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

Summary of Water Quality Data
For Reporting Year 2017/2018

Prepared by:
City Salem Public Works Department
Stormwater Services
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November 1, 2018

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1.0 Introduction

This document provides all monitoring data collected for the reporting year of July 1, 2017, to June 30, 2018 (RY 2017/18), in accordance with the City of Salem's NPDES MS4 permit requirements listed in Schedule B(5)(f)&(g). A background narrative for each monitoring element for which data were collected and a brief summary of results for RY 2017/18 is provided below, and all collected data are provided in the attached tables and figures.

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 the monitoring requirements defined in Table B-1 of the City's MS4 Permit are summarized in Table 1. Monitoring site locations are described in Table 2 and denoted in Figure 1, and the parameters analyzed for each monitoring element are listed in Table 3.

2.1 Monthly Instream Monitoring

Sampling of designated urban streams for the Monthly Instream[1] monitoring element is conducted on a predetermined monthly schedule at 24 different locations. This monitoring element includes the collection of grab samples and field measurements on 11 of Salem's MS4 stormwater runoff receiving streams and the Willamette River. 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 and runs dry during the summer months. The Willamette River has three sites located upstream, mid-way, and downstream of city limits.

The general locations of all sites are provided in Table 2 and Figure 1.

A general suite of water quality parameters are collected for each site, with additional water quality parameters analyzed 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).

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})

[1] Identified as "Urban Streams monitoring" in the City of Salem Stormwater Management Plan 2010.

- 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, PRI5 only)
- 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. Some general observations from this reporting period compared to the last reporting period include:

- **E. coli** – this year saw a decrease in the number of exceedances of the 406 MPN/100mL single sample criterion.
- **Dissolved Oxygen** – 19 of 24 sampling site dissolved oxygen medians were higher than the previous year.
- **Copper** – there were less exceedances of the water quality standard for Copper than last reporting year.
- **Lead** – no exceedances of the Lead water quality standard occurred this reporting year.
- **Zinc** – there were more exceedances of the Zinc water quality standard than last year.
- **Nitrate & Nitrite** – medians for RY 2017/18 were generally lower than last reporting year.
- **BOD** – 66% of sampling sites saw higher monthly median values than last year.
- **Specific Conductivity** – results were similar to last year.
- **pH** – results trended lower than last reporting year.
- **Turbidity** – for the second year in a row, turbidity saw a significant decrease in results overall.
- **Rainfall** – this reporting year saw less rainfall observed in the 24 hours prior to sample collection than last year, and only 3 of 11 of the sampling days had seen measurable rainfall in the preceding 24 hours.

2.2 Continuous Instream Monitoring

The City maintains a network of Continuous Instream water quality monitoring stations and stream gauging stations on seven different urban streams within the city. There are currently ten water quality and stream gauging stations and three stream gauge-only stations (SHE3, PRI4 and LPW1) within city limits. The City added two new stream gauge-only stations for reporting year 2017/18, and they will be operating for next reporting year. Figure 1 identifies the location of each of the existing stations.

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

Continuous data collected includes:

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

All data are recorded in 15-minute intervals. All continuous statistical data summaries presented in the various 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, and monthly medians for collected data are summarized in Table 10. Plots of continuous data are provided in Figures 4 through 6.** There were no significant changes in data trends or exceedances from last year.

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 2.5), and serves as an outreach/education opportunity for residents.

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 this permit cycle and is expected to continue beyond the current MS4 permit; 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:

- *E. coli*
- Dissolved Oxygen
- pH
- Temperature
- Specific Conductivity
- Copper (Total Recoverable and Dissolved)
- Zinc (Total Recoverable and Dissolved)
- Lead (Total Recoverable and Dissolved)
- Hardness
- Ammonia Nitrogen (NH_3)
- NO_3+NO_2-N

- Ortho Phosphorus
- Total Phosphorus (TP)
- BOD_{stream}
- TSS

Data for this monitoring element are provided in Table 11. For reporting year 2017/2018, staff captured two storm events.

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, but the residential site had been sampled previously during the last MS4 Permit and continued to be sampled through this 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 by land use and compare them with the ACWA characterized land use concentrations.

For reporting year 2017/2018, no storm events were captured.

2.5 Pesticide Monitoring

Staff collected one sample for the pesticide monitoring element for RY 2017/2018 during the spring. 2,4-D (herbicide) and Triclopyr (herbicide) were detected at the residential land use site; Carbaryl (insecticide) was detected at the commercial land use site; and Propiconazole (fungicide), Tebuconazole (fungicide), DCPMU (algicide and herbicide), and Diuron (algicide and herbicide) were detected at the industrial land use site.

The analytical lab report from Pacific Agricultural Laboratory is provided as Attachment B.

2.6 Macroinvertebrate Monitoring

The City utilized a consultant, Pacific Habitat Services, to collect benthic macroinvertebrates samples, fish samples, and physical habitat data on Pringle Creek, East Fork Pringle Creek, and Clark Creek during late summer 2017.

The technical memo of the results is provided as Attachment C.

2.7 Priority Dry Weather Outfall/Manhole Screening

The RY 2017/2018 dry weather outfall screening effort included a total of 38 outfall inspections (outfall structures or the first available upstream manhole). In total, 22 structures (outfalls and manholes) received analytical sampling as part of this inspection program. Of these 22 structures:

- 16 had detections for total chlorine (7 of these detections had total chlorine concentrations above 0.05 mg/L),

- 5 had concentrations of fluoride exceeding the action level (0.1 mg/L),
- 1 had a specific conductivity exceeding the action limit (250 µS/cm), and
- 5 had E. coli concentrations exceeding the action limit (406 MPN/100mL).

In general, if total chlorine results were below 0.05 mg/L, fluoride, detergents/surfactants, ammonia, potassium, sodium, and E. coli parameters were not analyzed unless physical indicators presented evidence of a potentially illicit discharge. Fluoride was not collected at all locations where chlorine was detected because the City's drinking water treatment plant was not fluorinating water at the time of the inspection or the fluoride dosage was variable. Due to ongoing bacteria issues in Clark Creek, all flowing outfalls in the Clark Creek basin were sampled for E. coli regardless of analytical screening results.
Based upon outfall inspection results:

- 13 pipesheds were investigated based upon the results of outfall inspections,
- 3 pipesheds had outfalls that received analytical sampling, but were not investigated because the pipeshed is characterized as having allowable discharges, and
- 1 pipeshed was not completed due to arrival of wet weather.

As part of these pipeshed investigations, a total of 4 additional structures received analytical confirmation sampling to identify the origin of flow.
Observational data collected at outfalls and subsequent pipeshed investigations revealed 1 illicit discharge (OERS reporting number 2018-0355) from leaking sanitary sewer laterals at South Salem High School (laterals have since been repaired) and 3 water main leaks. A pipeshed investigation for outfall D42480223, draining to the Willamette River, revealed potential exfiltration/infiltration from a damaged sewer main into a storm main. While a dye test did not indicate a positive connection, the sewer main is being lined due to consistently elevated bacteria results at outfall D42480223. The outfall and repair location will continue to be monitored to evaluate the impact of the repair.
Field screening parameters for RY 2017/2018 included temperature (outfall and receiving water), pH, specific conductivity, turbidity, total chlorine, fluoride, detergents/surfactants, and ammonia and were analyzed using a multi-parameter colorimeter and multi-parameter data sonde. Laboratory parameters included Potassium, Sodium, and E. coli and were analyzed by the City's laboratory at the Willow Lake Waste Water Treatment Plant.
Of the 38 outfalls inspected, 33 were identified in the City of Salem's *Dry Weather Outfall and Illicit Discharge Screening Plan*. The additional outfalls were inspected based upon Stream Crew reports of dry-weather flow and 1 outfall was inspected opportunistically due to its proximity to 2 existing priority outfalls. Two outfalls listed in the City of Salem's *Dry Weather Outfall and Illicit Discharge Screening Plan* are no longer inspected, outfall D48486207, which was determined to be a culvert structure above an existing priority outfall and D42456216, which requires confined space entry.
In addition to the priority outfall inspections detailed above, the City's Stream Cleaning Crew utilized a custom GIS smart phone application to document physical inspections of outfalls with dry weather flow over the course of 47.83 stream miles that they inspected. The crew documented a total of 78 outfalls with dry weather flow. Of these 78 outfalls, 4 received follow-up inspections with analytical sampling (listed above). The other 74 outfalls will be reviewed for possible inclusion in the City of Salem's *Dry Weather Outfall and Illicit Discharge Screening Plan* and used as data inputs for selecting future priority outfalls. No outfalls had physical indicators of an illicit discharge.

Data for this monitoring element are provided as an Attachment A at the end of this document.

3.0 Conclusion

The City continues to meet all monitoring requirements of its administratively extended MS4 Permit. Cumulatively, data collected throughout this MS4 Permit cycle will be used to meet monitoring objectives identified in the City's monitoring plan, while also supporting data analyses.

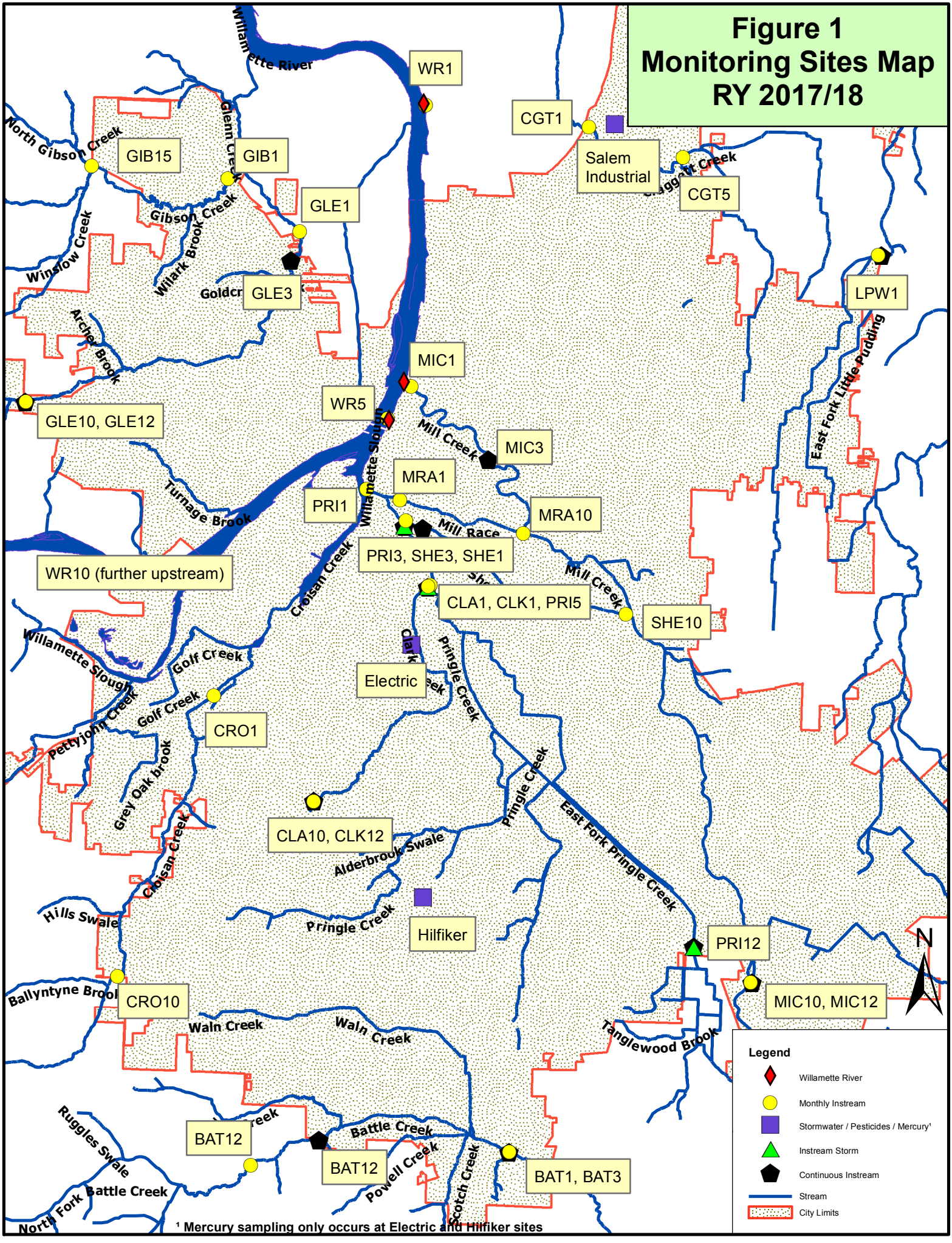
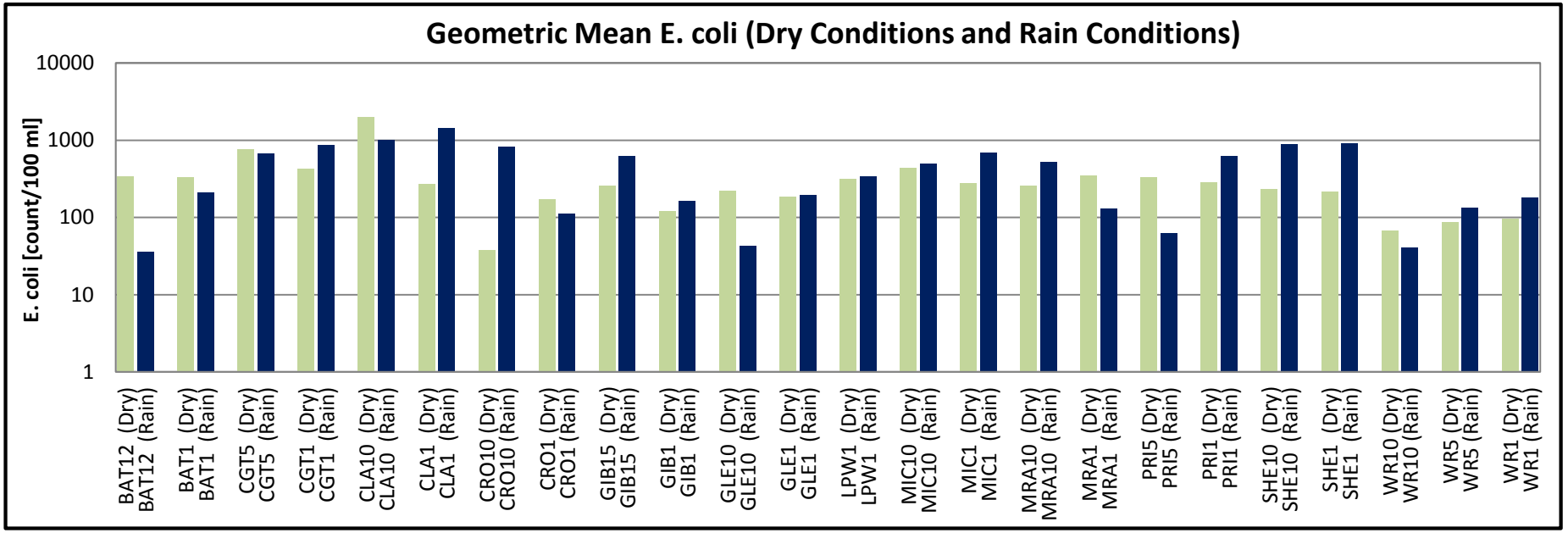
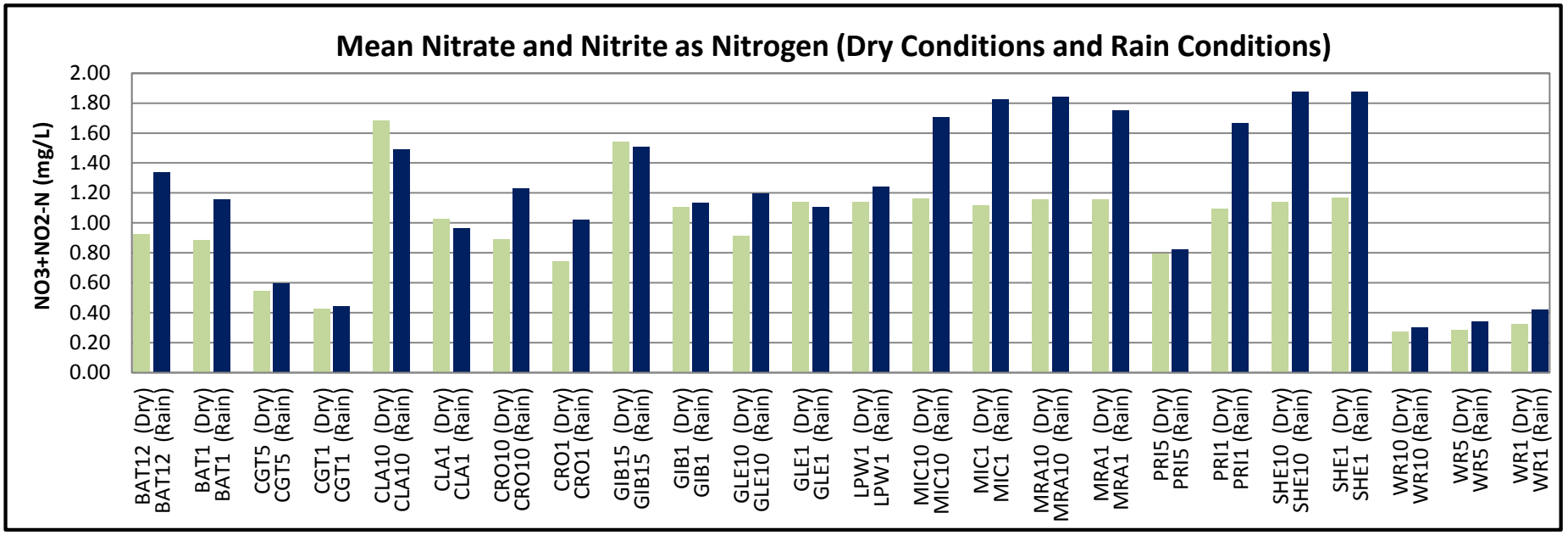


Figure 1
Monitoring Sites Map
RY 2017/18
Willamette River
WR1
CGT1
Salem Industrial
CGT5
GIB15
GIB1
GLE1
GLE3
LPW1
MIC1
WR5
MIC3
MRA1
PRI1
MRA10
PRI3, SHE3, SHE1
CLA1, CLK1, PRI5
SHE10
GLE10, GLE12
WR10 (further upstream)
Electric
CRO1
CLA10, CLK12
Hilfiker
PRI12
MIC10, MIC12
CRO10
BAT12
BAT12
BAT1, BAT3
North Gibson Creek
Gibson Creek
Glenn Creek
Winslow Creek
Wilark Brook
Goldcr
Archer Brook
Turnage Brook
Willamette Slough
Mill Creek
Mill Race
Croisan Creek
Clark
Pringle Creek
East Fork Little Pudding
Willamette Slough
Golf Creek
Pettyjohn Creek
Grey Oak brook
Alderbrook Swale
East Fork Pringle Creek
Hills Swale
Ballyntyne Brook
Waln Creek
Tanglewood Brook
Ruggles Swale
Battle Creek
Powell Creek
Scotch Creek
North Fork Battle Creek
N
Legend
Willamette River
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 (Reporting Year 2017/2018)





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.

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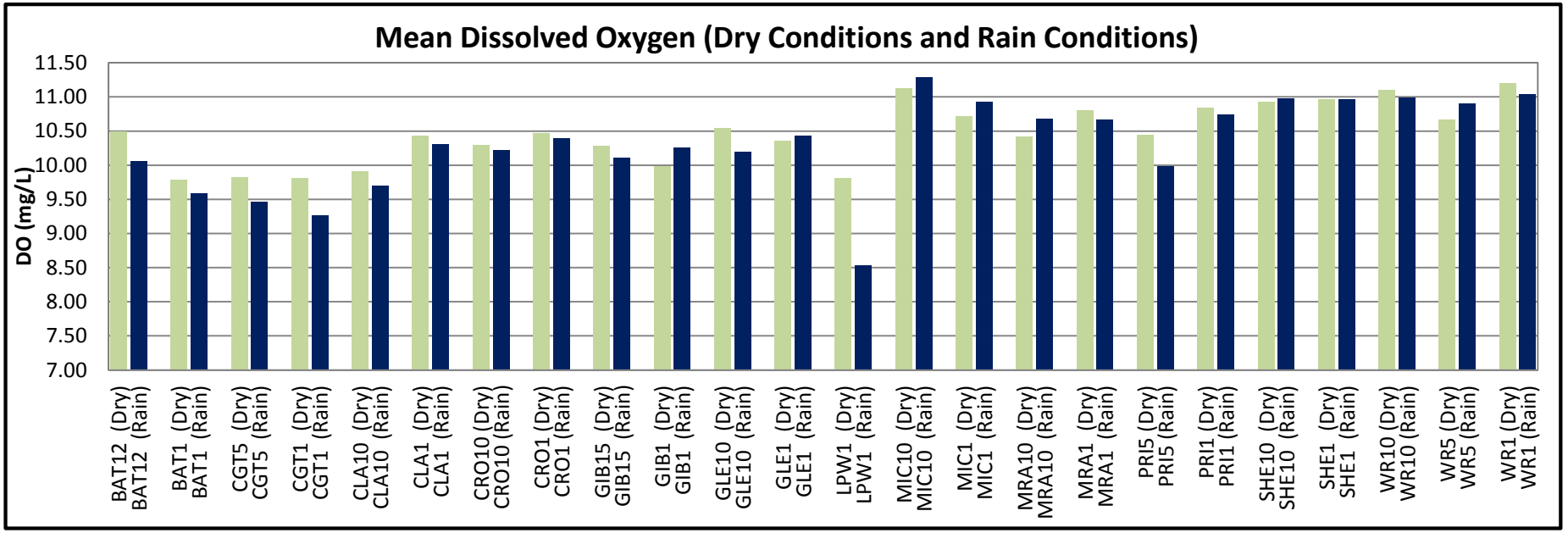

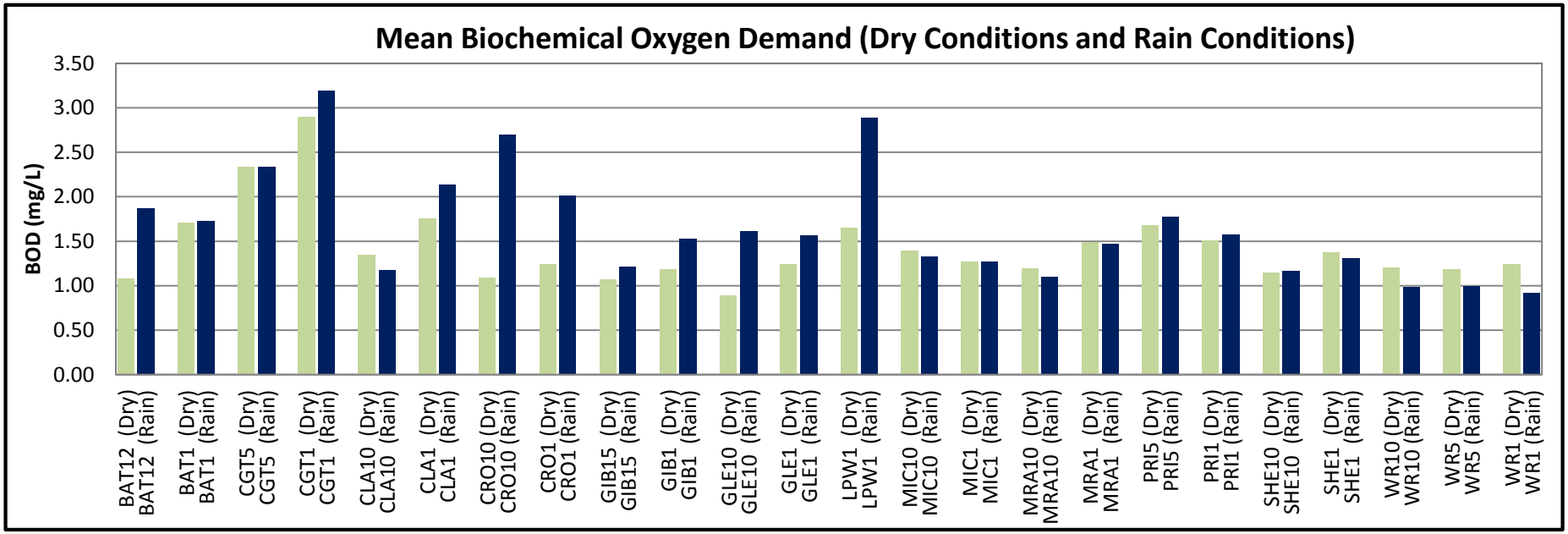

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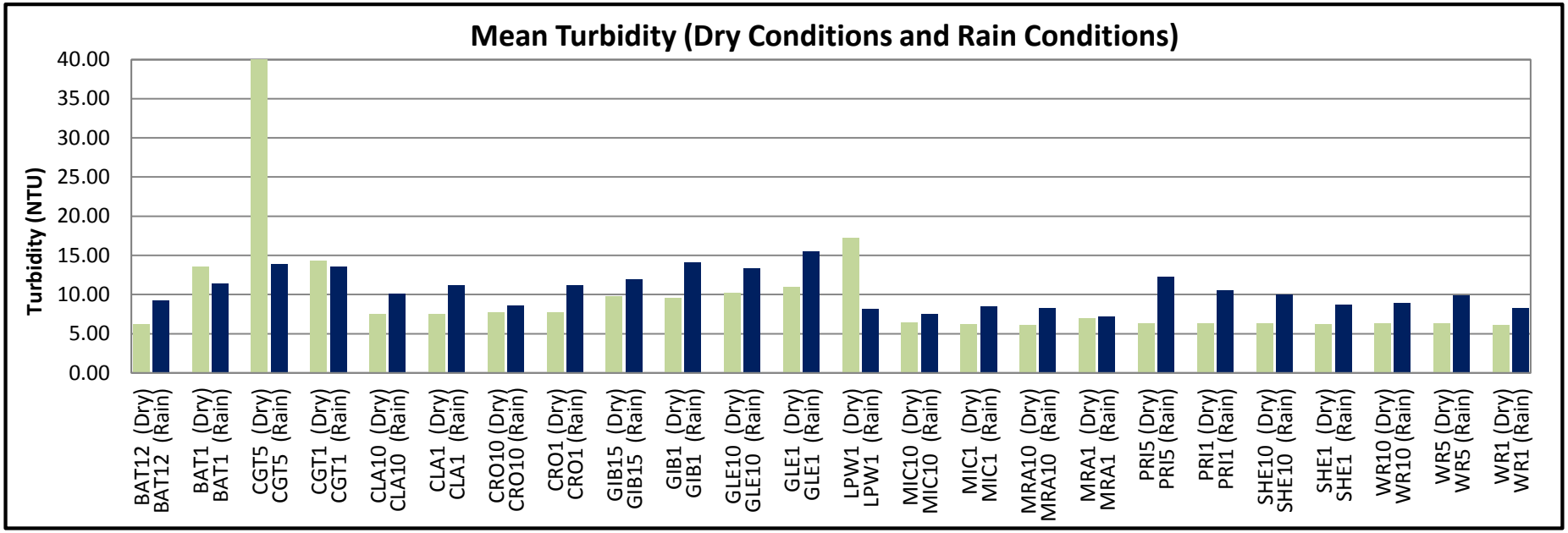

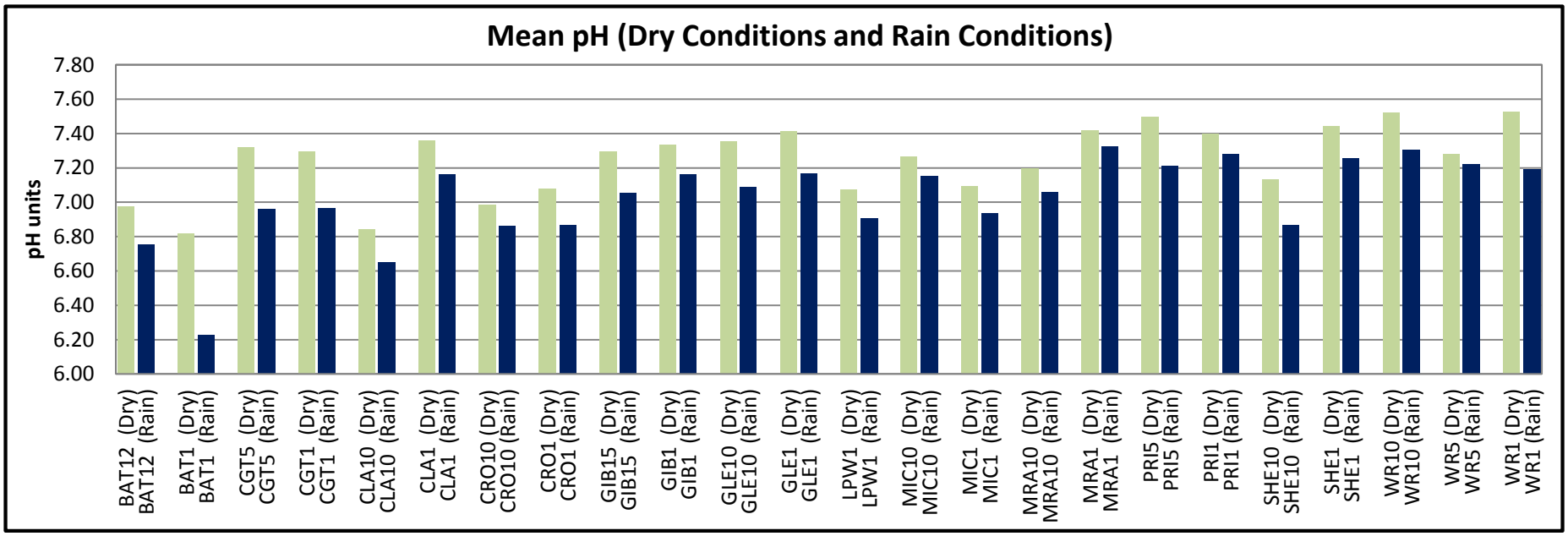

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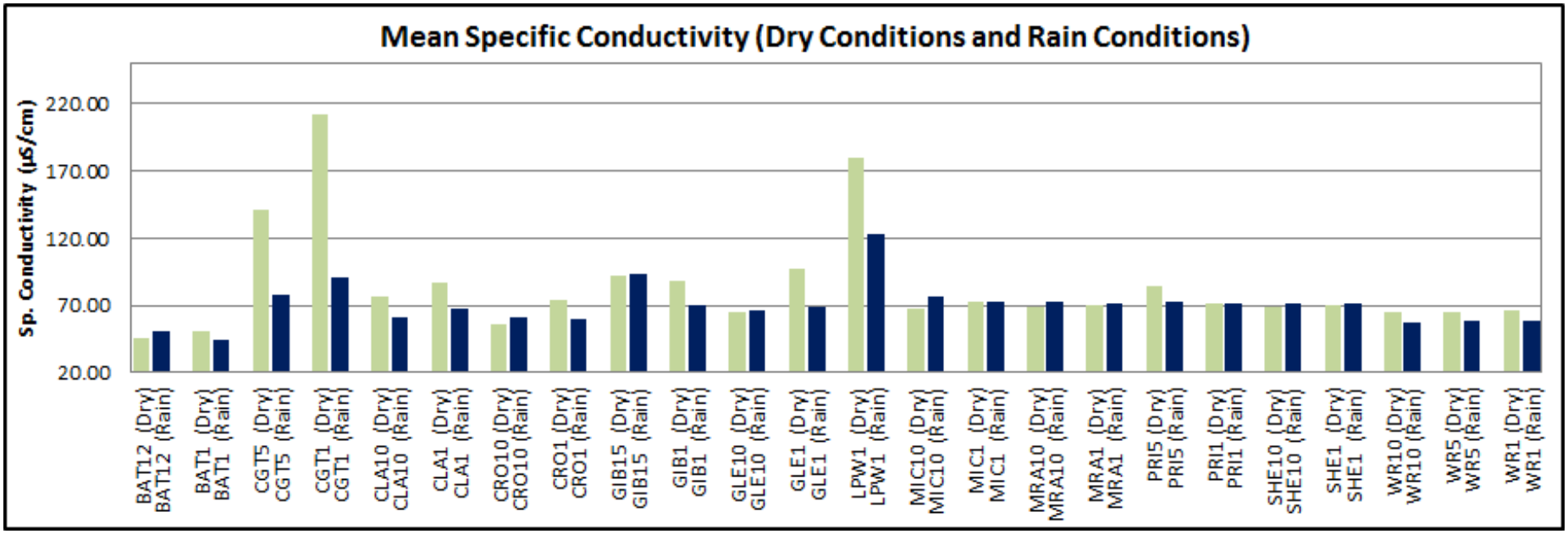
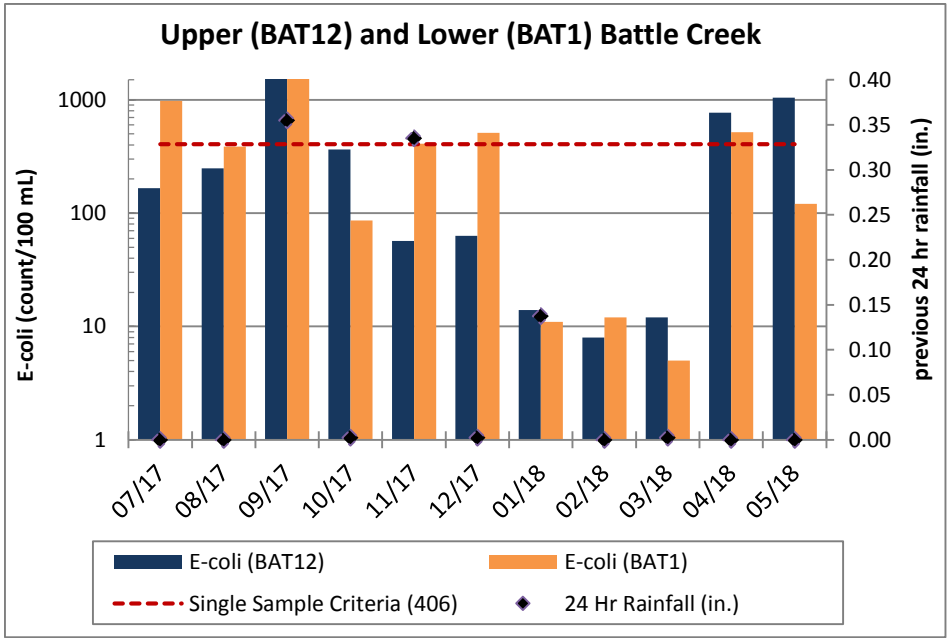
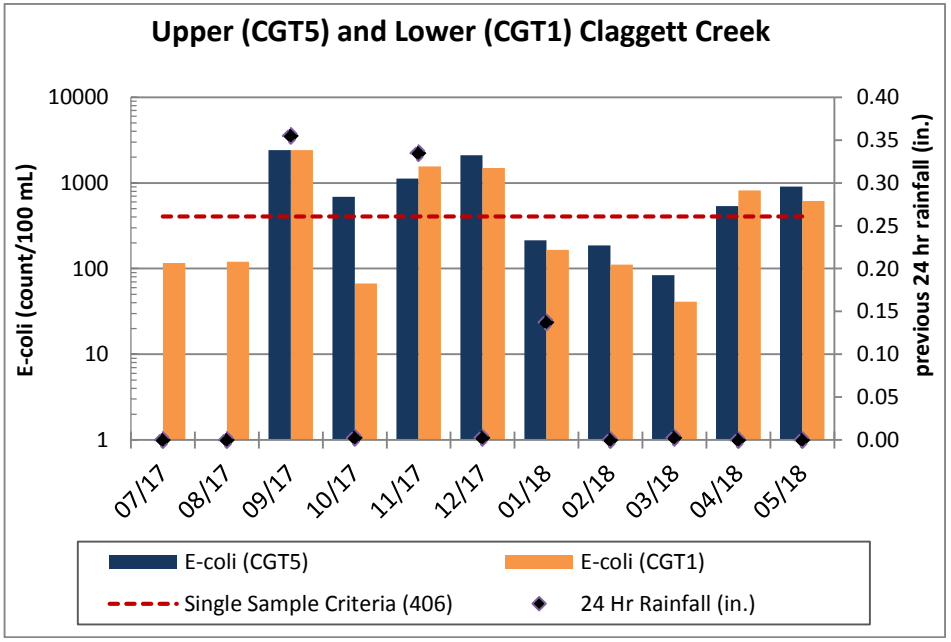


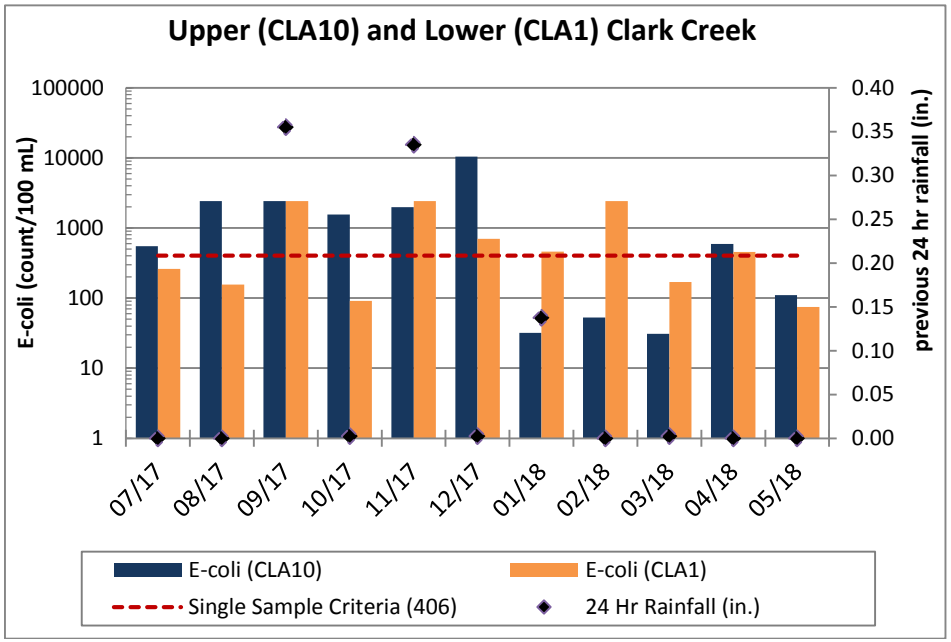
Dry conditions defined as less than 0.05 inches of rainfall in the 24 hours prior to sample collection; **rain** conditions defined as greater than or equal to 0.05 inches of rainfall in the 24 hours prior to sample collection.

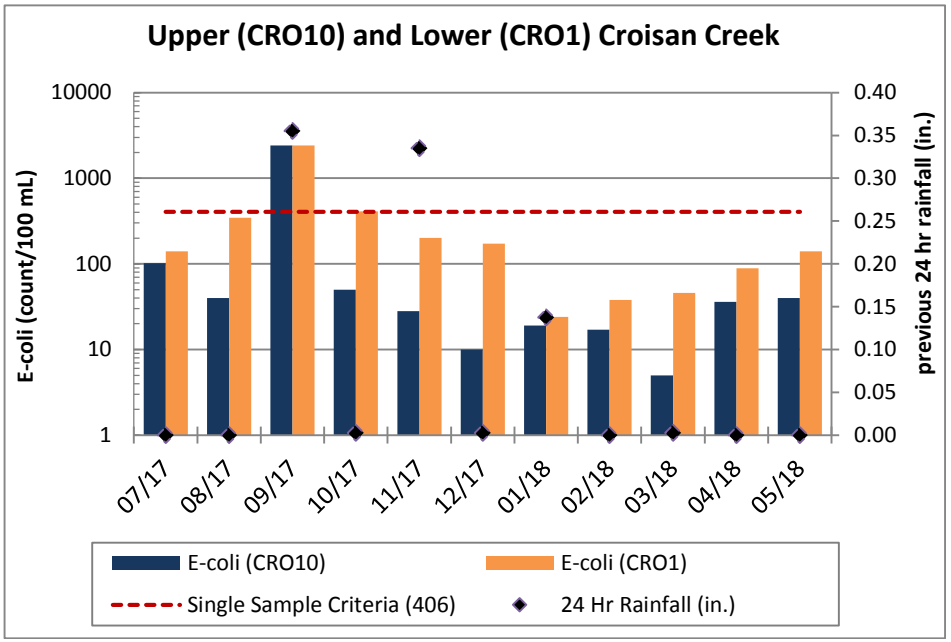
Figure 3

Monthly Instream E. Coli Upstream / Downstream Site Comparison (Reporting Year 2017/2018)





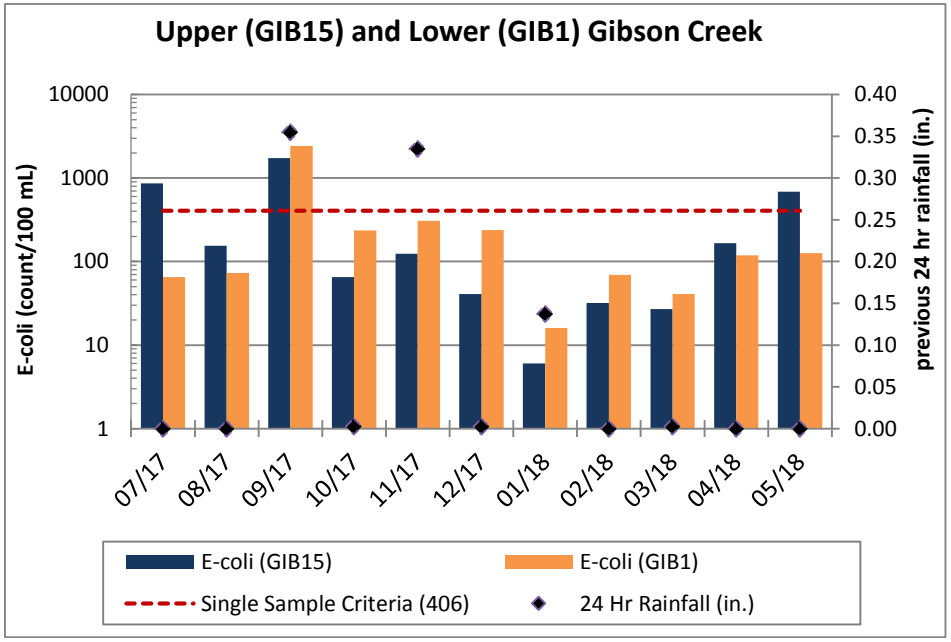


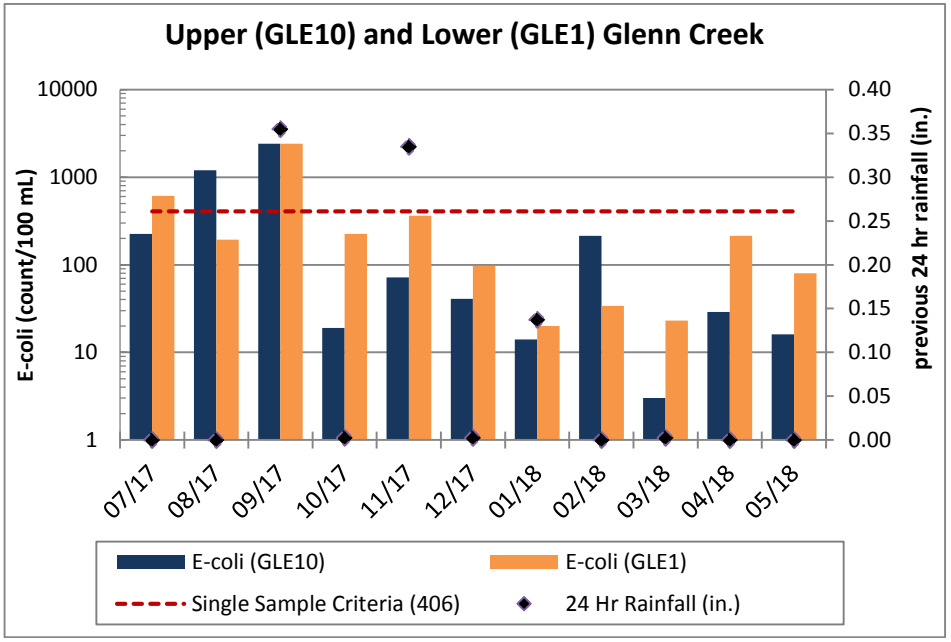


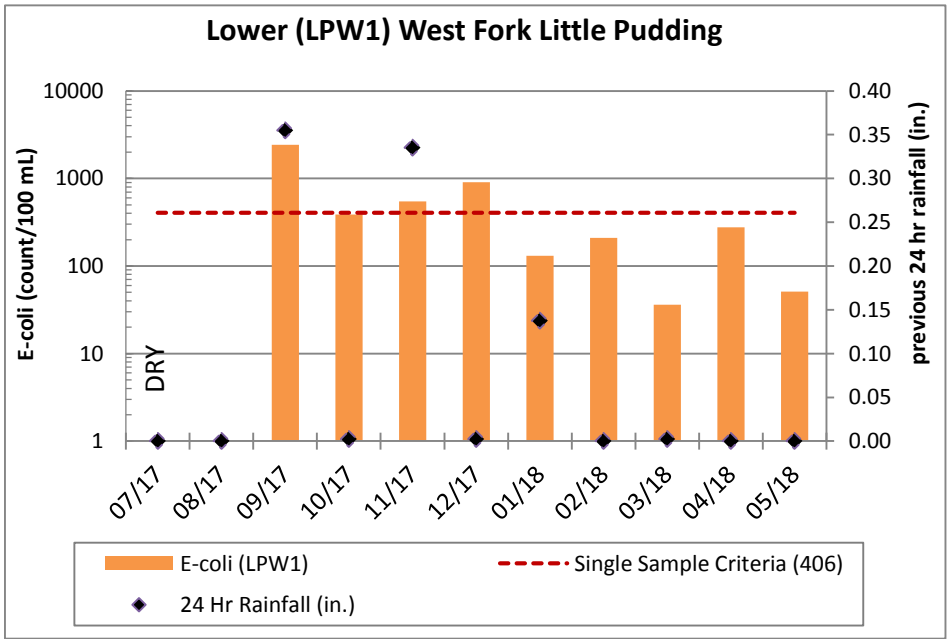
If 24 hour rainfall depth prior to sample collection differed between upstream and downstream sites, the average rainfall of the two sites was used.

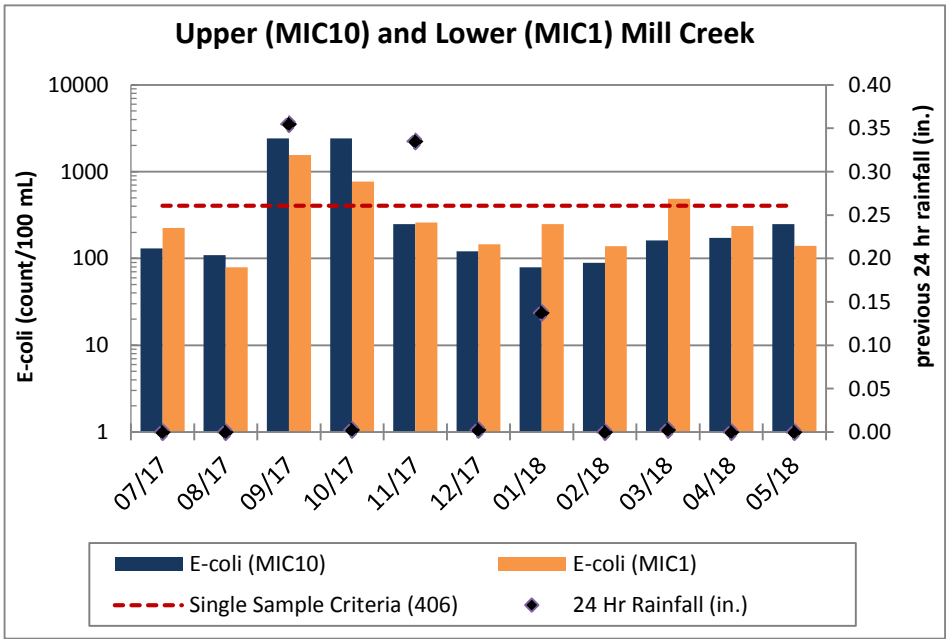
Figure 3

Monthly Instream E. Coli Upstream / Downstream Site Comparison (Reporting Year 2017/2018)









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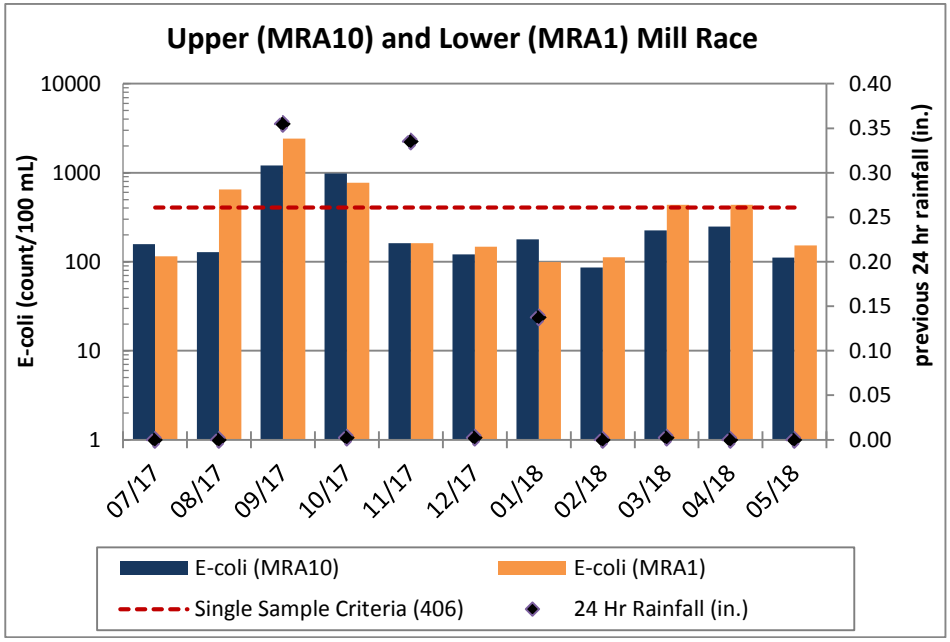
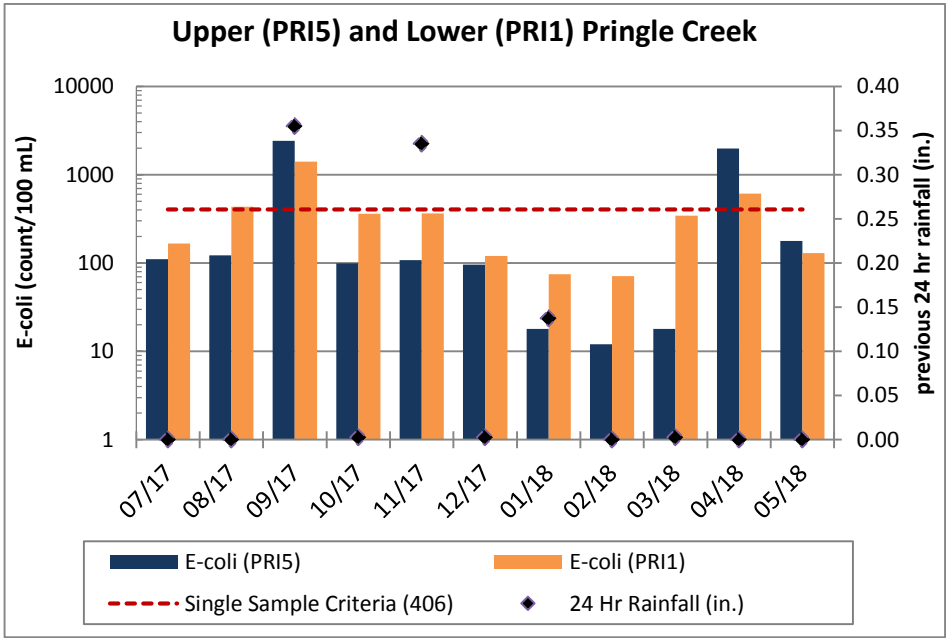
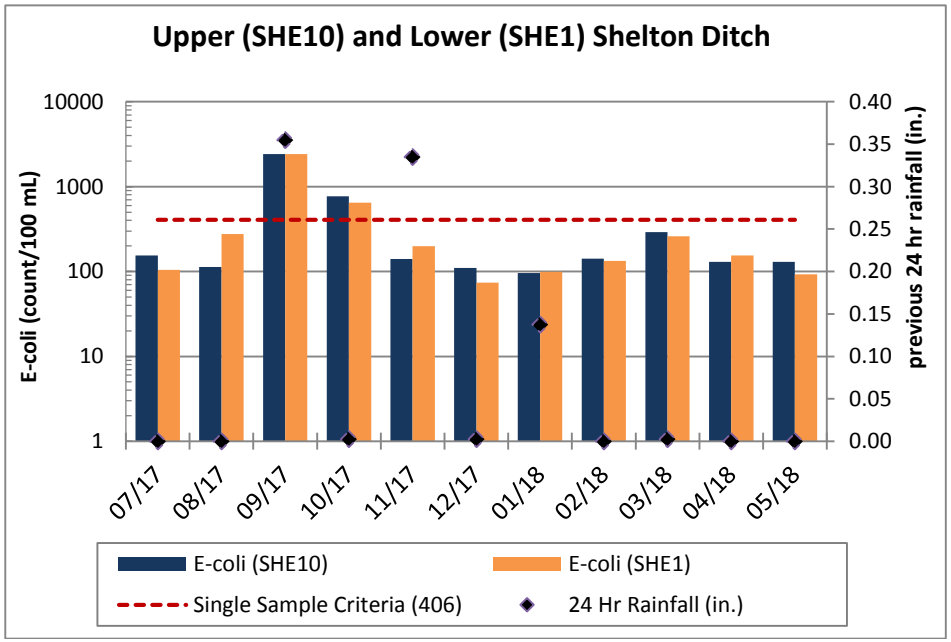
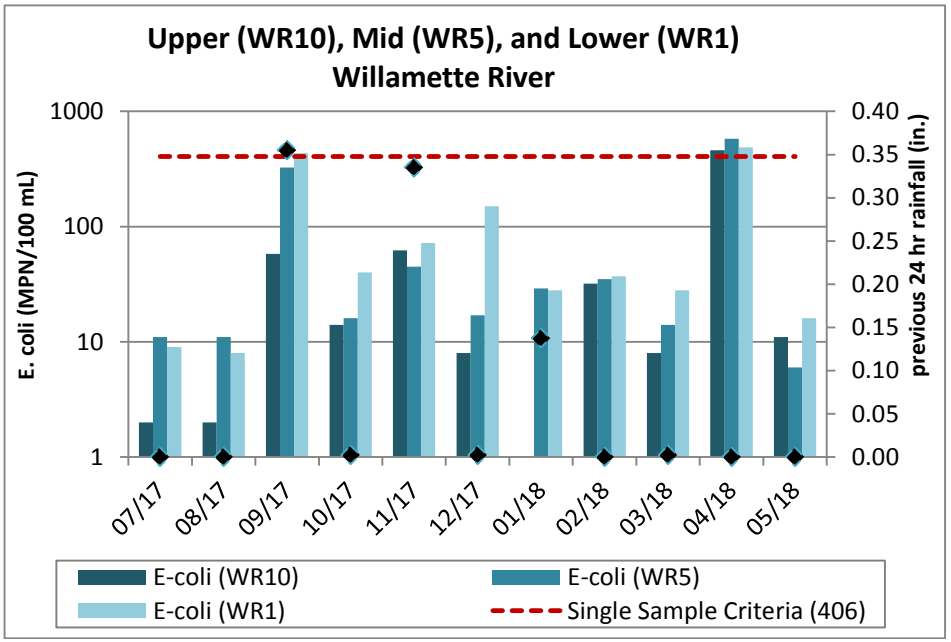




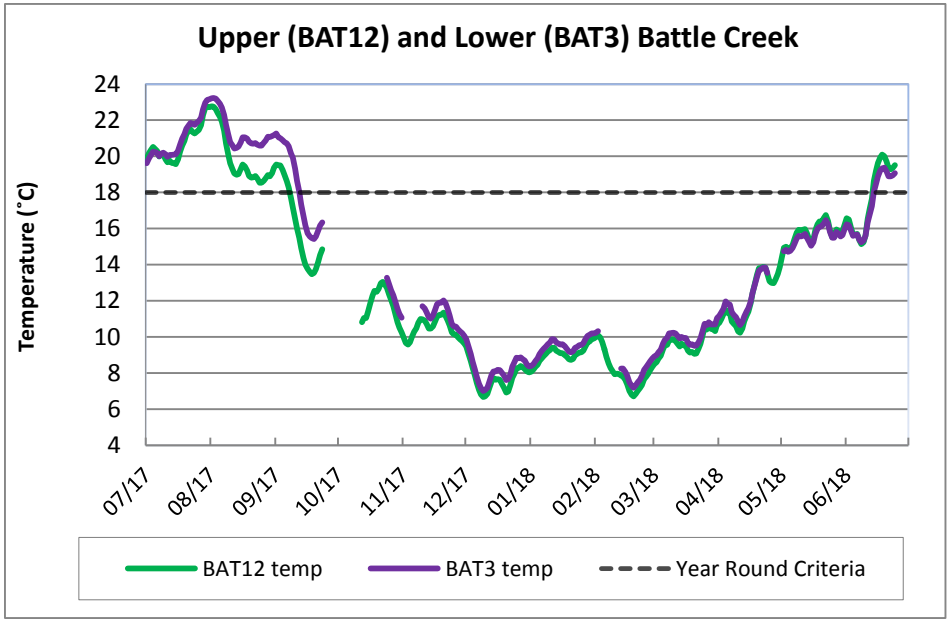


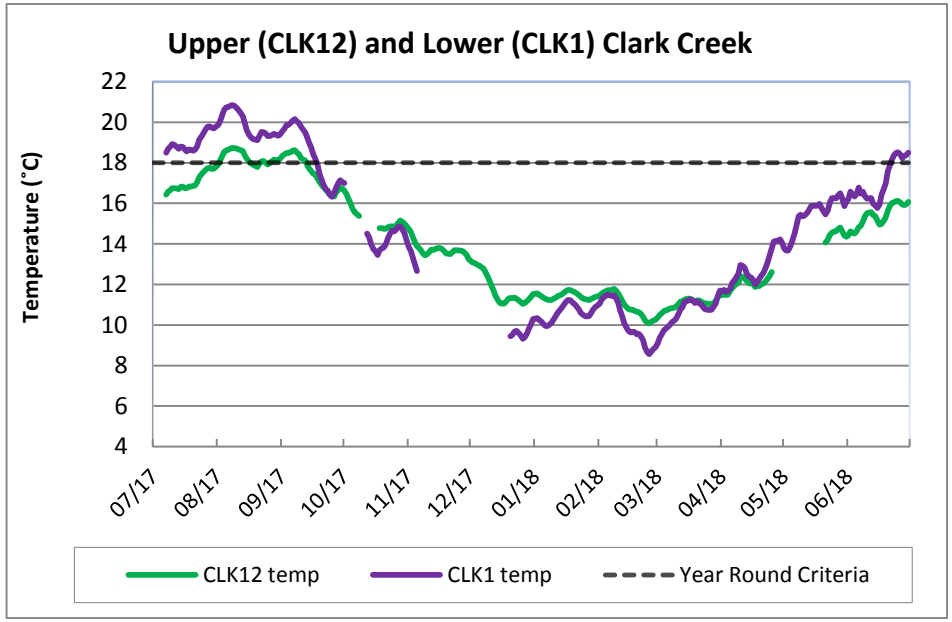


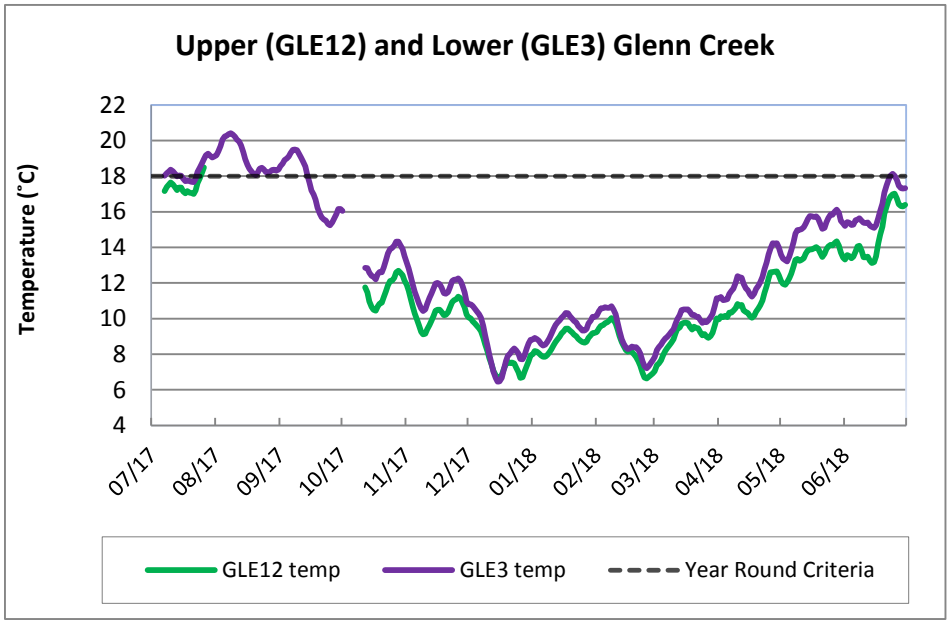
If 24 hour rainfall depth prior to sample collection differed between upstream and downstream sites, the average rainfall of the two sites was used.

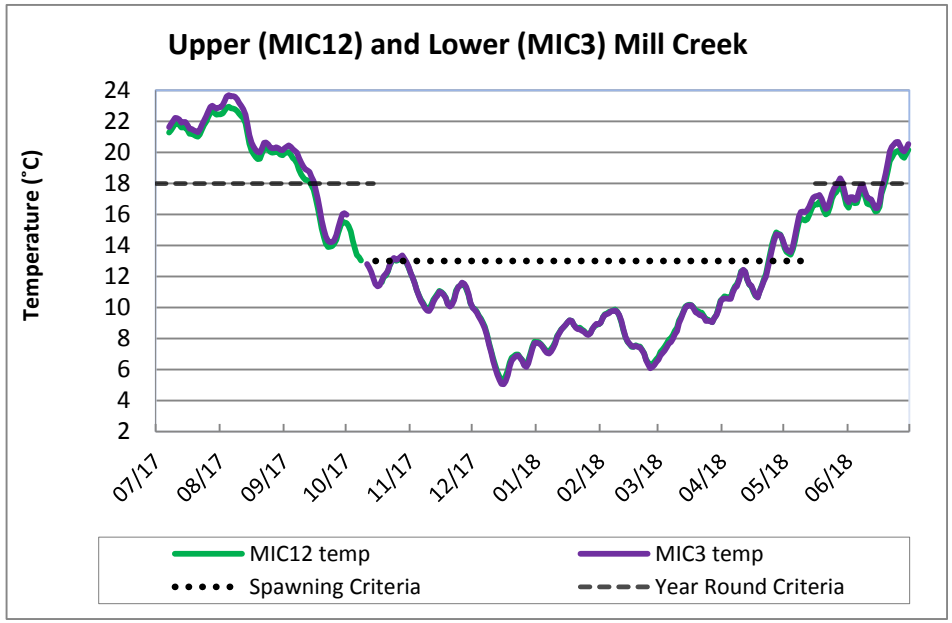
Figure 4

Continuous Instream Temperature 7-Day Moving Average Maximum (Reporting Year 2017/2018)







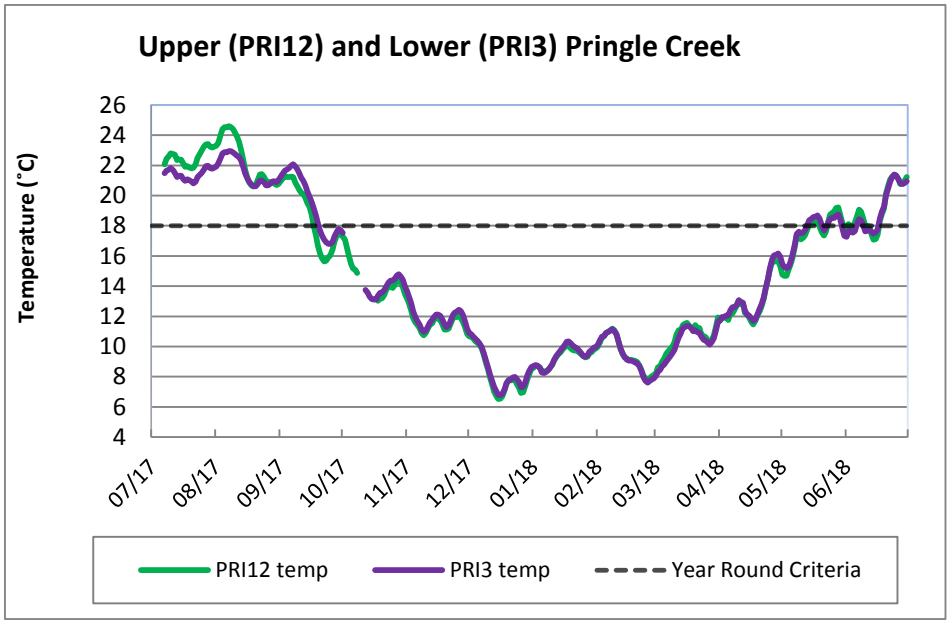


Presented temperature data consists of A grade data with greater than 80% of data points collected per day. Temperature criteria is defined in OAR 340--04100028 and OAR 340-0340, Tables 340A & B.

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

Figure 4

Continuous Instream Temperature 7-Day Moving Average Maximum (Reporting Year 2017/2018)



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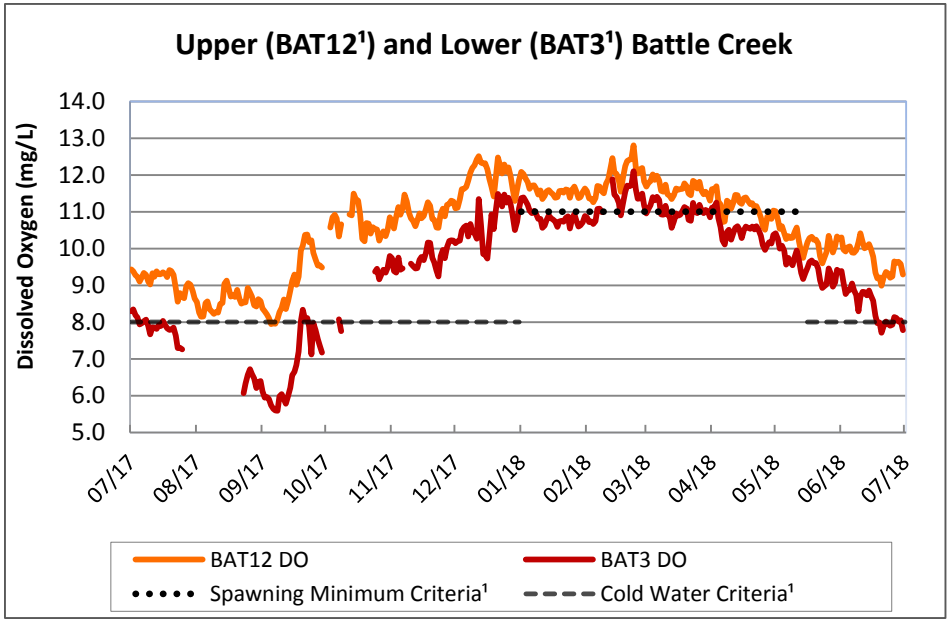
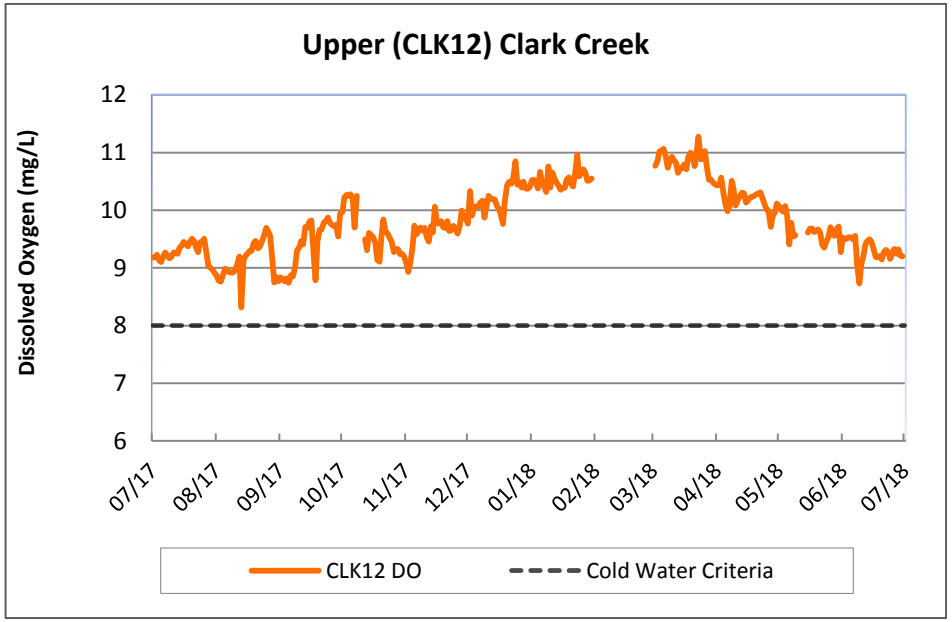
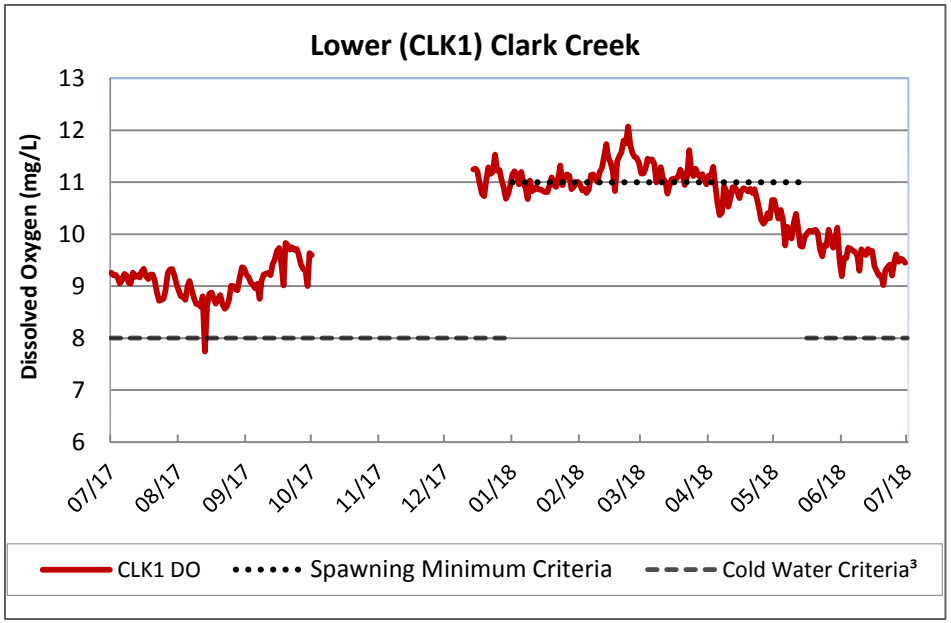
- Spawning Minimum Criteria for applicable streams may not exceed 7-day average maximum of 13 degrees C.
- Year Round Minimum Criteria may not exceed 7-day average maximum of 18 degrees C.

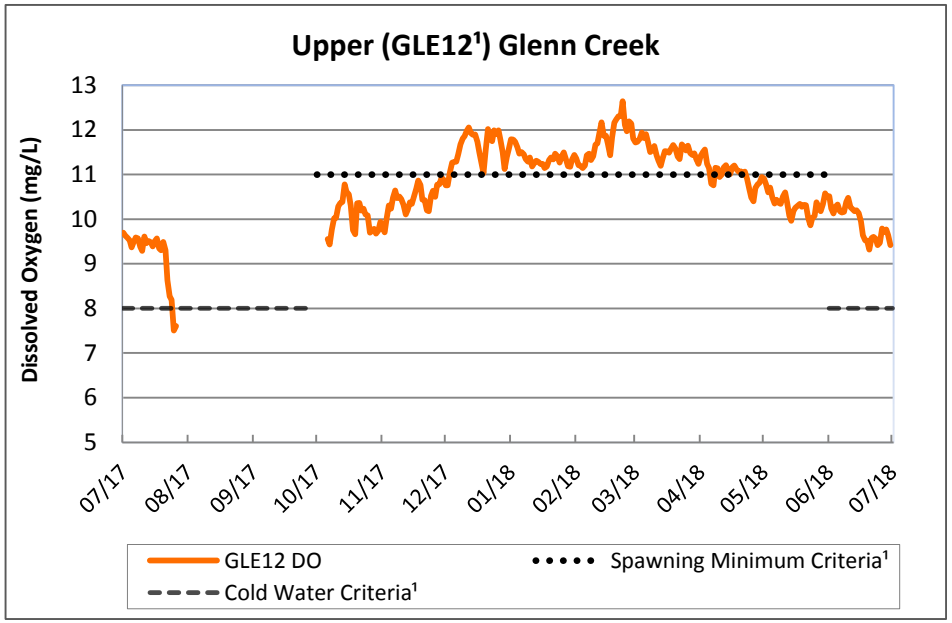
Figure 5

Continuous Instream Dissolved Oxygen Daily Mean (Reporting Year 2017/2018)









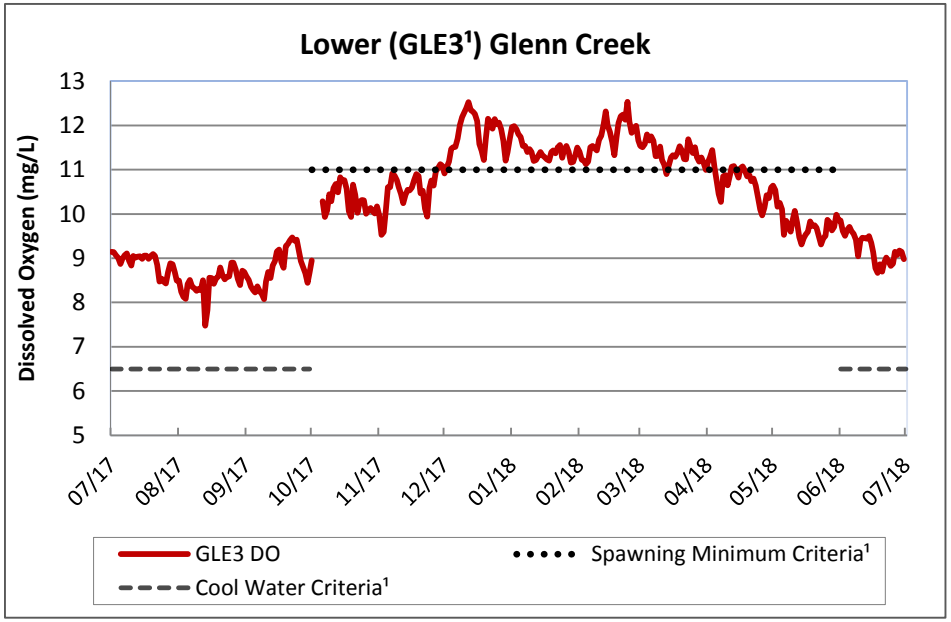
Presented DO data consists of A and B grade data with greater than or equal to 80% of data points collected per day. DO Criteria as defined in OAR 340-041-0016 and OAR 340-0340, Tables 340 A & B.

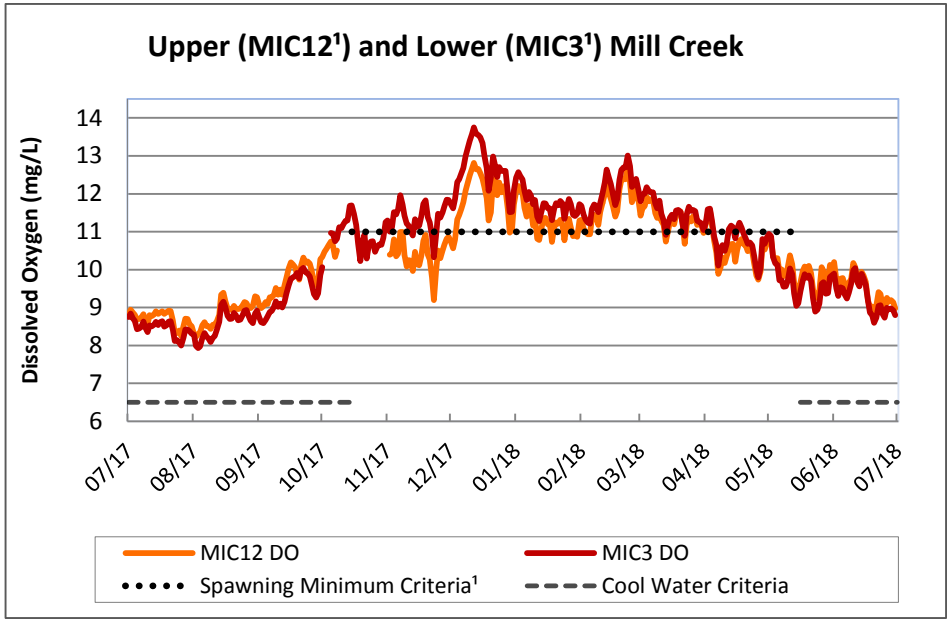
- Spawning Minimum Criteria for applicable streams may not be less than 11 mg/L.
- Oregon Cold Water Criteria for applicable streams may not be less than 8 mg/L.

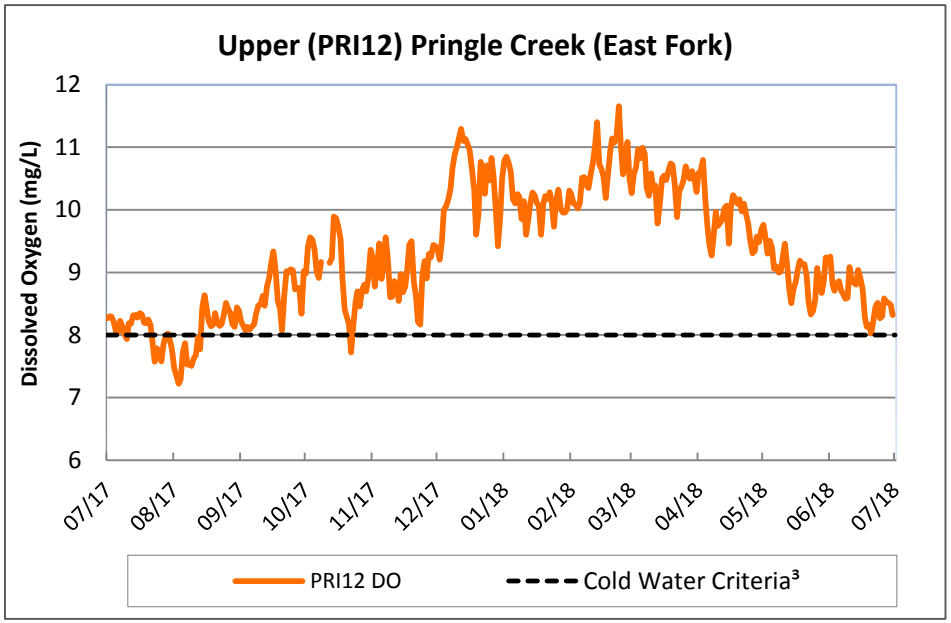
[1] Oregon's 2012 Integrated Report Section 303(d) listed.

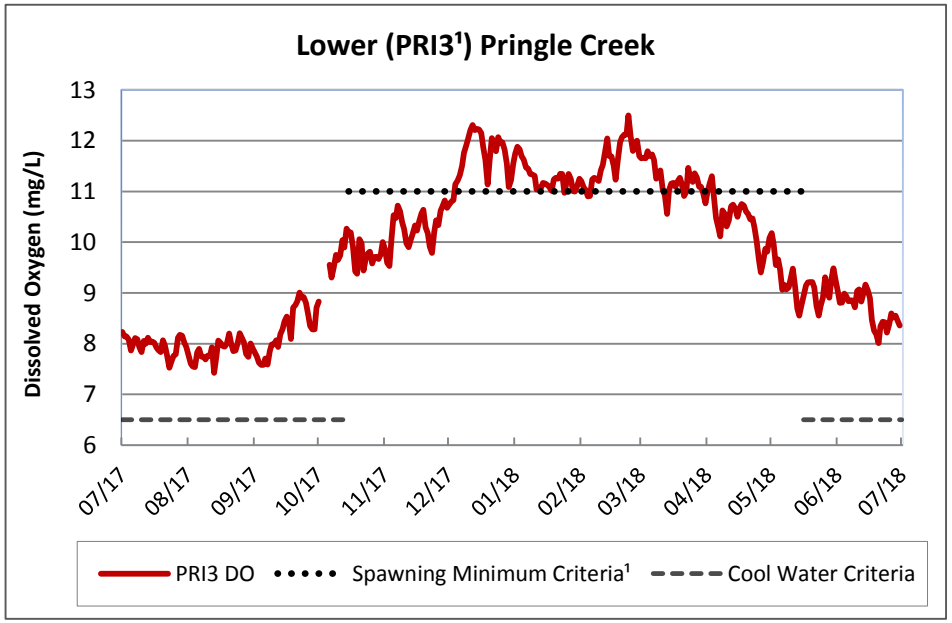
Figure 5

Continuous Instream Dissolved Oxygen Daily Mean (Reporting Year 2017/2018)









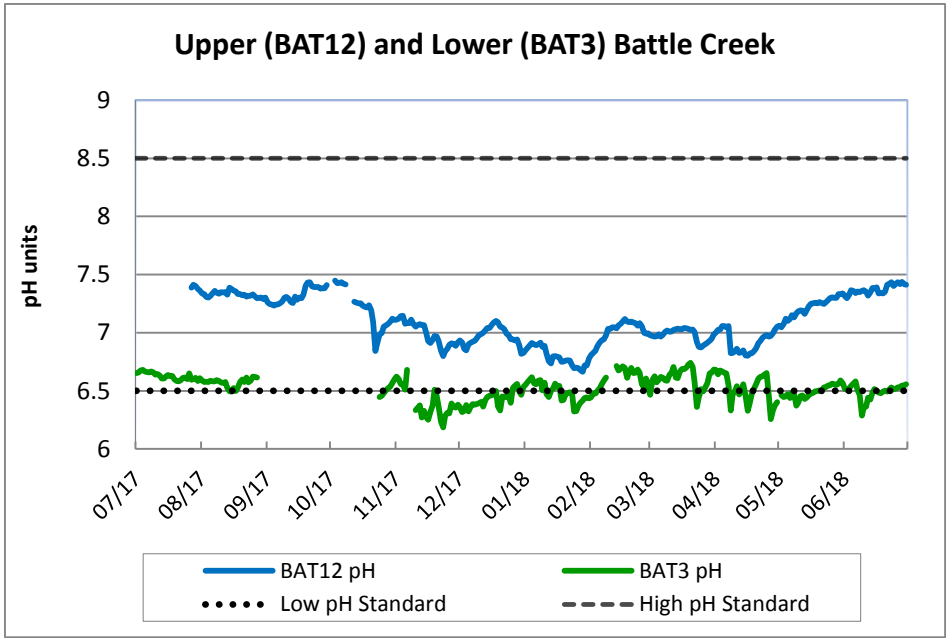
Presented DO data consists of A and B grade data with greater than or equal to 80% of data points collected per day. DO Criteria as defined in OAR 340-041-0016 and OAR 340-0340, Tables 340 A & B.

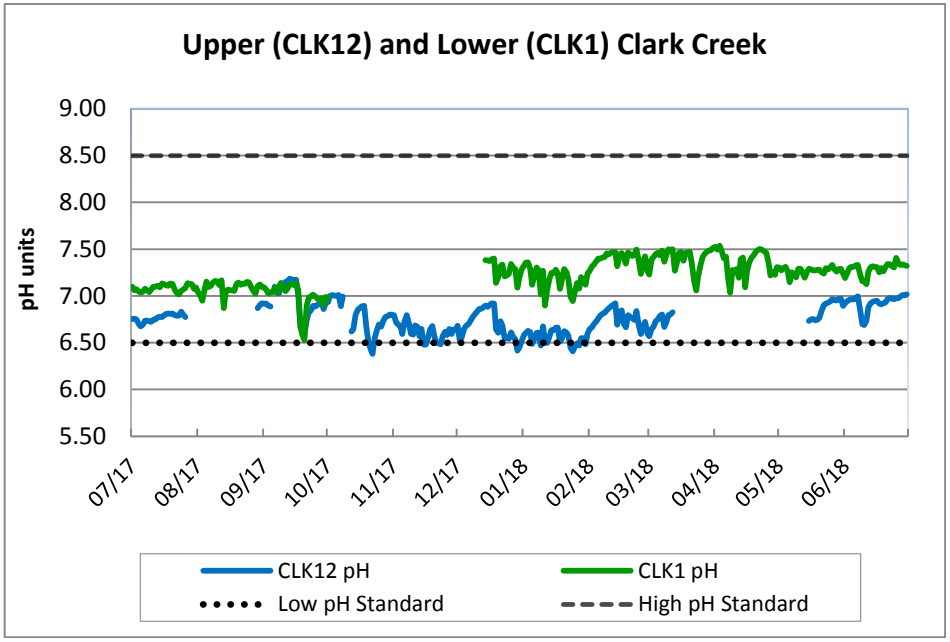
- Spawning Minimum Criteria for applicable streams may not be less than 11 mg/L.
- Oregon Cold Water Criteria for applicable streams may not be less than 8 mg/L.

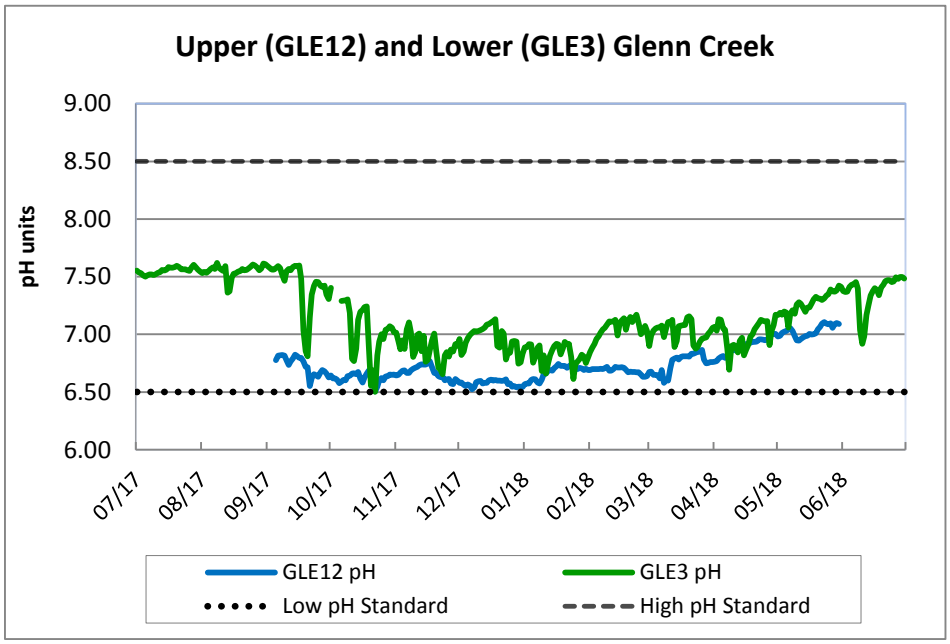
[1] Oregon's 2012 Integrated Report Section 303(d) listed.

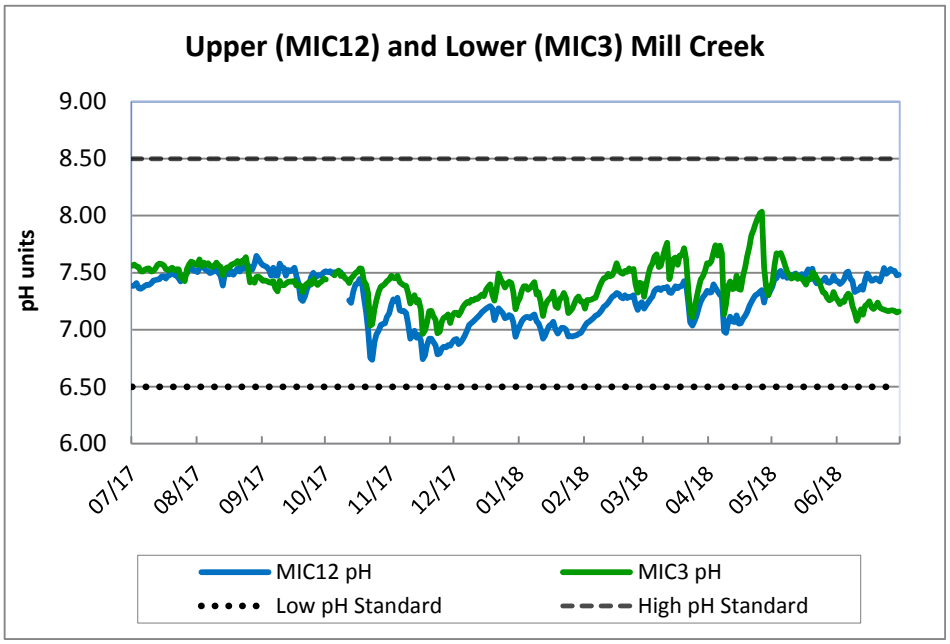
Figure 6

Continuous Instream pH Daily Mean (Reporting Year 2017/2018)



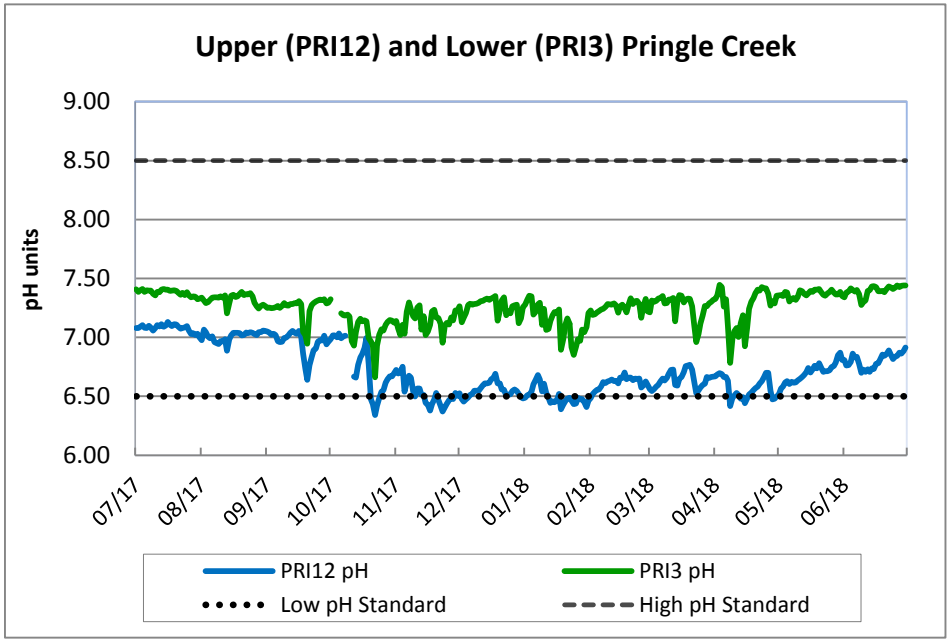






Presented pH data consist of A and B grade data with greater than or equal to 80% of data points collected per day.
As defined in OAR 341-041-0035 Water Quality Standards for the Willamette Basin, pH should not fall outside the ranges of 6.5 to 8.5 pH units.

Figure 6
Continuous Instream pH Daily Mean (Reporting Year 2017/2018)



Presented pH data consist 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 should not fall outside the ranges of 6.5 to 8.5 pH units.

Figure 7
Total Rainfall by Month Across Salem (Reporting Year 2017/2018)

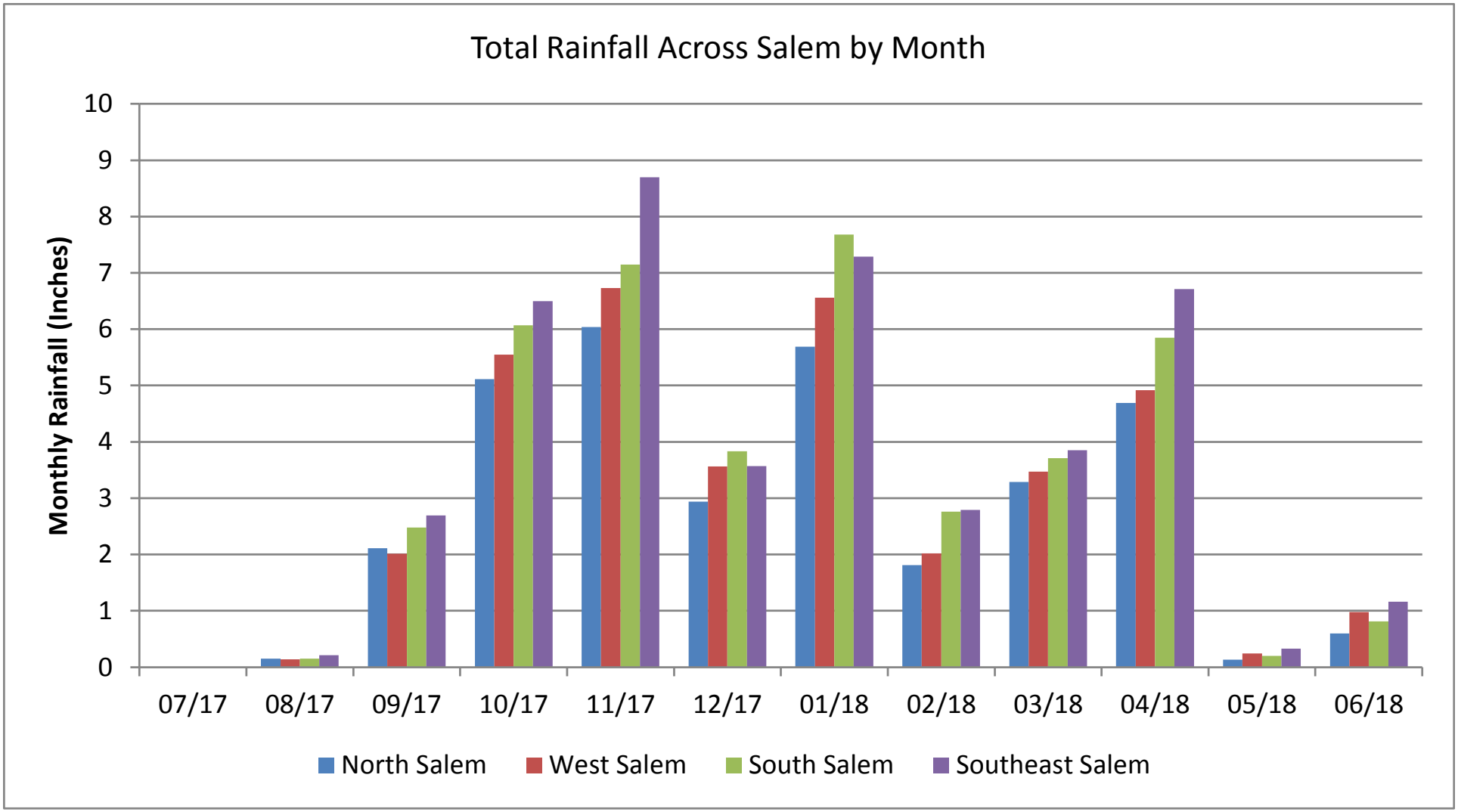


Table 1.
Completion of Table B-1 Environmental Monitoring Elements

Monitoring Type	# of sites	Total "Events" Needed	2011 / 2012	2012 / 2013	2013 / 2014	2014 / 2015	2015 / 2016	2016 / 2017	2017 / 2018
Monthly Instream	21	48 / site	12[1]	12[1]	12[1]	12[1]	12[1]	12[1]	12[1]
Continuous Instream	10	On going	NA	NA	NA	NA	NA	NA	NA
Instream Storm	3	25 / site	6	6	5	4	4	1	2
Stormwater (MS4)	3	15 / site	4	4	4	1	2	1	0
Pesticides	3	4 / site	1	2	0	1	0	0	1
Mercury	2	2 / site / year	2	1	1	COMPLETE[2]			
Macroinvertebrates	3	2 / site	1	1	0	0	0	0	1

[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] Following Table B-1 Special Condition #6 of the City's NPDES MS4 permit, the City requested and received approval 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[1]	Bush Park
CLK12	Ewald St SE
GLE3	Wallace Rd NW
GLE12	Hidden Valley Dr NW
LPW1[2]	Cordon Rd
MIC3	North Salem High School
MIC12	Turner Rd SE
PRI3[1]	Pringle Park
PRI4[2]	Salem Hospital Footbridge
PRI12[1]	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] Instream Storm sampling done at these sites. [2] Stage-only gauging station. [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[1]	
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[2]	
Dissolved Oxygen (DO)	mg/L	x	x	x	x
E. coli	MPN/100 mL	x	x	x	
Hardness	mg/L	x	x	x[2]	
Lead (Total Recoverable and Dissolved)	mg/L	x	x	x[2]	
Ammonia Nitrogen (NH_3-N)	mg/L	x	x	x[1]	
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[1]	
Temperature	˚C	x	x	x	x
Total Phosphorus (TP)	mg/L	x	x	x[1]	
Ortho Phosphorus	mg/L	x	x		
Total Solids (TS)	mg/L			x[1]	
Total Suspended Solids (TSS)	mg/L	x	x	x[1,3]	
Turbidity	NTU			x	x
Zinc (Total Recoverable and Dissolved)	mg/L	x	x	x[2]	

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

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

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

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*□
	October 15 - May 15	Spawning: Not less than 11.0 mg/L or 95% saturation	Mill Creek*, Pringle Creek*[1], Shelton Ditch*, Willamette River*[5]
	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, Willamette River*[6]
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*[3], Croisan Creek*, Glenn Creek*, Pringle Creek Trib*, Willamette River*
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*, Willamette River*
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 2012 Integrated Report Section 303(d) listed.

□ Gibson Creek is referred as Gibson Gulch in Oregon's 2012 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.

[5] Applies to Willamette River from river mile 54.8 to 186.5

[6] Applies to Willamette River from river mile 50.6 to 186.5

Table 5.
Median Values for Monthly Instream Sites (RY 2017/18)

Site ID	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	11	10.7	9.8	46.0	9.1	6.7	254.0	0.78	1.18
BAT 12	11	9.7	10.8	43.0	6.6	6.9	114.5	1.17	1.05
CGT 1	11	12.5	10.2	210.7	8.4	7.3	143.0	0.24	2.59
CGT 5	9	10.5	10.0	134.5	16.6	7.3	668.0	0.39	1.95
CLA 1	11	11.4	10.5	88.6	4.1	7.4	366.0	0.88	1.13
CLA 10	11	11.2	10.1	71.4	3.9	6.8	571.0	1.71	0.97
CRO 1	11	10.1	10.6	65.3	6.6	7.0	140.0	0.70	1.14
CRO 10	11	9.8	10.3	50.0	6.6	7.0	36.0	1.04	1.07
GIB 1	11	10.4	10.5	77.0	7.3	7.3	96.0	0.98	1.12
GIB 15	11	10.3	10.5	84.5	8.1	7.3	345.0	1.84	0.96
GLE 1	11	10.7	10.6	88.2	6.4	7.4	145.5	0.92	1.14
GLE 10	11	9.7	10.5	57.0	9.3	7.3	35.0	0.98	0.90
LPW 1	9	10.3	10.3	166.5	10.1	7.0	243.0	1.43	1.30
MIC 1	11	10.4	10.9	81.9	5.7	7.1	236.0	1.62	1.30
MIC 10	11	10.6	10.6	76.2	6.1	7.3	146.0	1.71	1.30
MRA 1	11	10.4	10.6	80.4	6.7	7.4	157.0	1.82	1.43
MRA 10	11	10.2	10.5	79.6	5.9	7.2	162.0	1.71	1.14
PRI 1	11	10.5	10.8	79.6	6.2	7.4	345.0	1.70	1.47
PRI 5	11	11.3	10.5	82.7	5.6	7.4	103.5	0.78	1.51
SHE 1	11	10.4	10.9	78.9	5.8	7.4	155.0	1.77	1.33
SHE 10	11	10.2	10.9	78.5	6.2	7.0	140.0	1.67	1.16
WR1	11	10.0	10.9	62.7	5.3	7.3	37.0	0.39	1.13
WR5	11	10.0	10.8	62.0	4.8	7.4	17.0	0.32	1.06
WR10	11	9.7	11.0	61.6	4.9	7.4	11.0	0.28	1.15

Table 6.

Number of Water Quality Criteria Exceedances for Monthly Instream Sites (RY 2017/18)

Site ID	Number of Samples	Dissolved Oxygen	pH	E. Coli[5]			Copper[6]		Lead[6]		Zinc[6]	
				Total #	Dry[2]	Rain[3]	Total	Dissolved	Total	Dissolved	Total	Dissolved
BAT 1	11	4	4	5	3	2						
BAT 12	11	3	0	3	2	1						
CGT 1	11	5	0	5	3	2						
CGT 5[4]	9	3	0	6	4	2						
CLA 1	11	3	0	6	3	3	1	0	0	0	1	1
CLA 10	11	0	2	7	5	2	1	0	0	0	1	1
CRO 1	11	1	0	2	1	1						
CRO 10	11	2	0	1	0	1						
GIB 1	11	5	0	1	0	1						
GIB 15	11	5	0	3	2	1						
GLE 1	11	2	0	2	1	1						
GLE 10[4]	11	2	0	2	1	1						
LPW 1[4]	9	4	1	3	1	2						
MIC 1	11	4	1	3	2	1						
MIC 10	11	3	0	2	1	1						
MRA 1	11	NA	0	5	4	1						
MRA 10	11	NA	0	2	1	1						
PRI 1	11	3	0	3	2	1	0	0	0	0	0	0
PRI 5	11	0	0	2	1	1	0	0	0	0	0	0
SHE 1	11	3	0	2	1	1						
SHE 10	11	3	0	2	1	1						
WR1	11	3	0	2	1	1						
WR5	11	3	1	1	1	0						
WR10	11	2	0	1	1	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 sample all 12 due to lack of flow/too high 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 - Battle Creek (RY 2017/18)

Site Name:	BAT1								
Site Description:	Commercial St								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 11:33	17.5	8.09	53.6	9.12	6.96	980	0.52	1.18	0.00
8/15/2017 11:35	16.6	6.63	70	7.78	6.92	387	0.31	3.01	0.00
9/19/2017 11:15	13.3	8.25	44.2	17	5.8	>2420	0.67	2.62	0.35
10/17/2017 11:23	10.7	9.51	56.3	9.58	6.64	86	0.44	1.13	0.00
11/21/2017 11:20	10.9	9.71	43.9	10.3	6.45	411	1.02	1.45	0.34
12/19/2017 13:00	9.2	10.25	39.6	52.3	7.13	512	0.48	4.12	0.00
1/16/2018 10:53	9	10.81	45.6	6.8	6.43	11	1.78	1.11	0.14
2/20/2018 10:42	5.8	11.78	46.3	4.5	6.8	12	1.42	1.21	0.00
3/20/2018 10:42	6.8	11.72	44.3	6.73	6.72	5	1.52	1.03	0.00
4/10/2018 11:00	10.3	10.45	46	12.9	6.46	517	1.61	0.95	0.00
5/15/2018 11:26	14	9.84	46.4	5.7	6.93	121	0.78	1.04	0.00
Median	**10.70**	**9.84**	**46.00**	**9.12**	**6.72**	**254**	**0.78**	**1.18**	

Site Name:	BAT12								
Site Description:	Rees Hill Rd.								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 11:18	17.1	8.93	49.6	8.45	7.26	166	0.19	0.92	0.00
8/15/2017 11:20	16.3	8.5	62.6	8.28	7.26	249	0.2	1.52	0.00
9/19/2017 10:58	13.2	9.15	66.2	15.5	7.09	>2420	0.54	3.41	0.35
10/17/2017 11:10	9.7	10.82	49.4	6.62	6.83	365	0.17	1.19	0.00
11/21/2017 10:41	10.5	10.05	44.5	7.73	6.5	57	1.5	0.91	0.34
12/19/2017 11:40	8.7	10.81	42.9	5.15	7.33	63	1.17	1.05	0.00
1/16/2018 10:23	8.6	10.98	43	4.6	6.67	14	1.98	1.28	0.14
2/20/2018 10:25	5.4	12.09	42.6	2.39	6.85	8	1.55	1.05	0.00
3/20/2018 10:22	6.3	11.9	41.2	3.73	6.74	12	1.62	1	0.00
4/10/2018 10:45	9.7	10.76	41.1	10.5	6.51	770	1.75	0.91	0.00
5/15/2018 11:13	13.4	10.1	41.3	4.88	7.02	1046	0.77	1.01	0.00
Median	**9.70**	**10.76**	**43.00**	**6.62**	**6.85**	**114.5**	**1.17**	**1.05**	

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 - Claggett Creek (RY 2017/18)

Site Name:	CGT1								
Site Description:	Mainline Dr S								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 13:20	22.7	10.56	268.1	3.59	7.5	116	0.23	1.64	0.00
8/15/2017 13:12	21.7	9.68	258.8	1.71	7.29	120	0.09	2.36	0.00
9/19/2017 13:35	16.5	8.31	81.2	11.2	6.93	>2420	0.36	3.59	0.35
10/17/2017 13:15	13.7	5.45	242.1	5.19	6.61	67	0.18	1.52	0.00
11/21/2017 13:10	10.4	9.33	41.9	21.2	6.84	1553	0.2	3.21	0.34
12/19/2017 14:00	9	10.16	72.5	70.5	7.22	1500	0.24	8.89	0.00
1/16/2018 12:50	9.6	10.15	148.9	8.4	7.13	166	0.77	2.79	0.14
2/20/2018 12:50	6.4	10.88	210.7	9.81	7.38	111	0.66	2.79	0.00
3/20/2018 12:38	9.5	11.07	219.5	7.94	7.37	41	0.64	1.63	0.00
4/10/2018 12:31	12.5	10.49	181.4	10.9	7.36	820	1.23	1.78	0.00
5/15/2018 12:38	19.9	10.2	245.5	4.9	7.62	616	0.15	2.59	0.00
Median	**12.50**	**10.16**	**210.70**	**8.40**	**7.29**	**143**	**0.24**	**2.59**	

Site Name:	CGT5								
Site Description:	Hawthorne Ave								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 12:45	No Flow								0.00
8/15/2017 12:45	No Flow								0.00
9/19/2017 13:10	15	8.35	54	12.5	6.75	>2420	0.39	3.51	0.35
10/17/2017 12:55	10.7	7.16	96.7	111	6.66	687	0.07	2.69	0.00
11/21/2017 12:25	10.5	9.71	44	16.6	6.84	1120	0.25	2.22	0.34
12/19/2017 14:08	8.7	10.9	37.3	187	7.36	2098	0.12	5.18	0.00
1/16/2018 12:33	9.5	10.31	134.5	12.5	7.29	214	1.15	1.28	0.14
2/20/2018 12:33	5.5	12.27	178.5	20.4	7.67	186	0.77	1.28	0.00
3/20/2018 12:13	8.5	11.65	196.8	17.8	7.66	84	0.82	1.07	0.00
4/10/2018 12:15	12.3	9.98	136.8	13.1	7.19	538	1.3	1.85	0.00
5/15/2018 12:26	15.4	6.99	198.2	14.8	7.38	909	0.21	1.95	0.00
Median	**10.50**	**9.98**	**134.50**	**16.60**	**7.29**	**668**	**0.39**	**1.95**	

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 - Clark Creek (RY 2017/18)

Site Name:	CLA1								
Site Description:	Bush Park								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 10:30	16.2	9.32	91.8	3.76	7.4	261	0.88	0.94	0.00
8/15/2017 10:50	16.6	9.15	91.6	3.17	7.41	156	0.72	1.31	0.00
9/19/2017 10:45	14.6	9.43	68.6	14.3	7.16	>2420	0.74	2.81	0.35
10/17/2017 10:34	13.2	10.18	80.7	6.45	7.45	91	0.43	0.95	0.00
11/21/2017 10:35	10.8	10.55	42.5	15.4	6.95	2420	0.44	2.46	0.34
12/19/2017 10:15	9.9	10.62	80.3	24.3	7.38	703	0.61	4.53	0.00
1/16/2018 10:05	10.5	10.92	91.9	3.8	7.38	461	1.72	1.13	0.14
2/20/2018 10:00	7.5	11.93	89.7	2.57	7.53	>2420	1.54	1.11	0.00
3/20/2018 9:30	8.2	11.52	93.2	4.1	7.31	169	1.57	0.98	0.00
4/10/2018 10:00	11.4	10.52	76.4	13.2	7.05	457	1.44	3.33	0.00
5/15/2018 9:55	13.6	10.17	88.6	2.39	7.35	75	1.05	0.91	0.00
Median	**11.40**	**10.52**	**88.60**	**4.10**	**7.38**	**366**	**0.88**	**1.13**	

Site Name:	CLA1						
Site Description:	Bush Park						
Collection Date/Time	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
7/18/2017 10:30	<0.0025	<0.0025	<0.0005	<0.0005	0.0043	0.0026	30
8/15/2017 10:50	<0.0025	<0.0025	<0.0005	<0.0005	0.0044	<0.0025	30
9/19/2017 10:45	0.0035	<0.0025	0.0008	<0.001	0.0196	0.013	21
10/17/2017 10:34	<0.0025	<0.0025	<0.0005	<0.0005	0.0044	0.0027	25
11/21/2017 10:35	0.0035	0.0026	0.001	<0.0005	0.0218	0.0149	22
12/19/2017 10:15	0.0092	0.004	0.002	<0.0005	0.1223	0.0667	22
1/16/2018 10:05	<0.0025	<0.0025	<0.0005	<0.0005	0.0141	0.0116	32
2/20/2018 10:00	<0.0025	<0.0025	<0.0005	<0.0005	0.0169	0.0141	30
3/20/2018 9:30	<0.0025	<0.0025	<0.0005	<0.0005	0.0128	0.009	36
4/10/2018 10:00	0.0037	<0.0025	0.0008	<0.0005	0.0357	0.0267	25
5/15/2018 9:55	<0.0025	<0.0025	<0.0005	<0.0005	0.0086	0.0065	27
Median	**NA**	**NA**	**NA**	**NA**	**0.0141**	**0.0123**	**27**

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

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

Table 7.
Monthly Instream Data - Clark Creek (RY 2017/18)

Site Name:	CLA10								
Site Description:	Ewald Ave								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 10:15	15.6	9.08	71.2	2.96	6.86	548	1.71	0.81	0.00
8/15/2017 10:15	16.1	8.89	70.2	3.87	7.11	2420	1.53	1.22	0.00
9/19/2017 10:05	15.3	8.46	75.7	16.6	6.76	>2420	1.52	1.55	0.35
10/17/2017 10:22	13.9	9.62	73.8	2.84	6.93	1553	1.34	0.85	0.00
11/21/2017 9:36	10.9	10.32	34.2	11.4	6.44	1986	0.57	0.97	0.34
12/19/2017 10:20	10.2	10.28	119.2	32.5	6.63	10460	0.69	4.45	0.00
1/16/2018 9:35	11.2	10.32	74	2.1	6.75	32	2.38	1	0.14
2/20/2018 9:35	9.4	10.77	72.1	4.04	6.89	53	2.21	0.81	0.00
3/20/2018 9:32	9.7	10.72	71.4	2.59	6.84	31	2.1	0.7	0.00
4/10/2018 10:00	11.2	10.13	69.9	7.74	6.4	594	2.01	1.19	0.00
5/15/2018 10:17	12.8	9.79	70.6	3.79	7.07	110	1.89	0.77	0.00
Median	**11.20**	**10.13**	**71.40**	**3.87**	**6.84**	**571**	**1.71**	**0.97**	

Site Name:	CLA10						
Site Description:	Ewald Ave						
Collection Date/Time	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
7/18/2017 10:15	<0.0025	<0.0025	<0.0005	<0.0005	0.0044	0.0036	20
8/15/2017 10:15	<0.0025	<0.0025	<0.0005	<0.0005	0.0059	0.0032	20
9/19/2017 10:05	<0.0025	<0.0025	<0.0005	<0.001	0.0282	0.0236	20
10/17/2017 10:22	<0.0025	<0.0025	<0.0005	<0.0005	0.0067	0.0043	23
11/21/2017 9:36	0.0025	<0.0025	0.0005	<0.0005	0.0175	0.0139	16
12/19/2017 10:20	0.0096	0.005	0.0016	<0.0005	9.705	9.46	40
1/16/2018 9:35	<0.0025	<0.0025	<0.0005	<0.0005	0.0107	0.01	23
2/20/2018 9:35	<0.0025	<0.0025	<0.0005	<0.0005	0.0445	0.0417	22
3/20/2018 9:32	<0.0025	<0.0025	<0.0005	<0.0005	0.0154	0.0143	23
4/10/2018 10:00	<0.0025	<0.0025	<0.0005	<0.0005	0.015	0.0131	21
5/15/2018 10:17	<0.0025	<0.0025	<0.0005	<0.0005	0.0101	0.0084	21
Median	**NA**	**NA**	**NA**	**NA**	**0.0150**	**0.0131**	**21.00**

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

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

Table 7.
Monthly Instream Data - Croisan Creek (RY 2017/18)

Site Name:	CRO1								
Site Description:	River Rd S								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 10:39	15	8.46	83.9	5.87	7.04	140	0.47	1.06	0.00
8/15/2017 10:45	14.6	8.06	99.5	3.87	7.11	345	0.33	1.42	0.00
9/19/2017 10:20	12.9	9.2	65.3	18	6.71	>2420	0.53	3.56	0.35
10/17/2017 10:43	8.7	10.45	87	4.94	6.91	411	0.34	1.1	0.00
11/21/2017 9:55	10.1	10.62	54.5	9.03	6.99	201	0.83	1.4	0.34
12/19/2017 10:40	8.6	10.92	68.4	12.4	7.19	173	0.7	2.03	0.00
1/16/2018 9:53	8.6	11.36	59.3	6.6	6.9	24	1.7	1.08	0.14
2/20/2018 9:55	5.2	12.47	64.9	4.72	7.21	38	1.22	1.01	0.00
3/20/2018 9:52	5.7	12.38	59.4	7.07	7.13	46	1.2	0.96	0.00
4/10/2018 10:13	10.1	11.01	56.9	17.6	6.87	89	1.16	1.14	0.00
5/15/2018 10:32	12.9	10	68.5	5.48	7.18	140	0.55	1.21	0.00
Median	**10.10**	**10.62**	**65.30**	**6.60**	**7.04**	**140**	**0.70**	**1.14**	

Site Name:	CRO10								
Site Description:	Ballantyne Rd.								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 10:55	14.9	8.79	61	9.56	7.01	102	0.6	0.99	0.00
8/15/2017 11:05	14.9	8.39	77.9	6.63	7.12	40	0.6	1.6	0.00
9/19/2017 10:40	12.4	9.23	84.7	14.8	7.03	2420	0.68	4.81	0.35
10/17/2017 10:55	9.5	10.09	63.8	8.35	6.71	50	0.24	1.15	0.00
11/21/2017 10:30	10.2	10.33	49.9	5.57	6.69	28	1.2	2.24	0.34
12/19/2017 11:10	8.2	10.63	50.4	6.31	7.24	10	1.04	1.05	0.00
1/16/2018 10:10	8.4	11.1	48.4	5.3	6.86	19	1.82	1.03	0.14
2/20/2018 10:10	5.8	11.81	48.4	4.8	6.85	17	1.31	0.96	0.00
3/20/2018 10:07	6.2	11.74	46.2	4.78	6.97	5	1.24	1.07	0.00
4/10/2018 10:28	9.8	10.88	45.5	14	6.83	36	1.37	0.8	0.00
5/15/2018 10:58	12.2	10.03	50	7.4	7.15	40	0.72	1.11	0.00
Median	**9.80**	**10.33**	**50.00**	**6.63**	**6.97**	**36**	**1.04**	**1.07**	

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 - Gibson Creek (RY 2017/18)

Site Name:	GIB1								
Site Description:	Wallace Rd.								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 11:40	18.3	8	101.3	6.31	7.4	65	0.57	1.07	0.00
8/15/2017 12:10	17.3	7.15	110.1	7.28	7.41	73	0.45	1.51	0.00
9/19/2017 11:35	14.3	8.94	66.8	16.9	7.14	>2420	0.42	2.45	0.35
10/17/2017 12:00	10.3	9.87	104.9	7.17	7.36	236	0.47	1.16	0.00
11/21/2017 11:25	10.4	10.51	69.4	17.3	7.09	308	0.94	1.12	0.34
12/19/2017 10:55	8.7	10.84	74.1	18.9	7.31	238	0.98	1.79	0.00
1/16/2018 11:30	9	11.33	73.9	8	7.25	16	2.04	1.02	0.14
2/20/2018 11:16	5.3	12.39	80.6	6.8	7.44	69	1.68	1.12	0.00
3/20/2018 10:15	7	11.94	77	6.31	7.3	41	1.81	0.96	0.00
4/10/2018 10:50	11.1	10.58	71.9	18.6	7.16	119	1.69	0.82	0.00
5/15/2018 11:45	15.6	9.12	84.6	5.42	7.29	126	1.18	1.02	0.00
Median	**10.40**	**10.51**	**77.00**	**7.28**	**7.30**	**96**	**0.98**	**1.12**	

Site Name:	GIB15								
Site Description:	Brush College Rd.								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 12:00	18.1	8.55	103	10.9	7.38	866	0.96	0.87	0.00
8/15/2017 12:30	16.8	8.5	113.5	7.33	7.38	155	0.47	1.21	0.00
9/19/2017 11:50	14.5	9.08	116.5	7.68	7.09	1733	0.51	1.8	0.35
10/17/2017 12:10	9.3	10.46	109.4	5.73	7.38	65	0.78	1.28	0.00
11/21/2017 11:40	10.3	10.14	84.5	19.9	6.94	124	1.55	0.96	0.34
12/19/2017 11:05	8.8	10.83	83.3	13.8	7.4	41	1.84	1.38	0.00
1/16/2018 11:40	9.1	11.1	78.2	8.1	7.13	6	2.47	0.89	0.14
2/20/2018 11:22	6.2	12.02	83.8	7.15	7.3	32	2.24	1.39	0.00
3/20/2018 10:38	7.5	11.61	78	9.34	7.16	27	2.18	0.87	0.00
4/10/2018 11:07	10.7	10.72	74.4	16.4	7.1	166	1.92	0.64	0.00
5/15/2018 11:55	14.6	9.57	88.8	7.23	7.26	687	1.95	0.93	0.00
Median	**10.30**	**10.46**	**84.50**	**8.10**	**7.26**	**345**	**1.84**	**0.96**	

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 - Glenn Creek (RY 2017/18)

Site Name:	GLE1								
Site Description:	River Bend Rd.								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 11:25	15.9	8.62	113.3	6.68	7.5	613	0.92	0.99	0.00
8/15/2017 11:55	15.7	8.26	118	5.01	7.46	194	0.85	1.35	0.00
9/19/2017 11:20	13.5	9.5	65.7	17.8	7.1	>2420	0.53	2.3	0.35
10/17/2017 11:42	11	10.44	104.1	6.35	7.42	225	0.64	1.31	0.00
11/21/2017 11:10	10.6	10.55	61.7	22.5	7.05	365	0.81	1.54	0.34
12/19/2017 10:42	9.2	10.85	93.4	34.4	7.46	97	0.98	1.91	0.00
1/16/2018 11:15	9.5	11.22	81.2	6.2	7.35	20	1.97	0.84	0.14
2/20/2018 10:47	5.9	12.28	88.2	6.22	7.49	34	1.5	1.07	0.00
3/20/2018 9:58	7.1	11.9	86.2	5.94	7.4	23	1.62	1.14	0.00
4/10/2018 10:35	10.7	10.72	79.8	17.2	7.11	214	1.72	1.11	0.00
5/15/2018 11:30	14.7	9.76	94.9	5.63	7.49	80	0.91	1.08	0.00
Median	**10.70**	**10.55**	**88.20**	**6.35**	**7.42**	**146**	**0.92**	**1.14**	

Site Name:	GLE10								
Site Description:	Hidden Valley Dr.								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 13:05	14.9	9.26	73.2	8.16	7.47	225	0.56	0.71	0.00
8/15/2017 12:50	14.9	8.23	90.7	7.93	7.29	1203	0.17	1.28	0.00
9/19/2017 12:00	13.7	8.8	81.5	15	6.95	>2420	0.23	3.39	0.35
10/17/2017 12:22	10.2	10.48	80.6	2.6	7.43	19	0.16	0.91	0.00
11/21/2017 11:55	10.3	10.54	62.1	15.6	7.1	72	1.32	0.75	0.34
12/19/2017 11:23	8.4	10.95	55.3	11.6	7.51	41	0.98	1.23	0.00
1/16/2018 11:53	9.1	11.24	55.6	9.3	7.21	14	2.04	0.71	0.14
2/20/2018 11:40	5.6	12.31	53.4	8.23	7.41	214	1.37	0.92	0.00
3/20/2018 10:56	7.3	11.84	55.7	10.7	7.25	3	1.57	0.9	0.00
4/10/2018 11:25	10.2	10.93	54.2	24.2	7.13	29	1.68	0.53	0.00
5/15/2018 12:12	12.2	10.32	57	8.36	7.33	16	0.85	0.67	0.00
Median	**9.65**	**10.54**	**57.00**	**9.30**	**7.29**	**35**	**0.98**	**0.90**	

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 - West Fork Little Pudding River (RY 2017/18)

Site Name:	LPW1									
Site Description:	Cordon Rd.									
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs	TSS
7/18/2017 12:15	No Flow									
8/15/2017 12:15	No Flow									
9/19/2017 12:28	14.8	6.25	125.6	6.01	6.74	>2420	1.12	5.97	0.35	4.20
10/17/2017 12:01	10.6	2.91	112	11.6	6.45	387	<0.05	1.93	0.00	9.3
11/21/2017 12:05	10.3	8.86	76.8	12.3	6.89	548	0.44	1.53	0.34	10.00
12/19/2017 13:45	8.5	10.34	65.3	56.7	7.32	908	0.35	3.35	0.00	151.00
1/16/2018 11:40	8.9	10.47	166.5	6	7.09	131	2.17	1.17	0.14	5.10
2/20/2018 12:07	5.8	14.47	216	12.6	7.61	210	1.74	1.06	0.00	15.60
3/20/2018 11:26	7.7	12.45	227.5	10.1	7.3	36	1.76	1.02	0.00	6.40
4/10/2018 12:00	12.2	11.32	168.4	8.06	7.03	276	1.76	1.24	0.00	4.00
5/15/2018 12:06	15.8	7.35	292.5	4.57	6.74	51	0.09	1.3	0.00	3.30

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 - Mill Creek (RY 2017/18)

Site Name:	MIC1								
Site Description:	Front St.								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 9:08	18.4	9.04	56.7	4.38	7.07	225	0.24	1.08	0.00
8/15/2017 9:10	16.3	9.54	50.2	4.68	6.98	79	0.15	1.38	0.00
9/19/2017 9:07	12.6	10.31	46.6	6.61	6.64	1553	0.11	1.55	0.35
10/17/2017 9:30	10.4	10.9	76.2	4.27	6.36	770	0.42	1.65	0.00
11/21/2017 8:47	10.2	10.86	88.1	10.3	7.07	260	2.67	1.35	0.34
12/19/2017 9:25	8	11.46	84.1	5.68	7.39	146	1.68	1.65	0.00
1/16/2018 8:55	8.3	11.61	83.3	8.6	7.1	248	2.69	0.92	0.14
2/20/2018 8:55	4.9	12.71	84.6	5.56	7.32	138	1.97	1.2	0.00
3/20/2018 8:41	7.4	11.81	81.9	5.85	7.34	488	1.62	1.3	0.00
4/10/2018 9:20	10.8	10.77	81.9	14.9	7.05	236	2.29	1.1	0.00
5/15/2018 9:10	16.4	9.48	63.9	3.91	7.25	140	0.6	0.84	0.00
Median	**10.40**	**10.86**	**81.90**	**5.68**	**7.07**	**236**	**1.62**	**1.30**	

Site Name:	MIC10								
Site Description:	Turner Rd								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 11:58	18.1	9.82	53.4	6.67	7.6	131	0.27	1.32	0.00
8/15/2017 11:53	15.6	10.33	48.6	4.19	7.46	109	0.14	1.61	0.00
9/19/2017 12:07	12.3	10.16	54.2	11.9	7.25	>2420	0.33	2.3	0.35
10/17/2017 11:45	10.6	11.45	75.5	5.61	6.85	2420	0.37	1.96	0.00
11/21/2017 11:40	10.2	10.18	89.6	11.5	7.01	248	3.06	1.09	0.34
12/19/2017 13:22	8.1	11.25	77	5.2	7.22	121	1.71	1.28	0.00
1/16/2018 11:20	8.3	11.23	79.3	8.2	7.03	79	2.79	1.23	0.14
2/20/2018 11:10	4.8	12.73	79.8	6.05	7.33	89	2.06	1.3	0.00
3/20/2018 11:05	6.9	12.41	76.2	5.37	7.36	161	1.76	1.22	0.00
4/10/2018 11:19	10.6	10.55	77.8	13.3	6.92	172	2.39	0.97	0.00
5/15/2018 11:46	15	10.42	57.4	5.5	7.37	249	0.6	1.48	0.00
Median	**10.60**	**10.55**	**76.20**	**6.05**	**7.25**	**146**	**1.71**	**1.30**	

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 - Mill Race (RY 2017/18)

Site Name:	MRA1								
Site Description:	High St.								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 10:00	18.8	9.24	53.2	4.99	7.47	115	0.25	1.37	0.00
8/15/2017 10:18	16.3	9.77	48.3	6.69	7.42	649	0.12	1.53	0.00
9/19/2017 10:20	12.9	10.47	45.3	7.74	7.34	>2420	0.1	1.8	0.35
10/17/2017 10:10	10.4	11.21	71.3	8.2	7.29	770	0.41	1.8	0.00
11/21/2017 9:50	10.1	10.62	85.2	8.7	7.25	162	2.58	1.4	0.34
12/19/2017 9:45	7.9	11.68	80.4	7.07	7.55	148	1.82	1.59	0.00
1/16/2018 9:27	7.9	10.91	84.5	5	7.39	99	2.58	1.21	0.14
2/20/2018 9:30	4.8	13.04	81.5	6.58	7.57	112	1.94	1.43	0.00
3/20/2018 9:08	7.3	11.9	82.1	5.71	7.42	435	1.86	1.68	0.00
4/10/2018 9:35	11	9.85	81.8	10.8	7.21	435	2.26	1.25	0.00
5/15/2018 9:25	16.3	9.72	60.3	5.51	7.44	152	0.6	1.29	0.00
Median	**10.40**	**10.62**	**80.40**	**6.69**	**7.42**	**157**	**1.82**	**1.43**	

Site Name:	MRA10								
Site Description:	19th St.								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 9:10	18.5	8.48	53.5	5.73	7.33	158	0.28	1.1	0.00
8/15/2017 9:15	15.9	9.32	48.5	4.99	7.11	128	0.11	1.38	0.00
9/19/2017 9:10	12.4	10.02	45.9	7.04	6.87	1203	0.1	1.36	0.35
10/17/2017 9:30	10.2	10.43	71.5	5.02	6.83	980	0.38	1.4	0.00
11/21/2017 8:55	10.1	10.65	88.8	10.3	7.11	162	2.77	0.93	0.34
12/19/2017 9:15	7.9	11.32	80.6	4.21	7.4	121	1.88	1.14	0.00
1/16/2018 9:00	8.1	11.37	82.8	7.3	7.2	179	2.66	1.01	0.14
2/20/2018 9:00	4.8	12.63	81.3	6.07	7.29	86	1.96	1.18	0.00
3/20/2018 8:39	7.1	11.48	79.6	5.86	7.26	225	1.71	1.24	0.00
4/10/2018 9:10	10.7	10.48	80.6	12.6	7.13	248	2.35	1.02	0.00
5/15/2018 8:55	16.1	9.16	60.2	4.5	7.23	111	0.6	1.14	0.00
Median	**10.20**	**10.48**	**79.60**	**5.86**	**7.20**	**162**	**1.71**	**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 - Pringle Creek (RY 2017/18)

Site Name:	PRI1								
Site Description:	Waterfront Park								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 9:45	18.5	9.18	55.1	4.91	7.46	166	0.2	1.32	0.00
8/15/2017 9:50	16.6	9.68	45.8	4.8	7.41	435	0.13	1.57	0.00
9/19/2017 10:00	13.4	9.85	51.4	13.5	7.4	1414	0.18	2.09	0.35
10/17/2017 10:00	10.5	11.23	69.7	4.25	7.28	361	0.4	1.63	0.00
11/21/2017 9:15	10.2	10.8	82	9.98	7.18	365	2.3	1.46	0.34
12/19/2017 9:35	8.1	11.43	92.8	6.2	7.47	120	1.72	1.83	0.00
1/16/2018 9:17	8.3	11.57	82	8.2	7.26	75	2.52	1.18	0.14
2/20/2018 9:20	4.9	12.92	82	7.41	7.55	71	1.83	1.47	0.00
3/20/2018 8:55	7.1	12.03	80.5	4.79	7.4	345	1.7	1.62	0.00
4/10/2018 9:22	10.7	10.69	79.6	13.6	7.15	613	2.17	1.38	0.00
5/15/2018 9:15	16.4	9.57	61.8	5.05	7.48	130	0.6	1.26	0.00
Median	**10.50**	**10.80**	**79.60**	**6.20**	**7.40**	**345**	**1.70**	**1.47**	

Site Name:	PRI1						
Site Description:	Waterfront Park						
Collection Date/Time	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
7/18/2017 9:45	<0.0025	<0.0025	<0.0005	<0.0005	<0.0025	<0.0025	21
8/15/2017 9:50	<0.0025	<0.0025	<0.0005	<0.0005	<0.0025	<0.0025	19
9/19/2017 10:00	<0.0025	<0.0025	0.0006	<0.0005	0.0128	0.0049	18
10/17/2017 10:00	<0.0025	<0.0025	<0.0005	<0.0005	<0.0025	<0.0025	28
11/21/2017 9:15	<0.0025	<0.0025	<0.0005	<0.0005	0.0082	0.0057	36
12/19/2017 9:35	<0.0025	<0.0025	<0.001	<0.0005	0.0171	0.0125	30
1/16/2018 9:17	<0.0025	<0.0025	<0.0005	<0.0005	0.0051	0.0039	28
2/20/2018 9:20	<0.0025	<0.0025	<0.0005	<0.0005	<0.0025	<0.0025	31
3/20/2018 8:55	<0.0025	<0.0025	<0.0005	<0.0005	<0.0025	<0.0025	30
4/10/2018 9:22	<0.0025	<0.0025	<0.0005	<0.0005	0.0066	0.0041	29
5/15/2018 9:15	<0.0025	<0.0025	<0.0005	<0.0005	0.0025	<0.0025	24
Median	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**28**

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

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

Table 7.
Monthly Instream Data - Pringle Creek (RY 2017/18)

Site Name:	PRI5								
Site Description:	Bush Park								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 10:40	19.2	8.76	82.7	4.65	7.47	111	0.37	1.41	0.00
8/15/2017 10:55	18.7	8.7	85.7	4.95	7.43	122	0.26	2.23	0.00
9/19/2017 10:50	15.7	8.47	66.3	21.4	7.15	>2420	0.24	2.77	0.35
10/17/2017 10:42	11.3	10.53	82.7	3.92	7.42	99	0.43	1.42	0.00
11/21/2017 10:40	10.8	10.25	72.1	9.8	7.09	108	0.77	1.51	0.34
12/19/2017 10:20	8.2	11.13	84.5	7.63	7.54	96	0.97	2.67	0.00
1/16/2018 10:19	9.2	11.23	81.8	5.6	7.39	18	1.46	1.05	0.14
2/20/2018 10:10	6.4	12.58	85.7	6.89	7.8	12	1.17	1.98	0.00
3/20/2018 9:37	7.6	11.99	88.4	3.31	7.53	18	1.15	1.24	0.00
4/10/2018 10:15	11.3	10.51	79.9	17	7.19	1986	1.22	1.52	0.00
5/15/2018 10:05	17	9.29	84.2	2.33	7.58	178	0.78	1	0.00
Median	**11.30**	**10.51**	**82.70**	**5.60**	**7.43**	**103.5**	**0.78**	**1.51**	

Site Name:	PRI5						
Site Description:	Bush Park						
Collection Date/Time	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
7/18/2017 10:40	<0.0025	<0.0025	<0.0005	<0.0005	0.0041	<0.0025	30
8/15/2017 10:55	<0.0025	<0.0025	<0.0005	<0.0005	0.0043	<0.0025	30
9/19/2017 10:50	0.0025	<0.0025	0.0007	<0.0005	0.0181	0.0075	24
10/17/2017 10:42	<0.0025	<0.0025	<0.0005	<0.0005	0.0041	<0.0025	33
11/21/2017 10:40	0.0026	<0.0025	<0.0005	<0.0005	0.0186	0.0123	31
12/19/2017 10:20	<0.0025	<0.0025	<0.0005	<0.0005	0.0171	0.0119	30
1/16/2018 10:19	<0.0025	<0.0025	<0.0005	<0.0005	0.0177	0.015	29
2/20/2018 10:10	<0.0025	<0.0025	<0.0005	<0.0005	0.0069	0.0037	33
3/20/2018 9:37	<0.0025	<0.0025	<0.0005	<0.0005	0.006	0.0038	33
4/10/2018 10:15	<0.0025	<0.0025	0.0013	<0.0005	0.0125	0.0074	28
5/15/2018 10:05	<0.0025	<0.0025	<0.0005	<0.0005	0.0032	<0.0025	30
Median	**NA**	**NA**	**NA**	**NA**	**0.0069**	**0.0075**	**30.00**

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

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

Table 7.
Monthly Instream Data - Shelton Ditch (RY 2017/18)

Site Name:	SHE1								
Site Description:	Church St.								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 10:10	18.5	9.37	54.3	4.67	7.51	105	0.28	1.1	0.00
8/15/2017 10:25	16.3	9.85	49.7	3.34	7.55	276	0.12	1.51	0.00
9/19/2017 10:30	12.7	10.32	47.9	8.07	7.25	2420	0.11	1.42	0.35
10/17/2017 10:20	10.4	11.16	72.4	4.75	7.31	649	0.41	1.63	0.00
11/21/2017 10:15	10.1	10.91	86.5	9.83	7.21	199	2.87	1.18	0.34
12/19/2017 9:53	8	11.54	84.7	4.74	7.54	74	1.82	1.55	0.00
1/16/2018 9:40	8.2	11.65	81.4	8.1	7.31	99	2.65	1.33	0.14
2/20/2018 9:40	4.8	13.09	80.5	7.13	7.58	133	1.95	1.27	0.00
3/20/2018 9:17	7	12.26	79.1	5.76	7.43	260	1.77	1.52	0.00
4/10/2018 9:44	10.6	10.8	78.9	15.5	7.15	155	2.37	1.19	0.00
5/15/2018 9:35	15.9	9.69	60.3	3.98	7.47	93	0.62	1.23	0.00
Median	**10.40**	**10.91**	**78.90**	**5.76**	**7.43**	**155**	**1.77**	**1.33**	

Site Name:	SHE10								
Site Description:	Airport Road								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 9:00	18.1	9.32	52.9	5.33	7.22	155	0.28	1.16	0.00
8/15/2017 9:00	15.6	9.84	48.2	4.7	7.12	113	0.11	1.38	0.00
9/19/2017 8:45	12.3	10.42	45.7	11.7	6.7	2420	0.1	1.59	0.35
10/17/2017 9:12	10.2	11.04	72.3	4.43	6.84	770	0.41	1.33	0.00
11/21/2017 8:35	10.1	10.85	89	9.86	6.9	140	2.85	0.8	0.34
12/19/2017 9:05	7.9	11.56	79.4	3.98	7.37	110	1.75	0.97	0.00
1/16/2018 8:45	8.2	11.65	80.8	8.3	7	96	2.69	1.09	0.14
2/20/2018 8:50	4.8	12.84	80	6.29	7.2	142	1.97	1.11	0.00
3/20/2018 8:27	6.9	12.01	78.5	6.17	7.29	291	1.67	1.18	0.00
4/10/2018 8:40	10.5	10.75	78.8	14.5	7	130	2.35	0.83	0.00
5/15/2018 10:25	15.6	10.07	59	5.37	7.01	130	0.59	1.23	0.00
Median	**10.20**	**10.85**	**78.50**	**6.17**	**7.01**	**140**	**1.67**	**1.16**	

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 - Willamette River (RY 2017/18)

Site Name:	WR1								
Site Description:	Sunset Park (Keizer)								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 13:45	21.2	10.33	71.1	1.29	7.98	9	0.19	1.02	0.00
8/15/2017 13:49	17.9	10.02	58.9	1.53	7.74	8	0.08	1.34	0.00
9/19/2017 13:51	15.3	10.71	60.3	3.14	7.05	435	0.13	1.13	0.35
10/17/2017 13:33	12.1	10.7	61.5	4.61	6.87	40	0.08	1.33	0.00
11/21/2017 13:40	9	10.94	53.3	13.8	7.22	72	0.46	0.7	0.34
12/19/2017 14:15	7.3	11.44	68.4	6	7.35	150	0.39	1.28	0.00
1/16/2018 13:10	7.8	11.45	62.7	7.9	7.31	28	0.68	0.93	0.14
2/20/2018 13:10	6	12.18	72.3	6.44	7.41	37	0.59	1.09	0.00
3/20/2018 13:05	8.7	12.04	70.8	5.26	7.33	28	0.54	1.13	0.00
4/10/2018 13:00	10	10.68	59.9	21.6	7.28	488	0.62	1.4	0.00
5/15/2018 13:05	16.4	12.21	65	2.11	8.24	16	0.13	1.35	0.00
Median	**10.00**	**10.94**	**62.70**	**5.26**	**7.33**	**37**	**0.39**	**1.13**	

Site Name:	WR1				
Site Description:	Sunset Park (Keizer)				
Alkalinity (mg/L)	Ammonia (mg/L)	TP (mg/L)	TDS (mg/L)	TS (mg/L)	TSS (mg/L)
29	<0.05	0.036	59	61	2.3
27	<0.05	0.033	57	62	4.6
28	<0.05	0.026	52	57	4.6
26	<0.05	0.029	58	64	6.4
22	<0.05	0.061	52	69	17.5
30	<0.05	0.05	60	70	9.8
24	<0.05	0.051	63	72	8.9
29	<0.05	0.038	63	67	4.4
30	<0.05	0.036	64	68	4.4
25	0.141	0.082	58	83	25
27	<0.05	0.03	59	62	3.2
27	**NA**	**0.036**	**59**	**67**	**4.6**

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 - Willamette River (RY 2017/18)

Site Name:	WR5								
Site Description:	Union Street Railroad Bridge								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 9:35	19.6	8.85	71.7	1.47		11	0.18	1.06	0.00
8/15/2017 9:40	17.1	9.31	59.1	1.99	7.39	11	0.09	1.2	0.00
9/19/2017 9:30	14.1	9.99	61.5	2.4	6.77	326	0.11	0.99	0.35
10/17/2017 9:55	11.7	10.57	59.9	4.75	6.46	16	0.09	1.04	0.00
11/21/2017 9:10	9	11.12	52.9	19.5	7.37	45	0.32	1.04	0.34
12/19/2017 9:45	7.4	11.78	67.2	4.69	7.57	17	0.32	1.06	0.00
1/16/2018 9:13	7.7	11.6	62	7.7	7.52	29	0.6	0.96	0.14
2/20/2018 9:12	5.6	12.26	69.6	6.49	7.43	35	0.47	1.32	0.00
3/20/2018 8:58	7.9	11.67	67.6	4.97	7.44	14	0.48	1.1	0.00
4/10/2018 9:33	10	10.82	59.5	23.7	7.16	579	0.52	1.43	0.00
5/15/2018 9:44	15.8	10.07	62.1	2.89	7.52	6	0.13	1.23	0.00
Median	**10.00**	**10.82**	**62.00**	**4.75**	**7.41**	**17**	**0.32**	**1.06**	

Site Name:	WR5				
Site Description:	Union Street Railroad Bridge				
Alkalinity (mg/L)	Ammonia (mg/L)	TP (mg/L)	TDS (mg/L)	TS (mg/L)	TSS (mg/L)
29	<0.05	0.035	59	62	2.6
28	<0.05	0.035	52	58	6
27	<0.05	0.034	48	52	4
26	<0.05	0.032	57	63	6.4
22	<0.05	0.066	58	77	18.8
28	<0.05	0.03	68	71	2.8
25	<0.05	0.05	70	79	9.2
29	<0.05	0.039	56	61	5.2
30	<0.05	0.036	65	70	4.6
25	0.152	0.078	55	80	25
26	<0.05	0.027	51	56	4.8
27	**NA**	**0.035**	**57**	**63**	**5.2**

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 - Willamette River (RY 2017/18)

Site Name:	WR10								
Site Description:	Halls Ferry Road (Independence)								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
7/18/2017 13:30	20.8	11.02	71.9	1.22	8.14	2	0.2	0.97	0.00
8/15/2017 13:25	17.9	9.83	59.8	4.85	7.54	2	0.11	1.3	0.00
9/19/2017 12:35	15.2	10.38	61.6	4.2	7.35	58	0.11	1.09	0.35
10/17/2017 12:45	12	10.61	59	4.81	7.57	14	0.08	1.15	0.00
11/21/2017 12:20	8.8	11.01	51.2	14.6	7.27	62	0.29	0.87	0.34
12/19/2017 12:05	7	11.63	67.3	3.68	7.45	8	0.28	1.16	0.00
1/16/2018 12:22	7.6	11.56	60.4	7.8	7.3	1	0.5	1	0.14
2/20/2018 12:05	5.7	12.23	68	6.92	7.42	32	0.48	1.19	0.00
3/20/2018 11:22	8.1	11.7	67.4	5.17	7.35	8	0.49	1.13	0.00
4/10/2018 11:57	9.7	10.75	57.1	20.9	7.21	461	0.42	1.48	0.00
5/15/2018 12:40	15.5	11.02	68.3	3.11	7.51	11	0.14	1.23	0.00
Median	**9.70**	**11.02**	**61.60**	**4.85**	**7.42**	**11**	**0.28**	**1.15**	

Site Name:	WR10				
Site Description:	Halls Ferry Road (Independence)				
Alkalinity (mg/L)	Ammonia (mg/L)	TP (mg/L)	TDS (mg/L)	TS (mg/L)	TSS (mg/L)
29	<0.05	0.035	60	63	2.8
28	<0.05	0.033	56	60	4.4
28	<0.05	0.021	53	56	2.8
25	<0.05	0.031	56	63	6.8
22	<0.05	0.057	54	71	17.2
30	<0.05	0.03	66	70	3.6
25	<0.05	0.046	78	87	8.8
29	<0.05	0.037	60	66	5.6
30	<0.05	0.036	66	71	5.2
24	0.148	0.081	56	82	25.6
26	<0.05	0.025	58	62	4
28	**NA**	**0.035**	**58**	**66**	**5.2**

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 2017/18)

Site ID	Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (#/ 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
GIB1	07/18/2017 11:42	18.3	7.94	101.4	6.28	7.35	81	0.54	0.94								
GIB15	07/18/2017 12:05	18.1	8.55	103	10.3	7.4	816	0.94	0.76								
MIC10	07/18/2017 12:05	18.2	9.85	53.4	5.34	7.66	147	0.29	1.04								
GLE10	08/15/2017 12:55	14.4	8.06	89.7	6.95	7.24	980	0.16	1.2								
CGT1	08/15/2017 13:18	21.8	9.82	258.6	1.62	7.31	83	0.08	2.05								
SHE10	09/19/2017 08:50	12.3	10.42	45.7	10.7	6.7	2420	0.1	1.44								
MIC1	09/19/2017 09:10	12.6	10.32	46.5	7.19	6.58	1733	0.12	1.45								
MRA10	10/17/2017 09:35	10.2	10.43	71.5	4.65	6.88	727	0.37	1.45								
CLA10	10/17/2017 10:26	13.9	9.6	73.8	2.71	6.95	2420	1.3	0.89		<0.0025	<0.0025	<0.0005	<0.0005	0.0051	0.0041	23
PRI1	11/21/2017 09:20	10.2	10.81	81.9	10.1	7.18	238	2.27	1.1		<0.0025	<0.0025	<0.0005	<0.0005	0.0088	0.0058	35
MRA1	11/21/2017 09:55	20.1	10.62	85.1	8.57	7.25	167	2.52	1.16								
CRO1	11/21/2017 10:02	10.1	10.61	54.5	9.03	6.99	248	0.84	1.18								
SHE1	12/19/2017 09:56	8	11.53	84.6	5.26	7.51	135	1.89	1.43								
CRO10	12/19/2017 11:18	8.2	10.63	50.3	6.2	6.85	10	1.17	1.46								
BAT12	12/19/2017 11:50	8.7	10.79	42.8	6.82	6.89	85	1.18	1								
CLA1	01/16/2018 10:07	10.5	10.91	91.8	3.8	7.37	238	1.74	0.93		<0.0025	<0.0025	<0.0005	<0.0005	0.0146	0.0111	28
PRI5	01/16/2018 10:21	9.2	11.23	81.9	5.5	7.39	21	1.53	1.03		<0.0025	<0.0025	<0.0005	<0.0005	0.0172	0.0143	29
BAT1	01/16/2018 10:56	9	10.78	45.6	6.8	6.38	19	1.71	0.86								
GLE1	02/20/2018 10:49	5.9	12.28	88.2	5.98	7.49	36	1.55	0.96								
MIC10	02/20/2018 11:16	4.9	12.74	79.8	6.05	7.41	118	2.11	1.34								
LPW1	02/20/2018 12:12	5.8	14.52	216	12.1	7.63	124	1.76	1.38	14							
GIB1	03/20/2018 10:16	7.1	11.88	76.8	6.53	7.24	37	1.77	0.96								
GIB15	03/20/2018 10:39	7.5	11.6	78	7.27	7.14	31	2.25	0.9								
CGT5	03/20/2018 12:19	8.6	11.65	196.7	21.4	7.69	135	0.86	1.1								
GLE10	04/10/2018 11:30	10.2	10.93	54.2	24.4	7.1	45	1.68	0.64								
CGT1	04/10/2018 12:32	12.5	10.52	181.3	10.9	7.37	1050	1.26	2.28								
MIC1	05/15/2018 09:15	16.4	9.48	63.9	3.84	7.25	161	0.6	1.2								

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

Table 8.
Monthly Instream Data - Willamette River Duplicates (RY 2017/18)

Site ID	Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (#/ 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)
WR1	08/15/2017 13:57	17.9	10.03	59	1.95	7.69	8	0.08	1.22	27	<0.05	0.035	52	57	4.8
WR10	09/19/2017 12:40	15.2	10.38	61.5	3.58	7.37	59	0.12	0.95	29	<0.05	0.019	47	49	2.4
WR5	10/17/2017 09:58	11.7	10.55	60	4.83	6.51	26	0.09	1.1	26	<0.05	0.034	58	63	5.2
WR1	04/10/2018 13:03	10.1	10.68	60	19.9	7.21	517	0.62	1.32	25	0.139	0.083	54	79	24.6
WR10	05/15/2018 12:45	15.5	11	66.5	2.21	7.49	6	0.15	1.08	26	<0.05	0.029	55	59	3.6

Note: Duplicate field measurements and duplicate grab samples are taken at a minimum of 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 Median Values for Continuous Instream Data (RY 2017/18)

Monthly Medians for **Turbidity** at Continuous Instream Sites												
	Jul 2017	Aug 2017	Sep 2017	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018
Station Name	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)
BAT3	9.48	11.64	12.14	NA	9.11	6.85	9.76	6.30	6.42	7.86	5.89	6.84
BAT12	3.92	2.85	3.40	3.53	4.20	2.83	6.21	1.81	2.57	3.73	3.57	3.93
CLK1	2.70	2.50	2.10	NA	NA	NA	5.50	2.47	3.07	3.10	2.24	2.79
CLK12	2.00	3.20	2.40	2.40	3.10	2.60	2.80	1.60	3.60	2.10	NA	3.00
GLE3	7.10	6.00	7.90	7.70	9.40	5.70	NA	7.50	8.40	9.70	6.30	6.30
GLE12	5.30	NA	NA	2.70	5.50	5.50	11.40	8.70	10.70	9.70	7.40	6.20
MIC3	4.32	4.53	4.48	4.41	11.25	8.78	11.86	5.70	6.66	4.66	3.57	3.72
MIC12	5.57	NA	NA	NA	NA	NA	NA	7.98	NA	NA	NA	NA
PRI3	2.72	3.46	3.07	3.51	6.71	3.93	8.72	4.16	5.88	NA	1.55	2.16
PRI12	NA	4.36	NA	9.94	6.15	2.95	NA	3.70	4.26	4.15	3.07	3.02

Monthly Medians for **Specific Conductivity** at Continuous Instream Sites												
	Jul 2017	Aug 2017	Sep 2017	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018
Station Name	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)
BAT3	60.09	64.05	NA	NA	48.71	46.50	46.19	45.69	45.68	44.24	45.69	51.55
BAT12	50.22	59.29	60.48	NA	47.99	47.00	45.06	43.79	43.24	42.90	42.86	46.78
CLK1	94.00	93.00	95.00	NA	NA	NA	92.61	95.62	93.45	94.84	95.19	99.21
CLK12	74.00	74.00	77.00	78.00	77.00	78.00	76.00	76.00	77.00	NA	NA	72.15
GLE3	117.00	123.00	123.00	113.00	96.00	96.00	85.00	87.00	87.00	85.00	98.00	110.00
GLE12	74.00	NA	NA	81.00	66.00	60.00	62.00	58.00	NA	56.00	59.00	72.00
MIC3	55.30	50.36	47.23	67.33	93.44	89.57	85.19	83.30	81.66	78.79	60.81	57.01
MIC12	60.37	NA	NA	93.92	92.81	87.10	85.26	83.92	NA	78.05	63.13	52.88
PRI3	101.66	105.03	99.39	96.99	91.50	96.42	86.43	92.70	91.91	89.79	94.35	97.02
PRI12	NA	63.35	57.63	92.76	87.64	86.23	79.60	83.18	81.48	76.40	74.94	71.05

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.

Table 10.
Monthly Median Values for Continuous Instream Data (RY 2017/18)

Monthly Medians for **Temperature** at Continuous Instream Sites												
	Jul 2017	Aug 2017	Sep 2017	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018
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	18.40	19.41	16.64	NA	10.64	7.64	8.77	7.70	8.56	10.25	13.88	15.70
BAT12	17.10	17.41	14.55	10.70	9.97	7.15	8.37	7.29	8.07	9.80	13.71	15.33
CLK1	17.36	18.52	16.89	13.72	NA	NA	10.18	9.15	9.92	11.56	13.91	15.53
CLK12	15.89	17.15	16.40	14.42	13.20	10.96	11.16	10.35	10.57	11.33	NA	14.54
GLE3	17.06	17.97	15.92	12.50	10.71	7.67	9.08	7.87	8.98	10.95	14.13	15.14
GLE12	15.71	NA	NA	10.94	9.80	7.00	8.35	7.21	7.97	9.76	12.34	13.43
MIC3	20.49	19.97	16.10	12.05	9.84	6.12	7.97	6.96	8.60	10.97	15.29	17.34
MIC12	19.91	19.36	15.28	11.92	9.89	6.37	7.96	7.04	8.41	10.70	14.69	16.67
PRI3	19.65	20.19	17.77	13.27	10.97	7.39	9.07	8.15	9.42	11.67	16.10	17.78
PRI12	19.14	19.21	16.18	12.37	10.50	7.05	8.70	7.78	8.73	10.77	14.93	16.86

Monthly Medians for **pH** at Continuous Instream Sites												
	Jul 2017	Aug 2017	Sep 2017	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018
Station Name	pH (S.U)	pH (S.U)	pH (S.U)	pH (S.U)	pH (S.U)	pH (S.U)	pH (S.U)	pH (S.U)	pH (S.U)	pH (S.U)	pH (S.U)	pH (S.U)
BAT3	6.63	6.58	NA	NA	6.36	6.42	6.50	6.62	6.62	6.53	6.49	6.50
BAT12	NA	7.33	7.34	7.22	6.98	6.96	6.78	7.03	6.99	6.91	7.23	7.37
CLK1	7.09	7.10	7.03	NA	NA	NA	7.22	7.42	7.44	7.39	7.28	7.31
CLK12	6.76	NA	6.93	6.80	6.63	6.69	6.58	6.77	NA	NA	NA	6.95
GLE3	7.55	7.56	7.51	7.06	6.90	6.98	6.85	7.08	7.04	7.02	7.27	7.41
GLE12	7.07	NA	NA	6.74	6.63	6.67	6.58	6.69	6.69	6.78	6.91	7.02
MIC3	7.52	7.51	7.38	7.42	7.19	7.29	7.27	7.38	7.40	7.52	7.38	7.14
MIC12	7.36	7.41	7.38	7.25	6.91	7.09	7.01	7.22	7.28	7.20	7.41	7.37
PRI3	7.38	7.32	7.27	7.11	7.15	7.28	7.15	7.24	7.26	7.28	7.36	7.39
PRI12	7.06	6.99	6.96	6.76	6.50	6.54	6.49	6.60	6.62	6.57	6.68	6.80

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.

Table 10.
Monthly Median Values for Continuous Instream Data (RY 2017/18)

Monthly Medians for **Dissolved Oxygen** at Continuous Instream Sites												
	Jul 2017	Aug 2017	Sep 2017	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018
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	7.82	NA	6.55	NA	9.72	10.65	10.81	11.28	11.02	10.46	9.53	8.43
BAT12	9.15	8.50	9.02	10.64	10.94	11.99	11.56	11.91	11.66	11.21	10.21	9.76
CLK1	9.14	8.82	9.38	NA	NA	NA	10.93	11.32	11.15	10.74	10.03	9.51
CLK12	9.27	9.12	9.57	9.51	9.61	10.21	10.47	NA	10.84	10.21	NA	9.35
GLE3	8.91	8.48	8.77	10.24	10.60	11.85	11.41	11.75	11.40	10.80	9.73	9.24
GLE12	9.39	NA	NA	10.08	10.47	11.65	11.35	11.80	11.58	11.04	10.34	9.97
MIC3	8.43	8.58	9.38	10.84	11.35	12.65	11.72	12.05	11.56	10.82	9.65	9.26
MIC12	8.60	8.75	9.73	NA	10.39	11.99	11.21	11.74	11.35	10.49	9.89	9.48
PRI3	7.95	7.84	8.23	9.71	10.32	11.75	11.23	11.64	11.25	10.51	9.16	8.68
PRI12	8.01	8.05	8.58	8.95	8.98	10.48	10.09	10.60	10.38	9.79	8.94	8.54

Monthly Medians for **Stage** at Continuous Instream Sites												
	Jul 2017	Aug 2017	Sep 2017	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018
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	4.07	4.17	4.24	4.24	5.24	4.74	5.40	4.62	4.77	5.05	4.27	4.18
BAT12	4.27	4.21	4.19	4.32	4.85	4.72	4.93	4.65	4.70	4.82	4.45	4.34
CLK1	3.71	3.73	3.73	4.06	4.33	4.26	4.46	4.28	4.27	4.25	3.89	3.97
CLK12	NA	NA	NA	NA	NA	NA	4.56	4.34	4.42	4.40	3.99	4.01
GLE3	4.09	4.05	4.04	4.20	4.56	4.46	4.62	4.39	4.45	4.47	4.16	4.09
GLE12	NA	NA	NA	0.82	1.01	1.05	1.13	0.99	1.03	1.08	0.90	0.82
LPW1	0.00	0.00	0.00	0.00	1.76	1.67	1.99	1.76	1.97	2.21	1.45	0.00
MIC3	5.40	5.63	5.79	5.46	6.69	6.24	6.74	6.00	6.14	6.34	5.65	5.62
MIC12	7.11	7.11	7.15	7.04	8.20	7.82	8.33	7.64	7.71	7.82	7.25	7.20
PRI3	4.26	4.25	4.25	4.44	4.88	4.65	4.97	4.55	4.69	4.66	4.39	4.35
PRI4	7.34	7.32	7.34	7.52	8.09	7.86	8.19	7.72	7.84	7.85	7.50	7.46
PRI12	4.27	4.24	4.21	4.13	4.57	4.37	4.68	4.36	4.44	4.49	4.32	4.32
SHE3	6.19	6.07	6.08	6.17	6.94	6.65	7.03	6.51	6.55	6.64	6.24	6.20

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.

Table 11.
Instream Storm Monitoring Data (RY 2017/18)

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
10/19/2017 09:25	5172	9.31	7.6	14.28	68.6														
10/19/2017 09:28 - DUP	4611	9.27	7.61	14.33	68.5														
10/20/2017 09:00						30.8	0.0134	0.0031	0.0812	0.024	0.0079	< 0.0005	47	0.075	0.3	0.037	0.283	5.6	108
03/21/2018 12:32	>2420	10.66	6.92	10.1	67.2														
03/21/2018 12:34 - DUP	>2420	10.66	6.92	10.1	66.4														
03/22/2018 12:40						37.2	0.0055	< 0.0025	0.124	0.0809	0.0027	< 0.0005	21	< 0.050	0.83	0.02	0.115	1.9	42

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
10/19/2017 9:49	677	9.19*	7.41	13.51	89.7														
10/20/2017 09:35						40.4	0.0092	< 0.0025	0.0703	0.0202	0.0053	< 0.0005	22	< 0.050	0.26	0.018	0.239	4.1	106
3/21/2018 13:25	1414	11.4	7.38	9.9	81.5														
3/22/2018 13:00						42	0.0043	< 0.0025	0.0547	0.0272	0.0019	< 0.0005	25	< 0.050	0.71	0.011	0.119	1.9	39

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
10/19/2017 10:12	216	8.57	7.3	12.81	103.4														
10/20/2017 10:10						71.2	0.0059	< 0.0025	0.0229	0.0073	0.0017	< 0.0005	34	< 0.050	0.54	0.011	0.231	2.7	66.5
3/21/2018 12:59	66	11.38	6.87	8.7	78.2														
3/22/2018 12:15						50.1	< 0.0025	< 0.0025	0.0213	0.0126	< 0.0005	< 0.0005	27	< 0.050	1.32	0.01	0.066	< 1.00	15.8

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

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

Attachment A. Dry Weather Priority Outfall Screening Inspection Results (RY 2017/2018)

Dry Weather Priority Out Fall Screening Inspection Results - RY 2017/2018

Basin	Primary Outfall	Inspection Location	Asset Type	Date	Time	Flow?	Est. Flow (GPM)	Temp °C Receiving Water	Temp °C	pH S.U.	Sp Cond µS/cm	Turbidity NTU	Total Cl mg/L	Fl mg/L	Detergents mg/L	NH3 mg/L	K mg/L	NA mg/L	E. coli MPN/100 mL	Outfall Notes	Inspection Comments
Clark Creek	D39460252	D39460252	Outfall	9/28/2017	11:40	Yes	10-15	16.8	16.8	7.35	72.1	1.20	0.01						186	Source of Clark Creek. Confirmed as ground water.	Pipeshed inspection for Liberty St portion of line requires coordination with traffic engineering and after hours work.
Clark Creek	D42466417	D42466417	Outfall	9/28/2017	11:20	Yes	10-15	16.1	18.3	7.20	84.3	1.93	0.02						727		Recommend deploying temperature logger and flow sensor next spring to narrow down time of day flow surges begin.
Clark Creek	D42468233	D42468233	Outfall	9/28/2017	09:25	Yes	10-15	15.6	17.1	7.58	155.6	2.33	0.0	0.2		0.13	2.1	10.7	> 2420	*Outfall previously listed as D42468PVT.	High E coli result prompted further investigation including dye testing at highschool and TV inspection. Investigation revealed leaking sewer lateral/s at South Salem High School. Dye test revealed effluent from school traveling subsurface into stormline.
Clark Creek	D42468244	D42468244	Outfall	9/28/2017	11:00	Yes	10-15	16.2	17.7	7.8	113.2	1.9	0.03						201		
East Bank Willamette	42482230	42482230	Outfall	9/26/2017	10:30	No															
East Bank Willamette	D42480205	D42480205	Outfall	9/26/2017	12:41	No															
East Bank Willamette	D42480215	D42480215	Outfall	7/31/2017	14:16	Yes	20-30	22.4	19.8	7.72	80.3	3.1	0.10	0.0							Waiting for leak detection
East Bank Willamette	D42480223	D42480223	Outfall	7/31/2017	13:55	Yes	1-5	22.4	17.1	7.20	302.4	3.7		0.18		0.61	3.364	12.4	5172	10" sewer line above stormline in bad repair. Location near to report of I&I. Dye test performed, but was negative. Sewer main scheduled for slip lining.	Pipeshed performed by TV crew (SR 10000965).
East Bank Willamette	D42480223	D45478209	ManHole	9/26/2017	13:50	Yes	5-10						0.08	0.2		0.76	2.3	11.5	2851		Manhole sampling based on pipeshed investigation.
East Bank Willamette	D42482212	D42482212	Outfall	9/26/2017	11:37	Yes	15-20	15.1	16.0	7.32	61.3	1.1	0.09		0.0	0.04	0.6	11.5	< 10		
East Bank Willamette	D42482213	D42482213	Outfall	2/26/2017	10:50	No															

Basin	Primary Outfall	Inspection Location	Asset Type	Date	Time	Flow?	Est. Flow (GPM)	Temp °C Receiving Water	Temp °C	pH S.U.	Sp Cond µS/cm	Turbidity NTU	Total Cl mg/L	Fl mg/L	Detergents mg/L	NH3 mg/L	K mg/L	NA mg/L	E. coli MPN/100 mL	Outfall Notes	Inspection Comments
East Bank Willamette	D42482223	D42482223	Outfall	9/26/2017	12:45	Yes	10-15	15.1	17.1	7.66	197.0	1.5	0.03	0.20	0.0	0.03	1.5	8.688	2755		Need to identify location of water leak before determining location of any exfiltration from sewer.
East Bank Willamette River	D42476279	D39476238	ManHole	8/24/2017	10:50	No														Outfall is under water in the Willamette. Inspection needs to take place at MH D39476238	
Lower Claggett Creek	D51488203	D51488203	Outfall	9/26/2017	10:30	No															
Lower Claggett Creek	D51488236	D51488236	Outfall	9/26/2017	10:23	No															
Lower Claggett Creek	D54494201	D54494201	Outfall	9/26/2017	09:45	No															Checked 3 upstream manholes from 2 separate lines. All dry.
Mill Creek	D42476203	D42476203	Outfall	8/24/2017	11:50	No															
Mill Creek	D42478237	D42478237	Outfall	7/31/2017	13:13	No	1	21.0	21.7		50.3	14.7	0.77	0.1							Reported to Leak Detection
Mill Creek	D45476207	D45476207	Outfall	8/24/2017	12:00	Yes	100-200	18.2	17.9	7.28	173.0	10.8	0.39								Hydrant flush at Belmont and Cottage (due to main repair at Market & Winter) taking place at time of sample collection.
Mill Creek	D45476217	D45476217	Outfall	8/24/2017	12:45	Yes	1-5	18.5	20.1	7.67	224	5.2	0.04								Smoke test confirmed infiltration of non-city irrigation water through Capitol Mall.
Mill Creek	D51470205	D51470205	Outfall	8/23/2017	10:30	Yes	5-10													Flow not discernable at first 6 manholes. At seventh manhole, which is inaccessible for sampling a splashing can be heard. Review of CCTV footage reveals one potential drinking water leak (Reported to Water Department) and one source of water from nearby	
Mill Creek	D54470205	D54470205	Outfall	8/23/2017	09:50	Yes	< 1		18.5	6.80	94.17	14.2	0.11		0.0	0.08					Irrigation repairs taking place at time of inspection. Flow could be due to leaking sprinkler heads infilitrating to line below.
Pringle Creek	D39456229	D39456229	Outfall	9/28/2017	12:30	Yes	10-15	16.5	16.8	7.21	79.4	0.76	0.0								
Pringle Creek	D42468235	D42468235	Outfall	9/28/2017	09:15	No															

Basin	Primary Outfall	Inspection Location	Asset Type	Date	Time	Flow?	Est. Flow (GPM)	Temp °C Receiving Water	Temp °C	pH S.U.	Sp Cond µS/cm	Turbidity NTU	Total Cl mg/L	Fl mg/L	Detergents mg/L	NH3 mg/L	K mg/L	NA mg/L	E. coli MPN/100 mL	Outfall Notes	Inspection Comments
Pringle Creek	D45464207	D42464206	ManHole	9/28/2017	13:10	Yes	1-5		18.7	7.19	163.6	4.9	0.01								Flowing entering manhole from two directions. Results for each recorded seperately. This inspection is for flow from MH D45464205 to MH D45464206
Pringle Creek	D45464207	D45464206	ManHole	9/28/2017	13:00	Yes	5-10		17.6	7.36	98	4.8								Outfall partially submerged. Inspction performed at first upstream manhole	Flowing entering manhole from two directions. Results for each recorded seperately. This inspection is for flow from MH D45464257 to MH D45464206
Pringle Creek	D45466212	D45466217	ManHole	8/24/2017	14:44	No															Manhole wet. No flow.
Pringle Creek	D48460229	D48460229	Outfall	9/28/2017	10:05	No														Beaver dam backing water up very far into the line.	
Pringle Creek	D48464203	D48464203	Outfall	9/28/2017	11:15	No															First manhole upstream is dry.
Pringle Creek	D48464249	D48464249	Outfall	9/28/2017	11:15	No															Pipe dries out after second manhole.
Shelton Ditch	D45468241	D45468241	Outfall	9/28/2017	13:45	Yes	50-100	16.2	18.3	7.65	144.8	2.4	0.02							Lines leading to outfall from from Mission St connect to ditch at north side of airport. Ditch has water in it year round. Water from outfall is from this perennial source. Lines leading from south are along course small stream that is noted on historica	
Upper Claggett Creek	D51486201	D51486201	Outfall	9/26/2017	10:45	Yes														Outfall and storm main/ditch have backwater.	
Upper Claggett Creek	D51486216	D51486216	Outfall	8/24/2017	13:30	Yes	1-5	16.9	17.2	7.74	83.3	3.2	0.04								
Upper Claggett Creek	D54486217	D54482247	Outfall	8/23/2017	12:00	Yes	30-50	17.7	17.7	8.30	186.2	1.7	0.03							Investigation for D54486217. Daylight of stream at Lansing Park	
Upper Claggett Creek	D54486217	D54486217	Outfall	8/23/2017	11:35	Yes	30-50	18.8	18.8			2.1	0.05							Outfall is really daylighting of piped stream. Multiple water leaks have been repaired upstream.	Source tracked to daylighting at Lansing Park (See results for OF D544822247).
Waln Creek	D36450241	D36450241	Outfall	7/27/2017	10:00	Yes	5-10	14.2	15.5	5.81		0.49	0.0	0.0							

Basin	Primary Outfall	Inspection Location	Asset Type	Date	Time	Flow?	Est. Flow (GPM)	Temp °C Receiving Water	Temp °C	pH S.U.	Sp Cond µS/cm	Turbidity NTU	Total Cl mg/L	Fl mg/L	Detergents mg/L	NH3 mg/L	K mg/L	NA mg/L	E. coli MPN/100 mL	Outfall Notes	Inspection Comments
Willamette Bank	D30470203	D30470203	Outfall	8/24/2017	09:30	Yes	< 1													Outfall becoming dangerous to access. Property owner is piling riprap to extend property. Slope is 20-30 feet and extremely unstable. Recommend removing from list.	Traced water to MH 205. Source of water is small seep. Unable to collect sample due to sediment. Ampule sucks in too much sediment.
Willamette Bank	D36472203	D36474226	ManHole	8/24/2017	10:35	No															Manhole is wet, but has no discernable flow. Need to TV line to confirm moisture due to high E coli results from previous year.
Willamette Slough	D39470220	D39470220	Outfall	7/27/2017	12:15	Yes	50-100		17.6	6.69	74.2	5.17	0.04	0.1	0.0	0.01			41	Difficult access via Minto Brown.	
Willamette Slough	D39470220	D39470236	CleanOut	8/31/2017	11:00	Yes	30-50		19.4	7.85	50.5	2.5	0.43	0.20		< 0.050	0.499	5.140	< 1		Large water leak at private service. Reported to water department.
Willamette Slough	D39478271	D39478271	Outfall	8/24/2017	11:15	Yes	30-50		18.9	6.72	99.4		2.5							Outfall is daylighting of piped stream visible on historical topo maps.	

Attachment B. Analytical Report for Pesticide Screening - Pacific Agricultural Laboratory (March 28, 2018)

Pacific Agricultural Laboratory
21830 S.W. Alexander Ln. • Sherwood, OR 97140 • Ph 503.626.7943 • pacaglab.com

City of Salem
1410 20th St. SE Building 2
Salem, OR 97302

Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Analytical Report

Client Sample ID: Electric
Matrix: water

PAL Sample ID: P180319-01
Sample Date: 3/13/18

Method: Modified EPA 8081B (GC-ECD)

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
3/16/18	3/27/18	a-BHC	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Acetochlor	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Alachlor	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Aldrin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	b-BHC	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Benfluralin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Bifenthrin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Captafol	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Captan	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Chlordane	Not Detected	0.60 ug/L	
3/16/18	3/27/18	Chlorobenzilate	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Chloroneb	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Chlorothalonil	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Chlorpyrifos	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Cyfluthrin	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Cyhalothrin	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Cypermethrin	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Dacthal	Not Detected	0.12 ug/L	
3/16/18	3/27/18	d-BHC	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Deltamethrin	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Dichlobenil	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Dicloran	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Dicofol	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Dieldrin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Dithiopyr	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Endosulfan I	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Endosulfan II	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Endosulfan sulfate	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Endrin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Endrin aldehyde	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Endrin ketone	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Esfenvalerate	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Ethalfluralin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Etridiazole	Not Detected	0.12 ug/L	

Rick Jordan, Laboratory Manager

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Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Analytical Report

Client Sample ID: Electric
Matrix: water

PAL Sample ID: P180319-01
Sample Date: 3/13/18

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
3/16/18	3/27/18	Fenarimol	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Fenvalerate	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Flutolanil	Not Detected	1.2 ug/L	
3/16/18	3/27/18	Folpet	Not Detected	0.12 ug/L	
3/16/18	3/27/18	g-BHC	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Heptachlor	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Heptachlor epoxide	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Hexachlorobenzene	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Iprodione	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Methoxychlor	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Metolachlor	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Mirex	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Norflurazon	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Ovex	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Oxadiazon	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Oxyfluorfen	Not Detected	0.12 ug/L	
3/16/18	3/27/18	p,p'-DDD	Not Detected	0.12 ug/L	
3/16/18	3/27/18	p,p'-DDE	Not Detected	0.12 ug/L	
3/16/18	3/27/18	p,p'-DDT	Not Detected	0.12 ug/L	
3/16/18	3/27/18	PCNB	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Pendimethalin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Permethrin	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Prodiamine	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Pronamide	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Propachlor	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Propanil	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Propiconazole	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Terbacil	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Toxaphene	Not Detected	6.0 ug/L	
3/16/18	3/27/18	Trifloxystrobin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Triflumizole	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Trifluralin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Vinclozalin	Not Detected	0.12 ug/L	

Surrogate Recovery: 96 %
Surrogate Recovery Range: 38-143
(DCBP used as Surrogate)

Rick Jordan, Laboratory Manager

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City of Salem
1410 20th St. SE Building 2
Salem, OR 97302

Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Analytical Report

Client Sample ID: Electric
Matrix: water

PAL Sample ID: P180319-01
Sample Date: 3/13/18

Method: Modified EPA 8141B (GC-FPD)

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
3/16/18	3/22/18	Aspon	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Azinphos-methyl	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Carbofenothion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Chlorfenvinphos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Chlorpyrifos-methyl	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Coumaphos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Demeton	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Diazinon	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Dichlorofenthion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Dichlorvos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Dicrotophos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Dimethoate	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Disulfoton	Not Detected	0.30 ug/L	
3/16/18	3/22/18	EPN	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Ethion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Ethoprop	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Famphur	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Fenamiphos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Fenitrothion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Fensulfothion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Fenthion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Malathion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Merphos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Methidathion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Mevinphos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Monocrotophos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Parathion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Parathion methyl	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Phorate	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Phosmet	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Phosphamidon	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Pirimiphos-methyl	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Ronnel	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Sulprofos	Not Detected	0.30 ug/L	

Rick Jordan, Laboratory Manager

Pacific Agricultural Laboratory
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City of Salem
1410 20th St. SE Building 2
Salem, OR 97302

Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Analytical Report

Client Sample ID: Electric
Matrix: water

PAL Sample ID: P180319-01
Sample Date: 3/13/18

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
3/16/18	3/22/18	Terbufos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Tetrachlorvinphos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Tokuthion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Trichloronate	Not Detected	0.30 ug/L	

Surrogate Recovery: 99 %
Surrogate Recovery Range: 46-157
(TPP-d15 used as Surrogate)

Method: Modified EPA 8151A (GC-MS/MS)

3/19/18	3/26/18	2,4,5-T	Not Detected	0.080 ug/L	
3/19/18	3/26/18	2,4,5-TP	Not Detected	0.080 ug/L	
3/19/18	3/26/18	2,4-D	0.24 ug/L	0.080 ug/L	
3/19/18	3/26/18	2,4-DB	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Acifluorfen	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Bentazon	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Clopyralid	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Dicamba	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Dichlorprop	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Dinoseb	Not Detected	0.080 ug/L	
3/19/18	3/26/18	MCPA	Not Detected	0.080 ug/L	
3/19/18	3/26/18	MCPP	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Picloram	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Quinclorac	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Triclopyr	1.6 ug/L	0.080 ug/L	

Surrogate Recovery: 76 %
Surrogate Recovery Range: 64-139
(DCPAA used as Surrogate)

Method: Modified EPA 8270D (GC-MS/MS)

3/16/18	3/19/18	Ametryn	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Amitraz	Not Detected	0.12 ug/L	
3/16/18	3/19/18	Atrazine	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Bromopropylate	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Cyanazine	Not Detected	0.12 ug/L	
3/16/18	3/19/18	Diclofop-methyl	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Dimethenamid	Not Detected	0.060 ug/L	

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Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Analytical Report

Client Sample ID: Electric
Matrix: water

PAL Sample ID: P180319-01
Sample Date: 3/13/18

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
3/16/18	3/19/18	Diphenylamine	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Ethofumesate	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Fenbuconazole	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Fenoxaprop-ethyl	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Fipronil	Not Detected	0.12 ug/L	
3/16/18	3/19/18	Fluazifop-p-butyl	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Fludioxonil	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Fluroxypyr-meptyl	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Hexazinone	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Mefenoxam	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Metalaxyl	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Metribuzin	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Myclobutanil	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Napropamide	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Pirimicarb	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Prometon	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Prometryn	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Propazine	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Pyridaben	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Simazine	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Simetryn	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Sulfentrazone	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Tebuconazole	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Tebuthiuron	Not Detected	0.12 ug/L	
3/16/18	3/19/18	Triadimefon	Not Detected	0.12 ug/L	

Surrogate Recovery: 96 %
Surrogate Recovery Range: 29-130
(DCBP used as Surrogate)

Method: Modified EPA 8321B (LC-MS/MS)

3/16/18	3/22/18	3-Hydroxycarbofuran	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Aldicarb	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Aldicarb Sulfone	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Aldicarb Sulfoxide	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Azoxystrobin	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Bendiocarb	Not Detected	0.060 ug/L	

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Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Analytical Report

Client Sample ID: Electric
Matrix: water

PAL Sample ID: P180319-01
Sample Date: 3/13/18

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
3/16/18	3/23/18	Bensulide	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Boscalid	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Bromacil	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Carbaryl	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Carbofuran	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Carfentrazone-ethyl	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Clothianidin	Not Detected	0.060 ug/L	
3/16/18	3/22/18	DCPMU	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Diuron	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Fenobucarb	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Fenuron	Not Detected	0.060 ug/L	
3/16/18	3/23/18	Flumioxazin	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Fluometuron	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Imidacloprid	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Isoxaben	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Linuron	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Methiocarb	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Methomyl	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Monuron	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Neburon	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Oxamyl	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Propargite	Not Detected	0.12 ug/L	
3/16/18	3/22/18	Propoxur	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Pyraclostrobin	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Pyrimethanil	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Sethoxydim	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Siduron	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Thiabendazole	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Thiobencarb	Not Detected	0.060 ug/L	

Surrogate Recovery: 100 %
Surrogate Recovery Range: 60-140
(TPP-d15 used as Surrogate)

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Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Analytical Report

Client Sample ID: Hilfiker
Matrix: water

PAL Sample ID: P180319-02
Sample Date: 3/13/18

Method: Modified EPA 8081B (GC-ECD)

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
3/16/18	3/27/18	a-BHC	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Acetochlor	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Alachlor	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Aldrin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	b-BHC	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Benfluralin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Bifenthrin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Captafol	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Captan	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Chlordane	Not Detected	0.60 ug/L	
3/16/18	3/27/18	Chlorobenzilate	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Chloroneb	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Chlorothalonil	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Chlorpyrifos	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Cyfluthrin	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Cyhalothrin	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Cypermethrin	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Dacthal	Not Detected	0.12 ug/L	
3/16/18	3/27/18	d-BHC	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Deltamethrin	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Dichlobenil	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Dicloran	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Dicofol	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Dieldrin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Dithiopyr	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Endosulfan I	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Endosulfan II	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Endosulfan sulfate	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Endrin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Endrin aldehyde	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Endrin ketone	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Esfenvalerate	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Ethalfluralin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Etridiazole	Not Detected	0.12 ug/L	

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Report Date: March 28, 2018
Client Project ID: [none]

Analytical Report

Client Sample ID: Hilfiker
Matrix: water

PAL Sample ID: P180319-02
Sample Date: 3/13/18

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
3/16/18	3/27/18	Fenarimol	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Fenvalerate	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Flutolanil	Not Detected	1.2 ug/L	
3/16/18	3/27/18	Folpet	Not Detected	0.12 ug/L	
3/16/18	3/27/18	g-BHC	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Heptachlor	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Heptachlor epoxide	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Hexachlorobenzene	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Iprodione	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Methoxychlor	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Metolachlor	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Mirex	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Norflurazon	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Ovex	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Oxadiazon	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Oxyfluorfen	Not Detected	0.12 ug/L	
3/16/18	3/27/18	p,p'-DDD	Not Detected	0.12 ug/L	
3/16/18	3/27/18	p,p'-DDE	Not Detected	0.12 ug/L	
3/16/18	3/27/18	p,p'-DDT	Not Detected	0.12 ug/L	
3/16/18	3/27/18	PCNB	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Pendimethalin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Permethrin	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Prodiamine	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Pronamide	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Propachlor	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Propanil	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Propiconazole	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Terbacil	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Toxaphene	Not Detected	6.0 ug/L	
3/16/18	3/27/18	Trifloxystrobin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Triflumizole	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Trifluralin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Vinclozalin	Not Detected	0.12 ug/L	

Surrogate Recovery: 87 %
Surrogate Recovery Range: 38-143
(DCBP used as Surrogate)

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Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Analytical Report

Client Sample ID: Hilfiker
Matrix: water

PAL Sample ID: P180319-02
Sample Date: 3/13/18

Method: Modified EPA 8141B (GC-FPD)

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
3/16/18	3/22/18	Aspon	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Azinphos-methyl	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Carbofenothion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Chlorfenvinphos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Chlorpyrifos-methyl	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Coumaphos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Demeton	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Diazinon	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Dichlorofenthion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Dichlorvos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Dicrotophos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Dimethoate	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Disulfoton	Not Detected	0.30 ug/L	
3/16/18	3/22/18	EPN	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Ethion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Ethoprop	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Famphur	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Fenamiphos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Fenitrothion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Fensulfothion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Fenthion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Malathion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Merphos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Methidathion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Mevinphos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Monocrotophos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Parathion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Parathion methyl	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Phorate	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Phosmet	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Phosphamidon	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Pirimiphos-methyl	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Ronnel	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Sulprofos	Not Detected	0.30 ug/L	

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Matrix: water

PAL Sample ID: P180319-02
Sample Date: 3/13/18

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
3/16/18	3/22/18	Terbufos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Tetrachlorvinphos	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Tokuthion	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Trichloronate	Not Detected	0.30 ug/L	

Surrogate Recovery: 99 %
Surrogate Recovery Range: 46-157
(TPP-d15 used as Surrogate)

Method: Modified EPA 8151A (GC-MS/MS)

3/19/18	3/26/18	2,4,5-T	Not Detected	0.080 ug/L	
3/19/18	3/26/18	2,4,5-TP	Not Detected	0.080 ug/L	
3/19/18	3/26/18	2,4-D	Not Detected	0.080 ug/L	
3/19/18	3/26/18	2,4-DB	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Acifluorfen	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Bentazon	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Clopyralid	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Dicamba	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Dichlorprop	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Dinoseb	Not Detected	0.080 ug/L	
3/19/18	3/26/18	MCPA	Not Detected	0.080 ug/L	
3/19/18	3/26/18	MCPP	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Picloram	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Quinclorac	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Triclopyr	Not Detected	0.080 ug/L	

Surrogate Recovery: 71 %
Surrogate Recovery Range: 64-139
(DCPAA used as Surrogate)

Method: Modified EPA 8270D (GC-MS/MS)

3/16/18	3/19/18	Ametryn	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Amitraz	Not Detected	0.12 ug/L	
3/16/18	3/19/18	Atrazine	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Bromopropylate	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Cyanazine	Not Detected	0.12 ug/L	
3/16/18	3/19/18	Diclofop-methyl	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Dimethenamid	Not Detected	0.060 ug/L	

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Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Analytical Report

Client Sample ID: Hilfiker
Matrix: water

PAL Sample ID: P180319-02
Sample Date: 3/13/18

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
3/16/18	3/19/18	Diphenylamine	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Ethofumesate	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Fenbuconazole	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Fenoxaprop-ethyl	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Fipronil	Not Detected	0.12 ug/L	
3/16/18	3/19/18	Fluazifop-p-butyl	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Fludioxonil	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Fluroxypyr-meptyl	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Hexazinone	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Mefenoxam	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Metalaxyl	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Metribuzin	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Myclobutanil	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Napropamide	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Pirimicarb	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Prometon	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Prometryn	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Propazine	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Pyridaben	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Simazine	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Simetryn	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Sulfentrazone	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Tebuconazole	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Tebuthiuron	Not Detected	0.12 ug/L	
3/16/18	3/19/18	Triadimefon	Not Detected	0.12 ug/L	

Surrogate Recovery: 85 %
Surrogate Recovery Range: 29-130
(DCBP used as Surrogate)

Method: Modified EPA 8321B (LC-MS/MS)

3/16/18	3/22/18	3-Hydroxycarbofuran	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Aldicarb	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Aldicarb Sulfone	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Aldicarb Sulfoxide	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Azoxystrobin	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Bendiocarb	Not Detected	0.060 ug/L	

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Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Analytical Report

Client Sample ID: Hilfiker
Matrix: water

PAL Sample ID: P180319-02
Sample Date: 3/13/18

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
3/16/18	3/23/18	Bensulide	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Boscalid	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Bromacil	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Carbaryl	0.16 ug/L	0.060 ug/L	
3/16/18	3/22/18	Carbofuran	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Carfentrazone-ethyl	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Clothianidin	Not Detected	0.060 ug/L	
3/16/18	3/22/18	DCPMU	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Diuron	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Fenobucarb	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Fenuron	Not Detected	0.060 ug/L	
3/16/18	3/23/18	Flumioxazin	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Fluometuron	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Imidacloprid	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Isoxaben	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Linuron	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Methiocarb	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Methomyl	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Monuron	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Neburon	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Oxamyl	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Propargite	Not Detected	0.12 ug/L	
3/16/18	3/22/18	Propoxur	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Pyraclostrobin	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Pyrimethanil	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Sethoxydim	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Siduron	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Thiabendazole	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Thiobencarb	Not Detected	0.060 ug/L	

Surrogate Recovery: 96 %
Surrogate Recovery Range: 60-140
(TPP-d15 used as Surrogate)

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Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Analytical Report

Client Sample ID: Salem Industrial
Matrix: water

PAL Sample ID: P180319-03
Sample Date: 3/13/18

Method: Modified EPA 8081B (GC-ECD)

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
3/16/18	3/27/18	a-BHC	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Acetochlor	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Alachlor	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Aldrin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	b-BHC	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Benfluralin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Bifenthrin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Captafol	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Captan	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Chlordane	Not Detected	0.60 ug/L	
3/16/18	3/27/18	Chlorobenzilate	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Chloroneb	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Chlorothalonil	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Chlorpyrifos	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Cyfluthrin	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Cyhalothrin	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Cypermethrin	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Dacthal	Not Detected	0.12 ug/L	
3/16/18	3/27/18	d-BHC	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Deltamethrin	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Dichlobenil	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Dicloran	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Dicofol	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Dieldrin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Dithiopyr	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Endosulfan I	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Endosulfan II	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Endosulfan sulfate	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Endrin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Endrin aldehyde	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Endrin ketone	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Esfenvalerate	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Ethalfluralin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Etridiazole	Not Detected	0.12 ug/L	

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Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Analytical Report

Client Sample ID: Salem Industrial
Matrix: water

PAL Sample ID: P180319-03
Sample Date: 3/13/18

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
3/16/18	3/27/18	Fenarimol	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Fenvalerate	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Flutolanil	Not Detected	1.2 ug/L	
3/16/18	3/27/18	Folpet	Not Detected	0.12 ug/L	
3/16/18	3/27/18	g-BHC	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Heptachlor	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Heptachlor epoxide	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Hexachlorobenzene	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Iprodione	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Methoxychlor	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Metolachlor	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Mirex	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Norflurazon	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Ovex	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Oxadiazon	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Oxyfluorfen	Not Detected	0.12 ug/L	
3/16/18	3/27/18	p,p'-DDD	Not Detected	0.12 ug/L	
3/16/18	3/27/18	p,p'-DDE	Not Detected	0.12 ug/L	
3/16/18	3/27/18	p,p'-DDT	Not Detected	0.12 ug/L	
3/16/18	3/27/18	PCNB	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Pendimethalin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Permethrin	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Prodiamine	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Pronamide	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Propachlor	Not Detected	0.30 ug/L	
3/16/18	3/27/18	Propanil	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Propiconazole	0.88 ug/L	0.30 ug/L	
3/16/18	3/27/18	Terbacil	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Toxaphene	Not Detected	6.0 ug/L	
3/16/18	3/27/18	Trifloxystrobin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Triflumizole	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Trifluralin	Not Detected	0.12 ug/L	
3/16/18	3/27/18	Vinclozalin	Not Detected	0.12 ug/L	

Surrogate Recovery: 88 %
Surrogate Recovery Range: 38-143
(DCBP used as Surrogate)

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Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Analytical Report

Client Sample ID: Salem Industrial
Matrix: water

PAL Sample ID: P180319-03
Sample Date: 3/13/18

Method: Modified EPA 8141B (GC-FPD)

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
3/16/18	3/26/18	Aspon	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Azinphos-methyl	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Carbofenothion	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Chlorfenvinphos	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Chlorpyrifos-methyl	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Coumaphos	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Demeton	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Diazinon	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Dichlorofenthion	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Dichlorvos	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Dicrotophos	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Dimethoate	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Disulfoton	Not Detected	0.30 ug/L	
3/16/18	3/26/18	EPN	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Ethion	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Ethoprop	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Famphur	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Fenamiphos	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Fenitrothion	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Fensulfothion	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Fenthion	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Malathion	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Merphos	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Methidathion	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Mevinphos	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Monocrotophos	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Parathion	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Parathion methyl	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Phorate	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Phosmet	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Phosphamidon	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Pirimiphos-methyl	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Ronnel	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Sulprofos	Not Detected	0.30 ug/L	

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Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Analytical Report

Client Sample ID: Salem Industrial
Matrix: water

PAL Sample ID: P180319-03
Sample Date: 3/13/18

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
3/16/18	3/26/18	Terbufos	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Tetrachlorvinphos	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Tokuthion	Not Detected	0.30 ug/L	
3/16/18	3/26/18	Trichloronate	Not Detected	0.30 ug/L	

Surrogate Recovery: 83 %
Surrogate Recovery Range: 46-157
(TPP-d15 used as Surrogate)

Method: Modified EPA 8151A (GC-MS/MS)

3/19/18	3/26/18	2,4,5-T	Not Detected	0.080 ug/L	
3/19/18	3/26/18	2,4,5-TP	Not Detected	0.080 ug/L	
3/19/18	3/26/18	2,4-D	Not Detected	0.080 ug/L	
3/19/18	3/26/18	2,4-DB	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Acifluorfen	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Bentazon	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Clopyralid	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Dicamba	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Dichlorprop	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Dinoseb	Not Detected	0.080 ug/L	
3/19/18	3/26/18	MCPA	Not Detected	0.080 ug/L	
3/19/18	3/26/18	MCPP	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Picloram	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Quinclorac	Not Detected	0.080 ug/L	
3/19/18	3/26/18	Triclopyr	Not Detected	0.080 ug/L	

Surrogate Recovery: 84 %
Surrogate Recovery Range: 64-139
(DCPAA used as Surrogate)

Method: Modified EPA 8270D (GC-MS/MS)

3/16/18	3/19/18	Ametryn	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Amitraz	Not Detected	0.12 ug/L	
3/16/18	3/19/18	Atrazine	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Bromopropylate	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Cyanazine	Not Detected	0.12 ug/L	
3/16/18	3/19/18	Diclofop-methyl	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Dimethenamid	Not Detected	0.060 ug/L	

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Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Analytical Report

Client Sample ID: Salem Industrial
Matrix: water

PAL Sample ID: P180319-03
Sample Date: 3/13/18

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
3/16/18	3/19/18	Diphenylamine	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Ethofumesate	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Fenbuconazole	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Fenoxaprop-ethyl	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Fipronil	Not Detected	0.12 ug/L	
3/16/18	3/19/18	Fluazifop-p-butyl	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Fludioxonil	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Fluroxypyr-meptyl	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Hexazinone	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Mefenoxam	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Metalaxyl	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Metribuzin	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Myclobutanil	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Napropamide	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Pirimicarb	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Prometon	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Prometryn	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Propazine	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Pyridaben	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Simazine	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Simetryn	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Sulfentrazone	Not Detected	0.060 ug/L	
3/16/18	3/19/18	Tebuconazole	0.080 ug/L	0.060 ug/L	
3/16/18	3/19/18	Tebuthiuron	Not Detected	0.12 ug/L	
3/16/18	3/19/18	Triadimefon	Not Detected	0.12 ug/L	

Surrogate Recovery: 88 %
Surrogate Recovery Range: 29-130
(DCBP used as Surrogate)

Method: Modified EPA 8321B (LC-MS/MS)

3/16/18	3/22/18	3-Hydroxycarbofuran	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Aldicarb	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Aldicarb Sulfone	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Aldicarb Sulfoxide	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Azoxystrobin	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Bendiocarb	Not Detected	0.060 ug/L	

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Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Analytical Report

Client Sample ID: Salem Industrial
Matrix: water

PAL Sample ID: P180319-03
Sample Date: 3/13/18

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
3/16/18	3/23/18	Bensulide	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Boscalid	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Bromacil	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Carbaryl	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Carbofuran	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Carfentrazone-ethyl	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Clothianidin	Not Detected	0.060 ug/L	
3/16/18	3/22/18	DCPMU	0.12 ug/L	0.060 ug/L	
3/16/18	3/22/18	Diuron	1.7 ug/L	0.060 ug/L	
3/16/18	3/22/18	Fenobucarb	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Fenuron	Not Detected	0.060 ug/L	
3/16/18	3/23/18	Flumioxazin	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Fluometuron	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Imidacloprid	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Isoxaben	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Linuron	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Methiocarb	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Methomyl	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Monuron	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Neburon	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Oxamyl	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Propargite	Not Detected	0.12 ug/L	
3/16/18	3/22/18	Propoxur	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Pyraclostrobin	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Pyrimethanil	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Sethoxydim	Not Detected	0.30 ug/L	
3/16/18	3/22/18	Siduron	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Thiabendazole	Not Detected	0.060 ug/L	
3/16/18	3/22/18	Thiobencarb	Not Detected	0.060 ug/L	

Surrogate Recovery: 106 %
Surrogate Recovery Range: 60-140
(TPP-d15 used as Surrogate)

Rick Jordan, Laboratory Manager

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City of Salem
1410 20th St. SE Building 2
Salem, OR 97302

Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Quality Assurance

Method Blank Data **Matrix:** water

Extraction Date	Analysis Date	Batch QC Sample #	Analyte	% Recovery	Expected % Recovery	Notes
3/16/18	3/22/18	8031601-BLK1	3-Hydroxycarbofuran	Not Detected	< 0.060 ug/L	
3/16/18	3/27/18	8031601-BLK1	a-BHC	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Acetochlor	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	Alachlor	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Aldicarb	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Aldicarb Sulfone	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Aldicarb Sulfoxide	Not Detected	< 0.060 ug/L	
3/16/18	3/27/18	8031601-BLK1	Aldrin	Not Detected	< 0.12 ug/L	
3/16/18	3/19/18	8031601-BLK1	Ametryn	Not Detected	< 0.060 ug/L	
3/16/18	3/19/18	8031601-BLK1	Amitraz	Not Detected	< 0.12 ug/L	
3/16/18	3/22/18	8031601-BLK1	Aspon	Not Detected	< 0.30 ug/L	
3/16/18	3/19/18	8031601-BLK1	Atrazine	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Azinphos-methyl	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Azoxystrobin	Not Detected	< 0.060 ug/L	
3/16/18	3/27/18	8031601-BLK1	b-BHC	Not Detected	< 0.12 ug/L	
3/16/18	3/22/18	8031601-BLK1	Bendiocarb	Not Detected	< 0.060 ug/L	
3/16/18	3/27/18	8031601-BLK1	Benfluralin	Not Detected	< 0.12 ug/L	
3/16/18	3/23/18	8031601-BLK1	Bensulide	Not Detected	< 0.060 ug/L	
3/16/18	3/27/18	8031601-BLK1	Bifenthrin	Not Detected	< 0.12 ug/L	
3/16/18	3/22/18	8031601-BLK1	Boscalid	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Bromacil	Not Detected	< 0.060 ug/L	
3/16/18	3/19/18	8031601-BLK1	Bromopropylate	Not Detected	< 0.060 ug/L	
3/16/18	3/27/18	8031601-BLK1	Captafol	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Captan	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Carbaryl	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Carbofenothion	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Carbofuran	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Carfentrazone-ethyl	Not Detected	< 0.060 ug/L	
3/16/18	3/27/18	8031601-BLK1	Chlordane	Not Detected	< 0.60 ug/L	
3/16/18	3/22/18	8031601-BLK1	Chlorfenvinphos	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	Chlorobenzilate	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	Chloroneb	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	Chlorothalonil	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Chlorpyrifos	Not Detected	< 0.12 ug/L	
3/16/18	3/22/18	8031601-BLK1	Chlorpyrifos-methyl	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Clothianidin	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Coumaphos	Not Detected	< 0.30 ug/L	
3/16/18	3/19/18	8031601-BLK1	Cyanazine	Not Detected	< 0.12 ug/L	

Rick Jordan, Laboratory Manager

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City of Salem
1410 20th St. SE Building 2
Salem, OR 97302

Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Method Blank Data **Matrix:** water

Extraction Date	Analysis Date	Batch QC Sample #	Analyte	% Recovery	Expected % Recovery	Notes
3/16/18	3/27/18	8031601-BLK1	Cyfluthrin	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	Cyhalothrin	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	Cypermethrin	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	Dacthal	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	d-BHC	Not Detected	< 0.12 ug/L	
3/16/18	3/22/18	8031601-BLK1	DCPMU	Not Detected	< 0.060 ug/L	
3/16/18	3/27/18	8031601-BLK1	Deltamethrin	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Demeton	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Diazinon	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	Dichlobenil	Not Detected	< 0.12 ug/L	
3/16/18	3/22/18	8031601-BLK1	Dichlorofenthion	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Dichlorvos	Not Detected	< 0.30 ug/L	
3/16/18	3/19/18	8031601-BLK1	Diclofop-methyl	Not Detected	< 0.060 ug/L	
3/16/18	3/27/18	8031601-BLK1	Dicloran	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Dicofol	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Dicrotophos	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	Dieldrin	Not Detected	< 0.12 ug/L	
3/16/18	3/19/18	8031601-BLK1	Dimethenamid	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Dimethoate	Not Detected	< 0.30 ug/L	
3/16/18	3/19/18	8031601-BLK1	Diphenylamine	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Disulfoton	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	Dithiopyr	Not Detected	< 0.12 ug/L	
3/16/18	3/22/18	8031601-BLK1	Diuron	Not Detected	< 0.060 ug/L	
3/16/18	3/27/18	8031601-BLK1	Endosulfan I	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Endosulfan II	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Endosulfan sulfate	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Endrin	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Endrin aldehyde	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Endrin ketone	Not Detected	< 0.12 ug/L	
3/16/18	3/22/18	8031601-BLK1	EPN	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	Esfenvalerate	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Ethalfluralin	Not Detected	< 0.12 ug/L	
3/16/18	3/22/18	8031601-BLK1	Ethion	Not Detected	< 0.30 ug/L	
3/16/18	3/19/18	8031601-BLK1	Ethofumesate	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Ethoprop	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	Etridiazole	Not Detected	< 0.12 ug/L	
3/16/18	3/22/18	8031601-BLK1	Famphur	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Fenamiphos	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	Fenarimol	Not Detected	< 0.12 ug/L	
3/16/18	3/19/18	8031601-BLK1	Fenbuconazole	Not Detected	< 0.060 ug/L	

Rick Jordan, Laboratory Manager

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City of Salem
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Salem, OR 97302

Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Method Blank Data **Matrix:** water

Extraction Date	Analysis Date	Batch QC Sample #	Analyte	% Recovery	Expected % Recovery	Notes
3/16/18	3/22/18	8031601-BLK1	Fenitrothion	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Fenobucarb	Not Detected	< 0.060 ug/L	
3/16/18	3/19/18	8031601-BLK1	Fenoxaprop-ethyl	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Fensulfothion	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Fenthion	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Fenuron	Not Detected	< 0.060 ug/L	
3/16/18	3/27/18	8031601-BLK1	Fenvalerate	Not Detected	< 0.12 ug/L	
3/16/18	3/19/18	8031601-BLK1	Fipronil	Not Detected	< 0.12 ug/L	
3/16/18	3/19/18	8031601-BLK1	Fluazifop-p-butyl	Not Detected	< 0.060 ug/L	
3/16/18	3/19/18	8031601-BLK1	Fludioxonil	Not Detected	< 0.060 ug/L	
3/16/18	3/23/18	8031601-BLK1	Flumioxazin	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Fluometuron	Not Detected	< 0.060 ug/L	
3/16/18	3/19/18	8031601-BLK1	Fluroxypyr-meptyl	Not Detected	< 0.060 ug/L	
3/16/18	3/27/18	8031601-BLK1	Flutolanil	Not Detected	< 1.2 ug/L	
3/16/18	3/27/18	8031601-BLK1	Folpet	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	g-BHC	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Heptachlor	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Heptachlor epoxide	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Hexachlorobenzene	Not Detected	< 0.12 ug/L	
3/16/18	3/19/18	8031601-BLK1	Hexazinone	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Imidacloprid	Not Detected	< 0.060 ug/L	
3/16/18	3/27/18	8031601-BLK1	Iprodione	Not Detected	< 0.12 ug/L	
3/16/18	3/22/18	8031601-BLK1	Isoxaben	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Linuron	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Malathion	Not Detected	< 0.30 ug/L	
3/16/18	3/19/18	8031601-BLK1	Mefenoxam	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Merphos	Not Detected	< 0.30 ug/L	
3/16/18	3/19/18	8031601-BLK1	Metalaxyl	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Methidathion	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Methiocarb	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Methomyl	Not Detected	< 0.060 ug/L	
3/16/18	3/27/18	8031601-BLK1	Methoxychlor	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Metolachlor	Not Detected	< 0.30 ug/L	
3/16/18	3/19/18	8031601-BLK1	Metribuzin	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Mevinphos	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	Mirex	Not Detected	< 0.12 ug/L	
3/16/18	3/22/18	8031601-BLK1	Monocrotophos	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Monuron	Not Detected	< 0.060 ug/L	
3/16/18	3/19/18	8031601-BLK1	Myclobutanil	Not Detected	< 0.060 ug/L	
3/16/18	3/19/18	8031601-BLK1	Napropamide	Not Detected	< 0.060 ug/L	

Rick Jordan, Laboratory Manager

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Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Method Blank Data **Matrix:** water

Extraction Date	Analysis Date	Batch QC Sample #	Analyte	% Recovery	Expected % Recovery	Notes
3/16/18	3/22/18	8031601-BLK1	Neburon	Not Detected	< 0.060 ug/L	
3/16/18	3/27/18	8031601-BLK1	Norflurazon	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Ovex	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Oxadiazon	Not Detected	< 0.12 ug/L	
3/16/18	3/22/18	8031601-BLK1	Oxamyl	Not Detected	< 0.060 ug/L	
3/16/18	3/27/18	8031601-BLK1	Oxyfluorfen	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	p,p'-DDD	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	p,p'-DDE	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	p,p'-DDT	Not Detected	< 0.12 ug/L	
3/16/18	3/22/18	8031601-BLK1	Parathion	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Parathion methyl	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	PCNB	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Pendimethalin	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Permethrin	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Phorate	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Phosmet	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Phosphamidon	Not Detected	< 0.30 ug/L	
3/16/18	3/19/18	8031601-BLK1	Pirimicarb	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Pirimiphos-methyl	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	Prodiamine	Not Detected	< 0.12 ug/L	
3/16/18	3/19/18	8031601-BLK1	Prometon	Not Detected	< 0.060 ug/L	
3/16/18	3/19/18	8031601-BLK1	Prometryn	Not Detected	< 0.060 ug/L	
3/16/18	3/27/18	8031601-BLK1	Pronamide	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Propachlor	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	Propanil	Not Detected	< 0.12 ug/L	
3/16/18	3/22/18	8031601-BLK1	Propargite	Not Detected	< 0.12 ug/L	
3/16/18	3/19/18	8031601-BLK1	Propazine	Not Detected	< 0.060 ug/L	
3/16/18	3/27/18	8031601-BLK1	Propiconazole	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Propoxur	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Pyraclostrobin	Not Detected	< 0.060 ug/L	
3/16/18	3/19/18	8031601-BLK1	Pyridaben	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Pyrimethanil	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Ronnel	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Sethoxydim	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Siduron	Not Detected	< 0.060 ug/L	
3/16/18	3/19/18	8031601-BLK1	Simazine	Not Detected	< 0.060 ug/L	
3/16/18	3/19/18	8031601-BLK1	Simetryn	Not Detected	< 0.060 ug/L	
3/16/18	3/19/18	8031601-BLK1	Sulfentrazone	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Sulprofos	Not Detected	< 0.30 ug/L	
3/16/18	3/19/18	8031601-BLK1	Tebuconazole	Not Detected	< 0.060 ug/L	

Rick Jordan, Laboratory Manager

City of Salem
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Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Method Blank Data **Matrix:** water

Extraction Date	Analysis Date	Batch QC Sample #	Analyte	% Recovery	Expected % Recovery	Notes
3/16/18	3/19/18	8031601-BLK1	Tebuthiuron	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Terbacil	Not Detected	< 0.12 ug/L	
3/16/18	3/22/18	8031601-BLK1	Terbufos	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Tetrachlorvinphos	Not Detected	< 0.30 ug/L	
3/16/18	3/22/18	8031601-BLK1	Thiabendazole	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Thiobencarb	Not Detected	< 0.060 ug/L	
3/16/18	3/22/18	8031601-BLK1	Tokuthion	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	Toxaphene	Not Detected	< 6.0 ug/L	
3/16/18	3/19/18	8031601-BLK1	Triadimefon	Not Detected	< 0.12 ug/L	
3/16/18	3/22/18	8031601-BLK1	Trichloronate	Not Detected	< 0.30 ug/L	
3/16/18	3/27/18	8031601-BLK1	Trifloxystrobin	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Triflumizole	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Trifluralin	Not Detected	< 0.12 ug/L	
3/16/18	3/27/18	8031601-BLK1	Vinclozalin	Not Detected	< 0.12 ug/L	

Method Blank Data **Matrix:** water

Extraction Date	Analysis Date	Batch QC Sample #	Analyte	% Recovery	Expected % Recovery	Notes
3/19/18	3/26/18	8031904-BLK1	2,4,5-T	Not Detected	< 0.080 ug/L	
3/19/18	3/26/18	8031904-BLK1	2,4,5-TP	Not Detected	< 0.080 ug/L	
3/19/18	3/26/18	8031904-BLK1	2,4-D	Not Detected	< 0.080 ug/L	
3/19/18	3/26/18	8031904-BLK1	2,4-DB	Not Detected	< 0.080 ug/L	
3/19/18	3/26/18	8031904-BLK1	Acifluorfen	Not Detected	< 0.080 ug/L	
3/19/18	3/26/18	8031904-BLK1	Bentazon	Not Detected	< 0.080 ug/L	
3/19/18	3/26/18	8031904-BLK1	Clopyralid	Not Detected	< 0.080 ug/L	
3/19/18	3/26/18	8031904-BLK1	Dicamba	Not Detected	< 0.080 ug/L	
3/19/18	3/26/18	8031904-BLK1	Dichlorprop	Not Detected	< 0.080 ug/L	
3/19/18	3/26/18	8031904-BLK1	Dinoseb	Not Detected	< 0.080 ug/L	
3/19/18	3/26/18	8031904-BLK1	MCPA	Not Detected	< 0.080 ug/L	
3/19/18	3/26/18	8031904-BLK1	MCPP	Not Detected	< 0.080 ug/L	
3/19/18	3/26/18	8031904-BLK1	Picloram	Not Detected	< 0.080 ug/L	
3/19/18	3/26/18	8031904-BLK1	Quinclorac	Not Detected	< 0.080 ug/L	
3/19/18	3/26/18	8031904-BLK1	Triclopyr	Not Detected	< 0.080 ug/L	

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Report Number: P180319
Report Date: March 28, 2018
Client Project ID: [none]

Blank Spike Data **Matrix:** water

Extraction Date	Analysis Date	Batch QC Sample #	Analyte	% Recovery	Expected % Recovery	Notes
3/16/18	3/19/18	8031601-BS1	Atrazine	82	79-125	
3/16/18	3/19/18	8031601-BSD1	Atrazine	84	79-125	
3/16/18	3/27/18	8031601-BS1	Chlorpyrifos	99	74-142	
3/16/18	3/27/18	8031601-BSD1	Chlorpyrifos	98	74-142	
3/16/18	3/22/18	8031601-BS1	Diazinon	92	66-124	
3/16/18	3/22/18	8031601-BSD1	Diazinon	87	66-124	
3/16/18	3/27/18	8031601-BS1	Dieldrin	105	53-131	
3/16/18	3/27/18	8031601-BSD1	Dieldrin	101	53-131	
3/16/18	3/22/18	8031601-BS1	Diuron	90	76-104	
3/16/18	3/22/18	8031601-BSD1	Diuron	97	76-104	
3/16/18	3/19/18	8031601-BS1	Ethofumesate	97	73-129	
3/16/18	3/19/18	8031601-BSD1	Ethofumesate	94	73-129	
3/16/18	3/22/18	8031601-BS1	Fluometuron	93	58-109	
3/16/18	3/22/18	8031601-BSD1	Fluometuron	93	58-109	
3/16/18	3/22/18	8031601-BS1	Imidacloprid	76	61-128	
3/16/18	3/22/18	8031601-BSD1	Imidacloprid	70	61-128	
3/16/18	3/19/18	8031601-BS1	Napropamide	100	64-112	
3/16/18	3/19/18	8031601-BSD1	Napropamide	98	64-112	
3/16/18	3/27/18	8031601-BS1	Oxadiazon	105	78-121	
3/16/18	3/27/18	8031601-BSD1	Oxadiazon	102	78-121	
3/16/18	3/22/18	8031601-BS1	Parathion methyl	89	72-128	
3/16/18	3/22/18	8031601-BSD1	Parathion methyl	86	72-128	
3/16/18	3/22/18	8031601-BS1	Thiobencarb	67	66-115	
3/16/18	3/22/18	8031601-BSD1	Thiobencarb	73	66-115	

Blank Spike Data **Matrix:** water

Extraction Date	Analysis Date	Batch QC Sample #	Analyte	% Recovery	Expected % Recovery	Notes
3/19/18	3/26/18	8031904-BS1	2,4-D	66	22-136	
3/19/18	3/26/18	8031904-BSD1	2,4-D	66	22-136	
3/19/18	3/26/18	8031904-BS1	Dicamba	82	67-127	
3/19/18	3/26/18	8031904-BSD1	Dicamba	86	67-127	
3/19/18	3/26/18	8031904-BS1	Triclopyr	78	48-138	
3/19/18	3/26/18	8031904-BSD1	Triclopyr	77	48-138	

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Analyte Information

Method: Modified EPA 8081B (GC-ECD)
Method: Modified EPA 8141B (GC-FPD)
Method: Modified EPA 8151A (GC-MS/MS)
Chlorinated acids were converted to free acids. Residues were quantitated as free acids.
Method: Modified EPA 8270D (GC-MS/MS)
Method: Modified EPA 8321B (LC-MS/MS)

Rick Jordan, Laboratory Manager

Attachment C. Results of Benthic Macroinvertebrate Sampling, Fish Sampling, and Physical Habitat Data - Pacific Habitat Services (October 24, 2017)

Results of
Benthic Macroinvertebrate Sampling, Fish Sampling, and Physical Habitat Data Collection for
Pringle Creek, Clark Creek, Battle Creek, and Waln Creek
in Salem, Oregon

Prepared for

City of Salem
Attn: Anita Panko
Public Works Department
555 Liberty Street SE
Salem, Oregon 97301

Prepared by

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PHS Project Number: 5244

October 24, 2017

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1.0 INTRODUCTION

This report describes the results of the benthic macroinvertebrate sampling, fish sampling, and physical habitat characterization conducted in May and June 2017 on reaches of Clark Creek, East Fork Pringle Creek, Pringle Creek, Battle Creek, and Waln Creek. Benthic macroinvertebrate sampling was conducted on May 8, 2017; fish sampling was conducted on June 29, 2017; and physical habitat characterization was conducted on various dates in May and June 2017. Benthic macroinvertebrates, fish and physical habitat parameters were collected along the same reaches and using the same methodology as in previous sampling conducted in 2011, 2012, and 2013. This memorandum provides the data from the 2017 sampling effort.

2.0 STUDY AREA AND SUMMARY OF PREVIOUS SAMPLING EFFORTS

In Fall 2011, PHS collected data on benthic macroinvertebrate communities, fish presence, and physical habitat characteristics on two reaches of Battle Creek and two reaches of Waln Creek to provide baseline information for assessing the success of the Waln Creek stream restoration activities. These data were collected on four sample reaches, as described below:

- Lower Waln Creek: Waln Creek, immediately upstream of its confluence with Battle Creek;
- Upper Waln Creek: Waln Creek, upstream of SE Wiltsey Road;
- Lower Battle Creek: Battle Creek, upstream from the culvert located near the eastern edge of the former Battle Creek Golf Course and downstream of the Waln Creek/Battle Creek confluence;
- Upper Battle Creek: Battle Creek, upstream of the Waln Creek/Battle Creek confluence and in the vicinity of previous City of Salem sampling efforts.

In the 2011, the Lower Waln Creek Reach consisted the reach of Waln Creek that was to be relocated to the east of its original location. This reach was sampled in order to provide baseline data against which data from the relocated stream channel could be compared. The Lower Waln Creek Reach sampled in 2017 consisted of the relocated stream channel, immediately upstream from Waln Creek's confluence with Battle Creek in subsequent sampling years.

The Upper Waln Creek reach is located approximately 1000 feet upstream of the Lower Waln Creek reach, upstream of Wiltsey Road. Data was collected along this portion of Waln Creek to document potential stream changes resulting from inputs occurring upstream of the project area. Between SE Madras Street and Wiltsey Road.

The Lower Battle Creek reach is located immediately downstream of the confluence of Waln Creek and Battle Creek. After it is relocated, Waln Creek will flow into Battle Creek near the upstream end of Lower Battle Creek. Data collected in this stream was collected to document changes that might occur in Battle Creek following the Waln Creek restoration project.

The Upper Battle Creek reach is located approximately 183 feet upstream of the confluence of Waln Creek and Battle Creek but still within the former Battle Creek Golf Course. Data was collected along this portion of Battle Creek to document potential stream changes resulting from

inputs to Battle Creek occurring upstream of the project area. The City has benthic macroinvertebrate data from pervious sampling efforts near the location of Upper Battle Creek. The data from this previous sampling effort may be used in conjunction with data collected during this study to evaluate pre-project conditions in Battle Creek.

In May and June 2013, PHS collected data on benthic macroinvertebrate communities, fish presence, and physical habitat characteristics at three sample reaches within the City of Salem. These reaches are the same reaches sampled by PHS in May and June 2012, and are in close proximity to a previous macroinvertebrate sampling effort that was conducted during 2000 and 2001 (Pringle Creek Watershed Bioassessment Project). General locations of each of the sampling reaches are as follows:

- East Fork Pringle Creek where the stream enters the City (2000/2001 sampling site PR00-15),
- Pringle Creek below the confluence with Clark Creek and upstream of confluence with Shelton Ditch (2000/2001 sampling site PR00-02), and
- Clark Creek in Gilmore Field (2000/2001 sampling site PR00-24).

The East Fork Pringle Creek sampling reach is located downstream (north) of Trelstad Avenue SE, near the Salem city limits. The upstream end of the reach begins just north of the riprap apron of the culverts that carry the stream under Trelstad Avenue and extends for 150 meters downstream. In this area, East Fork Pringle Creek has been channelized and straightened with a berm of discharged dredge material along the bank. A short concrete sluice is present near the downstream end of the reach. The substrate of the stream is generally dominated by fine gravel and smaller sediments.

The Pringle Creek sampling reach is located within Bush's Pasture Park, approximately 10 meters downstream of the confluence of Clark Creek and Pringle Creek, and extends for 292.5 meters downstream. Within this reach, Pringle Creek is gently meandering. The stream banks are generally low and gently to moderately sloped, though vertical and undercut, eroding banks are present in some areas. A vertical concrete wall is present along the right bank near the upstream limits of the sampling reach, where private residences occur in close proximity to the stream. Substrates within the channel are generally dominated by cobbles and coarse gravel.

The Clark Creek sampling reach is located within Gilmore Field, just south of Hoyt Street SE. The downstream end of the project reach begins upstream of the detention structure south of Hoyt Street SE and continues upstream for 150 meters along the west side of Gilmore Field. In general, the stream banks are steep and the stream channel is incised. Substrates within the channel are generally dominated by silt and fine gravel, with areas of exposed clay hardpan.

3.0 METHODOLOGY

As recommended in the "Technical Memorandum for the City of Salem's MS4 Permit Requirements for Benthic Macroinvertebrate Sampling and Hydromodification Assessment", dated March 21, 2011, PHS followed the Oregon Department of Environmental Quality's *Water Monitoring and Assessment Mode of Operations Manual* (*MOMs*) (June 2010) transect sampling

approach for collecting benthic macroinvertebrate samples and the methodologies found in the Environmental Protection Agency's *Environmental Monitoring and Assessment Program - Surface Waters: Western Pilot Study Field Operations Manual for Wadeable Streams* (EMAP-SW) for collecting physical habitat data within the project area. Both protocols require the collection of data at evenly spaced transects within the sampling reach. Therefore, prior to the initiation of sampling and data collection, PHS established permanent transects within each of the three sampling reaches.

Both the MOMs and EMAP-SW protocols specify that the length of the sampling reach is forty times the average wetted width of the channel or a minimum of 150 meters long, when the average wetted width is less than four meters. Because the average wetted widths of East Fork Pringle and Clark Creeks are less than four meters, PHS determined that the reach length for each of the reaches on these streams is 150 meters. PHS measured the wetted width of Pringle Creek at five representative locations and determined that the average wetted width is approximately 7.31 meters and the total reach length is 292.5 meters.

3.1 Benthic Macroinvertebrate Sampling

Benthic macroinvertebrates were sampled using a transect sampling approach, as described in the Oregon Department of Environmental Quality's *Water Monitoring and Assessment Mode of Operations Manual* (*MOMs*) (June 2010).

One kick-net sample was collected at each of the eleven transects on the reach beginning at Transect A, which is located at the downstream end of the reach. The Transect A sample was collected from the middle of the left one-third of the stream; the Transect B sample was collected from the middle of the center one-third of the stream; and the Transect C sample was collected from the middle of the right one-third. For transect D, the sample was collected from the left one-third, and the cycle was repeated for all 11 transects. Samples were not collected from the stream margins.

At each sampling location, a D-frame kick net with 500 µm mesh net was placed in the stream with the flat part of the hoop resting on the streambed and perpendicular to the stream flow. Substrate preventing the flat part of the kicknet from sitting flush with the bottom was removed, when necessary.

Macroinvertebrate samples were collected from a one-square-foot sample area immediately upstream of the net. Before disturbing the substrate, this area was inspected for large macroinvertebrates such as mussels, and any such organisms were picked by hand and placed directly into the sieve. Within the sample area, all substrate particles larger than approximately five centimeters were carefully rubbed by hand in front of the net to dislodge any clinging macroinvertebrates. After rubbing, the substrate materials were placed outside of the sample plot. After all large substrate materials within the sample area were scrubbed by hand and removed from the sample area, the remaining substrate in the sample area was disturbed with the hands or feet for one minute. When samples were collected in slow-moving water where the water current was not strong enough to carry any dislodged organisms into the net, the net was pulled through the water as the substrate is disturbed to capture suspended organisms. After the sample was collected and the net removed from the stream, large substrate was returned to the sample area. Following collection of each sample, the contents of the net were placed in a 500µm mesh sieve, and the

procedure was repeated at each transect, working from downstream (Transect A) to upstream (Transect K). The samples from each transect were composited into the sieve.

After the samples from all transects on the reach were completed and transferred to the sieve, large organic material and rocks were rinsed, carefully inspected for clinging macroinvertebrates, and removed. Fine sediment was washed away to the extent possible. The composite sample was placed in a jar labeled with the date and reach name and preserved with 95% denatured ethanol for transport to the lab for sorting and subsampling. A label with site information written in pencil on Rite in the Rain paper was placed inside the container. After all samples were collected, they were delivered to Aquatic Biology Associates, Inc. in Corvallis for sorting, subsampling, and data analysis.

3.2 Fish Sampling

An Oregon Scientific Take Permit (STP) must be obtained from the Oregon Department of Fish and Wildlife (ODFW) to conduct fish sampling within the State. Prior to conducting the fish sampling within the project area, PHS completed the online permit application (https://apps.nmfs.noaa.gov/) and obtained the necessary Oregon STP from ODFW. Due to the potential presence of salmonid species listed under the Endangered Species Act in the mainstem Pringle Creek reach, a permit from the National Marine Fisheries Service (NMFS) must also be obtained. Correspondence with NMFS personnel in 2012 indicated that such a permit would be difficult to obtain, and PHS did not pursue the permit from the NMFS. Therefore, fish sampling was not conducted on the mainstem Pringle Creek reach. Fish sampling was conducted on all other sampling reaches.

PHS conducted the fish sampling on June 29, 2017. Starting at the downstream end of the sampling reach and working upstream along the reach, fish sampling was conducted using a Smith-Root backpack electrofishing unit. A second person followed the operator of the electrofishing unit with a dip net to retrieve stunned fish. All retrieved fish were transferred to a five-gallon bucket equipped with an aerator for later processing. Following completion of electrofishing at the upstream end of the sampling reach, all captured fish were identified and counted before being returned to the stream.

Following completion of the fish sampling, PHS completed the follow-up reporting required by the Oregon STP.

3.3 Physical Habitat Characterization

The EMAP-SW protocol was used to collect physical habitat data for the three stream reaches. The habitat characterization portion of the EMAP-SW protocol includes five components: thalweg profile; woody debris tally; channel and riparian characterization; assessment of channel constraint, debris torrents, and major floods; and discharge. While the characterization of all of these components is not especially useful for a hydromodification assessment, collection of certain data prescribed by the protocol may be useful. The following additional data, as described by the EMAP-SW habitat characterization protocol, were collected for future hydromodification analysis:

- Water Depth - The water depth is determined along the thalweg profile at low flow for 10 uniformly spaced intervals between transects.
- Wetted Width - The wetted width is determined at the 11 transects also used for macroinvertebrate sampling and at the mid-points of the intervals between those transects for a total of 21 measurements. In addition, the stream substrate is assessed at each of these transects at 5 points: left and right edge of water, midpoint of channel, and the two points midway between center of channel and water's edge. The substrate at these 5 points is characterized by size as boulders (> 250 mm), cobbles (>64 to 250 mm), coarse gravel (>16 to 64 mm), fine gravel (>2 to 16 mm), sand (>0.06 to 2 mm), and fines (<2 mm). Indications of burial around substrate particles at each of the substrate locations within a radius of 5 cm are used to assess the embeddedness as a fraction of the sediment particles surrounded by sand or finer particles.
- Channel Morphology - The channel morphology is measured at the 11 transects also used for macroinvertebrate assays. The bank angles from the edge of water to the top of the stream bank are recorded. The distance of bank overhang (if occurring) is measured from the edge of water to the vertical projection of the edge of bank. The vertical distance from the water surface to the lowest floodplain terrace is recorded for each transect as well as the vertical distance to the bankfull elevation. The bankfull width is also recorded at each transect.

In addition to the information described above, PHS collected data related to riparian habitat condition. The methodologies used to collect the physical habitat data within the sampling reaches are described below. More detailed descriptions of the methodologies can be found in the EMAP-SW document.

Thalweg Profile

Beginning at the downstream end of the reach, measurement stations were established at intervals between transects. As recommended by the EMAP-SW protocol procedures for streams with a wetted width less than 2.5 meters wide. Stations were numbered "0" through "14" at one-meter intervals beginning at the downstream end of the first transect (Transect "A") and measuring upstream to the next transect. The wetted width of the stream was measured to the nearest 0.1 m at stations "0" and "7". At station 7 the substrate particle size at the tip of the depth measuring rod was classified at the left wetted margin and at positions 25%, 50%, 75%, and 100% of the distance across the wetted width of the stream. Because the average wetted width of Pringle Creek is greater than 2.5 meters, stations numbered "0" through "9" were spaced at 2.9-meter intervals (one-tenth the distance between transects), as recommended by the EMAP-SW protocol procedures. The wetted width of the stream was measured at stations 0 and 5, and the substrate particle size was measured at station 5.

The procedure for determining substrate particle size at the mid-way station is identical to the substrate size evaluation procedure described for regular channel cross-sections A through K, except that for these mid-way supplemental cross-sections, substrate size is entered on the Thalweg Profile side of the field form.

At each thalweg profile station, a meter ruler was used to locate the deepest point (the "thalweg"), and the thalweg depth was measured to the nearest cm. The depth was read on the

side of the ruler to avoid inaccuracies due to the wave formed by the rod in moving water. At the point where the thalweg depth was measured, the presence or absence of “soft/small sediment” (defined as fine gravel, sand, silt, clay or muck readily apparent by "feeling" the bottom with the staff) was noted.

The channel unit code and pool forming element codes for the station were determined and recorded on the field data form using the standard codes provided on the form. According to the EMAP-SW protocol, the unit should be at least as long as the channel is wide to be recorded. The same measurements were recorded for all stations upstream to the next transect and for all stations to the upstream end of the sampling reach (Transect “K”).

Large Woody Debris Tally

Large woody debris (LWD), defined by this methodology as woody material with a small end diameter of at least 10 cm and a length of at least 1.5 m, within the reach was tallied while working upstream to collect the thalweg profile data. All pieces of LWD that were at least partially in the baseflow channel, the "active channel" (flood channel up to bankfull stage), or spanning above the active channel were included in the tally. LWD in the active channel was tallied over the entire length of the reach, including the area between the channel cross-section transects. The procedure for tallying LWD is presented in more detail in Table 7-5 of the EMAP-SW methodology.

All pieces of LWD within the segment that are at least partially within the bankfull channel were tallied by class based on the diameter of the large end (0.1 m to < 0.3 m, 0.3 m to <0.6 m, 0.6 m to <0.8 m, or >0.8 m, and the class based on the length of the piece (1.5m to <5.0m, 5m to <15m, or >15m). A tally mark was placed in the appropriate box in the “Pieces All/Part In Bankfull Channel” section of the Thalweg Profile and Woody Debris Form.

All pieces of LWD within the segment that are not actually within the bankfull channel, but are at least partially spanning (bridging) the bankfull channel were tallied by class based on the diameter of the large end (0.1 m to < 0.3 m, 0.3 m to <0.6 m, 0.6 m to <0.8 m, or >0.8 m), and the length of the piece (1.5 m to <5.0 m, 5 m to <15 m, or >15 m). For each piece observed, a tally mark was placed in the appropriate box in the “Pieces Bridge Above Bankfull Channel” section of the Thalweg Profile and Woody Debris Form.

After all pieces within the segment were tallied and marked on the form, the total number of pieces for each class were written in the small box at the lower right-hand corner of each tally box.

Substrate Size/Channel Dimensions

The wetted channel width was divided into four equal segments to locate substrate measurement points on the cross-section. The distances corresponding to 0% (Left), 25% (LCtr), 50% (Ctr), 75% (RCtr), and 100% (Right) of the measured wetted width were recorded in the “DistLB” fields of the form. The distance recorded for the right bank was the same as the wetted channel width. At each measurement point on the cross section, (Left, LCtr, Ctr, RCtr, Right), the depth of the water was recorded. Because the left and right measurement points were at the limits of the wetted width of the stream, the water depth at these points was recorded as “0”.

Substrate size and embeddedness were evaluated at each of the 11 cross-section transects. A substrate particle was picked up at each measuring point (unless the substrate was bedrock or consolidated hardpan material), and the size of the particle was visually estimated, according to the table on the Channel/Riparian Cross-section Form. The substrate embeddedness was also evaluated according to the guidelines on the form and in the EMAP-SW protocol and the value was recorded on the data form. By definition, sand and fine-grained sediments were considered 100 percent embedded; bedrock and hardpan were considered 0 percent embedded.

Bank Characteristics

Bank angle and bank undercut distance were determined on the left and right banks at each cross section transect. To measure bank angle, the surveyor's rod was laid against the bank, with one end at the water's edge. A clinometer was placed on the rod, and the bank angle in degrees was read from the external scale on the clinometer. The angle was recorded in the field for the left bank in the "Bank Measurement" section of the Channel/ Riparian Cross-section Form. If the bank was undercut, the horizontal distance of the undercutting (defined as the distance from the water's edge out to the point where a vertical plumb line from the bank would hit the water's surface) was measured to the nearest 0.01 m, and the distance was recorded on the field data form.

The incised height of the stream was measured by holding the surveyor's rod vertically, with its base at the water's edge. Using the surveyor's rod as a guide while examining both banks, the channel incision as the height up from the water surface to elevation of the first terrace of the valley floodplain was visually estimated, and the value was recorded in the "Incised Height" field of the bank measurement section on the field data form.

At each transect, both banks were examined to estimate and record the height of bankfull flow above the thalweg elevation. The EMAP-SW protocol calls for bankfull height to be measured relative to the water surface elevation at the time of sampling; however, recording bankfull height relative to the thalweg elevation allows for comparison from year to year without the need to account for differing flow conditions. Potential bankfull indicators looked for included the following:

- An obvious slope break that differentiates the channel from a relatively flat floodplain terrace higher than the channel;
- A transition from exposed stream sediments to terrestrial vegetation;
- Moss growth on the banks;
- Presence of drift material caught on overhanging vegetation; and/or
- Transition from flood- and scour-tolerant vegetation to that which is relatively intolerant of these conditions.

The procedure for obtaining bank and channel dimension measurements is presented in more detail in Table 7-8 of the EMAP-SW protocol.

Canopy Cover

Canopy cover over the stream was determined at each of the 11 cross-section transects using a Convex Spherical Densiometer taped as shown in the procedures outlined in the EMAP-SW protocol. The EMAP-SW protocol recommends obtaining six measurements at each cross-section transect (four measurements in four directions at mid-channel and one at each bank). The mid-channel measurements are used to estimate canopy cover over the channel. The two bank measurements complement your visual estimates of vegetation structure and cover within the riparian zone itself, and are particularly important in wide streams, where riparian canopy may not be detected by the densiometer when standing midstream. Because the stream channels within the project area are relatively narrow, only the four mid-channel measurements were collected for this project.

Facing upstream at mid-channel at each cross-section transect and with the densitometer held level at 0.3 m (1 ft.) above the surface of the stream the number of grid intersection points covered by either a tree, a leaf, or a high branch were counted. The value (0 to 17) was recorded in the "CenUp" field of the canopy cover measurement section of the Channel/Riparian Cross-section and Thalweg Profile Form. Canopy cover values were then determined for the left bank, downstream, and right bank and recorded in the appropriate spaces of the field data form.

Riparian Vegetation Structure

Riparian vegetation observations were made for a distance of 5 meters upstream and downstream of each of the 11 cross-section transects. The riparian vegetation observations were made for the visible area from the stream back a distance of 10m (30 ft.) shoreward from both the left and right banks, creating a 10 m × 10 m riparian plot on each side of the stream. The riparian plot dimensions were estimated and not measured.

Standing mid-channel at a cross-section transect, a 5-meter distance upstream and downstream was estimated for the purpose of assessing riparian vegetation cover. For one bank and then the other, a distance of 10 meters back into the riparian vegetation was estimated. Within this 10 m × 10 m area, the riparian vegetation was conceptually divided into three layers: a CANOPY LAYER (>5m high), an UNDERSTORY (0.5 to 5 m high), and a GROUND COVER layer (<0.5 m high), and the dominant vegetation type for the CANOPY LAYER (vegetation > 5 m high) was determined to be either Deciduous, Coniferous, broadleaf Evergreen, Mixed, or None.

The areal cover class of large trees (> 0.3 m [1 ft.] diameter at breast height [DBH]) and small trees (< 0.3 m DBH) within the canopy layer was determined separately, and the appropriate cover class was recorded on the field data form ("0"=absent: zero cover, "1"=sparse: <10%, "2"=moderate: 10-40%, "3"=heavy: 40-75%, or "4"=very heavy: >75%). Next, the dominant vegetation type for the understory layer was determined as described above for the canopy layer. The areal cover class for woody shrubs and saplings was determined separately from non-woody vegetation within the understory. Similarly, the areal cover class for woody shrubs and seedlings, non-woody vegetation, and the amount of bare ground present in the ground cover layer was determined as described above.

In stream Fish Cover, Algae, and Aquatic Macrophysics

The areal cover of all of the fish cover and other listed features that are in the water and on the banks 5 meters upstream and downstream of the cross-section were recorded in the "Fish Cover/Other" section of the Channel /Riparian Cross-section Form.

Standing mid-channel at a cross-section transect, a 5-meter distance upstream and downstream (10 m total length) was estimated for the purpose of evaluating fish cover. The water and the banks within the 10-m segment of stream were examined for the following features and types of fish cover:

- filamentous algae - long streaming algae that often occur in slow moving waters;
- aquatic saprophytes - are water-loving plants, including mosses, in the stream that could provide cover for fish or macroinvertebrates;
- large woody debris – the larger pieces of wood that can influence cover and stream morphology (i.e., those pieces that would be included in the large woody debris tally);
- brush and small woody debris – smaller wood pieces that primarily affect cover but not morphology;
- in-channel live trees or roots - living trees that are within the channel -- estimate the areal cover provided by the parts of these trees or roots that are inundated;
- overhanging vegetation - includes tree branches, brush, twigs, or other small debris that is not in the water but is close to the stream (within 1 m of the surface) and provides potential cover;
- undercut banks;
- boulders - typically basketball- to car-sized particles; and
- artificial structures - include those designed for fish habitat enhancement, as well as in-channel structures discarded (e.g., cars or tires) or purposefully placed for diversion, impoundment, channel stabilization, or other purposes.

For each cover type, the areal cover was estimated as follows and recorded in the "FISH COVER/OTHER" section of the Channel/Riparian Cross-section Form. According to the EMAP-SW protocol the cover classes of in stream fish cover features were estimated as follows:

"0"=absent: zero cover,
"1"=sparse: <10%,
"2"=moderate: 10-40%,
"3"=heavy: 40-75%, or
"4"=very heavy: >75%.

Human Influence

For the left and right banks at each of the 11 detailed Channel and Riparian Cross-Sections, the presence/absence and the proximity of 11 categories of human influences were evaluated.

Standing mid-channel at each cross-section transect, a 5-meter distance was estimated upstream and downstream (10 m total length), and a distance of 10 meters back into the riparian zone from

each bank was estimated to define a riparian plot area. The channel, bank and riparian plot area adjacent to the defined stream segment were examined for the following human influences:

(1) walls, dikes, revetments, riprap, and dams;
(2) buildings;
(3) pavement/cleared lot (e.g., paved, graveled, dirt parking lot, foundation);
(4) roads or railroads,
(5) inlet or outlet pipes;
(6) landfills or trash (e.g., cans, bottles, trash heaps);
(7) parks or maintained lawns;
(8) row crops;
(9) pastures, rangeland, hay fields, or evidence of livestock;
(10) logging; and
(11) mining (including gravel mining).

For each type of influence, its presence or absence and its proximity to the stream and riparian plot area was determined. The human disturbance items were considered to be present if they were visible from the cross-section transect. For each type of influence, the appropriate proximity class was recorded in the "Human Influence" part of the "Visual Riparian Estimates" section of the Channel/Riparian Cross-section Form. The proximity classes are defined by the EMAP-SW protocol as follows:

B ("Bank") - Present within the defined 10 m stream segment and located in the stream or on the stream bank.
C ("Close") - Present within the 10 × 10 m riparian plot area, but away from the bank.
P ("Present") - Present, but outside the riparian plot area.
O ("Absent") - Not present within or adjacent to the 10 m stream segment or the riparian plot area at the transect

A particular influence may be observed outside of more than one riparian observation plot (e.g., at both transects "D" and "E"). In such situations, the influence was recorded as present at every transect from which it was observed without having to site through another transect or its 10 m × 10 m riparian plot.

Riparian "Legacy" Trees and Invasive Alien Plants

One tree was identified as a "legacy" tree at each transect, and at transect K, the legacy tree was identified as the largest tree within 4 channel widths upstream of the transect location. For each legacy tree, which was defined as the largest tree within sight of the transect, the following information was recorded:

- type of tree, and, the taxonomic group, as defined on the field data form and Table 7-13 of the EMAP-SW protocol;
- estimated height,
- diameter at breast height (dbh), and
- distance from the wetted margin of the stream.

At each transect, the presence of listed invasive plant species within the 10 m x 10 m riparian plots on either bank was recorded on the Riparian "Legacy" Trees and Invasive Alien Plants field form. In accordance with the EMAP-SW protocol, only the presence of plants which are targets in the state (as identified in the EMAP-SW protocol) were recorded, even though other invasive species may be present.

4.0 RESULTS AND DISCUSSION

4.1 Benthic Macroinvertebrate Sampling

Benthic macroinvertebrate sampling was originally conducted on May 8, 2017. Initial processing by Aquatic Biology Associates, Inc (ABA) showed that very few specimens were collected during the sampling effort – likely a result of the heavy rains and high stream flows in the weeks prior to sampling. Because of the low number of organisms collected, the initial samples were not analyzed. PHS re-sampled all of the stream reaches on June 5, 2017, after stream flows had receded, and the benthic macroinvertebrate samples were processed by ABA. Data and results from ABA's analysis are provided in Appendix B. A summary of the results of the analysis are present in the following sections.

4.1.1 Benthic Index of Biological Integrity

Each sample was scored according to the Benthic Index of Biological Integrity (BIBI), modified from Karr 1998, which is a quantitative method for determining and comparing the biological condition of streams. The BIBI scoring system is composed of the 10 metrics:

- Total number of taxa;
- Number of Ephemeroptera taxa;
- Number of Plecoptera taxa;
- Number of Trichoptera taxa;
- Number of long-lived taxa;
- Number of intolerant taxa;
- Percent tolerant taxa;
- Percent predators;

- Number of clinger taxa; and
- Percent dominant taxa.

Each individual metric is given a score of 1 through 5, with higher numbers given to conditions representative of streams unaltered by anthropogenic influence and exhibiting higher biological integrity. These metrics are then added together for the single, integrated overall BIBI score.

The results of the BIBI scoring for each of the sample reaches are summarized in Tables 1 and 2 and in the text below. The descriptions of metrics that follow are summarized from The Puget Sound Stream Benthos website (www.pugetsoundstreambenthos.org).

Table 1. Benthic Invertebrate Index of Biological Integrity – BIBI (modified Karr 1998) for Clark Creek, East Fork Pringle Creek and Pringle Creek

Metric	Clark Creek		East Fork Pringle Creek (PC1)		Pringle Creek (PC2)	
	Value	Score[a]	Value	Score[a]	Value	Score[a]
Total Number of Taxa[b]	34	3	39	3	38	3
Number of Ephemeroptera Taxa[b]	1	1	3	1	1	1
Number of Plecoptera Taxa[b]	0	1	0	1	0	1
Number of Trichoptera Taxa[b]	2	1	3	1	3	1
Number of Long-lived Taxa[b]	3	3	5	5	5	5
Number of Intolerant Taxa[b]	0	1	0	1	0	1
Percent Tolerant Taxa[c]	27	3	62	1	59	1
Percent Predators[b]	11	3	4.9	1	5.2	1
Number of Clinger Taxa[b]	11	3	13	3	14	3
Percent Dominance (3 Taxa)[c]	32	5	57	3	52	3
Total BIBI Score[d]:	**n/a**	24	**n/a**	**20**	**n/a**	**20**
Biological Condition:	**Low**		**Low**		**Low**	

Notes:
a. Each metric scored: 1 = Low; 3 = Moderate; 5 = High
b. Metric value generally decreases with declining biological integrity
c. Metric value general increases with declining biological integrity
d. Key to Total BIBI Scores:
BIBI scores 0 – 24 = Low biological integrity
BIBI scores 25 – 39 = Moderate biological integrity
BIBI scores 39 – 50 = High biological integrity

Table 2. Benthic Invertebrate Index of Biological Integrity – BIBI (modified Karr 1998) for Battle Creek and Waln Creek

Metric	Lower Battle Creek		Upper Battle Creek		Lower Waln Creek		Upper Waln Creek	
	Value	Score[a]	Value	Score[a]	Value	Score[a]	Value	Score[a]
Total Number of Taxa[b]	47	5	50	5	26	3	30	3
Number of Ephemeroptera Taxa[b]	4	1	3	1	1	1	2	1
Number of Plecoptera Taxa[b]	0	1	1	1	0	1	0	1
Number of Trichoptera Taxa[b]	2	1	2	1	0	1	1	1
Number of Long-lived Taxa[b]	3	3	5	5	2	1	4	3
Number of Intolerant Taxa[b]	2	1	0	1	0	1	0	1
Percent Tolerant Taxa[c]	18	5	32	3	18	5	23	3
Percent Predators[b]	5.3	1	8.4	1	3.7	1	7.7	1
Number of Clinger Taxa[b]	13	3	13	3	9	1	11	3
Percent Dominance (3 Taxa)[c]	51	3	49	5	57	3	60	3
Total BIBI Score[d]:	**n/a**	**24**	**n/a**	**26**	**n/a**	**18**	**n/a**	**20**
Biological Condition:	**Low**		**Low**		**Low**		**Moderate**	

Notes:
a. Each metric scored: 1 = Low; 3 = Moderate; 5 = High
b. Metric value generally decreases with declining biological integrity
c. Metric value general increases with declining biological integrity
d. Key to Total BIBI Scores:
BIBI scores 0 – 24 = Low biological integrity
BIBI scores 25 – 39 = Moderate biological integrity
BIBI scores 39 – 50 = High biological integrity

Total Number of Taxa

The total number of taxa, or total taxa richness, is the total number of unique taxa identified within the sample. All types of invertebrates (mayflies, caddisflies, stoneflies, true flies, midges, clams, snails, and worms) collected from the sampling reach are included in this metric. The biodiversity of a stream declines as flow regimes are altered, habitat is lost, chemicals are introduced, energy cycles are disrupted, and alien taxa invade. The moderate scores given for total number of taxa in most of the sampling reaches indicates some level of disturbance within the assessment reaches.

Number of Ephemeroptera Taxa

The number of Ephemeroptera taxa, or Ephemeroptera taxa richness, is the total number of unique mayfly (Family Ephemeroptera) taxa identified within the sample. Typically, the

diversity of mayflies declines in response to most types of human influence. The low numbers of mayfly taxa recorded in the sample reaches are indicative of disturbed systems.

Number of Plecoptera Taxa

The number of Plecoptera taxa, or Plecoptera taxa richness, is the total number of unique stonefly (Family Plecoptera) taxa identified within the sample. In general, stoneflies are among the most sensitive benthic macroinvertebrates, and they are among the first macroinvertebrates to disappear from a stream as human disturbance increases. Many stoneflies are predators that stalk their prey and hide around and between rocks, and these hiding places are lost as sediment washes into a stream and the stream substrates become embedded. Like salmonids, most stoneflies require cool, well-oxygenated water, and increased stream temperatures adversely affect the stream's ability to support stoneflies. Stonefly larvae were recorded in only one sampling reach – Upper Battle Creek. The absence or low number of stonefly taxa recorded within the sampling reaches is indicative of disturbed systems.

Number of Trichoptera Taxa

The number of Trichoptera taxa, or Trichoptera taxa richness, is the total number of unique caddisfly (Family Trichoptera) taxa identified within the sample. Caddisflies are a diverse family of insect. Various caddisfly taxa feed in a variety of ways: some spin nets to trap food, others collect or scrape food from the tops of exposed rocks. Many caddisflies build gravel or wood cases to protect them from predators, and others are predators themselves. Although caddisflies are a diverse family, taxa richness of caddisflies declines steadily as the variety and complexity of stream habitats decline. The low numbers of caddisfly taxa recorded within all of the sampling reaches are indicative of disturbed systems.

Number of Long-Lived Taxa

The number of long-lived taxa is the total number of unique taxa that require more than one year to complete their life cycles. Because of their longer life cycles, these taxa are exposed to cumulatively more stream disturbances than taxa with shorter life cycles. If the stream is dry part of the year or subject to flooding, taxa with longer life cycles may disappear from the stream. Loss of long-lived taxa from a system may indicate an on-going problem that repeatedly interrupts their life cycles. The East Fork Pringle Creek, Pringle Creek, and Upper Battle Creek sampling reaches received high scores for the long-lived taxa metric. The moderate to low scores given for total number of long-lived taxa in the remaining sampling reaches indicate some level of disturbance within the assessment reaches.

Number of Intolerant Taxa

The number of intolerant taxa is the total number of unique taxa that are intolerant of stream pollution. Chironomids are not included in this metric. Benthic macroinvertebrates identified as intolerant are the most sensitive taxa and represent approximately five to ten percent of the taxa present in the region. These taxa are the first to disappear as stream degradation increases. The low scores for the number of intolerant taxa in each of the sampling reaches indicate disturbance within the assessment reaches.

Percent Tolerant Taxa

The percent tolerant taxa is the total number of individuals belonging to taxa tolerant to stream degradation, divided by the total number of individuals within the sample, multiplied by 100. Chironomids are not included in this metric. Tolerant taxa are present within most streams, but as disturbance increases, tolerant taxa represent an increasingly large percentage of the total macroinvertebrate community. The low scores for the percent tolerant taxa in the East Fork Pringle Creek and Pringle Creek sampling reaches suggest better water quality conditions compared to the other sampling reaches, which received moderate to high scores for this metric.

Percent Predators

The percent predators metric is the total number of predator individuals identified within the sample, divided by the total number of individuals within the sample, multiplied by 100. Predator taxa represent the peak of the food web and depend on a reliable source of other invertebrates that they can eat. The percentage of animals that are obligate predators provides a measure of the trophic complexity supported by a site. Less disturbed sites generally support a greater diversity of prey items and, therefore, a larger diversity of predators to feed on them. The low to moderate scores for percent predators in each of the sampling reaches indicates some level of disturbance within the assessment reaches.

Number of Clinger Taxa

This metric is the total number of unique clinger taxa within the sample. “Clingers” have physical adaptations that allow them to hold onto smooth substrates in fast water. These macroinvertebrates typically occupy the open areas between rocks and cobbles along the bottom of the stream; thus, they are particularly sensitive to fine sediments that fill these spaces and eliminate the variety and complexity of these small habitats. Sediment also prevents clingers from accessing the hyporheic zone of the stream bed. The moderate to low numbers of clinger taxa recorded within the assessment reaches are indicative of disturbed systems.

Percent Dominance

Percent dominance is the sum of the individuals of the three most abundant taxa in the sample, divided by the total number of individuals in the sample, multiplied by 100. In general, as diversity declines, a fewer number of taxa make up a larger percentage of the total macroinvertebrate community. In contrast to most other metrics examined, the scores for percent dominance within all of the sample reaches were within the “moderate” or “high” categories.

Total BIBI Score

Scores for all ten metrics are added together to arrive at a total BIBI score. The stream’s total BIBI score is a measure of the stream’s biological condition. Because there are ten metrics and each metric is scored 1 to 5, the total BIBI score can range from 10 to 50. A score closer to 50 indicates a high biotic condition similar to that found in a “natural” reference stream, which in the Willamette Valley Region is a relatively undisturbed Pacific Northwest montane stream. A score closer to 10 indicates a severely degraded stream with poor biological integrity. Total BIBI scores for the project area sampling reaches ranged from 18 to 26. Only the Upper Battle Creek sampling reach received a score in the moderate BIBI score range.

4.1.2 Other Stream Assessment Metrics

ABA provided scores for thirteen other metrics that may be useful in assessing the biological integrity of the project area streams. Values and biological integrity scores for each of these metrics are provided in Tables 3 and 4. For the first six metrics listed in Table 2 (total abundance, EPT taxa richness, predator richness, scraper richness, shredder richness, and percent intolerant taxa), the metric value generally decreases as biological integrity decreases. For the project-area sampling reaches, these metrics generally scored low overall, indicating low biological integrity for project area streams.

For the last seven metrics listed in Tables 3 and 4 (percent *Baetis tricaudatus*, percent collector, percent parasite, percent Oligochaeta, number of tolerant taxa, percent Simuliidae, and percent Chironomidae), the metric value generally increases as biological integrity decreases. Though scores for these metrics were variable for the project-area sampling reaches, approximately half of the scores were in the moderate to high range, indicating impaired biological integrity for project-area streams.

Table 3. Other Community Composition Metrics that are Indicative of Biological Condition – Clark Creek, East Fork Pringle Creek, and Pringle Creek

Metric	Clark Creek		East Fork Pringle Creek (PC1)		Pringle Creek (PC2)	
	Value	Score[a]	Value	Score[a]	Value	Score[a]
Total Abundance[b]	1592	-	1064	-	1464	-
EPT Taxa Richness[b]	3	L	6	L	4	L
Predator Richness[b]	4	L	8	L	5	L
Scraper Richness[b]	4	L	2	L	4	L
Shredder Richness[b]	2	L	2	L	2	L
Percent Intolerant Taxa[b]	3.2	L	0	L	0.5	L
Percent *Baetis tricaudatus*[c]	3.8	H	4.3	H	14.8	M
Percent Collector[c]	68	L	39	M	46	M
Percent Parasite[c]	0.3	H	2.3	H	0.5	H
Percent Oligochaeta[c]	8.4	L	5.3	M	7.3	L
Number of Tolerant taxa[c]	12	L	15	L	16	L
Percent Simuliidae[c]	1.2	H	3.8	H	2.3	H
Percent Chironomidae	51	L	17	M	27	L

Notes:
a. Low (L), moderate (M), and high (H) scores compared with a Pacific Northwest montane stream with high biological integrity.
b. Metric value generally decreases with declining biological integrity
c. Metric value generally increases with declining biological integrity

Table 4. Other Community Composition Metrics that are Indicative of Biological Condition – Battle Creek and Waln Creek

Metric	Lower Battle Creek		Upper Battle Creek		Lower Waln Creek		Upper Waln Creek	
	Value	Score[a]	Value	Score[a]	Value	Score[a]	Value	Score[a]
Total Abundance[b]	569	-	462	-	2370	-	1523	-
EPT Taxa Richness[b]	6	L	6	L	1	L	3	L
Predator Richness[b]	6	L	9	L	6	L	6	L
Scraper Richness[b]	3	L	3	L	2	L	4	L
Shredder Richness[b]	3	L	3	L	0	L	2	L
Percent Intolerant Taxa[b]	6.8	M	2.2	L	2	L	17.3	H
Percent *Baetis tricaudatus*[c]	3.2	H	2.4	H	0.4	H	0.7	H
Percent Collector[c]	66	L	38	M	93	L	63	L
Percent Parasite[c]	2.6	H	4.1	M	0	H	0.3	H
Percent Oligochaeta[c]	2.1	H	3.3	M	2.2	H	6.3	L
Number of Tolerant taxa[c]	16	L	15	L	10	L	9	M
Percent Simuliidae[c]	1.7	H	3.7	H	0.5	H	1	H
Percent Chironomidae	78	L	56	L	81	L	84	L

Notes:
a. Low (L), moderate (M), and high (H) scores compared with a Pacific Northwest montane stream with high biological integrity.
b. Metric value generally decreases with declining biological integrity
c. Metric value generally increases with declining biological integrity

4.2 Fish Sampling

Table 5 summarizes the results of the fish sampling efforts within the project-sample reaches. As noted above, the purpose of this sampling was to document the types of fish inhabiting the project-area streams. The sampling effort was not designed to document the number of fish within the project-area reaches. As noted above, mainstem Pringle Creek was not sampled because it was not possible to get the necessary permits from the NMFS within the time constraints associated with this sampling effort.

Six fish taxa were identified within the reaches in which fish were surveyed. All fish collected at both reaches were native to the Willamette River watershed, and all appeared healthy. All cutthroat trout collected were juveniles, suggesting that breeding populations are present in East Fork Pringle Creek and Battle Creek.

Table 5. Results of Fish Sampling for Project Area Sampling Reaches

Fish Species	Sampling Reach					
	Clark Creek	East Fork Pringle Creek	Lower Battle Creek	Upper Battle Creek	Lower Waln Creek	Upper Waln Creek
Cutthroat Trout	-	2	-	1	-	-
Redside Shiner	16	74	13	57	61	113
Dace sp.	3	14	-	-	4	4
Sculpin sp	29	34	41	78	24	21
Lamprey sp.	-	1	-	1	3	1
Longnose Sucker	1	-	-	17	21	1
Total						

4.3 Physical Habitat Characterization

As in previous monitoring efforts, PHS collected data related to thalweg profile, stream and riparian cross sections, substrate type, and presence of large woody debris for each of the sampling reaches. At the time of this monitoring effort, the entire Lower Waln Creek reach had been dammed by beavers and water three or more feet deep was present throughout the reach, and it was not possible to collect physical habitat data because of the depth of the water. The data are provided on data forms derived from those provided in the EMAP-SW protocol, and the data forms for each of the sampling reaches are in Appendices B - G. Comparison of the data contained in this report to data obtained in previous and future monitoring efforts can document changes in the streams over time. However, a comparison of data was beyond the scope of this project.

5.0 REFERENCES

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Pacific Habitat Services, Inc. March 21, 2011. *Technical Memorandum for the City of Salem's MS4 Permit Requirements for Benthic Macroinvertebrate Sampling and Hydromodification Assessment.*

Puget Sound Stream Benthos Website. www.pugetsoundstreambenthos.org. Accessed February 2012.

Appendix A

Benthic Macroinvertebrate Sampling Data

Aquatic Biology Associates, Inc
3490 NW Deer Run Street
Corvallis, OR 97330
aquaticbio.com

Robert Wisseman, Senior Scientist
541-740-1568
bob@aquaticbio.com

Date run:
'2017-07-09
Analysis program in developmental phase.

Abundances and biomass (mg) converted to a standard full sample (if subsampled) and one square meter basis.

Metrics most useful for tracking trends in biological integrity

Waterbody	Battle Creek	Battle Creek	Clark Creek	Pringle Creek	Pringle Creek	Waln Creek	Waln Creek
Station	Lower	Upper	Upper	East Fork	Upper	Lower	Upper
Date	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05
Subsample count	532	462	583	532	562	554	584
Subsample correction factor to full sample	1.07	1	2.73	2	2.61	4.29	2.61
Area correction factor to square meter	1	1	1	1	1	1	1
SUMMARY METRICS							
Total taxa richness	47	50	34	39	38	26	30
Total abundance	569.17	462	1591.59	1064	1463.6	2370.08	1522.63
EPT taxa richness	6	6	3	6	4	1	3
EPT abundance	29.96	36	152.88	114	266.22	8.58	15.66
Hilsenhoff Biotic Index (WY DEQ version)	6.36	6.12	6.03	6.48	6.76	6.95	6.56
DOMINANCE AND DIVERSITY							
% Dominant taxa	25.38	23.81	11.32	37.97	26.39	34.39	26.23
% Subdominant taxa	19.93	18.4	10.98	13.16	14.8	12.49	17.14
% Top 3 taxa	50.57	48.7	32.25	56.95	51.89	57.2	60.17
% Top 5 taxa	60.35	57.36	49.4	66.54	65.8	69.87	71.99
% Top 10 taxa	76.51	71.86	78.04	82.33	85.24	87.79	89.65
Shannon-Weaver Diversity (loge)	2.79	2.91	2.88	2.48	2.57	2.35	2.37
Shannon-Weaver Diversity (log2)	4.02	4.19	4.16	3.57	3.71	3.39	3.42
Shannon Evenness Index	0.72	0.74	0.82	0.68	0.71	0.72	0.7
TOLERANT AND INTOLERANT TAXA							
Total tolerant taxa richness	16	15	12	15	16	10	9
Total tolerant abundance	83.46	135	371.28	614	650.89	412.84	336.69
% Total tolerant by abundance	14.66	29.22	23.33	57.71	44.47	17.42	22.11
Baetis tricaudatus complex	3.196	2.381	3.774	4.323	14.8	0.362	0.6857
Adjusted % total tolerant	17.856	31.601	27.104	62.033	59.27	17.782	22.7957
Highly tolerant taxa richness	3	1	3	3	3	2	2
Highly tolerant abundance	9.63	4	46.41	6	24.49	81.51	279.27
% Highly tolerant by abundance	1.692	0.8658	2.916	0.5639	1.673	3.439	18.34
Moderately tolerant taxa richness	13	14	9	12	13	8	7
Moderately tolerant abundance	73.83	131	324.87	608	626.4	331.33	57.42
% Moderately tolerant by abundance	12.97	28.35	20.41	57.14	42.8	13.98	3.771
Total intolerant taxa richness	5	3	1	0	1	1	2
Total intolerant abundance	38.52	10	51.87	0	7.83	47.19	263.61
% Total intolerant by abundance	6.768	2.165	3.259	0	0.535	1.991	17.31
Highly intolerant taxa richness	0	0	0	0	0	0	0
Highly intolerant abundance	0	0	0	0	0	0	0
% Highly intolerant by abundance	0	0	0	0	0	0	0
Moderately intolerant taxa richness	5	3	1	0	1	1	2
Moderately intolerant abundance	38.52	10	51.87	0	7.83	47.19	263.61
% Moderately intolerant by abundance	6.768	2.165	3.259	0	0.535	1.991	17.31

Waterbody	Battle Creek	Battle Creek	Clark Creek	Pringle Creek	Pringle Creek	Waln Creek	Waln Creek
Station	Lower	Upper	Upper	East Fork	Upper	Lower	Upper
Date	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05
VOLTINISM (length of life cycle)							
TAXA RICHNESS							
Semivoltine (> 1 year life cycle) taxa richness	6	9	5	8	6	3	5
Univoltine (1 year life cycle) taxa richness	9	8	4	6	4	3	6
Multivoltine (< 1 year life cycle) taxa richness	32	33	25	25	28	20	19
ABUNDANCE							
Semivoltine (> 1 year life cycle) abundance	50.22	106	267.54	624	552.71	298.01	94.96
Univoltine (1 year life cycle) abundance	26.75	42	229.32	90	138.33	81.51	112.23
Multivoltine (< 1 year life cycle) abundance	492.2	314	1094.73	350	772.56	1990.56	1315.44
PERCENTAGE BY ABUNDANCE							
% Semivoltine (> 1 year life cycle) by abundance	8.823	22.94	16.81	58.65	37.76	12.57	6.237
% Univoltine (1 year life cycle) by abundance	4.7	9.091	14.41	8.459	9.451	3.439	7.371
% Multivoltine (< 1 year life cycle) by abundance	86.48	67.97	68.78	32.89	52.78	83.99	86.39
GROWTH AND DEVELOPMENT							
% Fast seasonal life cycle by abundance	84.78	66.67	61.92	29.7	45.65	82.36	85.71
% Slow seasonal life cycle by abundance	10.9	29.65	27.1	60.15	48.57	5.11	8.742
% Nonseasonal life cycle by abundance	4.312	3.68	10.98	10.15	5.775	12.53	5.551
OCCURRENCE IN DRIFT							
% Rare in drift by abundance	13.71	31.17	43.57	67.29	54.35	17.64	14.46
% Common in drift by abundance	3.384	6.926	0.1715	6.579	1.962	0	0.1714
% Abundant in drift by abundance	82.9	61.9	56.26	26.13	43.69	82.36	85.36
SIZE AT MATURITY							
TAXA RICHNESS							
Small size at maturity taxa richness	31	35	24	27	27	19	21
Medium size at maturity taxa richness	13	12	7	9	7	5	6
Large size at maturity taxa richness	3	3	3	3	4	2	3
ABUNDANCE							
Small size at maturity abundance	503.97	325	1081.08	552	1106.64	2175.03	1148.4
Medium size at maturity abundance	37.45	46	444.99	102	261	193.05	365.4
Large size at maturity abundance	27.75	91	65.52	410	95.96	2	8.83
PERCENTAGE BY ABUNDANCE							
% Small size at maturity by abundance	88.54	70.35	67.92	51.88	75.61	91.77	75.42
% Medium size at maturity by abundance	6.58	9.957	27.96	9.586	17.83	8.145	24
% Large size at maturity by abundance	4.876	19.7	4.117	38.53	6.556	0.08439	0.5799
RHEOPHILY AND HABITAT AFFINITY							
% Depositional only by abundance	24.63	27.27	15.44	1.128	13.55	6.878	43.2
% Depositional and erosional by abundance	73.68	68.83	83.19	92.29	83.24	92.58	55.78
% Erosional by abundance	1.692	3.896	1.372	6.579	3.21	0.543	1.028
THERMAL PREFERENCE							
% Cold stenothermal and cool eurythermal by abundance	6.956	1.948	3.259	0	0.535	1.991	17.31
% Cool/warm eurythermal by abundance	92.86	98.05	96.4	99.44	99.47	96.92	82.69
% Warm eurythermal by abundance	0.188	0	0.3431	0.5639	0	1.086	0

Waterbody	Battle Creek	Battle Creek	Clark Creek	Pringle Creek	Pringle Creek	Waln Creek	Waln Creek
Station	Lower	Upper	Upper	East Fork	Upper	Lower	Upper
Date	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05
NON-INSECT AND INSECT ORDERS							
TAXA RICHNESS							
Non-insect invertebrates taxa richness	15	13	11	11	12	6	8
Ephemeroptera (mayflies) taxa richness	4	3	1	3	1	1	2
Odonata (damsel- and dragonflies) taxa richness	0	0	1	1	0	2	0
Plecoptera (stoneflies) taxa richness	0	1	0	0	0	0	0
Hemiptera (true bugs taxa richness	0	0	0	0	0	0	0
Megaloptera (alderflies and hellgramites) taxa richness	0	0	0	1	0	0	0
Trichoptera (caddisflies) taxa richness	2	2	2	3	3	0	1
Lepidoptera (moths) taxa richness	0	0	0	0	0	0	0
Coleoptera (beetles) taxa richness	2	4	0	2	0	0	1
Diptera (total)(true flies) taxa richness	24	27	19	18	22	17	18
Chironomidae (midges) taxa richness	20	22	16	14	19	15	15
Chironomidae (midges -Nostoc midge) taxa richness	20	22	16	14	19	15	15
ABUNDANCE							
Non-insect invertebrates abundance	80.18	138	597.87	684	766.73	412.84	207.19
Ephemeroptera (mayflies) abundance	23.54	22	60.06	76	216.63	8.58	13.05
Odonata (damsel- and dragonflies) abundance	0	0	2.73	8	0	5.29	0
Plecoptera (stoneflies) abundance	0	2	0	0	0	0	0
Hemiptera (true bugs abundance	0	0	0	0	0	0	0
Megaloptera (alderflies and hellgramites) abundance	0	0	0	2	0	0	0
Trichoptera (caddisflies) abundance	6.42	12	92.82	38	49.59	0	2.61
Lepidoptera (moths) abundance	0	0	0	0	0	0	0
Coleoptera (beetles) abundance	2.14	7	0	22	0	0	2.61
Diptera (total)(true flies) abundance	456.89	281	838.11	234	430.65	1943.37	1297.17
Chironomidae (midges) abundance	444.05	257	810.81	184	388.89	1909.05	1273.68
Chironomidae (midges -Nostoc midge) abundance	444.05	257	810.81	184	388.89	1909.05	1273.68
PERCENTAGE BY ABUNDANCE							
% Non-insect invertebrates by abundance	14.09	29.87	37.56	64.29	52.39	17.42	13.61
% Ephemeroptera (mayflies) by abundance	4.136	4.762	3.774	7.143	14.8	0.362	0.8571
% Odonata (damsel- and dragonflies) by abundance	0	0	0.1715	0.7519	0	0.2232	0
% Plecoptera (stoneflies) by abundance	0	0.4329	0	0	0	0	0
% Hemiptera (true bugs by abundance	0	0	0	0	0	0	0
% Megaloptera (alderflies and hellgramites) by abundance	0	0	0	0.188	0	0	0
% Trichoptera (caddisflies) by abundance	1.128	2.597	5.832	3.571	3.388	0	0.1714
% Lepidoptera (moths) by abundance	0	0	0	0	0	0	0
% Coleoptera (beetles) by abundance	0.376	1.515	0	2.068	0	0	0.1714
% Diptera (total)(true flies) by abundance	80.27	60.82	52.66	21.99	29.42	82	85.19
% Chironomidae (midges) by abundance	78.02	55.63	50.94	17.29	26.57	80.55	83.65
% Chironomidae (midges -Nostoc midge) by abundance	78.02	55.63	50.94	17.29	26.57	80.55	83.65
FAMILIES AND GROUPS							
TAXA RICHNESS							
Oligochaeta (segmented worms) taxa richness	1	1	1	1	1	1	1

Waterbody	Battle Creek	Battle Creek	Clark Creek	Pringle Creek	Pringle Creek	Waln Creek	Waln Creek
Station	Lower	Upper	Upper	East Fork	Upper	Lower	Upper
Date	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05
Mollusca (snails and bivalves) taxa richness	4	4	5	4	5	2	5
Crustacea taxa richness	3	3	3	2	3	2	1
Acari (mites) taxa richness	6	5	1	3	1	0	0
Baetidae (mayfly) taxa richness	2	1	1	2	1	1	1
Baetis tricaudatus (mayfly) taxa richness	0	0	0	0	0	0	0
Ephemerellidae (mayfly) taxa richness	0	1	0	0	0	0	0
Heptageniidae (mayfly) taxa richness	1	0	0	0	0	0	0
Leptohyphidae (mayfly) taxa richness	0	0	0	0	0	0	0
Leptophlebiidae (mayfly) taxa richness	1	1	0	1	0	0	1
Chloroperlidae (mayfly) taxa richness	0	1	0	0	0	0	0
Nemouridae (stonefly) taxa richness	0	0	0	0	0	0	0
Perlidae (stonefly) taxa richness	0	0	0	0	0	0	0
Perlodidae (stonefly) taxa richness	0	0	0	0	0	0	0
Peltoperlidae (stonefly) taxa richness	0	0	0	0	0	0	0
Pteronarcyidae (stonefly) taxa richness	0	0	0	0	0	0	0
Brachycentridae (caddisfly) taxa richness	0	0	0	0	0	0	0
Glossosomatidae (caddisfly) taxa richness	0	0	0	0	0	0	0
Hydropsychidae (caddisfly) taxa richness	0	1	0	1	1	0	0
Lepidostomatidae (caddisfly) taxa richness	2	1	1	1	1	0	1
Limnephilidae (caddisfly) taxa richness	0	0	0	0	0	0	0
Philopotamidae (caddisfly) taxa richness	0	0	0	1	0	0	0
Rhyacophilidae (caddisfly) taxa richness	0	0	1	0	0	0	0
Uenoidae (caddisfly) taxa richness	0	0	0	0	0	0	0
Elmidae (riffle beetle) taxa richness	1	3	0	2	0	0	0
Empididae (dance fly) taxa richness	2	1	0	0	0	0	1
Athericidae (higher flies) taxa richness	0	0	0	0	0	0	0
Simuliidae (black fly) taxa richness	1	1	1	1	1	1	1
Tipulidae (crane fly) taxa richness	1	1	1	0	1	0	1
Chironomidae: Chironominae taxa richness	8	7	5	4	7	4	4
Tanytarsini taxa richness	4	3	2	2	3	2	1
Chironomidae: Diamesinae taxa richness	0	0	0	0	0	0	0
Chironomidae: Orthocladiinae taxa richness	9	10	7	6	8	6	5
Chironomidae: Prodiamesinae taxa richness	1	0	1	0	1	1	1
Chironomidae: Tanypodinae taxa richness	1	4	2	3	2	3	4
Cricotopus (Nostococladius) taxa richness	0	0	0	0	0	0	0
ABUNDANCE							
Oligochaeta (segmented worms) abundance	11.77	15	133.77	56	107.01	51.48	96.57
Mollusca (snails and bivalves) abundance	48.15	94	270.27	596	550.71	300.3	104.4
Crustacea abundance	5.28	10	188.37	6	100.18	35.32	1
Acari (mites) abundance	13.91	19	2.73	24	5.22	0	0
Baetidae (mayfly) abundance	19.26	11	60.06	62	216.63	8.58	10.44
Baetis tricaudatus (mayfly) abundance	0	0	0	0	0	0	0
Ephemerellidae (mayfly) abundance	0	1	0	0	0	0	0

Waterbody	Battle Creek	Battle Creek	Clark Creek	Pringle Creek	Pringle Creek	Waln Creek	Waln Creek
Station	Lower	Upper	Upper	East Fork	Upper	Lower	Upper
Date	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05
Heptageniidae (mayfly) abundance	1.07	0	0	0	0	0	0
Leptohyphidae (mayfly) abundance	0	0	0	0	0	0	0
Leptophlebiidae (mayfly) abundance	3.21	10	0	14	0	0	2.61
Chloroperlidae (mayfly) abundance	0	2	0	0	0	0	0
Nemouridae (stonefly) abundance	0	0	0	0	0	0	0
Perlidae (stonefly) abundance	0	0	0	0	0	0	0
Perlodidae (stonefly) abundance	0	0	0	0	0	0	0
Peltoperlidae (stonefly) abundance	0	0	0	0	0	0	0
Pteronarcyidae (stonefly) abundance	0	0	0	0	0	0	0
Brachycentridae (caddisfly) abundance	0	0	0	0	0	0	0
Glossosomatidae (caddisfly) abundance	0	0	0	0	0	0	0
Hydropsychidae (caddisfly) abundance	0	1	0	14	13.05	0	0
Lepidostomatidae (caddisfly) abundance	6.42	11	90.09	8	26.1	0	2.61
Limnephilidae (caddisfly) abundance	0	0	0	0	0	0	0
Philopotamidae (caddisfly) abundance	0	0	0	16	0	0	0
Rhyacophilidae (caddisfly) abundance	0	0	2.73	0	0	0	0
Uenoidae (caddisfly) abundance	0	0	0	0	0	0	0
Elmidae (riffle beetle) abundance	1.07	6	0	22	0	0	0
Empididae (dance fly) abundance	2.14	1	0	0	0	0	2.61
Athericidae (higher flies) abundance	0	0	0	0	0	0	0
Simuliidae (black fly) abundance	9.63	17	19.11	40	33.93	12.87	15.66
Tipulidae (crane fly) abundance	1.07	4	2.73	0	5.22	0	5.22
Chironomidae: Chironominae abundance	311.37	165	294.84	36	245.34	1222.65	733.41
Tanytarsini abundance	178.69	37	128.31	32	41.76	1059.63	73.08
Chironomidae: Diamesinae abundance	0	0	0	0	0	0	0
Chironomidae: Orthocladiinae abundance	78.11	55	273	106	41.76	570.57	143.55
Chironomidae: Prodiamesinae abundance	29.96	0	51.87	0	7.83	47.19	261
Chironomidae: Tanypodinae abundance	18.19	30	169.26	36	70.47	55.77	112.23
Cricotopus (Nostococladius) abundance	0	0	0	0	0	0	0
PERCENTAGE BY ABUNDANCE							
% Oligochaeta (segmented worms) by abundance	2.068	3.247	8.405	5.263	7.311	2.172	6.342
% Mollusca (snails and bivalves) by abundance	8.46	20.35	16.98	56.02	37.63	12.67	6.857
% Crustacea by abundance	0.9277	2.165	11.84	0.5639	6.845	1.49	0.06568
% Acari (mites) by abundance	2.444	4.113	0.1715	2.256	0.3567	0	0
% Baetidae (mayfly) by abundance	3.384	2.381	3.774	5.827	14.8	0.362	0.6857
% Baetis tricaudatus (mayfly) by abundance	3.196	2.381	3.774	4.323	14.8	0.362	0.6857
% Ephemerellidae (mayfly) by abundance	0	0.2165	0	0	0	0	0
% Heptageniidae (mayfly) by abundance	0.188	0	0	0	0	0	0
% Leptohyphidae (mayfly) by abundance	0	0	0	0	0	0	0
% Leptophlebiidae (mayfly) by abundance	0.564	2.165	0	1.316	0	0	0.1714
% Chloroperlidae (mayfly) by abundance	0	0.4329	0	0	0	0	0
% Nemouridae (stonefly) by abundance	0	0	0	0	0	0	0
% Perlidae (stonefly) by abundance	0	0	0	0	0	0	0

Waterbody	Battle Creek	Battle Creek	Clark Creek	Pringle Creek	Pringle Creek	Waln Creek	Waln Creek
Station	Lower	Upper	Upper	East Fork	Upper	Lower	Upper
Date	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05
% Perlodidae (stonefly) by abundance	0	0	0	0	0	0	0
% Peltoperlidae (stonefly) by abundance	0	0	0	0	0	0	0
% Pteronarcyidae (stonefly) by abundance	0	0	0	0	0	0	0
% Brachycentridae (caddisfly) by abundance	0	0	0	0	0	0	0
% Glossosomatidae (caddisfly) by abundance	0	0	0	0	0	0	0
% Hydropsychidae (caddisfly) by abundance	0	0.2165	0	1.316	0.8916	0	0
% Lepidostomatidae (caddisfly) by abundance	1.128	2.381	5.66	0.7519	1.783	0	0.1714
% Limnephilidae (caddisfly) by abundance	0	0	0	0	0	0	0
% Philopotamidae (caddisfly) by abundance	0	0	0	1.504	0	0	0
% Rhyacophilidae (caddisfly) by abundance	0	0	0.1715	0	0	0	0
% Uenoidae (caddisfly) by abundance	0	0	0	0	0	0	0
% Elmidae (riffle beetle) by abundance	0.188	1.299	0	2.068	0	0	0
% Empididae (dance fly) by abundance	0.376	0.2165	0	0	0	0	0.1714
% Athericidae (higher flies) by abundance	0	0	0	0	0	0	0
% Simuliidae (black fly) by abundance	1.692	3.68	1.201	3.759	2.318	0.543	1.028
% Tipulidae (crane fly) by abundance	0.188	0.8658	0.1715	0	0.3567	0	0.3428
% Chironomidae: Chironominae by abundance	54.71	35.71	18.52	3.383	16.76	51.59	48.17
% Tanytarsini by abundance	31.39	8.009	8.062	3.008	2.853	44.71	4.8
% Chironomidae: Diamesinae by abundance	0	0	0	0	0	0	0
% Chironomidae: Orthocladiinae by abundance	13.72	11.9	17.15	9.962	2.853	24.07	9.428
% Chironomidae: Prodiamesinae by abundance	5.264	0	3.259	0	0.535	1.991	17.14
% Chironomidae: Tanypodinae by abundance	3.196	6.494	10.63	3.383	4.815	2.353	7.371
% Cricotopus (Nostococladius) by abundance	0	0	0	0	0	0	0
FEEDING GROUPS							
TAXA RICHNESS							
Predator taxa richness	6	9	4	8	5	6	6
Parasite taxa richness	7	5	2	3	2	0	1
Collector-gatherer taxa richness	22	23	17	16	17	14	12
Collector-filterer taxa richness	4	4	3	6	4	3	2
Collector (total) taxa richness	26	27	20	22	21	17	14
Piercer herbivore taxa richness	0	0	0	0	1	0	0
Macrophyte herbivore taxa richness	0	1	1	1	1	0	1
Shredder taxa richness	3	3	2	2	2	0	2
Caddisfly shredder taxa richness	2	1	1	1	1	0	1
Stonefly shredder taxa richness	0	0	0	0	0	0	0
Wood-eating taxa richness	2	1	0	1	0	0	0
Scraper taxa richness	3	3	4	2	4	2	4
Omnivore taxa richness	2	2	1	2	2	1	2
Unknown feeding group taxa richness	0	0	0	0	0	0	0
ABUNDANCE							
Predator abundance	29.96	39	174.72	52	76.69	86.8	117.45
Parasite abundance	14.98	19	5.46	24	7.83	0	5.22
Collector-gatherer abundance	313.51	147	889.98	286	542.88	1638.78	866.52

Waterbody	Battle Creek	Battle Creek	Clark Creek	Pringle Creek	Pringle Creek	Waln Creek	Waln Creek
Station	Lower	Upper	Upper	East Fork	Upper	Lower	Upper
Date	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05
Collector-filterer abundance	60.99	26	199.29	124	125.28	553.41	99.18
Collector (total) abundance	374.5	173	1089.27	410	668.16	2192.19	965.7
Piercer herbivore abundance	0	0	0	0	10.44	0	0
Macrophyte herbivore abundance	0	13	10.92	2	31.32	0	5.22
Shredder abundance	7.49	19	92.82	12	31.32	0	7.83
Caddisfly shredder abundance	6.42	11	90.09	8	26.1	0	2.61
Stonefly shredder abundance	0	0	0	0	0	0	0
Wood-eating taxa abundance	2.14	4	0	4	0	0	0
Scraper abundance	115.56	112	158.34	156	548.1	90.09	417.6
Omnivore abundance	26.68	87	60.06	408	89.74	1	3.61
Unknown feeding group abundance	0	0	0	0	0	0	0
PERCENTAGE BY ABUNDANCE							
% Predator by abundance	5.264	8.442	10.98	4.887	5.24	3.662	7.714
% Parasite by abundance	2.632	4.113	0.3431	2.256	0.535	0	0.3428
% Collector-gatherer by abundance	55.08	31.82	55.92	26.88	37.09	69.14	56.91
% Collector-filterer by abundance	10.72	5.628	12.52	11.65	8.56	23.35	6.514
% Collector (total) by abundance	65.8	37.45	68.44	38.53	45.65	92.49	63.42
% Piercer herbivore by abundance	0	0	0	0	0.7133	0	0
% Macrophyte herbivore by abundance	0	2.814	0.6861	0.188	2.14	0	0.3428
% Shredder by abundance	1.316	4.113	5.832	1.128	2.14	0	0.5142
% Caddisfly shredder by abundance	1.128	2.381	5.66	0.7519	1.783	0	0.1714
% Stonefly shredder by abundance	0	0	0	0	0	0	0
% Wood-eating taxa by abundance	0.376	0.8658	0	0.3759	0	0	0
% Scraper by abundance	20.3	24.24	9.949	14.66	37.45	3.801	27.43
% Omnivore by abundance	4.688	18.83	3.774	38.35	6.131	0.04219	0.2371
% Unknown feeding group by abundance	0	0	0	0	0	0	0

HABIT

TAXA RICHNESS							
Skater taxa richness	0	0	0	0	0	0	0
Planktonic taxa richness	0	0	0	0	0	0	0
Diver taxa richness	0	0	0	0	0	0	0
Swimmer taxa richness	8	7	4	5	3	2	0
Clinger taxa richness	13	13	11	13	14	9	11
Sprawler taxa richness	14	21	9	14	12	8	10
Climber taxa richness	3	2	3	3	1	2	2
Burrower taxa richness	9	7	7	4	8	5	7
Unknown habit taxa richness	0	0	0	0	0	0	0
ABUNDANCE							
Skater abundance	0	0	0	0	0	0	0
Planktonic abundance	0	0	0	0	0	0	0
Diver abundance	0	0	0	0	0	0	0
Swimmer abundance	18.19	24	193.83	32	104.4	55.77	0
Clinger abundance	381.99	276	439.53	734	984.97	1488.63	532.44

Waterbody	Battle Creek	Battle Creek	Clark Creek	Pringle Creek	Pringle Creek	Waln Creek	Waln Creek
Station	Lower	Upper	Upper	East Fork	Upper	Lower	Upper
Date	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05
Sprawler abundance	78.04	110	442.26	166	115.84	335.62	254.17
Climber abundance	7.49	15	95.55	18	26.1	5.29	5.22
Burrower abundance	83.46	37	420.42	114	232.29	484.77	730.8
Unknown habit abundance	0	0	0	0	0	0	0
PERCENTAGE BY ABUNDANCE							
% Skater by abundance	0	0	0	0	0	0	0
% Planktonic by abundance	0	0	0	0	0	0	0
% Diver by abundance	0	0	0	0	0	0	0
% Swimmer by abundance	3.196	5.195	12.18	3.008	7.133	2.353	0
% Clinger by abundance	67.11	59.74	27.62	68.98	67.3	62.81	34.97
% Sprawler by abundance	13.71	23.81	27.79	15.6	7.915	14.16	16.69
% Climber by abundance	1.316	3.247	6.003	1.692	1.783	0.2232	0.3428
% Burrower by abundance	14.66	8.009	26.42	10.71	15.87	20.45	48
% Unknown habit by abundance	0	0	0	0	0	0	0
STATE OF CALIFORNIA DESIGNATIONS							
CA % Sensitive EPT	1.316	3.03	5.832	2.256	1.783	0	0.1714
CA % Intolerant individuals	2.444	5.411	6.518	1.504	1.783	0.905	0.1714
CA % Tolerant individuals	10.15	11.04	16.47	7.707	7.915	22.26	26.05
CA weighted tolerance value	6.38	6.21	5.75	6.2	6.03	6.9	6.54
CA % Predators	7.896	12.55	11.32	7.143	5.775	3.662	8.056
CA % Collector-gatherers	52.83	24.46	44.94	24.62	36.02	64.8	50.05
CA % Filterers	10.53	5.411	12.52	11.09	8.56	23.35	6.514
CA % Scrapers	24.82	42.64	13.72	52.82	43.51	3.801	27.6
CA % Shredders	3.008	9.091	14.58	1.88	3.032	0.362	5.828
BIOTIC CONDITION INDEX							
CTQa- Community Tolerance Quotient actual	97.4	98.26	99.53	98.41	102.79	103.85	98.17
CTQd-Community Tolerance Quotient dominance	102.62	97.66	100.85	97.13	101.31	106.53	103.19

Benthic Invertebrate Index of Biological Integrity-BIBI (modified Karr 1998)

OR: Pacific Habitat Services, Salem, OR area streams.

Sampling method: qualitative dip net through multiple habitats, 500 micron mesh.

Subsampling: 500 organism minimum or entire sample. PNAMP level 2 standard taxonomic effort.

Abundances are relative, adjusted to a full sample basis.

	Waterbody	Battle Creek		Battle Creek		Clark Creek		Pringle Creek	
	Location	Lower		Upper		Upper		East Fork	
	Date	6/5/2017		6/5/2017		6/5/2017		6/5/2017	
	METRIC	Value	Score	Value	Score	Value	Score	Value	Score
D	Total number of taxa	47	5	50	5	34	3	39	3
D	Number Ephemeroptera taxa	4	1	3	1	1	1	3	1
D	Number Plecoptera taxa	0	1	1	1	0	1	0	1
D	Number Trichoptera taxa	2	1	2	1	2	1	3	1
D	Number of long-lived taxa	3	3	5	5	3	3	5	5
D	Number of intolerant taxa	2	1	0	1	0	1	0	1
I	% Tolerant taxa	18	5	32	3	27	3	62	1
D	% Predator	5.3	1	8.4	1	11	3	4.9	1
D	Number of clinger taxa	13	3	13	3	11	3	13	3
I	% Dominance (3 taxa)	51	3	49	5	32	5	57	3
	TOTAL SCORE		24		26		24		20
	BIOLOGICAL CONDITION CATEGORY								

Maximum score of 50.

Each metric scored: 1=low, 3=moderate, 5=high

OTHER COMMUNITY COMPOSITION METRICS THAT ARE INDICATIVE OF BIOLOGICAL CONDITION

	Total abundance (m2)	569		462		1592		1064	
D	EPT taxa richness	6		6		3		6	
D	Predator richness	6		9		4		8	
D	Scraper richness	3		3		4		2	
D	Shredder richness	3		3		2		2	
D	%Intolerant taxa	6.8		2.2		3.2		0	
I	*% Baetis tricaudatus complex*	3.2		2.4		3.8		4.3	
I	%Collector	66		38		68		39	
I	%Parasite	2.6		4.1		0.3		2.3	
I	%Oligochaeta	2.1		3.3		8.4		5.3	
I	Number tolerant taxa	16		15		12		15	
I	%Simuliidae	1.7		3.7		1.2		3.8	
I	%Chironomidae	78		56		51		17	

L,M & H comparisons with a Pacific Northwest montane stream with high biological integrity.

I= Metric value generally increases with declining biological integrity.

D= Metric value generally decreases with declining biological integrity.

L= Low biological integrity.		BIBI scores between 0-24.
M= Moderate biological integrity.		BIBI scores between 25-39.
H= High biological integrity.		BIBI scores >40.

Benthic Invertebrate Index of Biological Integrity-BIBI (modified Karr 1998)

OR: Pacific Habitat Services, Salem, OR area streams.

Sampling method: qualitative dip net through multiple habitats, 500 micron mesh.

Subsampling: 500 organism minimum or entire sample. PNAMP level 2 standard taxonomic effort.

Abundances are relative, adjusted to a full sample basis.

	Waterbody	**Pringle Creek**	**Waln Creek**	**Waln Creek**
	Location	**Upper**	**Lower**	**Upper**
	Date	**6/5/2017**	**6/5/2017**	**6/5/2017**

	METRIC	**Value**	**Score**	**Value**	**Score**	**Value**	**Score**	**Value**	**Score**
D	**Total number of taxa**	38	3	26	3	30	3		
D	**Number Ephemeroptera taxa**	1	1	1	1	2	1		
D	**Number Plecoptera taxa**	0	1	0	1	0	1		
D	**Number Trichoptera taxa**	3	1	0	1	1	1		
D	**Number of long-lived taxa**	5	5	2	1	4	3		
D	**Number of intolerant taxa**	0	1	0	1	0	1		
I	**% Tolerant taxa**	59	1	18	5	23	3		
D	**% Predator**	5.2	1	3.7	1	7.7	1		
D	**Number of clinger taxa**	14	3	9	1	11	3		
I	**% Dominance (3 taxa)**	52	3	57	3	60	3		
	TOTAL SCORE		**20**		**18**		**20**		**0**
	BIOLOGICAL CONDITION CATEGORY								

Maximum score of 50. Each metric scored: 1=low, 3=moderate, 5=high

OTHER COMMUNITY COMPOSITION METRICS THAT ARE INDICATIVE OF BIOLOGICAL CONDITION

	Total abundance (m2)	1464		2370		1523			
D	**EPT taxa richness**	4		1		3			
D	**Predator richness**	5		6		6			
D	**Scraper richness**	4		2		4			
D	**Shredder richness**	2		0		2			
D	**%Intolerant taxa**	0.5		2		17.3			
I	***% Baetis tricaudatus***	14.8		0.4		0.7			
I	**%Collector**	46		93		63			
I	**%Parasite**	0.5		0		0.3			
I	**%Oligochaeta**	7.3		2.2		6.3			
I	**Number tolerant taxa**	16		10		9			
I	**%Simuliidae**	2.3		0.5		1			
I	**%Chironomidae**	27		81		84			

L,M & H comparisons with a Pacific Northwest montane stream with high biological integrity.

I= Metric value generally increases with declining biological integrity.

D= Metric value generally decreases with declining biological integrity.

L= Low biological integrity.		BIBI scores between 0-24.
M= Moderate biological integrity.		BIBI scores between 25-39.
H= High biological integrity.		BIBI scores >40.

Abundances and biomass (mg) converted to a standard full sample (if subsampled) and one square meter basis.

							Waterbody	Battle Creek	Battle Creek	Clark Creek	Pringle Creek	Pringle Creek	Waln Creek	Waln Creek
							Station	Lower	Upper	Upper	East Fork	Upper	Lower	Upper
							Date	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05
Taxon	Stage	Insect?	Origin	Higher classification	Order	Family	Common name	Abundance	Abundance	Abundance	Abundance	Abundance	Abundance	Abundance
Trepaxonemata	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	x	flat worms				2		25.74	
Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	1.07		2.73		2.61		5.22
Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	11.77	15	133.77	56	107.01	51.48	96.57
Erpobdella	U	non-insect	Aquatic	Annelida: Hirudinea	miscellaneous non-insect	Erpobdellidae	leeches					1		
Fluminicola	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Hydrobiidae	snails			27.3	140	386.28		2.61
Ferrissia	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Planorbidae	snails		1			2.61		2.61
Gyraulus	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Planorbidae	snails	1.07						
Menetus	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Planorbidae	snails			5.46				13.05
Promenetus	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Planorbidae	snails			2.73		2.61	4.29	
Juga	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Pleuroceridae	snails	25.68	85	60.06	404	88.74		2.61
Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	20.33	7	174.72	46	70.47	296.01	83.52
Sphaerium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	1.07	1		6			
Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp			5.46		2.61		
Crangonyx	U	non-insect	Aquatic	Crustacea: Amphipoda	x	Crangonyctidae	scuds	3.21	4	180.18		96.57	34.32	
Caecidotea	U	non-insect	Aquatic	Crustacea: Isopoda	x	Asellidae	aquatic sow bugs	1.07	4	2.73	2			
Pacifastacus	U	non-insect	Aquatic	Crustacea: Decapoda	x	Astacidae	crayfish	1	2		4	1	1	1
Atractides	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	3.21	12					
Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	3.21	2		2			
Midea	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	2.14			20			
Oribatida	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	1.07	1	2.73				
Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	1.07	2			5.22		
Sperchonopsis	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	3.21	2		2			
Aeshna	L	insect	Aquatic	Arthropoda: Insecta	Odonata	Aeshnidae	dragonflies						1	
Argia	L	insect	Aquatic	Arthropoda: Insecta	Odonata	Coenagrionidae	damselflies			2.73	8			
Coenagrion/Enallagma	L	insect	Aquatic	Arthropoda: Insecta	Odonata	Coenagrionidae	damselflies						4.29	
Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	18.19	11	60.06	46	216.63	8.58	10.44
Labiobaetis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	1.07			16			
Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies		1					
Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	1.07						
Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	3.21	10		14			2.61
Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies		2					
Sialis	L	insect	Aquatic	Arthropoda: Insecta	Megaloptera	Sialidae	alderflies				2			
Cheumatopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies				14	13.05		
Hydropsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies		1					
Hydroptila	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydroptilidae	caddisflies					10.44		
Lepidostoma-panel case larvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	5.35	11	90.09	8	26.1		2.61
Lepidostoma-turret case larvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	1.07						
Wormaldia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Philopotamidae	caddisflies				16			
Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies			2.73				
Dytiscidae	A	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Dytiscidae	predaceous diving beetles	1.07						
Cleptelmis addenda	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Elmidae	riffle beetles		1					
Lara	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Elmidae	riffle beetles	1.07	4		4			
Optioservus	A	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Elmidae	riffle beetles				2			
Optioservus	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Elmidae	riffle beetles		1		16			
Gyrinus	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Gyrinidae	whirligig beetles							2.61
Ametor	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Hydrophilidae	water scavenger beetles		1					
Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges		1			2.61		
Dixa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Dixidae	dixid midges		1		2			
Dixella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Dixidae	dixid midges			5.46	6		21.45	
Empididae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies		1					
Empididae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	1.07						
Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	1.07						2.61
Muscidae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Muscidae	higher flies				2			
Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	9.63	17	19.11	40	33.93	12.87	15.66
Pedicia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	1.07						
Tipula	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies		4	2.73		5.22		5.22
Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	6.42	7	21.84	6	23.49	12.87	23.49
Ablabesmyia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges		1					
Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	9.63	23	139.23	8	13.05	8.58	80.91
Chironomus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	7.49		32.76		13.05	77.22	255.78
Cladopelma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	4.28						
Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges		3	32.76	4		120.12	10.44
Cricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	23.54					180.18	5.22
Cricotopus bicinctus group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	11.77					111.54	
Cricotopus trifascia group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges					2.61		
Cryptochironomus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	7.49	4		2	2.61		
Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges				16			
Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	4.28	12	35.49	4	2.61	94.38	23.49
Heterotrissocladius marcidus group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	4.28	7					
Limnophyes	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	4.28	1	5.46		10.44	55.77	
Metriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges					2.61		
Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	144.45	30	122.85	30	31.32	815.1	73.08
Paramerina	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges		11		2		30.03	10.44

							Waterbody	Battle Creek	Battle Creek	Clark Creek	Pringle Creek	Pringle Creek	Waln Creek	Waln Creek
							Station	Lower	Upper	Upper	East Fork	Upper	Lower	Upper
							Date	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05
Taxon	Stage	Insect?	Origin	Higher classification	Order	Family	Common name	Abundance	Abundance	Abundance	Abundance	Abundance	Abundance	Abundance
Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	7.49	1	27.3	62	2.61		
Paraphaenocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	6.42						
Paratanytarsus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	29.96			2		244.53	
Phaenopsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	113.42	110	122.85		156.6	85.8	399.33
Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges		13	10.92	2	31.32		5.22
Procladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges			10.92	2	10.44		23.49
Prodiamesa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Prodiamesinae	midges	29.96		51.87		7.83	47.19	261
Psectrotanypus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges						8.58	
Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	6.42	4	27.3		2.61		23.49
Rheotanytarsus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges			5.46		7.83		
Stempellina	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	2.14	2					
Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	2.14	5			2.61		
Stenochironomus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges		1					
Synorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges		1	5.46				
Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges		1					
Thienemannimyia complex	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	18.19	15	158.34	32	60.03	17.16	67.86
Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges		2		12	5.22		
Zavrelimyia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges		3					10.44

Abundances and biomass (mg) converted to a standard full sample (if subsampled) and one square meter basis.

							Waterbody	Battle Creek	Battle Creek	Clark Creek	Pringle Creek	Pringle Creek	Waln Creek	Waln Creek
							Station	Lower	Upper	Upper	East Fork	Upper	Lower	Upper
							Date	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05
Taxon	Stage	Insect?	Origin	Higher classification	Order	Family	Common name	% abundance	% abundance	% abundance	% abundance	% abundance	% abundance	% abundance
Trepaxonemata	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	x	flat worms				0.188		1.086	
Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	0.188		0.1715		0.1783		0.3428
Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	2.068	3.247	8.405	5.263	7.311	2.172	6.342
Erpobdella	U	non-insect	Aquatic	Annelida: Hirudinea	miscellaneous non-insect	Erpobdellidae	leeches					0.06832		
Fluminicola	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Hydrobiidae	snails			1.715	13.16	26.39		0.1714
Ferrissia	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Planorbidae	snails		0.2165			0.1783		0.1714
Gyraulus	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Planorbidae	snails	0.188						
Menetus	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Planorbidae	snails			0.3431				0.8571
Promenetus	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Planorbidae	snails			0.1715		0.1783	0.181	
Juga	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Pleuroceridae	snails	4.512	18.4	3.774	37.97	6.063		0.1714
Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	3.572	1.515	10.98	4.323	4.815	12.49	5.485
Sphaerium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	0.188	0.2165		0.5639			
Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp			0.3431		0.1783		
Crangonyx	U	non-insect	Aquatic	Crustacea: Amphipoda	x	Crangonyctidae	scuds	0.564	0.8658	11.32		6.598	1.448	
Caecidotea	U	non-insect	Aquatic	Crustacea: Isopoda	x	Asellidae	aquatic sow bugs	0.188	0.8658	0.1715	0.188			
Pacifastacus	U	non-insect	Aquatic	Crustacea: Decapoda	x	Astacidae	crayfish	0.1757	0.4329		0.3759	0.06832	0.04219	0.06568
Atractides	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	0.564	2.597					
Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	0.564	0.4329		0.188			
Midea	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	0.376			1.88			
Oribatida	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	0.188	0.2165	0.1715				
Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	0.188	0.4329			0.3567		
Sperchonopsis	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	0.564	0.4329		0.188			
Aeshna	L	insect	Aquatic	Arthropoda: Insecta	Odonata	Aeshnidae	dragonflies						0.04219	
Argia	L	insect	Aquatic	Arthropoda: Insecta	Odonata	Coenagrionidae	damselflies			0.1715	0.7519			
Coenagrion/Enallagma	L	insect	Aquatic	Arthropoda: Insecta	Odonata	Coenagrionidae	damselflies						0.181	
Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	3.196	2.381	3.774	4.323	14.8	0.362	0.6857
Labiobaetis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	0.188			1.504			
Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies		0.2165					
Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	0.188						
Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	0.564	2.165		1.316			0.1714
Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies		0.4329					
Sialis	L	insect	Aquatic	Arthropoda: Insecta	Megaloptera	Sialidae	alderflies				0.188			
Cheumatopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies				1.316	0.8916		
Hydropsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies		0.2165					
Hydroptila	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydroptilidae	caddisflies					0.7133		
Lepidostoma-panel case larvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	0.94	2.381	5.66	0.7519	1.783		0.1714
Lepidostoma-turret case larvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	0.188						
Wormaldia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Philopotamidae	caddisflies				1.504			
Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies			0.1715				
Dytiscidae	A	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Dytiscidae	predaceous diving beetles	0.188						
Cleptelmis addenda	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Elmidae	riffle beetles		0.2165					
Lara	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Elmidae	riffle beetles	0.188	0.8658		0.3759			
Optioservus	A	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Elmidae	riffle beetles				0.188			
Optioservus	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Elmidae	riffle beetles		0.2165		1.504			
Gyrinus	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Gyrinidae	whirligig beetles							0.1714
Ametor	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Hydrophilidae	water scavenger beetles		0.2165					
Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges		0.2165			0.1783		
Dixa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Dixidae	dixid midges		0.2165		0.188			
Dixella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Dixidae	dixid midges			0.3431	0.5639		0.905	
Empididae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies		0.2165					
Empididae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	0.188						
Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	0.188						0.1714
Muscidae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Muscidae	higher flies				0.188			
Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	1.692	3.68	1.201	3.759	2.318	0.543	1.028
Pedicia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	0.188						
Tipula	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies		0.8658	0.1715		0.3567		0.3428
Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	1.128	1.515	1.372	0.5639	1.605	0.543	1.543
Ablabesmyia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges		0.2165					
Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	1.692	4.978	8.748	0.7519	0.8916	0.362	5.314
Chironomus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	1.316		2.058		0.8916	3.258	16.8
Cladopelma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	0.752						
Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges		0.6494	2.058	0.3759		5.068	0.6857
Cricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	4.136					7.602	0.3428
Cricotopus bicinctus group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	2.068					4.706	
Cricotopus trifascia group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges					0.1783		
Cryptochironomus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	1.316	0.8658		0.188	0.1783		
Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges				1.504			
Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0.752	2.597	2.23	0.3759	0.1783	3.982	1.543
Heterotrissocladius marcidus group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0.752	1.515					
Limnophyes	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0.752	0.2165	0.3431		0.7133	2.353	
Metriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges					0.1783		
Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	25.38	6.494	7.719	2.82	2.14	34.39	4.8
Paramerina	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges		2.381		0.188		1.267	0.6857
Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	1.316	0.2165	1.715	5.827	0.1783		
Paraphaenocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	1.128						
Paratanytarsus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	5.264			0.188		10.32	

							Waterbody	Battle Creek	Battle Creek	Clark Creek	Pringle Creek	Pringle Creek	Waln Creek	Waln Creek
							Station	Lower	Upper	Upper	East Fork	Upper	Lower	Upper
							Date	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05	2017-06-05
Taxon	Stage	Insect?	Origin	Higher classification	Order	Family	Common name	% abundance	% abundance	% abundance	% abundance	% abundance	% abundance	% abundance
Phaenopsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	19.93	23.81	7.719		10.7	3.62	26.23
Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges		2.814	0.6861	0.188	2.14		0.3428
Procladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges			0.6861	0.188	0.7133		1.543
Prodiamesa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Prodiamesinae	midges	5.264		3.259		0.535	1.991	17.14
Psectrotanypus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges						0.362	
Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	1.128	0.8658	1.715		0.1783		1.543
Rheotanytarsus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges			0.3431		0.535		
Stempellina	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	0.376	0.4329					
Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	0.376	1.082			0.1783		
Stenochironomus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges		0.2165					
Synorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges		0.2165	0.3431				
Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges		0.2165					
Thienemannimyia complex	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	3.196	3.247	9.949	3.008	4.102	0.724	4.457
Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges		0.4329		1.128	0.3567		
Zavrelimyia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges		0.6494					0.6857