City of Salem
National Pollutant Discharge Elimination System (NPDES)
Municipal Separate Storm Sewer System (MS4)

Summary of Water Quality Data
For Reporting Year 2013/2014

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1.0 Introduction

This document provides all monitoring data, collected for the reporting year of July 1, 2013, to June 30, 2014 (RY 2013/14), in accordance with the City of Salem's NPDES MS4 permit requirements listed in Schedule B(5)(f)&(g). It also includes any additional data collected beyond the environmental data requirements in Table B-1, as required in Schedule F, Section C. A background narrative for each monitoring element for which data were collected for RY2013/14 is provided below, and all collected data are provided in the attached tables and figures[1].

2.0 Monitoring Elements

Specific details for each monitoring element can be found in the City's *Stormwater and Surface Water Monitoring Plan*. Progress toward meeting monitoring requirements defined in Table B-1 of the City's MS4 Permit is summarized in Table 1. Monitoring site locations are described in Table 2 and denoted in Figure 1, and each parameter analyzed for each different monitoring element are described in Table 3. Figure 8 displays the total monthly rainfall for each of the four rain gauge sites used for analysis.

2.1 Monthly Instream Monitoring

Sampling of designated urban streams for the Monthly Instream[2] monitoring element is conducted on a predetermined monthly schedule. This monitoring element includes the collection of grab samples and field measurements on 11 of Salem's MS4 stormwater runoff receiving streams. Ten of these streams are paired with upstream (at or near where the stream enters the City's jurisdiction) and downstream (at or near where the stream exits the City's jurisdiction or enters a receiving stream) site locations. The eleventh stream, the West Fork Little Pudding River, only has a downstream site location, because the West Fork Little Pudding River starts in the greater Salem area (outside city limits) and runs dry during the summer months.

Effective July 1, 2013, and with approval from the Oregon Department of Environmental Quality (DEQ), the City combined the Willamette River water quality sampling program with the Monthly Instream monitoring element. A copy of the City's revised *Surface Water and Stormwater Monitoring Plan* was included with last year's Annual Report, which described the program changes in detail. These changes included adding three Willamette River sampling sites to the Monthly Instream monitoring element, for a total number of 24 sites. The new Willamette River sites, are located upstream, mid-way, and downstream of city limits, and are included in Table 2 and Figure 1

Per Table B-1 of the City's MS4 permit, additional water quality parameters are monitored for the sites within the Pringle Creek Watershed (PRI1, PRI5, CLA1, and CLA10), West Fork Little Pudding River (LPW1), and the Willamette River (WR1, WR5, and WR10); these additional parameters are denoted with **bold lettering** in the list below.

[1] All tables, figures, and attachments at the end of this document are not discussed in the order in which they appear.
[2] Identified as "Urban Streams monitoring" in the City of Salem Stormwater Management Plan 2010.

Water quality parameters collected include:

- Temperature
- Turbidity
- Specific Conductivity
- pH
- Dissolved Oxygen (DO)
- Nitrate + Nitrite as Nitrogen (NO_3+NO_2-N)
- *Escherichia coli (E. coli)*
- Biochemical Oxygen Demand (BOD_{stream})
- Zinc -total recoverable and dissolved **(CLA1, CLA10, PRI1, PRI5 only)**
- Copper -total recoverable and dissolved **(CLA1, CLA10, PRI1, PRI5 only)**
- Lead -total recoverable and dissolved **(CLA1, CLA10, PRI1, PRI5 only)**
- Hardness **(CLA1, CLA10, PRI1, PRI5only)**
- Total Suspended Solids (TSS) **(LPW1, WR1, WR5, WR10 only)**
- Alkalinity **(WR1, WR5, WR10 only)**
- Ammonia **(WR1, WR5, WR10 only)**
- Total Phosphorus (TP) **(WR1, WR5, WR10 only)**
- Total Solids (TS) **(WR1, WR5, WR10 only)**
- Total Dissolved Solids (TDS) **(WR1, WR5, WR10 only)**

Data for this monitoring element are provided in Tables 5 through 8, and Figures 2 and 3.

2.2 Continuous Instream Monitoring

The City maintains a network of Continuous Instream water quality monitoring sites and stream gauging sites on seven different urban streams within the city. There are currently 11 water quality monitoring and stream gauging sites and two stream gauge-only sites (PRI4 and LPW1). The City will be adding two new stream gauge-only sites next fiscal year as part of a flood warning system for the Mill Creek Watershed. Figure 1 denotes the locations of each current site.

The monitoring sites for this monitoring element are positioned in an upstream/downstream configuration. The upstream sites are adjacent to where the stream enters the City and the downstream sites are either above the confluence with another stream or where the stream exits the City's jurisdictional boundary.

Continuous data collected include:

- Turbidity
- Specific Conductivity
- Temperature
- pH
- DO
- Stage

All data are recorded in 15-minute intervals. All continuous statistical data summaries presented in the attached tables and figures were computed using grade A and/or grade B data. Qualifications for what constitutes grade A and grade B data are provided in Table 9.

The Continuous Instream monitoring element incorporates an alarm system that supports the City's Illicit Discharge Detection and Elimination (IDDE) program. The alarm system is used to record, notify, and prompt investigation of water quality abnormalities that may be indicative of illicit discharges. It serves as an important tool to aid in the elimination of periodic illicit discharges, helps to prioritize dry weather outfall screening activities (see section 2.7), and serves as an outreach/education opportunity for residents.

Monthly medians for collected data are summarized in Table 10. Plots of continuous data and a summary of system alarms are provided in Figures 4 through 7.

2.3 Instream Storm Monitoring

Instream Storm refers to the monitoring of MS4 receiving streams during defined storm events. Sampling occurs at three sites in the Pringle Creek Watershed (continuous instream monitoring sites PRI12, PRI3, and CLK1). Data collected are used to increase understanding of receiving waters within the Pringle Creek Watershed and help guide Salem's stormwater management strategies in watersheds throughout the city. This monitoring element was initiated during this permit cycle and is expected to continue beyond the current MS4 permit cycle; ultimately providing a dataset for long-term trending and spatial analyses.

Sampling consists of flow weighted composite samples, grab samples, and field measurements. Parameters include:

- TSS
- BOD_{stream}
- Total Phosphorus (TP)
- Ortho Phosphorus
- NO_3+NO_2-N
- Ammonia Nitrogen (NH_3)
- Copper (Total Recoverable and Dissolved)
- Lead (Total Recoverable and Dissolved)
- Zinc (Total Recoverable and Dissolved)
- Hardness
- Specific Conductivity
- DO
- Temperature
- pH
- *E. coli*

Data for this monitoring element are provided in Table 11.

2.4 Stormwater Monitoring

The City has collected water quality samples from a number of sites throughout the piped MS4 system since 1995. Three monitoring sites are identified in the current monitoring plan, one each for residential, commercial, and industrial land use. The commercial and industrial sites are new sites for this permit cycle, while the residential site was sampled during the previous MS4 Permit cycle. Data from this monitoring element will be aggregated with previous data collected from similar land use types. The aggregated datasets will be used to characterize Salem's MS4 stormwater runoff pollutant concentrations per land use and compare them with the ACWA characterized land use concentrations.

Sampling consists of flow weighted[3] composite samples, grab samples, and field measurements. Parameters include:

- TSS
- $BOD_{5\text{-day}}$
- TP
- Ortho Phosphorus
- NH_3
- NO_3+NO_2-N
- Copper (Total Recoverable and Dissolved)
- Lead (Total Recoverable and Dissolved)
- Zinc (Total Recoverable and Dissolved)
- Hardness
- Specific Conductivity
- Temperature
- pH
- DO
- *E. coli*

Data for this monitoring element are provided in Table 12.

2.5 Pesticide Monitoring

Due to a lack of quality fall rainstorms, no pesticide sampling occurred during this fiscal year. The City will sample next fall to fulfill the requirement for this monitoring element.

2.6 Mercury Monitoring

Monitoring of low-level mercury and methyl mercury (total recoverable and dissolved) in MS4 discharges during storm events is a new requirement of the current MS4 Permit. Monitoring occurs twice per year (summer and winter) at the same residential and commercial land use sites used for Stormwater and Pesticide monitoring. EPA Method 1669 ultra clean sampling protocols are followed to collect all samples.

Per the DEQ's request, additional grab samples were collected at the same time as the mercury samples and analyzed for:

[3] Due to hydraulic conditions, accurate flow pace sampling is not achievable at the residential land use, therefore the City has employed a time paced sampling protocol for this site.

- TSS
- Dissolved Organic Carbon (DOC)
- Total Organic Carbon (TOC)
- Sulfate
- Alkalinity

Field Measurements were taken for:

- Temperature
- pH
- Oxygen Reduction Potential (ORP)
- DO
- Specific Conductivity

Mercury data collected for this monitoring element are provided in Table 13 and additional data collected are provided in Table 14. See Section 3.0 for more information on the future of Mercury sampling.

2.7 Priority Dry Weather Outfall/Manhole Screening

For RY 2013/2014, dry weather inspections were completed at a total of 34[4] structures (outfalls and manholes), all of which were identified in the City of Salem's Dry Weather Outfall and Illicit Discharge Screening Plan. Additionally, the plan identifies action levels (i.e. level that triggers a source investigation by City staff of a suspected illicit discharge) for all observed and analytical data collected.

Observational Data

Observational data collected did not produce any direct indication of the presence of an illicit discharge at any of the 34 priority structures.

Field Screening Pollutant Parameters

Field screening pollutant parameters include temperature, pH, specific conductivity, turbidity, and chlorine. Only chlorine had concentration levels above the action level, which occurred at four of the 34 sites. Two of the four samples had further analytical testing completed for detergents, fluoride, potassium, sodium, and ammonia. The results of this additional screening did not show any conclusive evidence that an illicit discharge was present. The other two sites with detectable chlorine concentrations did not have additional analytical testing done, because it was determined during the RY 2012/2013 sampling efforts that a drinking water main leak was the source of the water/chlorine.

Laboratory Analysis for E. Coli Bacteria

For RY 2013/2014, E. coli bacteria were analyzed at all but two (the two were determined to be groundwater) of the flowing priority outfalls, resulting in 18 samples analyzed. Of the 18 samples analyzed, seven had E. Coli concentrations greater than the 406 MPN/100 mL acute water quality criteria. Additional sampling and investigation of these catchments did not result in

[4] The plan had identified a total of 35 structures; however, staff were unable to locate one of the structures during field investigations.

a definitive identification of a source. In an attempt to determine if the E. coli bacteria is of human origin, the city has budgeted for bacteria source analysis to be done by-way-of an outside laboratory during RY 2014/2015.

Additional E. coli monitoring was performed on Clark Creek near South Salem High School. Follow up sampling will be completed during RY 2014/2015, including a source tracking analysis by an outside laboratory.

All data collected for this monitoring element are provided in Tables 15 through 17.

2.8 Additional Data Collected

In addition to the required environmental monitoring data collected, the City also chose to conduct monitoring of the stormwater entering and leaving a subsurface gravel treatment wetland that the City installed during the summer of 2012. The treatment wetland was designed based off a treatment wetland installed by the University of New Hampshire (UNH) Stormwater Center in 2006. Originally these anaerobic wetlands were used in wastewater treatment, but due to their success in the removal of bacteria, nutrients, sediment, and other pollutants, treatment wetlands were adapted for stormwater starting as early at 1996[5].

Although the data from the UNH gravel treatment wetland showed great promise, very little data about treatment capabilities of these types of BMPs for stormwater use exist. The City chose to retrofit an existing surface detention basin into a subsurface gravel treatment wetland, and conduct water quality monitoring before using it as a widespread BMP. A Performance Monitoring Strategy was created and is included as Attachment A. This document details the objectives and goals for data collection. The monitoring has been conducted in conjunction with the Stormwater and Instream Storm monitoring, and it follows the same criteria for storm event size, as well as analysis of the same parameters. Data collected are included in Table 18.

3.0 Correspondence with the DEQ

On November 20, 2013, the City submitted a letter to the DEQ requesting elimination of mercury monitoring in accordance with Table B-1 Special Condition 6, which states *"after two years of monitoring (minimum of four samples), the permittee may request in writing to the Department that the mercury and methyl mercury monitoring be eliminated"*. A formal approval of elimination was received via email from Benjamin Benninghoff, MS4 Stormwater Coordinator, on January 1, 2014.

A copy of the letter sent to the DEQ and a copy of the email approval from the DEQ are included as Attachment B.

4.0 Conclusion

The City completed all MS4 Permit monitoring requirements for this reporting year, and is on track to meet all of the minimum monitoring requirements outlined in the MS4 Permit before its expiration on December 29, 2015. Cumulatively, data collected throughout this MS4 Permit

[5] http://stormwater.wef.org/2012/07/subsurface-gravel-wetlands-for-stormwater-management/

cycle will be used to meet monitoring objectives identified in the City's monitoring plan, while also supporting data analyses that will be conducted in preparation for an MS4 Permit renewal package.

Table 1.

Progress Towards Completion of Table B-1 Environmental Monitoring Elements

Monitoring Type	# of sites	Total "Events" Needed	Completed 2010/2011	Completed 2011/2012	Completed 2012/2013	Completed 2013/2014	Remaining "Events" Needed
Monthly Instream	21	48 / site	12[1]	12[1]	12[1]	12[1]	12
Continuous Instream	10	On going	NA	NA	NA	NA	NA
Instream Storm	3	25 / site	0[2]	6	6	5	8
Stormwater (MS4)	3	15 / site	0[2]	4	4	4	3
Pesticides	3	4 / site	0[2]	1	2	0	1
Mercury	2	2 / site / year	0[2]	2	1	1	COMPLETE[3]
Macroinvertebrates	3	2 / site	0[2]	1	1		COMPLETE

[1] Due to no flow or access issues, several of the sites had less than 12 data collection events; however, all sites are on track to meet the minimum permit requirements.

[2] The City's monitoring plan was not approved by the Department until June 29, 2011; therefore, no sampling was conducted during this year for this element.

[3] Following Table B-1 Special Condition #6 of the City's NPDES MS4 permit, the City requested and received aproval from Department to eliminate the mercury and methyl mercury monitoring requirement after completing the required two years of monitoring.

Table 2.

Site Locations for Each Monitoring Element

Monthly Instream	
Site ID	Site Location
BAT 1	Commercial St SE
BAT 12	Rees Hill Rd SE
CGT 1	Mainline Dr NE
CGT 5	Hawthorne St NE @ Hyacinth St NE
CLA 1	Bush Park
CLA 10	Ewald St SE
CRO 1	Courthouse Athletic Club
CRO 10	Ballantyne Rd S
GIB 1	Wallace Rd NW
GIB 15	Brush College Rd NW
GLE 1	River Bend Rd NW
GLE 10	Hidden Valley Dr NW
LPW 1	Cordon Rd NE
MIC 1	Front St Bridge
MIC 10	Turner Rd SE
MRA 1	High St SE
MRA 10	Mill Race Park
PRI 1	Riverfront Park
PRI 5	Bush Park
SHE 1	Church St SE
SHE 10	State Printing Office
WR1	Sunset Park (Keizer)
WR5	Union St. Railroad Bridge
WR10	Halls Ferry Road (Independence)

Continuous Instream	
Site ID	Site Location
BAT3	Commercial St SE
BAT12	Lone Oak Rd SE
CLK1[2]	Bush Park
CLK12	Ewald St SE
GLE3	Wallace Rd NW
GLE12	Hidden Valley Dr NW
LPW1[1]	Cordon Rd
MIC3	North Salem High School
MIC12	Turner Rd SE
PRI3[2]	Pringle Park
PRI4[1]	Salem Hospital Footbridge
PRI12[2]	Trelstad Ave SE
SHE3	Winter St. Bridge

Stormwater / Pesticides / Mercury	
Site Id	Site Location
Electric[3]	Electric St. SE and Summer St. SE
Hilfiker[3]	Hilfiker Ln. SE and Commercial St. SE
Salem Industrial	Salem Industrial Dr. NE and Hyacinth St. NE

[1] Stage-only gauging station. [2] Instream Storm sampling done at these sites. [3] Mercury monitoring conducted at these sites.

BAT = Battle Creek, CGT = Claggett Creek, CLA / CLK = Clark Creek, CRO = Croisan Creek, GIB = Gibson Creek, GLE = Glenn Creek, MIC = Mill Creek, MRA = Mill Race, PRI = Pringle Creek, SHE = Shelton Ditch, LPW = West Fork Little Pudding River, WR = Willamette River

Table 3.
Parameters for Each Monitoring Element

Parameter	Units	Monitoring Element			
		Instream Storm	Stormwater	Monthly Instream	Continuous Instream
Alkalinity	mg/L			x[3]	
Biological Oxygen Demand (BOD_{stream})	mg/L	x		x	
Biological Oxygen Demand (BOD_{5day})	mg/L		x		
Specific Conductivity (Sp. Cond)	µS/cm	x	x	x	x
Copper (Total Recoverable and Dissolved)	mg/L	x	x	x[1]	
Dissolved Oxygen (DO)	mg/L	x	x	x	x
E. coli	MPN/100 mL	x	x	x	
Hardness	mg/L	x	x	x[1]	
Lead (Total Recoverable and Dissolved)	mg/L	x	x	x[1]	
Ammonia Nitrogen (NH_3-N)	mg/L	x	x	x[3]	
Nitrate and Nitrite (NO_3.NO_2)	mg/L	x	x	x	
pH	S.U.	x	x	x	x
Total Dissolved Solids (TDS)	mg/L			x[3]	
Temperature	˚C	x	x	x	x
Total Phosphorus (TP)	mg/L	x	x	x[3]	
Ortho Phosphorus	mg/L	x	x		
Total Solids (TS)	mg/L			x[3]	
Total Suspended Solids (TSS)	mg/L	x	x	x[2,3]	
Turbidity	NTU			x	x
Zinc (Total Recoverable and Dissolved)	mg/L	x	x	x[1]	

[1] Pringle Creek Watershed sites only (PRI1, PRI5, CLA1, and CLA10).

[2] West Fork of Little Pudding River site only (LPW 1).

[3] Willamette River sites only (WR1, WR5, and WR10).

Table 4.
Water Quality Criteria for Monitored Streams

Parameter	Season	Criteria	Applicable Waterbody
Dissolved Oxygen	January 1-May 15	Spawning: Not less than 11.0 mg/L or 95% saturation	Battle Creek*, Claggett Creek*, Clark Creek*[3], Croisan Creek*, Glenn Creek*, West Fork Little Pudding River*
	October 1- May 31	Spawning: Not less than 11.0 mg/L or 95% saturation	Gibson Creek*□ , Glenn Creek, Willamette River
	October 15 - May 15	Spawning: Not less than 11.0 mg/L or 95% saturation	Mill Creek*, Pringle Creek*[1], Shelton Ditch*
	Year Around (Non-spawning)	Cold water: Not less than 8.0 mg/L or 90% saturation	Battle Creek*, Croisan Creek*, Clark Creek, Glenn Creek*[4], Pringle Creek[2]
		Cool water: Not less than 6.5 mg/L	Claggett Creek*, Glenn Creek*, Mill Creek, Pringle Creek[1], Shelton Ditch, West Fork Little Pudding River
pH	Year Around	Must be within the range of 6.5 to 8.5 pH units	All Monitoring Streams
Temperature	October 15 - May 15	Salmon and steelhead spawning: 13˚C 7-day average maximum	Mill Creek, Shelton Ditch
	October 1- May 31	Salmon and steelhead spawning: 13˚C 7-day average maximum	Gibson Creek□
	Year Around (Non-spawning)	Salmon and trout rearing and migration: 18˚C 7-day average maximum	All Monitoring Streams
E. coli	Fall-Winter-Spring	30 day log mean of 126 E. coli organisms per 100 ml (or) no single sample > 406 organisms per 100 ml	All Monitoring Streams
	Summer	30 day log mean of 126 E. coli organisms per 100 ml (or) no single sample > 406 organisms per 100 ml	All Monitoring Streams
Biological Criteria	Year Around	Waters of the state must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.	Claggett Creek*, Clark Creek*, Croisan Creek*, Glenn Creek*, Pringle Creek Trib*
Copper	Year Around	Freshwater Acute and Chronic Criteria: 18 and 12 µg/L respectively with values calculated for a hardness of 100 mg/L	Pringle Creek*
Lead	Year Around	Freshwater Acute and Chronic Criteria: 82 and 3.2 µg/L respectively with values calculated for a hardness of 100 mg/L	Pringle Creek*
Zinc	Year Around	Freshwater Acute and Chronic Criteria: 120 and 110 µg/L respectively with values calculated for a hardness of 100 mg/L	Pringle Creek*

Note: All waterbodies in this table are included under the Willamette Basin or Molalla-Pudding Subbasin TMDL for Temperature and E. coli.

* Oregon's 2010 Integrated Report Section 303(d) listed.

□ Gibson Creek is referred as Gibson Gulch in Oregon's 2010 Integrated Report.

[1] Applies to Pringle Creek from river mile 0 to 2.6.

[2] Applies to Pringle Creek from river mile 2.6 to 6.2.

[3] Applies to Clark Creek from river mile 0 to 1.9.

[4] Applies to Glenn Creek from river mile 4.1 to 7.

Table 5.
Median Values for Monthly Instream Sites (RY 2013/14)

Station	Number of Samples	Temperature (C)	DO (mg/L)	Sp. Cond (µS/cm)	Turbidity (NTUs)	pH (S.U.)	E. Coli (MPN/100 mL)	NO_3 NO_2 (mg/L)	BOD_{stream} (mg/L)
BAT 1	12	10.7	10.1	49.5	9.5	6.8	118.0	0.63	1.08
BAT 12	12	9.9	10.5	43.7	7.0	6.9	77.0	0.56	0.89
CGT 1	12	13.6	9.1	182.3	8.1	7.4	139.5	0.18	2.00
CGT 5	12	12.1	9.8	167.3	17.9	7.3	530.0	0.18	1.71
CLA 1	12	11.6	10.4	91.9	3.5	7.3	403.0	0.81	1.08
CLA 10	12	12.4	9.9	70.4	4.3	6.9	178.0	1.41	1.07
CRO 1	12	10.4	10.3	72.0	5.9	7.2	133.5	0.44	0.93
CRO 10	12	10.2	9.8	52.8	8.8	6.9	43.0	0.42	0.93
GIB 1	12	11.1	10.4	87.1	9.7	7.1	79.5	1.02	1.26
GIB 15	12	11.0	10.4	93.0	9.9	7.3	49.0	1.87	1.20
GLE 1	12	11.3	10.1	97.2	9.3	7.2	160.0	0.85	1.37
GLE 10	12	10.8	10.6	65.0	7.8	7.3	56.0	1.03	1.09
LPW 1	11	11.3	8.5	205.7	12.0	7.0	105.0	0.21	2.14
MIC 1	12	11.9	10.3	80.7	5.3	7.3	106.5	1.41	1.03
MIC 10	12	11.9	10.6	83.6	6.7	7.4	110.0	1.75	1.14
MRA 1	12	11.6	10.7	78.2	5.6	7.4	172.0	1.44	1.20
MRA 10	12	11.5	10.0	82.8	6.0	7.2	106.5	1.62	1.03
PRI 1	12	11.5	10.6	79.5	5.5	7.3	117.0	1.31	1.21
PRI 5	12	12.1	10.6	88.5	5.9	7.5	168.0	0.89	1.47
SHE 1	12	11.4	10.6	81.5	5.5	7.3	70.0	1.59	1.05
SHE 10	12	11.5	10.5	80.7	5.9	7.0	57.0	1.68	1.16
WR1	12	12.8	10.9	62.4	4.0	7.5	32.5	0.23	0.95
WR5	12	11.3	10.6	61.0	4.2	7.4	30.0	0.17	1.10
WR10	12	11.7	10.6	60.2	4.1	7.4	13.5	0.18	0.90

Table 6.

Water Quality Criteria Exceedances for Monthly Instream Sites (RY 2013/14)

Station	Number of Samples	DO	pH	E. Coli[5]			Copper[6]		Lead[6]		Zinc[6]	
				Total #	Dry[2]	Rain[3]	Total	Dissolved	Total	Dissolved	Total	Dissolved
BAT 1	12	4	1	4	3	1						
BAT 12	12	2	0	1	1	0						
CGT 1	12	4	0	2	1	1						
CGT 5	12	3	0	7	6	1						
CLA 1	12	1	0	6	5	1	1	0	0	0	1	0
CLA 10	12	0	0	5	2	3	1	0	0	0	1	1
CRO 1	12	3	0	4	3	1						
CRO 10	12	4	2	0	0	0						
GIB 1	12	5[1]	0	2	0	2						
GIB 15	12	4[1]	0	4	3	1						
GLE 1	12	4	0	3	1	2						
GLE 10	12	4	0	3	2	1						
LPW 1[4]	11	6	0	4	3	1						
MIC 1	12	3	0	1	0	1						
MIC 10	12	3	0	0	0	0						
MRA 1	12	NA	0	3	1	2						
MRA 10	12	NA	0	1	0	1						
PRI 1	12	2	0	2	0	2	0	0	0	0	0	0
PRI 5	12	2	0	3	2	1	1	0	0	0	1	0
SHE 1	12	2	0	1	0	1						
SHE 10	12	2	0	0	0	0						
WR1	12	3	0	0	0	0						
WR5	12	4	0	0	0	0						
WR10	12	4	0	0	0	0						

Note: Copper, lead, and zinc collected at Pringle Creek Watershed sites only (PRI1, PRI5, CLA1, and CLA10).

NA = Not available (No dissolved oxygen water quality criteria associated with this waterbody).

[1] No year-round dissolved oxygen water quality criteria associated with this waterbody.

[2] Dry is < 0.05 inches of rainfall in previous 24 hours.

[3] Rain is ≥ 0.05 inches of rainfall in previous 24 hours.

[4] Unable to complete one sampling due to lack of flow.

[5] Single sample criterion of > 406 organisms per 100 mL used

[6] Exceedences calculated based on hardness concentration for each event

Table 7.
Monthly Instream Data (RY 2013/14)

Site Name: BAT1
Site Description: Commercial St

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/23/2013 10:25	18	7.78	57	13	6.73	411	0.46	1.22	0
8/20/2013 10:42	17.1	7.22	61	13	6.79	687	0.34	0.91	0
9/17/2013 11:30	16.4	8.32	59.1	11	6.8	1203	0.46	1.02	0
10/15/2013 11:23	10	10.27	51.1	7.13	6.75	115	0.58	0.77	0
11/19/2013 11:00	11	9.43	20.6	109	6.77	>2420	0.06	3.69	0.96
12/19/2013 11:06	5.4	11.71	48.7	9.83	6.3	74	0.67	1.43	0.16
1/14/2014 10:50	7.2	11.58	50.2	7.83	6.55	56	0.98	0.74	0
2/24/2014 11:10	9.2	10.54	45	19.7	6.65	205	1.46	1.62	0.16
3/18/2014 10:50	8.2	11.38	47.4	8.24	6.7	10	1.36	1.14	0.01
4/15/2014 10:30	10.3	10.77	45.5	5.07	6.8	36	1.04	0.71	0
5/20/2014 11:00	13.2	9.84	46.8	6.46	6.85	118	0.74	0.79	0
6/17/2014 10:52	13.2	9.12	70	9.22	6.75	365	0.59	1.28	0.1
Median	**10.65**	**10.055**	**49.5**	**9.525**	**6.75**	**118**	**0.63**	**1.08**	

Site Name: BAT12
Site Description: Rees Hill Rd.

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/23/2013 10:10	17.7	8.22	57.6	9.83	6.96	77	0.21	0.82	0
8/20/2013 10:26	16.9	7.12	69.5	9	7.05	96	0.29	0.96	0
9/17/2013 11:10	15.8	8.84	63.4	10	7.16	>2420	0.49	0.8	0
10/15/2013 11:06	9.3	10.77	43.1	6.16	6.93	135	0.43	0.61	0
11/19/2013 10:50	10.2	9.94	45.2	10.4	6.85	326	0.4	1.17	0.96
12/19/2013 10:55	4.8	12.22	42.7	3.81	6.6	59	0.62	1.31	0.16
1/14/2014 10:35	6.2	11.97	43.5	5.74	6.83	32	0.9	0.75	0
2/24/2014 10:30	8.3	10.84	43.9	9.43	6.66	30	1.73	1.51	0.15
3/18/2014 10:30	7.7	11.46	43	4.7	6.74	55	1.36	1.13	0.01
4/15/2014 9:55	9.6	11.07	42.4	4.18	7	38	1.04	0.75	0
5/20/2014 10:20	12	10.3	42.7	6.07	6.95	248	0.73	0.56	0
6/17/2014 10:29	13.1	9.85	45.2	7.79	6.86	345	0.42	1.06	0.1
Median	**9.90**	**10.54**	**43.70**	**6.98**	**6.90**	**77**	**0.56**	**0.89**	

Site Name: CGT1
Site Description: Mainline Dr S

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/23/2013 13:05	23.3	4	223	7.91	7.37	126	0.15	2.74	0
8/20/2013 13:10	22.5	4.04	214.6	5	7.2	248	0.1	2.03	0
9/17/2013 13:36	20	7	186	6	7.36	276	0.15	1.43	0
10/15/2013 13:32	12.7	6.79	170.1	7.78	7.19	49	0.2	1.3	0
11/19/2013 12:55	11.4	9.37	25.7	35	6.8	2420	0.15	2.89	0.92
12/19/2013 13:15	5.1	9.98	178.5	8.19	7.01	104	0.46	2.22	0.07
1/14/2014 12:45	7.4	9.88	186.3	13.7	7.32	153	0.9	1.9	0
2/24/2014 12:54	9.8	10.38	72.1	20.4	7.4	291	0.51	2.62	0.32
3/18/2014 12:55	10.8	11.29	174.6	8.94	7.52	84	0.84	1.71	0
4/15/2014 12:05	14.5	11.04	218.8	5.06	7.82	91	0.22	1.64	0
5/20/2014 12:12	19.4	8.88	195.6	4.65	7.66	93	0.12	1.97	0
6/17/2014 12:44	16.5	7.18	168.2	9.73	7.44	613	0.08	3.12	0
Median	**13.60**	**9.13**	**182.25**	**8.05**	**7.37**	**139.5**	**0.18**	**2.00**	

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

Table 7.
Monthly Instream Data (RY 2013/14)

Site Name: CGT5
Site Description: Hawthorne Ave

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/23/2013 12:50	21.7	5.58	190.2	41.4	7.16	649	0.22	1.69	0
8/20/2013 12:38	17.8	6.44	215.4	32	7.2	1203	0.13	1.67	0
9/17/2013 13:20	18.5	8.13	105.8	34	7.24	1414	0.14	1.54	0
10/15/2013 13:25	12.4	10.25	140.7	20.3	7.4	1986	0.1	1.28	0
11/19/2013 12:45	11.6	9.36	35.8	32	6.87	1733	0.24	2.93	0.92
12/19/2013 12:15	4.1	11.57	196.8	18.7	7.17	75	0.4	2.32	0.07
1/14/2014 12:30	7.7	11.37	176.1	12.5	7.6	54	1.22	0.91	0
2/24/2014 12:42	9.9	10.33	110.3	15.9	7.22	238	1.08	2.03	0.32
3/18/2014 12:45	11	13.16	177.7	10.1	7.86	75	1.19	1.36	0
4/15/2014 11:42	11.8	12.12	247	17.1	7.99	214	0.08	1.72	0
5/20/2014 11:57	15.7	8.2	158.5	12.7	7.41	411	0.11	1.73	0
6/17/2014 11:46	14.7	8.26	114	15.3	7.31	1986	0.08	2.37	0
Median	**12.10**	**9.81**	**167.30**	**17.90**	**7.28**	**530**	**0.18**	**1.71**	

Site Name: CLA1
Site Description: Bush Park

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs	Total Copper (mg/L)	Dissolved Copper (mg/L)	Total Lead (mg/L)	Dissolved Lead (mg/L)	Total Zinc (mg/L)	Dissolved Zinc (mg/L)	Hardness
7/23/2013 10:15	17.7	9.01	88.5	12.8	7.02	308	0.59	1.1	0	<0.0025	<0.0025	0.0019	0.0007	0.014	0.0073	24
8/20/2013 11:28	17.1	9.24	91.3	2.93	7.4	461	0.57	0.81	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0066	0.0055	35
9/17/2013 11:15	16.7	9.52	93.9	2.98	7.65	1046	0.67	0.76	0	0.0026	<0.0025	0.0032	0.0007	0.0048	0.0031	33
10/15/2013 10:25	11.6	10.57	98	2.17	7.54	461	0.75	0.89	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0064	0.0059	30
11/19/2013 10:30	11.6	10.32	29	36.7	7.03	2420	0.2	5.47	0.89	0.0062	0.0031	0.0027	<0.0005	0.042	0.0166	22
12/19/2013 10:40	6.8	11.83	94.4	7.27	7.22	161	0.8	1.31	0.09	<0.0025	<0.0025	<0.0005	<0.0005	0.0146	0.0127	32
1/14/2014 10:10	9.2	11.37	93.9	5.94	7.44	727	1.52	1.01	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0139	0.0114	40
2/24/2014 9:50	9.5	11.16	64	27	7.18	248	0.89	2.3	0.24	0.0049	0.0032	0.0019	0.0005	0.0327	0.0236	32
3/18/2014 10:05	9.6	11.25	94.9	3.51	7.37	77	1.62	1.23	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0113	0.0098	32
4/15/2014 9:40	11	10.8	92.4	2	7.44	79	1.23	0.9	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0049	0.0058	34
5/20/2014 11:00	13.8	10.02	90.8	*	7.05	866	1.03	1.27	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0084	0.0084	29
6/17/2014 10:00	14	9.77	90.7	2.96	7.29	345	0.82	1.06	0.12	<0.0025	<0.0025	<0.0005	<0.0005	0.0062	0.0051	26
Median	**11.60**	**10.45**	**91.85**	**3.51**	**7.33**	**403**	**0.81**	**1.08**		**NA**	**NA**	**NA**	**NA**	**0.0099**	**0.0079**	**32**

Site Name: CLA10
Site Description: Ewald Ave

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs	Total Copper (mg/L)	Dissolved Copper (mg/L)	Total Lead (mg/L)	Dissolved Lead (mg/L)	Total Zinc (mg/L)	Dissolved Zinc (mg/L)	Hardness
7/23/2013 9:20	16.5	8.86	67.6	4.76	6.87	>2420	1.21	1.21	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0057	0.0039	15
8/20/2013 9:25	15.9	9.06	68.4	5	6.78	1986	1.07	0.92	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0059	0.0048	25
9/17/2013 10:15	16.2	9.13	70.2	5	6.93	145	1.25	0.6	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0058	0.0028	23
10/15/2013 10:10	13.1	9.69	72.4	3.07	6.9	387	1.42	1.01	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0061	0.0064	24
11/19/2013 9:55	11.6	10.1	22.1	13.1	6.8	1553	0.29	3.7	0.95	0.0031	<0.0025	0.0005	<0.0005	0.02	0.0146	15
12/19/2013 9:45	9.5	10.68	74.4	3.87	6.52	89	1.26	1.32	0.16	<0.0025	<0.0025	<0.0005	<0.0005	0.0567	0.054	22
1/14/2014 9:35	10.4	10.81	74.6	4.95	6.71	109	1.71	0.72	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0114	0.0108	27
2/24/2014 9:35	10.2	10.29	68.3	13.9	6.53	488	1.58	1.96	0.14	0.0031	<0.0025	0.0005	<0.0005	0.0167	0.0148	24
3/18/2014 9:40	10.2	10.79	75.5	2.82	6.86	178	2.01	1.12	0.01	<0.0025	<0.0025	<0.0005	<0.0005	0.0124	0.0114	26
4/15/2014 9:00	11.2	10.42	72.2	2.94	6.96	17	1.61	0.7	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0072	0.0065	24
5/20/2014 9:30	13.1	9.73	70.6	2.84	6.88	93	1.47	0.78	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0082	0.0086	20
6/17/2014 9:40	13.7	9.36	69.1	3.58	6.9	1300	1.39	1.85	0.1	<0.0025	<0.0025	<0.0005	<0.0005	0.0073	0.0063	21
Median	**12.35**	**9.92**	**70.40**	**4.32**	**6.87**	**178**	**1.41**	**1.07**		**NA**	**NA**	**NA**	**NA**	**0.0078**	**0.0076**	**23.5**

* No data available for this parameter due to sensor malfunction.

NA=Medians not calculated for copper and lead due to the large number of censored values.

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli. Metals exceedances were calculated based on hardness results by site.

Table 7.
Monthly Instream Data (RY 2013/14)

Site Name: CRO1
Site Description: River Rd S

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/23/2013 9:35	17	7.26	94.8	6.22	7.13	727	0.41	1.01	0
8/20/2013 9:50	16.5	5.7	108.3	5	7.04	517	0.4	0.84	0
9/17/2013 10:32	15.9	7.98	100.4	5	7.17	488	0.46	0.72	0
10/15/2013 10:32	9	10.46	84.7	3.61	7.15	46	0.41	0.68	0
11/19/2013 10:10	10.9	10.03	48.8	51.3	7.31	1986	0.28	3.77	0.96
12/19/2013 10:04	4.2	12.67	72.2	4.71	7.02	46	0.55	1.34	0.16
1/14/2014 9:45	6.3	12.33	69.1	10.6	7.27	42	1.09	0.84	0
2/24/2014 9:50	8.5	11.23	61.4	11.8	6.99	77	1.44	1.89	0.14
3/18/2014 9:54	7.7	11.84	63.9	7.75	7.17	32	1.1	1.17	0.01
4/15/2014 9:20	9.9	11.12	65.5	5.64	7.22	142	0.6	0.73	0
5/20/2014 9:45	12.3	10.11	71.7	5.95	7.28	125	0.4	0.82	0
6/17/2014 10:00	12.5	9.79	79.9	5.84	7.28	147	0.36	1.03	0.1
Median	**10.40**	**10.29**	**71.95**	**5.90**	**7.17**	**133.5**	**0.44**	**0.93**	

Site Name: CRO10
Site Description: Ballantyne Rd.

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/23/2013 9:50	15.9	7.99	71.5	10.6	6.88	186	0.36	0.78	0
8/20/2013 10:10	15.8	5.81	86.8	16	6.83	91	0.31	1.12	0
9/17/2013 10:50	15.2	8.13	73.6	10	6.88	187	0.27	0.85	0
10/15/2013 10:52	9.5	9.81	53.1	7.66	6.7	64	0.42	0.85	0
11/19/2013 10:25	10.3	9.61	54.5	12.4	6.83	240	0.39	1.98	0.96
12/19/2013 10:35	4.4	11.55	51.4	5.5	6.4	2	0.54	1.42	0.16
1/14/2014 10:05	6.1	11.96	52.4	9.08	6.7	10	1.17	0.85	0
2/24/2014 10:15	8.5	10.92	50.9	11.2	6.89	6	1.71	1.42	0.15
3/18/2014 10:15	7.8	11.5	49.1	7.77	6.98	5	1.18	1.11	0.01
4/15/2014 9:40	10	10.75	49	6.87	5.43	8	0.7	0.87	0
5/20/2014 10:05	12.3	9.7	51.4	7.55	6.9	22	0.41	0.71	0
6/17/2014 10:15	12.6	9.44	58	8.54	6.98	210	0.41	0.99	0.1
Median	**10.15**	**9.76**	**52.75**	**8.81**	**6.86**	**43**	**0.42**	**0.93**	

Site Name: GIB1
Site Description: Wallace Rd.

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/23/2013 11:30	17.9	5.95	110.1	9.3	6.73	64	0.54	1.06	0
8/20/2013 13:05	20.4	*	114.1	8.03	6.97	83	0.37	1.02	0
9/17/2013 12:30	17	6.93	112.2	10	7.27	152	0.46	1.4	0
10/15/2013 11:45	10.5	10.36	87.7	8.3	7.37	76	0.98	0.89	0
11/19/2013 12:00	11	9.88	78.9	94.5	6.96	1986	0.89	3.3	0.57
12/19/2013 12:10	4.3	12.32	87.6	6.44	7.04	114	1.18	1.89	0.08
1/14/2014 10:55	6.7	11.72	86.6	15.8	7.31	36	1.5	1.02	0.01
2/24/2014 10:35	9.4	10.98	74.5	39.4	7.19	40	1.92	1.7	0.25
3/18/2014 10:45	8.5	11.28	79.1	20.1	7.24	44	1.85	1.3	0
4/15/2014 10:35	11.1	10.37	83.1	10	7.3	56	1.62	1.22	0
5/20/2014 12:05	16.2	9.26	85.8	8.16	6.9	179	1.06	1.11	0
6/17/2014 10:50	14.4	7.96	94.5	9	7.01	649	0.8	1.56	0.1
Median	**11.05**	**10.36**	**87.10**	**9.65**	**7.12**	**79.5**	**1.02**	**1.26**	

* No data available for this parameter due to sensor malfunction.

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

Table 7.
Monthly Instream Data (RY 2013/14)

Site Name: GIB15
Site Description: Brush College Rd.

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/23/2013 11:45	20.1	8.01	110.6	10.4	7.06	435	1.32	1.05	0
8/20/2013 13:30	18.5	*	110.5	9.53	7.16	66	0.36	1.1	0
9/17/2013 12:40	17.2	8.34	108.1	10.4	7.51	>2420	1.01	0.95	0
10/15/2013 12:00	10.6	10.43	97.7	6.2	7.37	921	1.83	0.56	0
11/19/2013 12:20	10.9	9.83	87.1	72.2	7.02	461	1.3	2.08	0.58
12/19/2013 12:22	4.8	12.42	93.3	4.85	6.98	37	2.18	1.66	0.08
1/14/2014 11:20	7.1	11.67	92.2	18.5	7.28	30	2.13	0.75	0.01
2/24/2014 10:50	9.2	11.14	81.7	16.6	7.27	49	2.5	1.21	0.25
3/18/2014 11:00	8.9	11.3	84.6	10.2	7.29	15	2.28	1.22	0
4/15/2014 10:55	11	10.68	91.3	6	7.45	20	2.46	1.25	0
5/20/2014 12:20	15.8	9.45	92.6	8.9	7.01	46	1.91	1.18	0
6/17/2014 11:05	14.7	9.49	101.4	5.34	7.36	105	1.8	1.25	0.09
Median	**10.95**	**10.43**	**92.95**	**9.87**	**7.28**	**49**	**1.87**	**1.20**	

Site Name: GLE1
Site Description: River Bend Rd.

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/23/2013 11:00	18.5	7.45	121	8.96	7.08	326	0.68	1.71	0
8/20/2013 12:50	18.8	*	126.8	11.6	7.24	1300	0.63	1.09	0
9/17/2013 12:15	17.3	8.07	124.2	6.34	7.44	248	0.75	0.91	0
10/15/2013 11:30	11.3	9.97	110	4.36	7.46	59	0.96	0.99	0
11/19/2013 11:50	11.3	10.11	44.2	54.6	6.94	2420	0.29	2.09	0.57
12/19/2013 11:45	5.4	11.92	95.4	22.6	7.19	121	0.7	1.8	0.08
1/14/2014 10:40	7.6	11.67	101	9.6	7.42	75	1.51	0.83	0.01
2/24/2014 10:25	9.1	11.28	69.3	19.3	7.18	199	1.5	1.76	0.25
3/18/2014 10:35	8.7	11.4	87.6	9.63	7.31	41	1.71	1.56	0
4/15/2014 10:20	11.2	10.43	89.4	6	7.4	91	1.29	1.42	0
5/20/2014 11:35	14.3	9.63	98.9	5.3	7.06	105	0.94	1.31	0
6/17/2014 10:40	13.7	9.23	94.7	7.24	7.23	659	0.66	1.18	0.11
Median	**11.30**	**10.11**	**97.15**	**9.28**	**7.24**	**160**	**0.85**	**1.37**	

Site Name: GLE10
Site Description: Hidden Valley Dr.

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/23/2013 12:05	16.6	8	109.9	6.35	7.15	1414	0.4	1.31	0
8/20/2013 13:40	17	*	137.2	5.03	7.21	579	0.26	0.99	0
9/17/2013 13:00	16.1	8.6	106.3	4.08	7.48	131	0.26	0.82	0
10/15/2013 12:15	10.9	10.6	70.4	3.54	7.32	56	0.85	0.75	0
11/19/2013 12:25	10.7	10.39	68.7	68.3	7.18	>2420	1.31	2.18	0.58
12/19/2013 12:40	4.8	12.4	61.6	7.19	7.07	32	1.01	1.53	0.08
1/14/2014 11:50	7.3	11.68	65.9	14.6	7.36	70	1.71	0.76	0.01
2/24/2014 11:05	8.7	11.32	57.2	19.9	7.22	29	1.96	1.41	0.25
3/18/2014 11:15	8.8	11.26	55.2	10.9	7.29	20	1.49	1.23	0
4/15/2014 11:10	10	10.93	57	9	7.44	22	1.19	0.89	0
5/20/2014 12:35	13.3	10.22	62.1	8.39	7.04	47	1.04	0.83	0
6/17/2014 11:20	12.3	9.83	64	6.49	7.36	108	0.72	1.19	0.09
Median	**10.80**	**10.60**	**64.95**	**7.79**	**7.26**	**56**	**1.03**	**1.09**	

* No data available for this parameter due to sensor malfunction.

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

Table 7.
Monthly Instream Data (RY 2013/14)

Site Name:	LPW1									
Site Description:	Cordon Rd.									
Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs	TSS
7/23/2013 12:20	19.4	1.63	342	78.3	6.93	16	0.18	7.58	0	58
8/20/2013 0:00	No samples taken - site was dry									
9/17/2013 12:50	18.2	0.67	224	7	6.76	147	0.16	2.8	0	9.6
10/15/2013 12:06	10.3	6.2	191.3	12.3	7.03	308	0.15	1.03	0	18.4
11/19/2013 11:45	11.3	8.52	51.5	39.5	6.87	2420	0.21	3.57	0.89	42.4
12/19/2013 11:55	4	11	224	10.8	7.03	63	0.65	2.14	0.07	8.4
1/14/2014 11:45	7.4	11.25	217.7	7.47	7.17	43	2.16	1.39	0	5.6
2/24/2014 12:25	9.9	11.99	143.3	13.5	7.19	36	1.61	2.13	0.32	7.6
3/18/2014 12:25	10.1	15.36	205.7	5.57	7.45	45	1.75	1.59	0	6
4/15/2014 11:10	12.2	8.76	258	4.64	7.34	770	0.48	1.46	0	2.8
5/20/2014 11:35	15.5	5.87	166	12	7.11	1414	0.13	2.56	0	12.4
6/17/2014 11:30	14.8	3.59	199.1	80.6	6.87	>2420	0.12	5.05	0	128
Median	**11.30**	**8.52**	**205.70**	**12.00**	**7.03**	**105**	**0.21**	**2.14**		**9.60**

Site Name:	MIC1								
Site Description:	Front St.								
Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/23/2013 8:35	20.3	8.64	54.5	5.22	7.45	129	0.32	0.93	0
8/20/2013 8:30	18.7	8.92	49.4	6	7.27	111	0.16	0.78	0
9/17/2013 9:15	16.4	9.54	64.6	4	7.51	276	0.6	0.68	0
10/15/2013 9:05	10.6	10.83	84.4	4.62	7.45	102	1.58	0.78	0
11/19/2013 9:00	11	10.39	67.8	22.7	7.17	365	1.24	2.43	0.85
12/19/2013 8:45	5	12.73	97.7	4.52	7.4	73	2.45	1.35	0.08
1/14/2014 8:50	7.3	12.2	100.2	14.4	7.37	50	3.48	0.65	0
2/24/2014 8:45	8.7	11.19	90.2	11.4	7.11	88	3.1	1.79	0.24
3/18/2014 8:45	8.8	11.61	92	10.7	7.27	82	2.7	1.06	0
4/15/2014 8:10	12.7	10.3	90.3	3.76	7.41	102	1.89	1.04	0
5/20/2014 8:40	14.8	9.81	76.9	5.42	7.15	140	1.08	1.01	0
6/17/2014 8:43	14.2	10.04	59.6	4.48	7.03	613	0.33	1.36	0.12
Median	**11.85**	**10.35**	**80.65**	**5.32**	**7.32**	**106.5**	**1.41**	**1.03**	

Site Name:	MIC10								
Site Description:	Turner Rd								
Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/23/2013 10:40	18.8	9.18	52.2	6.04	7.45	172	0.23	1.16	0
8/20/2013 11:05	17.8	9.32	48.4	6	7.31	155	0.22	0.77	0
9/17/2013 11:55	15.7	10.18	60.1	5	7.55	96	0.56	0.78	0
10/15/2013 11:45	10.8	10.82	86.4	7.31	7.39	124	1.58	1.47	0
11/19/2013 11:25	10.7	10.14	96.3	15.7	7.39	387	1.94	1.52	0.97
12/19/2013 11:27	4.5	13.16	90.6	5.22	7.14	23	2.36	1.49	0.16
1/14/2014 11:10	6.8	12.18	94.7	13.8	7.33	20	3.41	0.87	0
2/24/2014 12:05	8.9	10.89	87	11.1	7.09	72	3.3	1.83	0.17
3/18/2014 11:15	*	11.56	87.9	8.24	7.25	44	2.7	1.12	0.01
4/15/2014 10:50	11.9	11.38	80.7	4.63	7.42	88	1.92	1.12	0
5/20/2014 11:17	14.2	10.44	71.4	6.82	7.43	144	1.08	0.99	0
6/17/2014 11:10	13.6	10.38	52.9	6.53	7.32	345	0.44	1.33	0.1
Median	**11.90**	**10.63**	**83.55**	**6.68**	**7.36**	**110**	**1.75**	**1.14**	

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

Table 7.
Monthly Instream Data (RY 2013/14)

Site Name: MRA1
Site Description: High St.

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/23/2013 9:45	20.1	9.01	52.1	4.67	7.29	127	0.19	0.84	0
8/20/2013 10:20	18.8	9.33	48.2	4.2	7.1	248	0.16	0.81	0
9/17/2013 10:35	16.3	9.83	62.6	5.09	7.58	613	0.6	0.74	0
10/15/2013 9:50	10.6	11.18	81.3	3.43	7.56	137	1.5	0.7	0
11/19/2013 10:00	10.9	10.4	75.1	7.31	7.4	816	1.37	1.71	0.89
12/19/2013 10:05	4.7	12.92	93.7	5.4	7.35	210	2.33	1.69	0.09
1/14/2014 9:45	7.2	12.21	98.3	13.8	7.4	41	3.55	0.85	0
2/24/2014 9:25	8.2	10.93	91.5	7.33	7.32	>2420	3.12	1.88	0.24
3/18/2014 9:35	8.5	11.7	90.5	21.3	7.34	107	2.49	1.65	0
4/15/2014 9:05	12.2	11.11	84.5	3	7.73	133	1.85	1.37	0
5/20/2014 10:15	15.1	10.15	73.4	6.89	7.18	172	1.13	1.19	0
6/17/2014 9:25	14.1	10.23	55.4	5.78	7.35	285	0.37	1.21	0.12
Median	**11.55**	**10.67**	**78.20**	**5.59**	**7.35**	**172**	**1.44**	**1.20**	

Site Name: MRA10
Site Description: 19th St.

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/23/2013 9:00	19.7	8.58	52.5	6.1	7.45	140	0.21	0.91	0
8/20/2013 9:00	18.4	8.74	48.6	4.53	6.57	96	0.21	0.83	0
9/17/2013 9:40	15.9	9.25	62.1	4.27	7.39	285	0.61	0.73	0
10/15/2013 9:15	10.5	10.57	81.2	3.75	7.38	111	1.57	0.72	0
11/19/2013 9:10	10.8	10.24	84.4	7.42	7.4	517	1.67	1.47	0.8
12/19/2013 8:55	4.7	12.21	93.6	5.26	7.33	93	2.31	1.81	0.07
1/14/2014 8:55	7.2	11.69	98	14.5	7.19	29	3.45	0.74	0
2/24/2014 8:35	8.3	11.33	90.9	10.2	7.07	43	3.12	1.64	0.3
3/18/2014 9:00	8.2	11.2	90.1	10.2	7.18	102	2.61	1.2	0
4/15/2014 8:10	12.2	9.68	84.3	4	7.18	72	1.9	1.16	0
5/20/2014 9:10	14.7	9.76	74	7.09	6.98	150	1.09	1.05	0
6/17/2014 8:45	14	9.6	55.8	5.84	7.07	261	0.36	1.01	0
Median	**11.50**	**10.00**	**82.75**	**5.97**	**7.19**	**106.5**	**1.62**	**1.03**	

Site Name: PRI1
Site Description: Waterfront Park

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs	Total Copper (mg/L)	Dissolved Copper (mg/L)	Total Lead (mg/L)	Dissolved Lead (mg/L)	Total Zinc (mg/L)	Dissolved Zinc (mg/L)	Hardness
7/23/2013 9:20	19.6	9.09	53.3	4.95	7.03	140	0.25	0.78	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0027	<0.0025	19
8/20/2013 9:50	18.4	9.35	51.3	4.33	6.87	96	0.19	0.78	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0081	0.0039	27
9/17/2013 10:00	16	9.83	64.6	3.5	7.63	162	0.59	0.7	0	<0.0025	<0.0025	<0.0005	<0.0005	<0.0025	<0.0025	28
10/15/2013 9:30	10.6	11.2	83.3	3.39	7.52	88	1.51	0.62	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0035	0.0031	32
11/19/2013 9:30	11	10.57	62.4	24.2	7.35	1300	1	3.21	0.88	0.0048	<0.0025	0.0017	<0.0005	0.03	0.0114	30
12/19/2013 9:30	4.8	12.91	93.5	5.11	7.42	64	2.28	1.58	0.08	<0.0025	<0.0025	<0.0005	<0.0005	0.0025	0.003	36
1/14/2014 9:30	7.3	12.27	96	14.5	7.33	108	3.27	1.04	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0125	0.0057	43
2/24/2014 8:55	9.1	11.3	87	12.7	7.24	1553	2.95	1.8	0.24	0.0027	<0.0025	<0.0005	<0.0005	0.0115	0.0099	39
3/18/2014 9:20	8.1	11.8	90.5	11.9	7.3	70	2.48	1.38	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0119	0.0086	38
4/15/2014 8:45	12	10.67	84.1	4	7.46	56	1.83	1.25	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0033	0.0034	34
5/20/2014 9:40	14.7	10.19	75.7	6.2	7.19	126	1.1	1.17	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0044	0.0028	29
6/17/2014 9:05	14	10.27	57.4	5.92	7.34	249	0.42	1.36	0.12	<0.0025	<0.0025	<0.0005	<0.0005	0.0025	<0.0025	24
Median	**11.50**	**10.62**	**79.50**	**5.52**	**7.34**	**117**	**1.31**	**1.21**		**NA**	**NA**	**NA**	**NA**	**0.0063**	**0.0048**	**31**

NA= Medians not calculated for copper and lead due to the large number of censored values.

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli. Metals exceedances were calculated based on hardness results by site.

Table 7.
Monthly Instream Data (RY 2013/14)

Site Name: PRI5
Site Description: Bush Park

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs	Total Copper (mg/L)	Dissolved Copper (mg/L)	Total Lead (mg/L)	Dissolved Lead (mg/L)	Total Zinc (mg/L)	Dissolved Zinc (mg/L)	Hardness
7/23/2013 10:30	20.4	8.48	89.5	3	7.03	548	0.34	1.16	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0042	0.0027	28
8/20/2013 11:50	19.8	*	83.2	2.96	7.34	548	0.29	1.1	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0048	<0.0025	32
9/17/2013 11:25	17.3	9.28	84.2	6.71	7.73	214	0.58	1.73	0	<0.0025	<0.0025	<0.0005	<0.0005	0.004	<0.0025	35
10/15/2013 10:35	11.1	10.57	95.7	4.85	7.58	194	0.88	0.95	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0068	0.0063	37
11/19/2013 10:43	11.3	9.86	35.9	106	7.01	2420	0.18	5.83	0.89	0.0132	0.0031	0.0048	<0.0005	0.1396	0.022	29
12/19/2013 10:50	4.8	12.22	103.1	8.85	7.49	64	0.96	1.98	0.09	<0.0025	<0.0025	<0.0005	<0.0005	0.0073	0.0064	43
1/14/2014 10:20	8	11.53	99.2	11.6	7.45	31	1.28	1.19	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0101	0.0081	40
2/24/2014 10:00	9.2	11.06	76.9	25.5	7.35	142	1.4	2.07	0.24	0.0041	<0.0025	0.0008	<0.0005	0.023	0.0158	28
3/18/2014 10:15	9.5	11.33	87.4	7.96	7.45	82	1.58	1.3	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0081	0.007	34
4/15/2014 9:55	12.8	11.1	90.5	3	7.95	55	1.09	1.6	0	<0.0025	<0.0025	<0.0005	<0.0005	0.0046	0.0043	40
5/20/2014 11:10	17.2	9.55	93.5	3.42	7.35	137	0.9	1.34	0	<0.0025	<0.0025	<0.0005	<0.0005	0.006	0.0047	34
6/17/2014 10:15	16.1	9.33	84.4	5.07	7.53	222	0.5	2.07	0.12	<0.0025	<0.0025	<0.0005	<0.0005	0.0059	0.003	32
Median	**12.05**	**10.57**	**88.45**	**5.89**	**7.45**	**168**	**0.89**	**1.47**		**NA**	**NA**	**NA**	**NA**	**0.0064**	**0.0064**	**34**

Site Name: SHE1
Site Description: Church St.

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/23/2013 10:00	19.5	8.88	53	4.91	7.06	119	0.2	0.76	0
8/20/2013 10:40	18.4	9.21	49.4	4.18	6.68	91	0.18	0.68	0
9/17/2013 11:00	16	9.79	62	3.42	7.68	71	0.59	0.7	0
10/15/2013 9:55	10.6	11.01	81.2	3.43	7.52	69	1.56	0.63	0
11/19/2013 10:08	10.8	10.56	81.8	11.1	7.45	1733	1.62	1.47	0.89
12/19/2013 10:25	4.7	12.99	91.9	4.69	7.29	19	2.42	1.44	0.09
1/14/2014 10:00	7.1	12.08	96.6	13.6	7.39	62	3.54	1.06	0
2/24/2014 9:35	8.3	11.61	89.4	10.8	7.27	57	3.41	1.36	0.24
3/18/2014 9:40	8.2	11.56	89.5	8.95	7.31	32	2.61	1.03	0
4/15/2014 9:20	11.9	10.72	82.5	4	7.51	39	1.97	1.04	0
5/20/2014 10:40	14.6	10.04	74.4	6.38	7.17	84	1.06	1.49	0
6/17/2014 9:40	13.9	10.12	55.7	6.15	7.33	150	0.41	1.24	0.12
Median	**11.35**	**10.64**	**81.50**	**5.53**	**7.32**	**70**	**1.59**	**1.05**	

Site Name: SHE10
Site Description: Airport Road

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/23/2013 8:30	19.4	9	52.3	5.68	7.07	129	0.2	0.89	0
8/20/2013 8:30	18.5	9.08	48.6	4.59	6.51	64	0.18	0.84	0
9/17/2013 9:15	15.9	9.74	60.8	3.99	7.42	104	0.61	0.83	0
10/15/2013 9:00	10.81	11.02	79.6	3.92	7.39	50	1.59	0.54	0
11/19/2013 8:55	11	10.51	88.6	10.4	7.39	345	1.76	1.46	0.85
12/19/2013 8:35	5	12.6	91	4.59	7.36	26	2.36	1.49	0.17
1/14/2014 8:45	7.4	11.81	95.4	14.2	7.01	47	3.41	0.95	0
2/24/2014 8:20	8.4	11.5	89.1	10.3	6.95	36	3.12	1.24	0.13
3/18/2014 8:35	8.2	11.42	86.9	9.54	6.88	43	2.6	1.12	0.01
4/15/2014 7:55	12	10.5	81.8	4	6.9	28	1.91	1.24	0
5/20/2014 8:30	14.2	10.11	74	6.44	6.8	115	1.06	1.19	0
6/17/2014 8:30	14	10.17	54.8	6.18	7.12	276	0.41	1.42	0.1
Median	**11.50**	**10.51**	**80.70**	**5.93**	**7.04**	**57**	**1.68**	**1.16**	

* No data available for this parameter due to sensor malfunction. NA= Medians not calculated for copper and lead due to the large number of censored values.

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli. Metals exceedances were calculated based on hardness results by site.

Table 7.
Monthly Instream Data (RY 2013/14)

Site Name: WR1
Site Description: Sunset Park (Keizer)

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs	Alkalinity (mg/L)	Ammonia (mg/L)	TP (mg/L)	TDS (mg/L)	TS (mg/L)	TSS (mg/L)
7/23/2013 13:25	23.3	10.08	70.2	1.76	7.47	8	0.17	0.74	0	29	0.05	0.031	58.8	62	3.2
8/20/2013 13:45	21.5	10.49	66.2	2	8.28	8	0.26	0.84	0	28	0.05	0.027	55	59	4
9/17/2013 14:15	17	10.15	63.8	4	7.62	14	0.14	0.81	0	29	0.05	0.036	60.6	67	6.4
10/15/2013 14:01	13.5	10.44	60.1	3.69	7.36	46	0.19	0.55	0	28	0.05	0.044	56.8	62	5.2
11/19/2013 13:15	10.3	10.6	56.9	6	7.35	72	0.15	1.23	0.92	30	0.05	0.042	58	65	7.2
12/19/2013 13:41	5.2	12.79	69	4.58	7.08	5	0.32	1.49	0.07	29	0.05	0.033	50.7	56	5.3
1/14/2014 13:15	7.1	11.96	60.9	24.9	7.48	42	0.56	1.01	0	23	0.05	0.075	66	88	22.4
2/24/2014 13:15	7.4	11.2	52.2	22.6	7.4	42	0.41	1.4	0.32	22	0.05	0.082	64	84	19.6
3/18/2014 13:16	8.8	11.38	55.6	11.4	7.29	33	0.28	1.22	0	22	0.05	0.053	50	66	16
4/15/2014 13:10	12	11.03	66.9	3.84	7.75	32	0.29	0.88	0	27	0.05	0.034	48	52	4.4
5/20/2014 12:50	14.7	10.75	58.1	4.01	7.66	91	0.14	0.8	0	27	0.05	0.036	60	65	4.5
6/17/2014 13:10	15.1	11.4	66.3	2.6	7.67	21	0.1	1.33	0	29	0.05	0.026	58	63	4.8
Median	**12.75**	**10.89**	**62.35**	**4.01**	**7.48**	**32.5**	**0.23**	**0.95**		**28**	**0.05**	**0.036**	**58**	**64**	**5.25**

Site Name: WR5
Site Description: Union Street Railroad Bridge

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs	Alkalinity (mg/L)	Ammonia (mg/L)	TP (mg/L)	TDS (mg/L)	TS (mg/L)	TSS (mg/L)
7/23/2013 8:50	20.9	8.34	69.5	2.68	7.47	8	0.15	0.65	0	30	0.05	0.034	56.8	62	5.2
8/20/2013 8:55	19.7	8.7	68.2	2	7.32	6	0.12	0.86	0	55	0.05	0.026	63	67	4
9/17/2013 9:35	16	9.67	62.5	4	7.5	15	0.16	0.79	0	30	0.05	0.034	61	67	6
10/15/2013 9:35	11.2	10.61	59.9	4.08	7.43	96	0.11	0.66	0	27	0.05	0.045	60	64	4
11/19/2013 9:15	10.4	10.6	58	11.6	7.48	71	0.15	1.08	0.85	30	0.05	0.038	58	65	6.8
12/19/2013 9:05	4.5	12.57	66.1	4.47	7.25	10	0.22	1.52	0.08	28	0.05	0.031	55.4	59	3.6
1/14/2014 9:10	6.8	12.11	60.7	24.5	7.37	54	0.53	1.11	0	23	0.05	0.076	70	93	22.8
2/24/2014 9:10	7.4	11.29	51.2	23	7.06	21	0.34	1.36	0.24	22	0.05	0.084	67	85	17.6
3/18/2014 9:00	8.2	11.54	54.5	11.7	7.37	39	0.32	1.24	0	23	0.05	0.052	54	66	11.6
4/15/2014 8:35	11.4	10.88	63.9	3.5	7.37	52	0.22	0.86	0	26	0.05	0.028	52	55	3.2
5/20/2014 9:00	13.9	10.23	58.2	4.38	7.41	91	0.17	1.12	0	27	0.05	0.039	63	69	6
6/17/2014 9:15	14.1	10.19	61.2	2.47	7.27	19	0.08	1.35	0.12	28	0.05	0.027	56	60	4
Median	**11.30**	**10.61**	**60.95**	**4.23**	**7.37**	**30**	**0.17**	**1.10**		**27.5**	**0.05**	**0.036**	**59**	**65.5**	**5.6**

Site Name: WR10
Site Description: Halls Ferry Road (Independence)

Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs	Alkalinity (mg/L)	Ammonia (mg/L)	TP (mg/L)	TDS (mg/L)	TS (mg/L)	TSS (mg/L)
7/23/2013 13:30	22.4	9.16	70	2.65	7.33	2	0.25	0.63	0	30	0.05	0.032	56.8	62	5.2
8/20/2013 14:20	22.6		67.7	1.4	7.44	1	0.12	0.81	0	28	0.05	0.029	62	66	3.6
9/17/2013 13:25	16.5	9.73	62.8	3.4	7.59	14	0.17	0.75	0	31	0.05	0.035	59.8	67	7.2
10/15/2013 12:35	11.9	10.71	59.1	3.62	7.47	66	0.12	0.65	0	27	0.05	0.043	56.6	61	4.4
11/19/2013 13:00	10.4	10.62	55.5	5.47	7.52	29	0.12	1.15	0.96	29	0.05	0.035	59	65	5.6
12/19/2013 13:05	5.1	12.46	65	4.15	7.3	6	0.19	1.32	0.16	28	0.05	0.03	52.4	56	3.6
1/14/2014 12:50	7.5	11.82	58.2	26.6	7.45	37	0.42	0.96	0	24	0.05	0.073	68	94	25.6
2/24/2014 12:20	7.5	11.13	53.6	24.8	7.28	12	0.36	1.66	0.15	22	0.05	0.103	67	86	19.2
3/18/2014 12:20	8.8	11.28	56.7	11.5	7.26	20	0.28	1.34	0.01	24	0.05	0.056	53	65	12.4
4/15/2014 11:30	11.5	10.49	63.4	4	7.4	13	0.25	0.84	0	25	0.05	0.032	65	69	3.6
5/20/2014 13:00	14.4	10.35	55.8	4.18	7.15	50	0.11	0.77	0	27	0.05	0.034	61	67	6
6/17/2014 11:40	14.9	10.44	61.3	1.99	7.51	11	0.1	1.28	0.1	27	0.05	0.028	58	62	3.6
Median	**11.70**	**10.62**	**60.20**	**4.08**	**7.42**	**13.5**	**0.18**	**0.90**		**27**	**0.05**	**0.0345**	**59.4**	**65.5**	**5.4**

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

Table 8.

Monthly Instream Data - Duplicates (RY 2013/14)

Site ID	Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	TSS	Total Copper (mg/L)	Dissolved Copper (mg/L)	Total Lead (mg/L)	Dissolved Lead (mg/L)	Total Zinc (mg/L)	Dissolved Zinc (mg/L)	Hardness
SHE10	07/23/2013 08:40	19.2	9.04	52.4	5.48	7.12	162	0.24	0.81								
MIC10	07/23/2013 10:50	18.9	9.18	52.2	6.39	7.46	145	0.22	0.87								
MRA10	08/20/2013 09:01	18.5	8.71	48.6	4.44	6.56	83	0.19	0.93								
CGT5	08/20/2013 12:45	17.5	6.54	216.6	30	7.25	309	0.12	1.38								
CGT1	08/20/2013 13:13	22.5	4.07	214.4	5	7.32	249	0.14	1.92								
PRI1	09/17/2013 10:05	16.1	9.82	64.6	3.39	7.64	148	0.53	0.75		<0.0025	<0.0025	<0.0005	<0.0005	<0.0025	<0.0025	26
MRA1	09/17/2013 10:40	16.3	9.84	62.4	4.82	7.65	411	0.54	0.75								
CGT1	09/17/2013 13:38	20.1	6.99	186	7	7.43	365	0.15	1.36								
MIC1	10/15/2013 09:12	10.5	10.85	84.4	4.09	7.45	108	1.8	0.64								
SHE1	10/15/2013 10:00	10.6	11.05	81.1	3.57	7.48	55	1.52	0.64								
CLA1	11/19/2013 10:35	11.7	10.3	29.5	36.7	6.97	>2420	0.24	4.07		0.0066	0.0032	0.0027	0.0005	0.0422	0.0181	21
PRI5	11/19/2013 10:45	11.3	9.86	36	101	6.99	>2420	0.18	5.26		0.0134	0.0028	0.0057	<0.0005	0.1407	0.0219	25
CLA10	12/19/2013 09:50	9.6	10.63	74.1	3.15	6.58	121	1.33	1.12		<0.0025	0.004	<0.0005	<0.0005	0.0576	0.0552	25
CRO1	12/19/2013 10:13	4.1	12.71	72.3	4.69	7.05	26	0.57	1.5								
GLE1	12/19/2013 11:50	5.4	11.93	95.5	22.5	7.21	179	0.74	1.3								
CRO10	01/14/2014 10:10	6.1	11.94	52.4	7.85	6.79	2	1.23	0.89								
GIB1	01/14/2014 11:00	6.7	11.76	86.5	14.9	7.33	26	1.43	0.86								
GIB15	01/14/2014 11:25	7.2	11.65	92.1	18.3	7.28	36	2.11	0.72								
BAT12	02/24/2014 10:35	8.3	10.87	43.9	8.5	6.71	47	1.63	1.26								
GLE10	02/24/2014 11:10	8.5	11.41	57.4	20.6	7.24	23	1.86	1.29								
BAT1	02/24/2014 11:15	8.8	10.69	45	18.4	6.58	91	1.42	1.19								
SHE10	03/18/2014 08:40	8.2	11.51	88.5	9.07	6.92	59	2.89	0.79								
MIC10	03/18/2014 11:20	8.2	11.6	88	8.44	7.34	26	2.58	1.07								
MRA10	04/15/2014 08:20	12.2	9.71	84.2	4	7.29	88	1.82	1.12								
LPW1	04/15/2014 11:19	12.1	8.94	259	4.54	7.31	866	0.45	1.14	3.6							
PRI1	05/20/2014 09:45	14.8	10.19	75.8	5.58	7.15	91	1.1	1.12		<0.0025	<0.0025	<0.0005	<0.0005	0.006	0.0045	29
MRA1	05/20/2014 10:20	15.1	10.15	73.5	7.29	7.16	276	1.1	1								
MIC1	06/17/2014 08:44	14.1	10.05	59.7	4.81	7.13	435	0.44	1.12								
SHE1	06/17/2014 09:40	13.9	10.15	55.7	5.71	7.4	127	0.42	1.17								

Willamette River Sites Duplicates (RY 2013/14)

Site ID	Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Alkalinity (mg/L)	Ammonia (mg/L)	TP (mg/L)	TDS (mg/L)	TS (mg/L)	TSS (mg/L)
WR10	07/23/2013 13:55	22.6	9.24	70.1	2.47	6.97	6	0.16	0.9	30	0.05	0.032	56.2	61	4.8
WR1	10/15/2013 14:10	13.5	10.42	60.6	3.65	7.41	54	0.23	0.5	29	0.05	0.042	59.8	65	5.2
WR5	11/19/2013 09:20	10.3	10.63	56.6	8.2	7.54	127	0.11	1.15	22	0.05	0.037	62	67	5.2
WR10	03/18/2014 12:30	8.6	11.24	56.9	11.4	7.28	22	0.26	1.09	24	0.05	0.057	56	67	11.2
WR1	06/17/2014 13:12	15.3	11.46	66.8	2.13	7.6	25	0.09	1.4	29	0.05	0.028	57	62	4.8

Note: Duplicate field measurements and duplicate grab samples are taken at 10 percent of the sites each month. These sites are selected prior to sampling.

Table 9.
Continuous Instream Grade A and Grade B Data Qualifications

Grade Values	Temperature (˚C)	pH	Specific Conductivity (µS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
A	± < 0.5	± ≤ 0.30	≤ 10%	± ≤ 3 or 5% (whichever is greater)	± ≤ 0.3
B	± 0.51 to 2.00	± > 0.3 to 0.50	> 10% to ≤ 15%	± ≤ 5 or 30% (whichever is greater)	± > 0.3 to ± ≤ 1.0

Note: As stated in the "Continuous Water Quality Monitoring Program Quality Assurance Project Plan", data grades are a result of the absolute difference (value or percent) of station instrument reading and audit instrument reading at the time of site audit.

Table 10.
Monthly Medians Values for Continuous Instream Data (RY 2013/14)

Monthly Medians for **Turbidity** at Continuous Instream Sites

Station Name	Jul 2013 Turbidity (NTU)	Aug 2013 Turbidity (NTU)	Sep 2013 Turbidity (NTU)	Oct 2013 Turbidity (NTU)	Nov 2013 Turbidity (NTU)	Dec 2013 Turbidity (NTU)	Jan 2014 Turbidity (NTU)	Feb 2014 Turbidity (NTU)	Mar 2014 Turbidity (NTU)	Apr 2014 Turbidity (NTU)	May 2014 Turbidity (NTU)	Jun 2014 Turbidity (NTU)
BAT3	15.18	14.12	13.50	9.13	14.31	NA	16.44	No sonde	8.95	6.93	6.74	7.79
BAT12	7.34	4.66	4.96	6.40	5.91	5.89	5.14	No sonde	5.20	5.20	5.90	6.10
CLK1	6.06	6.68	NA	3.46	6.82	No sonde	No sonde	3.65	6.30	2.40	3.10	4.20
CLK12	6.70	6.10	6.12	4.01	4.29	4.00	4.07	11.93	6.18	3.56	7.34	9.24
GLE3	7.30	7.30	NA	3.30	4.80	4.10	5.30	4.40	13.30	9.30	5.90	6.70
GLE12	5.30	5.00	3.40	3.10	NA	4.60	7.50	12.10	14.50	11.20	NA	NA
MIC3	8.45	8.89	7.68	5.42	6.33	7.06	8.02	18.30	NA	8.11	11.19	9.42
MIC12	9.18	11.06	9.51	NA	10.35	10.52	11.28	17.87	18.63	9.42	7.75	10.79
PRI3	3.90	5.21	NA	3.08	5.51	5.42	6.05	17.14	16.50	6.94	5.50	5.43
PRI12	10.46	11.50	10.22	9.44	10.06	10.20	11.70	11.43	17.08	9.56	NA	9.33
SHE3	7.66	8.05	NA	NA	7.08	11.19	6.87	14.88	14.60	7.19	7.10	8.08

Monthly Medians for **Specific Conductivity** at Continuous Instream Sites

Station Name	Jul 2013 Specific Conductivity (µS/cm)	Aug 2013 Specific Conductivity (µS/cm)	Sep 2013 Specific Conductivity (µS/cm)	Oct 2013 Specific Conductivity (µS/cm)	Nov 2013 Specific Conductivity (µS/cm)	Dec 2013 Specific Conductivity (µS/cm)	Jan 2014 Specific Conductivity (µS/cm)	Feb 2014 Specific Conductivity (µS/cm)	Mar 2014 Specific Conductivity (µS/cm)	Apr 2014 Specific Conductivity (µS/cm)	May 2014 Specific Conductivity (µS/cm)	Jun 2014 Specific Conductivity (µS/cm)
BAT3	55.4	60.6	59.7	50.3	49.2	46.4	45.4	44.7	45.2	47.4	48.4	52.3
BAT12	49.7	58.2	NA	42.6	43.9	41.7	41.5	44.9	NA	33	36	38
CLK1	93.8	90.1	90.3	95.5	94.3	No sonde	No sonde	NA	94.0	95.0	NA	85.0
CLK12	65.0	66.0	68.9	70.3	69.8	70.0	68.9	74.5	73.0	71.4	73.2	69.0
GLE3	119.0	124.0	123.0	115.0	100.0	100.0	96.0	82.0	NA	86.0	106.0	110.0
GLE12	104.0	117.0	100.0	74.0	70.0	63.0	63.0	58.0	57.0	59.0	64.0	67.0
MIC3	55.5	48.5	66.1	83.0	91.4	96.1	94.0	92.9	90.1	87.6	81.9	61.6
MIC12	53	60.8	64	76.3	83.2	89.2	86.3	86.1	82.5	79.2	57.3	54
PRI3	97	96.7	92.3	101.5	98.8	100	98.9	90.2	88.1	91.8	96.4	97
PRI12	62.6	54.2	85	100.6	101.3	91.8	91.3	85.5	80.6	79.6	82.5	71.8
SHE3	58.5	46.9	62.4	78.2	84.3	88.2	86.5	86.5	84.7	82.1	73.3	55.7

Presented median values consist of A and B grade data only. NA = 60% of the continuous record for a given month is not represented by A and B grade data.

No sonde = The WQ monitoring station did not have a sonde deployed during this time due to equipment malfunction.

Table 10.
Monthly Medians Values for Continuous Instream Data (RY 2013/14)

Monthly Medians for **Temperature** at Continuous Instream Sites

	Jul 2013	Aug 2013	Sep 2013	Oct 2013	Nov 2013	Dec 2013	Jan 2014	Feb 2014	Mar 2014	Apr 2014	May 2014	Jun 2014
Station Name	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)
BAT3	18.84	18.88	16.60	11.11	9.83	6.15	6.55	5.88	9.50	10.84	13.27	15.58
BAT12	17.64	17.31	16.98	9.71	8.76	5.36	6.04	5.31	8.93	10.28	13.01	15.17
CLK1	17.69	17.99	17.02	12.67	12.05	No sonde	No sonde	9.82	10.70	11.78	13.81	15.46
CLK12	15.92	16.81	16.40	14.15	12.85	10.25	10.08	9.93	10.86	11.53	12.95	14.30
GLE3	17.47	17.81	16.71	12.03	10.81	6.49	6.59	8.03	10.07	11.40	14.06	15.30
GLE12	15.84	16.56	15.69	10.88	9.39	5.58	6.23	7.25	9.11	10.01	12.09	12.81
MIC3	20.46	19.39	16.62	11.42	9.76	5.14	5.59	7.34	9.81	12.14	15.55	17.44
MIC12	20.05	18.75	16.08	11.42	9.91	5.48	6.00	7.38	9.78	11.48	14.55	16.75
PRI3	19.12	19.08	17.50	12.17	10.70	6.12	6.69	8.28	10.63	12.69	15.76	17.44
PRI12	19.62	19.11	16.93	11.82	10.13	6.07	6.76	7.81	9.78	11.31	14.23	16.44
SHE3	20.29	19.29	16.60	11.56	10.02	5.51	5.98	7.55	10.02	12.00	15.48	17.33

Monthly Medians for **pH** at Continuous Instream Sites

	Jul 2013	Aug 2013	Sep 2013	Oct 2013	Nov 2013	Dec 2013	Jan 2014	Feb 2014	Mar 2014	Apr 2014	May 2014	Jun 2014
Station Name	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH
BAT3	6.89	6.96	6.65	6.75	6.66	6.63	6.66	6.75	6.56	6.59	6.66	6.86
BAT12	6.95	6.82	7.04	7.02	7.15	7.02	7.24	7.75	7.08	7.03	7.10	7.20
CLK1	7.80	7.48	7.51	7.47	7.34	No sonde	No sonde	7.33	7.25	7.18	7.04	7.07
CLK12	6.72	7.13	7.11	6.98	6.88	6.96	6.95	6.62	6.61	6.78	7.26	6.98
GLE3	7.51	7.53	7.42	7.33	7.25	7.30	7.35	7.05	7.10	7.27	7.26	7.39
GLE12	7.29	7.30	7.28	7.11	7.10	7.15	7.15	6.99	7.01	7.22	7.25	7.34
MIC3	7.70	7.84	7.80	7.75	7.63	7.62	7.69	7.55	NA	7.55	7.77	7.75
MIC12	7.59	7.50	7.53	7.46	7.53	7.43	7.47	7.06	7.12	7.30	7.62	7.38
PRI3	7.45	7.59	7.52	7.26	7.34	7.59	7.51	7.34	7.36	7.42	7.51	7.66
PRI12	7.27	7.42	7.14	7.02	6.98	7.04	7.08	6.78	6.71	6.93	6.91	6.57
SHE3	7.37	7.38	7.56	7.48	7.44	7.45	7.25	7.18	7.25	7.43	7.32	7.36

Presented median values consist of A and B grade data only. NA = 60% of the continuous record for a given month is not represented by A and B grade data.
No sonde = The WQ monitoring station did not have a sonde deployed during this time due to equipment malfunction.

Table 10.
Monthly Medians Values for Continuous Instream Data (RY 2013/14)

Monthly Medians for **Dissolved Oxygen** at Continuous Instream Sites

	Jul 2013	Aug 2013	Sep 2013	Oct 2013	Nov 2013	Dec 2013	Jan 2014	Feb 2014	Mar 2014	Apr 2014	May 2014	Jun 2014
Station Name	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)
BAT3	7.59	6.85	7.91	9.78	9.72	11.51	11.40	11.52	10.74	10.42	9.34	8.39
BAT12	8.48	8.27	NA	10.84	11.09	12.38	12.21	12.33	11.66	11.19	10.49	9.89
CLK1	8.60	8.46	8.76	9.54	8.83	No sonde	No sonde	11.08	11.22	10.65	10.19	9.30
CLK12	9.18	9.01	8.85	9.31	9.17	10.30	10.46	10.57	10.33	9.72	9.60	9.17
GLE3	8.63	8.71	9.12	10.11	10.31	11.87	12.21	11.75	10.89	10.57	10.11	9.55
GLE12	8.71	8.19	8.89	10.17	10.42	11.90	11.78	11.78	11.02	10.90	10.74	10.58
MIC3	8.80	8.77	9.13	10.37	10.72	12.45	12.37	11.68	11.06	10.75	9.94	9.44
MIC12	8.45	8.69	9.17	10.11	10.71	12.28	12.18	11.19	10.62	10.44	9.78	9.28
PRI3	8.11	8.14	8.62	9.76	10.06	12.03	11.88	11.21	10.64	9.99	8.76	8.42
PRI12	7.74	8.18	8.00	8.93	9.30	11.18	10.99	10.46	10.04	9.85	NA	8.81
SHE3	8.59	8.81	9.17	10.34	10.83	12.49	12.34	11.54	10.85	10.29	9.59	9.05

Monthly Medians for **Stage** at Continuous Instream Sites

	Jul 2013	Aug 2013	Sep 2013	Oct 2013	Nov 2013	Dec 2013	Jan 2014	Feb 2014	Mar 2014	Apr 2014	May 2014	Jun 2014
Station Name	Stage (ft)	Stage (ft)	Stage (ft)	Stage (ft)	Stage (ft)	Stage (ft)	Stage (ft)	Stage (ft)	Stage (ft)	Stage (ft)	Stage (ft)	Stage (ft)
BAT3	4.01	3.98	4.08	4.22	4.26	4.26	4.30	5.02	4.88	4.57	4.39	4.12
BAT12	4.63	4.55	4.71	4.97	4.97	4.97	5.00	5.29	5.24	5.12	5.00	4.84
CLK1	3.86	3.89	4.12	4.19	4.32	4.23	4.26	4.46	4.48	4.36	4.22	3.94
CLK12	3.90	3.89	3.94	3.95	4.01	4.00	4.02	4.20	4.20	4.09	4.05	4.00
GLE3	4.12	4.11	4.19	4.26	4.39	4.35	4.40	4.88	4.80	4.50	4.39	4.24
GLE12	0.66	0.64	NA	NA	0.83	0.83	0.86	1.10	1.07	0.98	0.88	0.81
LPW1	Dry	Dry	2.00[1]	1.73[1]	1.61[1]	1.57[1]	1.6[1]	2.00	1.90	1.57	1.66[1]	Dry
MIC3	5.61	5.65	5.44	5.53	5.46	5.31	5.37	6.45	6.40	5.74	5.41	5.24
MIC12	7.19	7.22	7.11	7.07	7.26	7.32	7.36	8.22	8.14	7.68	7.41	7.28
PRI3	4.29	4.29	4.36	4.35	4.40	4.38	4.43	4.40	4.63	4.54	4.46	4.34
PRI4	7.39	7.38	7.51	7.51	7.61	7.59	7.66	8.05	8.07	7.85	7.68	7.50
PRI12	4.22	4.18	4.09	4.09	4.15	4.18	4.23	4.61	4.58	4.50	4.38	4.32
SHE3	5.48	5.51	5.42	5.43	5.74	5.80	5.82	6.80	6.66	6.13	5.87	5.72

Presented median values consist of A and B grade data only. NA = 60% of the continuous record for a given month is not represented by A and B grade data.

No sonde = The WQ monitoring station did not have a sonde deployed during this time due to equipment malfunction. [1]Median calculated when >50% of data were > 0.00

Table 11.
Instream Storm Monitoring Data (RY 2013/14)

Site Name:	CLK1																		
Site Description:	Lower Clark Creek just upstream of confluence with Pringle Creek																		
Sample Collection Date/Time	**E. Coli**	**Diss. Oxygen**	**pH**	**temp**	**Sp. Cond, field**	**Sp. Cond, comp**	**Cu**	**Cu diss**	**Zn**	**Zn diss**	**Pb**	**Pb diss**	**Hardness**	**NH3**	**NO_3-NO_2**	**Ortho P**	**TP**	**BODs**	**TSS**
mm/dd/yyyy HH:MM	MPN/100 mL	mg/L	S.U	˚C	µS/cm	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
11/02/2013 03:09	1986	10.21	7.08	12	42.13														
11/04/2013 08:45						59.6	0.0087	0.0039	0.087	0.0383	0.0044	0.0025	35	<0.05	0.38	0.088	0.284	7.6	63
12/12/2013 17:40	461	12.09 (11.82)	7.23	5.6	277														
12/13/2013 9:10						299	0.0103	0.0045	0.113	0.0659	0.0039	0.0009	104	0.337	0.9	0.035	0.266	8.8	67.6
03/05/2014 04:52	291	10.53	6.55	11.3	32.2														
03/06/2014 09:27						40.8	0.0093	<0.0025	0.0801	0.0412	0.0072	<0.0005	19	<0.05	0.66	0.016	0.254	2.4	128
3/25/2014 7:20	197	10.49	7.01	10.4	91.1														
3/26/2014 10:53						84.5	0.009	0.0036	0.0626	0.0303	0.0029	<0.0005	36	0.078	0.98	0.024	0.176	8.3	62.8
4/17/2014 9:50	770	10.1	7.29	12	66.53														
4/17/2014 9:52 -duplicate	727	10.09 (9.32)	7.28	12	67.19														
4/18/2014 8:54						56.6	0.0071	0.0031	0.0414	0.0176	0.0032	<0.0005	30	<0.05	0.56	0.017	0.156	6.3	40.4
Median	**594**	**10.35**	**7.16**	**11.65**	**66.86**	**59.6**	**0.009**	**0.00375**	**0.0801**	**0.0383**	**0.0039**	**0.0017**	**35**	**0.2075**	**0.66**	**0.024**	**0.254**	**7.60**	**63.0**

Site Name:	PRI3																		
Site Description:	Lower Pringle Creek in Pringle Park, just upstream of confluence with Shelton Ditch																		
Sample Collection Date/Time	**E. Coli**	**Diss. Oxygen**	**pH**	**temp**	**Sp. Cond, field**	**Sp. Cond, comp**	**Cu**	**Cu diss**	**Zn**	**Zn diss**	**Pb**	**Pb diss**	**Hardness**	**NH3**	**NO_3-NO_2**	**Ortho P**	**TP**	**BODs**	**TSS**
mm/dd/yyyy HH:MM	MPN/100 mL	mg/L	S.U	˚C	µS/cm	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
11/2/2013 3:20	1733	9.31	7.01	12	72.83														
11/4/2013 9:05						72.7	0.0047	0.0026	0.0465	0.0217	0.0017	0.0007	38	<0.05	0.44	0.042	0.153	4.7	34
12/12/2013 18:03	457	12.24	7.24	4.3	367.5														
12/13/2013 9:25						208	0.0038	0.0026	0.0349	0.0267	0.001	0.0005	61	0.156	1.14	0.018	0.098	3.7	20
3/5/2014 5:17	144	10.34	7.14	10.97	53.83														
3/5/2014 5:18 - duplicate	133	10.35 (10.0)	7.15	10.97	53.59														
3/6/2014 9:13						54.2	0.0069	0.0026	0.061	0.0387	0.004	<0.0005	23	<0.05	1.05	0.011	0.208	2.1	97.5
3/25/2014 7:58	158	9.98	7.02	10.59	84.3														
3/26/2014 11:07						85.3	0.0026	<0.0025	0.0159	0.0112	<0.0005	<0.0005	31	<0.05	1.05	0.012	0.04	2.3	9.2
4/17/2014 9:30	548	9.85	7.41	12.7	81.68														
4/18/2014 8:35						70.1	0.0035	<0.0025	0.0183	0.0089	0.0012	<0.0005	33	<0.05	0.88	<0.01	0.085	3.5	20.6
Median	**307.5**	**9.98**	**7.15**	**10.97**	**77.255**	**72.7**	**0.0038**	**NA**	**0.0349**	**0.0217**	**0.00145**	**NA**	**33**	**0.156**	**1.05**	**0.015**	**0.098**	**2.33**	**20.6**

Site Name:	PRI12																		
Site Description:	Upper East Fork Pringle Creek																		
Sample Collection Date/Time	**E. Coli**	**Diss. Oxygen**	**pH**	**temp**	**Sp. Cond, field**	**Sp. Cond, comp**	**Cu**	**Cu diss**	**Zn**	**Zn diss**	**Pb**	**Pb diss**	**Hardness**	**NH3**	**NO_3-NO_2**	**Ortho P**	**TP**	**BODs**	**TSS**
mm/dd/yyyy HH:MM	MPN/100 mL	mg/L	S.U	˚C	µS/cm	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
11/2/2013 3:50	461	7.82 (7.88)	7.2	11.3	98.5														
11/4/2013 9:40						77.9	<0.0025	<0.0025	0.217	0.0984	0.0009	0.0017	27	<0.05	0.88	<0.01	0.065	2.9	14
12/12/2013 18:33	145	11.45	7.33	4.6	92.32														
12/13/2013 10:30						85.9	<0.0025	<0.0025	0.0096	0.0073	<0.0005	<0.001	34	<0.05	2.32	0.016	0.026	1.2	5.4
3/5/2014 6:04	192	9.27	7.01	10.01	80.24														
3/6/2014 9:56						80.9	0.0027	<0.0025	0.0336	0.0225	0.0008	<0.0005	25	<0.05	2.32	0.016	0.108	<1	36
3/25/2014 7:23	33	9.29	6.89	9.32	79.65														
3/25/2014 7:25 -duplicate	82	9.28	6.89	9.32	79.5														
3/26/2014 10:10						73.4	<0.0025	<0.0025	0.0106	0.0085	<0.0005	<0.0005	34	<0.05	2.02	<0.01	0.023	1.2	6.8
4/17/2014 10:20	345	10.07	7	11.13	81.32														
4/18/2014 9:20						74.2	<0.0025	<0.0025	0.0075	0.0085	<0.0005	<0.0005	33	<0.05	1.66	<0.01	0.03	1.3	6.6
Median	**169**	**9.29**	**7.005**	**9.67**	**80.78**	**77.9**	**NA**	**NA**	**0.0106**	**0.0085**	**0.00085**	**NA**	**33**	**NA**	**2.02**	**0.016**	**0.03**	**1.25**	**6.8**

NA= Median not calculated because ≥ 50% of values were censored values.

Data in red exceed applicable water quality criteria (see Table 4).

Data in blue are QA/QC DO readings done using Winkler Titration.

Table 12.
Stormwater Monitoring Data (RY 2013/14)

Site Name:	Electric[1]																	
Land use Type:	Residential																	
Sample Collection Date/Time	**E. Coli**	**Diss. Oxygen**	**pH**	**temp**	**Sp. Cond, field**	**Sp. Cond, comp**	**Cu**	**Cu diss**	**Zn**	**Zn diss**	**Pb**	**Pb diss**	**Hardness**	**NH3**	**NO_3-NO_2**	**Ortho P**	**TP**	**BOD5**	**TSS**
mm/dd/yyyy HH:MM	MPN/100 mL	mg/L	S.U	˚C	µS/cm	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
11/2/2013 3:23	1986	10.47	6.4	12.6	41.3														
11/2/2013 3:24- duplicate	1986	10.4	6.5	12.7	43.7														
11/4/2013 8:20						41.6	0.0081	0.0061	0.0569	0.041	0.002	0.0029	21	0.05	0.49	0.354	0.015	17.6	22
12/12/2013 16:10	3654	12.27	6.74	6.7	723														
12/13/2013 8:45						534	0.0163	0.0074	0.193	0.128	0.004	0.0008	204	0.386	0.98	0.103	0.529	18.9	94.4
3/5/2014 5:10	687	10.58	6.57	11.5	38.7														
3/6/2014 9:39						59.4	0.005	0.0031	0.0347	0.0305	0.002	0.0005	23	0.05	1.25	0.063	0.163	3.8	31.2
3/25/2014 7:05	488	10.76	6.7	10.4	70.1														
3/26/2014 10:40						90.6	0.0052	0.0034	0.134	0.119	0.0006	0.0005	41	0.088	1.38	0.066	0.111	5	11.8
Median	**1336.5**	**10.58**	**6.57**	**11.5**	**43.7**	**75**	**0.00665**	**0.00475**	**0.09545**	**0.08**	**0.002**	**0.00065**	**32**	**0.069**	**1.115**	**0.0845**	**0.137**	**11.3**	**26.6**

Site Name:	Hilfiker																	
Land use Type:	Commercial																	
Sample Collection Date/Time	**E. Coli**	**Diss. Oxygen**	**pH**	**temp**	**Sp. Cond, field**	**Sp. Cond, comp**	**Cu**	**Cu diss**	**Zn**	**Zn diss**	**Pb**	**Pb diss**	**Hardness**	**NH3**	**NO_3-NO_2**	**Ortho P**	**TP**	**BOD5**	**TSS**
mm/dd/yyyy HH:MM	MPN/100 mL	mg/L	S.U	˚C	µS/cm	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
11/2/2013 2:55	96	10.68	6.3	11.6	13.7														
11/4/2013 9:25						15.4	0.0088	0.0049	0.0803	0.046	0.0017	0.0009	10	0.078	0.14	0.063	0.143	9.8	27
12/12/2013 17:50	23	12.02	6.6	5.8	204.8														
12/13/2013 8:30						742	0.0377	0.0139	0.451	0.299	0.0075	0.0019	197	0.05	0.41	0.013	0.807	21	190
3/25/2014 6:40	1	9.6	5.97	10.5	32.5														
3/26/2014 10:28						32.1	0.0142	0.009	0.105	0.0817	0.0015	0.0005	16	0.264	0.38	0.026	0.151	9	42
Median	**23**	**10.68**	**6.3**	**10.5**	**32.5**	**32.1**	**0.0142**	**0.009**	**0.105**	**0.0817**	**0.0017**	**0.0009**	**16**	**0.078**	**0.38**	**0.026**	**0.151**	**9.8**	**42**

Site Name:	Salem Industrial																	
Land use Type:	Industrial																	
Sample Collection Date/Time	**E. Coli**	**Diss. Oxygen**	**pH**	**temp**	**Sp. Cond, field**	**Sp. Cond, comp**	**Cu**	**Cu diss**	**Zn**	**Zn diss**	**Pb**	**Pb diss**	**Hardness**	**NH3**	**NO_3-NO_2**	**Ortho P**	**TP**	**BOD5**	**TSS**
mm/dd/yyyy HH:MM	MPN/100 mL	mg/L	S.U	˚C	µS/cm	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
11/2/2013 4:01	649	9.84	5.9	12.3	25.3														
11/4/2013 10:15						24.8	0.0064	0.0047	0.0928	0.0677	0.0006	0.0005	15	0.05	0.25	0.099	0.207	8	25
12/12/2013 19:23	150	8.62	7.23	10.9	82.45														
12/12/2013 19:30-duplicate	260	8.66	7.08	10.5	81.2														
12/13/2013 12:30						106	0.01	0.0067	0.0785	0.054	0.0005	<0.0005	40	0.05	0.26	0.058	0.294	3.8	24.6
3/5/2014 5:53	58	9.75	6.64	11.4	18.68														
3/6/2014 10:45						35.8	0.0118	0.0088	0.0997	0.0889	0.0011	0.0005	12	0.05	0.12	0.017	0.157	2.3	32.4
3/25/2014 8:15	3	6.54	6.6	10	83.4														
3/26/2014 11:30						78.3	0.0099	0.0044	0.156	0.0623	0.001	0.0005	39	0.05	0.36	0.043	0.233	2.6	64
Median	**150**	**8.66**	**6.64**	**10.9**	**81.20**	**57.05**	**0.00995**	**0.0057**	**0.09625**	**0.065**	**0.0008**	**0.0005**	**27**	**0.05**	**0.255**	**0.0505**	**0.22**	**3.2**	**28.7**

[1]Due to the velocity and lift of water coming through the pipe at this site, the flow module is unable to detect the height of the water and often doesn't sample; thefore a time paced sampling method is utilized.

Table 13.
Mercury Monitoring Data (RY 2013/14)

Sample Date	Site Name	Time:	Analyte	Result (ng/L)	Detection Limit (ng/L)	Reporting Limit (ng/L)
9/5/2013	Hilfiker-native	18:05	Total Hg	3.11	0.28	1.00
			Diss. Hg	2.28	0.28	1.00
			Total MeHg	0.091	0.014	0.05
			Diss. MeHg	0.05	0.014	0.05
	Electric-blank	16:40	Total Hg	U	0.28	1.00
	Electric-native	16:52	Total Hg	29.3	0.56	2.00
			Diss. Hg	4.06	0.28	1.00
			Total MeHg	0.44	0.014	0.05
			Diss. MeHg	0.089	0.014	0.05
	Electric-dup	17:13	Total Hg	19.1	0.56	2.00
			Diss. Hg	2.37	0.28	1.00
			Total MeHg	0.47	0.014	0.05
			Diss. MeHg	0.081	0.014	0.05

Note: CH2MHill Applied Sciences Laboratory used for analysis. Samples were composited in the field by City staff to help eliminate discrepancies in data due to length of time between total and dissolved Hg and MeHg sample collection.

U= Not detected at specified reporting limit.

Table 14.
Mercury Monitoring - Additional Data (RY 2013/14)

Site Name:	Electric							
Sample Date/Time:	TSS (mg/L)	DOC (mg/L)	Sulfate (mg/L)	Total Alkalinity (mg/L)	TOC (mg/L)	pH (S.U)	ORP (V)	Sp. Cond (µS/cm)
09/05/2013 16:52	332	6.17	1.78	12.70	8.25	7.03	0.36	18.45
Site Name:	**Electric duplicate**							
Sample Date/Time:	TSS (mg/L)	DOC (mg/L)	Sulfate (mg/L)	Total Alkalinity (mg/L)	TOC (mg/L)	pH (S.U)	ORP	Sp. Cond (µS/cm)
09/05/2013 17:13	316	6.05	0.86	5	8.06	6.5	0.36	19.33
Site Name:	**Hilfiker**							
Sample Date/Time:	TSS (mg/L)	DOC (mg/L)	Sulfate (mg/L)	Total Alkalinity (mg/L)	TOC (mg/L)	pH (S.U)	ORP	Sp. Cond (µS/cm)
09/05/2013 18:05	15.00	2.37	0.52	5.00	2.44	6.45	0.34	8.69
Reporting Limit:	**2.0 mg/L**	**0.5 mg/L**	**0.10 mg/L**	**5.0 mg/L**	**0.5 mg/L**			

Note: CH2MHill Applied Sciences Laboratory used for analysis of TSS, DOC, Sulfate, Total Alkalinity, and TOC. pH, Oxygen Reduction Potential (ORP) and specific conductivity are field measurements collected by City staff.

Table 15.

Priority Dry Weather Outfall/Manhole Screening Data (RY 2013/14)

Site Information				Flow		Physical Indicators		Field Screening					Laboratory Testing						
ID	location note	west, north, south	Date/time	Flow Present	Estimated flow	Flowing Outfalls	Flowing and non-flowing outfalls	Temp (C)	pH (S.U.)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Chlorine (mg/L)	E. Coli (MPN/100 mL)	Detergents (mg/L)	Fluoride (mg/L)	K (mg/L)	Na (mg/L)	NH3 (mg/L)	**Notes**
D39476232*		west	10/17/13 11:45	n		n	n												
D45468241		south	10/17/13 13:20	y	20	n	n	15.1	7.67	150.6	0.7	0.3	1						
D39478271		west	10/17/13 12:00	n	50	n	n	14.1	7.16	118.3	5.03	0.5	228						
D42482228*		north	10/11/13 0:00	y	10	n	n	16.9	7.6	160	3.14	0	116						
D36472227*		west	10/17/13 10:30	y	5			16.3	6.51	139.7	6.84	0.5	22	<0.25	0.34	2.24	10.6	<0.5	
D30470204*		west	10/17/13 9:42	y	0.3	n	n												not enough flow to sample
D42480223		north	10/11/13 10:50	y	200	n	n	16.0	7.06	146	2.52	0	8164						
D42480214*		north	10/11/13 11:20	y	20	n	n	16.3	7.89	290	3.55	0.5	517	<0.25	0.16	2.06	10.9	<0.01	
D42480205		north	10/11/13 11:45	n		n	n												
D42482211*		north	10/11/13 12:15	n		n	n												
D42482210		north	10/11/13 12:10	n		n	n												
D39456229		south	10/11/13 9:40	y	15	n	n	13.1	6.52	80	0.96	0	<1						
D39460252		south	9/11/13 0:00	y	15	n	n	17.1	6.05	66.4	2.8	0	210						
D42466227*		south	9/11/13 13:45	y	30	n	n	21.3	6.8	98.7	5.87	0	2420						
D42468232		south	9/11/13 12:00	n		n	n												
D42468244		south	9/11/13 11:40	y	100	n	y (green bethnic growth)	19.3	7.61	128.3	5.23	0	1414						
D45464207		south	9/11/13 10:10	y	5	n	n	19.0	7.51	87.4	1.98	0							
D48464249		south	9/11/13 9:00	n		n	n												
D48464203		south	10/11/13 9:40	y	15	n	n	13.1	6.52	80	0.96	0	<1						
D45466212		south	9/11/13 8:30	y	5	n	n	20.5	7.6	101.3	1.83	0							
D42468235		south	9/11/13 10:27	n		n	n												
D48460230*	sub for 229	south	9/11/13 10:50	y	10	n	n	18.7	7.38	278.9	3.65	0	17						
D42476203		north	9/4/13 12:35	n		n	n												
D54494201		north	9/4/13 14:10	n		n	n												
D45476207		north	9/4/13 12:40	y	270	n	n	16.7	7.36	242.5	1.41	0	1120						
D45476217		north	9/4/13 12:35	y	5	n	n	19.8	7.46	146.8	1.74	0	387						
D51486211*	sub for 201	north	9/4/13 10:50	n				19.6	6.67	96.1	4.4	0	109						stagnant water
D51488203		north	9/4/13 10:35																couldn't access
D51488236		north	9/4/13 10:30	n		n	n												
D48486207		north	9/4/13 11:05	n		y (green faint color, some cloudiness)		20.0	6.87	176.2	4.22	0	146						stagnant water
D51486216		north	9/4/13 10:00	y	5	n	n	17.4	6.92	82.1	1.99	0	2420						
D51470203	sub for 205	north	9/4/13 8:40	n			n	19.1	7.29	249	2.5	0							stagnant water
D54486217		north	9/4/13 9:40	y	225	n	y (brown bethnic growth)	17.6	7.32	74.5	2.27	0	816						
D54470205		north	9/4/13 9:00	n			n												

Data in red exceed action levels, see Dry Weather Outfall and Illicit Discharge Screening Plan for more info.

* Stormwater Manhole.

Table 16.

Priority Dry Weather Screening Data - Follow Up Sampling (RY 2013/14)

Structure Sampled	Orignal E.Coli Sample Date	Original E.Coli Result	Follow up E. Coli Sample Date	Follow up E. Coli Result	Upstream Structure Sampled	Upstream E.Coli Sample Date	Upstream Structure E.Coli Result
ID	Date_time	E. Coli (MPN/100 mL)	E. Coli (MPN/100 mL)		ID	Date_time	E. Coli (MPN/100 mL)
D42480223	10/11/2013 10:50	8164	10/22/2013 11:20	>2420			
					D42480217	10/22/2013 12:00	>2420
					D45478203	10/22/2013 12:22	<1
					D45478207	10/22/2013 12:35	<1
					D45478210	10/22/2013 12:43	<1
D42480214*	10/11/2013 11:20	517	10/22/2013 11:30	185			
D42466227*	9/11/2013 13:45	2420	10/11/2013 9:20	11200			
					D42466226	10/16/2013 10:50	<1
					D42466240	10/16/2013 11:00	<1
					D42466207	10/16/2013 10:25	816
					D42466208	10/16/2013 11:17	58
					D42466228	10/16/2013 12:09	96
					D42466229	10/16/2013 12:16	<1
					D39466220	10/16/2013 12:35	7
					D39466224	10/16/2013 12:46	<1
D42468244	9/11/2013 11:40	1414	10/11/2013 8:40	55			
D45476207	9/4/2013 12:40	1120	10/22/2013 10:00	276			
					D45476213	10/22/2013 10:50	308
					D45476220	10/22/2013 10:45	184
D51486216	9/4/2013 10:00	2420	No follow up sample - not enough flowing water to sample, will re-sample in in 2014				
D54486217	9/4/2013 9:40	816	No follow up sample - perenial flow from road side ditch with nutria and ducks in it				

* Stormwater Manhole.

Table 17.

Priority Dry Weather Screening Data - Additional Sampling (RY 2013/14)

Clark Creek (concrete lined section near South Salem H.S)	Sample Date	E.Coli (mpn/100mL)	Notes
Clark Creek 100' Upstream of Sewer Line	9/11/2013 12:30	1046	Sampling was conducted 100 feet upstream and 100 feet downstream of a sewer manhole near Clark Creek at South Salem High School. Based on results, more testing will be conducted in RY 2014/2015 to try and indentify sources of *E. coli.*
Clark Creek 100' Upstream of Sewer Line	10/11/2013 8:50	2382	
Clark Creek 100' Upstream of Sewer Line	10/16/2013 10:10	115	
Clark Creek 100' Downstream of Sewer Line	9/11/2013 12:35	1986	
Clark Creek 100' Downstream of Sewer Line	10/11/2013 8:55	4884	
Clark Creek 100' Downstream of Sewer Line	10/16/2013 10:00	870	
Clark Creek at top of Conrete Lined Section	10/16/2013 10:15	308	
Clark Creek at bottom of Conrete Lined Section	10/16/2013 10:00	326	

Table 18.
Additional Data - Saddle Club Subsurface Gravel Treatment Wetland Data (RY 2013/14)

Saddle Club- IN	E. coli	cond	DO	temp	pH	Cu	Zn	Cu (Dis)	Zn (Dis)	BOD5	Cond (comp)	Hard	NH3	NO3/NO2	Ortho P	Pb	(Pb Dis)	TP	TSS
Date/Time	MPN/100 mL	uS/cm	mg/L	°C	S.U	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
12/12/2013 16:37	28	139.8	13.37	2.7	7.41														
12/12/2013 18:40	58	Not enough flow to take field measurements																	
12/13/2013 11:02						0.0103	0.136	0.0071	0.0973	14	115	26	0.169	0.3	0.124	0.0006	<0.0005	0.223	32
03/05/2014 04:42	96	50.65	8.77	10.74	6.98														
03/05/2014 06:16	162	33	9.6	10.95	7.1														
3/6/2014 10:19						0.0042	0.0318	0.003	0.0222	<3.8	53	18	<0.05	0.45	0.035	0.0005	<0.0005	0.146	15.2
03/25/2014 06:45	291	42.51	10.35	10	6.82														
03/25/2014 08:28	1414	116.3	5.4	10.48	6.94														
3/26/2014 9:58						0.0114	0.0538	0.0082	0.0368	11.9	66.8	28	0.117	0.74	0.021	<0.0005	<0.0005	0.13	18.8

Saddle Club- OUT	E. coli	cond	DO	temp	pH	Cu	Zn	Cu (Dis)	Zn (Dis)	BOD5	Cond (comp)	Hard	NH3	NO3/NO2	Ortho P	Pb	Pb (Dis)	TP	TSS
Date/Time	MPN/100 mL	uS/cm	mg/L	°C	S.U	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
12/12/2013 16:50	<1	127.5	2.05	5.1	7.17														
12/12/2013 18:50	<1	106.5	0.92	6.6	7.06														
12/13/2013 11:15	6					0.009	0.0071	0.0057	0.0044	1.1	95.7	51	0.066	< 0.05	0.122	< 0.0005	< 0.0005	0.077	12.2
03/05/2014 04:50	<1	169.7	0.44	8.99	6.75														
03/05/2014 06:23	<1	169	0.36	8.99	6.74														
03/06/2014 10:23	<1					0.0137	0.0035	0.0124	0.0041	< 5.4	172	74	0.051	< 0.05	0.073	< 0.0005	< 0.0005	0.131	3.5
03/25/2014 06:53	<1	157.3	0.56	10.41	6.47														
03/25/2014 08:44	<1	159.9	0.36	10.18	6.6														
03/26/2014 09:50	2					0.0129	0.0039	0.0113	0.0049	< 2.0	151	82	0.079	0.26	0.208	< 0.0005	< 0.0005	0.288	3.5

Additional E. coli samples taken from effluent during storm events

Date/Time	E. coli MPN/100 mL
01/13/2014 09:50	2
02/24/2014 08:24	<1

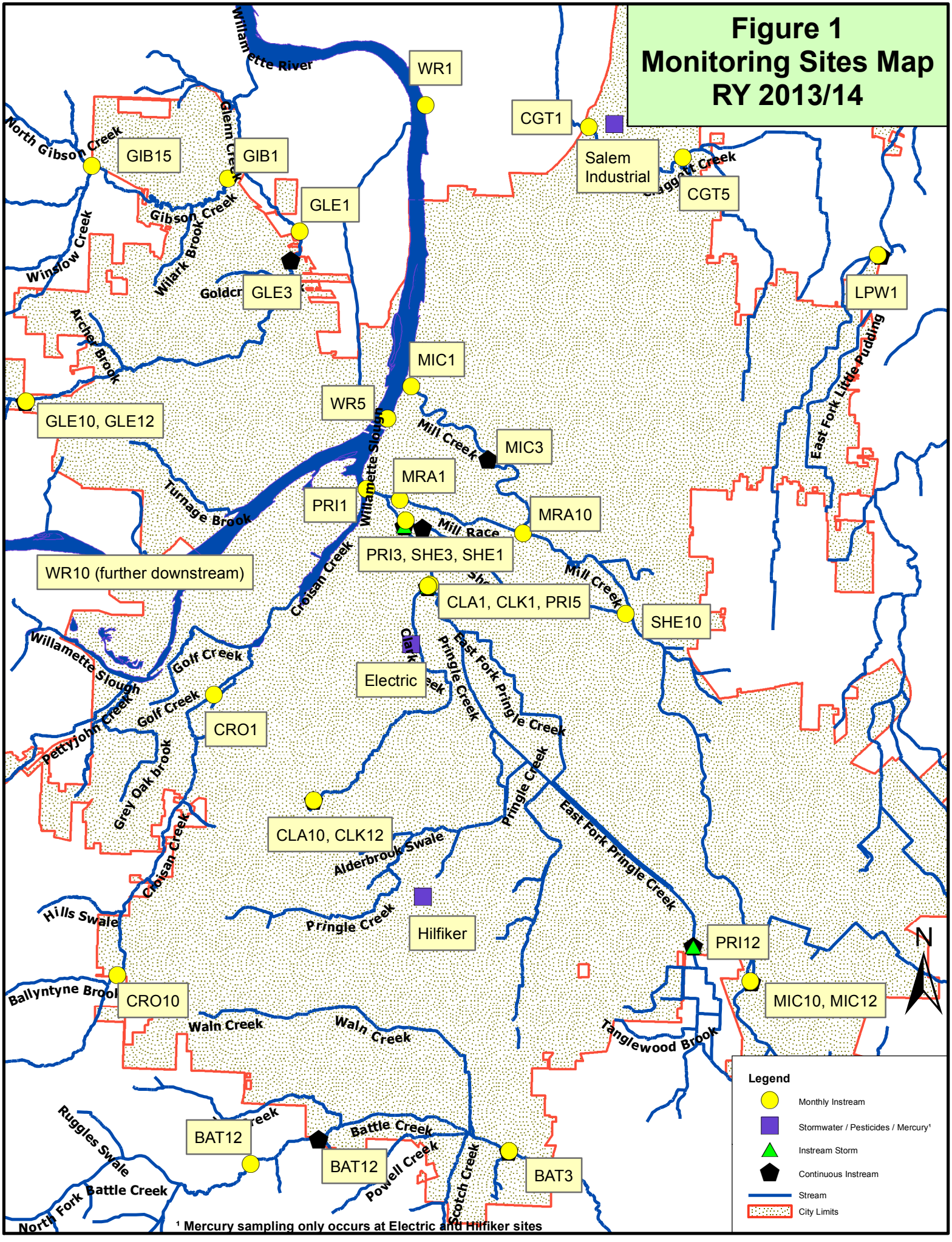
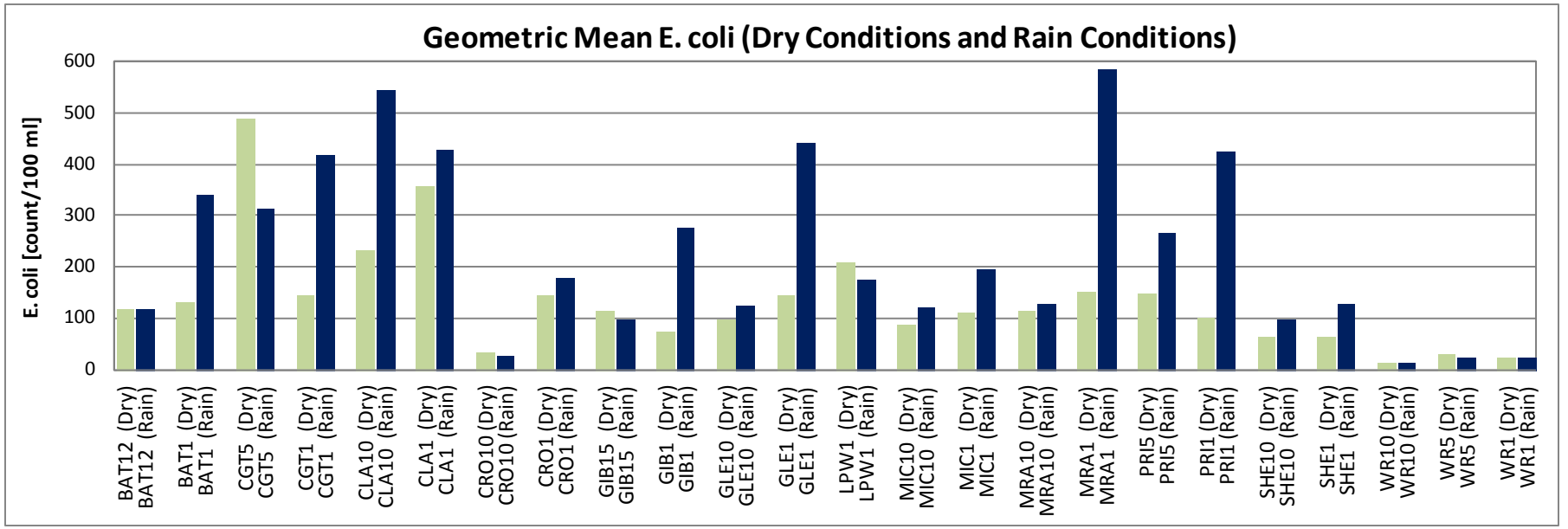
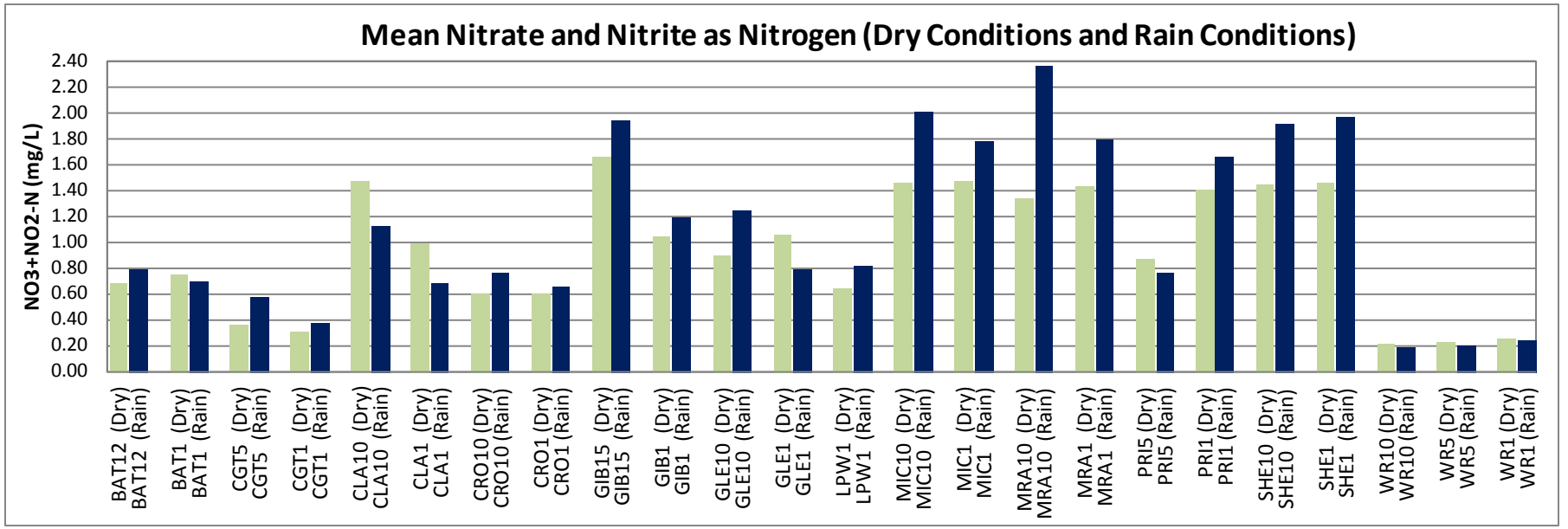


Figure 1
Monitoring Sites Map
RY 2013/14
WR1
CGT1
Salem Industrial
CGT5
GIB15
GIB1
GLE1
GLE3
LPW1
MIC1
WR5
MIC3
GLE10, GLE12
MRA1
PRI1
MRA10
PRI3, SHE3, SHE1
WR10 (further downstream)
CLA1, CLK1, PRI5
SHE10
Electric
CRO1
CLA10, CLK12
Hilfiker
PRI12
MIC10, MIC12
CRO10
BAT12
BAT12
BAT3
Willamette River
North Gibson Creek
Glenn Creek
Gibson Creek
Winslow Creek
Wilark Brook
Archer Brook
Willamette Slough
Mill Creek
Turnage Brook
Mill Race
Croisan Creek
East Fork Little Pudding
Pringle Creek
East Fork Pringle Creek
Golf Creek
Pettyjohn Creek
Grey Oak brook
Alderbrook Swale
Hills Swale
Ballyntyne Brook
Waln Creek
Tanglewood Brook
Ruggles Swale
Battle Creek
North Fork Battle Creek
Powell Creek
Scotch Creek
N
Legend
Monthly Instream
Stormwater / Pesticides / Mercury¹
Instream Storm
Continuous Instream
Stream
City Limits
¹ Mercury sampling only occurs at Electric and Hilfiker sites

Figure 2

Monthly Instream Mean Value Comparison for Dry and Rain Conditions (RY 2013/14)

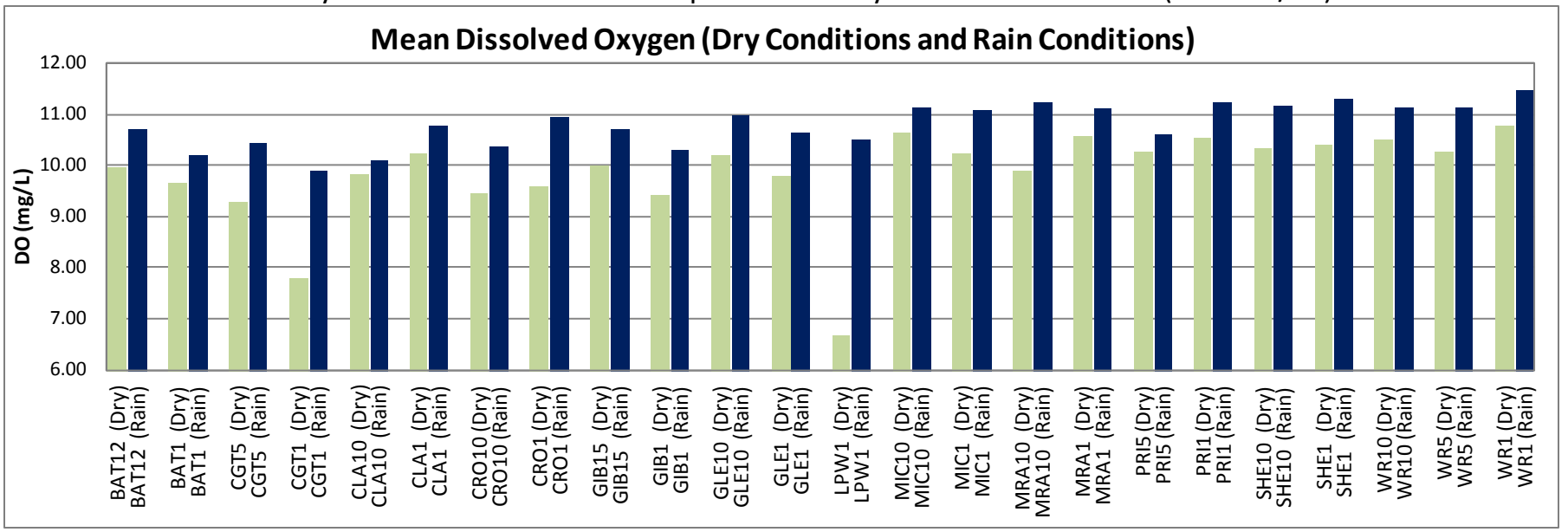


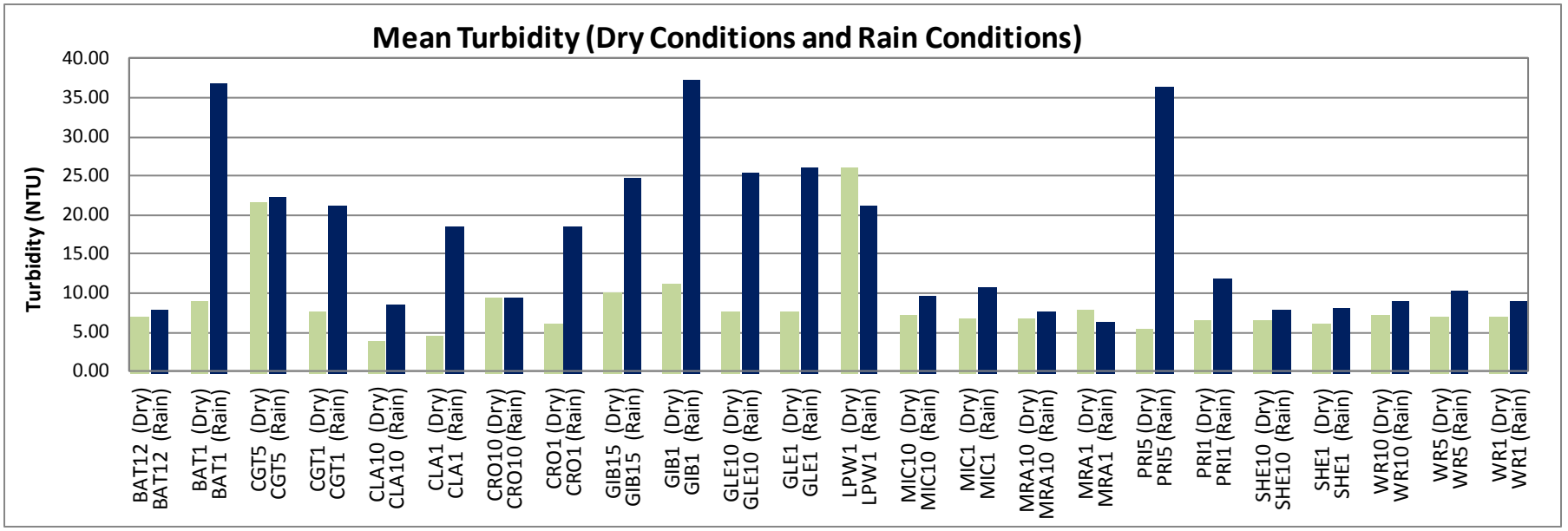


Dry conditions defined as less than 0.05 inches of rainfall in the 24 hours prior to sample collection; **rain** conditions defined as greater than or equal to 0.05 inches of rainfall in the 24 hours prior to sample collection.

Figure 2

Monthly Instream Mean Value Comparison for Dry and Rain Conditions (RY 2013/14)

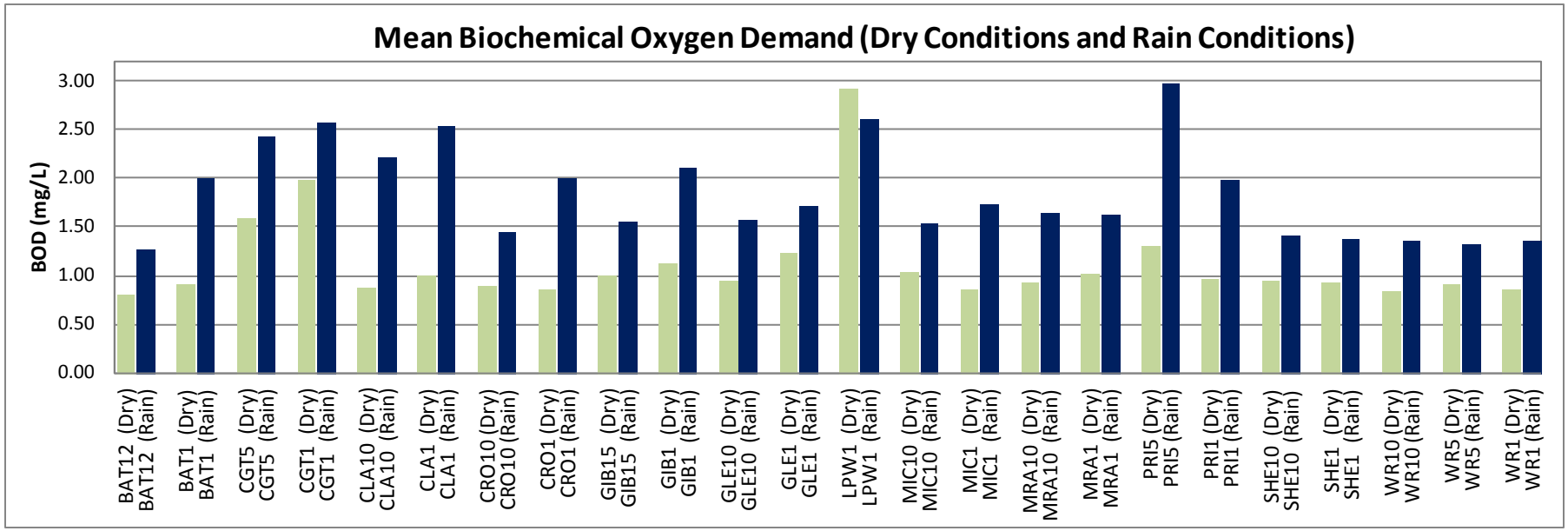


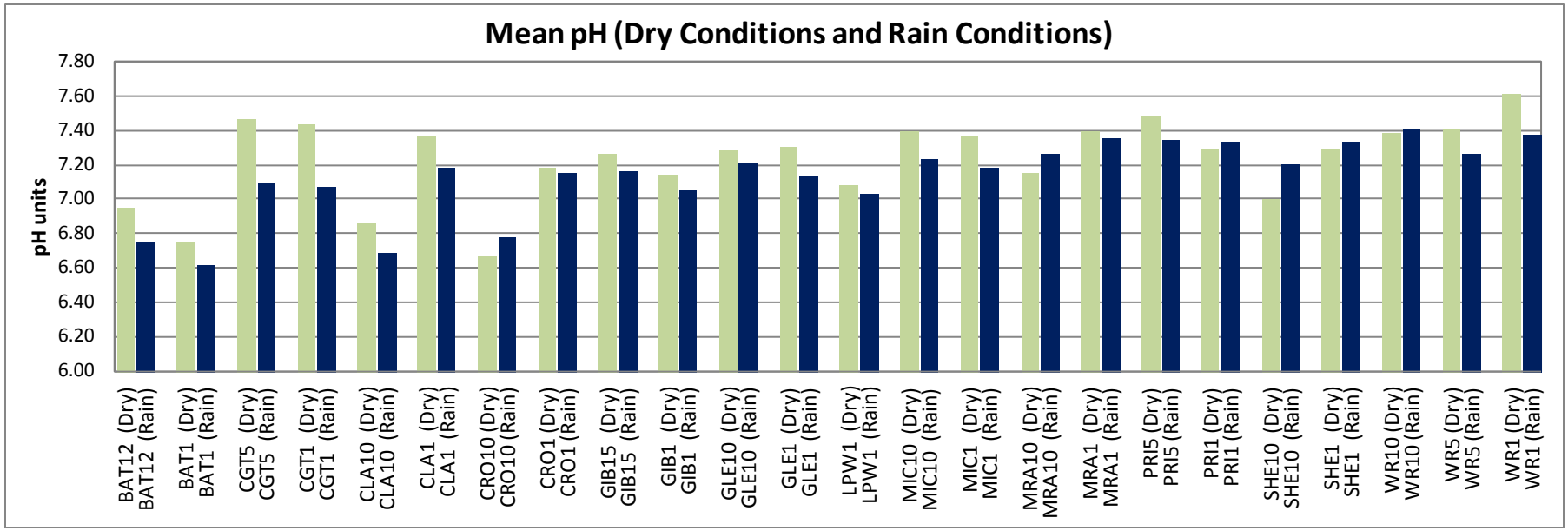


Dry conditions defined as less than 0.05 inches of rainfall in the 24 hours prior to sample collection; **rain** conditions defined as greater than or equal to 0.05 inches of rainfall in the 24 hours prior to sample collection.

Figure 2

Monthly Instream Mean Value Comparison for Dry and Rain Conditions (RY 2013/14)

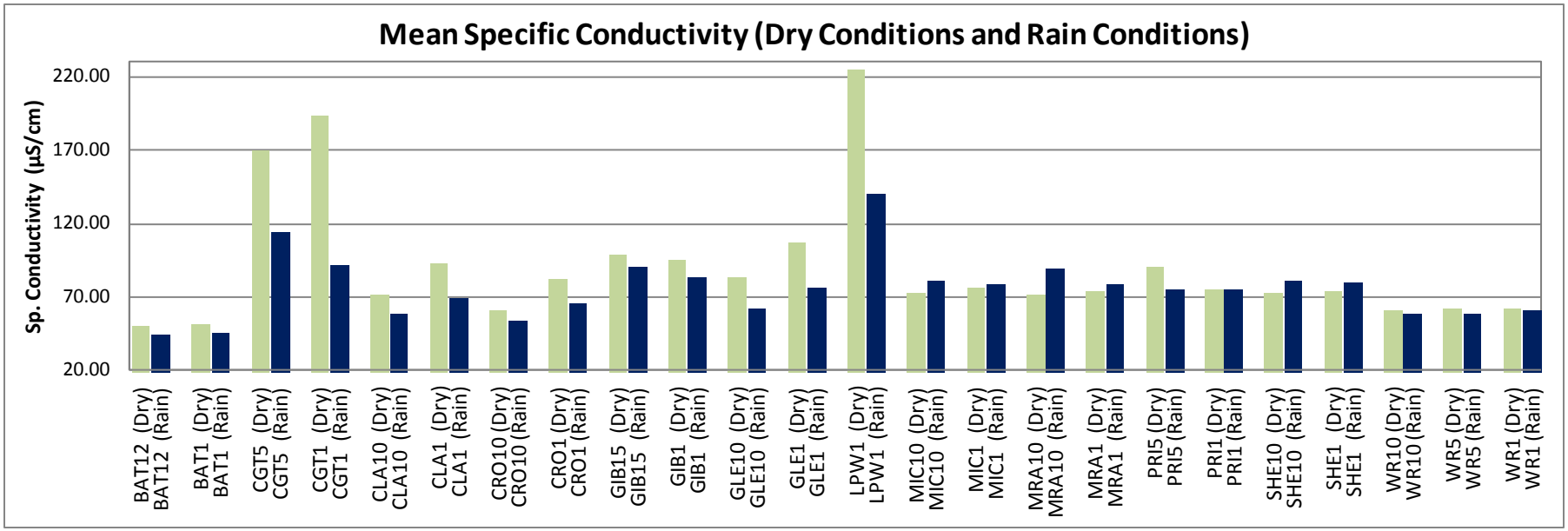




Dry conditions defined as less than 0.05 inches of rainfall in the 24 hours prior to sample collection; **rain** conditions defined as greater than or equal to 0.05 inches of rainfall in the 24 hours prior to sample collection.

Figure 2

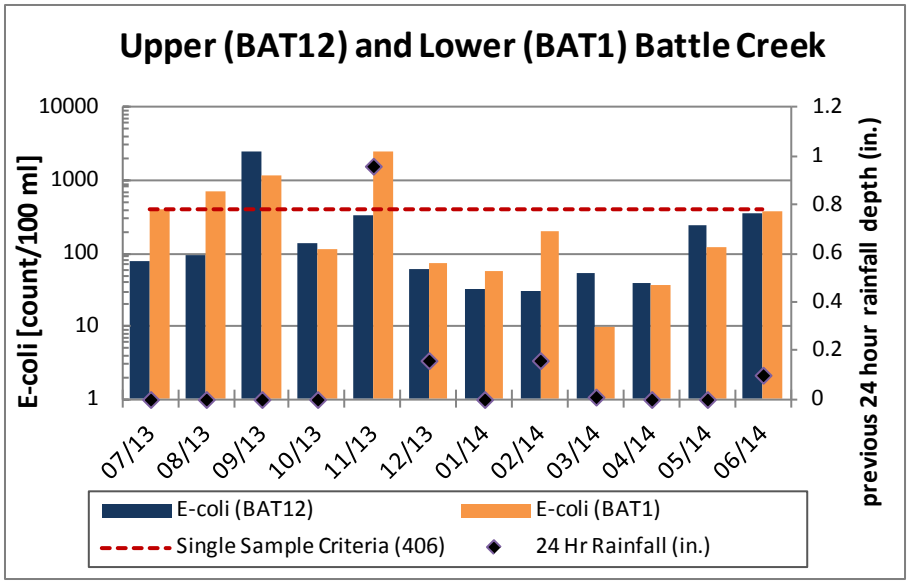
Monthly Instream Mean Value Comparison for Dry and Rain Conditions (RY 2013/14)

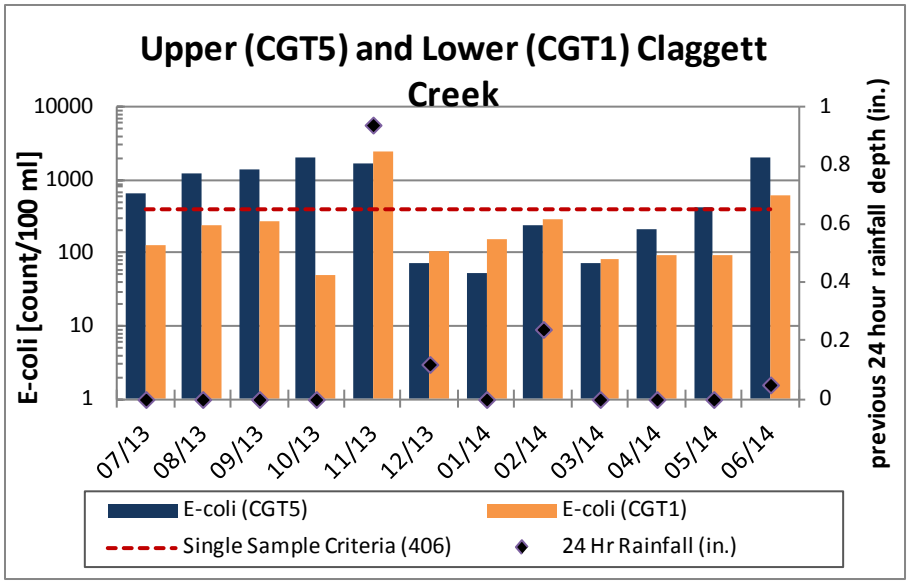


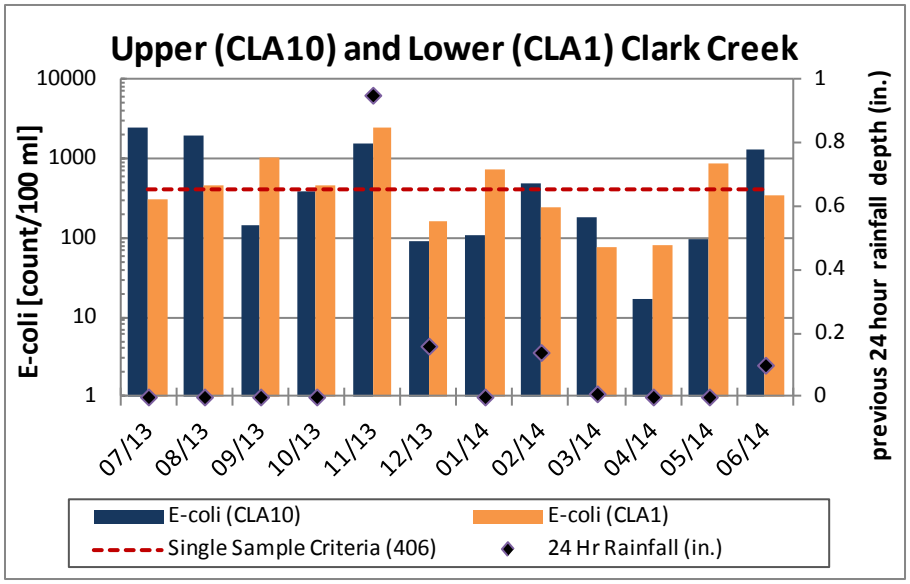
Dry conditions defined as less than 0.05 inches of rainfall in the 24 hours prior to sample collection; **rain** conditions defined as greater than or equal to 0.05 inches of rainfall in the 24 hours prior to sample collection.

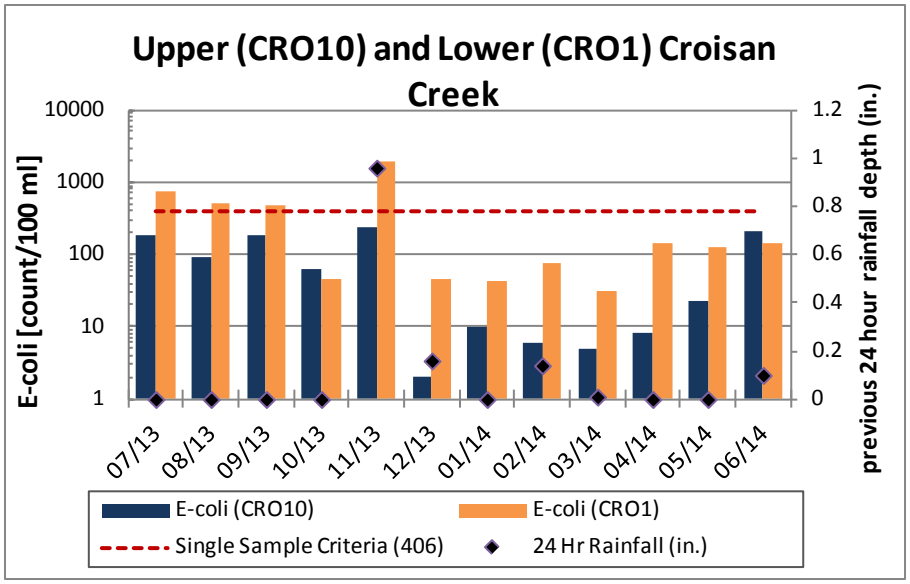
Figure 3

Monthly Instream E. Coli Upstream / Downstream Site Comparison (RY 2013/14)





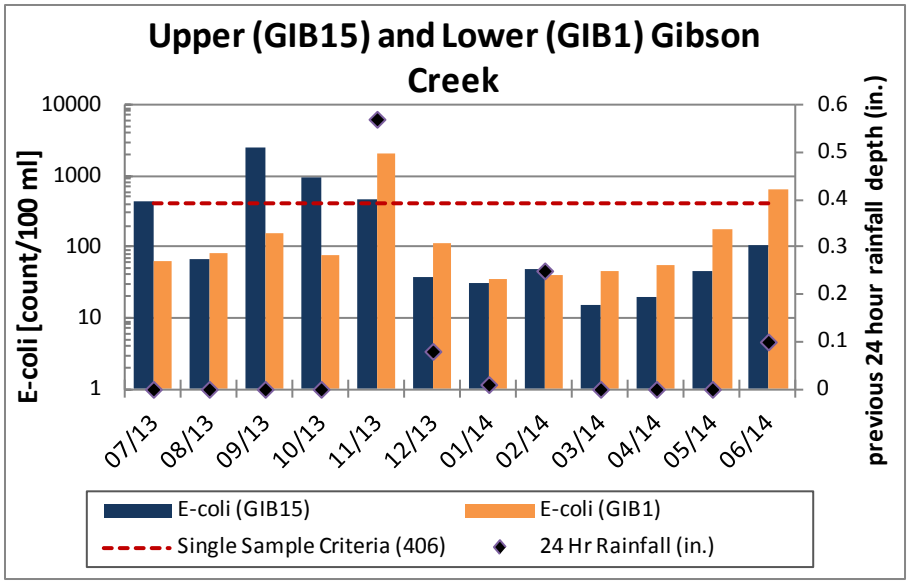


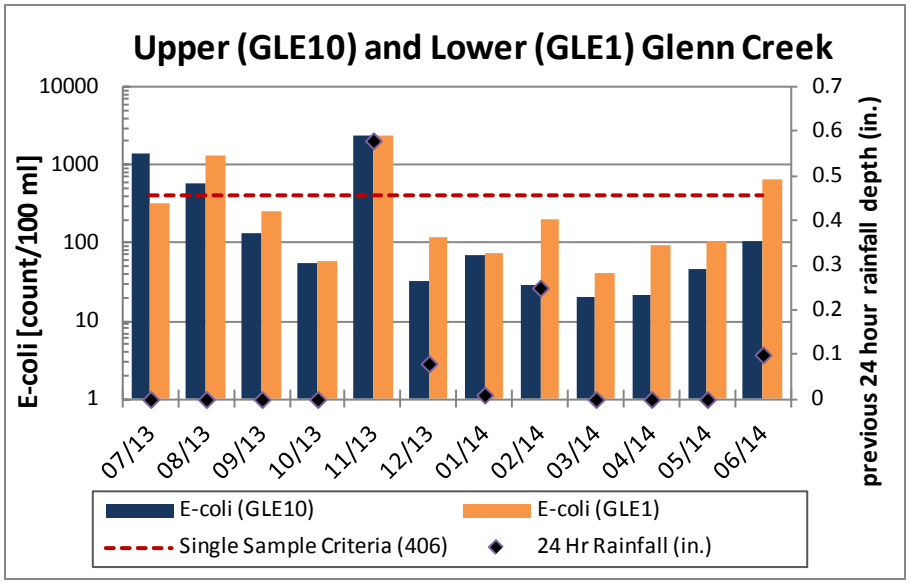


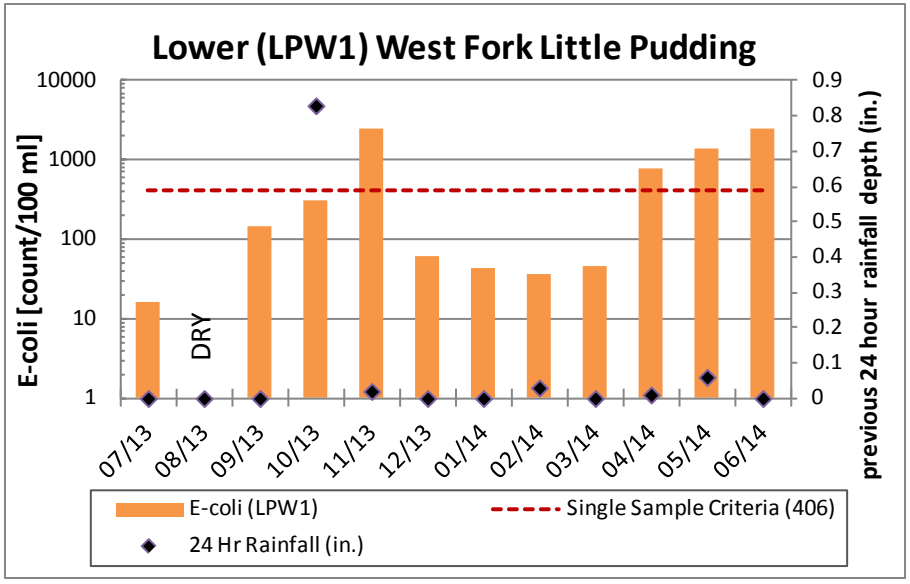
If 24 hour rainfall depth prior to sample collection differed between upstream and downstream sites, the average rainfall of the two sites was used.

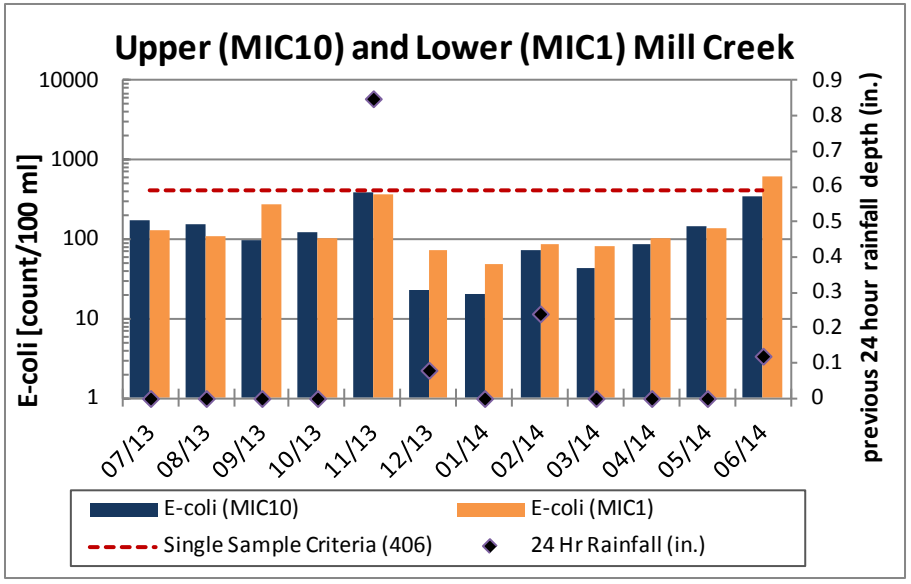
Figure 3

Monthly Instream E. Coli Upstream / Downstream Site Comparison (RY 2013/14)





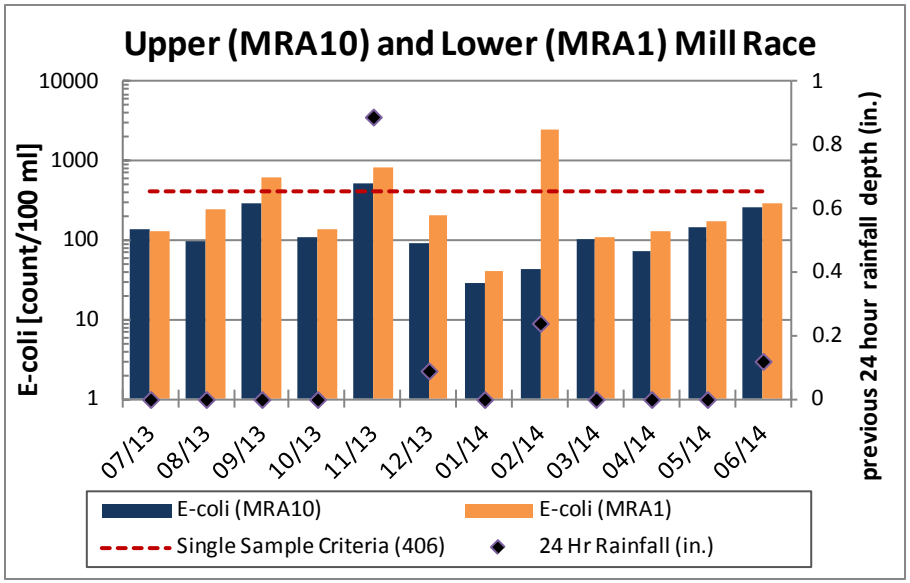


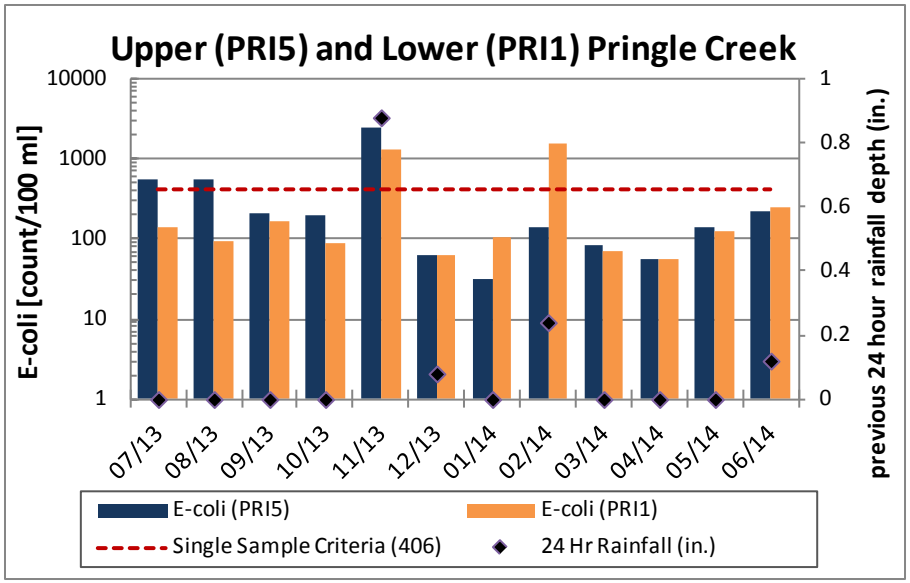


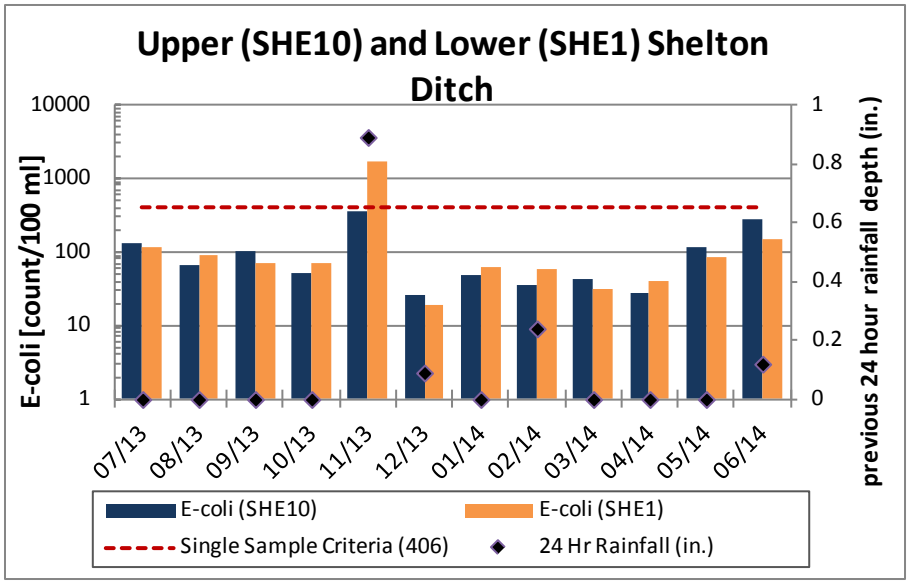
If 24 hour rainfall depth prior to sample collection differed between upstream and downstream sites, the average rainfall of the two sites was used.

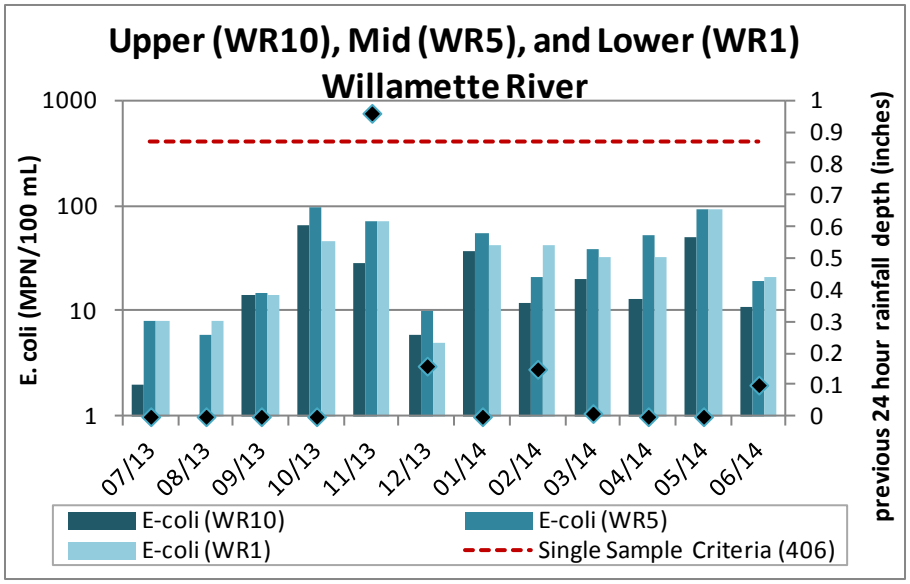
Figure 3

Monthly Instream E. Coli Upstream / Downstream Site Comparison (RY 2013/14)





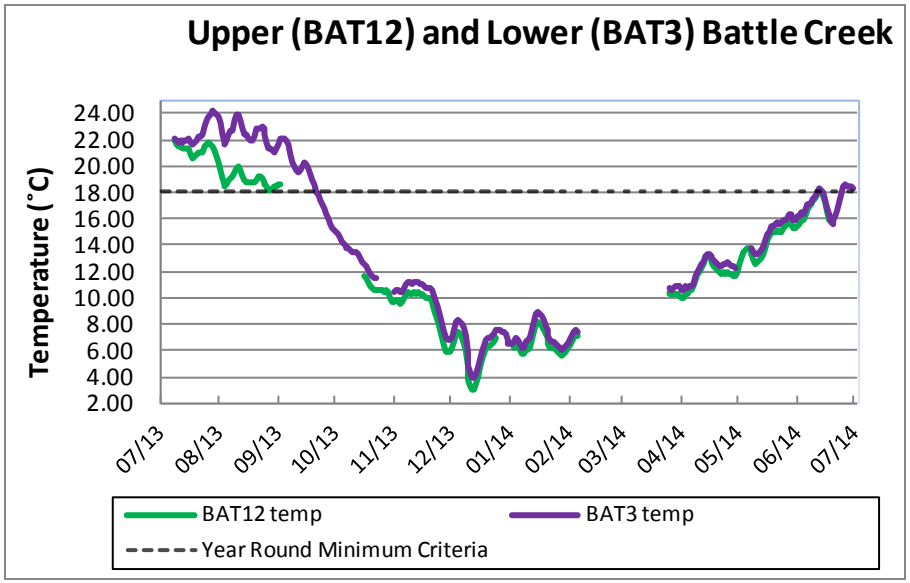


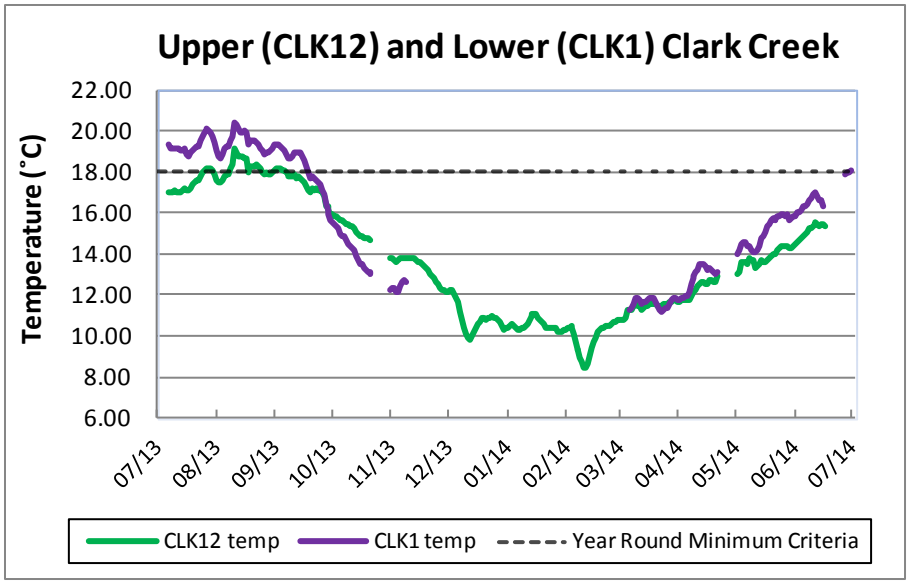


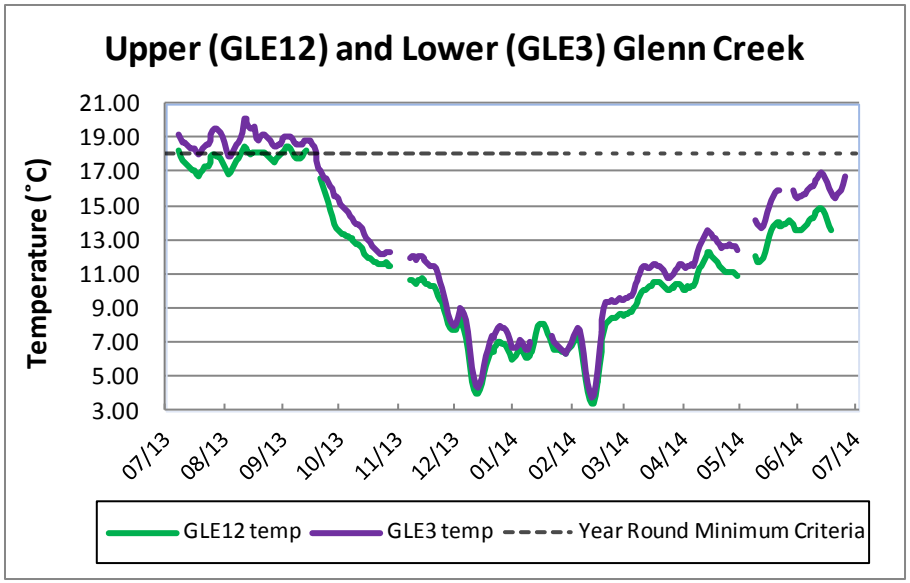
If 24 hour rainfall depth prior to sample collection differed between upstream and downstream sites, the average rainfall of the two sites was used.

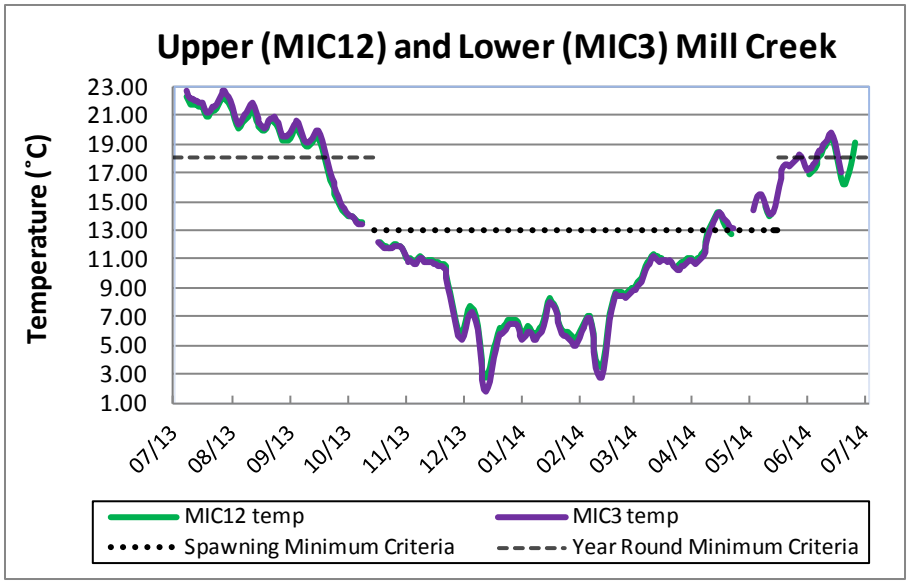
Figure 4

Continuous Instream Temperature 7-Day Moving Average Maximum (RY 2013/14)









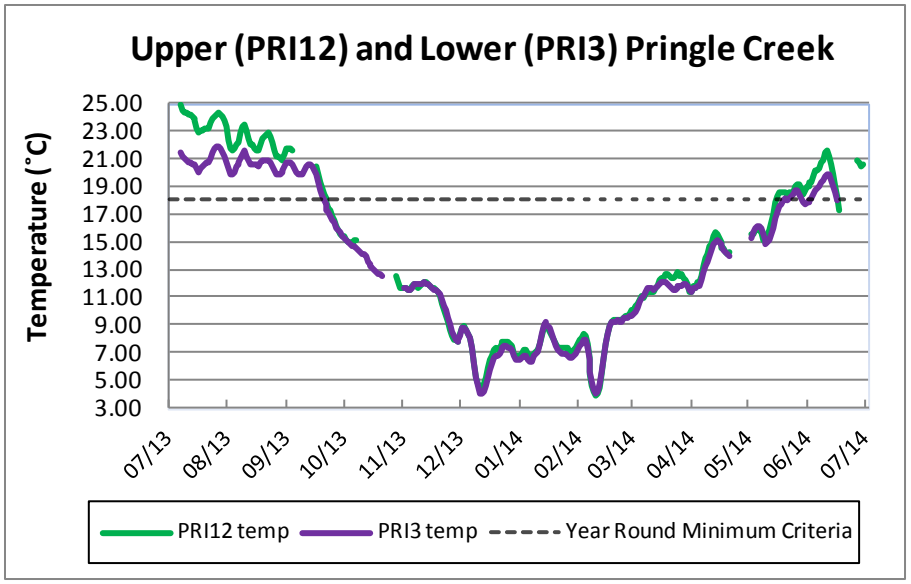
Presented temperature data consists of A grade data with greater than 80% of data points collected per day.

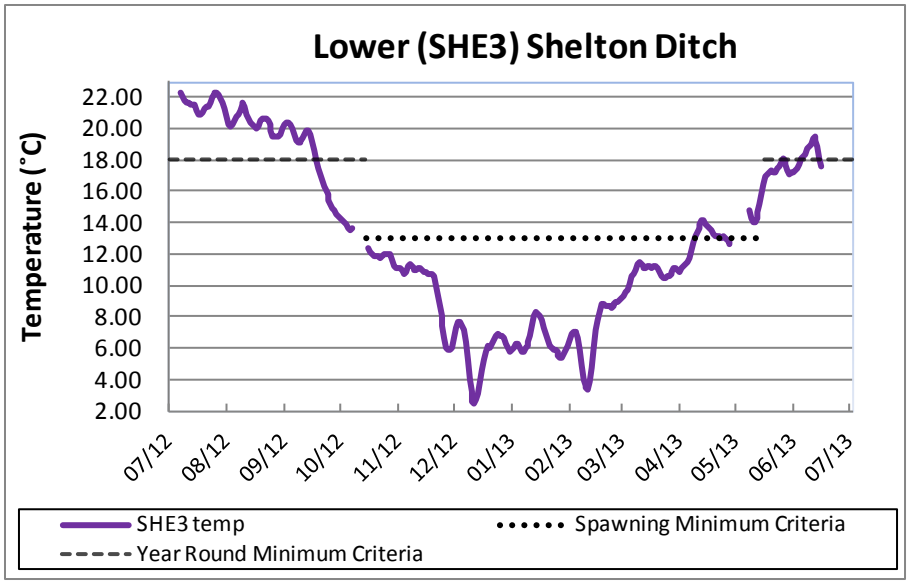
Temperature Criteria as defined in OAR 340-041-0028 and OAR-340-0340, Tables 340A and 340B.

- Spawning Minimum Criteria for applicable streams may not exceed 7-day average maximum of 13˚C.
- Year Round Minimum Criteria may not exceed 7-day average maximum of 18˚C.

Figure 4

Continuous Instream Temperature 7-Day Moving Average Maximum (RY 2013/14)





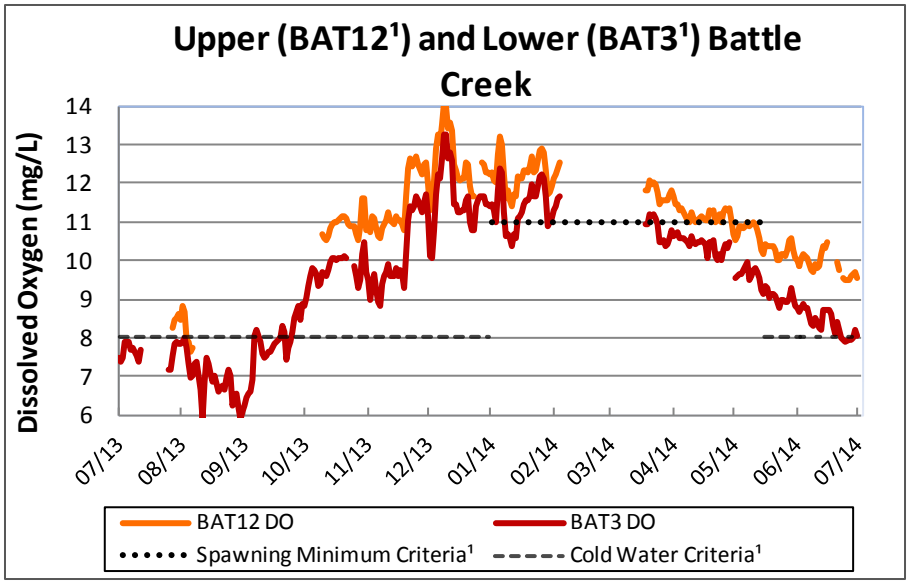
Presented temperature data consists of A grade data with greater than or equal to 80% of data points collected per day.

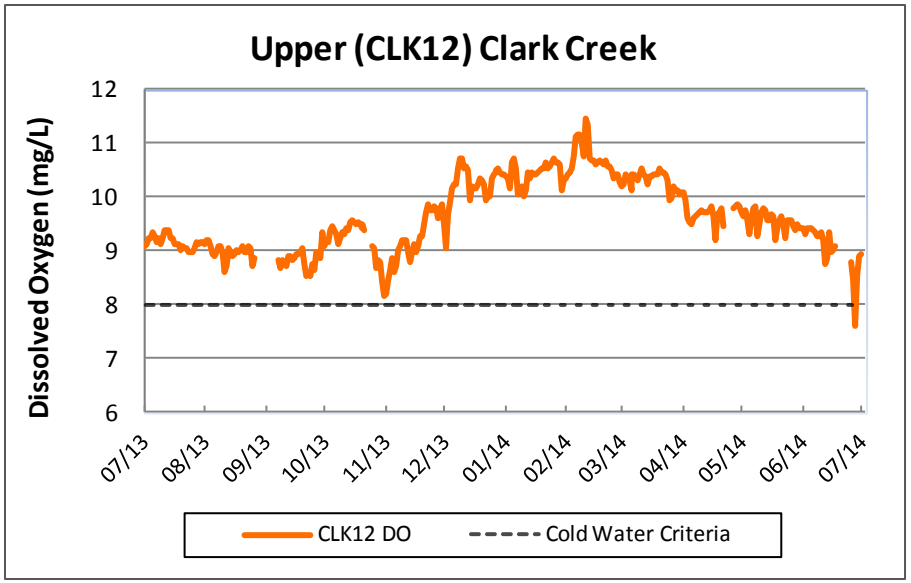
Temperature Criteria as defined in OAR 340-041-0028 and OAR-340-0340, Tables 340A and 340B.

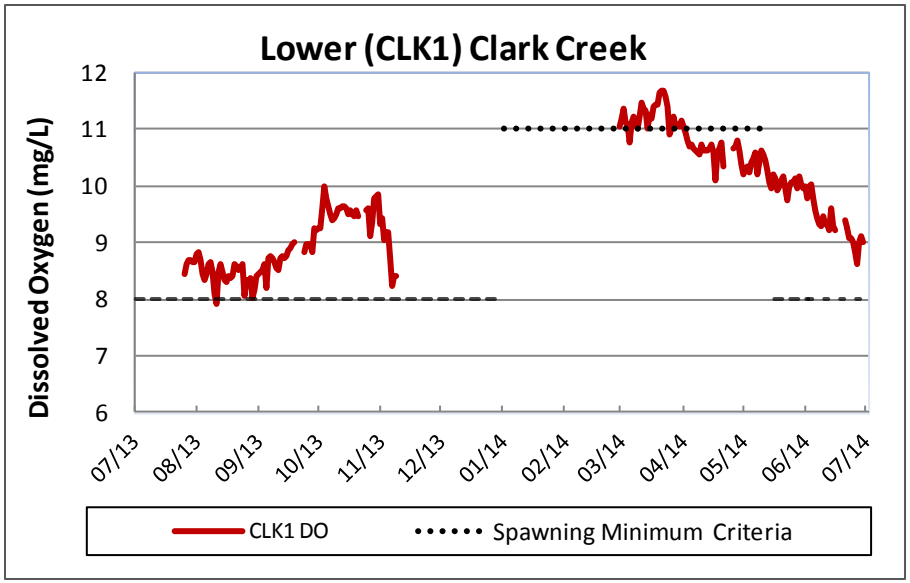
- Spawning Minimum Criteria for applicable streams may not exceed 7-day average maximum of 13˚C.
- Year Round Minimum Criteria may not exceed 7-day average maximum of 18˚C.

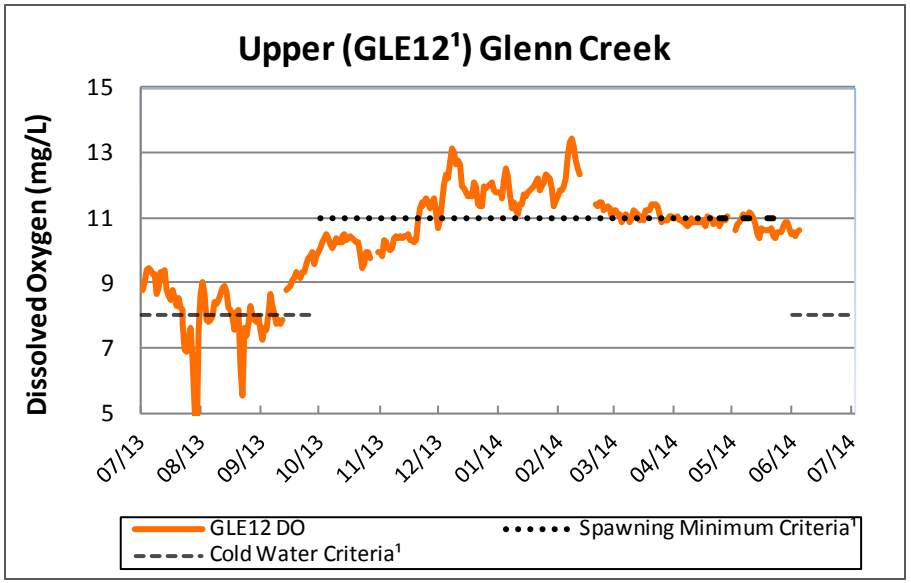
Figure 5

Continuous Instream Dissolved Oxygen Daily Mean (RY 2013/14)









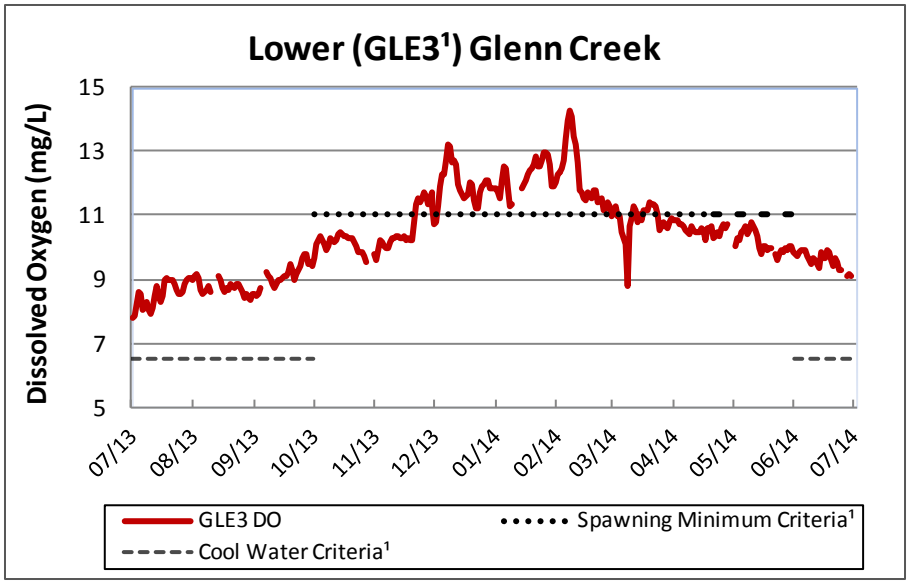
Presented DO data consists of A and B grade data with greater than or equal to 80% of data points collected per day.

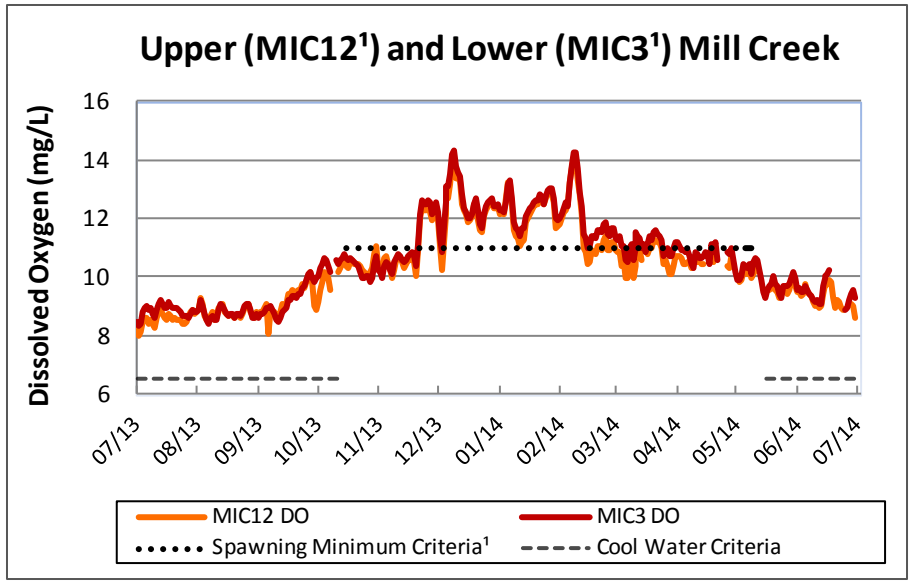
DO Criteria as defined in OAR 340-041-0016 and OAR-340-0340, Tables 340A and 340B.

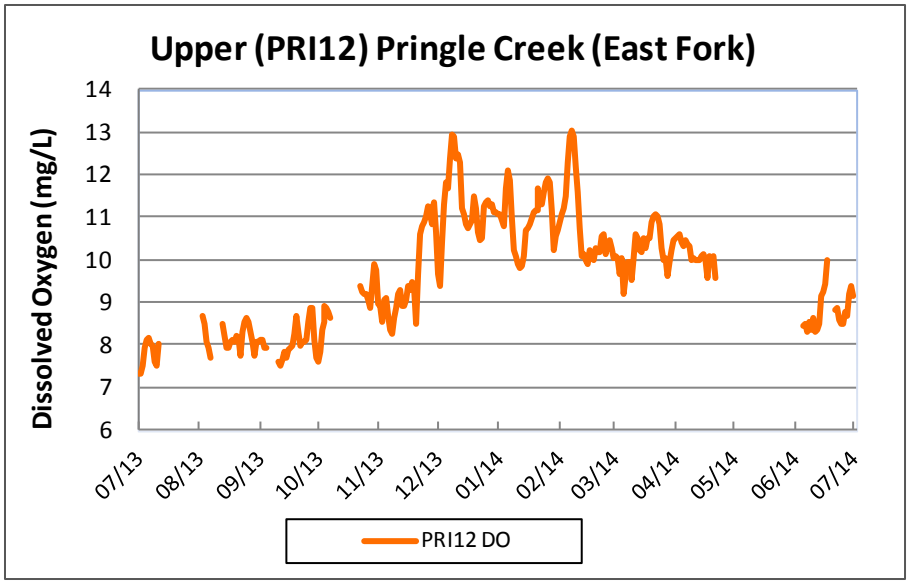
- Spawning Minimum Criteria for applicable streams may not be less than 11 mg/L .
- Cold Water Criteria for applicable streams may not be less than 8 mg/L.

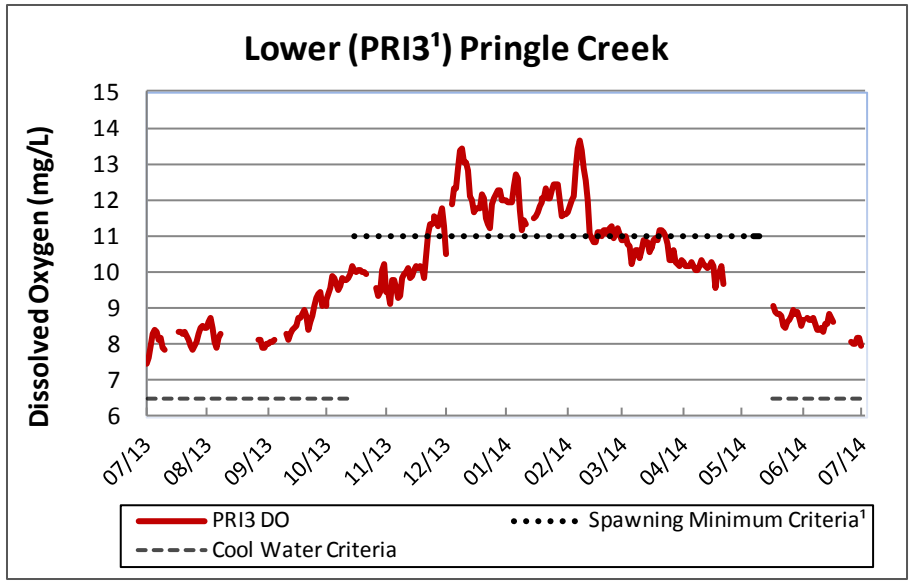
[1] Oregon's 2010 Integrated Report Section 303(d) listed.

Figure 5
Continuous Instream Dissolved Oxygen Daily Mean (RY 2013/14)







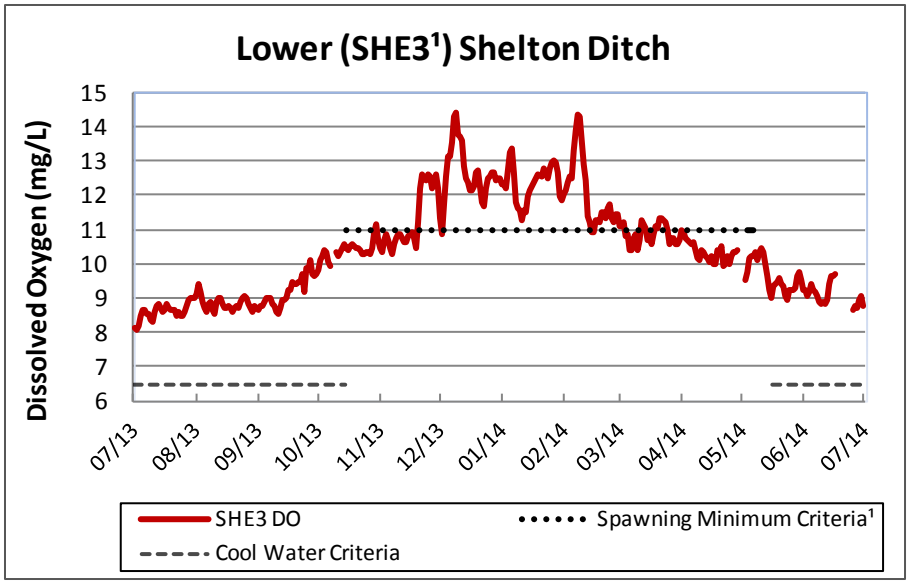


Presented DO data consists of A and B grade data with greater than or equal to 80% of data points collected per day.
DO Criteria as defined in OAR 340-041-0016 and OAR-340-0340, Tables 340A and 340B.

- Spawning Minimum Criteria for applicable streams may not be less than 11 mg/L .
- Cool Water Criteria for applicable streams may not be less than 6.5 mg/L.

[1] Oregon's 2010 Integrated Report Section 303(d) listed.

Figure 5
Continuous Instream Dissolved Oxygen Daily Mean (RY 2013/14)



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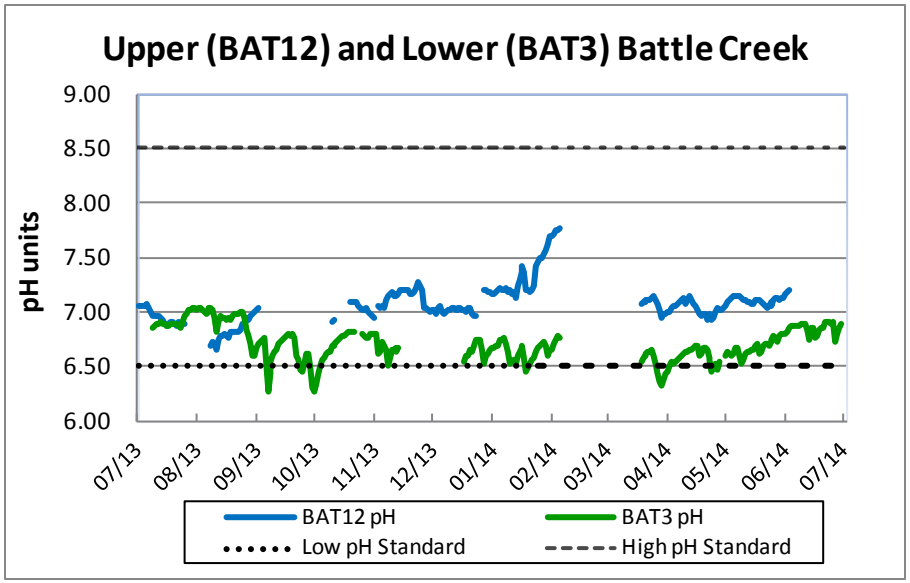
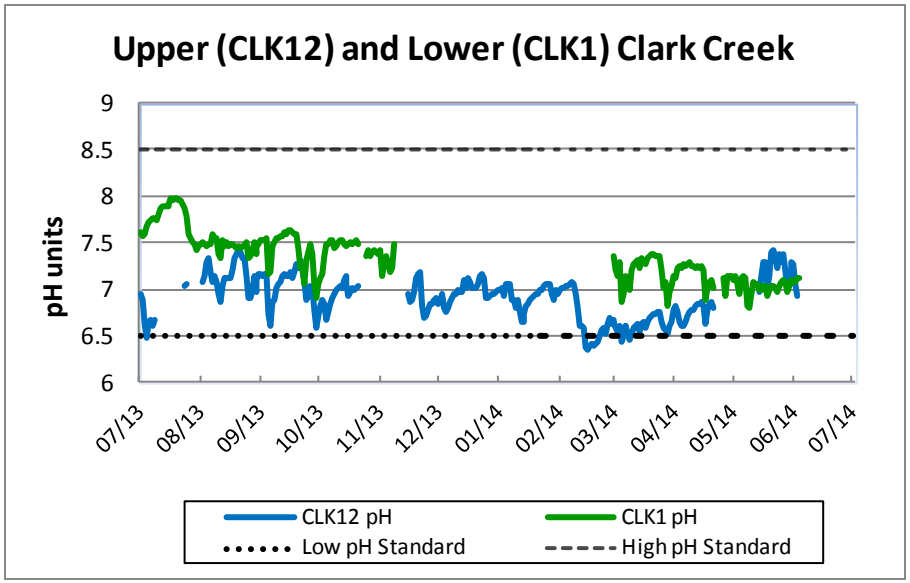
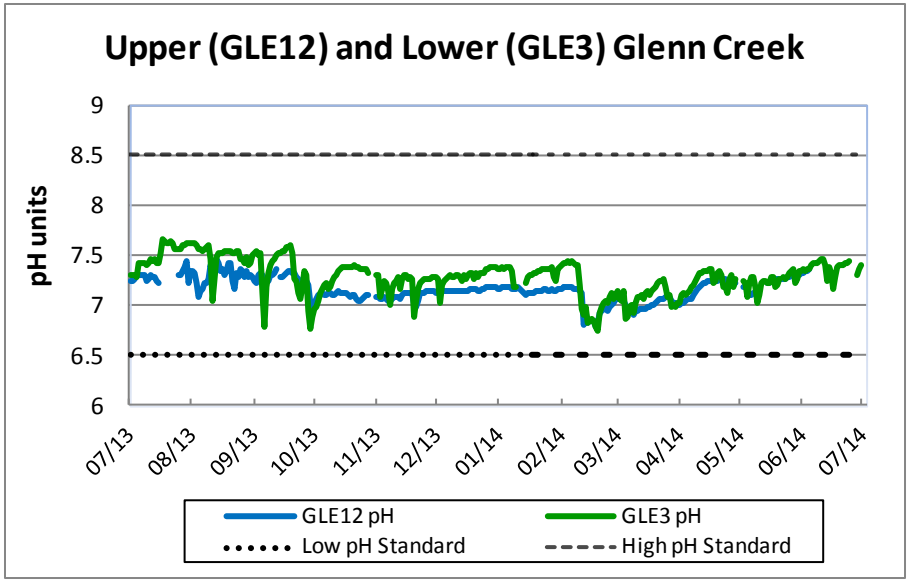
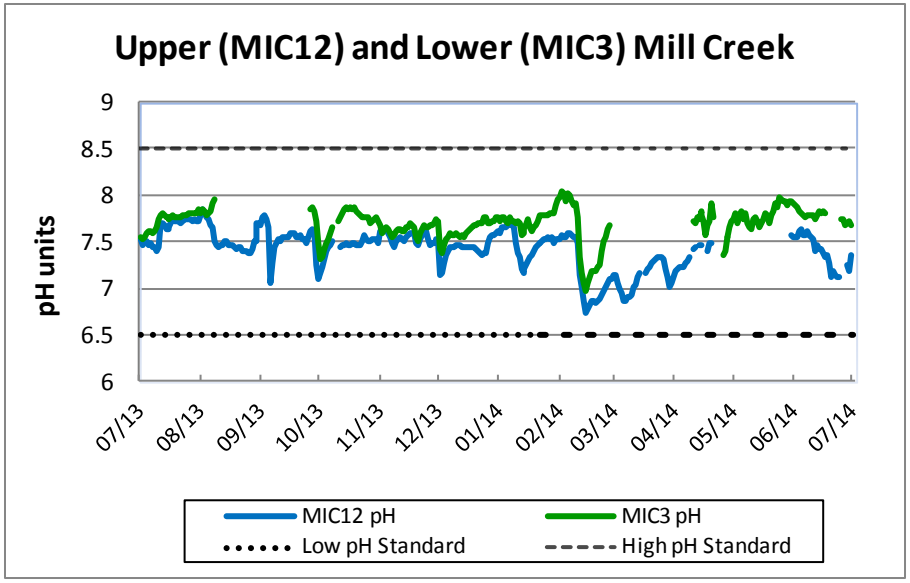
[1] Oregon's 2010Integrated Report Section 303(d) listed.

Figure 6
Continuous Instream pH Daily Mean (RY 2013/14)



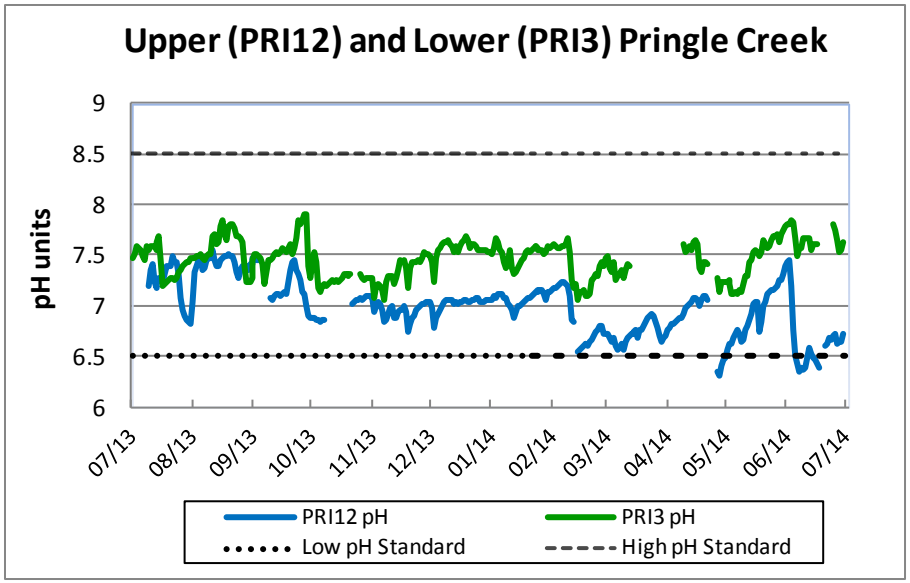


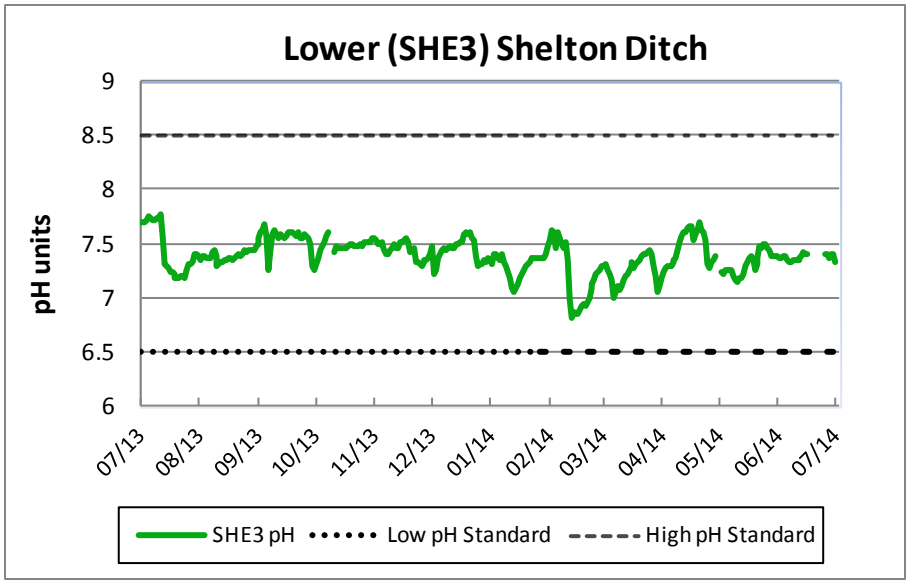




Presented pH data consists of A and B grade data with greater than or equal to 80% of data points collected per day.
As defined in OAR 341-041-0035, Water Quality Standards for the Willamette Basin, pH may not fall outside the ranges of 6.5 to 8.5.

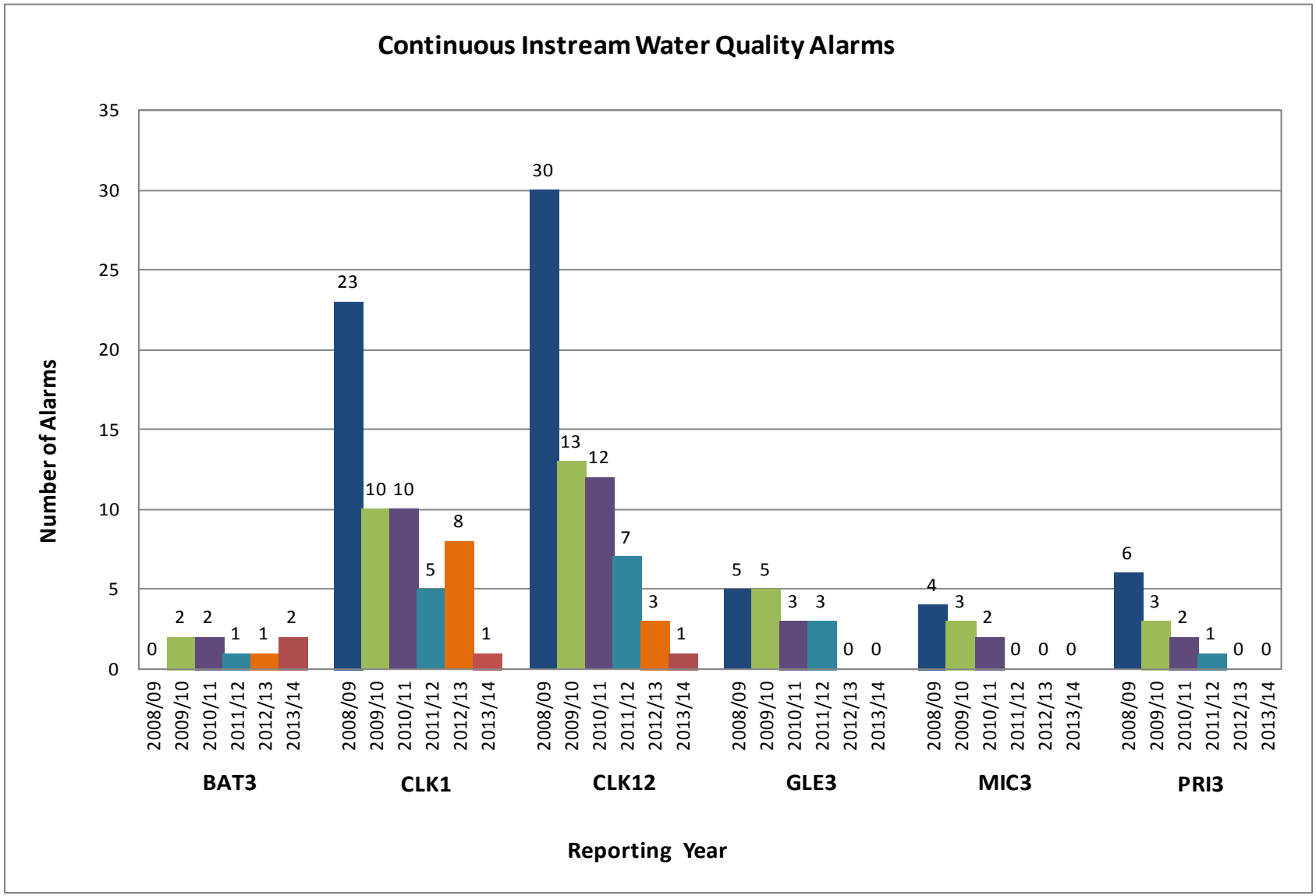
Figure 6
Continuous Instream pH Daily Mean (RY 2013/14)





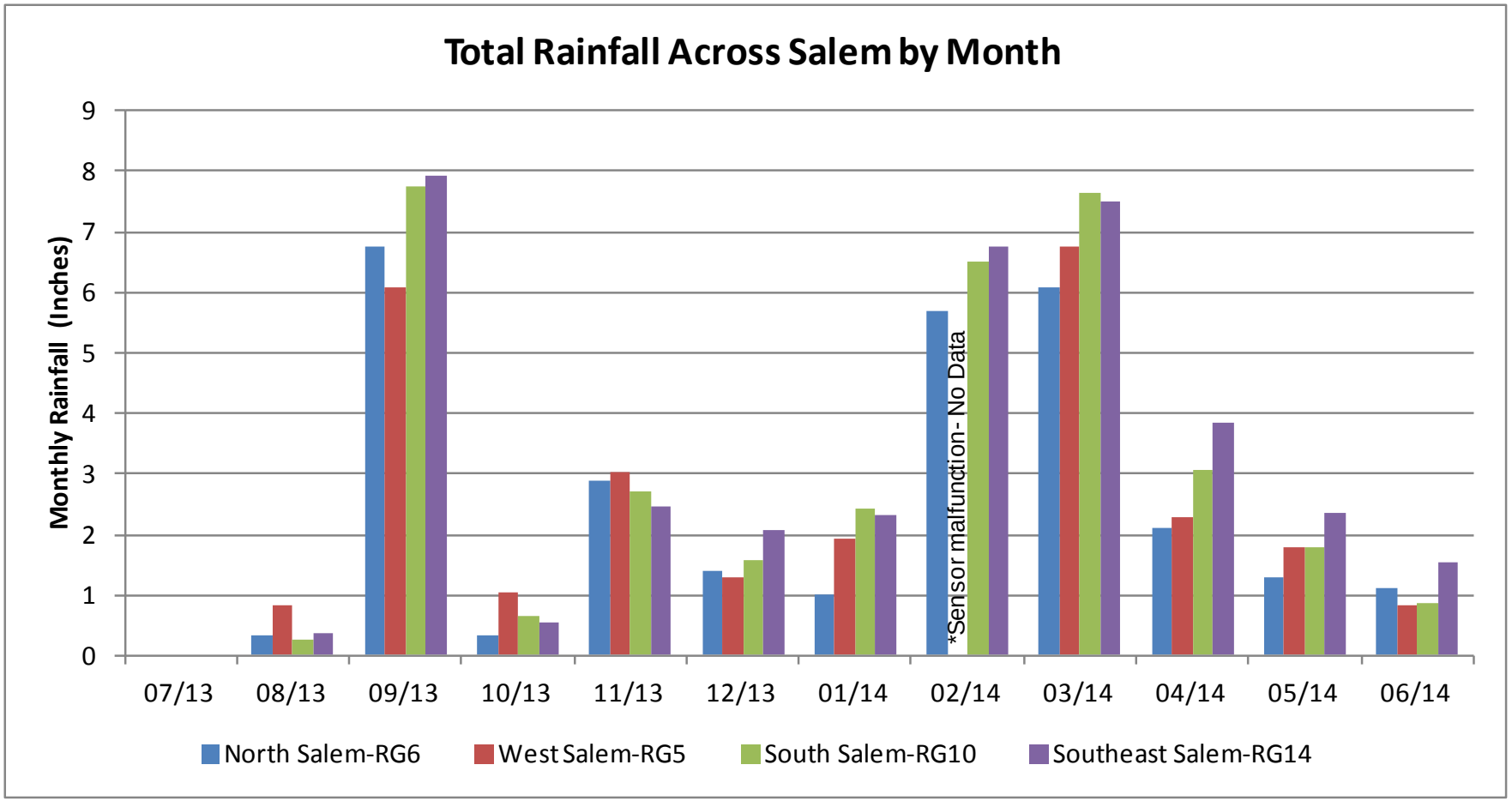
Presented pH data consists of A and B grade data with greater than or equal to 80% of data points collected per day.
As defined in OAR 341-041-0035, Water Quality Standards for the Willamette Basin, pH may not fall outside the ranges of 6.5 to 8.5.

Figure 7
Continuous Instream Water Quality Alarms (RY 2008/09 to 2013/14)



Note: The alarm counts have been filtered, based on best professional judgment, to remove alarms resulting from: rain events, non-prohibited activities identified in Schedule A.4.a.xii in the City's NPDES MS4 permit, permitted activities during the in-water work period, and wildlife activity.
Between April 2014 and August 2014, a malfunctioning radio prevented alarm notifications to the City's dispatch center, which may account for the lower number of alarms counts this reporting year.

Figure 8
Total Rainfall Across Salem by Month (RY 2013/14)



Rainfall data are from 4 rain gauges (RG) maintained by City of Salem that best represent each section of town.

ATTACHMENT A. City of Salem Saddle Club Structural BMP Subsurface Gravel Treatment Wetland Performance Monitoring Strategy.

City of Salem
Saddle Club Structural BMP
Subsurface Gravel Treatment Wetland

Performance Monitoring Strategy

Prepared by: City Salem Public Works Department
Stormwater Services

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List of Tables

1.0 Background

During the summer of 2012, the City of Salem's Public Works Department engineered a subsurface gravel treatment wetland, a structural stormwater treatment best management practice (BMP), off of Saddle Club drive in Southeast Salem. Very little data about the treatment capabilities of these types of BMPs exists at this time. For that reason, the City's Stormwater Service Section was tasked with developing a monitoring strategy to better understand and quantify the treatment capabilities of this type of BMP.

2.0 Monitoring Objectives

There are three monitoring objectives related to this strategy. The three objectives include:

- Determine the percent removal efficiency of core stormwater pollutant influent concentrations entering the BMP;
- Characterize core stormwater pollutant effluent concentrations;
- Characterize E. coli effluent concentrations leaving the BMP by September, 2014 so that the data can be used to model *E. coli* load reduction for TMDL attainment and the benchmarking NPDES MS4 permit requirement.

3.0 Percent Removal Efficiency

3.1 Study Design / Sampling Process

3.1.1 Study Design

The study design is a spatial layout of the two different sampling points at the site that are to be monitored during storm events only. The names of the sampling points are Saddle Club-IN (influent) and Saddle Club-OUT (effluent). To determine the percent removal efficiency, a minimum of 12 samples will be collected and analyzed for core stormwater pollutant parameters identified in Table 1 under section 3.1.3. After the twelve paired samples have been collected the data will be analyzed to determine the central tendency of the percent removal efficiency.

3.1.2 Sampling Point Locations

The Saddle Club In sampling point will be located at the catch basin that diverts flow in the BMP. The photo below shows the location of the influent sampling point.

The Saddle Club Out sampling point will be located at the stand pipe (northeast end of basin) that is connected to the perforated pipe that conveys effluent water out of the BMP. The photo below shows the location of the effluent sampling point.

3.1.3 Sample Collection Method

Sample collection methods will include grab samples, field measurements, and timed composites (see Table 1 for the collection method for specific parameters). Portable sampling units will be programmed to collect a time composite sample based on the forecasted length of the storm. To account for hydraulic detention time of the BMP, different sampling protocols will be applied to both the influent and effluent sampling points. These protocols are detailed below.

Influent:

- An initial *E. coli* grab sample will be collected during the first 3~~2~~ hours of the storm event;
- Field measurements will be collected at the same time as the initial *E. coli* sample;
- Portable sampler will be programmed to collect a total of 24 discrete samples;
- Portable sampler will be programmed to start at the beginning of the forecasted event;
- Sampler suction tubing will be placed ¼" to ½" above the standing water surface level prior to the sampling event (to ensure that sampler only collects stormwater runoff that occurred during the sampling event);
- Portable sampler will be programmed to end at the beginning of the first predicted 6 hour dry period or at the end of 24 hours (whichever comes first); and,
- A second E. coli grab sample will be collected 1 ½ to 3 hours after the initial *E. coli* sample.

Effluent:

- An initial *E. coli* grab sample will be collected during at the same time as the initial *E. coli* grab sample is collected from the influent;
- Initial field measurements will be collected at the same time as the initial E. coli sample;
- Portable sampler will be programmed to collect a total of 24 discrete samples;
- Portable sampler will be programmed to start 1 hour after the beginning of the forecasted event;
- Sampler suction tubing will be placed at the bottom of the stand pipe (to ensure that the end of the suction tubing is in the perforated pipe that conveys water out of the BMP);
- Portable sampler will be programmed to end 6 hours after the end of the predicted storm sampling event or at the end of 30 hours (whichever comes first);
- A second *E. coli* grab sample will be collected at the same time as the second influent *E. coli* grab sample is collected (1 ½ to 3 hours after the initial *E. coli* sample);
- A second set of field measurements will be collected at the same time as the second *E. coli* grab sample is collected; and,
- If effluent flow is still observed when the portable sampler samples are collected, a third *E. coli* grab sample will be collected.

Table 1: Core Stormwater Pollutant Parameters

Pollutant Parameter	Collection Method
TSS	Composite
$BOD_{5\text{-}day}$	Composite
Total Phosphorus	Composite
Nitrate+Nitrite as Nitrogen	Composite
Ammonia Nitrogen	Composite
Copper (Total Recoverable & Dissolved)	Composite
Lead (Total Recoverable & Dissolved)	Composite
Zinc (Total Recoverable & Dissolved)	Composite
Hardness	Composite
Sp. Conductivity	Field and Composite
Temperature	Field
pH	Field
Dissolved Oxygen	Field
E. coli	Grab

3.1.4 Storm Selection Criteria

The following criteria will be used to select storm events for sampling:

- Storm event must be greater than 0.1 inch of rainfall
- When possible, samples must be collected after an antecedent dry period of a minimum of 24 hours

4.0 Characterize Pollutant Effluent Concentrations

If the variances of the central tendency of the effluent pollutant concentrations are not statistically defensible after the twelve sample collection events have been completed, additional effluent samples will be collected. Additional effluent samples will follow the sample protocol outlined in section 3.1.3.

5.0 Characterize Effluent E. coli by 9/2014

It is not expected that all twelve sampling events will be collected prior to September 2014. However, Stormwater Services would like to have a statistically defensible effluent concentration for *E. coli* bacteria prior to September of 2014, so that the data can be used to model *E. coli* load reduction from the BMP for TMDL attaninment / benchmarking permit requirements. Therefore, additional effluent grab *E. coli* samples will be collected whenever feasible. These samples can be collected whenever effluent is observed leaving the site as long as it is within 24 hours of the end of a storm event.

6.0 Data Management

All composite and grab sample data from each wet-weather sampling event will be entered into Willow Lake Laboratory's LIMS database. Stormwater personnel receive hard and electronic copies of these data. All data will be imported into Stormwater Services Aquarius database.

7.0 Data Validation and Verification

The Stormwater Monitoring Analyst assigned as Project Manager will review all field and laboratory data. It will be the responsibility of the Project Manager to perform the final review and verification of the data reported prior to analyses. In addition, the Project Manager will follow up with the laboratory on any laboratory-generated data that has fallen outside an expected range. Decisions to accept, qualify or reject any data collected under this monitoring strategy will be made by the Project Manager.

ATTACHMENT B. Request for Elimination of Mercury and Methyl Mercury Monitoring memo, November 20, 2013; and DEQ approval email (January 3, 2014).

CITY OF Salem AT YOUR SERVICE
PUBLIC WORKS DEPARTMENT
555 Liberty Street SE / Room 325 • Salem OR 97301-3513 • Phone 503-588-6211 • Fax 503-588-6025

November 20, 2013

Benjamin Benninghoff
Stormwater Coordinator
Oregon Department of Environmental Quality
811 SW Sixth Avenue
Portland OR 97204-1390

SUBJECT: **City of Salem National Pollutant Discharge Elimination System**
Municipal Separate Storm Sewer System
Permit No. 101513, File No. 108919
Request for Elimination of Mercury and Methyl Mercury Monitoring

Dear Mr. Benninghoff:

The City of Salem operates its stormwater system under authority of a National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit (Permit No. 101513, File No. 108919). Table B-1 Special Condition 6 of the Permit states, *"After two years of monitoring (minimum of four samples), the permittee may request in writing to the Department that the mercury and methyl mercury monitoring be eliminated."*

All four mercury monitoring samples were collected in accordance with DEQ's December 23, 2010, memorandum, *Mercury Monitoring Requirements for Willamette Basin Permittees*, and followed EPA Method 1699 ultra clean sampling protocol for collection, and were analyzed using EPA Method 1631E (mercury) and US EPA Method 1630 (methyl mercury).

The City completed its fourth sampling event for mercury on September 5, 2013. Consequently, the mercury data from this storm event fell in FY 2013-14 and was not included in the City's annual report for FY 2012-13. The official lab report and data from this event are provided as an enclosure to this letter and will be included as part of the annual report for FY 2013-14.

The City is pleased to submit these documents showing the fulfillment of the minimum sampling requirements and requests written approval from the Department that the mercury and methyl mercury monitoring be eliminated.

If you have any questions or need additional information, please contact me at 503-589-2188 or ampanko@cityofsalem.net.

Sincerely,

Anita Panko
Stormwater Monitoring Analyst

VLS/KC:G:\Group\Files\CHRONO\2013\AP 112013 DEQ_MercuryLetter.doc
Enclosure: Attachment A—CH2MHill Applied Sciences Laboratory Analytical Report for City of Salem
cc: Sam Kidd, Stormwater and Wastewater Collections Services Manager
Keith Bondaug-Winn, Stormwater Quality Supervisor
File: Chrono; Regulatory

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Parks and Transportation Services Division
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