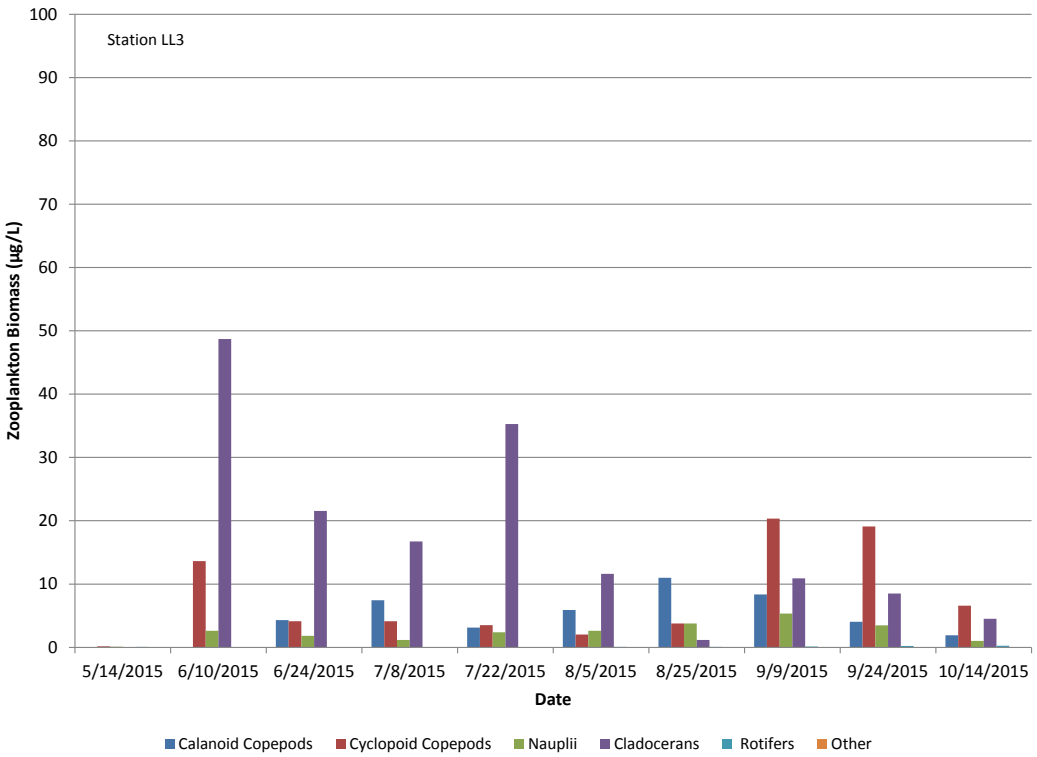

Figure 90. Zooplankton Biomass (µg/L) at Station LL3, May-October 2015

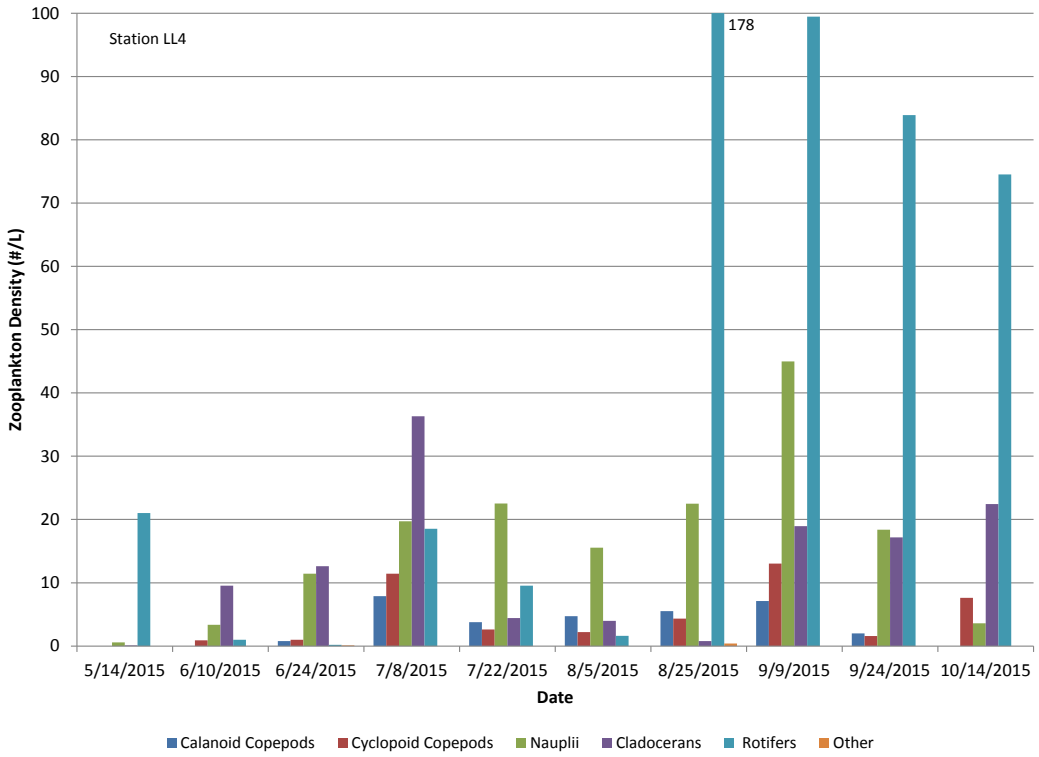

Figure 91. Zooplankton Density (#/L) at Station LL4, May-October 2015

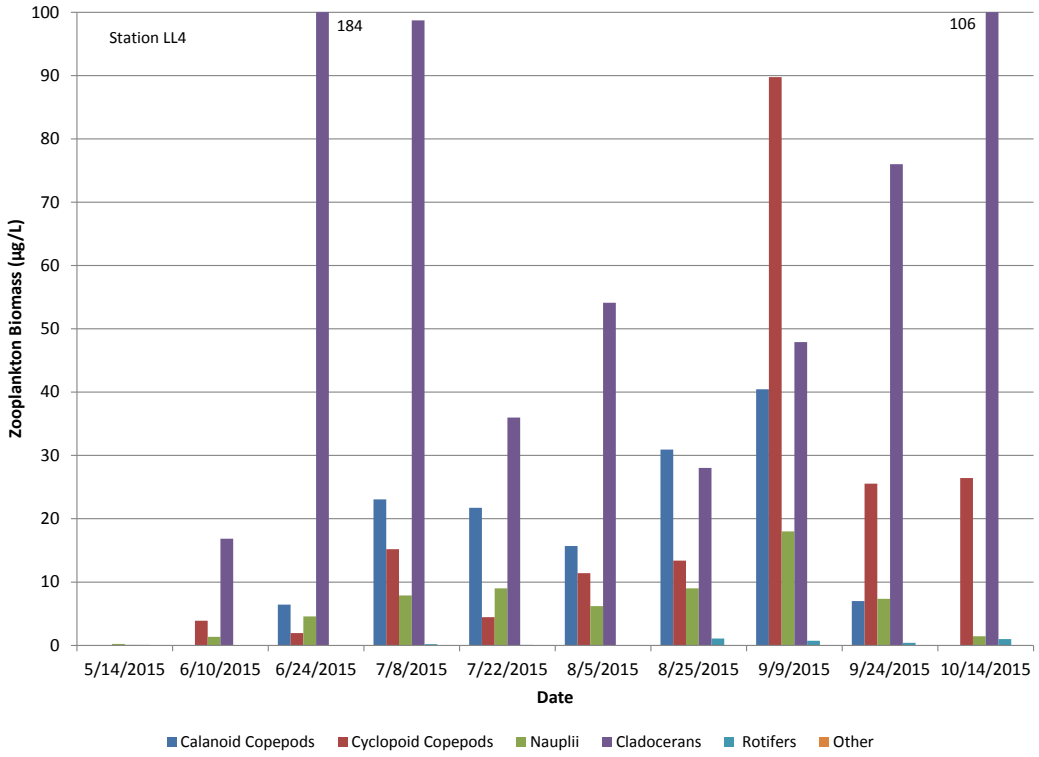

Figure 92. Zooplankton Biomass (µg/L) at Station LL4, May-October 2015

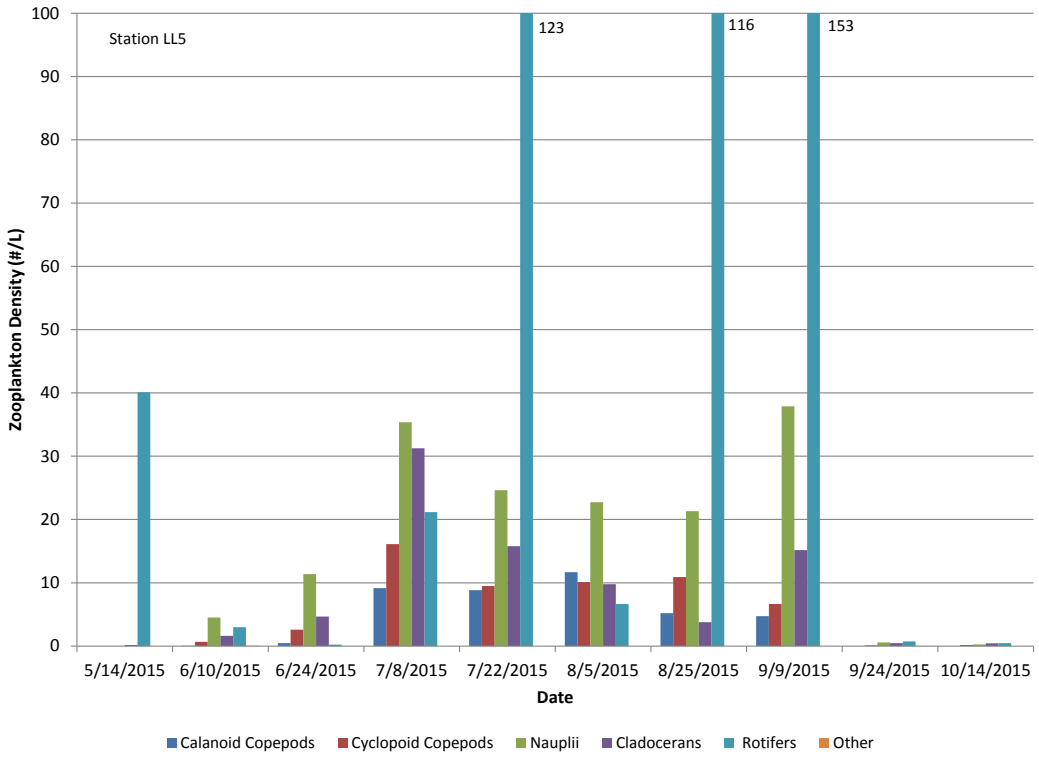

Figure 93. Zooplankton Density (#/L) at Station LL5, May-October 2015

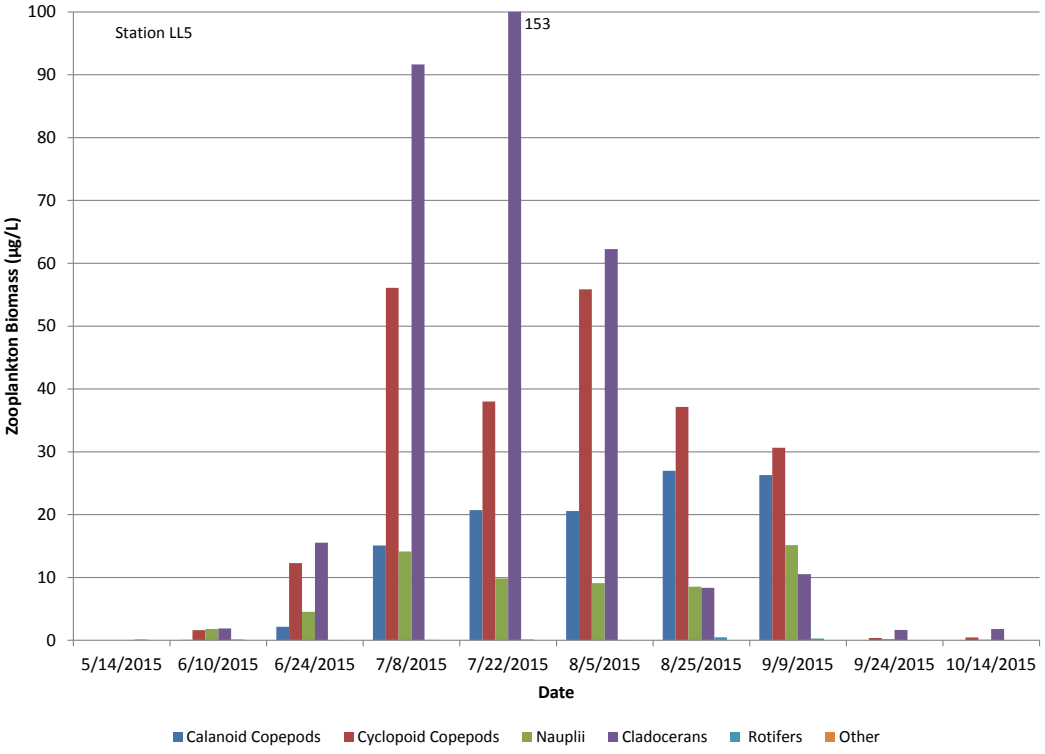

Figure 94. Zooplankton Biomass (µg/L) at Station LL5, May-October 2015

3.2.9 SPOKANE RIVER AT NINE MILE BRIDGE AND LITTLE SPOKANE RIVER NEAR MOUTH

Ecology monitored water quality in the Spokane River and Little Spokane River a short distance upstream of its confluence with Lake Spokane. The Spokane River at Nine Mile Bridge station, (54A090) is located approximately 0.1 mile downstream of Nine Mile Dam at River Mile (RM) 58. According to Ecology's River and Stream Water Quality Monitoring website, this station is a "basin" station with data collected during 2015 (January – December data are presented in this report).

Ecology's Little Spokane River near Mouth station (55B070), which is located on the Little Spokane River at RM 1.1, is a long-term site, according to its website. Sampling at these two stations were conducted by Ecology in accordance with the Stream Ambient Monitoring QAPP.

Water quality data available for the Spokane River at Nine Mile Bridge for 2015 are summarized below in Tables 14 and 15. The data are preliminary and have not been finalized by Ecology. Shaded values indicate exceedance of water quality standards or a strong contrast with historical results, according to Ecology's website.

Table 14. Spokane River at Nine Mile Bridge In-Situ Water Quality Data, 2015

Date	Temperature (°C)	Dissolved Oxygen (mg/L)	pH	Conductivity (µmhos/cm)
1/6/2015	4.8	12.2	7.73	103
2/3/2015	4.7	12.5	7.76	**84**
3/3/2015	4.7	12.7	7.74	96
4/7/2015	7.0	12.0	7.74	86
5/5/2015	12.1	10.0	7.89	**128**
6/2/2015	17.4	**8.4**	7.73	**129**
7/7/2015	18.4	9.6	8.48	268
8/4/2015	17.8	**11.3**	**8.77**	287
9/15/2015	14.1	9.5	8.20	294
10/6/2015	12.3	10.4	8.22	**271**
11/17/15	9.1	10.7	**7.57**	165
12/8/15	7.9	10.2	**7.63**	160

Note: Shaded values indicate an exceedance of water quality standards or strong contrast to historical results.

Table 15. Spokane River at Nine Mile Bridge Conventional Water Quality Data, 2015

Date	Total Phosphorus (µg/L)	Soluble Reactive Phosphorus (µg/L)	Total Reactive Phosphorus (µg/L)	Total Nitrogen (µg/L)	NO_3+NO_2 (µg/L)
1/6/2015	11.0	**5.6**	6.6	477	408
2/3/2015	9.4	**5.1**	6.0	359	299
3/3/2015	7.1	**4.1**	4.8	425	357
4/7/2015	11.6	4.5	5.1	416	376
5/5/2015	11.6	4.0	4.2	659	634
6/2/2015	16.6	6.1	6.1	**796**	**717**
7/7/2015	13.2	7.2	7.7	1,960	1,880
8/4/2015	15.8	**3.3**	4.3	2,270	2,210
9/15/2015	16.0	10.0	10.2	2,470	2,390
10/6/2015	14.5	11.5	11.8	**2,180**	**2,070**
11/17/15	11.4	6.8	7.0	1,050	1,000
12/8/15	24.2	12.3	**15.5**	1,450	1,370

Note: Shaded values indicate an exceedance of water quality standards or strong contrast to historical results.

Water quality data available for the Little Spokane River for 2015 are summarized below in Tables 16 and 17. The data are preliminary and have not been finalized by Ecology. Shaded values indicate exceedance of water quality standards or a strong contrast with historical results, according to Ecology's website.

Table 16. Little Spokane River near Mouth In-Situ Water Quality Data, 2015

Date	Temperature (°C)	Dissolved Oxygen (mg/L)	pH	Conductivity (µmhos/cm)
1/6/2015	6.0	10.3	8.13	279
2/3/2015	6.6	10.0	8.27	271
3/3/2015	6.0	10.2	8.16	245
4/7/2015	9.2	9.9	8.19	233
5/5/2015	12.8	**9.4**	8.34	261
6/2/2015	14.3	**7.4**	7.90	239
7/7/2015	**16.3**	9.5	8.40	279
8/4/2015	15.5	10.0	8.47	286
9/15/2015	11.9	10.1	8.31	291
10/6/2015	10.9	10.3	8.24	277
11/17/15	8.8	10.1	**7.96**	286
12/8/15	6.9	9.6	**7.65**	262

Note: Shaded values indicate an exceedance of water quality standards or strong contrast to historical results.

Table 17. Little Spokane River near Mouth Conventional Water Quality Data, 2015

Date	Total Phosphorus (µg/L)	Soluble Reactive Phosphorus (µg/L)	Total Reactive Phosphorus (µg/L)	Total Nitrogen (µg/L)	NO_3+NO_2 (µg/L)
1/6/2015	16.4	13.2	14.1	1,360	1,300
2/3/2015	20.3	15.3	16.9	1,250	1,150
3/3/2015	21.2	12.6	13.4	1,120	963
4/7/2015	26.1	14.8	16.2	987	920
5/5/2015	19.6	9.7	9.7	1,040	665
6/2/2015	397	49.6	59.7	1,040	910
7/7/2015	10.2	7.9	8.7	1,150	1,090
8/4/2015	9.3	5.6	5.7	1,180	1,170
9/15/2015	10.4	6.8	6.5	1,270	1,150
10/6/2015	9.0	6.8	6.9	1,270	1,170
11/17/15	10.5	7.9	8.3	1,310	1,340
12/8/15	53.6	33.4	**37.7**	1,400	1,370

Note: Shaded values indicate an exceedance of water quality standards or strong contrast to historical results.

Total N and nitrate+nitrite-N are high in both the Spokane and Little Spokane Rivers in late summer. Those levels, 1,040 to 2,470 TN, with most being nitrate+nitrite, roughly match the levels in the metalimnion and hypolimnion of the lacustrine zone. This suggests that plunging river inflows due to density were the source of the high summer N concentrations in the reservoir, with groundwater being an important contributor.

3.2.10 SPOKANE RIVER DOWNSTREAM OF LONG LAKE DAM

This site is also a "basin" station with data collected during October 2009 through September 2010 (Water Year 2010); however, Ecology did not conduct monitoring during 2015.

(This Page Intentionally Left Blank)

4. DISCUSSION

4.1 Dissolved Oxygen Assessment

Data collected during the past six years indicate an improvement in the reservoir's DO resource occurred in response to reduced inflow TP (Welch et al. 2015). The reservoir's DO has steadily improved from its hypereutrophic state since 85% of point source effluent phosphorus was removed in 1977. That is shown in Figure 95, which was modified from Patmont (1987). During 1972 to 1977, minimum volume-weighted hypolimnetic (below 15 m) DO ranged from 0.2 to 3.4 mg/L, with a mean of 1.4 mg/L. After phosphorus removal, there was a gradual improvement in minimum volume-weighted hypolimnetic DO, increasing to means of 2.5 mg/L during 1978 to 1981, and to 4.5 mg/L during 1982 to 1985 as inflow TP declined to 20 µg/L (Patmont 1987). Almost three generations later, minimum volume-weighted hypolimnetic DO averaged 6.3 mg/L during 2010 to 2015 at inflow TPs averaging 15.2 µg/L (riverine zone, volume weighted TP concentration at LL5) during the same period. That progression is evident in Figure 95.

Some of the variability about the line in Figure 95 is likely due to water inflow and residence time – higher inflows (shorter residence times) produced higher DO minimums in the 1970s through 1980s (Patmont 1987). Specifically, the high minimum volume-weighted hypolimnetic DOs in 1974 – 1975 had the highest June – October inflows during 1960 to 1985. Nevertheless, it appears that the principal control on minimum volume-weighted hypolimnetic DO immediately before and after phosphorus reduction was inflow TP, as evident in Figure 95, in contrast to residence time (Figure 96). Recently, data indicate that minimum volume-weighted hypolimnetic DO appears to be more dependent on residence time. Minimum volume-weighted hypolimnetic DO during 2010-2015 ranged from 5.1 mg/L to nearly 8 mg/L, while summer volume-weighted riverine TP (surrogate for flow-weighted inflow TP) ranged from 12.5 to 20 µg/L, and the two variables now appear to be unrelated to each other. However, it appears minimum volume-weighted hypolimnetic DO was more related to June-October water residence time. Residence times ranged from about 24 to 70 days during 2010, 2013, 2014 and 2015, corresponding with the lowest minimum volume-weighted hypolimnetic DOs, while residence times of about 14 to 19 days in 2011 and 2012 occurred with the highest minimum volume-weighted hypolimnetic DOs (Figures 95 and 96). The lowest minimum volume-weighted hypolimnetic DO during recent years was 5.1 mg/L in 2015 which had the highest June through October mean inflow TP (20 µg/L; volume weighted TP at LL5) and the longest June – October water residence time, about 70 days.

While DO conditions have greatly improved in Lake Spokane since 85% of point-source effluent phosphorus was removed in 1977, data collected in 2015 indicate DO levels do not meet the surface water quality standard in the hypolimnion during portions of the summer critical season.

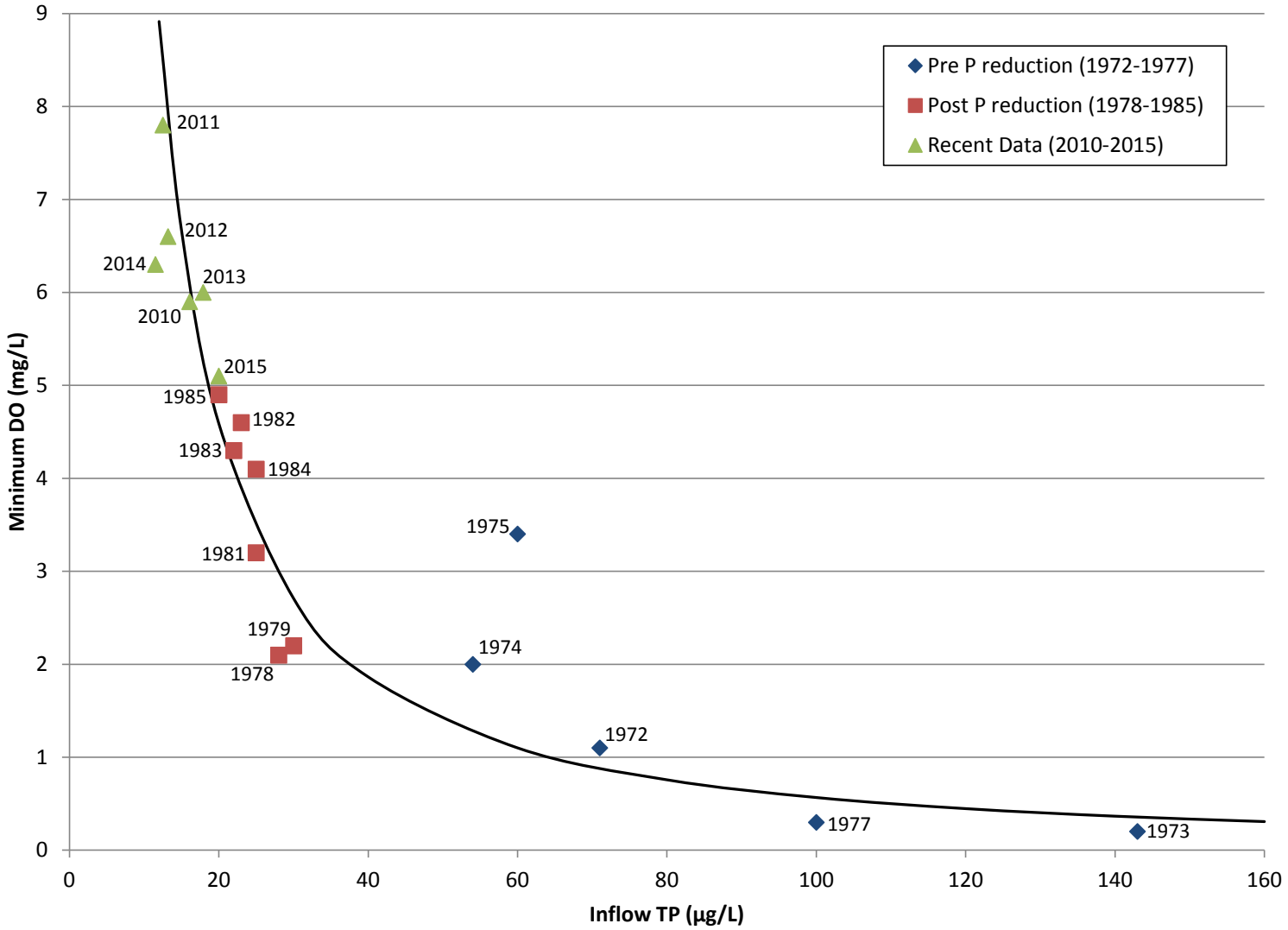

Figure 95. June-October Volume-Weighted Mean Inflow TP Concentrations related to Minimum Volume-Weighted Hypolimnetic DO Concentrations before and after Advanced Wastewater Treatment. Concentrations from 1972 through 1985 from observed loading at Nine Mile Dam (Patmont 1987). Mean inflow TP Concentrations from 2010-2015 were taken as Volume-Weighted Mean TP Concentrations at Station LL5, in lieu of loading data from Nine Mile Dam. Equation for the line: $y = 225.3197x^{-1.2998}$, $r^2 = 0.85$.

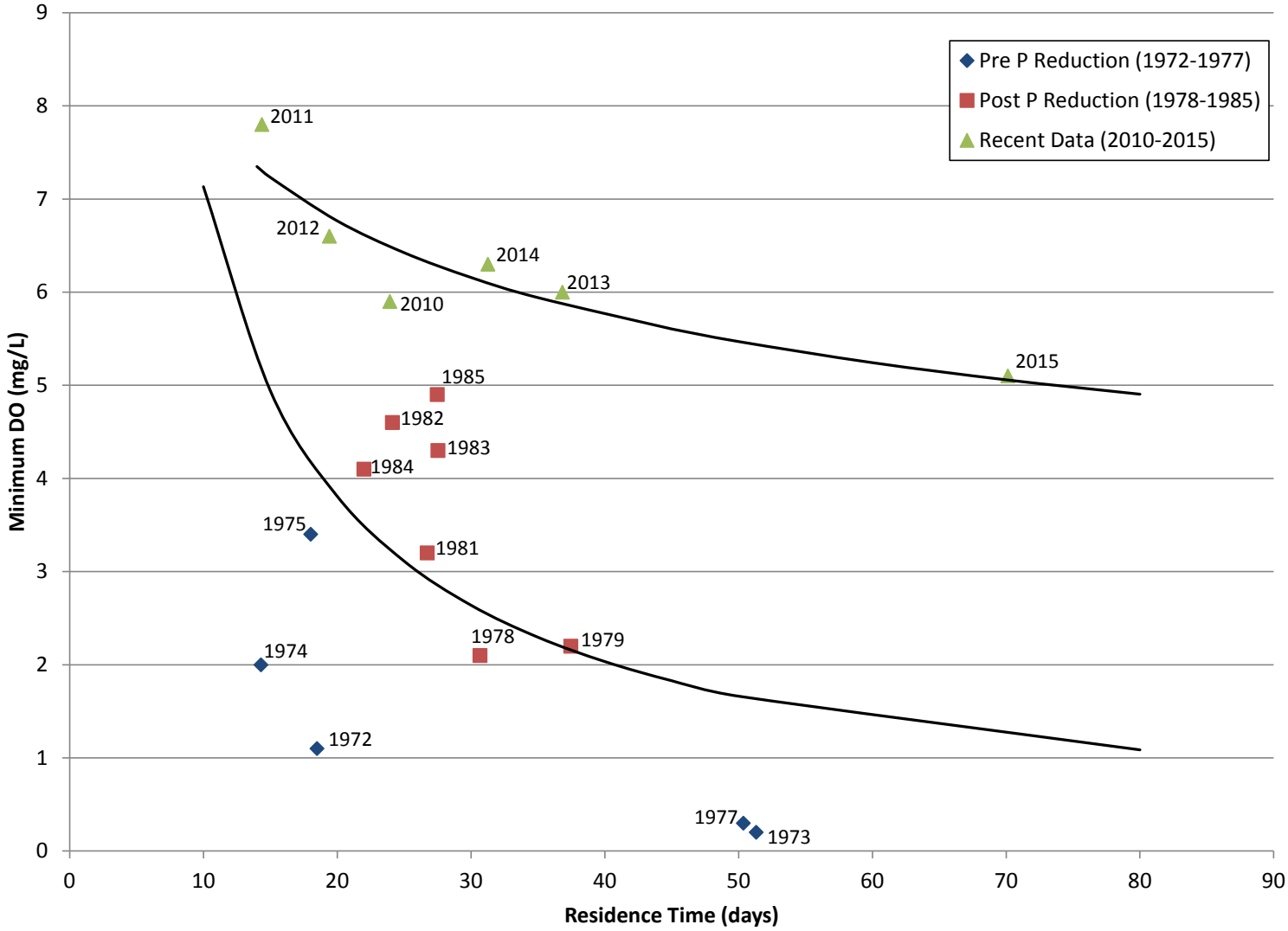

Figure 96. Mean hydraulic residence time (June-October) related to minimum v-w hypolimnetic (below 15 m) DO before and after advanced TP reduction in 1977. Residence time was calculated using reservoir outflows gaged by USGS (1972-1985) and Avista (2010-2015) at Long Lake Dam. Equation for line for all years: $y = 57.307x^{-0.905}$, $r^2 = 0.15$. Equation for line for 2010-2015: $y = 13.555x^{-0.232}$, $r^2 = 0.84$.

4.1.1 DO AND FISH HABITAT

The following section provides a cursory review of fish habitat in Lake Spokane and how it might be affected by DO and temperature conditions, based upon select literature sources, as well as the data collected at the six lake stations. To obtain site specific water quality limitations on fish habitat in Lake Spokane, a more thorough analysis would need to be completed.

Fish can be "squeezed" in summer between epilimnetic water that is too warm and deeper layers that are sufficiently cool but with DO that is too low. The threat to cold water species can be assessed by determining the depth intervals with temperature and DO that are within the optimum ranges for growth. Based upon USFWS, 1984, for rainbow trout, the maximum of the optimum temperature for growth is 18°C and the minimum for DO is 6 mg/L. Their preferred temperature is 14°C (Welch and Jacoby 2004). The minimum DO required is usually cited as 5 mg/L, recognizing that higher DO levels also occur (EPA 1986; USFWS 1984). Using these criteria, trout would have probably avoided the epilimnion during most of the summer due to temperature that reached 25°C and prefer to seek cooler water deeper than 10 m (Figures 8 to 11). For the majority of the summer, DO between 10 and 20 m, was usually near or above 6 mg/L at the four deepest stations (LL0, LL1, LL2, and LL3). In August and September at LL0, DO dropped below the often cited required minimum of 5 mg/L between 10 and 20 m and was even lower at deeper depths (Figure 20). However, at the other deep stations DO remained above 5 mg/L during this time providing refuge (Figures 21 to 23). These data suggest that rainbow trout are most likely inhabiting cooler water in the metalimnion and upper portions of the hypolimnion.

Using the critical maximum temperature (18°C) and minimum DO (6.0 mg/L), percent of the lake volumes acceptable for growth were computed for rainbow trout at the six stations for 2015 (Figures 97-102). Habitat volumes for temperature and DO together, as well as separately, are shown to indicate which factor was most limiting.

Analysis of data from 2011, a high flow year and 2013, a low-flow year, showed that habitat was more restrictive during the low-flow year (2013) than the high-flow year (2011) (Avista 2014). Flows in 2015 were even lower than in 2013, especially during the summer. June to October residence time in 2013 was approximately 37 days and in 2015 was almost double at 70 days. Results from 2015 were similar to those from 2013, but with less habitat available earlier in the year. There was a sharp decrease in June 2015 in the percent of available habitat. This habitat restriction lasted through the beginning of September, which was similar to conditions in 2013. The data suggest that temperature restricted habitat for rainbow trout during spring and early summer far more than DO at all sites and that temperature continued to be more limiting than DO for the rest of the year at the shallower sites. While DO was restrictive at LL0 later in the summer, there was little restriction from DO at other sites. Habitat became very restrictive for trout at LL0 during late July, August and early September when there were either no depths in the water column with temperatures less than 18°C and DO greater than 6 mg/L or only a very small percent of favorable habitat volume. The greater restriction by DO at LL0 than at other sites was due to DO reaching very low concentrations at depth, which in turn probably resulted to much longer residence times of bottom water, given the much longer water residence times in 2015. The data suggests that habitat was available further upstream at LL1, LL2, and LL3.

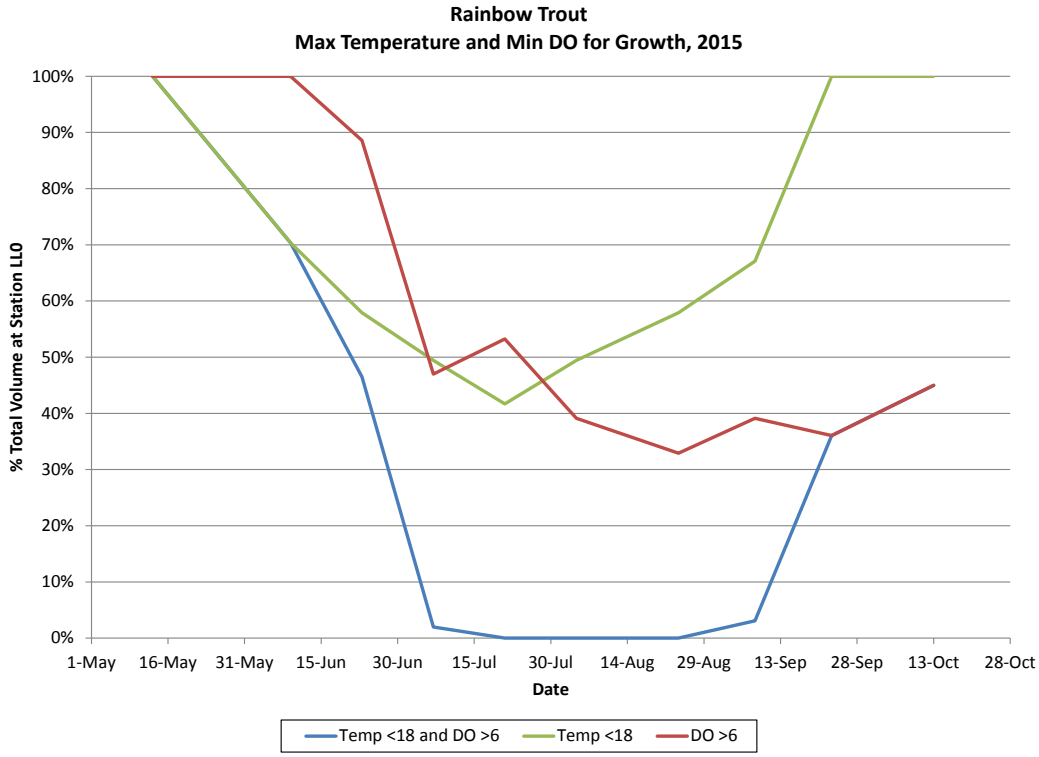

Figure 97. Habitat Conditions at Station LL0 for Rainbow Trout in 2015, Based on Maximum Temperature (18°C) and Minimum DO (6.0 mg/L) for Growth.

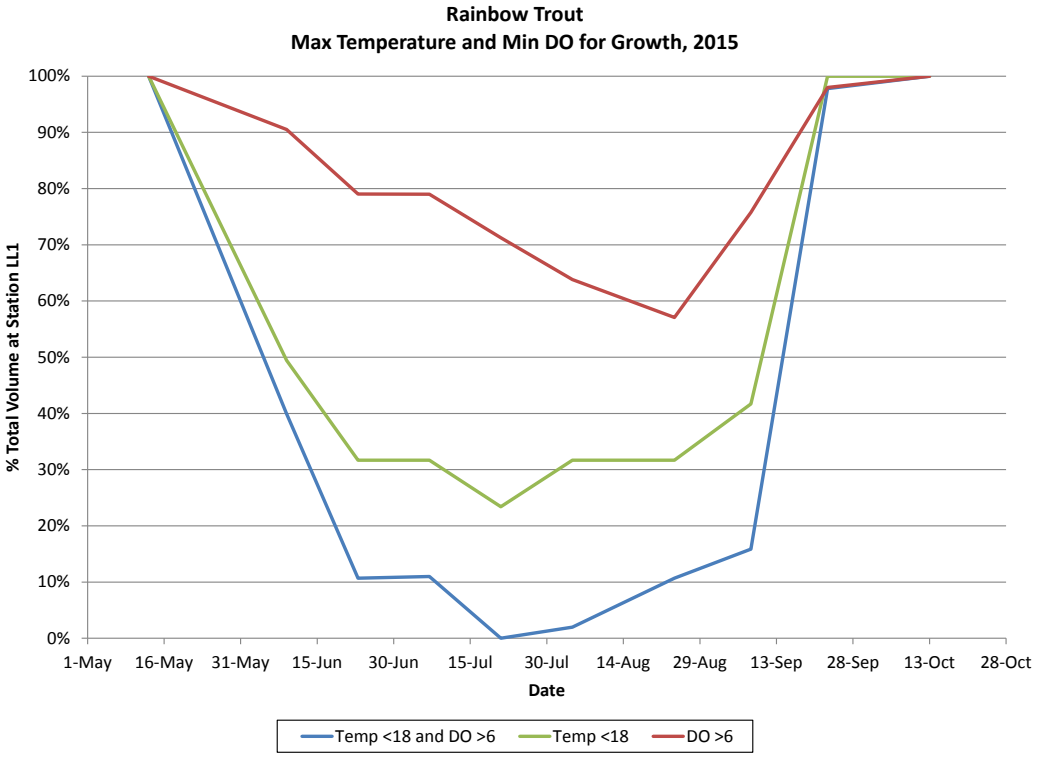

Figure 98. Habitat Conditions at Station LL1 for Rainbow Trout in 2015, Based on Maximum Temperature (18°C) and Minimum DO (6.0 mg/L) for Growth.

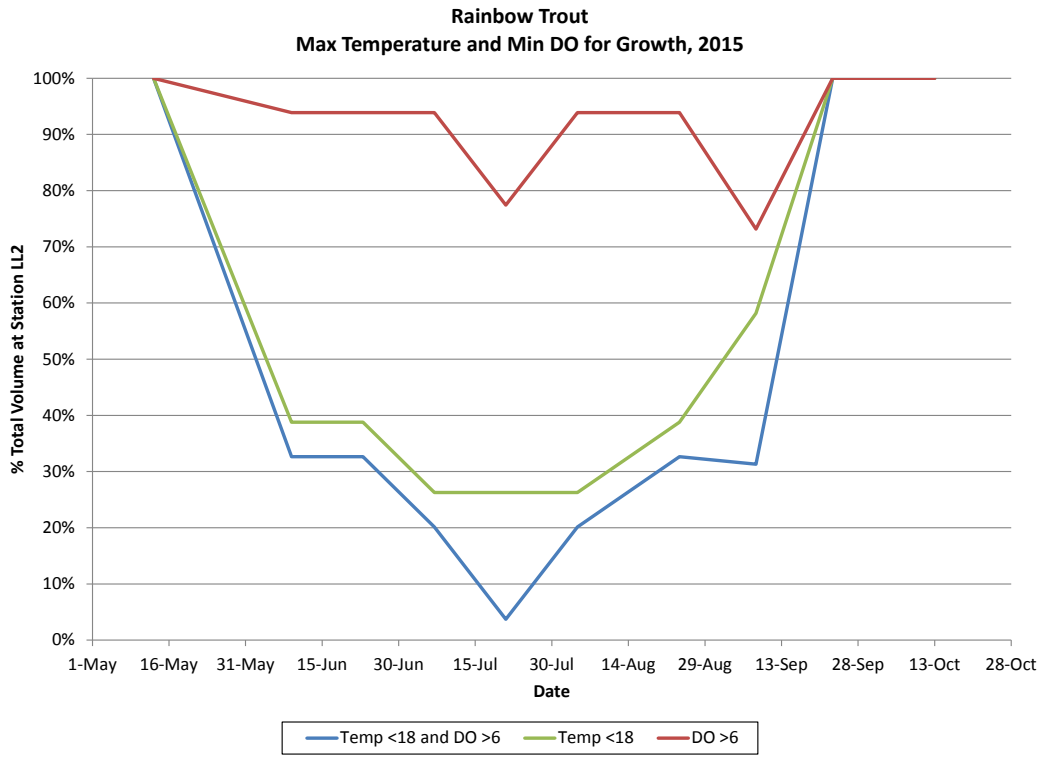

Figure 99. Habitat Conditions at Station LL2 for Rainbow Trout in 2015, Based on Maximum Temperature (18°C) and Minimum DO (6.0 mg/L) for Growth.

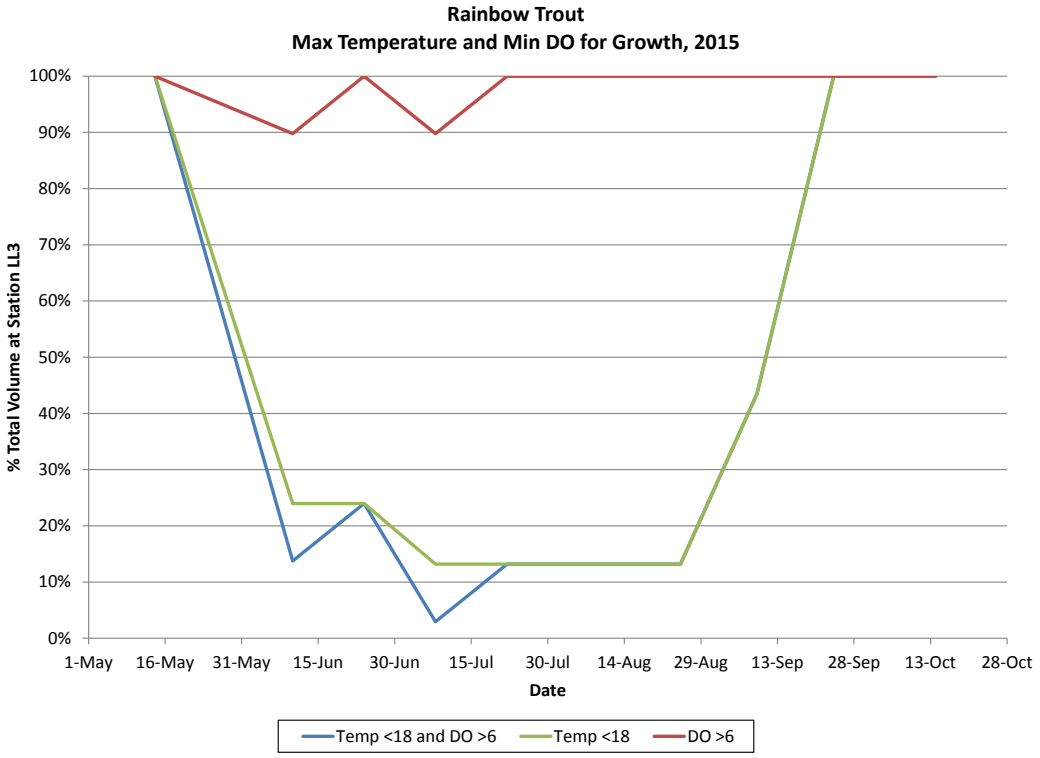

Figure 100. Habitat Conditions at Station LL3 for Rainbow Trout in 2015, Based on Maximum Temperature (18°C) and Minimum DO (6.0 mg/L) for Growth.

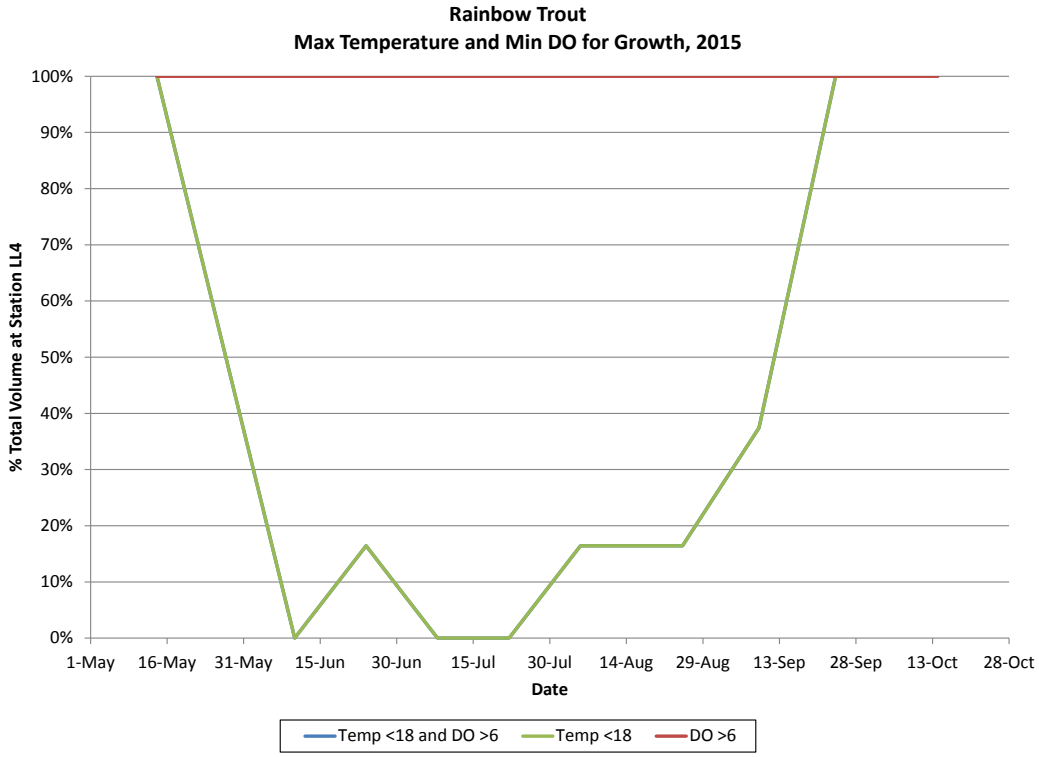

Figure 101. Habitat Conditions at Station LL4 for Rainbow Trout in 2015, Based on Maximum Temperature (18°C) and Minimum DO (6.0 mg/L) for Growth.

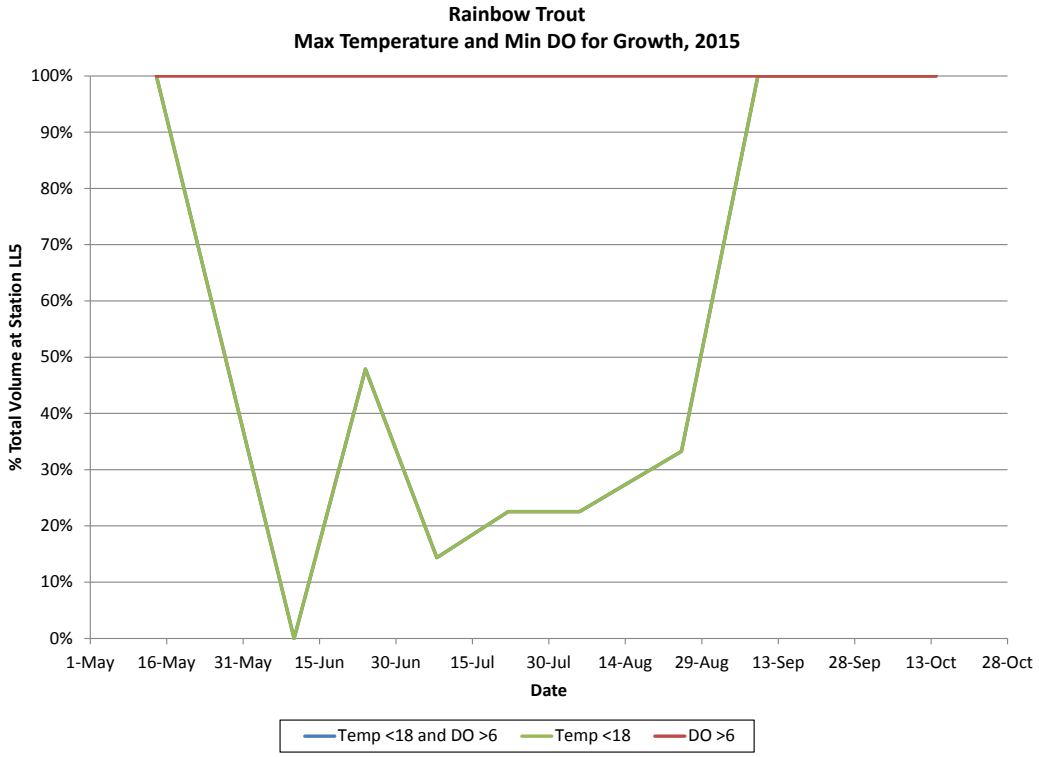

Figure 102. Habitat Conditions at Station LL5 for Rainbow Trout in 2015 Based on Maximum Temperature (18°C) and Minimum DO (6.0 mg/L) for Growth.

4.2 Phosphorus Assessment

Summer (June to September) epilimnetic mean TP concentrations in 2015 were lower than in 2010, 2012, and 2013, but similar to those in 2011 and 2014 at the deeper stations (LL0 to LL3) (Figure 103). Summer epilimnetic mean TP concentrations at LL4 and LL5 were higher in 2015 than any of the other recent years (Figure 103). Summer mean epilimnetic TPs in 2015 were calculated using concentrations at 0.5 and 5 m for stations LL0 to LL2, and concentrations at 0.5 m for stations LL3 to LL5. Summer means for 2010 and 2011 are based on averages from euphotic zone composite samples.

Summer mean TP decreased slightly through the reservoir in all six years with TP at station LL0 being the lowest. Area-weighted, whole-lake epilimnetic TPs averaged 11.7 ± 1.4 µg/L for the six years; a variation of only 12%.

Summer (June to September) hypolimnetic TPs also have been rather consistent the past six years – mean 23.8 ± 13%. Hypolimnetic TP was determined in the lacustrine zone for stations LL0, LL1, and LL2 for all six years (Figure 104). Hypolimnetic TP in 2012 through 2015 was calculated using samples collected at 20 m and deeper. This excludes the top 5 m of the hypolimnion, which is necessary in order to compare 2012-2015 data with those based on composite samples collected in 2010 and 2011 at various depths from 21 m and deeper. Hypolimnetic TPs calculated for stations LL0 and LL1 were volume-weighted while concentrations for station LL2 were from 1 m meter off the bottom only.

Maximum hypolimnetic TPs have been relatively low the past six years usually less than 35 µg/L, and the average hypolimnetic TP was only 22 µg/L (May-October).

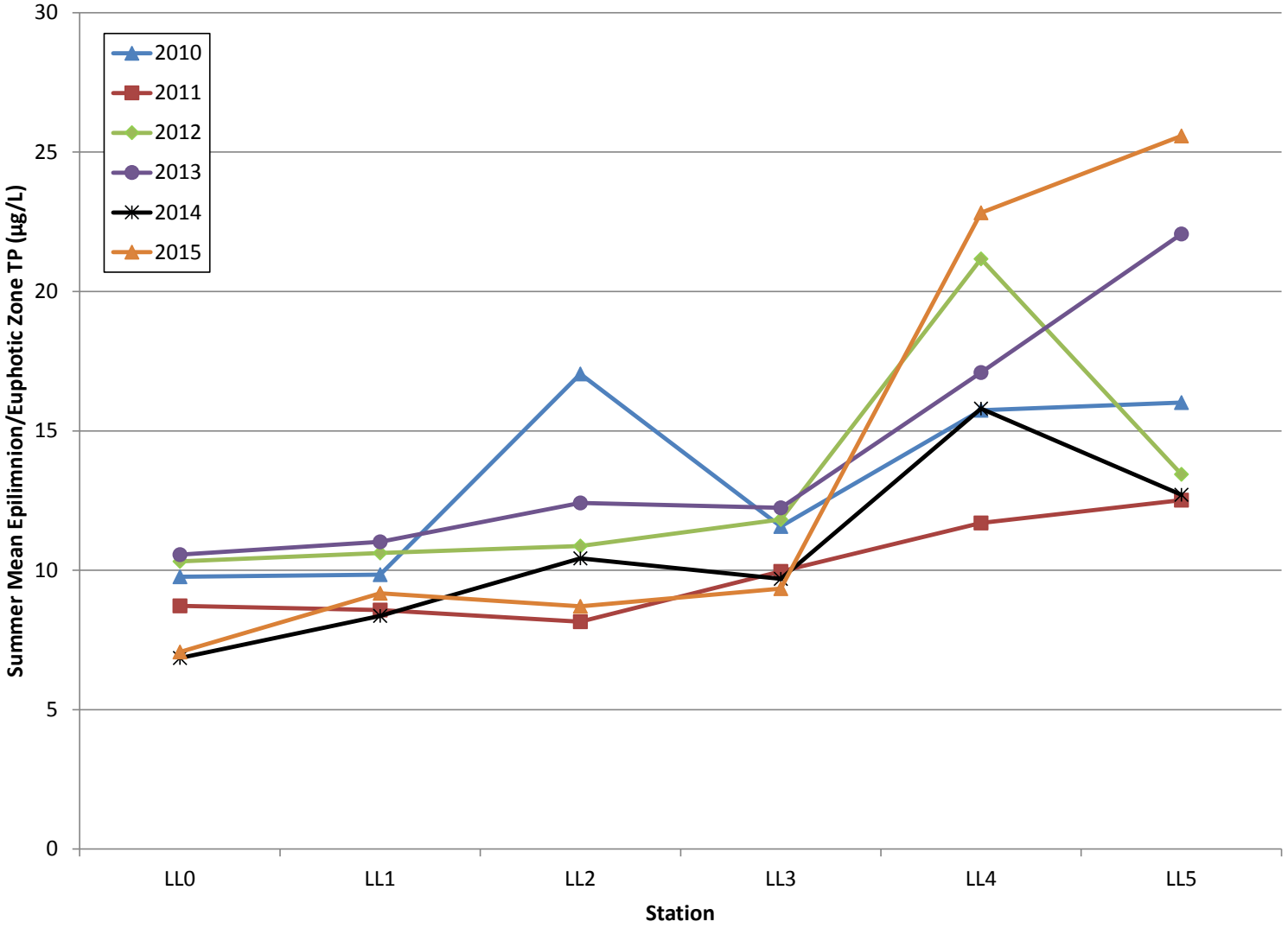

Figure 103. Summer (June-September) Mean Epilimnion/Euphotic Zone TP Concentrations, 2010-2015 (Data is presented from down-reservoir to up-reservoir, left to right.)

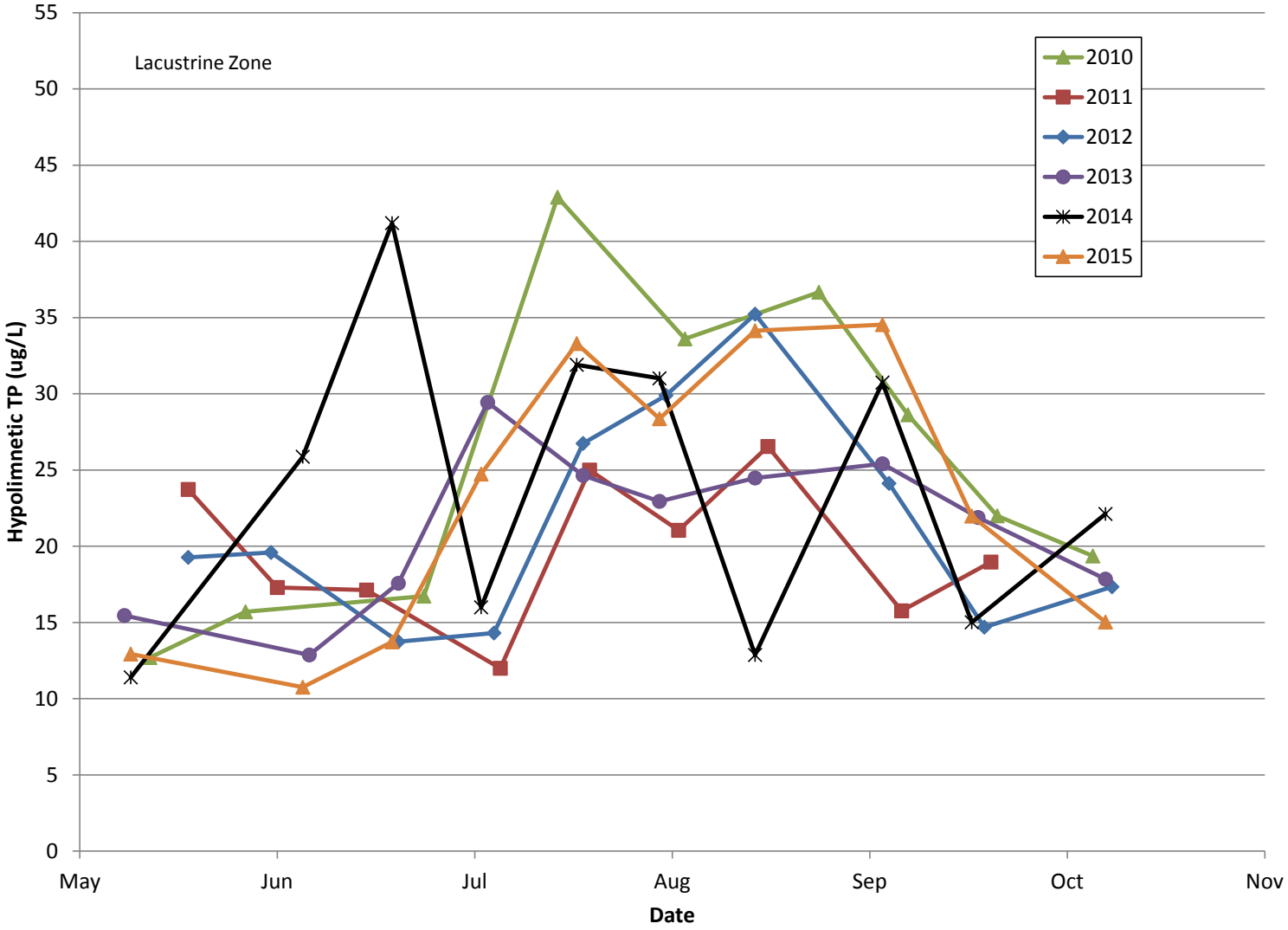

Figure 104. Lacustrine Zone Mean Hypolimnetic TP Concentrations, 2010-2015

4.3 Trophic State

Lake Spokane was at or near borderline oligotrophic-mesotrophic on average in all zones for the last 6 years, except for TP in the transition and riverine zones that averaged slightly greater than the oligotrophic-mesotrophic boundary of 10 µg/L (Tables 18 and 19). Higher average chl and TP in the transition and riverine zones in 2015 resulted in slightly higher 6 year averages for chl (4.0 to 4.9 µg/L in the transition zone and 2.9 to 3.7 µg/L in the riverine zone), and TP (13.6 to 14.1 and 15.3 to 17.1 µg/L in the transition and riverine zones, respectively).

The average trophic state index (TSI) values in the upper reservoir zones were similarly at or slightly over the TSI of 40 - the oligo-mesotrophic boundary (Table 20). TSI values lower than 40 indicate an oligotrophic state. TSI values between 40 and 50 indicate mesotrophy. In the transition and riverine zones, TSI values for chl were 50 and for TP in the riverine zone was 51, which are near and slightly over the mesotrophic-eutrophic boundary. TSI values for chl, TP and Secchi depth were consistent with each other at all zones in the previous five years.

Table 18. 2012-2015 Summer (June to September) Epilimnetic Means Compared to 2010 and 2011 Summer Euphotic Zone Means in Lacustrine, Transition, and Riverine Zones in Lake Spokane. Whole reservoir means are area weighted; Lacustrine 61%, Transition 29%, and Riverine 11% of the total reservoir area.

Year	Lacustrine (0.5, 5 m)			Transition (0.5 m)			Riverine Zone (0.5 m)			Whole Reservoir		
	TP (µg/L)	Chl (µg/L)	Secchi (m)	TP (µg/L)	Chl (µg/L)	Secchi (m)	TP (µg/L)	Chl (µg/L)	Secchi (m)	TP (µg/L)	Chl (µg/L)	Secchi (m)
2010	9.8	5.1	5.1	13.7	4.7	3.7	16.0	3.2	3.6	11.6	4.7	4.5
2011	9.1	3.3	5.8	10.8	1.9	4.7	12.5	1.4	4.8	10.0	2.7	5.4
2012	10.6	4.8	4.4	16.5	4.0	3.9	13.4	2.7	4.7	12.6	4.3	4.3
2013	11.3	3.0	5.7	14.7	5.5	3.9	22.1	3.2	4.1	13.4	3.7	5.0
2014	8.5	3.8	5.0	12.7	5.9	3.6	12.7	4.2	4.0	10.2	4.4	4.5
2015	8.3	3.8	5.3	16.1	7.2	3.3	25.6	7.4	2.9	12.4	5.1	4.5
Average	9.6	3.9	5.2	14.1	4.9	3.9	17.1	3.7	4.0	11.7	4.2	4.7

Table 19. Trophic State Boundaries

Parameter	Oligo-Mesotrophic	Meso-Eutrophic
TP (µg/L)	10	30
Chl (µg/L)	3	9
Secchi (m)	4	2

Source: Nurnberg 1996

Table 20. Trophic State Index Values for Lacustrine, Transition, and Riverine Zones in Lake Spokane, 2015

2015	Lacustrine	Transition	Riverine
TSI-TP	35	44	51
TSI-Chl	44	50	50
TSI-Secchi	36	43	45
TSI-Average	38	46	49

Total N-to-TP (TN:TP) ratios in 2015 (Table 21) were variable throughout the reservoir with the lowest (28.3) at LL4 and the highest ratio (132) at LL0. The lower ratio at LL4 is the lowest ratio observed at the six stations during 2012 through 2015, mostly due to higher epilimnetic TP concentration. In 2012, average epilimnetic TP at LL4 was similar to that in 2015 and resulted in a TN:TP ratio of 30.2. The reservoir inflow TN:TP during 1974 to 1978 before effluent phosphorus reduction averaged 15 and algal growth potential bioassays indicated that N alone, or N+P, limited algal growth 60% of the time on average (Patmont 1987). Removing phosphorus alone has greatly improved water quality of this reservoir and the inflow TN:TP ratio (LL5) has increased two to almost nine fold in recent years, compared to Patmont's pre-phosphorus removal inflow ratios, due partly to increased river N as well as reduced phosphorus (Table 21).

Table 21. Total Nitrogen to Total Phosphorus ratios for 2015 by station; calculated using summer mean Epilimnion TP and TN

Station	2015 TN:TP
LL0	132
LL1	95.7
LL2	91.9
LL3	76.7
LL4	28.3
LL5	40.5

4.4 Quality Assurance

Quality assurance review of field and laboratory data was conducted in accordance with the guidelines and requirements outlined in the *Quality Assurance Project Plan for Lake Spokane Baseline Nutrient Monitoring* (QAPP). Replicate field measurements and laboratory samples as well as field blanks were compared to the measurement quality objectives (MQOs) as stated in the QAPP. If data warranted qualification based on the guidelines in the QAPP, qualifiers such as "J – result is considered an estimate", were assigned to the associated data in the database prepared for Ecology's Environmental Information Management (EIM) along with a comment describing why the data needed qualification.

In 2015 one set of field measurements, temperature, pH, DO, and conductivity at Station LL0 at a depth of 9 m was qualified. The values were qualified in the EIM database as "IAE" meaning "instrument result adjusted; reported result is an estimate" because the values reported in the EIM

database and used for data analysis were an average of the parent and field replicate measurements. An average was taken between the parent and replicate measurements due to the relative percent difference (RPD) between the two measurements being outside the QAPP limits. There was also no reasonable explanation (i.e. wind, boat movement, etc.) for the difference between the two measurements. Other field replicate measurements on that sampling date (9/23/2015) were all within QAPP limits so no other field measurements were qualified.

One other instance occurred in 2015 when a field parent and replicate measurement RPD was outside of the QAPP limits. On July 21, DO measurements at Station LL2 at 24 m depth had an RPD of 28.6%. However, these measurements were not qualified in the EIM database because values were extremely low (0.16 and 0.12 mg/L) which was the reason why the RPD was high and the difference between the measurements was deemed not substantial. Also, weather conditions during that sampling event were very windy which caused the boat to swing around the anchor making replicate measurements at the exact same location and depth very challenging.

Within the database prepared for EIM, laboratory data was qualified using the following qualifiers; "U, for non-detect" or "J, for result is an estimate". For 2015, there were 6 nutrient samples, which were qualified within the database as "J, estimates" for this report. These nutrient samples were qualified within the database as estimates due to field replicate RPDs being outside the acceptable criteria stated in the QAPP. However, the parent sample results for these qualified samples were used in the data analysis since the results were within the expected range of concentrations and in line with other sample results at surrounding depths.

During the 2015 monitoring period, several field blank samples had TN concentrations over the detection limit (5 samples) and TP concentrations over the detection limit (4 samples). The field blank samples were collected using laboratory provided de-ionized water. The concentration of TN found in the field blank samples was just slightly over the method detection limit (MDL) and significantly lower than the TN concentrations found in the reservoir samples. The concentration of TP found in the field blanks samples was also just slightly over the MDL. After discussion with the lab it was thought that the de-ionized water provided by the laboratory may have picked up trace amounts of nitrogen and phosphorus from their respective bottles after shipment, especially since most of the detections occurred during the second sampling event of the month when the bottles of de-ionized water would have been sitting for several weeks. Another explanation for the field blank detections could have been due to incomplete rinsing of the Van Dorn sampling bottle prior to collection of the field blank. Although field staff thoroughly rinse the Van Dorn bottom with de-ionized water from Culligan both in between stations and prior to collecting the field blank, small particles/algal cells could have remained along the seal of the bottle and contaminated the field blank sample. Reservoir samples would not have been contaminated in this fashion since the Van Dorn bottle is fully open on both sides when it is lower into the water column, thereby providing a complete rinse of the apparatus. No reservoir TP data were qualified based on the detection of TP in the field blanks due to the reasons stated above. No reservoir TN data were qualified based on the detection of TN in the field blank due to the magnitude difference between the reservoir sample TN concentrations and the very low amount of TN detected in the field blank.

4.5 Monitoring Recommendations for 2016

Based on 2015 monitoring results, it is recommended that monitoring activities continue unchanged for 2016.

5. REFERENCES

Avista Corporation. 2014. Lake Spokane Dissolved Oxygen Water Quality Attainment Plan 2013 Annual Summary Report. WA 401 Certification FERC License Appendix B, Section 5.6. For Spokane River Hydroelectric Project, FERC Project No. 2545.

Downing, J.A., S.B. Watson, E. McCauley. 2001. Predicting Cyanobacteria dominance in lakes. Can. J. Fish. Aquat. Sci. 58(10): 1905-1908.

Ecology (Washington State Department of Ecology), 2010. Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load: Water Quality Improvement Report. Publication No. 07-10-073. Revised February 2010. www.ecy.wa.gov/biblio/0710073.html

EPA. 1986. Water Quality Criteria. U.S. Environmental Protection Agency 440/5-86-001 ("The Gold Book").

Nürnberg, GK. 1996. Trophic state of clear and colored soft and hardwater lakes with special consideration of nutrients, anoxia, phytoplankton and fish. Lake and Reserv. Manage. 12:423-447.

Patmont, C.R. 1987. The Spokane River Basin: allowable phosphorus loading. Seattle, WA: Harper-Owes. Final report, Contract No. C0087874 for State of Washington, Dept. of Ecology, with G.W. Pelletier, L.R. Singleton, R.A. Soltero, W.T. Trial, and E.B. Welch.

Soltero, R.A., D.G. Nichols, and M.R. Cather. 1982. The effect of continuous advanced wastewater treatment by the City of Spokane on the trophic status of Long Lake, WA. DOE. Contract No. WF81-001. Completion Report. Eastern Washington University; Cheney, WA. 188pp.

Spokesman Review. 2015a. Downpours wash out two Spokane County Roads. June 2, 2015. http://www.spokesman.com/stories/2015/jun/02/downpours-wash-out-two-spokane-co-roads/

Spokesman Review. 2015b. Rains drench region. June 3, 2105. http://www.spokesman.com/stories/2015/jun/03/rains-drench-region/

Tetra Tech, Inc. 2014. Quality Assurance Project Plan for Lake Spokane Baseline Nutrient Monitoring. In Support of Lake Spokane Dissolved Oxygen Water Quality Attainment Plan, Spokane River Hydroelectric Project, FERC Project no. 2545, WA 401 Certification Section 5.6. Prepared for Avista Utilities. January 2014.

U.S. Fish and Wildlife Service (USFWS). 1984. Habitat Suitability Information: Rainbow Trout. Division of Biological Services, Research and Development. FWS/OBS-82/10.60.

Welch, E.B., S.K. Brattebo, H.L. Gibbons, and R.W. Plotnikoff. 2015. A dramatic recovery of Lake Spokane water quality following wastewater phosphorus reduction. Lake Reserv. Manage. 31: 157-165.

Welch, E.B. and J.M. Jacoby. 2004. Pollution Effects in Freshwater: Applied Limnology. 3rd ed., Snow Press, New York.

APPENDIX I – Lake Spokane *In Situ* Monitoring Data

(This Page Intentionally Left Blank)

Table A-1. Station LL0 *In Situ* Water Quality Data, 2015

Date	Depth (m)	Temperature (°C)	pH	Cond (µS/cm)	DO (mg/l)	DO Sat. (%)	Winkler DO (mg/L)	Secchi Disk Depth (m)**
5/13/2015	0.5	16.44	8.94	130.5	11.63	126.2		2.7
5/13/2015	1	16.42	8.95	131	11.62	126.1		
5/13/2015	2	16.43	8.94	130.8	11.65	126.4		
5/13/2015	3	16.34	8.95	131.6	11.71	126.9		
5/13/2015	4	16.35	8.94	131.5	11.73	127.1		
5/13/2015	5	16.33	8.94	131.4	11.7	126.7	10.8	
5/13/2015	6	16.31	8.95	131.6	11.74	127		
5/13/2015	7	16.28	8.94	131.6	11.73	126.9		
5/13/2015	8	16.18	8.93	131.7	11.75	126.8		
5/13/2015	9	15.2	8.9	130.8	12.14	128.3		
5/13/2015	9*	15.34	8.91	130.4	12.19	129.2		
5/13/2015	10	15.28	8.88	130.6	12.13	128.5		
5/13/2015	12	15.02	8.82	132.1	11.76	123.8		
5/13/2015	15	14.56	8.69	129.3	11.53	120.2	10.7	
5/13/2015	18	12.57	8.31	130.4	10.06	100.4		
5/13/2015	21	11.76	8.12	126.6	10.08	98.7		
5/13/2015	24	10.99	8.06	123.6	10.06	96.8		
5/13/2015	27	10.45	7.99	120.8	10.01	95.1		
5/13/2015	30	10.05	7.9	118.3	9.78	92		
5/13/2015	33	9.66	7.88	114.8	9.94	92.7		
5/13/2015	33*	9.66	7.85	114.8	9.94	92.7		
5/13/2015	36	9.04	7.84	109.1	9.99	91.8		
5/13/2015	39	8.8	7.8	106.5	9.93	90.7		
5/13/2015	42	8.76	7.77	106.3	9.87	90.1		
5/13/2015	45	8.74	7.73	106.1	9.83	89.6		
5/13/2015	47.5	8.72	7.7	106.1	9.74	88.7		
6/9/2015	0.5	21.12	8.7	141.1	9.96	118.9		9.9
6/9/2015	1	20.84	8.67	141.5	10.07	119.4		
6/9/2015	2	20.69	8.71	141.5	10.15	120		
6/9/2015	3	20.6	8.67	141.4	10.12	119.4		
6/9/2015	4	20.08	8.55	141.2	10.09	117.8		
6/9/2015	5	19.53	8.45	141.4	10.21	117.9	9.06	
6/9/2015	6	18.99	8.39	141.1	10.13	115.7		
6/9/2015	7	18.32	8.17	140.8	9.23	104.1		
6/9/2015	8	18	8.07	141.2	9.21	103.1		
6/9/2015	9	17.75	7.98	141.2	8.86	98.7		
6/9/2015	9*	17.73	7.93	140.8	8.81	98.1		

6/9/2015	10	17.55	7.89	141.5	8.23	91.3		
6/9/2015	12	17.31	7.86	141.6	8.11	89.5		
6/9/2015	15	16.89	7.83	140.6	8.36	91.4	7.6	
6/9/2015	18	15.92	7.84	141.9	8.65	92.7		
6/9/2015	21	14.58	7.79	141.6	7.99	83.2		
6/9/2015	24	13.72	7.74	140.8	7.69	78.6		
6/9/2015	27	12.68	7.67	137.1	7.17	71.6		
6/9/2015	30	11.52	7.62	130.5	6.9	67.1		
6/9/2015	33	10.64	7.6	122.5	7.06	67.3		
6/9/2015	33*	10.71	7.58	122.3	7.05	67.3		
6/9/2015	36	9.63	7.57	113.3	7.85	73		
6/9/2015	39	9.27	7.57	109.9	7.92	73.1		
6/9/2015	42	9.05	7.54	108.7	7.75	71.1		
6/9/2015	45	9.01	7.52	108.6	7.73	70.8		
6/9/2015	47.5	8.93	7.51	108.5	7.65	70		
6/23/2015	0.5	21.82	8.55	145.6	9.21	110.5		9.7
6/23/2015	1	21.54	8.51	145.9	9.28	110.8		
6/23/2015	2	21.53	8.51	145.8	9.26	110.5		
6/23/2015	3	21.41	8.51	145.3	9.3	110.7		
6/23/2015	4	21.3	8.5	145.5	9.33	110.8		
6/23/2015	5	21.13	8.51	145.5	9.34	110.6	8.3	
6/23/2015	6	21.08	8.51	145.4	9.36	110.7		
6/23/2015	7	20.59	8.45	143.5	9.58	112.3		
6/23/2015	8	18.98	8.11	144.2	9.12	103.5		
6/23/2015	9	18.49	8.01	145.8	8.61	96.7		
6/23/2015	9*	18.48	7.96	146.5	8.67	97.4		
6/23/2015	10	18.3	7.87	144.7	8.32	93.1		
6/23/2015	12	17.61	7.69	142	7.05	77.8		
6/23/2015	15	17	7.66	142.5	6.85	74.6		
6/23/2015	18	16.52	7.67	141.3	7.31	78.8		
6/23/2015	21	15.55	7.64	141.7	7.24	76.5		
6/23/2015	24	14.4	7.58	141.4	6.81	70.2		
6/23/2015	27	12.8	7.53	138.2	6.15	61.1		
6/23/2015	30	11.88	7.49	133.2	5.5	53.6	6.01	
6/23/2015	33	11.04	7.47	125.9	5.9	56.4		
6/23/2015	33*	10.97	7.43	125.9	5.9	56.2		
6/23/2015	36	10.04	7.42	117.4	6.56	61.2		
6/23/2015	39	9.32	7.41	111.8	6.41	58.8		
6/23/2015	42	9.16	7.4	110.2	6.25	57.1		
6/23/2015	45	9.14	7.36	110.1	6.29	57.4		
6/23/2015	47.5	9.04	7.35	110.2	6.08	55.4		
7/7/2015	0.5	25.42	8.83	153.4	9.39	121.1		6.1

7/7/2015	1	25.39	8.84	152.9	9.44	121.7		
7/7/2015	2	25.37	8.83	153	9.48	122.3		
7/7/2015	3	25.35	8.8	153	9.48	122.1		
7/7/2015	4	25.09	8.84	155.7	10.01	128.3		
7/7/2015	5	24.45	8.83	162.5	10.65	135		
7/7/2015	6	23.55	8.89	155.8	11.69	145.7		
7/7/2015	7	21.91	8.8	158.3	12.24	147.8		
7/7/2015	8	20.4	8.63	158.4	11.35	133		
7/7/2015	9	19.42	8.32	160.7	10.03	115.2		
7/7/2015	9*	19.39	8.3	163.5	9.99	114.8		
7/7/2015	10	18.89	8.09	167.7	9.18	104.4		
7/7/2015	12	18.14	7.81	183.8	7.41	82.9		
7/7/2015	15	17.15	7.63	172.2	5.83	63.9	6.06	
7/7/2015	18	16.69	7.59	181.8	5.85	63.6		
7/7/2015	21	16.14	7.52	152.3	5.79	62.1		
7/7/2015	24	15.39	7.49	142	6	63.4		
7/7/2015	27	12.88	7.39	138.9	4.84	48.4		
7/7/2015	30	11.83	7.34	133.2	4.76	46.5		
7/7/2015	33	10.86	7.31	125.4	5.44	52		
7/7/2015	33*	10.85	7.29	125.7	5.44	51.9		
7/7/2015	36	9.95	7.29	117.4	5.74	53.6		
7/7/2015	39	9.53	7.24	114.3	5.52	51.1		
7/7/2015	42	9.27	7.21	112.2	5.29	48.6		
7/7/2015	45	9.18	7.19	112.1	5.22	47.9	5.13	
7/7/2015	47.5	9.15	7.18	112.1	5.1	46.8		
7/21/2015	0.5	24.05	9.05	170.9	10.02	126.4		5.0
7/21/2015	1	24.04	9.07	170.8	10.4	126.6		
7/21/2015	2	24.02	9.07	170.8	10.05	126.7		
7/21/2015	3	23.93	9.07	170.3	10.19	128.3		
7/21/2015	4	22.24	8.99	214.6	14.2	173.1		
7/21/2015	5	21.61	8.98	220.5	14.54	175.1	14	
7/21/2015	6	20.89	8.65	232.6	11.71	139.1		
7/21/2015	7	20.45	8.58	233.5	11.14	131.1		
7/21/2015	8	20.09	8.44	236.9	10.23	119.6		
7/21/2015	9	19.67	8.2	245.5	8.91	103.3		
7/21/2015	9*	19.71	8.2	245.9	8.91	103.3		
7/21/2015	10	19.11	8.02	244.8	7.78	89.1		
7/21/2015	12	18.55	7.89	256.6	6.84	77.5		
7/21/2015	15	18.08	7.81	239	6.47	72.6		
7/21/2015	18	17.65	7.72	224.8	5.85	65	6.24	
7/21/2015	21	17.16	7.67	217.6	5.67	62.4		
7/21/2015	24	15.45	7.49	159.6	4.61	49		

7/21/2015	27	13.35	7.4	142.3	4.31	43.7		
7/21/2015	30	12.02	7.34	136.9	3.95	38.8		
7/21/2015	33	11.21	7.31	130.3	4.8	46.3		
7/21/2015	33*	11.18	7.28	130.2	4.79	46.2		
7/21/2015	36	10.37	7.28	123.1	5.12	48.5		
7/21/2015	39	9.66	7.24	117.5	4.72	44		
7/21/2015	42	9.43	7.22	115.6	4.59	42.5		
7/21/2015	45	9.28	7.18	114.5	4.44	40.9		
7/21/2015	47	9.24	7.18	114.5	4.33	40		
8/4/2015	0.5	22.61	9.13	194.7	11.09	136.1		4.9
8/4/2015	1	22.6	9.16	194.4	11.06	135.8		
8/4/2015	2	22.52	9.18	194.7	11.16	136.8		
8/4/2015	3	22.45	9.15	194.5	11.11	135.9		
8/4/2015	4	22.39	9.16	195.1	11.07	135.3		
8/4/2015	5	22.08	9.09	196.6	10.99	133.5		
8/4/2015	6	21.32	8.63	230	9.86	118		
8/4/2015	7	20.5	8.27	252.7	8.8	103.7		
8/4/2015	8	19.92	8.19	259.9	8.55	99.5		
8/4/2015	9	19.44	7.98	262.9	7.19	82.9		
8/4/2015	9*	19.45	7.94	263.5	7.32	84.4		
8/4/2015	10	19.08	7.86	261.9	6.57	75.1		
8/4/2015	12	18.34	7.76	267.6	5.51	62.2		
8/4/2015	15	17.72	7.68	255.4	5.3	59	5.23	
8/4/2015	18	17.34	7.64	249.1	5.24	57.9		
8/4/2015	21	16.82	7.57	230.4	4.96	54.2		
8/4/2015	24	15.5	7.4	189.4	3.5	37.2		
8/4/2015	27	13.19	7.33	143.4	3.39	34.2		
8/4/2015	30	12.19	7.28	139.5	3.21	31.7		
8/4/2015	33	11.54	7.25	134.6	3.83	37.3	3.37	
8/4/2015	33*	11.56	7.22	134.7	3.79	36.9		
8/4/2015	36	10.51	7.21	125.2	4.53	43		
8/4/2015	39	9.9	7.17	119.6	4.17	39		
8/4/2015	42	9.58	7.14	117.7	3.99	37.1		
8/4/2015	45	9.45	7.12	116.9	3.78	35		
8/4/2015	47.5	9.35	7.1	116.9	3.55	32.8		
8/24/2015	0.5	21.26	8.96	215.3	10.14	120.6		4.9
8/24/2015	1	21.25	8.96	215.4	10.12	120.3		
8/24/2015	2	21.25	8.95	215.4	10.17	121		
8/24/2015	3	21.26	8.95	215.4	10.21	121.4		
8/24/2015	4	21.24	8.95	215.6	10.27	122.1		
8/24/2015	5	21.16	8.94	216.3	10.38	123.2	9.72	
8/24/2015	6	21.12	8.93	216.7	10.37	122.9		

8/24/2015	7	20.83	8.82	224.2	9.86	116.3		
8/24/2015	8	19.55	7.91	267.2	6.55	75.3		
8/24/2015	9	18.43	7.71	272.7	5.04	56.6		
8/24/2015	9*	18.41	7.71	272.7	4.9	55.1		
8/24/2015	10	18.09	7.72	272.1	4.91	54.8		
8/24/2015	12	17.77	7.68	271.4	4.62	51.2		
8/24/2015	15	17.51	7.75	270.7	5.45	60.1		
8/24/2015	18	17.24	7.65	267.4	4.64	50.9		
8/24/2015	21	16.83	7.53	258	3.63	39.5		
8/24/2015	24	16.06	7.39	235.2	2.66	28.5		
8/24/2015	27	13.72	7.06	147.4	2.27	23.1	2.84	
8/24/2015	30	12.26	7	141.1	2.34	23		
8/24/2015	33	11.51	6.99	135.5	3.24	31.3		
8/24/2015	33*	11.49	6.99	135.5	3.24	31.4		
8/24/2015	36	10.85	6.98	127.8	3.61	34.3		
8/24/2015	39	10.07	6.92	122.4	2.93	27.4		
8/24/2015	42	9.77	6.9	121	2.74	25.5		
8/24/2015	45	9.73	6.8	120.2	2.63	24.4		
8/24/2015	47.5	9.63	6.88	120.2	2.5	23.1		
9/8/2015	0.5	18.15	8.54	242.7	8.72	97.1		4.6
9/8/2015	1	18.13	8.54	242.8	8.75	97.3		
9/8/2015	2	18.14	8.54	243	8.74	97.3		
9/8/2015	3	18.12	8.55	243	8.75	97.3		
9/8/2015	4	18.11	8.55	242.7	8.75	97.3		
9/8/2015	5	18.1	8.56	242.7	8.77	97.5	7.36	
9/8/2015	6	18.1	8.56	242.7	8.78	97.6		
9/8/2015	7	18.09	8.56	242.4	8.82	98		
9/8/2015	8	18.08	8.55	242.8	8.78	97.5		
9/8/2015	9	18.06	8.54	243.1	8.64	96		
9/8/2015	9*	18.05	8.5	244.3	8.48	94.2		
9/8/2015	10	17.86	8.25	252	7.23	80		
9/8/2015	12	17.19	7.76	270.6	4.51	49.2		
9/8/2015	15	16.59	7.63	263.6	3.27	35.2		
9/8/2015	18	16.07	7.61	262.7	3.96	42.2	3.37	
9/8/2015	21	15.71	7.55	253.6	3.14	33.2		
9/8/2015	24	15.28	7.51	243.9	2.93	30.6		
9/8/2015	27	13.86	7.29	168.4	1	10.2		
9/8/2015	30	12.59	7.18	143.6	1.05	10.3		
9/8/2015	33	12.06	7.13	136.5	2.28	22.2		
9/8/2015	33*	11.8	7.11	136.6	2.37	23		
9/8/2015	36	11.1	7.08	129.2	2.88	27.4		
9/8/2015	39	10.23	7.03	123.6	2.45	22.9		

9/8/2015	42	9.9	6.99	121.2	2.04	18.9		
9/8/2015	45	9.7	6.98	120.6	1.69	15.6		
9/8/2015	47	9.67	6.96	120.2	1.54	14.2		
9/23/2015	0.5	17.11	8.49	251.9	9.19	100.5		4.8
9/23/2015	1	17.09	8.49	252	9.25	101.2		
9/23/2015	2	17.09	8.49	252	9.23	100.9		
9/23/2015	3	17.07	8.49	252.2	9.2	100.5		
9/23/2015	4	17.07	8.49	252	9.21	100.7		
9/23/2015	5	17.06	8.5	252.2	9.21	100.6	8.5	
9/23/2015	6	17.05	8.5	251.9	9.17	100.2		
9/23/2015	7	17.05	8.5	251.9	9.19	100.4		
9/23/2015	8	17.05	8.49	252.5	9.1	99.4		
9/23/2015	9***	16.965	7.925	263.5	6.535	71.25	Average of readings to use for graphing and analysis	
9/23/2015	10	16.74	7.64	274.4	4.13	44.9		
9/23/2015	12	16.23	7.56	271.3	3.82	41		
9/23/2015	15	15.46	7.57	266.6	4.53	47.9	3.93	
9/23/2015	18	14.92	7.61	266.5	5.21	54.4		
9/23/2015	21	14.48	7.55	257.5	4.6	47.6		
9/23/2015	24	14.25	7.52	254.7	4.47	46		
9/23/2015	27	13.75	7.38	231.8	2.88	29.3		
9/23/2015	30	13.07	7.21	188.9	0.8	8		
9/23/2015	33	11.94	7.09	141.4	1.38	13.4		
9/23/2015	33*	11.94	7.04	140.6	1.43	13.9		
9/23/2015	36	11.33	7.02	135.6	2.15	20.7		
9/23/2015	39	10.38	6.98	127.6	1.76	16.5		
9/23/2015	42	9.96	6.93	124.2	1.23	11.5		
9/23/2015	45	9.77	6.9	123.3	0.64	5.9		
9/23/2015	47	9.73	6.9	124.2	0	0		
10/13/2015	0.5	15.36	8.4	257.6	8.76	91.9		5.6
10/13/2015	1	15.36	8.4	258.4	8.77	92		
10/13/2015	2	15.38	8.41	257.6	8.77	92		
10/13/2015	3	15.38	8.35	257.5	8.77	92		
10/13/2015	4	15.39	8.39	257.7	8.74	91.8		
10/13/2015	5	15.38	8.4	257.5	8.74	91.8	7.56	
10/13/2015	6	15.38	8.41	257.7	8.77	92.1		
10/13/2015	7	15.38	8.35	257.8	8.68	91.2		
10/13/2015	8	15.39	8.36	258.1	8.71	91.4		
10/13/2015	9	15.38	8.37	257.8	8.67	91		
10/13/2015	9*	15.38	8.38	258.1	8.71	91.5		
10/13/2015	10	15.38	8.36	258.2	8.6	90.3		

10/13/2015	12	15.22	8.05	264.8	7.21	75.4		
10/13/2015	15	14.58	7.77	268.6	5.53	57	5.56	
10/13/2015	18	14.16	7.75	266.6	5.57	56.9		
10/13/2015	21	13.91	7.71	264.3	5.5	55.9		
10/13/2015	24	13.63	7.71	260.5	5.77	58.2		
10/13/2015	27	13.25	7.66	252	5.7	57.1		
10/13/2015	30	13.1	7.63	246.2	5.44	54.3		
10/13/2015	33	12.67	7.4	208.4	3.06	30.2		
10/13/2015	33*	12.66	7.38	208.2	3.04	30		
10/13/2015	36	11.44	7.2	138.7	1.07	10.3		
10/13/2015	39	10.53	7.12	126.7	0	0		
10/13/2015	42	10.28	7.07	124.9	0	0		
10/13/2015	45	10.14	7.03	124	0	0		
10/13/2015	47.5	10.09	7	124.2	0	0		

*QA/QC measurement for Hydrolab
**Secchi disk depths average of 3 measurements

Table A-2. Station LL1 *In Situ* Water Quality Data, 2015

Date	Depth (m)	Temperature (°C)	pH	Cond (µS/cm)	DO (mg/l)	DO Sat. (%)	Winkler DO (mg/L)	Secchi Disk Depth (m)**
5/13/2014	0.5	14.77	8.75	137.1	11.61	121.6		2.0
5/13/2014	1	14.76	8.77	136.6	11.58	121.2		
5/13/2014	2	14.76	8.77	136.6	11.56	121.1		
5/13/2014	3	14.76	8.77	137.1	11.54	120.9		
5/13/2014	4	14.75	8.77	136.8	11.52	120.6		
5/13/2014	4*	14.75	8.76	137.4	11.52	120.6		
5/13/2014	5	14.73	8.76	137	11.52	120.6	10.8	
5/13/2014	6	14.72	8.74	137.5	11.5	120.3		
5/13/2014	7	14.7	8.75	137.5	11.47	120		
5/13/2014	8	14.65	8.73	137.3	11.44	119.5		
5/13/2014	9	14.6	8.71	137.3	11.4	119		
5/13/2014	10	14.6	8.69	137.4	11.36	118.6		
5/13/2014	12	14.58	8.68	137.3	11.34	118.3		
5/13/2014	15	13.32	8.33	136.5	10.01	101.6		
5/13/2014	18	12.35	8.16	131.7	9.89	98.1		
5/13/2014	21	11.76	8.03	128.8	9.85	96.5	9.21	
5/13/2014	21*	11.75	7.95	128.6	9.88	96.7		
5/13/2014	24	11.21	7.92	125.8	9.81	94.8		
5/13/2014	27	10.57	7.86	122.5	9.53	90.8		
5/13/2014	30	10.14	7.8	119.9	9.22	86.9		
5/13/2014	33	9.83	7.76	118.4	8.95	83.8		
6/9/2015	0.5	23.28	8.64	143.4	9.25	115		7.1
6/9/2015	1	23.08	8.65	143.2	9.33	115.6		
6/9/2015	2	22.83	8.64	143	9.34	115.1		
6/9/2015	3	22.03	8.73	141.9	10.31	125.1		
6/9/2015	4	20.26	8.59	141.1	10.29	120.6		
6/9/2015	4*	20.17	8.6	141.4	10.33	120.9		
6/9/2015	5	19.39	8.69	140.6	11.38	131.2	10.7	
6/9/2015	6	19.02	8.58	141	10.93	125		
6/9/2015	7	18.61	8.46	141.5	10.41	118		
6/9/2015	8	18.36	8.28	141.4	9.67	109		
6/9/2015	9	18.14	8.15	141.3	9.09	102		
6/9/2015	10	17.79	8.01	142.1	8.37	93.4		
6/9/2015	12	17.36	7.89	141.7	7.87	87		
6/9/2015	15	16.89	7.83	141.3	7.76	84.9		
6/9/2015	18	16.33	7.81	141	8.06	87.2		
6/9/2015	21	15.2	7.78	142	8.01	84.5	8.04	
6/9/2015	21*	15.23	7.77	141.6	8.01	84.6		

6/9/2015	24	13.79	7.69	141.5	7.07	72.4		
6/9/2015	27	12.73	7.61	139.5	5.87	58.7		
6/9/2015	30	11.9	7.54	135.9	4.68	45.9		
6/9/2015	33	10.94	7.51	129.4	4.46	42.8		
6/23/2015	0.5	22.26	8.44	152.3	9.03	109.3		9.3
6/23/2015	1	22.17	8.43	152	9.05	109.4		
6/23/2015	2	21.94	8.45	152.2	9.15	110.1		
6/23/2015	3	21.86	8.42	151.5	8.99	108		
6/23/2015	4	21.76	8.47	151.8	9.19	110.2		
6/23/2015	4*	21.76	8.49	152.1	9.2	110.3		
6/23/2015	5	21.68	8.5	152.6	9.38	112.2	9.07	
6/23/2015	6	21.23	8.47	157.4	9.49	112.6		
6/23/2015	7	20.81	8.28	156.9	8.83	103.9		
6/23/2015	8	19.76	8.09	160.5	8.76	101		
6/23/2015	9	19.02	7.98	164.2	8.56	97.2		
6/23/2015	10	18.59	7.9	178.2	8.03	90.4		
6/23/2015	12	18.11	7.85	194.9	7.65	85.2		
6/23/2015	15	17.46	7.81	201.7	7.47	82.1		
6/23/2015	18	17.03	7.79	206.9	7.33	79.9		
6/23/2015	21	15.57	7.65	146.5	5.75	60.8	7.04	
6/23/2015	21*	15.58	7.59	146	5.78	61.1		
6/23/2015	24	14.28	7.52	142.1	5.1	52.4		
6/23/2015	27	12.47	7.44	137.2	3.78	37.3		
6/23/2015	30	11.52	7.38	132.4	3.34	32.2		
6/23/2015	33	11.06	7.33	130.3	3.01	28.7		
7/7/2015	0.5	24.82	8.76	160.9	9.75	124.6		5.2
7/7/2015	1	24.81	8.77	161.2	9.8	125.1		
7/7/2015	2	24.81	8.77	161	9.78	124.8		
7/7/2015	3	24.78	8.79	161.1	9.79	124.9		
7/7/2015	4	24.73	8.77	161.7	9.85	125.5		
7/7/2015	4*	24.75	8.78	161.5	9.81	125.1		
7/7/2015	5	24.62	8.79	162.3	9.92	126.1	8.89	
7/7/2015	6	24.45	8.76	162.3	10.11	128.1		
7/7/2015	7	23.72	8.75	165.5	10.59	132.4		
7/7/2015	8	20.4	8.4	195.8	10.22	119.7		
7/7/2015	9	19.25	8.14	244	8.86	101.5		
7/7/2015	10	19.07	8.09	248.8	8.46	96.1		
7/7/2015	12	18.61	8.03	251.9	8.05	91		
7/7/2015	15	17.44	7.85	241.8	7.19	79.4		
7/7/2015	18	16.97	7.82	246.6	7.06	77.1		
7/7/2015	21	16.21	7.61	216.7	5.23	56.2		
7/7/2015	21*	16.22	7.59	217.2	5.25	56.5		

7/7/2015	24	14.88	7.43	166.1	3.45	36.1		
7/7/2015	27	13.31	7.32	142.1	2.33	23.5		
7/7/2015	30	11.66	7.23	134.2	1.55	15.1	2.45	
7/7/2015	33	11.4	7.19	132.9	1.47	14.2		
7/21/2015	0.5	24.26	9	179.1	10.24	129.6		4.4
7/21/2015	1	24.25	9.01	179.4	10.29	130.3		
7/21/2015	2	24.21	9.02	179.4	10.27	129.9		
7/21/2015	3	24.12	9.02	179.3	10.36	130.9		
7/21/2015	4	24.06	9.03	178.6	10.44	131.7		
7/21/2015	4*	24.07	9.04	178.6	10.43	131.6		
7/21/2015	5	23.85	8.97	188.1	10.56	132.7		
7/21/2015	6	21.89	8.38	235.1	8.39	101.6		
7/21/2015	7	20.2	8.11	258.5	7.94	93		
7/21/2015	8	19.39	7.98	263.7	7.48	86.2		
7/21/2015	9	19.18	7.94	265.4	7.31	83.8		
7/21/2015	10	18.92	7.92	266.6	6.97	79.6		
7/21/2015	12	18.38	7.87	267	6.59	74.4		
7/21/2015	15	18.07	7.82	266.3	6.38	71.6	6.6	
7/21/2015	18	17.27	7.7	250.5	5.89	65		
7/21/2015	21	16.67	7.62	237.4	5.27	57.4		
7/21/2015	21*	16.65	7.59	237.6	5.22	56.9		
7/21/2015	24	15.31	7.42	204.2	3.09	32.7		
7/21/2015	27	12.68	7.28	144.7	1.4	14		
7/21/2015	30	11.79	7.2	136.9	1.09	10.7		
7/21/2015	33	11.42	7.14	135.2	0.58	5.7	1.35	
8/4/2015	0.5	23.18	9.18	196.1	11.05	137.2		4.3
8/4/2015	1	23.19	9.19	195.7	11.13	138.1		
8/4/2015	2	23.13	9.19	195.8	11.14	138.1		
8/4/2015	3	23.02	9.19	195.8	11.17	138.2		
8/4/2015	4	22.98	9.19	195.6	11.27	139.3		
8/4/2015	4*	22.99	9.18	195.7	11.25	139		
8/4/2015	5	22.61	9.17	197.2	11.81	145	8.58	
8/4/2015	6	21.78	8.78	221.4	9.72	117.4		
8/4/2015	7	20.7	8.25	250.4	7.85	92.9		
8/4/2015	8	20.02	8.03	260.2	7.11	82.9		
8/4/2015	9	18.9	7.9	266.3	6.38	72.7		
8/4/2015	10	18.52	7.89	267.5	6.38	72.2		
8/4/2015	12	18.16	7.83	268.3	6.11	68.7		
8/4/2015	15	17.8	7.74	267.7	5.24	58.5		
8/4/2015	18	17.22	7.77	263.9	5.63	62.1		
8/4/2015	21	16.79	7.82	262.3	6.13	67	8.72	
8/4/2015	21*	16.79	7.85	262	6.24	68.2		

8/4/2015	24	15.77	7.47	228.3	2.63	28.1		
8/4/2015	27	12.95	7.29	156.3	0	0		
8/4/2015	30	12.08	7.22	144.7	0	0		
8/4/2015	33	11.49	7.18	137.7	0	0		
8/24/2015	0.5	21.25	9.02	210	10.61	126.1		3.3
8/24/2015	1	21.26	9.03	209.9	10.6	126		
8/24/2015	2	21.23	9.03	210.1	10.64	126.5		
8/24/2015	3	21.2	9.03	209.9	10.54	125.7		
8/24/2015	4	21.16	9.03	210.2	10.57	125.5		
8/24/2015	4*	21.19	9.04	210.1	10.57	125.5		
8/24/2015	5	21.05	9	211.5	10.39	123	10.1	
8/24/2015	6	21.02	8.99	212.4	10.3	122.2		
8/24/2015	7	20.99	8.98	213.3	10.37	122.7		
8/24/2015	8	20.61	8.67	228.9	9	105.7		
8/24/2015	9	19.09	7.88	267	5.92	67.5		
8/24/2015	10	18.75	7.84	269.7	5.76	65.1		
8/24/2015	12	18.16	7.86	271.6	5.92	66.1		
8/24/2015	15	17.5	7.95	276.7	6.73	74.2	5.5	
8/24/2015	18	17.23	7.85	276.4	6.2	68		
8/24/2015	21	16.85	7.67	271	4.67	50.8		
8/24/2015	21*	16.83	7.67	270.5	4.69	51		
8/24/2015	24	15.82	7.45	249.2	2.24	23.8		
8/24/2015	27	14.13	7.22	200.6	0	0		
8/24/2015	30	12.38	7.06	158.9	0	0		
8/24/2015	33	11.88	7.02	150.4	0	0		
9/8/2015	0.5	18.15	8.64	233.2	9.13	101.5		3.7
9/8/2015	1	18.14	8.68	233.2	9.11	101.4		
9/8/2015	2	18.14	8.71	233.6	9.1	101.3		
9/8/2015	3	18.13	8.71	233.7	9.07	100.9		
9/8/2015	4	18.12	8.72	233.8	9.07	100.9		
9/8/2015	4*	18.13	8.72	233.7	9.09	101.1		
9/8/2015	5	18.11	8.72	233.8	9.06	100.8	8.78	
9/8/2015	6	18.1	8.71	233.9	9.05	100.6		
9/8/2015	7	18.09	8.71	234.4	8.99	99.9		
9/8/2015	8	18.08	8.7	235.2	8.97	99.6		
9/8/2015	9	18.06	8.69	235.6	8.89	98.8		
9/8/2015	10	18.05	8.67	236.5	8.84	98.2		
9/8/2015	12	17.77	8.14	257.7	6.71	74.1		
9/8/2015	15	16.54	7.86	270.8	5.66	61.1		
9/8/2015	18	16.15	7.93	270.3	6.47	69		
9/8/2015	21	15.65	8.08	271.4	7.5	79.2	6.71	
9/8/2015	21*	15.64	8.08	271.2	7.51	79.2		

9/8/2015	24	15.43	8.01	272.1	7.16	75.2		
9/8/2015	27	14.92	7.76	257.3	5.26	54.7		
9/8/2015	30	12.78	7.42	170.6	0	0		
9/8/2015	33.5	11.94	7.3	154.7	0	0		
9/23/2015	0.5	17.42	8.49	252.1	9.49	104.4		4.4
9/23/2015	1	17.41	8.5	251.7	9.54	104.9		
9/23/2015	2	17.29	8.52	251.6	9.59	105.3		
9/23/2015	3	17.27	8.53	251.6	9.52	104.4		
9/23/2015	4	17.24	8.52	251.6	9.46	103.7		
9/23/2015	4*	17.25	8.52	251.2	9.46	103.7		
9/23/2015	5	17.22	8.53	251.6	9.44	103.5	8.79	
9/23/2015	6	17.21	8.52	251.4	9.43	103.4		
9/23/2015	7	17.18	8.51	251.7	9.35	102.4		
9/23/2015	8	17.12	8.53	251.4	9.37	102.5		
9/23/2015	9	17.11	8.53	251.6	9.39	102.7		
9/23/2015	10	17.06	8.52	251.9	9.38	102.5		
9/23/2015	12	16.1	7.83	270.8	6.11	65.4		
9/23/2015	15	15.45	7.79	274	6.27	66.2		
9/23/2015	18	14.99	7.83	277.6	7.08	74		
9/23/2015	21	14.39	7.81	276.2	7.07	73	6.68	
9/23/2015	21*	14.42	7.81	276.4	7.08	73.1		
9/23/2015	24	14.12	7.89	275.8	7.65	78.5		
9/23/2015	27	14	7.93	275.5	7.86	80.4		
9/23/2015	30	13.81	7.76	267.8	6.7	68.2		
9/23/2015	33	12.76	7.29	206.2	0.85	8.5		
10/13/2015	0.5	15.79	8.47	254.8	9.06	95.9		5.8
10/13/2015	1	15.77	8.45	254.6	9.06	96		
10/13/2015	2	15.72	8.48	254.5	9.06	95.8		
10/13/2015	3	15.7	8.49	254.5	9.05	95.7		
10/13/2015	4	15.69	8.51	254.7	9.02	95.4		
10/13/2015	4*	15.69	8.46	254.5	9.01	95.2		
10/13/2015	5	15.68	8.44	254.3	8.97	94.8	8.77	
10/13/2015	6	15.68	8.43	254.5	8.96	94.6		
10/13/2015	7	15.67	8.45	254.7	8.88	93.8		
10/13/2015	8	15.64	8.44	254.8	8.88	93.7		
10/13/2015	9	15.6	8.42	255.2	8.77	92.5		
10/13/2015	10	15.57	8.42	255.8	8.74	92.1		
10/13/2015	12	15.33	8.34	258.6	8.49	89		
10/13/2015	15	14.37	7.99	270.4	6.99	71.8		
10/13/2015	18	14.09	7.9	271.6	6.75	68.9		
10/13/2015	21	13.71	7.97	272.3	7.68	77.8	6.96	
10/13/2015	21*	13.7	7.98	272.4	7.68	77.7		

10/13/2015	24	13.57	7.96	272.6	7.69	77.6		
10/13/2015	27	13.44	7.9	270.9	7.4	74.5		
10/13/2015	30	13.33	7.84	268.5	6.97	70		
10/13/2015	33.5	13.21	7.73	264.8	6.06	60.6		

*QA/QC measurement for Hydrolab
**Secchi disk depths average of 3 measurements

Table A-3. Station LL2 *In Situ* Water Quality Data, 2015

Date	Depth (m)	Temperature (°C)	pH	Cond (µS/cm)	DO (mg/l)	DO Sat. (%)	Winkler DO (mg/L)	Secchi Disk Depth (m)**
5/13/2015	0.5	14.24	8.5	141.8	11.19	115.8		2.1
5/13/2015	1	14.26	8.5	141.8	11.15	115.5		
5/13/2015	2	14.24	8.5	142.3	11.15	115.5		
5/13/2015	3	14.23	8.5	142.3	11.13	115.2		
5/13/2015	4	14.25	8.49	142.3	11.12	115.1		
5/13/2015	5	14.25	8.46	142.4	11.04	114.3	10.3	
5/13/2015	5*	14.24	8.46	142.4	11.03	114.2		
5/13/2015	6	14.24	8.44	142.3	10.97	113.5		
5/13/2015	7	14.09	8.38	142.4	10.75	110.9		
5/13/2015	8	14.04	8.36	142.1	10.7	110.3		
5/13/2015	9	13.96	8.31	142.1	10.66	109.7		
5/13/2015	10	13.92	8.28	142.1	10.66	109.6		
5/13/2015	12	13.88	8.26	142.1	10.66	109.5		
5/13/2015	15	12.98	8.05	140.2	9.76	98.2	9.77	
5/13/2015	18	12.18	7.93	133.6	9.47	93.6		
5/13/2015	21	11.05	7.85	126.1	9.27	89.3		
5/13/2015	24	10.38	7.76	122.7	8.4	79.7		
5/13/2015	24*	10.35	7.71	122.6	8.44	80		
5/13/2015	25.5	10.33	7.67	122.6	8.4	79.6		
6/9/2015	0.5	23.36	8.56	143.4	9.36	116.5		5.8
6/9/2015	1	23.21	8.56	143.6	9.37	116.3		
6/9/2015	2	23.04	8.58	142.7	9.42	116.6		
6/9/2015	3	22.49	8.6	142.6	9.92	121.4		
6/9/2015	4	20.71	8.66	141.9	11.05	130.7		
6/9/2015	5	19.59	8.67	141.1	11.4	131.8	11.3	
6/9/2015	5*	19.57	8.68	141	11.35	131.2		
6/9/2015	6	19.47	8.61	141.2	11.11	128.2		
6/9/2015	7	18.98	8.31	142.3	9.97	113.9		
6/9/2015	8	18.5	8.16	142.9	9.41	106.5		
6/9/2015	9	18.2	8.05	142.1	8.91	100.2		
6/9/2015	10	18.09	7.99	141.8	8.89	99.7		
6/9/2015	12	17.28	7.89	142.2	8.01	88.3		
6/9/2015	15	16.64	7.8	141.4	7.6	82.8	7.53	
6/9/2015	18	15.8	7.75	141.3	7.63	81.6		
6/9/2015	21	14.59	7.65	142.6	7.16	74.6		
6/9/2015	24	13.62	7.55	144.3	4.65	47.4		
6/9/2015	24*	13.61	7.49	144.4	4.57	46.6		
6/9/2015	25.5	13.11	7.45	144.7	3.68	37.1		

6/23/2015	0.5	22.61	8.58	156.6	9.51	115.9		8.0
6/23/2015	1	22.59	8.59	156.4	9.55	116.3		
6/23/2015	2	22.54	8.59	156.3	9.55	116.2		
6/23/2015	3	22.27	8.61	155.7	9.66	116.9		
6/23/2015	4	22.21	8.61	155.9	9.69	117.2		
6/23/2015	5	22.17	8.6	156	9.65	116.6	9.53	
6/23/2015	5*	22.19	8.6	155.7	9.67	116.9		
6/23/2015	6	22	8.58	159.6	9.72	117		
6/23/2015	7	21.12	8.36	174.3	9.34	110.6		
6/23/2015	8	19.45	8.22	220.2	9.14	104.8		
6/23/2015	9	18.68	8.15	225.1	8.94	100.9		
6/23/2015	10	18.48	8.21	238.6	9.25	103.9		
6/23/2015	12	18.01	8.2	247.2	9.13	101.6		
6/23/2015	15	17.56	8.08	242.3	9.62	95		
6/23/2015	18	17.02	7.96	234.3	7.97	86.8		
6/23/2015	21	16.06	7.7	205.9	5.98	83.8		
6/23/2015	24	14.1	7.54	151.2	2.85	29.2	5.7	
6/23/2015	24*	14.11	7.46	152	2.85	29.1		
6/23/2015	25	13.48	7.39	146.3	2.24	22.6		
7/7/2015	0.5	24.47	8.83	177.6	10.45	132.5		4.7
7/7/2015	1	24.47	8.84	177.5	10.47	132.7		
7/7/2015	2	24.4	8.85	177.3	10.48	132.7		
7/7/2015	3	24.31	8.85	176.8	10.51	132.8		
7/7/2015	4	24.16	8.83	174.2	10.4	131		
7/7/2015	5	24.06	8.87	177.7	10.69	134.5	9.82	
7/7/2015	5*	24.07	8.87	177.8	10.68	134.3		
7/7/2015	6	23.95	8.81	175	10.43	131		
7/7/2015	7	21.91	8.65	189.8	11.06	133.5		
7/7/2015	8	20.63	8.53	222.4	10.7	126		
7/7/2015	9	20.17	8.39	237.4	10.11	118		
7/7/2015	10	19.47	8.15	259	8.54	98.3		
7/7/2015	12	19.1	8.05	260.4	8.02	91.6	7.95	
7/7/2015	15	17.84	7.97	255.7	7.67	85.4		
7/7/2015	18	17.26	7.89	256.7	7.35	80.9		
7/7/2015	21	16.93	7.8	256.1	6.67	72.9		
7/7/2015	24	15.02	7.48	197.7	2	21		
7/7/2015	24*	15	7.38	196.3	1.92	20.1		
7/7/2015	25	13.97	7.28	165.6	0.05	0.5		
7/21/2015	0.5	24.36	9.08	183.5	10.23	129.8		3.5
7/21/2015	1	24.37	9.07	183.4	10.27	130.3		
7/21/2015	2	24.35	9.07	183.5	10.23	129.8		
7/21/2015	3	24.33	9.08	183.4	10.22	129.7		

7/21/2015	4	24.34	9.06	183.4	10.26	130.1		
7/21/2015	5	24.32	9.08	183.1	10.24	129.9	1.32	
7/21/2015	5*	24.29	9.08	183.2	10.32	130.7		
7/21/2015	6	24.25	9.09	182.6	10.37	131.3		
7/21/2015	7	23.91	8.94	189.6	10.16	127.9		
7/21/2015	8	20.46	8.12	254.2	7.27	85.5		
7/21/2015	9	19.58	8.03	262.8	7.17	83		
7/21/2015	10	19.14	8.02	263.7	7.16	82.1		
7/21/2015	12	18.3	8.04	265.6	7.29	82.2		
7/21/2015	15	17.93	8.06	266.4	7.44	83.3	7.3	
7/21/2015	18	17.56	7.74	264.5	5.2	57.8		
7/21/2015	21	16.58	7.56	248.1	3.51	38.2		
7/21/2015	24	14.76	7.37	202.2	0.16	1.7		
7/21/2015	24*	14.67	7.32	198.7	0.12	1.3		
7/21/2015	25	14.23	7.28	189.2	0	0		
8/4/2015	0.5	23.45	9.18	194.3	11.22	140		3.2
8/4/2015	1	23.46	9.18	194.5	11.21	139.9		
8/4/2015	2	23.41	9.18	194.6	11.24	140.1	11.8	
8/4/2015	3	23.2	9.16	195.5	11.15	138.4		
8/4/2015	4	23.15	9.15	196.2	10.94	135.7		
8/4/2015	5	22.6	8.97	204.1	10.59	129.9		
8/4/2015	5*	22.69	9.04	202.2	10.62	130.5		
8/4/2015	6	21.79	8.79	210.6	8.73	105.4		
8/4/2015	7	21.16	8.61	221.1	8.15	97.3		
8/4/2015	8	20.07	8.16	255.3	7.17	83.8		
8/4/2015	9	19.38	8.03	261.7	6.99	80.6		
8/4/2015	10	18.81	8.01	266.6	7.05	80.3		
8/4/2015	12	18.19	8.13	266.6	7.5	84.3		
8/4/2015	15	17.86	8.37	262.7	8.78	98.1		
8/4/2015	18	17.47	8.41	269.9	9.49	105.1	5.61	
8/4/2015	21	17.05	8.27	274.2	8.92	98		
8/4/2015	24	16.29	7.72	257.7	4.63	50		
8/4/2015	24*	16.56	7.8	267.1	5.49	59.7		
8/4/2015	25	15.7	7.39	235.8	0.49	5.2		
8/24/2015	0.5	21.56	9.08	204.5	10.89	130.2		3
8/24/2015	1	21.56	9.05	204.5	10.86	129.9		
8/24/2015	2	21.46	9.08	204.4	10.96	130.9		
8/24/2015	3	21.39	9.08	204.2	10.98	130.9		
8/24/2015	4	21.36	9.07	204.6	10.9	129.8		
8/24/2015	5	21.3	9.04	206.4	10.43	124.1		
8/24/2015	5*	21.3	9.04	206.5	10.5	124.9		
8/24/2015	6	21.11	8.87	216.3	9.49	112.5		

8/24/2015	7	19.97	8.26	249.8	7.32	81.9		
8/24/2015	8	19.14	8.09	260	6.86	78.2		
8/24/2015	9	18.71	7.96	266.2	6.34	71.7		
8/24/2015	10	18.32	7.98	270.2	6.63	74.3		
8/24/2015	12	17.83	8.13	277	7.76	86.1	5.68	windy; maybe missed the depth
8/24/2015	15	17.36	8.12	280.5	7.88	86.6		
8/24/2015	18	17.15	8.1	280.9	7.89	86.4		
8/24/2015	21	16.91	7.99	281.3	7.17	78.1		
8/24/2015	24	16.45	7.59	270.6	3.96	42.7	6.77	windy; maybe missed the depth
8/24/2015	24*	16.45	7.58	270.1	3.79	70.9		
8/24/2015	25	15.16	7.31	235	0	0		
9/8/2015	0.5	18.46	8.85	223.9	9.5	106.4		3.0
9/8/2015	1	18.46	8.85	224	9.49	106.2		
9/8/2015	2	18.42	8.84	224.4	9.45	105.7		
9/8/2015	3	18.37	8.84	224.4	9.4	105.1		
9/8/2015	4	18.35	8.83	225.6	9.31	104		
9/8/2015	5	18.35	8.83	226	9.31	104	8.8	
9/8/2015	5*	18.35	8.82	226	9.31	104.1		
9/8/2015	6	18.32	8.79	228.4	9.15	102.2		
9/8/2015	7	18.23	8.4	248	7.39	82.4		
9/8/2015	8	17.96	8.11	261.5	6.32	70.1		
9/8/2015	9	17.59	7.93	270.6	5.61	61.7		
9/8/2015	10	17.39	7.87	272.4	5.47	60		
9/8/2015	12	17.05	7.88	272.1	5.78	62.9		
9/8/2015	15	16.65	8.05	267.8	6.87	74.1	5.92	
9/8/2015	18	15.72	8.23	271.2	8.36	88.4		
9/8/2015	21	15.15	8.23	275.9	8.46	88.4		
9/8/2015	24	14.89	8.21	277.4	8.48	88.1		
9/8/2015	24*	14.88	8.21	277.4	8.46	87.9		
9/8/2015	25.5	14.89	8.19	277.3	8.36	86.9		
9/23/2015	0.5	17.7	8.73	239.3	9.89	109.5		3.6
9/23/2015	1	17.67	8.72	239	9.92	109.8		
9/23/2015	2	17.63	8.7	240.1	9.84	108.8		
9/23/2015	3	17.48	8.62	244.4	9.43	103.9		
9/23/2015	4	17.5	8.55	247	9.12	100.6		
9/23/2015	5	17.45	8.55	247.6	9.13	100.6	8.64	
9/23/2015	5*	17.46	8.55	247	9.13	100.6		
9/23/2015	6	17.43	8.54	247.4	9.1	100.1		

9/23/2015	7	17.41	8.51	249	9.05	99.5		
9/23/2015	8	17.37	8.51	249.6	8.89	97.7		
9/23/2015	9	17.34	8.47	250.9	8.67	95.3		
9/23/2015	10	17.1	8.34	251.9	8.04	87.9		
9/23/2015	12	16.1	8.37	251.9	8.43	90.3		
9/23/2015	15	15.35	8.05	270.5	7.7	81.1	7.14	
9/23/2015	18	14.68	8.16	269.9	8.44	87.6		
9/23/2015	21	13.99	8.26	273.1	9.38	96		
9/23/2015	24	13.74	8.09	277	8.43	85.8		
9/23/2015	24*	13.74	8.09	277.2	8.45	86		
9/23/2015	25	13.74	8.07	276.9	8.41	85.5		
10/13/2015	0.5	15.91	8.48	248.8	9.21	97.8		4.6
10/13/2015	1	15.79	8.49	248.4	9.27	98.1		
10/13/2015	2	15.75	8.52	248.1	9.33	98.7		
10/13/2015	3	15.71	8.47	248.2	9.31	98.4		
10/13/2015	4	15.7	8.48	248.1	9.33	98.6		
10/13/2015	5	15.7	8.49	248.4	9.31	98.4	8.53	
10/13/2015	5*	15.7	8.49	248.4	9.28	98.1		
10/13/2015	6	15.68	8.48	248.1	9.26	97.9		
10/13/2015	7	15.68	8.48	248.4	9.24	97.6		
10/13/2015	8	15.68	8.49	248.1	9.25	97.7		
10/13/2015	9	15.68	8.49	248.1	9.21	97.2		
10/13/2015	10	15.68	8.48	248	9.23	97.5		
10/13/2015	12	15.27	8.44	249.5	9.21	95.5		
10/13/2015	15	13.95	8.19	265.4	8.67	88.3	8.45	
10/13/2015	18	13.6	8.12	269.6	8.55	86.3		
10/13/2015	21	13.41	8.11	269.9	8.57	86.2		
10/13/2015	24	13.3	8.06	271.2	8.38	84		
10/13/2015	24*	13.31	8.05	270.9	8.35	83.8		
10/13/2015	25	13.27	7.96	271.9	7.81	78.3		

*QA/QC measurement for Hydrolab
**Secchi disk depths average of 3 measurements

Table A-4. Station LL3 *In Situ* Water Quality Data, 2015

Date	Depth (m)	Temperature (°C)	pH	Cond (µS/cm)	DO (mg/l)	DO Sat. (%)	Winkler DO (mg/L)	Secchi Disk Depth (m)**
5/14/2015	0.5	15.31	8.57	144.5	11.1	117.3		2.1
5/14/2015	1	15.34	8.56	144.9	11.08	117.2		
5/14/2015	2	15.15	8.55	144.8	11.14	117.3		
5/14/2015	3	14.34	8.32	146.2	10.41	107.6		
5/14/2015	4	13.99	8.2	145.7	10.15	104.2		
5/14/2015	5	13.89	8.13	145.7	10.03	102.8	10.3	
5/14/2015	6	13.87	8.1	146.1	9.93	101.6		
5/14/2015	7	13.71	8.07	145.2	9.89	100.9		
5/14/2015	8	13.68	8.05	145.7	9.92	101.2		
5/14/2015	9	13.64	8.03	145.1	9.93	101.1		
5/14/2015	9*	13.64	8.02	145.1	9.87	100.6		
5/14/2015	10	13.51	7.98	145.3	9.85	100	9.44	
5/14/2015	12	13.38	7.96	145	9.74	98.6		
5/14/2015	15	12.47	7.83	140.1	9.09	90.2		
5/14/2015	18	11.9	7.76	137	8.48	83.1		
6/10/2015	0.5	24	8.48	146.5	9.01	113.9		6.6
6/10/2015	1	23.99	8.45	146.1	9.05	114.3		
6/10/2015	2	23.83	8.46	145.9	9.08	114.4		
6/10/2015	3	22.31	8.56	145	10.03	122.7		
6/10/2015	4	21.21	8.52	149.8	10.33	123.7		
6/10/2015	5	20.56	8.41	158.7	10.14	120.1	10.1	
6/10/2015	6	20.04	8.32	169.3	9.8	114.7		
6/10/2015	7	19.31	8.18	179.6	9.13	105.3		
6/10/2015	8	19.07	8.12	183.3	9.02	103.6		
6/10/2015	9	18.62	7.99	174	8.42	95.8		
6/10/2015	9*	18.61	7.96	174.1	8.42	95.8		
6/10/2015	10	18.26	7.85	167.7	7.97	90	8.39	
6/10/2015	12	17.51	7.79	145.5	7.61	84.6		
6/10/2015	15	16.75	7.7	145.4	7.12	77.9		
6/10/2015	18	15.7	7.54	147.7	5.14	55.1		
6/10/2015	18.5	15.33	7.48	147.9	4.33	46		
6/24/2015	0.5	23.02	8.76	163.5	9.76	119.8		5.8
6/24/2015	1	23.02	8.73	163.5	9.78	119.8		
6/24/2015	2	23.02	8.74	163.9	9.78	120.1		
6/24/2015	3	23.01	8.77	163.5	9.77	119.9		
6/24/2015	4	22.99	8.73	163.7	9.75	119.7		
6/24/2015	5	22.39	8.55	174.7	9.68	117.5	10.4	
6/24/2015	6	21.31	8.57	202.7	9.67	114.9		

6/24/2015	7	20.73	8.49	212.4	9.47	111.3		
6/24/2015	8	19.47	8.43	231.6	9.56	109.6		
6/24/2015	9	18.87	8.42	240.4	9.64	109.2		
6/24/2015	9*	18.84	8.43	240.5	9.65	109.2		
6/24/2015	10	18.21	8.39	248.5	9.66	107.9		
6/24/2015	12	17.29	8.35	261	9.8	107.5		
6/24/2015	15	17.09	8.31	262.7	9.62	105		
6/24/2015	18	16.98	8.29	263.6	9.56	104.1	9.42	
6/24/2015	19	16.99	8.24	263.4	9.42	102.7		
7/8/2015	0.5	25.39	8.96	176.1	10.45	134.9		3.7
7/8/2015	1	25.39	8.97	176.1	10.46	135.1		
7/8/2015	2	25.2	8.96	178.2	10.4	133.8		
7/8/2015	3	25.09	8.95	178.7	10.43	134		
7/8/2015	4	22.72	8.7	227.2	11.41	140.2		
7/8/2015	5	22.01	8.65	235.5	11.38	137.9	broke	
7/8/2015	6	20.95	8.43	250.4	10.09	119.9		
7/8/2015	7	20.5	8.34	259.3	9.45	111.2		
7/8/2015	8	20.13	8.28	263.6	9.04	105.6		
7/8/2015	9	19.54	8.19	269	8.49	98		
7/8/2015	9*	19.59	8.19	268.8	8.57	99		
7/8/2015	10	19.22	8.12	270.3	8.18	93.8		
7/8/2015	12	18.74	8.04	271.8	7.75	88		
7/8/2015	15	18.04	7.89	268.4	6.95	77.8	6.72	
7/8/2015	18	17.08	7.66	270.5	4.63	50.8		
7/8/2015	18.5	17.07	7.64	270.6	4.6	50.5		
7/22/2015	0.5	24.57	9.13	186.8	10.62	135.4		3.5
7/22/2015	1	24.58	9.14	186.6	10.66	136		
7/22/2015	2	24.6	9.14	186.8	10.61	135.4		
7/22/2015	3	24.59	9.14	186.4	10.64	135.8		
7/22/2015	4	24.58	9.14	186.5	10.66	136		
7/22/2015	5	24.58	9.16	186.8	10.64	135.8	10.2	
7/22/2015	6	24.57	9.16	186.5	10.64	135.7		
7/22/2015	7	23.68	8.8	202.8	9.14	114.6		
7/22/2015	8	22.45	8.77	217.9	9.25	113.4		
7/22/2015	9	20.99	8.68	238.1	9.56	113.8		
7/22/2015	9*	21.08	8.68	236	9.54	113.8		
7/22/2015	10	20.09	8.58	248.7	9.43	110.3	9.21	
7/22/2015	12	18.41	8.38	269.4	9.35	105.8		
7/22/2015	15	17.97	8.29	272.6	9.16	102.8		
7/22/2015	18	17.9	8.23	271.8	8.72	97.7		
7/22/2015	19	17.85	8.16	272.1	8.19	91.7		
8/5/2015	0.5	23.54	9.14	194.1	11.01	137.4		3.0

8/5/2015	1	23.54	9.12	193.8	11.01	137.4		
8/5/2015	2	23.54	9.15	193.9	11.04	137.7		
8/5/2015	3	23.54	9.14	193.7	11.06	137.9		
8/5/2015	4	23.54	9.14	193.8	11.13	138.8		
8/5/2015	5	23.52	9.13	193.9	11.08	138.2	broke	
8/5/2015	6	23.48	9.12	194.2	10.9	135.8		
8/5/2015	7	22.12	8.8	206.7	9.07	110.2		
8/5/2015	8	21.4	8.77	218.8	9.59	114.9		
8/5/2015	9	20.9	8.64	228.6	8.9	105.6		
8/5/2015	9*	20.89	8.63	228.3	8.98	106.5		
8/5/2015	10	19.89	8.57	243.3	9.46	109.9		
8/5/2015	12	18.9	8.54	259	10.24	116.7		
8/5/2015	15	17.73	8.46	274.1	10.37	115.4	8.75	
8/5/2015	18	17.59	8.43	275.8	10.23	113.5		
8/5/2015	19.5	17.52	8.41	277	10.16	112.5		
8/25/2015	0.5	21.4	9.09	199.5	10.46	124.6		2.7
8/25/2015	1	21.42	9.09	199.3	10.44	124.5		
8/25/2015	2	21.42	9.09	199.4	10.56	126		
8/25/2015	3	21.42	9.09	199.4	10.6	126.5		
8/25/2015	4	21.4	9.08	199.5	10.65	127		
8/25/2015	5	21.36	9.08	199.6	10.63	126.7		
8/25/2015	6	21.09	8.63	212.4	8.49	100.6		
8/25/2015	7	20.13	8.43	240.9	8.22	95.6		
8/25/2015	8	19.66	8.45	243.8	8.6	99.1		
8/25/2015	9	18.96	8.52	248.4	9	102.2		
8/25/2015	9*	18.96	8.52	248.8	8.76	99.5		
8/25/2015	10	18.67	8.36	256.2	8.35	94.3		
8/25/2015	12	17.82	8.34	265.1	8.61	95.6		
8/25/2015	15	16.36	8.34	276.4	9.29	100		
8/25/2015	18	16.17	8.29	278.8	9.19	98.6		
8/25/2015	19	16.11	8.29	279.3	9.2	98.5	BROKE	
9/9/2015	0.5	18.34	8.85	213.8	9.46	105.9		2.4
9/9/2015	1	18.33	8.86	213.9	9.4	105.3		
9/9/2015	2	18.32	8.86	214	9.43	105.6		
9/9/2015	3	18.31	8.86	214.3	9.42	105.4		
9/9/2015	4	18.3	8.86	214.4	9.44	105.6		
9/9/2015	5	18.29	8.84	215.1	9.25	103.5	9.03	
9/9/2015	6	18.24	8.73	218.9	8.48	94.8		
9/9/2015	7	18.05	8.32	236.2	6.9	76.8		
9/9/2015	8	17.89	8.04	254.6	6.08	67.5		
9/9/2015	9	17.69	7.95	261.6	6	66.4		
9/9/2015	9*	17.71	7.95	261	5.98	66.1		

9/9/2015	10	17.47	8.06	257.4	6.61	72.7	5.81	
9/9/2015	12	16.87	8.56	238.4	8.55	92.9		
9/9/2015	15	14.89	8.43	259	9.05	94.3		
9/9/2015	18	13.81	8.27	275.3	9.1	92.6		
9/9/2015	19.5	13.73	8.26	276.1	9.11	92.5		
9/24/2015	0.5	17.4	8.89	232.6	10.28	112.7		3.0
9/24/2015	1	17.38	8.9	232.3	10.28	112.7		
9/24/2015	2	17.38	8.9	232.7	10.34	113.4		
9/24/2015	3	17.37	8.9	232.7	10.34	113.4		
9/24/2015	4	17.37	8.9	232.7	10.27	112.6		
9/24/2015	5	17.36	8.89	232.7	10.22	112	9.76	
9/24/2015	6	17.36	8.89	232.8	10.17	111.5		
9/24/2015	7	17.34	8.82	233.7	9.36	102.5		
9/24/2015	8	17.25	8.75	234.8	9.11	99.7		
9/24/2015	9	17.04	8.85	229.7	9.59	104.4		
9/24/2015	9*	17.04	8.85	229.9	9.58	104.3		
9/24/2015	10	17	8.85	230.5	9.68	105.3	9.09	
9/24/2015	12	16.2	8.79	244.1	10.16	108.7		
9/24/2015	15	14.35	8.35	281.4	9.59	98.6		
9/24/2015	18	14.27	8.32	282.9	9.54	97.9		
9/24/2015	19	14.24	8.3	283.1	9.54	97.8		
10/14/2015	0.5	15.69	8.72	242.8	9.9	104.3		3.1
10/14/2015	1	15.69	8.73	242.8	9.86	103.9		
10/14/2015	2	15.71	8.73	242.8	9.91	104.5		
10/14/2015	3	15.71	8.74	242.9	9.9	104.3		
10/14/2015	4	15.72	8.74	242.9	9.88	104.2		
10/14/2015	5	15.73	8.73	242.6	9.92	104.6	9.36	
10/14/2015	6	15.73	8.73	242.8	9.92	104.6		
10/14/2015	7	15.71	8.74	242.9	9.91	104.5		
10/14/2015	8	15.69	8.74	242.1	9.83	103.6		
10/14/2015	9	15.61	8.72	241.5	9.77	102.7		
10/14/2015	9*	15.59	8.72	240.5	9.76	102.7		
10/14/2015	10	15.26	8.68	245.4	9.84	102.7	9.32	
10/14/2015	12	14.4	8.58	261.1	10.06	103.1		
10/14/2015	15	13.66	8.42	274.6	10	100.8		
10/14/2015	18	13.62	8.36	275.7	9.76	98.3		
10/14/2015	19.5	13.39	8.3	280	9.66	96.8		

*QA/QC measurement for Hydrolab
**Secchi disk depths average of 3 measurements

Table A-5. Station LL4 *In Situ* Water Quality Data, 2015

Date	Depth (m)	Temperature (°C)	pH	Cond (µS/cm)	DO (mg/l)	DO Sat. (%)	Winkler DO (mg/L)	Secchi Disk Depth (m)**
5/14/2015	0.5	13.43	8.21	144.6	10.17	103.1		2.6
5/14/2015	1	13.16	8.16	144.3	10.23	103.1		
5/14/2015	2	12.76	8.11	144.5	10.28	102.6		
5/14/2015	3	12.66	8.08	144.7	10.27	102.4		
5/14/2015	4	12.55	8.06	145.3	10.26	102		
5/14/2015	4*	12.57	8.06	144.8	10.26	102.1		
5/14/2015	5	12.54	8.02	144.7	10.27	102.1		
5/14/2015	6	12.53	8.01	145.1	10.25	101.8		
5/14/2015	7	12.53	8.02	144.6	10.21	101.5		
5/14/2015	8	12.53	8.01	145.2	10.22	101.6		
6/10/2015	0.5	23.66	8.48	148.4	9.61	120.7		4.5
6/10/2015	1	23.59	8.48	149	9.62	120.6		
6/10/2015	2	23.26	8.47	151.2	9.63	120		
6/10/2015	3	22.37	8.45	176.1	10.04	123.1		
6/10/2015	4	20.68	8.49	196.7	10.3	122.1		
6/10/2015	4*	20.71	8.5	196.4	10.35	122.8		
6/10/2015	5	18.95	8.25	212.6	9.55	109.3		
6/10/2015	6	18.58	8.16	212.1	9.33	106		
6/10/2015	7	18.47	8.12	210.8	9.13	103.5		
6/10/2015	8	18.4	8.1	210.5	9.12	103.3		
6/24/2015	0.5	23.12	8.79	171	9.99	122.9		4.3
6/24/2015	1	23.1	8.8	170.7	9.99	122.9		
6/24/2015	2	23.02	8.76	170.9	9.98	122.6		
6/24/2015	3	22.56	8.76	176.5	10.18	124		
6/24/2015	4	21.75	8.75	196.4	10.46	125.4		
6/24/2015	4*	21.84	8.76	194.8	10.39	124.7		
6/24/2015	5	20.07	8.62	231.7	10.36	120.2		
6/24/2015	6	16.44	8.37	276.4	10.08	108.6		
6/24/2015	7	16.32	8.34	276.9	10.03	107.7		
6/24/2015	8	16.33	8.34	276.9	9.97	107.1		
7/8/2015	0.5	25.94	9.1	179.6	11.33	147.8		3.1
7/8/2015	1	25.95	9.11	179.8	11.31	147.6		
7/8/2015	2	25.93	9.11	179.9	11.34	147.9		
7/8/2015	3	25.89	9.11	179.7	11.3	147.3		
7/8/2015	4	25.25	8.93	195.2	11.68	150.4		
7/8/2015	4*	25.09	8.94	196.6	11.73	150.7		
7/8/2015	5	23.1	8.84	225	11.22	138.9		
7/8/2015	6	19.18	8.49	265.2	10.08	115.5		

7/8/2015	7	18.4	8.42	271.9	9.82	110.7		
7/8/2015	8	18.36	8.41	272.2	9.74	109.8		
7/22/2015	0.5	24.62	9.24	187.5	11.65	148.8		2.1
7/22/2015	1	24.6	9.25	187.4	11.62	148.3		
7/22/2015	2	24.6	9.26	187.1	11.6	148.1		
7/22/2015	3	24.52	9.25	187.9	11.54	147.1		
7/22/2015	4	24.5	9.27	186.9	11.6	147.8		
7/22/2015	4*	24.48	9.27	187	11.65	148.4		
7/22/2015	5	23.78	9.13	207.1	11.86	149.1		
7/22/2015	6	19.32	8.71	262.3	11.22	129.3		
7/22/2015	7	18.51	8.65	269	11.25	127.5		
7/22/2015	8	18.39	8.64	269.6	11.04	124.9		
8/5/2015	0.5	23.52	9.21	189.2	11.96	149.2		2.0
8/5/2015	1	23.53	9.22	189.1	11.97	149.3		
8/5/2015	2	23.52	9.22	189.3	11.96	149.1		
8/5/2015	3	23.09	9.1	199.5	12.08	149.5		
8/5/2015	4	22.6	9.13	201.5	13.11	160.7		
8/5/2015	4*	22.59	9.12	201.6	13.02	159.6		
8/5/2015	5	20.97	8.95	231.3	12.34	146.5		
8/5/2015	6	17.18	8.68	277.3	12.18	134		
8/5/2015	7	17.01	8.67	278.4	12.09	132.4		
8/5/2015	8	16.95	8.66	278.1	12.04	131.8		
8/25/2015	0.5	21.69	9.16	197.8	11.55	138.5		2.0
8/25/2015	1	21.64	9.16	197.9	11.46	137.3		
8/25/2015	2	21.59	9.16	197.7	11.38	136.2		
8/25/2015	3	21.47	9.16	197.6	11.35	135.5		
8/25/2015	4	21.11	9.16	197.7	11.17	132.5		
8/25/2015	4*	21.11	9.16	197.7	11.22	133		
8/25/2015	5	20.54	9.11	206.4	11.42	133.8		
8/25/2015	6	15.75	8.55	275.4	10.92	116.3		
8/25/2015	7	15.13	8.48	281.4	10.9	114.1		
8/25/2015	8	15	8.47	282.6	10.85	113.4		
9/9/2015	0.5	18.53	9.04	208.2	11.08	124.5		2.0
9/9/2015	1	18.49	9.06	208.4	11.07	124.4		
9/9/2015	2	18.42	9.05	208.7	11.02	123.6		
9/9/2015	3	18.36	9.04	208.9	10.85	121.6		
9/9/2015	4	17.5	9.12	206.3	10.82	119.1		
9/9/2015	4*	17.49	9.1	205.4	10.76	118.4		
9/9/2015	5	16.16	8.97	231.3	11.66	124.9		
9/9/2015	6	13.14	8.36	280.2	10.15	101.8		
9/9/2015	7	12.99	8.28	282.2	9.99	99.8		
9/9/2015	8	12.98	8.27	282.2	9.98	99.7		

9/24/2015	0.5	17.32	9.22	218.7	12.4	135.7		2.2
9/24/2015	1	17.22	9.22	218.6	12.49	136.5		
9/24/2015	2	17.12	9.23	218.7	12.45	135.8		
9/24/2015	3	17.1	9.22	218.7	12.46	135.8		
9/24/2015	4	17.01	9.22	217.8	12.4	134.9		
9/24/2015	4*	16.99	9.22	218.3	12.4	134.9		
9/24/2015	5	15.19	8.71	263.4	11.26	117.9		
9/24/2015	6	13.66	8.34	288.1	10.15	102.7		
9/24/2015	7	13.59	8.32	288.8	10.11	102.2		
9/24/2015	8	13.58	8.31	289.3	10.09	102		
10/14/2015	0.5	15.39	8.98	237.4	11.61	121.5		2.9
10/14/2015	1	15.4	8.98	237.5	11.59	121.3		
10/14/2015	2	15.39	8.98	238	11.6	121.5		
10/14/2015	3	15.24	8.97	238.9	11.4	119		
10/14/2015	4	14.87	8.88	248.1	11.39	117.9		
10/14/2015	4*	14.89	8.88	247.7	11.38	117.9		
10/14/2015	5	13.09	8.38	281.5	10.34	102.9		
10/14/2015	6	12.83	8.33	283.6	10.11	100.1		
10/14/2015	7	12.73	8.32	283.9	10.11	99.9		
10/14/2015	8	12.72	8.31	283.6	10.09	99.7		

*QA/QC measurement for Hydrolab
**Secchi disk depths average of 3 measurements

Table A-6. Station LL5 *In Situ* Water Quality Data, 2015

Date	Depth (m)	Temperature (°C)	pH	Cond (µS/cm)	DO (mg/l)	DO Sat. (%)	Winkler DO (mg/L)	Secchi Disk Depth (m)**
5/14/2015	0.5	12.81	8.19	147.1	10.19	101.9		3.8
5/14/2015	1	12.53	8.15	147.3	10.12	100.7		
5/14/2015	2	12.41	8.09	147.1	10.1	100.1		
5/14/2015	3	12.41	8.06	147	10.13	100.4		
5/14/2015	4	12.4	8.05	147	10.1	100.1		
5/14/2015	5	12.38	8.04	146.5	10.09	100		
6/10/2015	0.5	20.41	8.37	205.4	9.28	109.5		3.3
6/10/2015	1	19.58	8.2	220.9	8.99	104.3		
6/10/2015	2	19	8.21	221.5	8.81	101.1		
6/10/2015	3	18.75	8.17	221.4	8.66	98.8		
6/10/2015	4	18.69	8.15	221.3	8.62	98.2		
6/10/2015	5	18.6	8.13	221.3	8.49	96.5		
6/24/2015	0.5	22.25	8.87	183.1	10.34	125.1		4.1
6/24/2015	1	22.05	8.88	184	10.4	125.4		
6/24/2015	2	18.06	8.48	257	9.7	108.1		
6/24/2015	3	16.6	8.3	278.5	9.45	102.1		
6/24/2015	4	16.46	8.26	279	9.43	101.6		
6/24/2015	5	16.42	8.27	278.5	9.44	101.3		
7/8/2015	0.5	25.58	9.08	188.4	11.46	148.6		2.7
7/8/2015	1	25.53	9.08	188.5	11.34	146.8		
7/8/2015	2	21.76	8.76	233	10.69	128.9		
7/8/2015	3	18.45	8.44	269.8	9.95	112.4		
7/8/2015	4	18.27	8.39	270.8	9.73	109.5		
7/8/2015	5	17.97	8.37	273.4	9.75	109		
7/22/2015	0.5	22.87	9.22	209	12.02	148.5		1.6
7/22/2015	1	22.77	9.21	209.6	11.97	147.6		
7/22/2015	2	20.78	9.03	235.4	11.88	140.8		
7/22/2015	3	18.39	8.71	265.8	11.17	126.4		
7/22/2015	4	17.87	8.6	272.5	10.86	121.6		
7/22/2015	5	17.82	8.58	273.4	10.74	120		
8/5/2015	0.5	22.89	9.14	194.3	12.12	149.3		2.0
8/5/2015	1	22.82	9.15	194.8	12.09	148.8		
8/5/2015	2	22.24	9.12	198.7	11.97	145.7		
8/5/2015	3	18.34	8.71	270.5	12.16	136.9		
8/5/2015	4	17.25	8.57	282.6	11.23	123.8		
8/5/2015	5	17.06	8.53	284.7	11.18	122.6		
8/25/2015	0.5	20.85	9.2	201.9	12.39	146.1		2.2
8/25/2015	1	20.68	9.21	202.8	12.4	145.8		

8/25/2015	2	19.83	9.09	214.6	11.94	138		
8/25/2015	3	15.4	8.5	281.6	10.94	115.4		
8/25/2015	4	14.93	8.42	285.6	10.58	110.5		
8/25/2015	5	14.89	8.42	285.8	10.55	110.1		
9/9/2015	0.5	17.34	9.19	212.4	12.37	135.7		1.2
9/9/2015	1	16.84	9.15	213.1	12.1	131.3		
9/9/2015	2	13.42	8.48	274.4	10.83	109.2		
9/9/2015	3	13.1	8.37	282	10.72	107.3		
9/9/2015	4	13.07	8.35	282.5	10.63	106.4		
9/9/2015	5	12.93	8.33	283.4	10.52	104.9		
9/24/2015	0.5	13.13	8.33	289	10.43	104.4		6.1
9/24/2015	1	13.07	8.32	288.7	10.4	104		
9/24/2015	2	13.01	8.3	289.6	10.18	101.5		
9/24/2015	3	13	8.3	289.5	10.16	101.4		
9/24/2015	4	13	8.3	289.5	10.17	101.5		
9/24/2015	5	12.99	8.31	289.4	10.28	102.5		
10/14/2015	0.5	12.33	8.31	284.1	10.47	102.5		6.1
10/14/2015	1	12.29	8.31	283.4	10.49	102.6		
10/14/2015	2	12.26	8.31	283.3	10.49	102.5		
10/14/2015	3	12.22	8.33	282.9	10.47	102.2		
10/14/2015	4	12.2	8.32	282.9	10.41	101.6		
10/14/2015	5	12.2	8.32	282.7	10.34	100.9		

*QA/QC measurement for Hydrolab
**Secchi disk depths average of 3 measurements

(This Page Intentionally Left Blank)

APPENDIX II – Lake Spokane Laboratory Monitoring Data

(This Page Intentionally Left Blank)

Table B-1. Lake Spokane Lab Data, 2015

Station LL0

Date	TP (µg/L)				
	0.5 m	5 m	15 m	30 m	B-1
5/13/2015	10.0	10.9	12.0	8.3	13.1
6/9/2015	4.4	4.2	6.8	5.0	11.5
6/23/2015	3.1	4.3	4.2	4.7	5.7
7/7/2015	7.4	18.1	6.2	16.5	18.7
7/21/2015	4.1	7.7	5.2	25.0	21.2
8/4/2015	6.3	6.8	6.1	30.3	22.5
8/24/2015	7.7	9.1	5.7	38.7	29.5
9/8/2015	6.8	9.3	3.5	39.5	27.4
9/23/2015	6.5	7.3	4.0	24.3	26.2
10/13/2015	6.0	6.1	5.0	14.7	31.6

Date	SRP (µg/L)				
	0.5 m	5 m	15 m	30 m	B-1
5/13/2015	1.0	4.1	1.0	1.0	6.2
6/9/2015	1.0	1.0	2.0	3.0	5.7
6/23/2015	1.0	1.0	1.1	1.4	4.9
7/7/2015	1.0	1.0	3.4	16.5	17.4
7/21/2015	1.0	1.0	1.1	24.1	20.8
8/4/2015	1.8	3.3	1.4	29.2	22.4
8/24/2015	1.0	1.0	1.6	37.1	28.1
9/8/2015	1.0	1.9	2.3	35.3	24.1
9/23/2015	2.0	2.3	3.3	24.1	29.1
10/13/2015	1.3	1.8	1.9	14.1	29.5

Date	Chl (µg/L)		
	0.5 m	5 m	15 m
5/13/2015	6.9	6.9	12.0
6/9/2015	0.2	0.7	1.1
6/23/2015	0.8	1.1	1.1
7/7/2015	1.6	2.7	1.8
7/21/2015	2.4	3.2	2.1
8/4/2015	4.8	5.3	2.1
8/24/2015	2.7	2.7	2.7
9/8/2015	3.9	3.9	1.2
9/23/2015	4.8	6.7	3.2
10/13/2015	3.3	3.2	1.5

Date	TPN (µg/L)				
	0.5 m	5 m	15 m	30 m	B-1
5/13/2015	742	742	687	731	594
6/9/2015	723	926	931	878	752
6/23/2015	678	730	807	781	642
7/7/2015	595	646	1068	800	689
7/21/2015	611	1100	1882	709	878
8/4/2015	870	820	1788	728	644
8/24/2015	933	999	1707	765	685
9/8/2015	1428	1422	1847	970	761
9/23/2015	1187	1277	1440	1390	645
10/13/2015	1477	1372	1565	1521	762

Date	NO3+NO2 (µg/L)				
	0.5 m	5 m	15 m	30 m	B-1
5/13/2015	467	476	498	557	475
6/9/2015	517	589	665	645	514
6/23/2015	580	579	715	738	597
7/7/2015	538	576	987	740	626
7/21/2015	550	916	956	700	605
8/4/2015	599	618	1469	680	589
8/24/2015	735	790	1538	733	627
9/8/2015	1024	1017	1398	852	591
9/23/2015	1071	1050	1433	1206	610
10/13/2015	1196	1192	1503	1400	601

Station LL1

Date	TP (µg/L)			
	0.5 m	5 m	20 m	B-1
5/13/2015	13.3	13.9	10.0	14.8
6/9/2015	4.7	4.9	9.5	14.0
6/23/2015	4.7	7.5	12.6	19.4
7/7/2015	5.1	7.1	12.2	50.3
7/21/2015	6.4	16.8	15.8	50.9
8/4/2015	7.5	30.5	18.7	53.4
8/24/2015	8.8	11.4	14.7	58.6
9/8/2015	8.1	8.2	13.6	55.7
9/23/2015	6.2	8.8	6.3	23.3
10/13/2015	6.8	7.0	6.0	17.9

Date	SRP (µg/L)			
	0.5 m	5 m	20 m	B-1
5/13/2015	1.0	1.0	1.0	5.7
6/9/2015	1.2	1.3	6.9	8.9
6/23/2015	1.0	1.0	10.3	14.0
7/7/2015	1.0	1.0	11.3	43.8
7/21/2015	1.0	1.0	14.9	45.8
8/4/2015	3.4	3.7	18.0	51.6
8/24/2015	1.0	1.0	13.9	52.7
9/8/2015	1.6	1.7	11.3	42.2
9/23/2015	2.0	1.7	4.1	8.6
10/13/2015	2.2	2.3	5.9	12.3

Date	Chl (µg/L)		
	0.5 m	5 m	20 m
5/13/2015	11.7	12.0	4.8
6/9/2015	0.5	0.7	0.8
6/23/2015	1.0	1.4	1.3
7/7/2015	2.3	1.8	0.5
7/21/2015	3.5	4.8	1.1
8/4/2015	5.9	6.9	1.6
8/24/2015	5.3	4.8	1.1
9/8/2015	4.8	4.6	0.7
9/23/2015	4.8	4.8	3.2
10/13/2015	2.7	3.3	1.1

Date	TPN (µg/L)			
	0.5 m	5 m	20 m	B-1
5/13/2015	958	824	918	777
6/9/2015	749	808	877	913
6/23/2015	688	739	1456	830
7/7/2015	654	721	1564	703
7/21/2015	674	716	1876	691
8/4/2015	731	1014	1855	725
8/24/2015	869	923	1739	700
9/8/2015	1204	1178	1839	778
9/23/2015	1170	1201	1589	1726
10/13/2015	1317	1464	1599	1610

Date	NO3+NO2 (µg/L)			
	0.5 m	5 m	20 m	B-1
5/13/2015	542	546	605	544
6/9/2015	517	573	658	533
6/23/2015	622	623	1128	691
7/7/2015	598	606	1551	697
7/21/2015	586	603	992	682
8/4/2015	547	565	1393	587
8/24/2015	647	682	1627	635
9/8/2015	870	880	1442	601
9/23/2015	1037	1066	1566	1511
10/13/2015	1125	1130	1540	1464

Station LL2

Date	TP (µg/L)			
	0.5 m	5 m	15 m	B-1
5/13/2015	12.2	13.2	17.8	17.1
6/9/2015	5.3	6.9	11.3	14.0
6/23/2015	6.2	7.6	10.3	20.7
7/7/2015	5.8	8.8	8.0	28.7
7/21/2015	8.5	8.8	13.5	45.2
8/4/2015	8.0	8.6	9.0	23.5
8/24/2015	11.1	10.4	10.6	32.9
9/8/2015	11.9	12.4	6.8	35.9
9/23/2015	9.7	9.2	6.9	27.5
10/13/2015	6.3	14.1	9.1	14.6

Date	SRP (µg/L)			
	0.5 m	5 m	15 m	B-1
5/13/2015	1.0	1.0	1.0	7.5
6/9/2015	1.2	1.4	4.5	9.5
6/23/2015	1.0	1.0	8.2	20.2
7/7/2015	1.3	1.0	2.6	25.2
7/21/2015	1.0	1.0	8.8	38.8
8/4/2015	1.1	2.4	1.8	4.3
8/24/2015	1.0	1.0	4.9	13.2
9/8/2015	1.0	1.1	2.7	6.2
9/23/2015	1.0	1.4	1.5	4.8
10/13/2015	1.0	3.3	5.3	8.9

Date	Chl (µg/L)		
	0.5 m	5 m	15 m
5/13/2015	9.9	10.7	8.3
6/9/2015	0.5	1.6	1.3
6/23/2015	1.8	2.6	1.3
7/7/2015	3.0	2.8	1.1
7/21/2015	6.4	5.6	2.7
8/4/2015	7.5	8.5	4.3
8/24/2015	5.3	5.9	1.1
9/8/2015	6.2	6.4	1.2
9/23/2015	5.9	5.9	3.7
10/13/2015	2.3	5.9	2.2

Date	TPN (µg/L)			
	0.5 m	5 m	15 m	B-1
5/13/2015	883	950	844	780
6/9/2015	670	841	961	858
6/23/2015	732	665	1477	1279
7/7/2015	803	791	1634	1534
7/21/2015	686	680	1884	1702
8/4/2015	642	714	1770	1872
8/24/2015	739	780	1833	1942
9/8/2015	925	1026	1721	2046
9/23/2015	928	1185	1547	1634
10/13/2015	1174	1152	1489	1562

Date	NO3+NO2 (µg/L)			
	0.5 m	5 m	15 m	B-1
5/13/2015	633	633	641	550
6/9/2015	561	558	712	594
6/23/2015	618	624	1441	899
7/7/2015	642	649	1448	1380
7/21/2015	574	585	1064	891
8/4/2015	475	524	1302	1429
8/24/2015	552	581	1636	1449
9/8/2015	712	765	1413	1506
9/23/2015	801	927	1286	1488
10/13/2015	966	949	1141	1478

Station LL3

Date	TP (µg/L)			
	0.5 m	5 m	10 m	B-1
5/14/2015	11.9	13.7	14.2	15.5
6/10/2015	4.2	6.5	14.2	23.5
6/24/2015	7.0	8.7	8.9	13.9
7/8/2015	8.7	14.0	14.1	32.6
7/22/2015	9.9	34.4	25.8	21.5
8/5/2015	9.8	12.6	21.0	33.0
8/25/2015	13.5	13.9	16.7	34.1
9/9/2015	12.9	14.2	10.5	31.0
9/24/2015	8.6	16.6	11.6	19.4
10/14/2015	11.5	10.5	17.4	12.5

Date	SRP (µg/L)			
	0.5 m	5 m	10 m	B-1
5/14/2015	1.0	1.2	4.6	5.6
6/10/2015	1.0	1.0	6.9	14.9
6/24/2015	1.0	1.6	1.1	5.2
7/8/2015	1.0	1.0	1.0	19.3
7/22/2015	1.0	1.0	1.0	3.6
8/5/2015	4.1	4.5	4.0	7.5
8/25/2015	1.1	2.0	1.6	3.1
9/9/2015	1.0	1.0	9.1	1.7
9/24/2015	1.0	1.0	2.2	4.2
10/14/2015	1.0	1.0	1.0	1.0

Date	Chl (µg/L)		
	0.5 m	5 m	10 m
5/14/2015	7.7	5.6	4.5
6/10/2015	1.2	1.9	2.1
6/24/2015	2.9	2.7	2.9
7/8/2015	2.7	9.6	3.3
7/22/2015	6.4	8.0	11.7
8/5/2015	9.1	6.9	6.9
8/25/2015	8.5	9.6	7.5
9/9/2015	12.3	8.5	3.7
9/24/2015	5.9	8.2	7.5
10/14/2015	9.3	11.2	10.1

Date	TPN (µg/L)			
	0.5 m	5 m	10 m	B-1
5/14/2015	795	748	849	799
6/10/2015	705	913	1092	993
6/24/2015	930	967	1856	1834
7/8/2015	813	1628	1962	1385
7/22/2015	575	574	1096	1973
8/5/2015	548	589	1023	1818
8/25/2015	624	646	1508	2033
9/9/2015	700	703	1679	1952
9/24/2015	838	840	802	1736
10/14/2015	983	1077	990	1839

Date	NO3+NO2 (µg/L)			
	0.5 m	5 m	10 m	B-1
5/14/2015	610	717	706	650
6/10/2015	542	725	903	676
6/24/2015	555	584	1212	1540
7/8/2015	455	973	1444	1232
7/22/2015	474	447	870	1692
8/5/2015	335	342	710	1455
8/25/2015	357	336	1086	1560
9/9/2015	482	493	1174	1739
9/24/2015	640	637	596	1541
10/14/2015	734	696	697	1683

Station LL4

Date	TP (µg/L)		
	0.5 m	4 m	B-1
5/14/2015	13.5	12.8	12.8
6/10/2015	8.8	9.9	13.7
6/24/2015	10.2	34.0	10.7
7/8/2015	38.3	19.3	19.5
7/22/2015	43.6	23.3	19.8
8/5/2015	16.7	15.5	15.3
8/25/2015	26.7	24.7	13.6
9/9/2015	20.5	37.2	12.5
9/24/2015	17.8	33.8	10.1
10/14/2015	14.0	28.5	11.7

Date	SRP (µg/L)		
	0.5 m	4 m	B-1
5/14/2015	1.0	1.0	1.0
6/10/2015	1.0	1.0	3.1
6/24/2015	1.0	1.0	4.2
7/8/2015	1.6	1.0	1.3
7/22/2015	1.0	1.0	1.0
8/5/2015	3.8	5.6	12.3
8/25/2015	7.3	1.0	1.0
9/9/2015	1.0	1.0	1.5
9/24/2015	5.9	1.1	5.2
10/14/2015	1.6	1.2	7.9

Date	Chl (µg/L)	
	0.5 m	4 m
5/14/2015	4.4	4.5
6/10/2015	2.1	3.6
6/24/2015	2.7	4.0
7/8/2015	5.1	4.8
7/22/2015	11.7	12.3
8/5/2015	10.7	13.9
8/25/2015	15.5	12.3
9/9/2015	11.7	18.2
9/24/2015	6.9	6.9
10/14/2015	14.4	10.7

Date	TPN (µg/L)		
	0.5 m	4 m	B-1
5/14/2015	940	906	958
6/10/2015	833	1397	1523
6/24/2015	810	1241	2116
7/8/2015	730	724	1930
7/22/2015	501	467	2237
8/5/2015	496	672	1833
8/25/2015	636	625	2247
9/9/2015	552	692	1992
9/24/2015	605	721	2052
10/14/2015	929	1208	2305

Date	NO3+NO2 (µg/L)		
	0.5 m	4 m	B-1
5/14/2015	728	788	769
6/10/2015	586	685	1171
6/24/2015	534	639	1780
7/8/2015	350	395	1554
7/22/2015	253	258	1641
8/5/2015	230	414	1453
8/25/2015	235	220	1814
9/9/2015	317	288	1940
9/24/2015	307	319	1807
10/14/2015	599	709	2041

Station LL5

Date	TP (µg/L)	
	0.5 m	B-1
5/14/2015	13.5	12.8
6/10/2015	16.2	16.1
6/24/2015	13.5	9.4
7/8/2015	34.8	13.5
7/22/2015	42.1	16.4
8/5/2015	16.8	11.9
8/25/2015	21.9	13.1
9/9/2015	51.5	9.9
9/24/2015	7.8	6.8
10/14/2015	10.4	12.0

Date	SRP (µg/L)	
	0.5 m	B-1
5/14/2015	1.9	1.6
6/10/2015	1.3	2.9
6/24/2015	1.0	3.4
7/8/2015	1.0	1.0
7/22/2015	1.0	1.0
8/5/2015	2.4	2.8
8/25/2015	1.0	1.0
9/9/2015	2.4	2.8
9/24/2015	5.3	5.3
10/14/2015	9.5	9.9

Date	Chl (µg/L)
	0.5 m
5/14/2015	3.5
6/10/2015	2.9
6/24/2015	4.0
7/8/2015	5.9
7/22/2015	12.3
8/5/2015	8.0
8/25/2015	12.8
9/9/2015	11.7
9/24/2015	1.9
10/14/2015	2.1

Date	TPN (µg/L)	
	0.5 m	B-1
5/14/2015	931	1103
6/10/2015	1395	1586
6/24/2015	938	2267
7/8/2015	769	1731
7/22/2015	981	1715
8/5/2015	657	1855
8/25/2015	734	2351
9/9/2015	952	1957
9/24/2015	1865	1930
10/14/2015	2174	2266

Date	NO3+NO2 (µg/L)	
	0.5 m	B-1
5/14/2015	822	797
6/10/2015	1120	1325
6/24/2015	666	1707
7/8/2015	388	1590
7/22/2015	577	1656
8/5/2015	327	1549
8/25/2015	317	2000
9/9/2015	362	1897
9/24/2015	1624	1758
10/14/2015	1962	1976

APPENDIX III – Lake Spokane Phytoplankton Data

(This Page Intentionally Left Blank)

Avista Phytoplankton 2015 (Batch 1)
Taxa Report with Biovolumes

EcoAnalysts, Inc.

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in sample received)	Cells per mL (in sample received)	AVG_BV (µ³)	Biovolume (µ³/mL)
7170.01-01	Spokane River, WA	LL0-0.5m	1	5/13/2015	520	0.0156%	Asterionella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Asterionella	sp.	122	4.80	586	781895.35	3755661.29	1503.64	7222.43	1508.12	10892294.55
7170.01-01	Spokane River, WA	LL0-0.5m	1	5/13/2015	520	0.0156%	Cyclotella spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Cyclotella	spp.	2	1.00	2	12817.96	12817.96	24.65	24.65	215.98	5323.99
7170.01-01	Spokane River, WA	LL0-0.5m	1	5/13/2015	520	0.0156%	Diatoma spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Diatoma	sp.	7	4.14	29	44862.85	185860.37	86.27	357.42	1291.98	461784.39
7170.01-01	Spokane River, WA	LL0-0.5m	1	5/13/2015	520	0.0156%	Fragilaria sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	sp.	18	3.72	67	115361.61	429401.55	221.85	825.77	860.01	710173.18
7170.01-01	Spokane River, WA	LL0-0.5m	1	5/13/2015	520	0.0156%	Nitzschia spp.	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	Nitzschia	spp.	9	1.00	9	57680.80	57680.80	110.92	110.92	251.33	27878.35
7170.01-01	Spokane River, WA	LL0-0.5m	1	5/13/2015	520	0.0156%	Synedra sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Synedra	sp.	2	1.00	2	12817.96	12817.96	24.65	24.65	5552.77	136875.19
7170.01-01	Spokane River, WA	LL0-0.5m	1	5/13/2015	520	0.0156%	Tabellaria sp.	Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	Tabellaria	sp.	1	1.00	1	6408.98	6408.98	12.32	12.32	525.00	6470.60
7170.01-01	Spokane River, WA	LL0-0.5m	1	5/13/2015	520	0.0156%	Lagerheimia sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Lagerheimia	sp.	1	1.00	1	6408.98	6408.98	12.32	12.32	58.91	726.00
7170.01-01	Spokane River, WA	LL0-0.5m	1	5/13/2015	520	0.0156%	Monoraphidium spp.	Chlorophyta	Chlorophyceae	Sphaeropleales	Selenastraceae	Monoraphidium	spp.	5	1.00	5	32044.89	32044.89	61.62	61.62	108.39	6679.20
7170.01-01	Spokane River, WA	LL0-0.5m	1	5/13/2015	520	0.0156%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	3	9.33	28	19226.93	179451.39	36.97	345.10	222.53	76794.50
7170.01-01	Spokane River, WA	LL0-0.5m	1	5/13/2015	520	0.0156%	Stauridium sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Stauridium	sp.	1	8.00	8	6408.98	51271.83	12.32	98.60	131.95	13009.93
7170.01-01	Spokane River, WA	LL0-0.5m	1	5/13/2015	520	0.0156%	Chrysococcus sp.	Chrysophyta	Chrysophyceae	Chrysococcales	Chrysococcaceae	Chrysococcus	sp.	10	1.00	10	64089.78	64089.78	123.25	123.25	2144.66	264328.57
7170.01-01	Spokane River, WA	LL0-0.5m	1	5/13/2015	520	0.0156%	Ochromonas spp.	Chrysophyta	Chrysophyceae	Ochromonadales	Ochromonadaceae	Ochromonas	spp.	116	1.00	116	743441.48	743441.48	1429.70	1429.70	23.56	33686.48
7170.01-01	Spokane River, WA	LL0-0.5m	1	5/13/2015	520	0.0156%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	3	1.00	3	19226.93	19226.93	36.97	36.97	130.90	4840.01
7170.01-01	Spokane River, WA	LL0-0.5m	1	5/13/2015	520	0.0156%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	8	1.00	8	51271.83	51271.83	98.60	98.60	1884.96	185856.03
7170.01-01	Spokane River, WA	LL0-0.5m	1	5/13/2015	520	0.0156%	Ceratium sp.	Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	Ceratium	sp.	1	1.00	1	6408.98	6408.98	12.32	12.32	244299.67	3010983.25
7170.01-01	Spokane River, WA	LL0-0.5m	1	5/13/2015	520	0.0156%	Peridinium sp.	Pyrrhophyta	Dinophyceae	Peridiniales	Peridiniaceae	Peridinium	sp.	1	1.00	1	6408.98	6408.98	12.32	12.32	6924.59	85345.33
7170.01-02	Spokane River, WA	LL1-0.5m	1	5/13/2015	520	0.0517%	Asterionella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Asterionella	sp.	203	4.05	822	393007.98	1591391.94	755.78	3060.37	1198.05	3666463.58
7170.01-02	Spokane River, WA	LL1-0.5m	1	5/13/2015	520	0.0517%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	5	6.20	31	9680.00	60016.00	18.62	115.42	1654.05	190902.69
7170.01-02	Spokane River, WA	LL1-0.5m	1	5/13/2015	520	0.0517%	Cyclotella spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Cyclotella	spp.	4	1.00	4	7744.00	7744.00	14.89	14.89	367.57	5473.91
7170.01-02	Spokane River, WA	LL1-0.5m	1	5/13/2015	520	0.0517%	Diatoma spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Diatoma	sp.	3	4.33	13	5808.00	25168.00	11.17	48.40	765.76	37062.93
7170.01-02	Spokane River, WA	LL1-0.5m	1	5/13/2015	520	0.0517%	Fragilaria sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	sp.	47	2.62	123	90992.00	238127.99	174.98	457.94	782.26	358225.55
7170.01-02	Spokane River, WA	LL1-0.5m	1	5/13/2015	520	0.0517%	Melosira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	Melosira	sp.	1	2.00	2	1936.00	3872.00	3.72	7.45	12164.25	90576.85
7170.01-02	Spokane River, WA	LL1-0.5m	1	5/13/2015	520	0.0517%	Nitzschia spp.	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	Nitzschia	spp.	5	1.00	5	9680.00	9680.00	18.62	18.62	424.12	7895.06
7170.01-02	Spokane River, WA	LL1-0.5m	1	5/13/2015	520	0.0517%	Synedra sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Synedra	sp.	1	1.00	1	1936.00	1936.00	3.72	3.72	4594.58	17105.97
7170.01-02	Spokane River, WA	LL1-0.5m	1	5/13/2015	520	0.0517%	Tabellaria sp.	Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	Tabellaria	sp.	1	9.00	9	1936.00	17424.00	3.72	33.51	3822.00	128066.39
7170.01-02	Spokane River, WA	LL1-0.5m	1	5/13/2015	520	0.0517%	Monoraphidium sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Monoraphidium	sp.	2	1.00	2	3872.00	3872.00	7.45	7.45	122.52	912.32
7170.01-02	Spokane River, WA	LL1-0.5m	1	5/13/2015	520	0.0517%	Stauridium sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Stauridium	sp.	1	8.00	8	1936.00	15488.00	3.72	29.78	115.45	3438.75
7170.01-02	Spokane River, WA	LL1-0.5m	1	5/13/2015	520	0.0517%	Tetraedron sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Chlorococcaceae	Tetraedron	sp.	1	1.00	1	1936.00	1936.00	3.72	3.72	90.00	335.08
7170.01-02	Spokane River, WA	LL1-0.5m	1	5/13/2015	520	0.0517%	Chrysococcus sp.	Chrysophyta	Chrysophyceae	Chrysococcales	Chrysococcaceae	Chrysococcus	sp.	3	1.00	3	5808.00	5808.00	11.17	11.17	1150.35	12848.49
7170.01-02	Spokane River, WA	LL1-0.5m	1	5/13/2015	520	0.0517%	Ochromonas spp.	Chrysophyta	Chrysophyceae	Ochromonadales	Ochromonadaceae	Ochromonas	spp.	10	1.00	10	19360.00	19360.00	37.23	37.23	21.21	789.52
7170.01-02	Spokane River, WA	LL1-0.5m	1	5/13/2015	520	0.0517%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	4	1.00	4	7744.00	7744.00	14.89	14.89	150.80	2245.70
7170.01-02	Spokane River, WA	LL1-0.5m	1	5/13/2015	520	0.0517%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	13	1.00	13	25168.00	25168.00	48.40	48.40	3485.07	168677.53
7170.01-03	Spokane River, WA	LL2-0.5m	1	5/13/2015	518	0.0284%	Achnanthes sp. Bory	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Achnanthes	sp.	3	1.00	3	10565.72	10565.72	20.40	20.40	215.98	4405.46
7170.01-03	Spokane River, WA	LL2-0.5m	1	5/13/2015	518	0.0284%	Asterionella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Asterionella	sp.	221	6.11	1350	778341.31	4754573.61	1502.59	9178.71	1011.59	9285122.35
7170.01-03	Spokane River, WA	LL2-0.5m	1	5/13/2015	518	0.0284%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	5	7.40	37	17609.53	130310.54	34.00	251.56	791.68	199159.03
7170.01-03	Spokane River, WA	LL2-0.5m	1	5/13/2015	518	0.0284%	Cyclotella spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Cyclotella	spp.	4	1.00	4	14087.63	14087.63	27.20	27.20	461.81	12559.58
7170.01-03	Spokane River, WA	LL2-0.5m	1	5/13/2015	518	0.0284%	Staurosira sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Staurosira	sp.	1	26.00	26	3521.91	91569.57	6.80	176.78	188.50	33321.42
7170.01-03	Spokane River, WA	LL2-0.5m	1	5/13/2015	518	0.0284%	Tabellaria sp.	Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	Tabellaria	sp.	1	14.00	14	3521.91	49306.69	6.80	95.19	5292.00	503727.80
7170.01-03	Spokane River, WA	LL2-0.5m	1	5/13/2015	518	0.0284%	Monoraphidium spp.	Chlorophyta	Chlorophyceae	Sphaeropleales	Selenastraceae	Monoraphidium	spp.	5	1.00	5	17609.53	17609.53	34.00	34.00	848.23	28835.78
7170.01-03	Spokane River, WA	LL2-0.5m	1	5/13/2015	518	0.0284%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	3	5.33	16	10565.72	56350.50	20.40	108.78	58.64	6379.46
7170.01-03	Spokane River, WA	LL2-0.5m	1	5/13/2015	518	0.0284%	Tetraedron sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Chlorococcaceae	Tetraedron	sp.	1	1.00	1	3521.91	3521.91	6.80	6.80	120.00	815.89
7170.01-03	Spokane River, WA	LL2-0.5m	1	5/13/2015	518	0.0284%	Chrysococcus sp.	Chrysophyta	Chrysophyceae	Chrysococcales	Chrysococcaceae	Chrysococcus	sp.	9	1.00	9	31697.16	31697.16	61.19	61.19	904.78	55364.71
7170.01-03	Spokane River, WA	LL2-0.5m	1	5/13/2015	518	0.0284%	Dinobryon sp.	Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	Dinobryon	sp.	3	1.00	3	10565.72	10565.72	20.40	20.40	872.32	17792.75
7170.01-03	Spokane River, WA	LL2-0.5m	1	5/13/2015	518	0.0284%	Ochromonas spp.	Chrysophyta	Chrysophyceae	Ochromonadales	Ochromonadaceae	Ochromonas	spp.	18	1.00	18	63394.31	63394.31	122.38	122.38	141.37	17301.51
7170.01-03	Spokane River, WA	LL2-0.5m	1	5/13/2015	518	0.0284%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	6	1.00	6	21131.44	21131.44	40.79	40.79	126.71	5169.08
7170.01-03	Spokane River, WA	LL2-0.5m	1	5/13/2015	518	0.0284%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	9	1.00	9	31697.16	31697.16	61.19	61.19	2565.63	156994.80

Avista Phytoplankton 2015 (Batch 1)
Taxa Report with Biovolumes

EcoAnalysts, Inc.

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in sample received)	Cells per mL (in sample received)	AVG_BV (µ³)	Biovolume (µ³/mL)
7170.01-04	Spokane River, WA	LL3-0.5m	1	5/14/2015	532	0.0177%	Achnanthes sp. Bory	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Achnanthes	sp.	9	1.00	9	50982.62	50982.62	95.83	95.83	188.50	18063.95
7170.01-04	Spokane River, WA	LL3-0.5m	1	5/14/2015	532	0.0177%	Asterionella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Asterionella	sp.	248	6.05	1500	1404854.39	8497103.14	2640.70	15972.00	1142.44	18247049.84
7170.01-04	Spokane River, WA	LL3-0.5m	1	5/14/2015	532	0.0177%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	2	15.50	31	11329.47	175606.80	21.30	330.09	1231.50	406504.65
7170.01-04	Spokane River, WA	LL3-0.5m	1	5/14/2015	532	0.0177%	Cymbella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	Cymbella	sp.	3	1.00	3	16994.21	16994.21	31.94	31.94	720.00	22999.68
7170.01-04	Spokane River, WA	LL3-0.5m	1	5/14/2015	532	0.0177%	Staurosira sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Staurosira	sp.	1	19.00	19	5664.74	107629.97	10.65	202.31	42.41	8580.46
7170.01-04	Spokane River, WA	LL3-0.5m	1	5/14/2015	532	0.0177%	Synedra sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Synedra	sp.	1	1.00	1	5664.74	5664.74	10.65	10.65	5013.98	53388.87
7170.01-04	Spokane River, WA	LL3-0.5m	1	5/14/2015	532	0.0177%	Tabellaria sp.	Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	Tabellaria	sp.	4	1.00	4	22658.94	22658.94	42.59	42.59	816.00	34755.07
7170.01-04	Spokane River, WA	LL3-0.5m	1	5/14/2015	532	0.0177%	Monoraphidium spp.	Chlorophyta	Chlorophyceae	Sphaeropleales	Selenastraceae	Monoraphidium	spp.	5	1.00	5	28323.68	28323.68	53.24	53.24	1148.65	61153.85
7170.01-04	Spokane River, WA	LL3-0.5m	1	5/14/2015	532	0.0177%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	1	4.00	4	5664.74	22658.94	10.65	42.59	890.64	37934.22
7170.01-04	Spokane River, WA	LL3-0.5m	1	5/14/2015	532	0.0177%	Chrysococcus sp.	Chrysophyta	Chrysophyceae	Chrysococcales	Chrysococcaceae	Chrysococcus	sp.	1	1.00	1	5664.74	5664.74	10.65	10.65	1150.35	12248.89
7170.01-04	Spokane River, WA	LL3-0.5m	1	5/14/2015	532	0.0177%	Dinobryon spp.	Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	Dinobryon	spp.	8	1.00	8	45317.88	45317.88	85.18	85.18	3543.72	301867.96
7170.01-04	Spokane River, WA	LL3-0.5m	1	5/14/2015	532	0.0177%	Ochromonas spp.	Chrysophyta	Chrysophyceae	Ochromonadales	Ochromonadaceae	Ochromonas	spp.	7	1.00	7	39653.15	39653.15	74.54	74.54	205.25	15298.59
7170.01-04	Spokane River, WA	LL3-0.5m	1	5/14/2015	532	0.0177%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	5	1.00	5	28323.68	28323.68	53.24	53.24	188.04	10011.09
7170.01-04	Spokane River, WA	LL3-0.5m	1	5/14/2015	532	0.0177%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	11	1.00	11	62312.09	62312.09	117.13	117.13	1858.25	217653.32
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Achnanthes sp. Bory	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Achnanthes	sp.	23	1.00	23	55596.39	55596.39	100.72	100.72	204.20	20567.04
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Asterionella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Asterionella	sp.	166	6.03	1001	401260.92	2419651.72	726.92	4383.43	1051.81	4610511.33
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	9	5.44	49	21755.11	118444.49	39.41	214.57	565.49	121338.44
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Cocconeis sp.	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Cocconeis	sp.	9	1.00	9	21755.11	21755.11	39.41	39.41	1244.07	49030.62
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Cyclotella spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Cyclotella	spp.	10	1.00	10	24172.34	24172.34	43.79	43.79	500.30	21908.33
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Cymbella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	Cymbella	sp.	5	1.00	5	12086.17	12086.17	21.90	21.90	262.50	5747.50
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Epithemia sp.	Bacillariophyta	Bacillariophyceae	Pennales	Rhopalodiaceae	Epithemia	sp.	2	1.00	2	4834.47	4834.47	8.76	8.76	2436.31	21337.39
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Eunotia sp.	Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	Eunotia	sp.	1	1.00	1	2417.23	2417.23	4.38	4.38	16336.28	71537.36
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Fragilaria sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	sp.	34	2.35	80	82185.97	193378.76	148.89	350.32	6471.68	2267184.12
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Gomphonema sp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	sp.	10	1.00	10	24172.34	24172.34	43.79	43.79	769.69	33705.09
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Hannaea sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Hannaea	sp.	2	1.00	2	4834.47	4834.47	8.76	8.76	1696.46	14857.76
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Melosira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	Melosira	sp.	5	2.20	11	12086.17	26589.58	21.90	48.17	3583.77	172628.60
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Navicula spp.	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	Navicula	spp.	3	1.00	3	7251.70	7251.70	13.14	13.14	2144.14	28167.84
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Staurosira sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Staurosira	sp.	2	1.00	2	4834.47	4834.47	8.76	8.76	285.89	2503.81
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Tabellaria sp.	Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	Tabellaria	sp.	2	6.50	13	4834.47	31424.05	8.76	56.93	3367.00	191675.31
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Monoraphidium spp.	Chlorophyta	Chlorophyceae	Sphaeropleales	Selenastraceae	Monoraphidium	spp.	4	1.00	4	9668.94	9668.94	17.52	17.52	1559.41	27314.89
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	3	4.00	12	7251.70	29006.81	13.14	52.55	75.40	3962.06
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Dinobryon spp.	Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	Dinobryon	spp.	8	1.00	8	19337.88	19337.88	35.03	35.03	1340.41	46957.86
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Ochromonas spp.	Chrysophyta	Chrysophyceae	Ochromonadales	Ochromonadaceae	Ochromonas	spp.	4	1.00	4	9668.94	9668.94	17.52	17.52	284.84	4989.28
7170.01-05	Spokane River, WA	LL4-0.5m	1	5/14/2015	552	0.0414%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	6	1.00	6	14503.41	14503.41	26.27	26.27	5103.52	134091.27
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Achnanthes sp. Bory	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Achnanthes	sp.	20	1.00	20	31470.75	31470.75	59.16	59.16	314.16	18584.25
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Amphora sp.	Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	Amphora	sp.	5	1.00	5	7867.69	7867.69	14.79	14.79	2875.00	42518.05
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Asterionella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Asterionella	sp.	144	6.26	901	226589.42	1417757.39	425.92	2664.96	1321.98	3523026.39
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Cocconeis sp.	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Cocconeis	sp.	3	1.00	3	4720.61	4720.61	8.87	8.87	1036.73	9199.21
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Cymbella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Cymbellaceae	Cymbella	sp.	3	1.00	3	4720.61	4720.61	8.87	8.87	1053.00	9343.62
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Eunotia sp.	Bacillariophyta	Bacillariophyceae	Pennales	Eunotiaceae	Eunotia	sp.	2	1.00	2	3147.08	3147.08	5.92	5.92	21111.50	124886.26
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Fragilaria sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	sp.	40	4.50	180	62941.50	283236.77	118.31	532.40	1083.85	577041.15
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Gomphonema sp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	sp.	5	1.00	5	7867.69	7867.69	14.79	14.79	1781.28	26343.19
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Hannaea sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Hannaea	sp.	17	1.00	17	26750.14	26750.14	50.28	50.28	832.52	41861.05
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Melosira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	Melosira	sp.	4	1.75	7	6294.15	11014.76	11.83	20.70	10386.89	215054.79
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Navicula spp.	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	Navicula	spp.	1	1.00	1	1573.54	1573.54	2.96	2.96	12095.13	35774.71
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Nitzschia spp.	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	Nitzschia	spp.	1	1.00	1	1573.54	1573.54	2.96	2.96	1507.96	4460.22
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Synedra sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Synedra	sp.	3	1.00	3	4720.61	4720.61	8.87	8.87	11627.82	103177.51
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Tabellaria sp.	Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	Tabellaria	sp.	2	1.00	2	3147.08	3147.08	5.92	5.92	7488.00	44295.68
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Monoraphidium spp.	Chlorophyta	Chlorophyceae	Sphaeropleales	Selenastraceae	Monoraphidium	spp.	15	1.00	15	23603.06	23603.06	44.37	44.37	1148.65	50961.54
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Stauridium sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Stauridium	sp.	2	4.00	8	3147.08	12588.30	5.92	23.66	98.96	2341.61
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Tetraedron sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Chlorococcaceae	Tetraedron	sp.	2	1.00	2	3147.08	3147.08	5.92	5.92	900.00	5324.00
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Dinobryon spp.	Chrysophyta	Chrysophyceae	Chrysomonadales	Dinobryaceae	Dinobryon	spp.	11	2.45	27	17308.91	42485.52	32.54	79.86	2879.79	229980.25
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Ochromonas spp.	Chrysophyta	Chrysophyceae	Ochromonadales	Ochromonadaceae	Ochromonas	spp.	5	1.00	5	7867.69	7867.69	14.79	14.79	192.42	2845.72
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	1	1.00	1	1573.54	1573.54	2.96	2.96	188.50	557.53
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	13	1.00	13	20455.99	20455.99	38.45	38.45	4410.80	169599.99
7170.01-06	Spokane River, WA	LL5-0.5m	1	5/14/2015	532	0.0636%	Audouinella sp.	Rhodophyta	Rhodophyceae	Nemalionales	Chantransiacea	Audouinella	sp.	1	19.00	19	1573.54	29897.21	2.96	56.20	1806.42	101516.55

Avista Phytoplankton 2015 (Batch 2)
Taxa Report and Biovolumes

EcoAnalysts, Inc.

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in samples received)	Cells per mL (in sample received)	AVG_BV (μ^3)	Biovolume (μ^3/mL)
7170.02-01	Spokane River, WA	LL0-0.5m	1	6/9/2015	540	1.2161%	Asterionella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Asterionella	sp.	5	1	5	411	411	0.8	0.8	499.51	380.31
7170.02-01	Spokane River, WA	LL0-0.5m	1	6/9/2015	540	1.2161%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	3	1	3	247	247	0.5	0.5	1130.97	516.65
7170.02-01	Spokane River, WA	LL0-0.5m	1	6/9/2015	540	1.2161%	Chroococcus spp.	Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	Chroococcus	spp.	2	25	50	164	4111	0.3	7.6	33.51	255.13
7170.02-01	Spokane River, WA	LL0-0.5m	1	6/9/2015	540	1.2161%	Cosmarium spp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Cosmarium	spp.	7	1	7	576	576	1.1	1.1	1884.96	2009.20
7170.02-01	Spokane River, WA	LL0-0.5m	1	6/9/2015	540	1.2161%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	26	1	26	2138	2138	4.0	4.0	2360.38	9345.03
7170.02-01	Spokane River, WA	LL0-0.5m	1	6/9/2015	540	1.2161%	Cyclotella spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Cyclotella	spp.	12	1	12	987	987	1.8	1.8	923.63	1687.73
7170.02-01	Spokane River, WA	LL0-0.5m	1	6/9/2015	540	1.2161%	Desmodesmus spp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Desmodesmus	spp.	2	8	16	164	1316	0.3	2.4	196.35	478.38
7170.02-01	Spokane River, WA	LL0-0.5m	1	6/9/2015	540	1.2161%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	40	2	72	3289	5920	6.1	11.0	706.86	7749.78
7170.02-01	Spokane River, WA	LL0-0.5m	1	6/9/2015	540	1.2161%	Gymnodinium spp.	Pyrrhophyta	Dinophyceae	Gymnodiniales	Gymnodiniaceae	Gymnodinium	spp.	2	1	2	164	164	0.3	0.3	1415.81	431.18
7170.02-01	Spokane River, WA	LL0-0.5m	1	6/9/2015	540	1.2161%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	141	1	141	11594	11594	21.5	21.5	146.42	3143.82
7170.02-01	Spokane River, WA	LL0-0.5m	1	6/9/2015	540	1.2161%	Ochromonas spp.	Chrysophyta	Chrysophyceae	Ochromonadales	Ochromonadaceae	Ochromonas	spp.	44	1	44	3618	3618	6.7	6.7	131.95	884.05
7170.02-01	Spokane River, WA	LL0-0.5m	1	6/9/2015	540	1.2161%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	2	3	5	164	411	0.3	0.8	1281.77	975.90
7170.02-01	Spokane River, WA	LL0-0.5m	1	6/9/2015	540	1.2161%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	14	14	82	1151	0.2	2.1	288.00	613.97
7170.02-01	Spokane River, WA	LL0-0.5m	1	6/9/2015	540	1.2161%	Planktolyngbya spp.	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	Planktolyngbya	spp.	4	16	63	329	5180	0.6	9.6	17.18	164.82
7170.02-01	Spokane River, WA	LL0-0.5m	1	6/9/2015	540	1.2161%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	9	16	148	740	12170	1.4	22.5	268.08	6041.65
7170.02-01	Spokane River, WA	LL0-0.5m	1	6/9/2015	540	1.2161%	Woronichinia sp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	sp.	1	60	60	82	4934	0.2	9.1	18.85	172.22
7170.02-02	Spokane River, WA	LL1-0.5m	1	6/9/2015	542	1.2165%	Amphora sp.	Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	Amphora	sp.	1	1	1	82	82	0.2	0.2	828.00	125.58
7170.02-02	Spokane River, WA	LL1-0.5m	1	6/9/2015	542	1.2165%	Asterionella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Asterionella	sp.	5	1	5	411	411	0.8	0.8	1197.73	908.26
7170.02-02	Spokane River, WA	LL1-0.5m	1	6/9/2015	542	1.2165%	Ceratium sp.	Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	Ceratium	sp.	1	1	1	82	82	0.2	0.2	72039.08	10925.69
7170.02-02	Spokane River, WA	LL1-0.5m	1	6/9/2015	542	1.2165%	Cosmarium spp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Cosmarium	spp.	11	1	11	904	904	1.7	1.7	2546.78	4248.79
7170.02-02	Spokane River, WA	LL1-0.5m	1	6/9/2015	542	1.2165%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	43	1	43	3535	3535	6.5	6.5	1681.28	10964.48
7170.02-02	Spokane River, WA	LL1-0.5m	1	6/9/2015	542	1.2165%	Cyclotella spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Cyclotella	spp.	12	1	12	986	986	1.8	1.8	663.66	1207.84
7170.02-02	Spokane River, WA	LL1-0.5m	1	6/9/2015	542	1.2165%	Elakatothrix sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	Elakatothrix	sp.	1	4	4	82	329	0.2	0.6	284.71	172.72
7170.02-02	Spokane River, WA	LL1-0.5m	1	6/9/2015	542	1.2165%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	74	1	74	6083	6083	11.2	11.2	923.63	10365.96
7170.02-02	Spokane River, WA	LL1-0.5m	1	6/9/2015	542	1.2165%	Gymnodinium spp.	Pyrrhophyta	Dinophyceae	Gymnodiniales	Gymnodiniaceae	Gymnodinium	spp.	9	1	9	740	740	1.4	1.4	2278.70	3110.36
7170.02-02	Spokane River, WA	LL1-0.5m	1	6/9/2015	542	1.2165%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	79	1	79	6494	6494	12.0	12.0	149.59	1792.33
7170.02-02	Spokane River, WA	LL1-0.5m	1	6/9/2015	542	1.2165%	Ochromonas spp.	Chrysophyta	Chrysophyceae	Ochromonadales	Ochromonadaceae	Ochromonas	spp.	57	1	57	4685	4685	8.6	8.6	127.24	1099.92
7170.02-02	Spokane River, WA	LL1-0.5m	1	6/9/2015	542	1.2165%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	2	4	8	164	658	0.3	1.2	402.12	487.90
7170.02-02	Spokane River, WA	LL1-0.5m	1	6/9/2015	542	1.2165%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	3	11	32	247	2630	0.5	4.9	207.35	1006.29
7170.02-02	Spokane River, WA	LL1-0.5m	1	6/9/2015	542	1.2165%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	2	16	32	164	2630	0.3	4.9	87.11	422.78
7170.02-03	Spokane River, WA	LL2-0.5m	1	6/9/2015	540	0.8845%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	3	5	14	339	1583	0.6	2.9	508.94	1491.70
7170.02-03	Spokane River, WA	LL2-0.5m	1	6/9/2015	540	0.8845%	Botryococcus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Botryococcus	sp.	1	22	22	113	2487	0.2	4.6	58.64	270.10
7170.02-03	Spokane River, WA	LL2-0.5m	1	6/9/2015	540	0.8845%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	4	1	4	452	452	0.8	0.8	2120.58	1775.83
7170.02-03	Spokane River, WA	LL2-0.5m	1	6/9/2015	540	0.8845%	Cosmarium spp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Cosmarium	spp.	7	1	7	791	791	1.5	1.5	1415.81	2074.87
7170.02-03	Spokane River, WA	LL2-0.5m	1	6/9/2015	540	0.8845%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	49	1	49	5540	5540	10.3	10.3	3063.05	31422.29
7170.02-03	Spokane River, WA	LL2-0.5m	1	6/9/2015	540	0.8845%	Cyclotella spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Cyclotella	spp.	5	1	5	565	565	1.0	1.0	1237.00	1294.87
7170.02-03	Spokane River, WA	LL2-0.5m	1	6/9/2015	540	0.8845%	Desmodesmus spp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Desmodesmus	spp.	1	8	8	113	904	0.2	1.7	500.30	837.93
7170.02-03	Spokane River, WA	LL2-0.5m	1	6/9/2015	540	0.8845%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	102	1	102	11531	11531	21.4	21.4	807.39	17241.31
7170.02-03	Spokane River, WA	LL2-0.5m	1	6/9/2015	540	0.8845%	Gymnodinium spp.	Pyrrhophyta	Dinophyceae	Gymnodiniales	Gymnodiniaceae	Gymnodinium	spp.	9	1	9	1017	1017	1.9	1.9	4817.11	9076.45
7170.02-03	Spokane River, WA	LL2-0.5m	1	6/9/2015	540	0.8845%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	87	1	87	9836	9836	18.2	18.2	134.63	2452.16
7170.02-03	Spokane River, WA	LL2-0.5m	1	6/9/2015	540	0.8845%	Navicula spp.	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	Navicula	spp.	3	1	3	339	339	0.6	0.6	1300.62	816.88
7170.02-03	Spokane River, WA	LL2-0.5m	1	6/9/2015	540	0.8845%	Ochromonas spp.	Chrysophyta	Chrysophyceae	Ochromonadales	Ochromonadaceae	Ochromonas	spp.	31	1	31	3505	3505	6.5	6.5	78.54	509.73
7170.02-03	Spokane River, WA	LL2-0.5m	1	6/9/2015	540	0.8845%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	1	4	4	113	452	0.2	0.8	1281.77	1073.39
7170.02-03	Spokane River, WA	LL2-0.5m	1	6/9/2015	540	0.8845%	Pandorina sp.	Chlorophyta	Chlorophyceae	Volvocales	Volvocaceae	Pandorina	sp.	1	16	16	113	1809	0.2	3.3	435.63	1459.25
7170.02-03	Spokane River, WA	LL2-0.5m	1	6/9/2015	540	0.8845%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	12	12	113	1357	0.2	2.5	440.00	1105.40
7170.02-03	Spokane River, WA	LL2-0.5m	1	6/9/2015	540	0.8845%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	3	11	32	339	3618	0.6	6.7	207.35	1389.09
7170.02-03	Spokane River, WA	LL2-0.5m	1	6/9/2015	540	0.8845%	Chroococcus sp.	Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	Chroococcus	sp.	1	16	16	113	1809	0.2	3.3	22.45	75.20

Avista Phytoplankton 2015 (Batch 2)
Taxa Report and Biovolumes

EcoAnalysts, Inc.

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in samples received)	Cells per mL (in sample received)	AVG_BV (μ^3)	Biovolume (μ^3/mL)
7170.02-04	Spokane River, WA	LL3-0.5m	1	6/10/2015	567	0.9250%	Asterionella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Asterionella	sp.	2	1	2	216	216	0.4	0.4	1451.42	553.47
7170.02-04	Spokane River, WA	LL3-0.5m	1	6/10/2015	567	0.9250%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	3	1	3	324	324	0.6	0.6	692.72	396.24
7170.02-04	Spokane River, WA	LL3-0.5m	1	6/10/2015	567	0.9250%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	4	1	4	432	432	0.8	0.8	886.98	676.47
7170.02-04	Spokane River, WA	LL3-0.5m	1	6/10/2015	567	0.9250%	Ceratium sp.	Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	Ceratium	sp.	5	1	5	541	541	1.0	1.0	67347.89	64204.98
7170.02-04	Spokane River, WA	LL3-0.5m	1	6/10/2015	567	0.9250%	Cosmarium spp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Cosmarium	spp.	12	1	12	1297	1297	2.3	2.3	3392.92	7763.00
7170.02-04	Spokane River, WA	LL3-0.5m	1	6/10/2015	567	0.9250%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	71	1	71	7676	7676	13.5	13.5	2663.13	36051.65
7170.02-04	Spokane River, WA	LL3-0.5m	1	6/10/2015	567	0.9250%	Cyclotella spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Cyclotella	spp.	4	1	4	432	432	0.8	0.8	3801.33	2899.14
7170.02-04	Spokane River, WA	LL3-0.5m	1	6/10/2015	567	0.9250%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	66	1	66	7135	7135	12.6	12.6	753.98	9488.11
7170.02-04	Spokane River, WA	LL3-0.5m	1	6/10/2015	567	0.9250%	Gymnodinium spp.	Pyrrhophyta	Dinophyceae	Gymnodiniales	Gymnodiniaceae	Gymnodinium	spp.	24	1	24	2595	2595	4.6	4.6	4398.23	20126.30
7170.02-04	Spokane River, WA	LL3-0.5m	1	6/10/2015	567	0.9250%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	49	1	49	5297	5297	9.3	9.3	169.65	1584.95
7170.02-04	Spokane River, WA	LL3-0.5m	1	6/10/2015	567	0.9250%	Ochromonas spp.	Chrysophyta	Chrysophyceae	Ochromonadales	Ochromonadaceae	Ochromonas	spp.	37	1	37	4000	4000	7.1	7.1	301.59	2127.64
7170.02-04	Spokane River, WA	LL3-0.5m	1	6/10/2015	567	0.9250%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	12	3	40	1297	4324	2.3	7.6	333.53	2543.74
7170.02-04	Spokane River, WA	LL3-0.5m	1	6/10/2015	567	0.9250%	Pandorina sp.	Chlorophyta	Chlorophyceae	Volvocales	Volvocaceae	Pandorina	sp.	1	16	16	108	1730	0.2	3.1	536.17	1635.66
7170.02-04	Spokane River, WA	LL3-0.5m	1	6/10/2015	567	0.9250%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	3	12	36	324	3892	0.6	6.9	630.00	4324.32
7170.02-04	Spokane River, WA	LL3-0.5m	1	6/10/2015	567	0.9250%	Planktolyngbya sp.	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	Planktolyngbya	sp.	1	30	30	108	3243	0.2	5.7	19.64	112.31
7170.02-04	Spokane River, WA	LL3-0.5m	1	6/10/2015	567	0.9250%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	2	6	12	216	1297	0.4	2.3	143.99	329.45
7170.02-04	Spokane River, WA	LL3-0.5m	1	6/10/2015	567	0.9250%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	5	12	60	541	6486	1.0	11.4	220.89	2527.02
7170.02-04	Spokane River, WA	LL3-0.5m	1	6/10/2015	567	0.9250%	Woronichinia sp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	sp.	1	50	50	108	5405	0.2	9.5	11.45	109.19
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Asterionella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Asterionella	sp.	8	3	27	2172	7330	3.9	13.0	879.65	11473.48
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	4	6	23	1086	6244	1.9	11.1	452.39	5026.47
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Bitrichia sp.	Chrysophyta	Chrysophyceae	Hibberdiales	Stylococcaceae	Bitrichia	sp.	3	1	3	814	814	1.4	1.4	65.45	94.85
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	1	1	1	271	271	0.5	0.5	1415.81	683.96
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Ceratium sp.	Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	Ceratium	sp.	1	1	1	271	271	0.5	0.5	59870.90	28922.74
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Cosmarium spp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Cosmarium	spp.	5	1	5	1357	1357	2.4	2.4	3591.36	8674.67
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	1	16	16	271	4344	0.5	7.7	512.00	3957.43
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	194	1	194	52670	52670	93.7	93.7	2100.68	196872.41
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Desmodesmus spp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Desmodesmus	spp.	4	4	16	1086	4344	1.9	7.7	282.74	2185.42
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Elakatothrix sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	Elakatothrix	sp.	5	4	20	1357	5430	2.4	9.7	91.89	887.83
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	30	2	51	8145	13846	14.5	24.6	364.43	8978.46
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Gymnodinium spp.	Pyrrhophyta	Dinophyceae	Gymnodiniales	Gymnodiniaceae	Gymnodinium	spp.	3	1	3	814	814	1.4	1.4	5828.70	8447.28
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	7	1	7	1900	1900	3.4	3.4	142.55	482.05
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Ochromonas spp.	Chrysophyta	Chrysophyceae	Ochromonadales	Ochromonadaceae	Ochromonas	spp.	22	1	22	5973	5973	10.6	10.6	127.24	1352.24
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	4	4	16	1086	4344	1.9	7.7	593.76	4589.39
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Pandorina sp.	Chlorophyta	Chlorophyceae	Volvocales	Volvocaceae	Pandorina	sp.	4	12	48	1086	13032	1.9	23.2	636.17	14751.63
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	12	12	271	3258	0.5	5.8	216.00	1252.16
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	1	4	4	271	1086	0.5	1.9	117.81	227.65
7170.02-05	Spokane River, WA	LL4-0.5m	1	6/10/2015	562	0.3683%	Tetraedron sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Chlorococcaceae	Tetraedron	sp.	3	1	3	814	814	1.4	1.4	192.00	278.26
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Achnanthes spp. Bory	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Achnanthes	spp.	6	1	6	10074	10074	19.0	19.0	306.31	5821.99
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Amphora sp.	Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	Amphora	sp.	10	1	10	16790	16790	31.7	31.7	1092.00	34593.04
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Asterionella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Asterionella	sp.	5	8	40	8395	67159	15.8	126.7	1237.00	156746.02
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Chlamydomonas sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Chlamydomonas	sp.	73	1	73	122565	122565	231.3	231.3	912.32	210977.24
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Cocconeis sp.	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Cocconeis	sp.	8	1	8	13432	13432	25.3	25.3	628.32	15923.42
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Coelastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Coelastrum	sp.	1	12	12	1679	20148	3.2	38.0	113.10	4299.31
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	2	8	16	3358	26863	6.3	50.7	421.88	21383.06
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	64	1	64	107454	107454	202.7	202.7	1507.96	305729.31
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Cyclotella spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Cyclotella	spp.	20	1	20	33579	33579	63.4	63.4	2827.43	179138.30
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Desmodesmus spp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Desmodesmus	spp.	6	4	24	10074	40295	19.0	76.0	461.81	35111.10
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	34	1	45	57085	75553	107.7	142.6	962.11	137152.81
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Gomphonema spp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	spp.	7	1	7	11753	11753	22.2	22.2	1313.19	29119.94
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Hannaea sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Hannaea	sp.	4	1	4	6716	6716	12.7	12.7	973.89	12340.64
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Melosira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	Melosira	sp.	7	2	17	11753	28542	22.2	53.9	2488.14	133995.44
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Monoraphidium spp.	Chlorophyta	Chlorophyceae	Sphaeropleales	Selenastraceae	Monoraphidium	spp.	9	1	9	15111	15111	28.5	28.5	98.96	2821.42
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Navicula spp.	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	Navicula	spp.	12	1	12	20148	20148	38.0	38.0	1583.36	60190.49
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Nitzschia spp.	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	Nitzschia	spp.	17	1	17	28542	28542	53.9	53.9	467.31	25166.45
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Peridinium sp.	Pyrrhophyta	Dinophyceae	Peridiniales	Peridiniaceae	Peridinium	sp.	2	1	2	3358	3358	6.3	6.3	7841.42	49681.03
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Stauridium sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Stauridium	sp.	1	8	8	1679	13432	3.2	25.3	115.45	2925.94
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Staurosira sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Staurosira	sp.	1	13	13	1679	21827	3.2	41.2	339.29	13972.79
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Synedra sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Synedra	sp.	3	1	3	5037	5037	9.5	9.5	1295.91	12315.76
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Tabellaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	Tabellaria	sp.	7	1	7	11753	11753	22.2	22.2	1080.00	23949.03
7170.02-06	Spokane River, WA	LL5-0.5m	1	6/10/2015	530	0.0596%	Trachelomonas spp.	Euglenophyta	Euglenophyceae	Euglenales	Euglenaceae	Trachelomonas	spp.	3	1	3	5037	5037	9.5	9.5	904.78	8598.64

Avista Phytoplankton 2015 (Batch 3)
Taxa Report and Biovolumes

EcoAnalysts, Inc.

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in sample received)	Cells per mL (in sample received)	AVG_BV (μ^3)	Biovolume (μ^3/mL)
7170.03-01	Spokane River, WA	LL0-0.5m	1	6/23/2015	547	1.2848%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	10	1.40	14	778.36	1089.70	1.42	1.99	538.78	1073.33
7170.03-01	Spokane River, WA	LL0-0.5m	1	6/23/2015	547	1.2848%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	29	8.55	248	2257.24	19303.31	4.13	35.29	512.00	18068.18
7170.03-01	Spokane River, WA	LL0-0.5m	1	6/23/2015	547	1.2848%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	9	1.00	9	700.52	700.52	1.28	1.28	1432.57	1834.64
7170.03-01	Spokane River, WA	LL0-0.5m	1	6/23/2015	547	1.2848%	Cyclotella spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Cyclotella	spp.	32	1.00	32	2490.75	2490.75	4.55	4.55	929.13	4230.75
7170.03-01	Spokane River, WA	LL0-0.5m	1	6/23/2015	547	1.2848%	Elakatothrix sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	Elakatothrix	sp.	42	6.48	272	3269.11	21171.37	5.98	38.70	95.43	3693.42
7170.03-01	Spokane River, WA	LL0-0.5m	1	6/23/2015	547	1.2848%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	5	1.00	5	389.18	389.18	0.71	0.71	832.52	592.32
7170.03-01	Spokane River, WA	LL0-0.5m	1	6/23/2015	547	1.2848%	Gomphonema spp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	spp.	7	1.00	7	544.85	544.85	1.00	1.00	400.55	398.98
7170.03-01	Spokane River, WA	LL0-0.5m	1	6/23/2015	547	1.2848%	Navicula spp.	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	Navicula	spp.	3	1.00	3	233.51	233.51	0.43	0.43	1866.11	796.62
7170.03-01	Spokane River, WA	LL0-0.5m	1	6/23/2015	547	1.2848%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	32	4.94	158	2490.75	12298.08	4.55	22.48	551.35	12395.88
7170.03-01	Spokane River, WA	LL0-0.5m	1	6/23/2015	547	1.2848%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	66	14.64	966	5137.17	75189.51	9.39	137.46	429.61	59053.70
7170.03-01	Spokane River, WA	LL0-0.5m	1	6/23/2015	547	1.2848%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	63	8.00	504	4903.66	39229.31	8.96	71.72	87.11	6247.57
7170.03-01	Spokane River, WA	LL0-0.5m	1	6/23/2015	547	1.2848%	Stauridium sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Stauridium	sp.	2	24.00	48	155.67	3736.12	0.28	6.83	115.45	788.57
7170.03-02	Spokane River, WA	LL1-0.5m	1	6/23/2015	545	1.7779%	Asterionella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Asterionella	sp.	3	1.00	3	168.74	168.74	0.31	0.31	1335.18	413.39
7170.03-02	Spokane River, WA	LL1-0.5m	1	6/23/2015	545	1.7779%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	39	4.36	170	2193.64	9562.02	4.03	17.54	729.00	12790.30
7170.03-02	Spokane River, WA	LL1-0.5m	1	6/23/2015	545	1.7779%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	6	1.00	6	337.48	337.48	0.62	0.62	2155.13	1334.53
7170.03-02	Spokane River, WA	LL1-0.5m	1	6/23/2015	545	1.7779%	Cyclotella spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Cyclotella	spp.	5	1.00	5	281.24	281.24	0.52	0.52	796.39	410.96
7170.03-02	Spokane River, WA	LL1-0.5m	1	6/23/2015	545	1.7779%	Elakatothrix sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	Elakatothrix	sp.	32	4.00	128	1799.91	7199.64	3.30	13.21	102.49	1353.98
7170.03-02	Spokane River, WA	LL1-0.5m	1	6/23/2015	545	1.7779%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	9	1.00	9	506.22	506.22	0.93	0.93	980.18	910.44
7170.03-02	Spokane River, WA	LL1-0.5m	1	6/23/2015	545	1.7779%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	29	3.59	104	1631.17	5849.71	2.99	10.73	1357.17	14567.04
7170.03-02	Spokane River, WA	LL1-0.5m	1	6/23/2015	545	1.7779%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	3	21.33	64	168.74	3599.82	0.31	6.61	1256.64	8300.31
7170.03-02	Spokane River, WA	LL1-0.5m	1	6/23/2015	545	1.7779%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	55	10.45	575	3093.60	32342.14	5.68	59.34	837.76	49715.39
7170.03-02	Spokane River, WA	LL1-0.5m	1	6/23/2015	545	1.7779%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	123	7.80	960	6918.41	53997.31	12.69	99.08	140.64	13934.12
7170.03-03	Spokane River, WA	LL2-0.5m	1	6/23/2015	545	1.7256%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	1	12.00	12	57.95	695.42	0.11	1.28	1231.50	1571.40
7170.03-03	Spokane River, WA	LL2-0.5m	1	6/23/2015	545	1.7256%	Ceratium sp.	Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	Ceratium	sp.	1	1.00	1	57.95	57.95	0.11	0.11	73990.79	7867.69
7170.03-03	Spokane River, WA	LL2-0.5m	1	6/23/2015	545	1.7256%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	24	4.08	98	1390.84	5679.26	2.55	10.42	512.00	5335.38
7170.03-03	Spokane River, WA	LL2-0.5m	1	6/23/2015	545	1.7256%	Elakatothrix sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	Elakatothrix	sp.	3	8.00	24	173.85	1390.84	0.32	2.55	102.49	261.56
7170.03-03	Spokane River, WA	LL2-0.5m	1	6/23/2015	545	1.7256%	Gomphonema sp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	sp.	4	1.00	4	231.81	231.81	0.43	0.43	956.62	406.88
7170.03-03	Spokane River, WA	LL2-0.5m	1	6/23/2015	545	1.7256%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	47	3.53	166	2723.73	9619.98	5.00	17.65	1769.76	31238.69
7170.03-03	Spokane River, WA	LL2-0.5m	1	6/23/2015	545	1.7256%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	4	18.00	72	231.81	4172.52	0.43	7.66	339.29	2597.62
7170.03-03	Spokane River, WA	LL2-0.5m	1	6/23/2015	545	1.7256%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	72	7.96	573	4172.52	33206.30	7.66	60.93	410.50	25011.41
7170.03-03	Spokane River, WA	LL2-0.5m	1	6/23/2015	545	1.7256%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	146	6.99	1020	8460.94	59110.69	15.52	108.46	116.87	12675.39
7170.03-04	Spokane River, WA	LL3-0.5m	1	6/24/2015	535	1.0298%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	8	10.75	86	776.82	8350.81	1.45	15.61	512.00	7991.81
7170.03-04	Spokane River, WA	LL3-0.5m	1	6/24/2015	535	1.0298%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	30	4.23	127	2913.07	12332.02	5.44	23.05	1592.79	36714.53
7170.03-04	Spokane River, WA	LL3-0.5m	1	6/24/2015	535	1.0298%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	2	24.00	48	194.20	4660.92	0.36	8.71	571.77	4981.26
7170.03-04	Spokane River, WA	LL3-0.5m	1	6/24/2015	535	1.0298%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	161	9.94	1600	15633.50	155363.98	29.22	290.40	396.68	115195.39
7170.03-04	Spokane River, WA	LL3-0.5m	1	6/24/2015	535	1.0298%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	96	5.21	500	9321.84	48551.24	17.42	90.75	113.10	10263.55
7170.03-04	Spokane River, WA	LL3-0.5m	1	6/24/2015	535	1.0298%	Stauridium sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Stauridium	sp.	3	17.33	52	291.31	5049.33	0.54	9.44	190.85	1801.26
7170.03-05	Spokane River, WA	LL4-0.5m	1	6/24/2015	545	0.8759%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	10	5.60	56	1141.73	6393.71	2.09	11.73	1000.00	11731.58
7170.03-05	Spokane River, WA	LL4-0.5m	1	6/24/2015	545	0.8759%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	35	2.03	71	3996.07	8106.31	7.33	14.87	1140.40	16962.24
7170.03-05	Spokane River, WA	LL4-0.5m	1	6/24/2015	545	0.8759%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	24.00	24	114.17	2740.16	0.21	5.03	380.13	1911.24
7170.03-05	Spokane River, WA	LL4-0.5m	1	6/24/2015	545	0.8759%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	159	10.69	1700	18153.57	194094.82	33.31	356.14	342.12	121841.54
7170.03-05	Spokane River, WA	LL4-0.5m	1	6/24/2015	545	0.8759%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	116	7.93	920	13244.12	105039.55	24.30	192.73	179.59	34613.71
7170.03-05	Spokane River, WA	LL4-0.5m	1	6/24/2015	545	0.8759%	Stauridium sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Stauridium	sp.	1	8.00	8	114.17	913.39	0.21	1.68	153.94	257.99
7170.03-06	Spokane River, WA	LL5-0.5m	1	6/24/2015	550	0.4508%	Asterionella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Asterionella	sp.	8	4.13	33	1774.67	7320.50	3.23	13.31	1734.16	23081.65
7170.03-06	Spokane River, WA	LL5-0.5m	1	6/24/2015	550	0.4508%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	16	6.00	96	3549.33	21296.00	6.45	38.72	512.00	19824.64
7170.03-06	Spokane River, WA	LL5-0.5m	1	6/24/2015	550	0.4508%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	3	1.00	3	665.50	665.50	1.21	1.21	2463.01	2980.24
7170.03-06	Spokane River, WA	LL5-0.5m	1	6/24/2015	550	0.4508%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	54	2.06	111	11979.00	24623.50	21.78	44.77	2155.13	96485.29
7170.03-06	Spokane River, WA	LL5-0.5m	1	6/24/2015	550	0.4508%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	2	24.00	48	443.67	10648.00	0.81	19.36	380.13	7359.37
7170.03-06	Spokane River, WA	LL5-0.5m	1	6/24/2015	550	0.4508%	Phacus sp.	Euglenophyta	Euglenophyceae	Euglenales	Euglenaceae	Phacus	sp.	4	1.00	4	887.33	887.33	1.61	1.61	3454.08	5572.58
7170.03-06	Spokane River, WA	LL5-0.5m	1	6/24/2015	550	0.4508%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	159	8.81	1400	35271.49	310566.62	64.13	564.67	718.06	405466.29
7170.03-06	Spokane River, WA	LL5-0.5m	1	6/24/2015	550	0.4508%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	54	8.89	480	11979.00	106479.98	21.78	193.60	113.10	21895.58

Avista Phytoplankton 2015 (Batch 4)
Taxa Report and Biovolumes

EcoAnalysts, Inc.

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in sample received)	Cells per mL (in sample received)	AVG_BV (μ^3)	Biovolume (μ^3/mL)
7170.04-01	Spokane River, WA	LL0-0.5m	1	7/7/2015	551	0.3375%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	77	201.30	15500	22812.08	4592041.08	41.40	8334.01	4.19	34911.18
7170.04-01	Spokane River, WA	LL0-0.5m	1	7/7/2015	551	0.3375%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	1	1.00	1	296.26	296.26	0.54	0.54	6924.59	3723.20
7170.04-01	Spokane River, WA	LL0-0.5m	1	7/7/2015	551	0.3375%	Cocconeis sp.	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Cocconeis	sp.	3	1.00	3	888.78	888.78	1.61	1.61	2474.00	3990.65
7170.04-01	Spokane River, WA	LL0-0.5m	1	7/7/2015	551	0.3375%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	76	3.95	300	22515.81	88878.21	40.86	161.30	729.00	117590.23
7170.04-01	Spokane River, WA	LL0-0.5m	1	7/7/2015	551	0.3375%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	11	1.00	11	3258.87	3258.87	5.91	5.91	2035.23	12037.28
7170.04-01	Spokane River, WA	LL0-0.5m	1	7/7/2015	551	0.3375%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	2	1.00	2	592.52	592.52	1.08	1.08	1300.62	1398.63
7170.04-01	Spokane River, WA	LL0-0.5m	1	7/7/2015	551	0.3375%	Gomphonema spp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	spp.	2	1.00	2	592.52	592.52	1.08	1.08	1237.00	1330.22
7170.04-01	Spokane River, WA	LL0-0.5m	1	7/7/2015	551	0.3375%	Gymnodinium sp.	Pyrrhophyta	Dinophyceae	Gymnodiniales	Gymnodiniaceae	Gymnodinium	sp.	3	1.00	3	888.78	888.78	1.61	1.61	6082.12	9810.68
7170.04-01	Spokane River, WA	LL0-0.5m	1	7/7/2015	551	0.3375%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	11	2.36	26	3258.87	7702.78	5.91	13.98	1206.37	16864.64
7170.04-01	Spokane River, WA	LL0-0.5m	1	7/7/2015	551	0.3375%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	24.00	24	296.26	7110.26	0.54	12.90	432.00	5574.65
7170.04-01	Spokane River, WA	LL0-0.5m	1	7/7/2015	551	0.3375%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	33	8.00	264	9776.60	78212.83	17.74	141.95	461.81	65553.14
7170.04-01	Spokane River, WA	LL0-0.5m	1	7/7/2015	551	0.3375%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	86	8.14	700	25478.42	207382.50	46.24	376.37	185.09	69663.96
7170.04-01	Spokane River, WA	LL0-0.5m	1	7/7/2015	551	0.3375%	Tetraedron sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Chlorococcaceae	Tetraedron	sp.	1	1.00	1	296.26	296.26	0.54	0.54	576.00	309.70
7170.04-02	Spokane River, WA	LL1-0.5m	1	7/7/2015	549	0.2304%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	61	150.82	9200	26474.17	3992825.47	48.22	7272.91	4.19	30466.20
7170.04-02	Spokane River, WA	LL1-0.5m	1	7/7/2015	549	0.2304%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	92	4.35	400	39928.25	173601.11	72.73	316.21	542.03	171395.52
7170.04-02	Spokane River, WA	LL1-0.5m	1	7/7/2015	549	0.2304%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	4	1.00	4	1736.01	1736.01	3.16	3.16	1658.76	5245.22
7170.04-02	Spokane River, WA	LL1-0.5m	1	7/7/2015	549	0.2304%	Cyclotella spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Cyclotella	spp.	3	1.00	3	1302.01	1302.01	2.37	2.37	796.39	1888.73
7170.04-02	Spokane River, WA	LL1-0.5m	1	7/7/2015	549	0.2304%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	13	3.08	40	5642.04	17360.11	10.28	31.62	2948.91	93248.40
7170.04-02	Spokane River, WA	LL1-0.5m	1	7/7/2015	549	0.2304%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	20.00	20	434.00	8680.06	0.79	15.81	1280.00	20237.65
7170.04-02	Spokane River, WA	LL1-0.5m	1	7/7/2015	549	0.2304%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	70	6.57	460	30380.19	199641.27	55.34	363.65	603.19	219345.76
7170.04-02	Spokane River, WA	LL1-0.5m	1	7/7/2015	549	0.2304%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	57	8.42	480	24738.16	208321.33	45.06	379.46	381.70	144839.86
7170.04-03	Spokane River, WA	LL2-0.5m	1	7/7/2015	540	0.1435%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	77	155.84	12000	53665.92	8363520.23	99.38	15488.00	1.77	27367.30
7170.04-03	Spokane River, WA	LL2-0.5m	1	7/7/2015	540	0.1435%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	59	4.14	244	41120.64	170058.24	76.15	314.92	1000.00	314922.68
7170.04-03	Spokane River, WA	LL2-0.5m	1	7/7/2015	540	0.1435%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	8	1.00	8	5575.68	5575.68	10.33	10.33	3063.05	31627.04
7170.04-03	Spokane River, WA	LL2-0.5m	1	7/7/2015	540	0.1435%	Desmodesmus spp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Desmodesmus	spp.	2	4.00	8	1393.92	5575.68	2.58	10.33	125.66	1297.52
7170.04-03	Spokane River, WA	LL2-0.5m	1	7/7/2015	540	0.1435%	Elakatothrix sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	Elakatothrix	sp.	1	8.00	8	696.96	5575.68	1.29	10.33	412.33	4257.49
7170.04-03	Spokane River, WA	LL2-0.5m	1	7/7/2015	540	0.1435%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	12	3.50	42	8363.52	29272.32	15.49	54.21	2155.13	116825.45
7170.04-03	Spokane River, WA	LL2-0.5m	1	7/7/2015	540	0.1435%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	20.00	20	696.96	13939.20	1.29	25.81	576.00	14868.48
7170.04-03	Spokane River, WA	LL2-0.5m	1	7/7/2015	540	0.1435%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	98	6.02	590	68302.08	411206.41	126.49	761.49	1242.08	945836.43
7170.04-03	Spokane River, WA	LL2-0.5m	1	7/7/2015	540	0.1435%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	36	7.50	270	25090.56	188179.21	46.46	348.48	220.89	76976.79

Avista Phytoplankton 2015 (Batch 4)
Taxa Report and Biovolumes

EcoAnalysts, Inc.

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in sample received)	Cells per mL (in sample received)	AVG_BV (µ³)	Biovolume (µ³/mL)
7170.04-04	Spokane River, WA	LL3-0.5m	1	7/8/2015	560	0.0582%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	29	13.79	400	49838.38	687425.92	89.00	1227.55	4.19	5142.19
7170.04-04	Spokane River, WA	LL3-0.5m	1	7/8/2015	560	0.0582%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	17	4.00	68	29215.60	116862.41	52.17	208.68	729.00	152129.81
7170.04-04	Spokane River, WA	LL3-0.5m	1	7/8/2015	560	0.0582%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	9	1.00	9	15467.08	15467.08	27.62	27.62	3351.03	92554.81
7170.04-04	Spokane River, WA	LL3-0.5m	1	7/8/2015	560	0.0582%	Cyclotella spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Cyclotella	spp.	7	1.00	7	12029.95	12029.95	21.48	21.48	678.58	14577.38
7170.04-04	Spokane River, WA	LL3-0.5m	1	7/8/2015	560	0.0582%	Desmodesmus spp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Desmodesmus	spp.	3	4.00	12	5155.69	20622.78	9.21	36.83	1156.11	42575.21
7170.04-04	Spokane River, WA	LL3-0.5m	1	7/8/2015	560	0.0582%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	3	1.00	3	5155.69	5155.69	9.21	9.21	879.65	8098.55
7170.04-04	Spokane River, WA	LL3-0.5m	1	7/8/2015	560	0.0582%	Gymnodinium spp.	Pyrrhophyta	Dinophyceae	Gymnodiniales	Gymnodiniaceae	Gymnodinium	spp.	3	1.00	3	5155.69	5155.69	9.21	9.21	2002.77	18438.65
7170.04-04	Spokane River, WA	LL3-0.5m	1	7/8/2015	560	0.0582%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	5	1.00	5	8592.82	8592.82	15.34	15.34	104.72	1606.86
7170.04-04	Spokane River, WA	LL3-0.5m	1	7/8/2015	560	0.0582%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	22	3.27	72	37808.43	123736.67	67.52	220.96	2035.23	449700.58
7170.04-04	Spokane River, WA	LL3-0.5m	1	7/8/2015	560	0.0582%	Planktolyngbya sp.	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	Planktolyngbya	sp.	4	28.00	112	6874.26	192479.26	12.28	343.71	6.28	2159.55
7170.04-04	Spokane River, WA	LL3-0.5m	1	7/8/2015	560	0.0582%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	161	8.07	1300	276688.93	2234134.24	494.09	3989.53	737.23	2941185.87
7170.04-04	Spokane River, WA	LL3-0.5m	1	7/8/2015	560	0.0582%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	37	8.11	300	63586.90	515569.44	113.55	920.66	268.08	246813.22
7170.04-04	Spokane River, WA	LL3-0.5m	1	7/8/2015	560	0.0582%	Stephanodiscus spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Stephanodiscus	spp.	2	1.00	2	3437.13	3437.13	6.14	6.14	6381.36	39167.07
7170.04-05	Spokane River, WA	LL4-0.5m	1	7/8/2015	560	0.0711%	Amphora sp.	Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	Amphora	sp.	4	1.00	4	5624.86	5624.86	10.04	10.04	1023.00	10275.41
7170.04-05	Spokane River, WA	LL4-0.5m	1	7/8/2015	560	0.0711%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	10	6.30	63	14062.15	88591.52	25.11	158.20	923.63	146117.17
7170.04-05	Spokane River, WA	LL4-0.5m	1	7/8/2015	560	0.0711%	Cosmarium spp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Cosmarium	spp.	3	1.00	3	4218.64	4218.64	7.53	7.53	6647.61	50078.39
7170.04-05	Spokane River, WA	LL4-0.5m	1	7/8/2015	560	0.0711%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	4	4.00	16	5624.86	22499.43	10.04	40.18	421.88	16949.91
7170.04-05	Spokane River, WA	LL4-0.5m	1	7/8/2015	560	0.0711%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	11	1.00	11	15468.36	15468.36	27.62	27.62	3082.95	85157.47
7170.04-05	Spokane River, WA	LL4-0.5m	1	7/8/2015	560	0.0711%	Dictyosphaerium spp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Dictyosphaerium	spp.	5	6.00	30	7031.07	42186.44	12.56	75.33	148.18	11162.46
7170.04-05	Spokane River, WA	LL4-0.5m	1	7/8/2015	560	0.0711%	Elakatothrix sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	Elakatothrix	sp.	3	4.00	12	4218.64	16874.58	7.53	30.13	102.49	3088.47
7170.04-05	Spokane River, WA	LL4-0.5m	1	7/8/2015	560	0.0711%	Fragilaria sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	sp.	8	1.63	13	11249.72	18280.79	20.09	32.64	829.38	27074.50
7170.04-05	Spokane River, WA	LL4-0.5m	1	7/8/2015	560	0.0711%	Gomphonema sp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	sp.	1	1.00	1	1406.21	1406.21	2.51	2.51	1055.58	2650.65
7170.04-05	Spokane River, WA	LL4-0.5m	1	7/8/2015	560	0.0711%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	6	1.00	6	8437.29	8437.29	15.07	15.07	160.22	2413.98
7170.04-05	Spokane River, WA	LL4-0.5m	1	7/8/2015	560	0.0711%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	49	3.06	150	68904.52	210932.20	123.04	376.66	3534.29	1331242.84
7170.04-05	Spokane River, WA	LL4-0.5m	1	7/8/2015	560	0.0711%	Pandorina sp.	Chlorophyta	Chlorophyceae	Volvocales	Volvocaceae	Pandorina	sp.	2	8.00	16	2812.43	22499.43	5.02	40.18	91.63	3681.47
7170.04-05	Spokane River, WA	LL4-0.5m	1	7/8/2015	560	0.0711%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	16.00	16	1406.21	22499.43	2.51	40.18	216.00	8678.35
7170.04-05	Spokane River, WA	LL4-0.5m	1	7/8/2015	560	0.0711%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	184	7.61	1400	258743.50	1968700.54	462.04	3515.54	581.30	2043579.36
7170.04-05	Spokane River, WA	LL4-0.5m	1	7/8/2015	560	0.0711%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	11	8.18	90	15468.36	126559.32	27.62	226.00	220.89	49921.55
7170.04-05	Spokane River, WA	LL4-0.5m	1	7/8/2015	560	0.0711%	Tetraedron sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Chlorococcaceae	Tetraedron	sp.	1	1.00	1	1406.21	1406.21	2.51	2.51	400.00	1004.44
7170.04-06	Spokane River, WA	LL5-0.5m	1	7/8/2015	567	0.0427%	Amphora sp.	Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	Amphora	sp.	1	1.00	1	2341.06	2341.06	4.13	4.13	690.00	2848.91
7170.04-06	Spokane River, WA	LL5-0.5m	1	7/8/2015	567	0.0427%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	7	1.86	13	16387.45	30433.83	28.90	53.68	1215.80	65258.08
7170.04-06	Spokane River, WA	LL5-0.5m	1	7/8/2015	567	0.0427%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	8	4.00	32	18728.51	74914.05	33.03	132.12	1331.00	175856.44
7170.04-06	Spokane River, WA	LL5-0.5m	1	7/8/2015	567	0.0427%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	20	1.00	20	46821.28	46821.28	82.58	82.58	8863.48	731921.49
7170.04-06	Spokane River, WA	LL5-0.5m	1	7/8/2015	567	0.0427%	Cyclotella spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Cyclotella	spp.	11	1.00	11	25751.70	25751.70	45.42	45.42	1237.00	56181.50
7170.04-06	Spokane River, WA	LL5-0.5m	1	7/8/2015	567	0.0427%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	9	7.44	67	21069.58	156851.29	37.16	276.63	879.65	243339.70
7170.04-06	Spokane River, WA	LL5-0.5m	1	7/8/2015	567	0.0427%	Gomphonema spp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	spp.	3	1.00	3	7023.19	7023.19	12.39	12.39	467.31	5788.40
7170.04-06	Spokane River, WA	LL5-0.5m	1	7/8/2015	567	0.0427%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	7	2.86	20	16387.45	46821.28	28.90	82.58	2261.95	186785.28
7170.04-06	Spokane River, WA	LL5-0.5m	1	7/8/2015	567	0.0427%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	218	12.39	2700	510351.96	6320872.92	900.09	11147.92	1216.01	13555940.27
7170.04-06	Spokane River, WA	LL5-0.5m	1	7/8/2015	567	0.0427%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	15	8.00	120	35115.96	280927.69	61.93	495.46	113.10	56035.41
7170.04-06	Spokane River, WA	LL5-0.5m	1	7/8/2015	567	0.0427%	Tabellaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	Tabellaria	sp.	3	1.00	3	7023.19	7023.19	12.39	12.39	288.00	3567.34

Avista Phytoplankton 2015 (Batch 5 & 6)
Taxa Report and Biovolumes

EcoAnalysts, Inc.

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in sample received)	Cells per mL (in sample received)	AVG_BV (μ^3)	Biovolume (μ^3/mL)
7170.05-01	Spokane River, WA	LL0-0.5m	1	7/21/2015	564	0.2290%	Amphora sp.	Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	Amphora	sp.	6	1.00	6	2620.57	2620.57	4.65	4.65	384.00	1784.22
7170.05-01	Spokane River, WA	LL0-0.5m	1	7/21/2015	564	0.2290%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	72	5.56	400	31446.84	174704.64	55.76	309.76	4.19	1297.58
7170.05-01	Spokane River, WA	LL0-0.5m	1	7/21/2015	564	0.2290%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	2	1.00	2	873.52	873.52	1.55	1.55	333.53	516.57
7170.05-01	Spokane River, WA	LL0-0.5m	1	7/21/2015	564	0.2290%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	72	4.06	292	31446.84	127534.39	55.76	226.12	729.00	164844.98
7170.05-01	Spokane River, WA	LL0-0.5m	1	7/21/2015	564	0.2290%	Elakatothrix sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	Elakatothrix	sp.	2	8.00	16	873.52	6988.19	1.55	12.39	294.52	3649.27
7170.05-01	Spokane River, WA	LL0-0.5m	1	7/21/2015	564	0.2290%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	38	1.13	43	16596.94	18780.75	29.43	33.30	5864.31	195276.70
7170.05-01	Spokane River, WA	LL0-0.5m	1	7/21/2015	564	0.2290%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	16.00	16	436.76	6988.19	0.77	12.39	484.00	5996.95
7170.05-01	Spokane River, WA	LL0-0.5m	1	7/21/2015	564	0.2290%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	78	8.00	624	34067.41	272539.25	60.40	483.23	731.26	353362.59
7170.05-01	Spokane River, WA	LL0-0.5m	1	7/21/2015	564	0.2290%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	53	4.00	212	23148.37	92593.46	41.04	164.17	113.10	18567.45
7170.05-02	Spokane River, WA	LL1-0.5m	1	7/21/2015	565	0.0776%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	54	46.30	2500	69615.08	3222920.41	123.21	5704.28	1.77	10079.47
7170.05-02	Spokane River, WA	LL1-0.5m	1	7/21/2015	565	0.0776%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	2	1.00	2	2578.34	2578.34	4.56	4.56	207.35	946.20
7170.05-02	Spokane River, WA	LL1-0.5m	1	7/21/2015	565	0.0776%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	94	4.00	376	121181.81	484727.23	214.48	857.92	565.00	484727.23
7170.05-02	Spokane River, WA	LL1-0.5m	1	7/21/2015	565	0.0776%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	27	1.00	27	34807.54	34807.54	61.61	61.61	2668.26	164381.47
7170.05-02	Spokane River, WA	LL1-0.5m	1	7/21/2015	565	0.0776%	Gymnodinium spp.	Pyrrhophyta	Dinophyceae	Gymnodiniales	Gymnodiniaceae	Gymnodinium	spp.	2	1.00	2	2578.34	2578.34	4.56	4.56	980.18	4472.97
7170.05-02	Spokane River, WA	LL1-0.5m	1	7/21/2015	565	0.0776%	Microcystis sp.	Cyanophyta	Myxophyceae	Chroococcales	Microcystaceae	Microcystis	sp.	1	100.00	100	1289.17	128916.82	2.28	228.17	268.08	61168.86
7170.05-02	Spokane River, WA	LL1-0.5m	1	7/21/2015	565	0.0776%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	29	1.24	36	37385.88	46410.05	66.17	82.14	9349.38	767973.86
7170.05-02	Spokane River, WA	LL1-0.5m	1	7/21/2015	565	0.0776%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	2	28.00	56	2578.34	72193.42	4.56	127.78	784.00	100176.35
7170.05-02	Spokane River, WA	LL1-0.5m	1	7/21/2015	565	0.0776%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	66	8.00	528	85085.10	680680.79	150.59	1204.74	636.70	767056.17
7170.05-03	Spokane River, WA	LL2-0.5m	1	7/21/2015	550	0.0626%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	64	50.00	3200	102220.78	5111039.17	185.86	9292.80	4.19	38927.53
7170.05-03	Spokane River, WA	LL2-0.5m	1	7/21/2015	550	0.0626%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	62	4.00	248	99026.38	396105.54	180.05	720.19	729.00	525019.88
7170.05-03	Spokane River, WA	LL2-0.5m	1	7/21/2015	550	0.0626%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	13	1.00	13	20763.60	20763.60	37.75	37.75	6048.61	228347.20
7170.05-03	Spokane River, WA	LL2-0.5m	1	7/21/2015	550	0.0626%	Elakatothrix sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	Elakatothrix	sp.	1	2.00	2	1597.20	3194.40	2.90	5.81	155.51	903.20
7170.05-03	Spokane River, WA	LL2-0.5m	1	7/21/2015	550	0.0626%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	23	1.00	23	36735.59	36735.59	66.79	66.79	5445.43	363710.90
7170.05-03	Spokane River, WA	LL2-0.5m	1	7/21/2015	550	0.0626%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	3	16.00	48	4791.60	76665.59	8.71	139.39	416.00	57987.06
7170.05-03	Spokane River, WA	LL2-0.5m	1	7/21/2015	550	0.0626%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	89	8.09	720	142150.78	1149983.81	258.46	2090.88	558.58	1167913.11
7170.05-03	Spokane River, WA	LL2-0.5m	1	7/21/2015	550	0.0626%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	55	6.36	350	87845.99	559019.91	159.72	1016.40	65.45	66523.37
7170.05-03	Spokane River, WA	LL2-0.5m	1	7/21/2015	550	0.0626%	Tetraedron sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Chlorococcaceae	Tetraedron	sp.	1	1.00	1	1597.20	1597.20	2.90	2.90	48.00	139.39
7170.05-04	Spokane River, WA	LL3-0.5m	1	7/22/2015	418	0.1100%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	48	41.67	2000	43653.15	1818881.40	104.43	4351.39	8.18	35598.73
7170.05-04	Spokane River, WA	LL3-0.5m	1	7/22/2015	418	0.1100%	Chroococcus spp.	Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	Chroococcus	spp.	3	8.00	24	2728.32	21826.58	6.53	52.22	47.71	2491.41
7170.05-04	Spokane River, WA	LL3-0.5m	1	7/22/2015	418	0.1100%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	4	1.00	4	3637.76	3637.76	8.70	8.70	130.90	1139.19
7170.05-04	Spokane River, WA	LL3-0.5m	1	7/22/2015	418	0.1100%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	11	4.00	44	10003.85	40015.39	23.93	95.73	1000.00	95730.60
7170.05-04	Spokane River, WA	LL3-0.5m	1	7/22/2015	418	0.1100%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	35	1.00	35	31830.42	31830.42	76.15	76.15	3082.95	234764.61
7170.05-04	Spokane River, WA	LL3-0.5m	1	7/22/2015	418	0.1100%	Elakatothrix sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	Elakatothrix	sp.	1	2.00	2	909.44	1818.88	2.18	4.35	137.84	599.78
7170.05-04	Spokane River, WA	LL3-0.5m	1	7/22/2015	418	0.1100%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	3	1.00	3	2728.32	2728.32	6.53	6.53	2332.63	15225.30
7170.05-04	Spokane River, WA	LL3-0.5m	1	7/22/2015	418	0.1100%	Gomphonema spp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	spp.	5	1.00	5	4547.20	4547.20	10.88	10.88	890.64	9688.83
7170.05-04	Spokane River, WA	LL3-0.5m	1	7/22/2015	418	0.1100%	Navicula spp.	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	Navicula	spp.	4	1.00	4	3637.76	3637.76	8.70	8.70	1060.29	9227.46
7170.05-04	Spokane River, WA	LL3-0.5m	1	7/22/2015	418	0.1100%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	29	1.31	38	26373.78	34558.75	63.10	82.68	5445.43	450208.45
7170.05-04	Spokane River, WA	LL3-0.5m	1	7/22/2015	418	0.1100%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	2	24.00	48	1818.88	43653.15	4.35	104.43	330.00	34463.02
7170.05-04	Spokane River, WA	LL3-0.5m	1	7/22/2015	418	0.1100%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	121	8.15	986	110042.32	896708.53	263.26	2145.24	1608.81	3451275.39
7170.05-04	Spokane River, WA	LL3-0.5m	1	7/22/2015	418	0.1100%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	43	6.00	258	39105.95	234635.70	93.55	561.33	321.56	180498.28
7170.05-04	Spokane River, WA	LL3-0.5m	1	7/22/2015	418	0.1100%	Tetraedron sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Chlorococcaceae	Tetraedron	sp.	2	1.00	2	1818.88	1818.88	4.35	4.35	320.00	1392.45

Avista Phytoplankton 2015 (Batch 5 & 6)
Taxa Report and Biovolumes

EcoAnalysts, Inc.

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in sample received)	Cells per mL (in sample received)	AVG_BV (μ^3)	Biovolume (μ^3/mL)
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Amphora sp.	Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	Amphora	sp.	1	1.00	1	4514.40	4514.40	8.16	8.16	1512.00	12343.16
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Anabaena sp.	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	Anabaena	sp.	3	19.00	57	13543.19	257320.62	24.49	465.32	33.51	15592.79
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	33	36.36	1200	148975.10	5417276.23	269.39	9796.16	8.18	80142.38
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	4	4.75	19	18057.59	85773.54	32.65	155.11	846.66	131321.77
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Ceratium sp.	Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	Ceratium	sp.	2	1.00	2	9028.79	9028.79	16.33	16.33	152907.60	2496512.04
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Chroococcus spp.	Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	Chroococcus	spp.	6	8.00	48	27086.38	216691.05	48.98	391.85	14.14	5539.53
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	5	1.00	5	22571.98	22571.98	40.82	40.82	134.63	5495.24
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Cosmarium spp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Cosmarium	spp.	3	1.00	3	13543.19	13543.19	24.49	24.49	3732.21	91403.36
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	13	4.00	52	58687.16	234748.64	106.13	424.50	512.00	217344.13
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	24	1.00	24	108345.52	108345.52	195.92	195.92	4241.15	830939.64
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Fragilaria sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	sp.	5	7.40	37	22571.98	167032.68	40.82	302.05	1759.29	531391.07
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Gonium sp.	Chlorophyta	Chlorophyceae	Volvocales	Volvocaceae	Gonium	sp.	1	4.00	4	4514.40	18057.59	8.16	32.65	381.70	12464.11
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Nitzschia spp.	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	Nitzschia	spp.	2	1.00	2	9028.79	9028.79	16.33	16.33	923.63	15080.01
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	5	3.60	18	22571.98	81259.14	40.82	146.94	4536.46	666598.29
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Pandorina sp.	Chlorophyta	Chlorophyceae	Volvocales	Volvocaceae	Pandorina	sp.	2	16.00	32	9028.79	144460.70	16.33	261.23	333.53	87128.87
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	3	19.33	58	13543.19	261835.02	24.49	473.48	720.00	340906.35
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Planktolyngbya spp.	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	Planktolyngbya	spp.	3	21.33	64	13543.19	288921.40	24.49	522.46	9.43	4924.20
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	169	7.10	1200	762933.07	5417276.23	1379.63	9796.16	1785.37	17489741.95
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	26	6.38	166	117374.32	749389.88	212.25	1355.14	381.70	517260.60
7170.05-05	Spokane River, WA	LL4-0.5m	1	7/22/2015	553	0.0222%	Woronichinia sp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	sp.	5	26.00	130	22571.98	586871.59	40.82	1061.25	6.28	6667.84
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Amphora sp.	Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	Amphora	sp.	4	1.00	4	20561.32	20561.32	37.25	37.25	4440.00	165384.54
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Anabaena sp.	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	Anabaena	sp.	19	31.58	600	97666.27	3084198.15	176.93	5587.32	381.70	2132700.67
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	3	9.00	27	15420.99	138788.92	27.94	251.43	763.41	191942.81
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	1	1.00	1	5140.33	5140.33	9.31	9.31	1744.63	16246.34
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Ceratium sp.	Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	Ceratium	sp.	9	1.00	9	46262.97	46262.97	83.81	83.81	503675.84	42212937.49
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Chroococcus spp.	Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	Chroococcus	spp.	4	4.50	18	20561.32	92525.94	37.25	167.62	65.45	10970.69
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Cosmarium sp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Cosmarium	sp.	1	1.00	1	5140.33	5140.33	9.31	9.31	6924.59	64483.15
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	8	4.50	36	41122.64	185051.89	74.50	335.24	857.38	287425.48
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	17	1.00	17	87385.61	87385.61	158.31	158.31	4914.50	778000.77
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Cyclotella spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Cyclotella	spp.	2	1.00	2	10280.66	10280.66	18.62	18.62	5428.67	101105.68
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Cymatopleura sp.	Bacillariophyta	Bacillariophyceae	Pennales	Surirellaceae	Cymatopleura	sp.	2	1.00	2	10280.66	10280.66	18.62	18.62	20027.65	373002.72
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Desmidium sp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Desmidium	sp.	1	33.00	33	5140.33	169630.90	9.31	307.30	1858.25	571045.21
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Elakatothrix sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	Elakatothrix	sp.	3	4.00	12	15420.99	61683.96	27.94	111.75	307.88	34404.01
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	8	14.38	115	41122.64	591137.98	74.50	1070.90	1720.02	1841975.23
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Gomphonema spp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	spp.	3	1.00	3	15420.99	15420.99	27.94	27.94	1253.50	35018.36
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Melosira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	Melosira	sp.	1	1.00	1	5140.33	5140.33	9.31	9.31	9110.62	84839.84
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Microcystis sp.	Cyanophyta	Myxophyceae	Chroococcales	Microcystaceae	Microcystis	sp.	10	600.00	6000	51403.30	30841981.49	93.12	55873.15	179.59	10034483.38
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Navicula spp.	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	Navicula	spp.	3	1.00	3	15420.99	15420.99	27.94	27.94	31855.75	889940.63
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	12	1.67	20	61683.96	102806.60	111.75	186.24	3082.95	574180.48
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Pandorina sp.	Chlorophyta	Chlorophyceae	Volvocales	Volvocaceae	Pandorina	sp.	1	16.00	16	5140.33	82245.28	9.31	149.00	721.00	107424.86
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	24.00	24	5140.33	123367.93	9.31	223.49	400.00	89397.05
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Phormidium sp. Kützing ex Gomont	Cyanophyta	Myxophyceae	Oscillatoriales	Phormidiaceae	Phormidium	sp.	1	19.00	19	5140.33	97666.27	9.31	176.93	28.27	5002.57
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	162	10.19	1650	832733.50	8481544.91	1508.58	15365.12	1409.21	21652735.75
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	8	8.00	64	41122.64	328981.14	74.50	595.98	87.11	51918.23
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Staurastrum sp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Staurastrum	sp.	1	1.00	1	5140.33	5140.33	9.31	9.31	18027.51	167875.61
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Synedra sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Synedra	sp.	1	1.00	1	5140.33	5140.33	9.31	9.31	24912.83	231993.07
7170.05-06	Spokane River, WA	LL5-0.5m	1	7/22/2015	552	0.0195%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	13	27.69	360	66824.29	1850518.89	121.06	3352.39	8.38	28086.32

Avista Phytoplankton 2015 (Batch 5 & 6)
Taxa Report and Biovolumes

EcoAnalysts, Inc.

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in sample received)	Cells per mL (in sample received)	AVG_BV (μ^3)	Biovolume (μ^3/mL)
7170.06-01	Spokane River, WA	LL0-0.5m	1	8/4/2015	511	0.4371%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	38	18.42	700	8693.44	160142.30	17.01	313.39	8.18	2563.84
7170.06-01	Spokane River, WA	LL0-0.5m	1	8/4/2015	511	0.4371%	Chroococcus spp.	Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	Chroococcus	spp.	2	8.00	16	457.55	3660.40	0.90	7.16	22.45	160.81
7170.06-01	Spokane River, WA	LL0-0.5m	1	8/4/2015	511	0.4371%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	125	4.40	550	28596.84	125826.09	55.96	246.24	644.90	158796.96
7170.06-01	Spokane River, WA	LL0-0.5m	1	8/4/2015	511	0.4371%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	3	1.00	3	686.32	686.32	1.34	1.34	1357.17	1822.81
7170.06-01	Spokane River, WA	LL0-0.5m	1	8/4/2015	511	0.4371%	Cyclotella spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Cyclotella	spp.	1	1.00	1	228.77	228.77	0.45	0.45	6902.08	3090.06
7170.06-01	Spokane River, WA	LL0-0.5m	1	8/4/2015	511	0.4371%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	15	2.00	30	3431.62	6863.24	6.72	13.43	5292.54	71084.06
7170.06-01	Spokane River, WA	LL0-0.5m	1	8/4/2015	511	0.4371%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	3	12.00	36	686.32	8235.89	1.34	16.12	546.00	8799.99
7170.06-01	Spokane River, WA	LL0-0.5m	1	8/4/2015	511	0.4371%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	103	9.71	1000	23563.80	228774.72	46.11	447.70	763.41	341777.34
7170.06-01	Spokane River, WA	LL0-0.5m	1	8/4/2015	511	0.4371%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	13	8.00	104	2974.07	23792.57	5.82	46.56	179.59	8362.04
7170.06-02	Spokane River, WA	LL1-0.5m	1	8/4/2015	550	0.2379%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	39	23.08	900	16392.31	378284.15	29.80	687.79	8.18	5626.80
7170.06-02	Spokane River, WA	LL1-0.5m	1	8/4/2015	550	0.2379%	Chroococcus spp.	Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	Chroococcus	spp.	9	4.00	36	3782.84	15131.37	6.88	27.51	14.14	388.93
7170.06-02	Spokane River, WA	LL1-0.5m	1	8/4/2015	550	0.2379%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	101	4.46	450	42451.89	189142.07	77.19	343.89	765.48	263242.78
7170.06-02	Spokane River, WA	LL1-0.5m	1	8/4/2015	550	0.2379%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	17	1.00	17	7145.37	7145.37	12.99	12.99	9650.97	125381.36
7170.06-02	Spokane River, WA	LL1-0.5m	1	8/4/2015	550	0.2379%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	94	8.30	780	39509.68	327846.26	71.84	596.08	994.84	593007.13
7170.06-02	Spokane River, WA	LL1-0.5m	1	8/4/2015	550	0.2379%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	36	8.33	300	15131.37	126094.72	27.51	229.26	179.59	41174.28
7170.06-02	Spokane River, WA	LL1-0.5m	1	8/4/2015	550	0.2379%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	3	20.00	60	1260.95	25218.94	2.29	45.85	18.85	864.32
7170.06-03	Spokane River, WA	LL2-0.5m	1	8/4/2015	549	0.2147%	Anabaena sp.	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	Anabaena	sp.	1	28.00	28	465.78	13041.97	0.85	23.76	523.60	12438.55
7170.06-03	Spokane River, WA	LL2-0.5m	1	8/4/2015	549	0.2147%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	12	50.00	600	5589.41	279470.75	10.18	509.05	8.18	4164.57
7170.06-03	Spokane River, WA	LL2-0.5m	1	8/4/2015	549	0.2147%	Chroococcus spp.	Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	Chroococcus	spp.	4	5.50	22	1863.14	10247.26	3.39	18.67	14.14	263.87
7170.06-03	Spokane River, WA	LL2-0.5m	1	8/4/2015	549	0.2147%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	77	4.68	360	35865.41	167682.45	65.33	305.43	729.00	222660.30
7170.06-03	Spokane River, WA	LL2-0.5m	1	8/4/2015	549	0.2147%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	9	2.67	24	4192.06	11178.83	7.64	20.36	2680.83	54587.43
7170.06-03	Spokane River, WA	LL2-0.5m	1	8/4/2015	549	0.2147%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	3	24.00	72	1397.35	33536.49	2.55	61.09	630.00	38484.50
7170.06-03	Spokane River, WA	LL2-0.5m	1	8/4/2015	549	0.2147%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	160	7.75	1240	74525.53	577572.88	135.75	1052.05	1165.74	1226411.74
7170.06-03	Spokane River, WA	LL2-0.5m	1	8/4/2015	549	0.2147%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	37	7.19	266	17234.03	123898.70	31.39	225.68	321.56	72568.75
7170.06-03	Spokane River, WA	LL2-0.5m	1	8/4/2015	549	0.2147%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	4	20.00	80	1863.14	37262.77	3.39	67.87	18.85	1279.42
7170.06-04	Spokane River, WA	LL3-0.5m	1	8/5/2015	560	0.1499%	Anabaena sp.	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	Anabaena	sp.	2	19.50	39	1334.35	26019.84	2.38	46.46	696.91	32381.23
7170.06-04	Spokane River, WA	LL3-0.5m	1	8/5/2015	560	0.1499%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	7	40.14	281	4670.23	187476.29	8.34	334.78	8.18	2738.83
7170.06-04	Spokane River, WA	LL3-0.5m	1	8/5/2015	560	0.1499%	Asterionella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Asterionella	sp.	1	1.00	1	667.18	667.18	1.19	1.19	753.98	898.28
7170.06-04	Spokane River, WA	LL3-0.5m	1	8/5/2015	560	0.1499%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	2	4.50	9	1334.35	6004.58	2.38	10.72	75.40	808.45
7170.06-04	Spokane River, WA	LL3-0.5m	1	8/5/2015	560	0.1499%	Chroococcus sp.	Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	Chroococcus	sp.	3	8.00	24	2001.53	16012.21	3.57	28.59	22.45	641.89
7170.06-04	Spokane River, WA	LL3-0.5m	1	8/5/2015	560	0.1499%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	43	4.65	200	28688.54	133435.08	51.23	238.28	729.00	173703.88
7170.06-04	Spokane River, WA	LL3-0.5m	1	8/5/2015	560	0.1499%	Cyclotella spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Cyclotella	spp.	2	1.00	2	1334.35	1334.35	2.38	2.38	1407.43	3353.59
7170.06-04	Spokane River, WA	LL3-0.5m	1	8/5/2015	560	0.1499%	Gomphonema sp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	sp.	1	1.00	1	667.18	667.18	1.19	1.19	2403.32	2863.28
7170.06-04	Spokane River, WA	LL3-0.5m	1	8/5/2015	560	0.1499%	Microcystis sp.	Cyanophyta	Myxophyceae	Chroococcales	Microcystaceae	Microcystis	sp.	7	50.00	350	4670.23	233511.39	8.34	416.98	87.11	36325.20
7170.06-04	Spokane River, WA	LL3-0.5m	1	8/5/2015	560	0.1499%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	20	2.00	40	13343.51	26687.02	23.83	47.66	4536.46	216186.75
7170.06-04	Spokane River, WA	LL3-0.5m	1	8/5/2015	560	0.1499%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	24.00	24	667.18	16012.21	1.19	28.59	585.00	16727.04
7170.06-04	Spokane River, WA	LL3-0.5m	1	8/5/2015	560	0.1499%	Planktolyngbya spp.	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	Planktolyngbya	spp.	4	12.50	50	2668.70	33358.77	4.77	59.57	6.28	374.27
7170.06-04	Spokane River, WA	LL3-0.5m	1	8/5/2015	560	0.1499%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	176	8.52	1500	117422.87	1000763.10	209.68	1787.08	844.15	1508553.87
7170.06-04	Spokane River, WA	LL3-0.5m	1	8/5/2015	560	0.1499%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	36	7.44	268	24018.31	178803.01	42.89	319.29	321.56	102669.64
7170.06-04	Spokane River, WA	LL3-0.5m	1	8/5/2015	560	0.1499%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	6	23.33	140	4003.05	93404.56	7.15	166.79	18.85	3144.06

Avista Phytoplankton 2015 (Batch 5 & 6)
Taxa Report and Biovolumes

EcoAnalysts, Inc.

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in sample received)	Cells per mL (in sample received)	AVG_BV (μ^3)	Biovolume (μ^3/mL)
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Amphora sp.	Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	Amphora	sp.	1	1.00	1	713.72	713.72	1.30	1.30	3196.00	4162.47
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Anabaena sp.	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	Anabaena	sp.	10	24.00	240	7137.15	171291.67	13.02	312.58	523.60	163664.50
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	5	30.00	150	3568.58	107057.29	6.51	195.36	8.18	1598.24
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	1	23.00	23	713.72	16415.45	1.30	29.96	274.89	8234.36
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Botryococcus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Botryococcus	sp.	1	17.00	17	713.72	12133.16	1.30	22.14	58.64	1298.40
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Chroococcus spp.	Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	Chroococcus	spp.	2	4.00	8	1427.43	5709.72	2.60	10.42	22.45	233.90
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	3	4.00	12	2141.15	8564.58	3.91	15.63	343.00	5360.68
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Cyclotella spp.	Bacillariophyta	Bacillariophyceae	Centrales	Stephanodiscaceae	Cyclotella	spp.	1	1.00	1	713.72	713.72	1.30	1.30	1237.00	1611.07
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Desmidium sp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Desmidium	sp.	1	18.00	18	713.72	12846.88	1.30	23.44	1021.02	23935.93
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Elakatothrix sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	Elakatothrix	sp.	2	3.00	6	1427.43	4282.29	2.60	7.81	213.63	1669.37
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	10	4.70	47	7137.15	33544.62	13.02	61.21	1099.56	67306.97
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Gomphonema sp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	sp.	1	1.00	1	713.72	713.72	1.30	1.30	584.34	761.04
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	8	2.00	16	5709.72	11419.44	10.42	20.84	1281.77	26710.04
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	24.00	24	713.72	17129.17	1.30	31.26	192.00	6001.46
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	211	8.06	1700	150593.93	1213315.99	274.81	2214.08	813.78	1801768.04
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	36	8.00	288	25693.75	205550.00	46.89	375.09	113.10	42421.69
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Staurastrum sp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Staurastrum	sp.	1	1.00	1	713.72	713.72	1.30	1.30	5383.90	7012.00
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Tetraedron sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Chlorococcaceae	Tetraedron	sp.	1	1.00	1	713.72	713.72	1.30	1.30	108.00	140.66
7170.06-05	Spokane River, WA	LL4-0.5m	1	8/5/2015	548	0.1401%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	11	31.82	350	7850.87	249800.35	14.33	455.84	18.85	8592.59
7170.06-06	Spokane River, WA	LL5-0.5m	1	8/5/2015	541	0.0813%	Amphora sp.	Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	Amphora	sp.	2	1.00	2	2461.33	2461.33	4.55	4.55	1127.00	5127.40
7170.06-06	Spokane River, WA	LL5-0.5m	1	8/5/2015	541	0.0813%	Anabaena sp.	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	Anabaena	sp.	12	21.83	262	14768.00	322434.65	27.30	596.00	696.91	415356.62
7170.06-06	Spokane River, WA	LL5-0.5m	1	8/5/2015	541	0.0813%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	1	12.00	12	1230.67	14768.00	2.27	27.30	314.16	8575.79
7170.06-06	Spokane River, WA	LL5-0.5m	1	8/5/2015	541	0.0813%	Ceratium sp.	Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	Ceratium	sp.	2	1.00	2	2461.33	2461.33	4.55	4.55	441786.47	2009951.40
7170.06-06	Spokane River, WA	LL5-0.5m	1	8/5/2015	541	0.0813%	Chlorella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Chlorella	sp.	126	1.00	126	155063.99	155063.99	286.62	286.62	59.85	17153.75
7170.06-06	Spokane River, WA	LL5-0.5m	1	8/5/2015	541	0.0813%	Chroococcus spp.	Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	Chroococcus	spp.	7	4.00	28	8614.67	34458.67	15.92	63.69	33.51	2134.40
7170.06-06	Spokane River, WA	LL5-0.5m	1	8/5/2015	541	0.0813%	Cocconeis sp.	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Cocconeis	sp.	1	1.00	1	1230.67	1230.67	2.27	2.27	2276.08	5177.64
7170.06-06	Spokane River, WA	LL5-0.5m	1	8/5/2015	541	0.0813%	Desmidium sp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Desmidium	sp.	1	22.00	22	1230.67	27074.67	2.27	50.05	1858.25	92997.32
7170.06-06	Spokane River, WA	LL5-0.5m	1	8/5/2015	541	0.0813%	Fragilaria sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	sp.	2	14.50	29	2461.33	35689.33	4.55	65.97	942.48	62174.51
7170.06-06	Spokane River, WA	LL5-0.5m	1	8/5/2015	541	0.0813%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	8	2.00	16	9845.33	19690.67	18.20	36.40	890.12	32397.44
7170.06-06	Spokane River, WA	LL5-0.5m	1	8/5/2015	541	0.0813%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	24.00	24	1230.67	29536.00	2.27	54.60	504.00	27515.98
7170.06-06	Spokane River, WA	LL5-0.5m	1	8/5/2015	541	0.0813%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	101	8.91	900	124297.33	1107599.95	229.75	2047.32	1658.76	3396014.05
7170.06-06	Spokane River, WA	LL5-0.5m	1	8/5/2015	541	0.0813%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	19	8.00	152	23382.67	187061.32	43.22	345.77	220.89	76378.07
7170.06-06	Spokane River, WA	LL5-0.5m	1	8/5/2015	541	0.0813%	Staurastrum sp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Staurastrum	sp.	3	1.00	3	3692.00	3692.00	6.82	6.82	63813.60	435489.47
7170.06-06	Spokane River, WA	LL5-0.5m	1	8/5/2015	541	0.0813%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	18	22.22	400	22152.00	492266.64	40.95	909.92	11.45	10422.22

Avista Phytoplankton 2015 (Batch's 7-10)
Taxa Report with Biovolumes

EcoAnalysts, Inc.
LIFE IN WATER

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in sample received)	Cells per mL (in sample received)	AVG_BV (µ³)	Biovolume (µ³/mL)
7170.07-01	Spokane River, WA	LL0-0.5m	1	8/24/2015	250	0.1116%	Achnanthes sp. Bory	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Achnanthes	sp.	1	1.00	1	896	896	4	4	541.93	1942.90
7170.07-01	Spokane River, WA	LL0-0.5m	1	8/24/2015	250	0.1116%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	5	20.00	100	4481	89630	18	359	8.18	2933.04
7170.07-01	Spokane River, WA	LL0-0.5m	1	8/24/2015	250	0.1116%	Asterionella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Asterionella	sp.	2	1.00	2	1793	1793	7	7	2356.19	16894.78
7170.07-01	Spokane River, WA	LL0-0.5m	1	8/24/2015	250	0.1116%	Chroococcus spp.	Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	Chroococcus	spp.	3	4.00	12	2689	10756	11	43	14.14	608.21
7170.07-01	Spokane River, WA	LL0-0.5m	1	8/24/2015	250	0.1116%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	8	1.00	8	7170	7170	29	29	359.19	10302.07
7170.07-01	Spokane River, WA	LL0-0.5m	1	8/24/2015	250	0.1116%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	18	4.00	72	16133	64533	65	258	343.00	88539.73
7170.07-01	Spokane River, WA	LL0-0.5m	1	8/24/2015	250	0.1116%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	13	1.00	13	11652	11652	47	47	2035.23	94856.70
7170.07-01	Spokane River, WA	LL0-0.5m	1	8/24/2015	250	0.1116%	Gomphonema spp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	spp.	2	1.00	2	1793	1793	7	7	1822.12	13065.30
7170.07-01	Spokane River, WA	LL0-0.5m	1	8/24/2015	250	0.1116%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	3	1.00	3	2689	2689	11	11	142.55	1533.20
7170.07-01	Spokane River, WA	LL0-0.5m	1	8/24/2015	250	0.1116%	Navicula spp.	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	Navicula	spp.	2	1.00	2	1793	1793	7	7	3067.77	21997.01
7170.07-01	Spokane River, WA	LL0-0.5m	1	8/24/2015	250	0.1116%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	17	4.12	70	15237	62741	61	251	1592.79	399730.53
7170.07-01	Spokane River, WA	LL0-0.5m	1	8/24/2015	250	0.1116%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	183	8.20	1500	164022	1344444	656	5378	502.66	2703166.79
7170.07-01	Spokane River, WA	LL0-0.5m	1	8/24/2015	250	0.1116%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	17	8.00	136	15237	121896	61	488	143.79	70111.33
7170.07-01	Spokane River, WA	LL0-0.5m	1	8/24/2015	250	0.1116%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	28	30.00	840	25096	752889	100	3012	18.85	56767.82
7170.07-02	Spokane River, WA	LL1-0.5m	1	8/24/2015	250	0.0478%	Ceratium sp.	Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	Ceratium	sp.	3	1.00	3	6274	6274	25	25	865901.48	21730919.18
7170.07-02	Spokane River, WA	LL1-0.5m	1	8/24/2015	250	0.0478%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	4	1.00	4	8365	8365	33	33	307.88	10302.06
7170.07-02	Spokane River, WA	LL1-0.5m	1	8/24/2015	250	0.0478%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	67	4.00	268	140121	560484	560	2242	512.00	1147871.09
7170.07-02	Spokane River, WA	LL1-0.5m	1	8/24/2015	250	0.0478%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	67	1.00	67	140121	140121	560	560	4410.80	2472180.28
7170.07-02	Spokane River, WA	LL1-0.5m	1	8/24/2015	250	0.0478%	Fragilaria sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	sp.	1	7.00	7	2091	14640	8	59	1272.35	74506.01
7170.07-02	Spokane River, WA	LL1-0.5m	1	8/24/2015	250	0.0478%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	6	3.33	20	12548	41827	50	167	3082.95	515804.16
7170.07-02	Spokane River, WA	LL1-0.5m	1	8/24/2015	250	0.0478%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	2	24.00	48	4183	100385	17	402	2500.00	1003851.81
7170.07-02	Spokane River, WA	LL1-0.5m	1	8/24/2015	250	0.0478%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	120	12.00	1440	250963	3011555	1004	12046	1734.16	20890063.91
7170.07-02	Spokane River, WA	LL1-0.5m	1	8/24/2015	250	0.0478%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	8	6.00	48	16731	100385	67	402	143.79	57738.75
7170.07-02	Spokane River, WA	LL1-0.5m	1	8/24/2015	250	0.0478%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	29	31.03	900	60649	1882222	243	7529	14.14	106435.90
7170.07-03	Spokane River, WA	LL2-0.5m	1	8/24/2015	250	0.0319%	Amphora sp.	Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	Amphora	sp.	3	1.00	3	9411	9411	38	38	2376.00	89443.20
7170.07-03	Spokane River, WA	LL2-0.5m	1	8/24/2015	250	0.0319%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	16	1.00	16	50193	50193	201	201	435.63	87462.40
7170.07-03	Spokane River, WA	LL2-0.5m	1	8/24/2015	250	0.0319%	Cocconeis sp.	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Cocconeis	sp.	1	1.00	1	3137	3137	13	13	785.40	9855.29
7170.07-03	Spokane River, WA	LL2-0.5m	1	8/24/2015	250	0.0319%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	58	4.00	232	181948	727793	728	2911	512.00	1490519.17
7170.07-03	Spokane River, WA	LL2-0.5m	1	8/24/2015	250	0.0319%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	34	1.00	34	106659	106659	427	427	3216.99	1372487.46
7170.07-03	Spokane River, WA	LL2-0.5m	1	8/24/2015	250	0.0319%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	2	5.50	11	6274	34507	25	138	1413.72	195134.83
7170.07-03	Spokane River, WA	LL2-0.5m	1	8/24/2015	250	0.0319%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	6	2.67	16	18822	50193	75	201	1949.88	391478.52
7170.07-03	Spokane River, WA	LL2-0.5m	1	8/24/2015	250	0.0319%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	111	12.00	1332	348211	4178533	1393	16714	1583.89	26473280.81
7170.07-03	Spokane River, WA	LL2-0.5m	1	8/24/2015	250	0.0319%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	37	6.00	222	116070	696422	464	2786	179.59	500292.99
7170.07-03	Spokane River, WA	LL2-0.5m	1	8/24/2015	250	0.0319%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	51	30.00	1530	159989	4799666	640	19199	18.85	361894.85
7170.07-03	Spokane River, WA	LL2-0.5m	1	8/24/2015	250	0.0319%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	24.00	24	3137	75289	13	301	672.00	202376.53

Avista Phytoplankton 2015 (Batch's 7-10)
Taxa Report with Biovolumes

EcoAnalysts, Inc.
LIFE IN WATER

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in sample received)	Cells per mL (in sample received)	AVG_BV (µ³)	Biovolume (µ³/mL)
7170.07-04	Spokane River, WA	LL3-0.5m	1	8/25/2015	250	0.0319%	Anabaena sp.	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	Anabaena	sp.	13	21.54	280	40781	878370	163	3513	381.70	1341109.89
7170.07-04	Spokane River, WA	LL3-0.5m	1	8/25/2015	250	0.0319%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	6	10.00	60	18822	188222	75	753	2513.27	1892216.00
7170.07-04	Spokane River, WA	LL3-0.5m	1	8/25/2015	250	0.0319%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	12	1.00	12	37644	37644	151	151	307.88	46359.28
7170.07-04	Spokane River, WA	LL3-0.5m	1	8/25/2015	250	0.0319%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	33	8.00	264	103522	828178	414	3313	729.00	2414966.31
7170.07-04	Spokane River, WA	LL3-0.5m	1	8/25/2015	250	0.0319%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	50	1.00	50	156852	156852	627	627	3769.91	2365270.00
7170.07-04	Spokane River, WA	LL3-0.5m	1	8/25/2015	250	0.0319%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	3	4.00	12	9411	37644	38	151	1303.76	196317.43
7170.07-04	Spokane River, WA	LL3-0.5m	1	8/25/2015	250	0.0319%	Gomphonema spp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	spp.	3	1.00	3	9411	9411	38	38	508.94	19158.69
7170.07-04	Spokane River, WA	LL3-0.5m	1	8/25/2015	250	0.0319%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	2	24.00	48	6274	150578	25	602	1020.00	614357.31
7170.07-04	Spokane River, WA	LL3-0.5m	1	8/25/2015	250	0.0319%	Planktolyngbya spp.	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	Planktolyngbya	spp.	10	12.00	120	31370	376444	125	1506	6.28	9460.80
7170.07-04	Spokane River, WA	LL3-0.5m	1	8/25/2015	250	0.0319%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	121	12.00	1452	379581	4554978	1518	18220	1204.28	21941819.08
7170.07-04	Spokane River, WA	LL3-0.5m	1	8/25/2015	250	0.0319%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	24	6.67	160	75289	501926	301	2008	179.59	360571.53
7170.07-04	Spokane River, WA	LL3-0.5m	1	8/25/2015	250	0.0319%	Staurastrum sp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Staurastrum	sp.	1	1.00	1	3137	3137	13	13	23816.41	298851.88
7170.07-04	Spokane River, WA	LL3-0.5m	1	8/25/2015	250	0.0319%	Tetraedron sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Chlorococcaceae	Tetraedron	sp.	3	1.00	3	9411	9411	38	38	2016.00	75891.20
7170.07-04	Spokane River, WA	LL3-0.5m	1	8/25/2015	250	0.0319%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	24	31.67	760	75289	2384148	301	9537	18.85	179764.76
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Achnanthes spp. Bory	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Achnanthes	spp.	4	1.00	4	4183	4183	17	17	358.14	5992.02
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Amphora sp.	Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	Amphora	sp.	3	1.00	3	3137	3137	13	13	630.00	7905.33
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Anabaena sp.	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	Anabaena	sp.	5	30.00	150	5228	156852	21	627	904.78	567665.03
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	5	30.00	150	5228	156852	21	627	8.18	5132.82
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	20	5.00	100	20914	104568	84	418	1154.54	482909.19
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	53	1.00	53	55421	55421	222	222	1681.28	372711.89
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Ceratium sp.	Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	Ceratium	sp.	1	1.00	1	1046	1046	4	4	60082.96	251309.95
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Chlamydomonas sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Chlamydomonas	sp.	12	1.00	12	12548	12548	50	50	523.60	26280.79
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Chlorella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Chlorella	sp.	9	1.00	9	9411	9411	38	38	65.45	2463.83
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	3	1.00	3	3137	3137	13	13	333.53	4185.21
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	9	4.00	36	9411	37644	38	151	421.88	63525.00
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	38	1.00	38	39736	39736	159	159	3619.12	575233.73
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	21	2.29	48	21959	50193	88	201	1055.58	211928.18
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Gomphonema spp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	spp.	5	1.00	5	5228	5228	21	21	1979.20	41392.22
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Monoraphidium spp.	Chlorophyta	Chlorophyceae	Sphaeropleales	Selenastraceae	Monoraphidium	spp.	7	1.00	7	7320	7320	29	29	28.27	827.83
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Nitzschia spp.	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	Nitzschia	spp.	4	1.00	4	4183	4183	17	17	1357.17	22706.59
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	2	1.00	2	2091	2091	8	8	4410.80	36898.21
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Planktolyngbya spp.	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	Planktolyngbya	spp.	20	8.00	160	20914	167309	84	669	9.43	6307.54
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	83	3.25	270	86791	282333	347	1129	359.19	405644.10
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	4	8.00	32	4183	33462	17	134	65.45	8760.28
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Trachelomonas spp.	Euglenophyta	Euglenophyceae	Euglenales	Euglenaceae	Trachelomonas	spp.	2	1.00	2	2091	2091	8	8	6370.63	53293.04
7170.07-05	Spokane River, WA	LL4-0.5m	1	8/25/2015	250	0.0956%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	4	40.00	160	4183	167309	17	669	6.28	4204.80
7170.07-06	Spokane River, WA	LL5-0.5m	1	8/25/2015	250	0.0797%	Amphora sp.	Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	Amphora	sp.	1	1.00	1	1255	1255	5	5	1568.00	7870.20
7170.07-06	Spokane River, WA	LL5-0.5m	1	8/25/2015	250	0.0797%	Anabaena sp.	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	Anabaena	sp.	30	20.00	600	37644	752889	151	3012	696.91	2098783.10
7170.07-06	Spokane River, WA	LL5-0.5m	1	8/25/2015	250	0.0797%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	15	9.33	140	18822	175674	75	703	961.33	675520.90
7170.07-06	Spokane River, WA	LL5-0.5m	1	8/25/2015	250	0.0797%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	68	1.00	68	85327	85327	341	341	886.98	302733.44
7170.07-06	Spokane River, WA	LL5-0.5m	1	8/25/2015	250	0.0797%	Chlorella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Chlorella	sp.	43	1.00	43	53957	53957	216	216	65.45	14125.95
7170.07-06	Spokane River, WA	LL5-0.5m	1	8/25/2015	250	0.0797%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	3	1.00	3	3764	3764	15	15	282.22	4249.61
7170.07-06	Spokane River, WA	LL5-0.5m	1	8/25/2015	250	0.0797%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	8	1.00	8	10039	10039	40	40	3783.00	151902.90
7170.07-06	Spokane River, WA	LL5-0.5m	1	8/25/2015	250	0.0797%	Desmidium sp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Desmidium	sp.	1	27.00	27	1255	33880	5	136	572.56	77592.65
7170.07-06	Spokane River, WA	LL5-0.5m	1	8/25/2015	250	0.0797%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	10	4.80	48	12548	60231	50	241	1068.14	257341.51
7170.07-06	Spokane River, WA	LL5-0.5m	1	8/25/2015	250	0.0797%	Monoraphidium spp.	Chlorophyta	Chlorophyceae	Sphaeropleales	Selenastraceae	Monoraphidium	spp.	12	1.00	12	15058	15058	60	60	50.27	3027.52
7170.07-06	Spokane River, WA	LL5-0.5m	1	8/25/2015	250	0.0797%	Nitzschia spp.	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	Nitzschia	spp.	3	1.00	3	3764	3764	15	15	637.74	9602.99
7170.07-06	Spokane River, WA	LL5-0.5m	1	8/25/2015	250	0.0797%	Planktolyngbya sp.	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	Planktolyngbya	sp.	54	6.48	350	67760	439185	271	1757	6.28	11037.60
7170.07-06	Spokane River, WA	LL5-0.5m	1	8/25/2015	250	0.0797%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	29	8.28	240	36390	301156	146	1205	975.47	1175066.77
7170.07-06	Spokane River, WA	LL5-0.5m	1	8/25/2015	250	0.0797%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	28	32.14	900	35135	1129333	141	4517	18.85	85151.73

Avista Phytoplankton 2015 (Batch's 7-10)
Taxa Report with Biovolumes

EcoAnalysts, Inc.
LIFE IN WATER

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in sample received)	Cells per mL (in sample received)	AVG_BV (µ³)	Biovolume (µ³/mL)
7170.08-01	Spokane River, WA	LL0-0.5m	1	9/8/2015	500	0.0620%	Amphora sp.	Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	Amphora	sp.	1	1.00	1	1613	1613	3	3	1188.00	3833.28
7170.08-01	Spokane River, WA	LL0-0.5m	1	9/8/2015	500	0.0620%	Asterionella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Asterionella	sp.	1	1.00	1	1613	1613	3	3	895.35	2889.01
7170.08-01	Spokane River, WA	LL0-0.5m	1	9/8/2015	500	0.0620%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	1	11.00	11	1613	17747	3	35	1231.50	43710.18
7170.08-01	Spokane River, WA	LL0-0.5m	1	9/8/2015	500	0.0620%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	2	1.00	2	3227	3227	6	6	368.61	2378.79
7170.08-01	Spokane River, WA	LL0-0.5m	1	9/8/2015	500	0.0620%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	17	4.00	68	27427	109707	55	219	274.63	60256.39
7170.08-01	Spokane River, WA	LL0-0.5m	1	9/8/2015	500	0.0620%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	43	1.00	43	69373	69373	139	139	1809.56	251070.00
7170.08-01	Spokane River, WA	LL0-0.5m	1	9/8/2015	500	0.0620%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	16	4.75	76	25813	122613	52	245	1941.50	476108.55
7170.08-01	Spokane River, WA	LL0-0.5m	1	9/8/2015	500	0.0620%	Gomphonema spp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	spp.	2	1.00	2	3227	3227	6	6	471.24	3041.06
7170.08-01	Spokane River, WA	LL0-0.5m	1	9/8/2015	500	0.0620%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	4	1.00	4	6453	6453	13	13	126.71	1635.42
7170.08-01	Spokane River, WA	LL0-0.5m	1	9/8/2015	500	0.0620%	Microcystis sp.	Cyanophyta	Myxophyceae	Chroococcales	Microcystaceae	Microcystis	sp.	1	80.00	80	1613	129067	3	258	33.51	8650.05
7170.08-01	Spokane River, WA	LL0-0.5m	1	9/8/2015	500	0.0620%	Navicula spp.	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	Navicula	spp.	5	1.00	5	8067	8067	16	16	735.13	11860.15
7170.08-01	Spokane River, WA	LL0-0.5m	1	9/8/2015	500	0.0620%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	24	1.00	24	38720	38720	77	77	7095.81	549499.60
7170.08-01	Spokane River, WA	LL0-0.5m	1	9/8/2015	500	0.0620%	Planktolyngbya spp.	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	Planktolyngbya	spp.	3	20.00	60	4840	96800	10	194	9.43	1824.68
7170.08-01	Spokane River, WA	LL0-0.5m	1	9/8/2015	500	0.0620%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	166	7.40	1228	267813	1981173	536	3962	1457.18	5773832.50
7170.08-01	Spokane River, WA	LL0-0.5m	1	9/8/2015	500	0.0620%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	14	6.00	84	22587	135520	45	271	65.45	17739.57
7170.08-01	Spokane River, WA	LL0-0.5m	1	9/8/2015	500	0.0620%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	6	30.00	180	9680	290400	19	581	6.28	3649.17
7170.08-02	Spokane River, WA	LL1-0.5m	1	9/8/2015	500	0.0992%	Anabaena sp.	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	Anabaena	sp.	3	24.33	73	3025	73608	6	147	65.45	9635.33
7170.08-02	Spokane River, WA	LL1-0.5m	1	9/8/2015	500	0.0992%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	3	9.33	28	3025	28233	6	56	989.60	55879.53
7170.08-02	Spokane River, WA	LL1-0.5m	1	9/8/2015	500	0.0992%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	13	1.00	13	13108	13108	26	26	3901.86	102293.71
7170.08-02	Spokane River, WA	LL1-0.5m	1	9/8/2015	500	0.0992%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	5	4.00	20	5042	20167	10	40	343.00	13834.33
7170.08-02	Spokane River, WA	LL1-0.5m	1	9/8/2015	500	0.0992%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	24	1.00	24	24200	24200	48	48	3180.86	153953.77
7170.08-02	Spokane River, WA	LL1-0.5m	1	9/8/2015	500	0.0992%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	11	7.91	87	11092	87725	22	175	1366.59	239768.74
7170.08-02	Spokane River, WA	LL1-0.5m	1	9/8/2015	500	0.0992%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	41	1.00	41	41342	41342	83	83	169.65	14026.90
7170.08-02	Spokane River, WA	LL1-0.5m	1	9/8/2015	500	0.0992%	Microcystis sp.	Cyanophyta	Myxophyceae	Chroococcales	Microcystaceae	Microcystis	sp.	1	60.00	60	1008	60500	2	121	268.08	32438.04
7170.08-02	Spokane River, WA	LL1-0.5m	1	9/8/2015	500	0.0992%	Monoraphidium spp.	Chlorophyta	Chlorophyceae	Sphaeropleales	Selenastraceae	Monoraphidium	spp.	7	1.00	7	7058	7058	14	14	28.27	399.13
7170.08-02	Spokane River, WA	LL1-0.5m	1	9/8/2015	500	0.0992%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	21	4.00	84	21175	84700	42	169	3901.86	660974.75
7170.08-02	Spokane River, WA	LL1-0.5m	1	9/8/2015	500	0.0992%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	2	24.00	48	2017	48400	4	97	3120.00	302016.00
7170.08-02	Spokane River, WA	LL1-0.5m	1	9/8/2015	500	0.0992%	Planktolyngbya spp.	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	Planktolyngbya	spp.	6	11.33	68	6050	68567	12	137	9.43	1292.48
7170.08-02	Spokane River, WA	LL1-0.5m	1	9/8/2015	500	0.0992%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	144	8.00	1152	145200	1161600	290	2323	737.23	1712725.77
7170.08-02	Spokane River, WA	LL1-0.5m	1	9/8/2015	500	0.0992%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	18	6.00	108	18150	108900	36	218	179.59	39115.57
7170.08-02	Spokane River, WA	LL1-0.5m	1	9/8/2015	500	0.0992%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	11	25.45	280	11092	282333	22	565	18.85	10643.97
7170.08-03	Spokane River, WA	LL2-0.5m	1	9/8/2015	500	0.0744%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	15	6.00	90	20167	121000	40	242	1000.60	242144.47
7170.08-03	Spokane River, WA	LL2-0.5m	1	9/8/2015	500	0.0744%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	11	1.00	11	14789	14789	30	30	3732.21	110390.54
7170.08-03	Spokane River, WA	LL2-0.5m	1	9/8/2015	500	0.0744%	Chroococcus sp.	Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	Chroococcus	sp.	4	1.00	4	5378	5378	11	11	47.71	513.18
7170.08-03	Spokane River, WA	LL2-0.5m	1	9/8/2015	500	0.0744%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	14	4.00	56	18822	75289	38	151	274.63	41352.42
7170.08-03	Spokane River, WA	LL2-0.5m	1	9/8/2015	500	0.0744%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	11	1.00	11	14789	14789	30	30	4536.46	134178.41
7170.08-03	Spokane River, WA	LL2-0.5m	1	9/8/2015	500	0.0744%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	17	22.35294118	380	22856	510889	46	1022	1790.708	1829705.641
7170.08-03	Spokane River, WA	LL2-0.5m	1	9/8/2015	500	0.0744%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	24	1	24	32267	32267	65	65	169.646	10947.82187
7170.08-03	Spokane River, WA	LL2-0.5m	1	9/8/2015	500	0.0744%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	24	1.583333333	38	32267	51089	65	102	3480.361	355615.5528
7170.08-03	Spokane River, WA	LL2-0.5m	1	9/8/2015	500	0.0744%	Planktolyngbya spp.	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	Planktolyngbya	spp.	23	7.826086957	180	30922	242000	62	484	12.272	5939.648
7170.08-03	Spokane River, WA	LL2-0.5m	1	9/8/2015	500	0.0744%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	155	8	1240	208389	1667111	417	3334	1047.198	3491590.843
7170.08-03	Spokane River, WA	LL2-0.5m	1	9/8/2015	500	0.0744%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	7	6	42	9411	56467	19	113	113.097	12772.4212
7170.08-03	Spokane River, WA	LL2-0.5m	1	9/8/2015	500	0.0744%	Tabellaria sp.	Bacillariophyta	Bacillariophyceae	Pennales	Tabellariaceae	Tabellaria	sp.	1	1	1	1344	1344	3	3	3055	8214.555556

Avista Phytoplankton 2015 (Batch's 7-10)
Taxa Report with Biovolumes

EcoAnalysts, Inc.
LIFE IN WATER

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in sample received)	Cells per mL (in sample received)	AVG_BV (µ³)	Biovolume (µ³/mL)
7170.08-04	Spokane River, WA	LL3-0.5m	1	9/9/2015	500	0.0868%	Amphora sp.	Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	Amphora	sp.	3	1	3	3457	3457	7	7	2500	17285.71429
7170.08-04	Spokane River, WA	LL3-0.5m	1	9/9/2015	500	0.0868%	Anabaena sp.	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	Anabaena	sp.	1	27	27	1152	31114	2	62	696.91	43367.71371
7170.08-04	Spokane River, WA	LL3-0.5m	1	9/9/2015	500	0.0868%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	81	11.11111111	900	93343	1037143	187	2074	1308.473	2714146.851
7170.08-04	Spokane River, WA	LL3-0.5m	1	9/9/2015	500	0.0868%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	1	1	1	1152	1152	2	2	980.177	2259.07461
7170.08-04	Spokane River, WA	LL3-0.5m	1	9/9/2015	500	0.0868%	Chlamydomonas sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Chlamydomonas	sp.	3	1	3	3457	3457	7	7	1150.347	7953.827829
7170.08-04	Spokane River, WA	LL3-0.5m	1	9/9/2015	500	0.0868%	Chlorella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Chlorella	sp.	4	1	4	4610	4610	9	9	113.097	1042.646629
7170.08-04	Spokane River, WA	LL3-0.5m	1	9/9/2015	500	0.0868%	Cocconeis sp.	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Cocconeis	sp.	1	1	1	1152	1152	2	2	2412.743	5560.798152
7170.08-04	Spokane River, WA	LL3-0.5m	1	9/9/2015	500	0.0868%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	22	1	22	25352	25352	51	51	2827.433	143364.3171
7170.08-04	Spokane River, WA	LL3-0.5m	1	9/9/2015	500	0.0868%	Desmidium sp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Desmidium	sp.	2	19	38	2305	43790	5	88	1140.398	99877.14293
7170.08-04	Spokane River, WA	LL3-0.5m	1	9/9/2015	500	0.0868%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	44	20	880	50705	1014095	101	2028	2097.013	4253141.795
7170.08-04	Spokane River, WA	LL3-0.5m	1	9/9/2015	500	0.0868%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	5	1	5	5762	5762	12	12	126.711	1460.193429
7170.08-04	Spokane River, WA	LL3-0.5m	1	9/9/2015	500	0.0868%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	3	4	12	3457	13829	7	28	1281.77	35450.096
7170.08-04	Spokane River, WA	LL3-0.5m	1	9/9/2015	500	0.0868%	Planktolyngbya spp.	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	Planktolyngbya	spp.	5	12	60	5762	69143	12	138	9.425	1303.342857
7170.08-04	Spokane River, WA	LL3-0.5m	1	9/9/2015	500	0.0868%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	136	10.29411765	1400	156724	1613333	313	3227	603.186	1946280.16
7170.08-04	Spokane River, WA	LL3-0.5m	1	9/9/2015	500	0.0868%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	1	8	8	1152	9219	2	18	179.594	3311.371276
7170.08-05	Spokane River, WA	LL4-0.5m	1	9/9/2015	500	0.0487%	Amphora sp.	Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	Amphora	sp.	1	1	1	2054	2054	4	4	1584	6507.578243
7170.08-05	Spokane River, WA	LL4-0.5m	1	9/9/2015	500	0.0487%	Anabaena sp.	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	Anabaena	sp.	9	26.66666667	240	18487	492998	37	986	696.91	687150.9626
7170.08-05	Spokane River, WA	LL4-0.5m	1	9/9/2015	500	0.0487%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	148	10.27027027	1520	304016	3122323	608	6245	1306.903	8161146.315
7170.08-05	Spokane River, WA	LL4-0.5m	1	9/9/2015	500	0.0487%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	13	1	13	26704	26704	53	53	1949.882	104139.5996
7170.08-05	Spokane River, WA	LL4-0.5m	1	9/9/2015	500	0.0487%	Ceratium sp.	Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	Ceratium	sp.	1	1	1	2054	2054	4	4	294524.311	1209999.999
7170.08-05	Spokane River, WA	LL4-0.5m	1	9/9/2015	500	0.0487%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	14	1	14	28758	28758	58	58	6073.746	349340.4561
7170.08-05	Spokane River, WA	LL4-0.5m	1	9/9/2015	500	0.0487%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	15	25	375	30812	770310	62	1541	1531.526	2359499.355
7170.08-05	Spokane River, WA	LL4-0.5m	1	9/9/2015	500	0.0487%	Melosira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	Melosira	sp.	1	3	3	2054	6162	4	12	11217.842	138259.4404
7170.08-05	Spokane River, WA	LL4-0.5m	1	9/9/2015	500	0.0487%	Microcystis sp.	Cyanophyta	Myxophyceae	Chroococcales	Microcystaceae	Microcystis	sp.	1	200	200	2054	410832	4	822	268.083	220274.1285
7170.08-05	Spokane River, WA	LL4-0.5m	1	9/9/2015	500	0.0487%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	4	3	12	8217	24650	16	49	2052.507	101188.2568
7170.08-05	Spokane River, WA	LL4-0.5m	1	9/9/2015	500	0.0487%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	100	10	1000	205416	2054160	411	4108	703.717	2891094.342
7170.08-05	Spokane River, WA	LL4-0.5m	1	9/9/2015	500	0.0487%	Tetraedron sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Chlorococcaceae	Tetraedron	sp.	1	1	1	2054	2054	4	4	1014	4165.836072
7170.08-05	Spokane River, WA	LL4-0.5m	1	9/9/2015	500	0.0487%	Trachelomonas spp.	Euglenophyta	Euglenophyceae	Euglenales	Euglenaceae	Trachelomonas	spp.	4	1	4	8217	8217	16	16	904.779	14868.48519
7170.08-05	Spokane River, WA	LL4-0.5m	1	9/9/2015	500	0.0487%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	3	30	90	6162	184874	12	370	0	0
7170.08-06	Spokane River, WA	LL5-0.5m	1	9/9/2015	500	0.0146%	Anabaena sp.	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	Anabaena	sp.	8	20	160	54778	1095552	110	2191	381.704	836353.0793
7170.08-06	Spokane River, WA	LL5-0.5m	1	9/9/2015	500	0.0146%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	2	175	350	13694	2396520	27	4793	4.189	20078.04259
7170.08-06	Spokane River, WA	LL5-0.5m	1	9/9/2015	500	0.0146%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	5	9	45	34236	308124	68	616	763.407	470447.9909
7170.08-06	Spokane River, WA	LL5-0.5m	1	9/9/2015	500	0.0146%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	2	1	2	13694	13694	27	27	1592.787	43624.52031
7170.08-06	Spokane River, WA	LL5-0.5m	1	9/9/2015	500	0.0146%	Ceratium sp.	Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	Ceratium	sp.	7	1	7	47930	47930	96	96	392,699	37,644,444
7170.08-06	Spokane River, WA	LL5-0.5m	1	9/9/2015	500	0.0146%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	1	4	4	6847	27389	14	55	343	18788.71496
7170.08-06	Spokane River, WA	LL5-0.5m	1	9/9/2015	500	0.0146%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	10	1	10	68472	68472	137	137	2668.259	365402.0247
7170.08-06	Spokane River, WA	LL5-0.5m	1	9/9/2015	500	0.0146%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	13	12.30769231	160	89014	1095552	178	2191	1366.593	2994347.095
7170.08-06	Spokane River, WA	LL5-0.5m	1	9/9/2015	500	0.0146%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	240	1	240	1643328	1643328	3287	3287	126.711	416455.4276
7170.08-06	Spokane River, WA	LL5-0.5m	1	9/9/2015	500	0.0146%	Microcystis sp.	Cyanophyta	Myxophyceae	Chroococcales	Microcystaceae	Microcystis	sp.	1	100	100	6847	684720	14	1369	179.594	245943.1833
7170.08-06	Spokane River, WA	LL5-0.5m	1	9/9/2015	500	0.0146%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	24	24	6847	164333	14	329	1440	473278.4177
7170.08-06	Spokane River, WA	LL5-0.5m	1	9/9/2015	500	0.0146%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	11	9.090909091	100	75319	684720	151	1369	333.532	456752.0174
7170.08-06	Spokane River, WA	LL5-0.5m	1	9/9/2015	500	0.0146%	Staurastrum sp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Staurastrum	sp.	1	1	1	6847	6847	14	14	6325.073	86618.07121

Avista Phytoplankton 2015 (Batch's 7-10)
Taxa Report with Biovolumes

EcoAnalysts, Inc.
LIFE IN WATER

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in sample received)	Cells per mL (in sample received)	AVG_BV (µ³)	Biovolume (µ³/mL)
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Achnanthes spp. Bory	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Achnanthes	spp.	6	1	6	14520	14520	29	29	494.801	14369.02104
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Amphora sp.	Bacillariophyta	Bacillariophyceae	Pennales	Catenulaceae	Amphora	sp.	3	1	3	7260	7260	15	15	4200	60984
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	4	15	60	9680	145200	19	290	791.681	229904.1624
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	17	1	17	41140	41140	82	82	2360.383	194212.3132
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Chroococcus spp.	Cyanophyta	Myxophyceae	Chroococcales	Chroococcaceae	Chroococcus	spp.	11	4	44	26620	106480	53	213	33.51	7136.2896
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	12	1	12	29040	29040	58	58	282.22	16391.3376
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Cosmarium sp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Cosmarium	sp.	1	1	1	2420	2420	5	5	2238.385	10833.7834
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	17	4	68	41140	164560	82	329	512	168509.44
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	64	1	64	154880	154880	310	310	2565.634	794730.7878
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	33	8.484848485	280	79860	677600	160	1355	854.513	1158036.018
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Gomphonema spp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	spp.	2	1	2	4840	4840	10	10	933.053	9031.95304
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	22	1	22	53240	53240	106	106	169.646	18063.90608
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Monoraphidium spp.	Chlorophyta	Chlorophyceae	Sphaeropleales	Selenastraceae	Monoraphidium	spp.	3	1	3	7260	7260	15	15	393.746	5717.19192
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Navicula spp.	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	Navicula	spp.	3	1	3	7260	7260	15	15	1519.745	22066.6974
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	9	3.555555556	32	21780	77440	44	155	12034.394	1863886.943
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	12	12	2420	29040	5	58	1530	88862.4
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Planktolyngbya spp.	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	Planktolyngbya	spp.	6	10	60	14520	145200	29	290	12.566	3649.1664
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	83	8.192771084	680	200860	1645600	402	3291	670.206	2205781.987
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	4	8	32	9680	77440	19	155	268.083	41520.69504
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Staurastrum sp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Staurastrum	sp.	1	1	1	2420	2420	5	5	3390.302	16409.06168
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Trachelomonas spp.	Euglenophyta	Euglenophyceae	Euglenales	Euglenaceae	Trachelomonas	spp.	1	1	1	2420	2420	5	5	6924.594	33515.03496
7170.09-01	Spokane River, WA	LL0-0.5m	1	9/23/2015	500	0.0413%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	7	30	210	16940	508200	34	1016	18.85	19159.14
7170.09-02	Spokane River, WA	LL1-0.5m	1	9/23/2015	500	0.1322%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	4	41	164	3025	124025	6	248	8.181	2029.29705
7170.09-02	Spokane River, WA	LL1-0.5m	1	9/23/2015	500	0.1322%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	25	6	150	18906	113438	38	227	2099.369	476294.3419
7170.09-02	Spokane River, WA	LL1-0.5m	1	9/23/2015	500	0.1322%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	22	1	22	16638	16638	33	33	4071.504	135479.2956
7170.09-02	Spokane River, WA	LL1-0.5m	1	9/23/2015	500	0.1322%	Ceratium sp.	Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	Ceratium	sp.	1	1	1	756	756	2	2	487045.036	736655.617
7170.09-02	Spokane River, WA	LL1-0.5m	1	9/23/2015	500	0.1322%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	2	8	16	1513	12100	3	24	614.125	14861.825
7170.09-02	Spokane River, WA	LL1-0.5m	1	9/23/2015	500	0.1322%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	56	1	56	42350	42350	85	85	3753.156	317892.3132
7170.09-02	Spokane River, WA	LL1-0.5m	1	9/23/2015	500	0.1322%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	20	1	20	15125	15125	30	30	929.911	28129.80775
7170.09-02	Spokane River, WA	LL1-0.5m	1	9/23/2015	500	0.1322%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	36	1	36	27225	27225	54	54	169.646	9237.2247
7170.09-02	Spokane River, WA	LL1-0.5m	1	9/23/2015	500	0.1322%	Monoraphidium spp.	Chlorophyta	Chlorophyceae	Sphaeropleales	Selenastraceae	Monoraphidium	spp.	3	1	3	2269	2269	5	5	340.339	1544.288213
7170.09-02	Spokane River, WA	LL1-0.5m	1	9/23/2015	500	0.1322%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	23	2	46	17394	34788	35	70	9349.38	650483.1135
7170.09-02	Spokane River, WA	LL1-0.5m	1	9/23/2015	500	0.1322%	Planktolyngbya spp.	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	Planktolyngbya	spp.	4	9	36	3025	27225	6	54	21.206	1154.6667
7170.09-02	Spokane River, WA	LL1-0.5m	1	9/23/2015	500	0.1322%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	96	10	960	72600	726000	145	1452	376.991	547390.932
7170.09-02	Spokane River, WA	LL1-0.5m	1	9/23/2015	500	0.1322%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	1	8	8	756	6050	2	12	179.594	2173.0874
7170.09-02	Spokane River, WA	LL1-0.5m	1	9/23/2015	500	0.1322%	Trachelomonas spp.	Euglenophyta	Euglenophyceae	Euglenales	Euglenaceae	Trachelomonas	spp.	6	1	6	4538	4538	9	9	10305.995	93526.90463
7170.09-02	Spokane River, WA	LL1-0.5m	1	9/23/2015	500	0.1322%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	6	23.33333333	140	4538	105875	9	212	14.137	2993.50975
7170.09-03	Spokane River, WA	LL2-0.5m	1	9/23/2015	500	0.0661%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	11	43.63636364	480	16638	726000	33	1452	8.181	11878.812
7170.09-03	Spokane River, WA	LL2-0.5m	1	9/23/2015	500	0.0661%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	34	5.294117647	180	51425	272250	103	545	848.23	461861.235
7170.09-03	Spokane River, WA	LL2-0.5m	1	9/23/2015	500	0.0661%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	29	1	29	43863	43863	88	88	4817.109	422580.887
7170.09-03	Spokane River, WA	LL2-0.5m	1	9/23/2015	500	0.0661%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	12	4	48	18150	72600	36	145	166.375	24157.65
7170.09-03	Spokane River, WA	LL2-0.5m	1	9/23/2015	500	0.0661%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	28	1	28	42350	42350	85	85	5670.575	480297.7025
7170.09-03	Spokane River, WA	LL2-0.5m	1	9/23/2015	500	0.0661%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	52	16.34615385	850	78650	1285625	157	2571	1564.513	4022754.051
7170.09-03	Spokane River, WA	LL2-0.5m	1	9/23/2015	500	0.0661%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	26	1	26	39325	39325	79	79	169.646	13342.6579
7170.09-03	Spokane River, WA	LL2-0.5m	1	9/23/2015	500	0.0661%	Planktolyngbya spp.	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	Planktolyngbya	spp.	8	7	56	12100	84700	24	169	9.425	1596.595
7170.09-03	Spokane River, WA	LL2-0.5m	1	9/23/2015	500	0.0661%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	78	8.205128205	640	117975	968000	236	1936	183.26	354791.36
7170.09-03	Spokane River, WA	LL2-0.5m	1	9/23/2015	500	0.0661%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	9	8	72	13613	108900	27	218	179.594	39115.5732
7170.09-03	Spokane River, WA	LL2-0.5m	1	9/23/2015	500	0.0661%	Trachelomonas spp.	Euglenophyta	Euglenophyceae	Euglenales	Euglenaceae	Trachelomonas	spp.	2	1	2	3025	3025	6	6	4849.048	29336.7404
7170.09-03	Spokane River, WA	LL2-0.5m	1	9/23/2015	500	0.0661%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	17	20	340	25713	514250	51	1029	18.85	19387.225

Avista Phytoplankton 2015 (Batch's 7-10)
Taxa Report with Biovolumes

EcoAnalysts, Inc.
LIFE IN WATER

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in sample received)	Cells per mL (in sample received)	AVG_BV (µ³)	Biovolume (µ³/mL)
7170.09-04	Spokane River, WA	LL3-0.5m	1	9/24/2015	500	0.0579%	Achnanthes spp. Bory	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Achnanthes	spp.	5	1	5	8643	8643	17	17	376.991	6516.558714
7170.09-04	Spokane River, WA	LL3-0.5m	1	9/24/2015	500	0.0579%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	26	10	260	44943	449429	90	899	1000.597	899393.7606
7170.09-04	Spokane River, WA	LL3-0.5m	1	9/24/2015	500	0.0579%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	7	1	7	12100	12100	24	24	2120.575	51317.915
7170.09-04	Spokane River, WA	LL3-0.5m	1	9/24/2015	500	0.0579%	Ceratium sp.	Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	Ceratium	sp.	4	1	4	6914	6914	14	14	363246.651	5023182.26
7170.09-04	Spokane River, WA	LL3-0.5m	1	9/24/2015	500	0.0579%	Crucigeniella sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Crucigeniella	sp.	4	8	32	6914	55314	14	111	512	56641.82857
7170.09-04	Spokane River, WA	LL3-0.5m	1	9/24/2015	500	0.0579%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	46	1	46	79514	79514	159	159	3934.321	625669.4482
7170.09-04	Spokane River, WA	LL3-0.5m	1	9/24/2015	500	0.0579%	Elakatothrix sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	Elakatothrix	sp.	2	2	4	3457	6914	7	14	1060.288	14662.26834
7170.09-04	Spokane River, WA	LL3-0.5m	1	9/24/2015	500	0.0579%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	51	23.52941176	1200	88157	2074286	176	4149	1470.265	6099499.371
7170.09-04	Spokane River, WA	LL3-0.5m	1	9/24/2015	500	0.0579%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	34	1	34	58771	58771	118	118	142.55	16755.73429
7170.09-04	Spokane River, WA	LL3-0.5m	1	9/24/2015	500	0.0579%	Microcystis sp.	Cyanophyta	Myxophyceae	Chroococcales	Microcystaceae	Microcystis	sp.	1	120	120	1729	207429	3	415	65.45	27152.4
7170.09-04	Spokane River, WA	LL3-0.5m	1	9/24/2015	500	0.0579%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	10	4	40	17286	69143	35	138	1281.77	177250.48
7170.09-04	Spokane River, WA	LL3-0.5m	1	9/24/2015	500	0.0579%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	24	24	1729	41486	3	83	480	39826.28571
7170.09-04	Spokane River, WA	LL3-0.5m	1	9/24/2015	500	0.0579%	Planktolyngbya spp.	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	Planktolyngbya	spp.	6	11	66	10371	114086	21	228	12.566	2867.202171
7170.09-04	Spokane River, WA	LL3-0.5m	1	9/24/2015	500	0.0579%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	104	8.269230769	860	179771	1486571	360	2973	395.841	1176891.842
7170.09-04	Spokane River, WA	LL3-0.5m	1	9/24/2015	500	0.0579%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	3	8	24	5186	41486	10	83	220.893	18327.80777
7170.09-04	Spokane River, WA	LL3-0.5m	1	9/24/2015	500	0.0579%	Tetrastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Tetrastrum	sp.	6	1	6	10371	10371	21	21	381.704	7917.631543
7170.09-05	Spokane River, WA	LL4-0.5m	1	9/24/2015	500	0.0744%	Anabaena sp.	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	Anabaena	sp.	11	20	220	14789	295778	30	592	381.704	225799.1218
7170.09-05	Spokane River, WA	LL4-0.5m	1	9/24/2015	500	0.0744%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	25	9.2	230	33611	309222	67	618	565.487	349722.2936
7170.09-05	Spokane River, WA	LL4-0.5m	1	9/24/2015	500	0.0744%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	12	1	12	16133	16133	32	32	1539.38	49670.66133
7170.09-05	Spokane River, WA	LL4-0.5m	1	9/24/2015	500	0.0744%	Ceratium sp.	Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	Ceratium	sp.	1	1	1	1344	1344	3	3	357493.609	961260.5931
7170.09-05	Spokane River, WA	LL4-0.5m	1	9/24/2015	500	0.0744%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	23	1	23	30922	30922	62	62	4410.796	272783.2282
7170.09-05	Spokane River, WA	LL4-0.5m	1	9/24/2015	500	0.0744%	Desmidium sp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Desmidium	sp.	2	27	54	2689	72600	5	145	628.319	91231.9188
7170.09-05	Spokane River, WA	LL4-0.5m	1	9/24/2015	500	0.0744%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	76	20	1520	102178	2043556	204	4087	1734.159	7087700.517
7170.09-05	Spokane River, WA	LL4-0.5m	1	9/24/2015	500	0.0744%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	38	1	38	51089	51089	102	102	210.159	21473.5796
7170.09-05	Spokane River, WA	LL4-0.5m	1	9/24/2015	500	0.0744%	Microcystis sp.	Cyanophyta	Myxophyceae	Chroococcales	Microcystaceae	Microcystis	sp.	4	40	160	5378	215111	11	430	113.097	48656.84267
7170.09-05	Spokane River, WA	LL4-0.5m	1	9/24/2015	500	0.0744%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	10	4	40	13444	53778	27	108	1206.372	129752.0107
7170.09-05	Spokane River, WA	LL4-0.5m	1	9/24/2015	500	0.0744%	Planktolyngbya spp.	Cyanophyta	Myxophyceae	Oscillatoriales	Pseudanabaenaceae	Planktolyngbya	spp.	40	6.5	260	53778	349556	108	699	19.635	13727.04667
7170.09-05	Spokane River, WA	LL4-0.5m	1	9/24/2015	500	0.0744%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	59	10.50847458	620	79322	833556	159	1667	487.47	812666.6533
7170.09-05	Spokane River, WA	LL4-0.5m	1	9/24/2015	500	0.0744%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	9	8	72	12100	96800	24	194	220.893	42764.8848
7170.09-05	Spokane River, WA	LL4-0.5m	1	9/24/2015	500	0.0744%	Woronichinia spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Woronichinia	spp.	7	22.85714286	160	9411	215111	19	430	21.206	9123.292444
7170.09-06	Spokane River, WA	LL5-0.5m	1	9/24/2015	500	0.0992%	Achnanthes spp. Bory	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Achnanthes	spp.	61	1	61	61508	61508	123	123	245.044	30144.49607
7170.09-06	Spokane River, WA	LL5-0.5m	1	9/24/2015	500	0.0992%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	13	4	52	13108	52433	26	105	311.018	32615.42093
7170.09-06	Spokane River, WA	LL5-0.5m	1	9/24/2015	500	0.0992%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	13	1	13	13108	13108	26	26	4607.669	120797.7223
7170.09-06	Spokane River, WA	LL5-0.5m	1	9/24/2015	500	0.0992%	Cocconeis sp.	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Cocconeis	sp.	34	1	34	34283	34283	69	69	2056.172	140984.8601
7170.09-06	Spokane River, WA	LL5-0.5m	1	9/24/2015	500	0.0992%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	17	5	85	17142	85708	34	171	895.354	153478.5982
7170.09-06	Spokane River, WA	LL5-0.5m	1	9/24/2015	500	0.0992%	Gomphonema spp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	spp.	6	1	6	6050	6050	12	12	933.053	11289.9413
7170.09-06	Spokane River, WA	LL5-0.5m	1	9/24/2015	500	0.0992%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	24	1	24	24200	24200	48	48	210.159	10171.6956
7170.09-06	Spokane River, WA	LL5-0.5m	1	9/24/2015	500	0.0992%	Melosira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Melosiraceae	Melosira	sp.	4	2	8	4033	8067	8	16	17520.662	282666.6803
7170.09-06	Spokane River, WA	LL5-0.5m	1	9/24/2015	500	0.0992%	Monoraphidium spp.	Chlorophyta	Chlorophyceae	Sphaeropleales	Selenastraceae	Monoraphidium	spp.	29	1	29	29242	29242	58	58	84.823	4960.731783
7170.09-06	Spokane River, WA	LL5-0.5m	1	9/24/2015	500	0.0992%	Navicula spp.	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	Navicula	spp.	8	1	8	8067	8067	16	16	522.29	8426.278667
7170.09-06	Spokane River, WA	LL5-0.5m	1	9/24/2015	500	0.0992%	Nitzschia spp.	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	Nitzschia	spp.	16	1	16	16133	16133	32	32	285.885	9224.556
7170.09-06	Spokane River, WA	LL5-0.5m	1	9/24/2015	500	0.0992%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	20	4	80	20167	80667	40	161	58.643	9461.070667
7170.09-06	Spokane River, WA	LL5-0.5m	1	9/24/2015	500	0.0992%	Tetrastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Tetrastrum	sp.	2	4	8	2017	8067	4	16	33.51	540.628

Avista Phytoplankton 2015 (Batch's 7-10)
Taxa Report with Biovolumes

EcoAnalysts, Inc.
LIFE IN WATER

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in sample received)	Cells per mL (in sample received)	AVG_BV (µ³)	Biovolume (µ³/mL)
7170.10-01	Spokane River, WA	LL0-0.5m	1	10/13/2015	500	0.0814%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	8	20	160	9834	196673	20	393	8.181	3217.963886
7170.10-01	Spokane River, WA	LL0-0.5m	1	10/13/2015	500	0.0814%	Asterionella sp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Asterionella	sp.	1	1	1	1229	1229	2	2	1376.018	3382.820124
7170.10-01	Spokane River, WA	LL0-0.5m	1	10/13/2015	500	0.0814%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	1	25	25	1229	30730	2	61	1346.958	82784.46629
7170.10-01	Spokane River, WA	LL0-0.5m	1	10/13/2015	500	0.0814%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	2	1	2	2458	2458	5	5	680.678	3346.774877
7170.10-01	Spokane River, WA	LL0-0.5m	1	10/13/2015	500	0.0814%	Cosmarium sp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Cosmarium	sp.	1	1	1	1229	1229	2	2	20114.571	49449.91677
7170.10-01	Spokane River, WA	LL0-0.5m	1	10/13/2015	500	0.0814%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	91	1	91	111858	111858	224	224	4725.479	1057163.16
7170.10-01	Spokane River, WA	LL0-0.5m	1	10/13/2015	500	0.0814%	Elakatothrix sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	Elakatothrix	sp.	1	2	2	1229	2458	2	5	1702.351	8370.162631
7170.10-01	Spokane River, WA	LL0-0.5m	1	10/13/2015	500	0.0814%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	13	17.30769231	225	15980	276571	32	553	1288.053	712477.3166
7170.10-01	Spokane River, WA	LL0-0.5m	1	10/13/2015	500	0.0814%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	62	1	62	76211	76211	152	152	169.646	25857.7126
7170.10-01	Spokane River, WA	LL0-0.5m	1	10/13/2015	500	0.0814%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	1	1	1	1229	1229	2	2	12034.394	29585.50703
7170.10-01	Spokane River, WA	LL0-0.5m	1	10/13/2015	500	0.0814%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	2	2	1229	2458	2	5	3500	17208.88889
7170.10-01	Spokane River, WA	LL0-0.5m	1	10/13/2015	500	0.0814%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	123	10	1230	151192	1511924	302	3024	414.69	1253959.369
7170.10-01	Spokane River, WA	LL0-0.5m	1	10/13/2015	500	0.0814%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	1	8	8	1229	9834	2	20	321.555	6324.119162
7170.10-01	Spokane River, WA	LL0-0.5m	1	10/13/2015	500	0.0814%	Tetrastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Tetrastrum	sp.	1	12	12	1229	14750	2	30	381.704	11260.63153
7170.10-02	Spokane River, WA	LL1-0.5m	1	10/13/2015	500	0.1763%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	4	20	80	2269	45386	5	91	8.181	742.6070505
7170.10-02	Spokane River, WA	LL1-0.5m	1	10/13/2015	500	0.1763%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	2	10	20	1135	11347	2	23	805.033	18268.64631
7170.10-02	Spokane River, WA	LL1-0.5m	1	10/13/2015	500	0.1763%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	1	1	1	567	567	1	1	1642.006	1863.105416
7170.10-02	Spokane River, WA	LL1-0.5m	1	10/13/2015	500	0.1763%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	66	1	66	37444	37444	75	75	16362.462	1225336.231
7170.10-02	Spokane River, WA	LL1-0.5m	1	10/13/2015	500	0.1763%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	17	10	170	9645	96445	19	193	1932.079	372680.3461
7170.10-02	Spokane River, WA	LL1-0.5m	1	10/13/2015	500	0.1763%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	67	1	67	38011	38011	76	76	160.221	12180.27039
7170.10-02	Spokane River, WA	LL1-0.5m	1	10/13/2015	500	0.1763%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	4	2	8	2269	4539	5	9	1267.109	11501.82224
7170.10-02	Spokane River, WA	LL1-0.5m	1	10/13/2015	500	0.1763%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	145	10	1450	82262	822623	165	1645	235.619	387651.0809
7170.10-03	Spokane River, WA	LL2-0.5m	1	10/13/2015	500	0.0108%	Anabaena sp.	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	Anabaena	sp.	7	15	105	64533	968000	129	1936	381.704	738978.944
7170.10-03	Spokane River, WA	LL2-0.5m	1	10/13/2015	500	0.0108%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	7	25.71428571	180	64533	1659429	129	3319	8.181	27151.57029
7170.10-03	Spokane River, WA	LL2-0.5m	1	10/13/2015	500	0.0108%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	8	5.625	45	73752	414857	148	830	471.239	390993.7303
7170.10-03	Spokane River, WA	LL2-0.5m	1	10/13/2015	500	0.0108%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	3	1	3	27657	27657	55	55	265.465	14684.00686
7170.10-03	Spokane River, WA	LL2-0.5m	1	10/13/2015	500	0.0108%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	59	1	59	543924	543924	1088	1088	4410.796	4798273.927
7170.10-03	Spokane River, WA	LL2-0.5m	1	10/13/2015	500	0.0108%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	8	15	120	73752	1106286	148	2213	989.602	2189565.111
7170.10-03	Spokane River, WA	LL2-0.5m	1	10/13/2015	500	0.0108%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	61	1	61	562362	562362	1125	1125	169.646	190804.8954
7170.10-03	Spokane River, WA	LL2-0.5m	1	10/13/2015	500	0.0108%	Monoraphidium spp.	Chlorophyta	Chlorophyceae	Sphaeropleales	Selenastraceae	Monoraphidium	spp.	2	1	2	18438	18438	37	37	75.398	2780.39101
7170.10-03	Spokane River, WA	LL2-0.5m	1	10/13/2015	500	0.0108%	Navicula spp.	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	Navicula	spp.	2	1	2	18438	18438	37	37	395.841	14597.10811
7170.10-03	Spokane River, WA	LL2-0.5m	1	10/13/2015	500	0.0108%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	16	2.75	44	147505	405638	295	811	2474.004	2007100.54
7170.10-03	Spokane River, WA	LL2-0.5m	1	10/13/2015	500	0.0108%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	145	10	1450	1336762	13367619	2674	26735	590.096	15776357.06
7170.10-03	Spokane River, WA	LL2-0.5m	1	10/13/2015	500	0.0108%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	1	16	16	9219	147505	18	295	179.594	52981.94042
7170.10-03	Spokane River, WA	LL2-0.5m	1	10/13/2015	500	0.0108%	Tetrastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Tetrastrum	sp.	7	4	28	64533	258133	129	516	321.555	166008.128
7170.10-03	Spokane River, WA	LL2-0.5m	1	10/13/2015	500	0.0108%	Nitzschia spp.	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	Nitzschia	spp.	4	1	4	36876	36876	74	74	1060.288	78198.7645

Avista Phytoplankton 2015 (Batch's 7-10)
Taxa Report with Biovolumes

EcoAnalysts, Inc.
LIFE IN WATER

EcoAnalysts Sample ID	Waterbody	Site ID	Replicate	Collection Date	Volume Received (mL)	Percent Counted	Taxon	Division	Class	Order	Family	Genus	Species	Number of Natural Units	Cells per Natural Unit	Number of Cells	Units / Sample	Cells/ sample	Units per mL (in sample received)	Cells per mL (in sample received)	AVG_BV (µ³)	Biovolume (µ³/mL)
7170.10-04	Spokane River, WA	LL3-0.5m	1	10/14/2015	500	0.0610%	Anabaena sp.	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	Anabaena	sp.	4	1	4	6556	6556	13	13	381.704	5004.725123
7170.10-04	Spokane River, WA	LL3-0.5m	1	10/14/2015	500	0.0610%	Aphanocapsa spp.	Cyanophyta	Myxophyceae	Chroococcales	Merismopediaceae	Aphanocapsa	spp.	2	1	2	3278	3278	7	7	8.181	53.63273143
7170.10-04	Spokane River, WA	LL3-0.5m	1	10/14/2015	500	0.0610%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	4	1	4	6556	6556	13	13	537.212	7043.673614
7170.10-04	Spokane River, WA	LL3-0.5m	1	10/14/2015	500	0.0610%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	5	1	5	8195	8195	16	16	1415.811	23204.31827
7170.10-04	Spokane River, WA	LL3-0.5m	1	10/14/2015	500	0.0610%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	7	1	7	11473	11473	23	23	333.532	7652.953505
7170.10-04	Spokane River, WA	LL3-0.5m	1	10/14/2015	500	0.0610%	Cocconeis sp.	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Cocconeis	sp.	1	1	1	1639	1639	3	3	1531.526	5020.163955
7170.10-04	Spokane River, WA	LL3-0.5m	1	10/14/2015	500	0.0610%	Coelastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Coelastrum	sp.	1	1	1	1639	1639	3	3	381.704	1251.181281
7170.10-04	Spokane River, WA	LL3-0.5m	1	10/14/2015	500	0.0610%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	80	1	80	131115	131115	262	262	4241.15	1112159.682
7170.10-04	Spokane River, WA	LL3-0.5m	1	10/14/2015	500	0.0610%	Elakatothrix sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Coccomyxaceae	Elakatothrix	sp.	3	1	3	4917	4917	10	10	735.133	7229.041209
7170.10-04	Spokane River, WA	LL3-0.5m	1	10/14/2015	500	0.0610%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	20	1	20	32779	32779	66	66	1357.168	88972.77454
7170.10-04	Spokane River, WA	LL3-0.5m	1	10/14/2015	500	0.0610%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	70	1	70	114726	114726	229	229	169.646	38925.58886
7170.10-04	Spokane River, WA	LL3-0.5m	1	10/14/2015	500	0.0610%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	3	1	3	4917	4917	10	10	1769.764	17403.24116
7170.10-04	Spokane River, WA	LL3-0.5m	1	10/14/2015	500	0.0610%	Pediastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	Pediastrum	sp.	1	1	1	1639	1639	3	3	1615	5293.782011
7170.10-04	Spokane River, WA	LL3-0.5m	1	10/14/2015	500	0.0610%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	92	1	92	150783	150783	302	302	538.783	162478.2522
7170.10-04	Spokane River, WA	LL3-0.5m	1	10/14/2015	500	0.0610%	Sphaerocystis sp.	Chlorophyta	Chlorophyceae	Tetrasporales	Palmellaceae	Sphaerocystis	sp.	4	1	4	6556	6556	13	13	179.594	2354.752908
7170.10-04	Spokane River, WA	LL3-0.5m	1	10/14/2015	500	0.0610%	Staurastrum sp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Staurastrum	sp.	3	1	3	4917	4917	10	10	3051.272	30005.14332
7170.10-04	Spokane River, WA	LL3-0.5m	1	10/14/2015	500	0.0610%	Tetrastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Tetrastrum	sp.	4	1	4	6556	6556	13	13	321.555	4216.079441
7170.10-05	Spokane River, WA	LL4-0.5m	1	10/14/2015	500	0.0678%	Anabaena sp.	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	Anabaena	sp.	8	20	160	11800	236008	24	472	321.555	151778.8599
7170.10-05	Spokane River, WA	LL4-0.5m	1	10/14/2015	500	0.0678%	Aulacoseira sp.	Bacillariophyta	Bacillariophyceae	Centrales	Aulacoseiraceae	Aulacoseira	sp.	9	13.11111111	118	13275	174056	27	348	678.584	236222.7164
7170.10-05	Spokane River, WA	LL4-0.5m	1	10/14/2015	500	0.0678%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	16	1	16	23601	23601	47	47	1507.964	71178.19865
7170.10-05	Spokane River, WA	LL4-0.5m	1	10/14/2015	500	0.0678%	Ceratium sp.	Pyrrhophyta	Dinophyceae	Peridiniales	Oxytoxaceae	Ceratium	sp.	1	1	1	1475	1475	3	3	362618.332	1069758.614
7170.10-05	Spokane River, WA	LL4-0.5m	1	10/14/2015	500	0.0678%	Chroomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Chroomonas	spp.	4	1	4	5900	5900	12	12	226.195	2669.18717
7170.10-05	Spokane River, WA	LL4-0.5m	1	10/14/2015	500	0.0678%	Cosmarium sp.	Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	Cosmarium	sp.	1	1	1	1475	1475	3	3	13417.219	39582.07388
7170.10-05	Spokane River, WA	LL4-0.5m	1	10/14/2015	500	0.0678%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	32	1	32	47202	47202	94	94	9349.38	882609.9653
7170.10-05	Spokane River, WA	LL4-0.5m	1	10/14/2015	500	0.0678%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	49	10.6122449	520	72277	767025	145	1534	999.026	1532555.36
7170.10-05	Spokane River, WA	LL4-0.5m	1	10/14/2015	500	0.0678%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	118	1	118	174056	174056	348	348	169.646	59055.6791
7170.10-05	Spokane River, WA	LL4-0.5m	1	10/14/2015	500	0.0678%	Monoraphidium spp.	Chlorophyta	Chlorophyceae	Sphaeropleales	Selenastraceae	Monoraphidium	spp.	7	1	7	10325	10325	21	21	113.097	2335.528448
7170.10-05	Spokane River, WA	LL4-0.5m	1	10/14/2015	500	0.0678%	Oocystis sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Oocystaceae	Oocystis	sp.	6	4	24	8850	35401	18	71	1077.043	76257.10621
7170.10-05	Spokane River, WA	LL4-0.5m	1	10/14/2015	500	0.0678%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	64	10	640	94403	944030	189	1888	890.642	1681586.383
7170.10-05	Spokane River, WA	LL4-0.5m	1	10/14/2015	500	0.0678%	Tetrastrum sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Tetrastrum	sp.	5	8	40	7375	59002	15	118	381.704	45042.52611
7170.10-06	Spokane River, WA	LL5-0.5m	1	10/14/2015	500	0.1085%	Achnanthes spp. Bory	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Achnanthes	spp.	86	1	86	79284	79284	159	159	223.838	35493.45871
7170.10-06	Spokane River, WA	LL5-0.5m	1	10/14/2015	500	0.1085%	Anabaena sp.	Cyanophyta	Myxophyceae	Nostocales	Nostocaceae	Anabaena	sp.	2	18	36	1844	33189	4	66	381.704	25336.42094
7170.10-06	Spokane River, WA	LL5-0.5m	1	10/14/2015	500	0.1085%	Carteria sp.	Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Carteria	sp.	1	1	1	922	922	2	2	2709.624	4996.030537
7170.10-06	Spokane River, WA	LL5-0.5m	1	10/14/2015	500	0.1085%	Cocconeis sp.	Bacillariophyta	Bacillariophyceae	Pennales	Achnanthaceae	Cocconeis	sp.	1	1	1	922	922	2	2	1409.004	2597.934994
7170.10-06	Spokane River, WA	LL5-0.5m	1	10/14/2015	500	0.1085%	Cryptomonas spp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Cryptomonas	spp.	7	1	7	6453	6453	13	13	2591.814	33451.67936
7170.10-06	Spokane River, WA	LL5-0.5m	1	10/14/2015	500	0.1085%	Diatoma spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Diatoma	sp.	5	1	5	4610	4610	9	9	7225.663	66613.73128
7170.10-06	Spokane River, WA	LL5-0.5m	1	10/14/2015	500	0.1085%	Fragilaria spp.	Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	Fragilaria	spp.	36	5	180	33189	165943	66	332	885.929	294027.179
7170.10-06	Spokane River, WA	LL5-0.5m	1	10/14/2015	500	0.1085%	Gomphonema spp.	Bacillariophyta	Bacillariophyceae	Pennales	Gomphonemataceae	Gomphonema	spp.	5	1	5	4610	4610	9	9	245.044	2259.072305
7170.10-06	Spokane River, WA	LL5-0.5m	1	10/14/2015	500	0.1085%	Komma sp.	Cryptophyta	Cryptophyceae	Cryptomonadales	Cryptomonadaceae	Komma	sp.	71	1	71	65455	65455	131	131	142.55	18661.28838
7170.10-06	Spokane River, WA	LL5-0.5m	1	10/14/2015	500	0.1085%	Monoraphidium spp.	Chlorophyta	Chlorophyceae	Sphaeropleales	Selenastraceae	Monoraphidium	spp.	3	1	3	2766	2766	6	6	30.631	169.4331886
7170.10-06	Spokane River, WA	LL5-0.5m	1	10/14/2015	500	0.1085%	Navicula spp.	Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	Navicula	spp.	10	1	10	9219	9219	18	18	1470.265	27108.8861
7170.10-06	Spokane River, WA	LL5-0.5m	1	10/14/2015	500	0.1085%	Nitzschia spp.	Bacillariophyta	Bacillariophyceae	Pennales	Bacillariaceae	Nitzschia	spp.	7	1	7	6453	6453	13	13	1165.531	15043.12011
7170.10-06	Spokane River, WA	LL5-0.5m	1	10/14/2015	500	0.1085%	Scenedesmus sp.	Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	sp.	23	4	92	21204	84815	42	170	282.743	47961.82973

APPENDIX IV – Lake Spokane Zooplankton Data

(See Excel Spreadsheet of Laboratory Data)

(This Page Intentionally Left Blank)