Stantec Consulting Ltd.
40 Highfield Park Drive, Suite 102
Dartmouth NS B3A 0A3
Tel: (902) 468-7777
Fax: (902) 468-9009

May 27, 2013
File: 121510982

Clayton Developments Limited
255 Lacewood Drive, Suite 100C
Halifax, NS B3M 4G2

Attention: Mike Hanusiak, Sr. Vice President, General Manager

Dear Mr. Hanusiak:

Reference: Water Quality Monitoring Results for Russell Lake – April 2013 Sampling Event

To monitor the effects of development, water quality monitoring has been undertaken on a seasonal basis since April of 2005 at four stations in Russell Lake (Figure 1 in Attachment). Monitoring events include one spring, two summer, and one fall sampling event each year. Water samples are not collected in winter. Sampling results have been provided in previous letter reports to you, with a summary of the sampling up to November 7, 2012 presented in the report dated December 9, 2012. The present report builds on the results to date while focusing on the most current spring sampling event on April 3, 2013, with special attention provided to previous spring sampling events.

The weather during the sampling period on April 3, 2013 was overcast with an air temperature of -7°C to -4°C. A trace amount of rain occurred within 48 hours prior to the sampling event, with 0.5 mm of rain measured at the Halifax International Airport on April 2. Hourly mean wind speeds were up to 45 km/h and blew primarily from the north for 48 hours leading up to the date of sample collection. The mean hourly wind speeds were between 14 and 42 km/h on the sampling date, similar to the previous 48 hours.

Sampling was conducted between 13:30 and 14:00 on April 3, 2013. The following conditions were observed at the four Russell Lake monitoring stations (i.e., In-Lake, Outlet, South Inlet and North Inlet sampling stations):

- In Russell Lake, the water appeared clear to slightly tea-stained at the In-Lake station.
- At the Outlet station of Russell Lake, the water appeared clear. The water level at the Outlet station appeared similar to other spring events.
- Water flowing in the South Inlet station appeared slightly tea-stained. The South Inlet station contained a water level similar to previous spring sampling events.
- The water appeared clear to slightly tea-stained at the time of sample collection from the North Inlet station. The grating within the culvert at this station contained garbage. Algal growth was minimal but present on the substrate within the North Inlet dissipation pool.

Tables 1 to 6 below present statistical summaries of analytical results from April 2005 to April 2013 for key water quality parameters (total suspended solids (TSS), turbidity, pH, conductivity, sodium and chloride ions, total phosphorus (TP), Chlorophyll a (Chl a), and faecal coliforms) at each of the monitoring stations. The seasonal trends for some of the key water quality parameters are presented graphically in Figures 2 to 8, which are attached to this letter report. Where applicable, the water quality data were compared to the Canadian Council for the Ministers of the Environment Guidelines for the Protection of Freshwater Aquatic Life (CCME FAL).

Reference: Water Quality Monitoring Results for Russell Lake – April 2013 Sampling Event

Water Clarity

TSS concentrations (Figure 2 in Attachment and Table 1 below) were detected at 1 mg/L for the In-Lake station and 2 mg/L at the Outlet station. These values are below the historical median TSS concentrations for the In-Lake and Outlet stations. The concentration of TSS at the South Inlet station was 1 mg/L and similar to the median and mean for this station. The TSS concentration at the North Inlet was analytically non-detectable and lower than the historical median concentration. These results are consistent with low TSS concentrations for previous spring sampling events.

Table 1 Russell Lake - TSS Statistics

Station	April 3, 2013 Results (mg/L)	Spring Season Min (mg/L)	Spring Season Max (mg/L)	Spring Season Median (mg/L)	Spring Season Mean (mg/L)
In-Lake	1	ND*	9	2	3
Outlet	2	ND	5	3	2
South Inlet	1	ND	2	1	1
North Inlet	ND	ND	330	4	53

* ND = <1 mg/L TSS

Turbidity levels at the In-Lake, Outlet and North Inlet stations for April 3, 2013 were generally consistent with historical spring median values as presented below in Table 2. Turbidity at the In-Lake and North Inlet Station was lower than historical minimum concentrations.

Table 2 Russell Lake - Turbidity Statistics

Station	April 3, 2013 Results (NTU)	Spring Season Min (NTU)	Spring Season Max (NTU)	Spring Season Median (NTU)	Spring Season Mean (NTU)
In-Lake	0.6	0.7	3.1	1.4	1.8
Outlet	0.8	1.2	2.9	1.6	1.9
South Inlet	1.8	0.3	2.4	1.0	1.0
North Inlet	1.2	1.3	170	6.4	28.4

pH

Measurements of pH collected since April 2005 (Figure 3 in Attachment and Table 3 below) indicate that the water of Russell Lake and its tributaries are historically slightly basic. The pH readings in April 2013 were neutral to slightly basic and ranged from 7.2 at the North Inlet station to 7.5 at the South Inlet station. These pH results are consistent with results from previous spring sampling events and are within the CCME FAL guideline of 6.5 to 9.0 for pH.

Table 3 Russell Lake - pH Statistics

Station	April 3, 2013 Results (Units)	Spring Season Min (Units)	Spring Season Max (Units)	Spring Season Median (Units)	Spring Season Mean (Units)
In-Lake	7.3	6.5	7.8	7.2	7.1
Outlet	7.4	6.5	7.7	7.2	7.2
South Inlet	7.5	6.4	7.8	7.3	7.1
North Inlet	7.2	7.0	8.1	7.8	7.6

Salt Concentrations

As is typical of urban lakes in watersheds subject to development, Russell Lake has relatively higher salt concentrations than would be expected for a similar lake in a less developed watershed. Conductivity increases with salt concentrations and elevated levels are typically exhibited during spring melt conditions that generally decrease to lower concentrations during the summer monitoring periods. Concentrations tend to be higher at the North Inlet station, where the road network and associated drainage is concentrated and lower at the South Inlet station, which is less developed.

As presented in Table 4 (below) and on Figure 4 (Attachment), the April 2013 conductivity measurements at the In-Lake, Outlet and South and North Inlet stations were within the range observed since 2005 and similar to the overall spring median and mean conductivity values.

Table 4 Russell Lake - Conductivity Statistics

Station	April 3, 2013 Results (µS/cm)	Spring Season Min (µS/cm)	Spring Season Max (µS/cm)	Spring Season Median (µS/cm)	Spring Season Mean (µS/cm)
In-Lake	654	350	1000	640	678
Outlet	654	360	1000	645	683
South Inlet	234	130	330	230	231
North Inlet	1178	490	5100	2000	2061

Sodium and chloride are indicators of road salt concentrations in urban lakes and are discussed in that context below. Given that CCME FAL recommends a chloride concentration of less than 120 mg/L for the long-term health of aquatic organisms (guideline of 640 mg/L for short-term exposure), the discussion of salt concentrations below will revolve predominantly around chloride with a brief description of sodium concentrations within Russell Lake.

Sodium (Na) concentrations in April 3, 2013 at the In-Lake, Outlet, North Inlet and South Inlet sampling stations (131 mg/L, 138 mg/L, 410 mg/L and 42 mg/L, respectively) were within their respective ranges observed over the duration of monitoring during previous spring events.

Chloride ions at the In-Lake, Outlet and North Inlet stations (200 mg/L, 220 mg/L and 410 mg/L, respectively) exceeded the CCME FAL long-term guideline value of 120 mg/L. The In-Lake, Outlet and North Inlet stations on the long term have generally exceeded the CCME long-term guideline concentration for chloride, with the North Inlet having the highest median spring chloride concentration of 560 mg/L (see Table 5). The April 2013

South Inlet sample concentration (73 mg/L) was below the CCME long-term guideline and within the range of concentrations observed since April 2005.

Table 5 Russell Lake - Chloride Statistics

Station	April 3, 2013 Results (mg/L)	Spring Season Min (mg/L)	Spring Season Max (mg/L)	Spring Season Median (mg/L)	Spring Season Mean (mg/L)
In-Lake	200	91	270	170	180
Outlet	220	93	270	175	180
South Inlet	73	23	76	50	50
North Inlet	410	110	1500	560	578

Nutrient Enrichment

The Chlorophyll a (Chl a) concentration of 0.89 µg/L (based on the acidification technique) at the In-Lake station for April 2013 was within the range of previously reported spring samples and below the median and mean spring concentrations (Table 6 below and Figure 6 in Attachment). The Outlet sample (2.69 µg/L) also was within the range of previous spring samples which included a low of 1.54 µg/L in 2008 and a high of 19.56 µg/L in 2011.

Total phosphorus (TP) concentrations at the In-Lake station have fluctuated over the spring sampling events, ranging from a low of 3 µg/L in 2005 to a high of 31 µg/L in 2011 (Figure 7 in Attachment and Table 7). The total phosphorus concentration in April 2013 was non-detectable (Table 7), which is the lowest spring value recorded since monitoring began in 2005. The April 2013 concentration is also below the HRM threshold value of 15 µg/L for Russell Lake. It should be noted that the HRM threshold value is intended for comparison to sample results at the In-Lake station only. The Outlet station TP concentration fluctuated similarly to the In-Lake station with a range from 6 µg/L in 2010 to 23 µg/L in 2011. The April 2013 TP concentration of 5 µg/L was the lowest spring value recorded since monitoring began in 2005 (Table 7).

Table 6 Russell Lake - Chl a Statistics

Station	April 3, 2013 Results (µg/L)	Spring Season Min (µg/L)	Spring Season Max (µg/L)	Spring Season Median (µg/L)	Spring Season Mean (µg/L)
In-Lake	0.89	0.84	29.10	4.21	8.23
Outlet	2.69	1.54	19.56	5.19	7.04
South Inlet	10.17	0.69	2.22	1.47	1.50
North Inlet	1.26	0.31	2.78	0.99	1.16

The Chl a concentration for the April 2013 sampling event at the South Inlet station was 10.17 µg/L (Table 6). This result is above the range of previous spring season values, which were between 0.69 µg/L (in 2009) and 2.22 µg/L (in 2007). The TP concentration at the South Inlet station in April 2013 measured 15 µg/L (Table 7), which is the second lowest concentration recorded since 2005. Prior TP concentrations ranged from 14 µg/L in 2012 to 45 µg/L in 2010. It should be noted that dissolved phosphorus was detected only at the South Inlet station at a concentration of 3 ug/L (refer to Table 10), suggesting that the source of TP is attributed to primarily particulate matter. Further, based on the fact that the orthophosphate concentration (measured as phosphorus) is the inorganic form of phosphorus and was not detected, this further suggests that most of the

TP measured at the South Inlet station is from organic sources of particulate matter (e.g., vegetative or decaying biological matter). This may also explain the above-noted high concentration of Chl a that was measured at this station and which could be attributed to undetected small pieces of macroalgae being present in the water sample.

The Chl a concentration for the April 2013 sampling event at the North Inlet station was 1.26 µg/L (Table 6 above). This result is within the range of all previous spring season values, which were between 0.31 µg/L (in 2008) and 2.78 µg/L (in 2012). As indicated in Table 7 (below), the TP concentration at the North Inlet station in April 2013 measured 2 µg/L and is the lowest concentration of previous spring values for TP concentrations.

Table 7 Russell Lake - TP Statistics

Station	April 3, 2013 Results (µg/L)	Spring Season Min (µg/L)	Spring Season Max (µg/L)	Spring Season Median (µg/L)	Spring Season Mean (µg/L)
In-Lake	ND*	3	31	13	14
Outlet	5	6	23	12	14
South Inlet	15	14	45	31	31
North Inlet	2	3	180	12	40

* ND = <2 µg/L TP

Bacterial Contamination

Bacterial contamination in Russell Lake is measured by sampling and testing for the presence of faecal coliforms in the water. In addition to faecal coliform analysis conducted by the laboratory, analysis of *Escherichia coli* (*E. coli*) has also been carried out for sampling events beginning in 2010. *E coli* are a type of faecal coliform that may be considered a more specific indicator of bacteria found in the intestines of warm-blooded animals and humans and are a strong indicator of recent sewage or animal waste contamination, whereas some faecal bacteria may originate from non-faecal sources. *E coli* counts were non-detectable for both the In-Lake and Outlet Stations. The *E. coli* counts at the South and North Inlet Stations were 10 CFU/100mL and 30 CFU/100mL, respectively. The *E. coli* counts at all stations were below the CCME Water Quality Guideline for Recreational Use of 200 CFU/100mL. The concentration of faecal coliforms were non-detectable at all stations in April 2013. These bacterial concentrations are low for spring sampling events when compared to station-specific results from previous years (refer to Figure 8 in Attachment).

Conclusion

The results of the April 2013 sampling event indicate that total phosphorus (TP) levels for the In-Lake station are below the HRM threshold value of 15 µg/L. The spring TP result at the Outlet station was slightly higher than the concentration at the In-Lake station. The In-Lake and Outlet Chl a concentrations were the second lowest concentration, for their respective stations, observed during the spring season. The high Chl a concentration for the South Inlet station was the highest ever recorded for a spring sampling event and which could be attributed to particulate matter of organic origin in the water sample.

The April 2013 conductivity, sodium (Na) and chloride (Cl) concentrations were within the range of results from previous spring sampling events for all stations; concentrations of chloride exceeded CCME FAL long-term guideline for chloride at the North Inlet, In-Lake and Outlet stations.

Reference: Water Quality Monitoring Results for Russell Lake – April 2013 Sampling Event

The pH values from April 2013 were within the range of results from previous spring sampling events for all stations. They were within the CCME FAL guideline for pH of 6.5 to 9.0.

The TSS and turbidity concentrations were all within the range of results from previous spring sampling events and generally the April 2013 concentrations were below the respective median values.

Sincerely,

STANTEC CONSULTING LTD.

ORIGINAL SIGNED BY

Matt Steeves, B.Sc
Aquatic Scientist
Tel: (902) 468-7777
matt.steeves@stantec.com

ORIGINAL SIGNED BY

Amber Fox, MREM
Project Manager
Tel: (902) 468-7777
amber.fox@stantec.com

cc: Cameron Deacoff, Halifax Regional Municipality

Attachment: Figures 1-8 and Tables 8-11

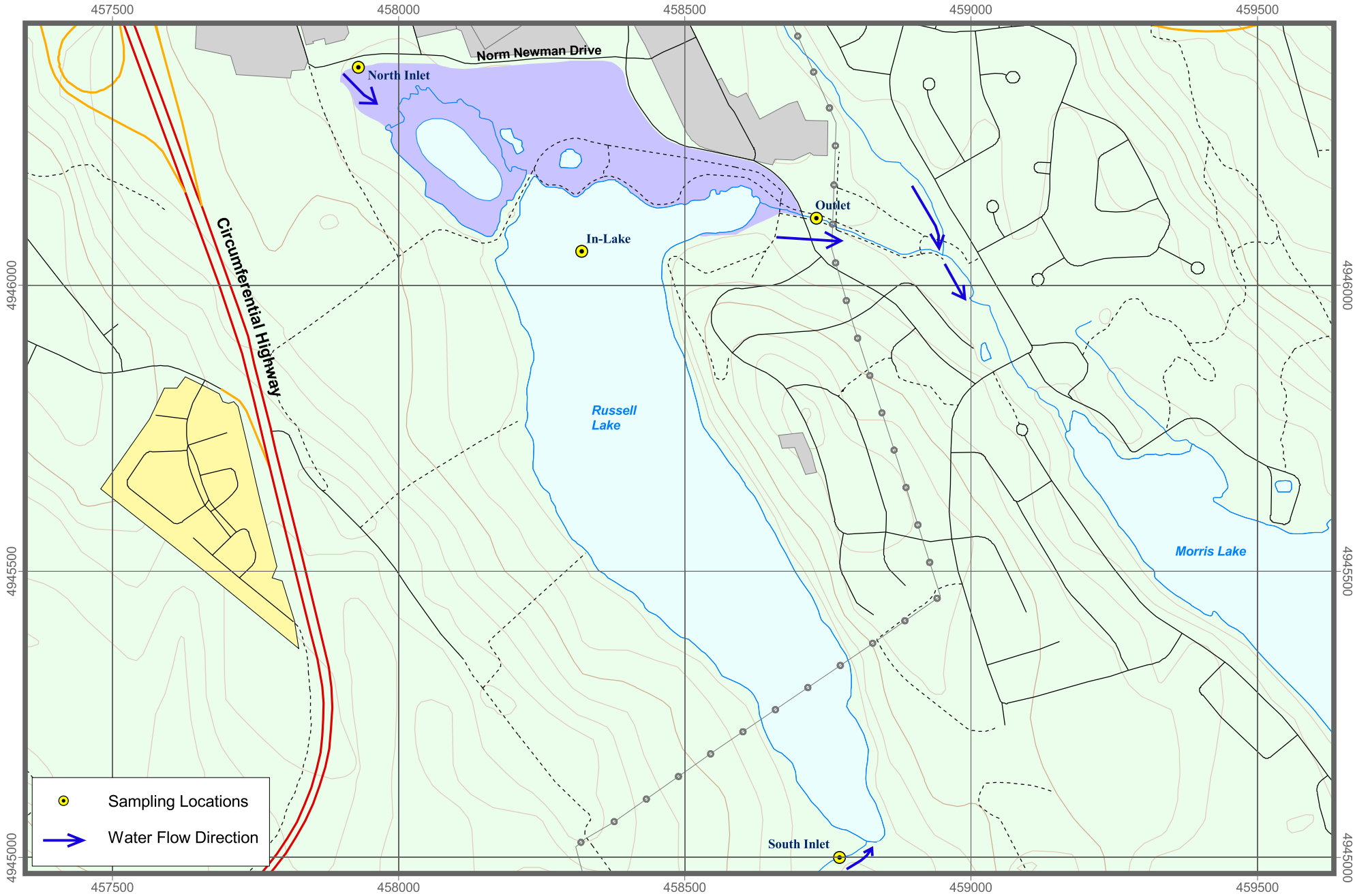


Figure 1

Russell Lake Sampling Locations

0 250 500

Metres

Map Parameters
Projection: UTM-NAD83-Z20
Scale 1:9,000
Date: May 11, 2007
Project No.: NSD19184

Stantec

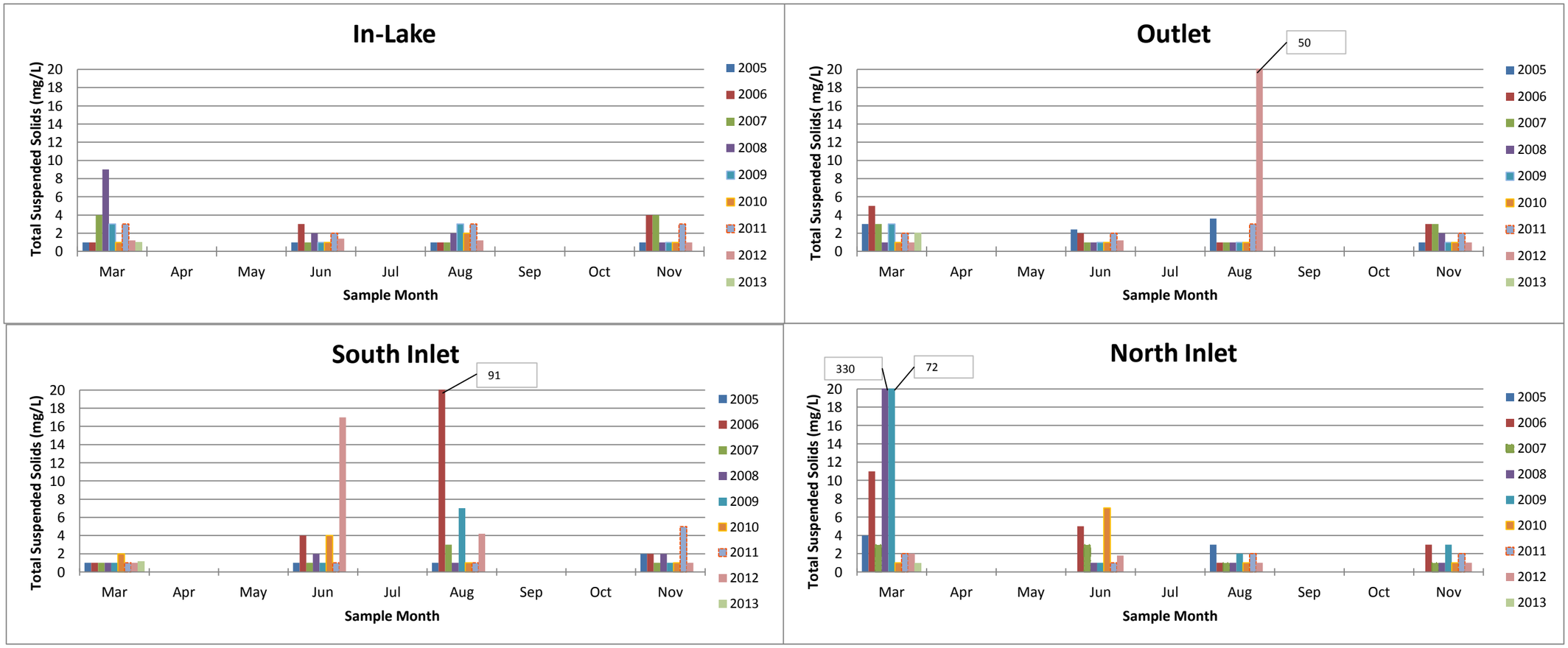


Figure 2. Total Suspended Solids at four sites in Russell Lake from April 2005 to April 2013

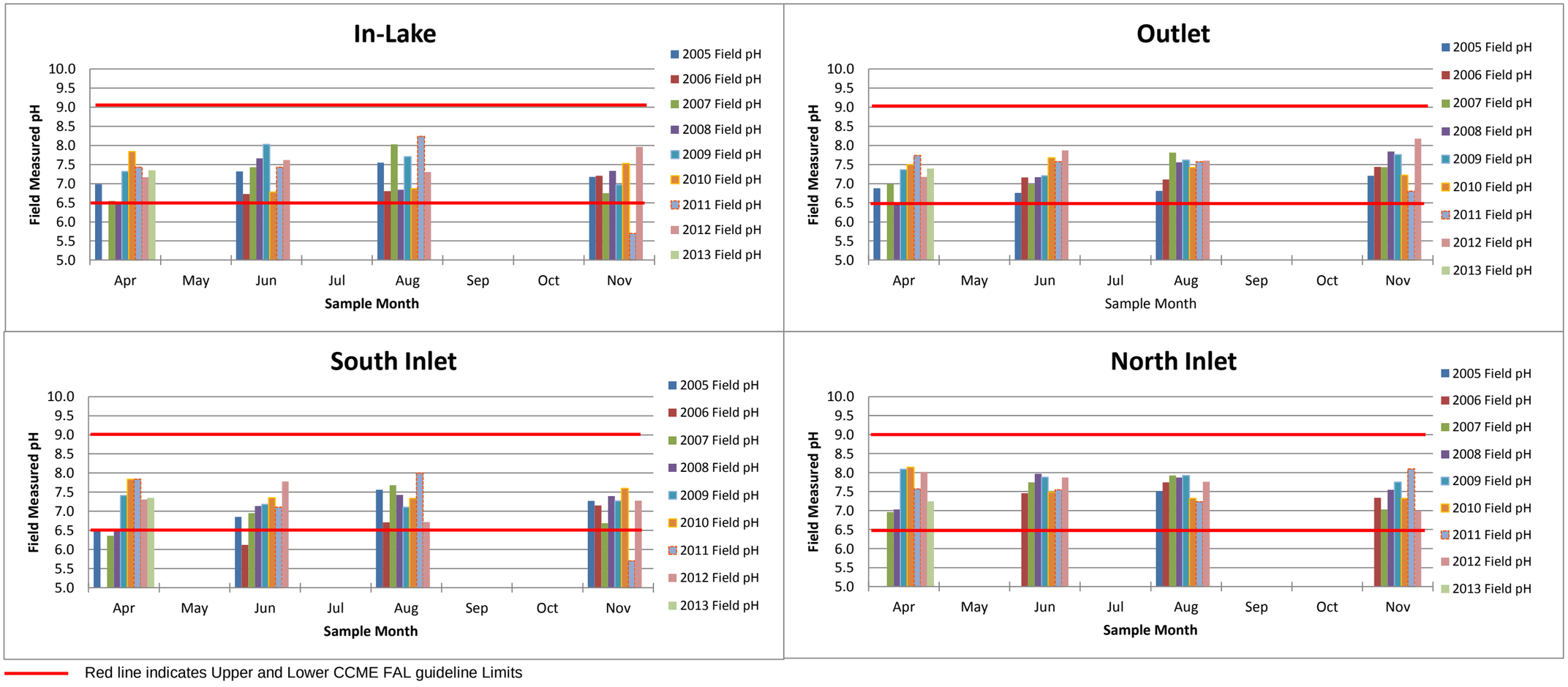


Figure 3. pH at four sites in Russell Lake from April 2005 to April 2013

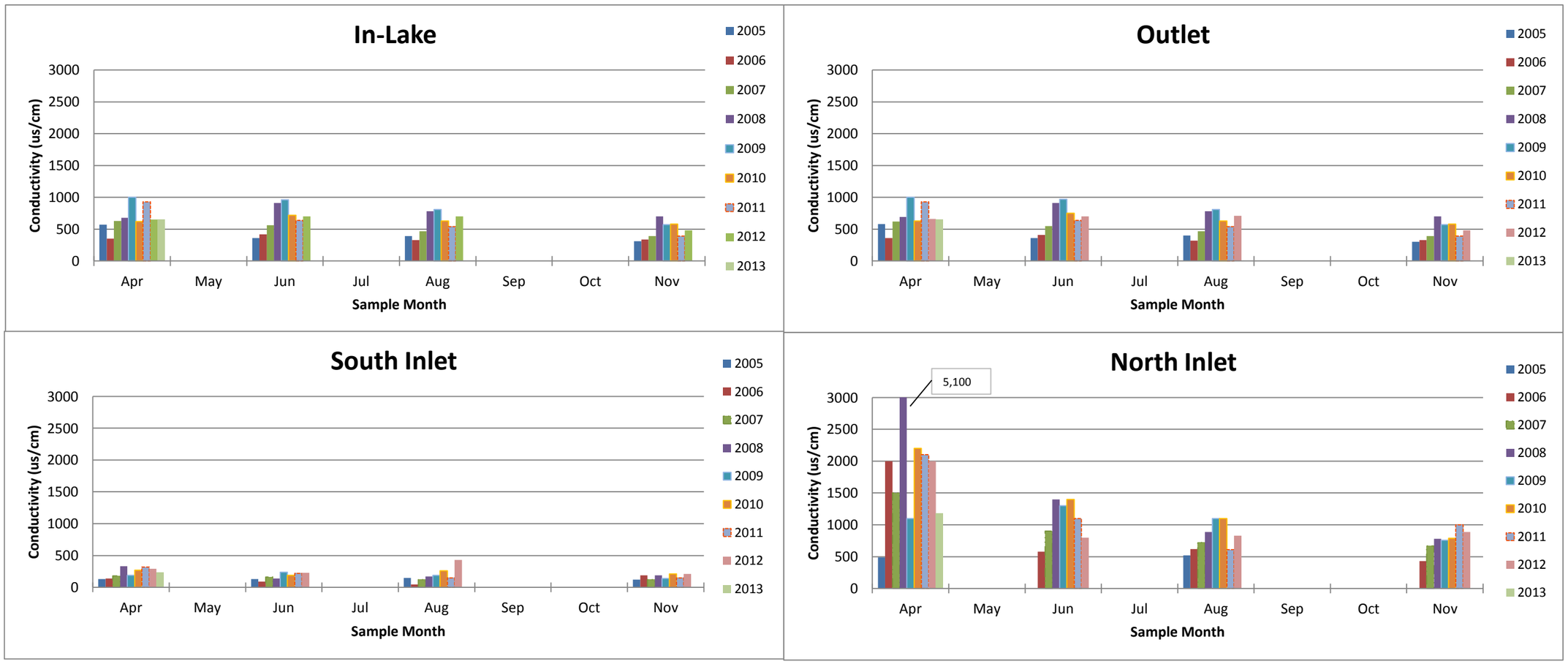
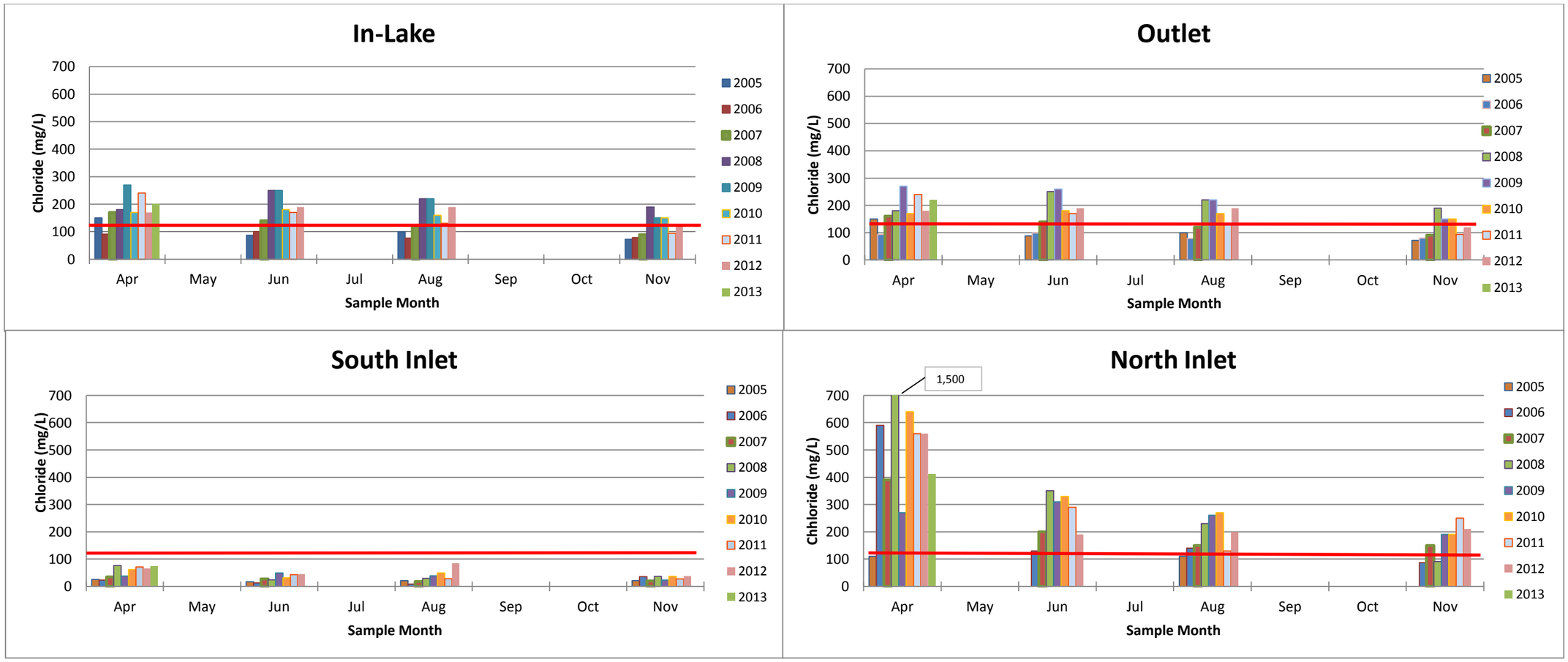


Figure 4. Conductivity at four sites in Russell Lake from April 2005 to April 2013



Red line indicates long-term CCME FAL guideline limit of 120 mg/L for chloride

Figure 5. Chloride concentrations at four sites in Russell Lake from April 2005 to April 2013

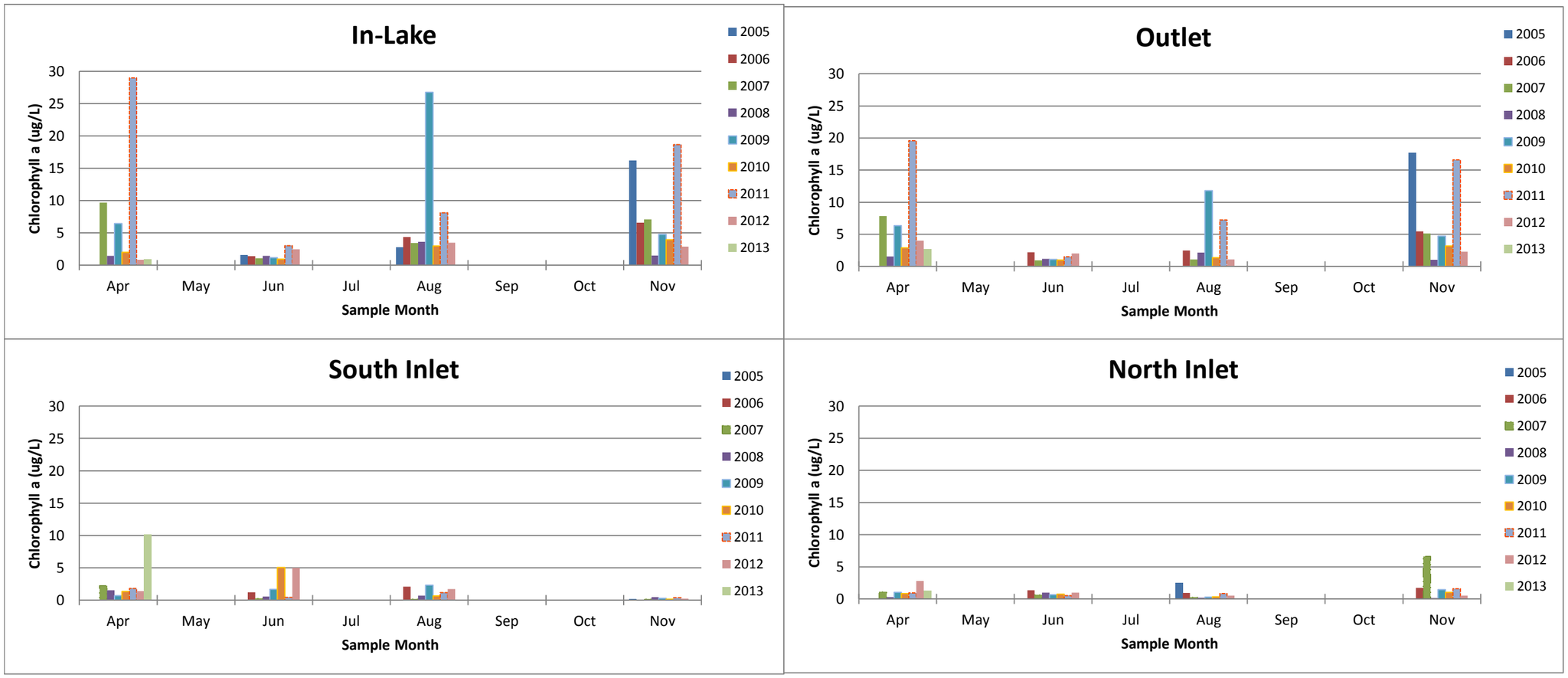


Figure 6. Chlorophyll a concentrations at four sites in Russell Lake from April 2005 to April 2013

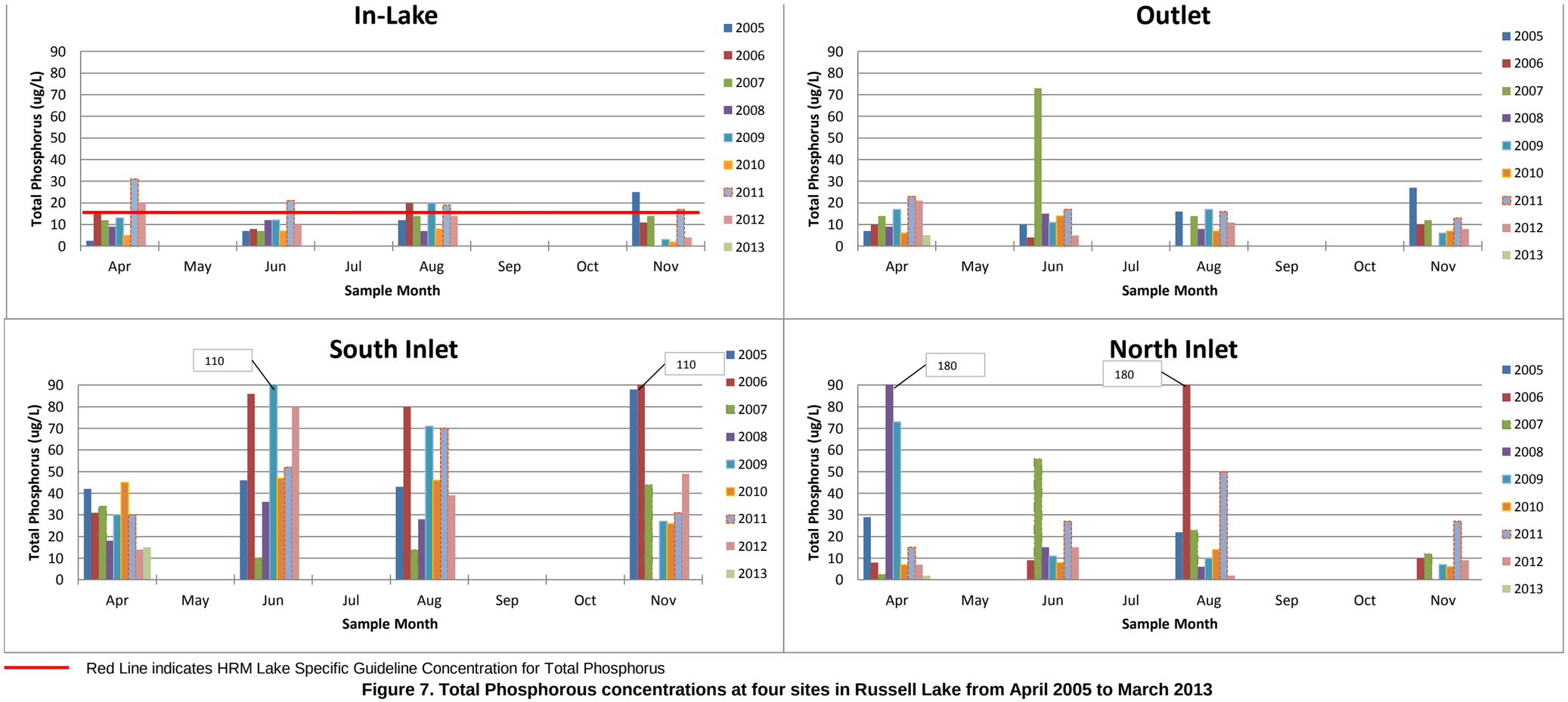


Figure 7. Total Phosphorous concentrations at four sites in Russell Lake from April 2005 to March 2013

Red line indicates Upper CCME Recreational Use guideline Limit

Figure 8. Faecal Coliform at four sites in Russell Lake from April 2005 to April 2013

TABLE 8 Surface Water Quality Data for Russell Lake, In-Lake (2005-2013)

Analyte	Units	CCME FWAL	In-Lake																																			
			2005				2006				2007				2008				2009				2010				2011				2012				2013			
			Apr	Jun	Aug	Nov	Mar	Jun	Aug	Oct	Apr	Jun	Aug	Oct	Mar	Jun	Aug	Oct	Apr	Jun	Aug	Oct	Mar	Jun	Aug	Nov	Mar	Jun	Aug	Nov	Apr	Jun	Aug	Nov	Apr	Summer1	Summer2	Fall
General Chemistry																																						
Total Alkalinity (as $CaCO_3$)	mg/L		20	17	21	17	15	20	25	26	22	29	27	30	19	22	28	34	27	30	36	35	30	35	36	36	32	31	33	35	27	33	35	36	32			
Chloride	mg/L		150	87	99	72	91	100	77	79	170	140	120	89	180	250	220	190	270	250	220	150	170	180	160	150	240	170	130	94	170	190	190	120	200			
Colour	TCU		12	12	8	18	12	14	13	11	9	9	8	12	10	11	15	9	16	9	14	20	14	8	10	15	14	19	22	21	10	7.9	6.2	15	11			
Hardness (as $CaCO_3$)	mg/L		48	34	40	37		43	39	42	59	53	52	46	52	62	64	56	70	65	66	52	54	69	65	58	69	60	53	47	56	63	62	52	66			
Nitrate + Nitrite (as N)	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.05	<0.05	<0.05	0.2	<0.05	<0.05	<0.05	0.11	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	0.095	<0.05	<0.05	<0.05	0.14			
Nitrate (as N)	mg/L	13000	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-			
Nitrite (as N)	mg/L	60	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	<0.01	<0.01	-	-	-	-	-	-	-	-	-			
Ammonia (as N)	mg/L	19	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	>0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.12	<0.05	<0.05	0.064	<0.05	<0.05	0.059			
Total Keljdahl Nitrogen	mg/L		-	-	-	0.4	0.4	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Total Organic Carbon	mg/L		1.9	3.6	3	4.4	<0.5	3.7	4.6	3.6	2.7	4	2.4	4.3	2	2.2	2.4	4.3	3.3	3.1	5	4.5	2.9	2.4	4.1	3.3	2.7	3.5	4.2	<5	2.7	2.9	3.1	4	3.1			
Ortho Phosphate (as P)	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			
Total Phosphorus	ug/L		*2.5*	7	12	25	15	8	20	11	12	7	14	14	9	12	7		13	12	20	3	5	7	8	2	31	21	19	17	20	10	14	4	<1			
Dissolved Phosphorus	mg/L		<0.005	-	<0.1	-	0.006	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002			
pH	Units	6.5-9	7.0	7.0	7.1	7.3	7.0	6.8	7.4	7.5	7.4	7.5	7.6	7.5	7.5	7.6	7.4	7.4	7.1	7.4	7.5	7.5	7.3	7.5	7.5	7.5	7.4	7.5	6.8	7.6	7.5	7.7	7.8	7.7	7.4			
Reactive Silica (as SiO_2)	mg/L		1.8	0.7	2.1	3.5	2.5	1.3	2.5	<0.5	0.9	0.7	2.3	0.8	1.8	0.8	2.6	3.6	2.2	0.6	2.2	3.4	2.8	1.2	2.4	2.4	1.9	0.8	2.0	2.5	1.9	1	2.0	3.5	2.3			
Sulphate	mg/L		16	12	13	13	15	15	11	12	17	18	16	13	20	24	23	20	25	26	20	17	18	18	16	16	23	17	16	13	16	18	15	13	21			
Turbidity	NTU		0.7	0.6	0.8	2	1.3	1.1	1	3.6	2.9	0.9	0.8	3.2	3.1	1	1.7	0.7	1.4	0.6	1	0.8	1.1	0.5	1	1.2	2.8	1.0	2.2	1.2	1.2	1.1	0.9	1.3	0.62			
Conductivity	µS/cm		570	360	390	310	350	420	330	340	630	560	470	390	680	910	780	700	1000	960	810	570	620	720	630	580	930	640	540	390	650	700	700	480	830			
TDS (calculated)	mg/L		289	176	206	159	192	212	176	170	326	285	245	204	345	462	434	368	518	485	418	300	327	358	139	309	456	332	279	207	328	365	359	256	403			
Bicarbonate (as $CaCO_3$)	mg/L		20	17.1	21.3	17	15	20	25	26	22	29	27	30	19	22	27	34	27	30	36	35	30	35	36	36	31	31	33	35	27	33	35	36	32			
Carbonate (as $CaCO_3$)	mg/L		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1			
Calcium	mg/L		16	12	14	12	13	14	13	14	20	18	17	15	18	21	22	19	24	22	23	18	18	23	22	20	24	20	18	16	19	21	21	17.5	22.3			
Magnesium	mg/L		1.8	1.4	1.7	1.6	1.7	1.8	1.8	1.8	2.5	2.1	2.1	1.8	1.8	2.2	2.2	2.1	2.4	2.2	2.3	2	1.9	2.6	2.4	2.2	2.3	2.2	2.0	1.9	2	2.3	2.4	2.06	2.48			
Potassium	mg/L		1.5	1.2	1.5	1.5	1.5	1.4	1.6	1.7	2.2	2.3	2.1	2.3	2.1	2.3	2.4	2.4	2.6	2.5	2.5	2.3	2.0	2.2	2.1	2.3	2	1.9	1.8	1.9	1.8	2.0	2.0	1.95	2.15			
Sodium	mg/L		92	52	64	46	58	64	54	45	100	85	73	63	110	150	140	110	180	160	130	89	95	107	89	94	144	102	85	57	99	115	109	74.4	131			
*Total Suspended Solids	mg/L		**1**	**1**	**1**	**1**	**1**	3	**1**	4	4	1	1	4	9	2	2	1	3	**1**	3	1	**1**	**1**	2	**1**	3	2	3	3	1.2	1.4	1.2	1	1			
Chlorophyll a	µg/L			1.60	2.80	16.20		1.42	4.35	6.58	9.69	1.07	3.45	7.11	1.44	1.47	3.64	1.48	6.43	1.17	26.80	4.78	1.99	0.96	2.99	3.96	29.01	3.04	8.11	18.67	0.84	2.46	3.48	2.87	0.89			
Field Measurements																																						
Secchi disc depth	m		-	3.4	2.8	3.0	-	2.8	-	1.5	-	4.8	2.5	1.5	-	-	1.75	4	1.3	6	1.4	3.75	3.5	4	2.3	2.6	1.7	1.6	1.5	1.4	4.5	2.8	3.6	2.7	4.5			
Dissolved Oxygen	mg/L		10.5	8.9	7.3	13.2	-	10.6	5.6	12.3	14.5	9.8	11.0	10.2	16.9	9.5	8.0	10.8	9.7	11.3	8.8	10.9	13.4	8.1	7.6	13.1	13.1	7.4	5.9	10.5	10.5	8.2	9.6	10.6	13.4			
pH	units		7.0	7.3	7.6	7.2		6.7	6.8	7.2	6.6	7.4	8.0	6.8	6.5	7.7	6.8	7.3	7.3	8.0	7.7	7.0	7.8	6.8	6.9	7.5	7.4	7.4	8.2	5.7	7.2	7.6	7.3	8.0	7.3			
Conductivity	µS/cm		602	334	188	129		393	310	330	612	527	474	278	444	1701	1514	600	1031	278	831	-	601	698	635	570	917	631	526	387	648	635	652	443	654			
Temperature (field)	°C		10.4	19.6	23.4	7.2	-	19.8	21.1	8.4	7.8	20.4	23.3	11.1	5.6	18.3	21.9	9.5	5.3	16.9	22.2	8.3	5.2	20.6	22.6	8.7	3.4	18.3	20.7	8.0	6.8	18.9	25.0	10.1	5.2			
Bacteriological																																						
**E.Coli	CFU/100ml																						1	**1**	3	3	<1	3	67	4	1	45	1	20	**1**			
**Faecal Coliform	MPN/100 ml		**1**	**1**	1	1		5	1300	**1**	3	120	300	140	11	8	440	2	150	**1**	3200	32	**1**	160	20	57	2	3	240	**1**	4	30	1	**10**	**1**			

FWAL - Freshwater Aquatic Life

***Results below detection limits (DL) shown as 1/2 DL**

****Results below detection limits shown as 1**

Cells left intentionally blank for graphs to indicate no sample collected

Cells with dash indicate no sample collected

April 2005 result for TP is italized because result was below detection limit (DL) and shown as 2.5 (1/2 DL). The DL is now 2 ug/L.

TABLE 9 Surface Water Quality Data for Russell Lake, Outlet (2005-2013)

Analyte	Units	CCME FWAL	Outlet																																			
			2005				2006				2007				2008				2009				2010				2011				2012				2013			
			Apr	Jun	Aug	Nov	Mar	Jun	Aug	Oct	Apr	Jun	Aug	Oct	Mar	Jun	Aug	Oct	Apr	Jun	Aug	Oct	Mar	Jun	Aug	Nov	Mar	Jun	Aug	Nov	Apr	Jun	Aug	Nov	Apr	Summer1	Summer2	Fall
General Chemistry																																						
Total Alkalinity (as $CaCO_3$)	mg/L		19	17	23	17	16	21	25	26	22	26	27	30	19	23	27	33	27	29	36	34	30	34	37	37	29	33	34	34	28	30	37	37	32			
Chloride	mg/L		150	88	100	72	93	99	79	80	160	140	120	90	180	250	220	190	270	260	220	150	170	180	170	150	240	170	130	93	180	190	190	120	220			
Colour	TCU		11	12	12	18	12	14	14	11	9	9	9	12	11	10	16	9	16	10	16	18	16	14	14	18	13	21	21	22	13	8.7	10	16	9.4			
Hardness (as $CaCO_3$)	mg/L		49	6.94	42	37	-	43	41	41	59	54	50	44	53	63	65	59	65	68	66	51	56	73	62	58	68	55	54	48	58	61	63	55	69			
Nitrate + Nitrite (as N)	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.14	<0.05	<0.05	<0.05	0.21	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	<0.05	0.092	<0.05	<0.05	<0.05	0.12			
Nitrate (as N)	mg/L	13000	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-			
Nitrite (as N)	mg/L	60	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	<0.01	<0.01	-	-	-	-	-	-	-	-	-			
Ammonia (as N)	mg/L	19	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Total Kejldahl Nitrogen	mg/L		-	0.5	0.4	0.3	0.1	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Total Organic Carbon	mg/L		2.1		3.6	4.3	3.6	3.3	5.4	2.9	2.9	3.7	3.2	4.3	2.3	3.3	3.2	3.8	2.7	3.1	3.7	3.5	2.8	3	3.7	3.6	2.5	3.7	4.2	<0.01	3	3.2	3.5	4.1	2.8			
Ortho Phosphate (as P)	mg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			
Total Phosphorus	ug/L		7	10	16	27	10	4	<20	10	14	73	14	12	9	15	8		17	11	17	6	6	14	7	7	23	17	16	13	21	5	11	8	5			
Dissolved Phosphorus	mg/L		0.005	-	<0.1	-	0.007	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002			
pH	Units	6.5-9.0	6.7	6.9	7.1	7.3	6.9	6.7	7.4	7.5	7.2	7.4	7.6	7.5	7.5	7.4	7.3	7.3	7.1	7.5	7.3	7.8	7.3	7.3	7.7	7.5	7.5	7.7	6.6	7.6	7.5	7.7	7.6	7.7	7.4			
Reactive Silica (as SiO_2)	mg/L		1.4	1	2.5	3.5	2	1.3	2.4	1.4	0.9	4.4	2.3	0.8	1.8	1.6	2.6	3.4	2.1	0.5	2.4	3.3	2.3	0.9	2.4	2.4	1.7	0.8	2.1	2.4	1.3	1.1	2.4	3.4	2			
Sulphate	mg/L		16	12	12	16	14	14	11	12	17	18	16	13	19	24	23	20	25	24	20	17	17	18	17	16	23	17	15.0	13	16	18	15	12	21			
Turbidity	NTU		1.4	2.4	0.2	1.8	1.2	1	0.3	2.8	2.9	0.7	0.6	2.5	2.8	0.8	1.2	0.3	1.4	0.6	0.5	0.7	1.2	1	0.6	0.8	2.4	0.6	1.3	1.1	1.8	0.88	0.34	1.3	0.8			
Conductivity	µS/cm		580	360	400	300	360	410	320	330	620	550	470	390	690	910	780	700	1000	970	810	570	630	750	630	580	930	640	540	390	660	700	710	480	840			
TDS (calculated)	mg/L		292	<1	214	162	197	209	178	171	323	286	243	201	342	469	435	372	506	499	417	296	328	365	319	308	450	324	279	207	339	360	365	260	425			
Bicarbonate (as $CaCO_3$)	mg/L		19.5	36	23	17	16	21	25	26	22	26	27	30	19	23	27	33	27	29	36	34	30	34	37	36	29	33	33	34	28	30	37	36	32			
Carbonate (as $CaCO_3$)	mg/L		<1	16.8	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ND			
Calcium	mg/L		17	12	14	12	14	14	14	14	20	18	17	15	18	22	22	19	22	23	23	17	19	25	21	20	23	19	18	16	20.0	20.7	21.3	148.3	23.3			
Magnesium	mg/L		1.8	1.5	1.7	1.6	1.7	1.7	1.7	1.8	2.3	2.2	2.1	1.8	1.8	2.2	2.2	2.1	2.2	2.3	2.3	1.9	2.0	2.7	2.3	2.1	2.3	2.0	2	1.9	2.00	2.24	2.39	2.13	2.59			
Potassium	mg/L		1.6	1.3	1.2	1.5	1.5	1.4	1.5	1.7	2.4	2.1	2	2.3	2.1	2.3	2.4	2.4	2.4	2.6	2.5	2.1	2.0	2.2	2.0	2.2	2.0	1.8	1.8	1.9	2.00	1.99	1.97	1.95	2.27			
Sodium	mg/L		92	57	65	46	61	64	52	44	110	87	71	61	110	150	140	110	160	170	130	88	98	112	85	93	143	95.1	87	58	104	113	110	77.4	138			
**Total Suspended Solids	mg/L		3	2.4	3.6	**1**	5	2	**1**	3	3	**1**	**1**	3	1	1	**1**	2	3	1	1	1	1	**1**	**1**	1	2	2	3	2	**1**	1.2	50	**1**	2			
Chlorophyll a	µg/L					17.70		2.19	2.46	5.46	7.85	0.95	1.08	5.16	1.54	1.20	2.16	1.04	6.35	1.07	11.80	4.72	2.92	1.00	1.35	3.18	19.56	1.49	7.22	16.61	4.03	2.02	1.08	2.3	2.69			
Field Measurements																																						
Secchi disc depth	m		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Dissolved Oxygen	mg/L		10.2	7.4	5.5	10.8	-	11.3	8.9	11.9	14.8	8.4	11.3	10.1	19.3	8.4	7.4	10.9	9.6	6.9	8.1	10.6	11.1	5.0	5.6	13.4	12.6	7.3	5.5	11.2	11.0	8.9	8.1	10.5	13.8			
pH	units		6.9	6.8	6.8	7.2		7.2	7.1	7.4	7.0	7.0	7.8	7.4	6.5	7.2	7.6	7.8	7.4	7.2	7.6	7.8	7.5	7.7	7.4	7.2	7.7	7.6	7.6	6.8	7.2	7.9	7.6	8.2	7.4			
Conductivity	µS/cm		635	345	201	136		389	399	344	613	532	473	272	448	1703	1505	602	1023	278	834	-	592	702	633	571	914	634	529	389	659	633	657	444	654			
Temperature (field)	°C		12.2	22.5	25.5	7.6	-	21.3	23.1	9.1	9.6	22.9	24.5	9.9	5.5	18.6	23.2	7.8	6.2	19.6	23.5	8.8	5.1	20.5	22.8	7.9	5.0	21.0	21	9.3	7.6	20.3	25.9	8.4	5.2			
Bacteriological																																						
**E.Coli	CFU/100ml																						3	**1**	29	10	1	28	54	4	**1**	59	**1**	20	**1**			
**Faecal Coliform	MPN/100 ml		**1**	8	10	**1**		170	2700	**1**	1	700	3000	640	9	160	930	4	140	24	8100	160	**1**	35	600	200	4	23	490	**1**	**1**	70	100	**1**	**1**			

FWAL - Freshwater Aquatic Life

***Results below detection limits (DL) shown as 1/2 DL**

****Results below detection limits shown as 1**

Cells left intentionally blank for graphs to indicate no sample collected

Cells with dash indicate no sample collected

TABLE 10 Surface Water Quality Data for Russell Lake, South Inlet (2005-2013)

Analyte	Units	CCME FWAL	South Inlet																																					
			2005				2006					2007				2008				2009				2010				2011				2012				2013				
			Apr	Jun	Aug	Nov	Mar	Jun	Aug	Sep	Oct	Apr	Jun	Aug	Oct	Mar	Jun	Aug	Oct	Apr	Jun	Aug	Oct	Mar	Jun	Aug	Nov	Mar	Jun	Aug	Nov	Apr	Jun	Aug	Nov	Apr	Summer1	Summer2	Fall
General Chemistry										additional																														
Total Alkalinity (as$CaCO_3$)	mg/L		11	31	33	7	21	13	<5	35	13	11	25	24	25	18	23	37	32	16	34	54	24	25	41	56	27	25	35	24	28	28	32	73	36	27			
Chloride	mg/L		25	17	21	21	23	13	9	36	26	35	27	18	20	76	24	29	37	38	49	39	23	62	31	49	37	71	43	28	27	66	45	85	38	73			
Colour	TCU		24	27	21	45	14	68	380	44	38	23	47	52	41	17	52	150	51	51	50	150	57	26	47	87	59	22	83	200	42	18	99	38	59	24			
Hardness (as $CaCO_3$)	mg/L		24	40	45	23	-	21	46	48	29	30	33	33	28	43	29	41	37	27	40	53	32	42	47	54	43	42	40	31	38	48	44	89	44	46			
Nitrate + Nitrite (as N)	mg/L		<0.05	<0.05	0.09	0.08	0.13	<0.05	<0.05	0.12	0.08	0.09	<0.05	0.07	0.05	0.1	<0.05	0.1	<0.05	0.15	<0.05	0.14	<0.05	0.11	0.06	0.1	<0.05	<0.05	<0.05	<0.05	42	0.067	0.19	0.14	0.11	0.066			
Nitrate (as N)	mg/L	13000	<0.05	<0.05	0.09	0.08	0.13	<0.05	<0.05	-	0.07	0.09	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	0.1	<0.05	-	-	-	-	-	-	-	-			
Nitrite (as N)	mg/L	60	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	<0.01	0.01	-	-	-	-	-	-	-	-			
Ammonia (as N)	mg/L	19	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	0.062	<0.05	<0.05			
Total Keijdahl Nitrogen	mg/L		-	0.3	0.4	0.3	0.3	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Total Organic Carbon	mg/L		6.6	7.1	6.1	9	4.6	<0.5	45	11	7.2	5.6	11	11	9.2	3.3	8.5	17	11	6.3	8.9	13	7.8	5.5	8.1	12	8.4	4.2	9.1	17	5	5.1	11	9.7	8.4	5			
Ortho Phosphate (as P)	mg/L		0.04	0.03	0.04	0.08	0.02	0.08	0.01	0.11	0.05	<0.01	0.05	0.07	0.03	<0.01	0.03	0.03	0.02	0.01	0.01	0.03	<0.01	0.01	0.03	0.02	0.03	0.01	0.02	0.03	0.01	0.012	0.028	0.015	0.013	<1			
Total Phosphorus	ug/L		42	46	43	88	31	86	80	110	53	34	10	14	44	18	36	28	-	30	110	71	27	45	47	46	26	30	52	70	31	14	80	39	49	15			
Dissolved Phosphorus	mg/L		0.037	-	<0.1	-	0.021	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.003			
pH	Units	6.5-9.0	6.8	7.0	7.2	6.6	7.0	6.6	4.7	7.5	6.9	7.0	7.3	7.2	7.2	7.4	7.3	7.2	7.4	6.9	7.4	7.4	7.4	7.3	7.6	7.6	7.4	7.4	7.5	7.0	7.4	7.5	7.4	7.9	7.6	7.3			
Reactive Silica (as SiO_2)	mg/L		4.1	7.2	9.9	5.7	7.4	3.8	5.9	10	5.8	3.5	0.7	6.1	6.5	3.8	4.8	6.5	8.8	3.2	3.5	7.1	5.5	5.6	6.8	7.2	6.4	4.8	4.1	4.8	6.8	4.1	4.5	9	6.9	3.4			
Sulphate	mg/L		12	5.1	7.9	16	11	<2	<10	<2	13	12	<2	<2	<2	15	2	<2	<2	15	3	<2	12	12	3	<2	18	14	<2	<2	11	11	14	10	7.3	14			
Turbidity	NTU		0.3	0.2	<0.1	0.7	1.2	0.4	3.2	1.3	2.8	0.8	0.5	1.6	1.2	0.5	0.5	2.4	1.6	2.4	1.1	6.4	1.5	1.1	1.7	4.1	1.5	0.9	1.0	2.5	4.5	1.3	39	7.5	5.5	1.8			
Conductivity	µS/cm		130	130	150	120	140	89	45	190	140	180	160	120	120	330	140	170	190	190	240	190	140	270	190	260	210	320	220	150	150	290	230	430	210	320			
TDS (calculated)	mg/L		73	74.6	89.3	70	83	43	60	113	78	91	78	66	67	170	75	98	102	104	125	128	84	147	101	139	119	165	112	83	93	155	134	237	116	167			
Bicarbonate (as $CaCO_3$)	mg/L		10.7	31.3	32.8	7	21	13	<1	35	13	11	25	24	25	18	23	37	32	16	34	54	24	25	40	56	27	25	35	24	28	28	32	73	36	27			
Carbonate (as $CaCO_3$)	mg/L		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ND			
Calcium	mg/L		6.6	10	11	6.7	9.1	5.8	14	14	8.4	8.3	9.4	9.3	7.9	13	8.1	13	10	8.3	12	16	9.4	12	13	16.1	13	13	12	9.7	11	147	135	28.1	13.1	14			
Magnesium	mg/L		1.9	3.4	4.1	1.6	3.2	1.5	3	3.4	2	2.1	0.01	2.3	2	2.3	2.2	2.4	2.7	1.5	2.3	3.3	2	2.8	3.6	3.3	2.6	2.7	2.5	1.75	2.5	2.7	2.49	4.5	2.75	2.5			
Potassium	mg/L		1	0.9	0.9	1	1	0.5	2	2	2.1	1.4	0.9	1	1.5	1.6	1.1	1.9	2.4	1.4	1.3	1.4	1.1	1.3	0.9	1.4	1.6	1.1	0.8	1.1	1.4	1.4	2.16	2.63	1.45	1.8			
Sodium	mg/L		16	12	14	13	15	10	21	25	13	21	18	14	13	47	18	21	21	26	34	24	16	35	19	26	24	44	28	21	16	37	30	51	23	42			
**Total Suspended Solids	mg/L		**1**	**1**	**1**	2	**1**	4	91	2	**1**	**1**	**1**	3	1	**1**	2	1	2	**1**	**1**	7	**1**	2	4	**1**	**1**	**1**	1	**1**	5	**1**	17	4.2	**1**	1.2			
Chlorophyll *a*	µg/L				0.10	0.20		1.23	2.07		1.08	2.22	0.22	0.16	0.15	1.54	0.56	0.70	0.48	0.69	1.67	2.32	0.29	1.37	5.05	0.64	0.13	1.80	0.42	1.18	0.36	1.39	4.99	1.71	0.24	10.17			
Field Measurements																																								
Secchi disc depth	m		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Dissolved Oxygen	mg/L		10.4	9.3	7.4	13.0	-	10.3	8.8	-	12.3	14.8	9.9	11.7	12.5	21.4	10.5	6.9	11.4	10.0	10.9	9.1	10.7	15.6	9.3	9.5	15.1	13.7	7.9	6.3	11.0	10.4	8.2	9.8	10.2	15.0			
pH	units		6.5	6.9	7.6	7.3		6.1	6.7	7.2	7.2	6.4	7.0	7.7	6.7	6.5	7.1	7.4	7.4	7.4	7.2	7.1	7.3	7.8	7.4	7.3	7.6	7.8	7.1	8.0	5.7	7.3	7.8	6.7	7.3	7.3			
Conductivity	µS/cm		124	105	185	78		94	161	-	142	174	145	121	74	187	260	331	164	191	69	232	-	268	187	270	205	316	214	145.0	157.0	334	213	392	191	234.3			
Temperature (field)	°C		9.0	15.3	23.5	5.7	-	14.7	16.9	-	6.6	4.8	14.7	16.3	5.1	0.5	12.0	17.2	5.6	4.3	13.3	16.0	5.7	3.7	13.0	16.6	5.4	2.1	13.3	17	7.0	2.6	15.1	17.1	5.3	2.7			
Bacteriological																																								
**E. Coli	CFU/100ml																							2	**1**	500	7	**1**	4	>250	5	**1**	340	**1**	30	10			
**Faecal Coliform	MPN/100 ml		**1**	14	66	**1**		1	100		**1**	**1**	2	200	6	2	2	150	3	3	1	2200	2	**1**	1	1100	280	5	12	200	11	**1**	310	**1**	**1**	**1**			

FWAL - Freshwater Aquatic Life

***Results below detection limits (DL) shown as 1/2 DL**

****Results below detection limits shown as 1**

Cells left intentionally blank for graphs to indicate no sample collected

Cells with dash indicate no sample collected

TABLE 11 Surface Water Quality Data for Russell Lake, North Inlet (2005-2013)

Analyte	Units	CCME FWAL	North Inlet																																					
			2005				2006				2007				2008				2009				2010				2011				2012				2013			
			Apr	Jun	Aug	Nov	Mar	Jun	Aug	Oct	Apr	Jun	Aug	Oct	Mar	Jun	Aug	Oct	Apr	Jun	Aug	Oct	Mar	Jun	Aug	Nov	Mar	Jun	Aug	Nov	Apr	Jun	Aug	Nov	Apr	Summer1	Summer2	Fall
General Chemistry																																								
Total Alkalinity (as $CaCO_3$)	mg/L		28	-	56	-	71	63	70	41	56	81	88	83	40	<1	87	71	47	80	92	72	70	110	99	77	83	92	77	98	84	68	76	93	59			
Chloride	mg/L		110		110		590	130	140	87	390	200	150	150	1500	350	230	91	270	310	260	190	640	330	270	190	560	290	130	250	560	190	200	210	410			
Colour	TCU		28	-	17	-	7	21	13	20	12	13	15	12	7	16	49	13	30	24	25	27	11	22	38	33	13	36	63	18	9.3	41	21	20	11			
Hardness (as $CaCO_3$)	mg/L		62	-	93	-	-	86	110	81	160	150	120	120	230	150	130	120	100	140	140	110	200	170	160	120	220	150	90	170	210	99	110	130	140			
Nitrate + Nitrite (as N)	mg/L		0.65	-	0.22	-	0.4	<0.05	0.07	1.3	0.32	0.24	0.25	0.23	0.62	0.2	0.26	0.15	0.56	0.27	0.21	0.23	0.33	0.26	0.24	0.36	0.47	0.27	0.38	0.35	0.27	0.74	0.27	0.32	0.53			
Nitrate (as N)	mg/L	13000		-		-	0.4	<0.05	0.07	1.27	0.32	-	-	-	-	-	-	-	-	-	-	0.23	-	-	0.23	0.36	-	-	-	-	-	-	-	-	-			
Nitrite (as N)	mg/L	60	<0.01	-		-	<0.01	<0.01	<0.01	0.03	<0.01	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	0.01	<0.01	-	-	-	-	-	-	-	-			
Ammonia (as N)	mg/L	19	<0.05	-	<0.05	-	0.14	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.12	<0.05	<0.05	<0.05	0.06	<0.05	0.06	<0.05	<0.05	<0.05	0.15	0.07	<0.05	0.06	0.1	0.12	0.15	0.082	<0.05	0.091	<0.05			
Total Keljdahl Nitrogen	mg/L			-	0.3	-	0.6	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Total Organic Carbon	mg/L		6.5	-	3.3	-	2	4.6	5.8	4.9	4.2	3.9	3.7	4.3	5	3.8	6.2	3.3	5	4.7	4.8	5	3..4	5	7	4.5	3.1	5.1	6.6	6	3.3	6.2	4.4	4.5	3			
Ortho Phosphate (as P)	mg/L		0.02	-	<0.01	-	<0.01	<0.01	0.11	<0.01	5.2	0.03	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.010	0.010	<0.01	<0.01			
*Total Phosphorus	ug/L		29		22		8	9	180	10	**2.5**	56	23	12	180	15	6		73	11	10	7	7	8	14	6	15	27	50	27	7	15	2	9	2			
Dissolved Phosphorus	mg/L		-	-	-	-	0.007	-	-	-	5.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002			
pH	Units	6.5-9.0	7.3		7.6		7.7	7.3	7.8	7.6	7.3	7.9	7.9	7.9	7.6	8.0	7.8	7.7	7.4	7.7	7.9	7.9	7.8	7.9	8.0	7.8	7.9	7.9	7.9	8.0	8.0	7.98	8.1	8.04	7.7			
Reactive Silica (as SiO_2)	mg/L		3.3	-	4	-	3.4	2.2	3.3	5.5	3.3	3.3	4.9	4.2	2.6	2.2	5.7	4.5	3.2	2.9	4.9	5.4	4.5	5.5	5.9	6.1	5.3	4.1	5.8	5.8	3.8	5.2	5	6.4	4.5			
Sulphate	mg/L		26	-	21	-	40	17	12	26	46	50	30	23	97	22	32	20	38	28	14	23	<0.01	17	19	29	46	23	22.0	22	36	28	15	19	40			
Turbidity	NTU		25	-	3.3	-	14	2.1	0.7	10	4.2	1.5	1.2	1.5	170	0.8	1.5	0.6	8.5	1	0.9	1.3	1.8	0.9	2.7	1.3	1.3	1.8	4.3	1.9	2	5.1	1.7	1.3	1.2			
Conductivity	µS/cm		490		520		2000	580	620	430	1500	900	720	670	5100	1400	890	780	1100	1300	1100	760	2200	1400	1100	790	2100	1100	610	1000	2000	800	830	890	1500			
TDS (calculated)	mg/L		262	-	274	-	1110	310	339	234	804	488	392	364	2740	693	521	413	563	652	560	407	1170	-	574	428	1080	593	335	544	1030	427	439	468	800			
Bicarbonate (as $CaCO_3$)	mg/L		28	-	56	-	71	63	70	41	56	80	88	83	40	83	87	70	47	80	91	71	70	104	98	76	82	92	76	97	84	67	75	92	58			
Carbonate (as $CaCO_3$)	mg/L		<1	-	<1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1			
Calcium	mg/L		21	-	31	-	62	29	39	26	55	50	42	40	78	52	43	40	35	47	48	37	69	57	54	40	75	51	31	57	71	34	39	44	48			
Magnesium	mg/L		2.3	-	3.7	-	6.3	3.2	4	3.7	5	5.2	4.4	4.3	8.4	5.8	4.4	4.8	3.8	5.1	5.6	4.3	7.7	7	5.8	4.2	8.6	6.1	3.3	7.3	8.3	3.7	4.4	5.4	5.1			
Potassium	mg/L		2.3	-	2.4	-	3.4	2.1	2.5	5.2	5.9	4.4	4.1	4.8	6.8	2.6	3.4	3.3	3.4	2.9	3.0	2.6	4.0	3.4	3.7	3.1	3.8	2.8	2.9	3.1	3.5	3.1	2.3	2.6	3.0			
Sodium	mg/L		75		68		360	83	91	49	250	120	98	90	990	210	150	100	180	200	160	110	350	174	148	109	330	162	89	132	292	118	121	116	253			
**Total Suspended Solids	mg/L		4		3		11	5	**1**	3	3	3	1	1	330	**1**	**1**	**1**	72	**1**	2	3	1	7	**1**	**1**	2	1	2	2	2	1.8	**1**	**1**	**1**			
Chlorophyll *a*	µg/L				2.50			1.35	0.94	1.74	1.08	0.59	0.23	6.60	0.31	1.00	0.21	0.17	1.03	0.67	0.27	1.44	0.83	0.75	0.35	1.04	0.94	0.51	0.84	1.61	2.78	0.98	0.51	0.53	1.26			
Field Measurements				-		-																																		
Secchi disc depth	m		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Dissolved Oxygen	mg/L		-	-	12.0	-	-	11.6	9.8	12.1	13.9	10.0	11.3	13.9	20.3	10.3	9.4	11.6	10.3	9.5	9.6	11.0	12.4	8.8	7.9	14.2	13.9	5.4	7.0	11.0	13.3	8.9	11.0	10.5	12.5			
pH	units				7.5			7.5	7.7	7.3	7.0	7.7	7.9	7.0	7.0	8.0	7.9	7.6	8.1	7.9	7.9	7.8	8.1	7.5	7.3	7.3	7.6	7.6	7.2	8.1	8.0	7.9	7.8	7.0	7.2			
Conductivity	µS/cm				170			542	754	437	1523	908	728	444	3036	2540	1750	681	1075	366	1069	-	2093	1293	1119	780	2142	1142	598	999	1957	633	765	823	1178			
Temperature (field)	°C		-	-	7.2	-	-	18.9	21.8	8.2	8.9	19.0	18.7	9.0	1.9	14.4	18.3	8.7	6.4	14.8	18.3	7.5	4.1	15.8	19.0	7.2	2.5	16.1	18	8.2	4.6	17.4	20.9	8.4	3.2			
Bacteriological																																							
E.Coli	CFU/100ml																						45	1	21	7	1	6	>250	14	**1**	>250	100	60	30			
**Faecal Coliform	MPN/100 ml				**1**			35	4200	**1**	6	34	10000	710	22	22	830	5	6400	20	1700	51	**1**	65	1100	180	13	150	490	15	1	>250	800	30	**1**			

FWAL - Freshwater Aquatic Life

***Results below detection limits (DL) shown as 1/2 DL**

****Results below detection limits (DL) shown as 1**

Cells left intentionally blank for graphs to indicate no sample collected

Cells with dash indicate no sample collected