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

Summary of Water Quality Data
For Fiscal Year 2011/2012

Prepared by: City Salem Public Works Department
Stormwater Services

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1.0 Introduction

This document provides monitoring data collected during the previous NPDES MS4 reporting period, from July 1, 2011, to June 30, 2012. The City's "Surface Water and Stormwater Monitoring Plan" was not approved by the Oregon Department of Environmental Quality (DEQ) until June 29, 2011, therefore, this is the first reporting period that sampling was completed for monitoring elements: Instream Storm, Stormwater, Mercury, Pesticide, and Macroinvertebrates. A background narrative for each monitoring element is provided below, and all collected data are provided in the tables, figures, and attachments[1].

2.0 Monitoring Elements

Specific details for each monitoring element can be found in the City's "Stormwater and Surface Water Monitoring Plan." Progress toward meeting monitoring requirements of the MS4 Permit are summarized in Table 1. Monitoring site locations and parameters for each monitoring element are described in Tables 2 and 3, respectively.

2.1 Monthly Instream

Monthly Instream[2] monitoring of urban streams is conducted on a predetermined schedule. This monitoring element includes the collection of grab samples and field measurements on 11 of Salem's MS4 stormwater runoff receiving streams. Ten of the monitored streams are paired with upstream (at or near where the stream enters the City's jurisdiction) and downstream (at or near where the stream exists the City's jurisdiction or enters a receiving stream) site locations. Additionally, there is a downstream monitoring site on the West Fork Little Pudding River. Since the West Fork Little Pudding River starts in the greater Salem area and runs dry during the summer months, an upstream site was not selected. Figure 1 details the locations of each site.

Water quality parameters collected at all sites 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})

Additional water quality parameters were added for the sites within the Pringle Creek Watershed (PRI1, PRI5, CLA1, and CLA10; refer to Table 2 for list of site names) to meet requirements of the MS4 Permit. These additional parameters include:

- Zinc (total recoverable and dissolved)
- Copper (total recoverable and dissolved)

[1] All tables, figures and attachments are at the end of this document and are not necessarily discussed in the order that they appear.

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

- Lead (total recoverable and dissolved)
- Hardness

Special Condition #2 of Table B-1 in the City's MS4 Permit states the following, "Monthly Instream monitoring for metals and hardness conducted in Pringle Creek between May and September each year may be eliminated after December 2011 if statistical analysis of the monitoring results indicates concentrations below the reporting limits." This condition was not met, and therefore the City will continue to collect metals and hardness data, which will aid in the 303(d) evaluation report to be completed by the end of the Permit term.

In addition, total suspended solids (TSS) was added to the list of parameters for the West Fork Little Pudding site.

Data for this monitoring element is provided as follows:

- Table 5 - Monthly medians for collected data
- Table 6 - Number of water quality criteria exceedances
- Table 7 - All raw monthly data
- Figure 2 - Graphs of mean value comparison for dry and rain conditions
- Figure 3 - Upstream/downstream comparison of E.Coli data

2.2 Continuous Instream

The City maintains a network of Continuous Instream monitoring sites located on urban streams within the city. For the July 1, 2011, thru June 30, 2012, reporting period, there were 11 sites located on 5 different streams. One of the sites, MIC1, was decommissioned in April 2012. In anticipation of the decommissioning, this station was not identified in the NPDES MS4 Permit, and therefore data collected at the MIC1 site was not included in this data summary. Also during this reporting period, one continuous water quality/gauging site (Shelton Ditch) and two gauge only sites (Pringle Creek and West Fork Little Pudding River) were added to the network. Data collection from these sites did not start until late June 2012, therefore these data will not be included in this year's Annual Report.

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

Continuous data collected includes:

- Temperature
- DO
- Specific Conductivity
- pH
- Turbidity
- 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. Qualification of what constitutes grade A and grade B data are provided in Table 8.

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 able 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, while also helping to prioritize dry weather outfall screening activities, and providing outreach/education opportunities for residents.

Monthly medians for collected data are summarized in Table 9. Plots of continuous data and a summary of system alarms are provided in Figures 4 through 7.

2.3 Instream Storm Monitoring

Instream Storm refers to the monitoring of MS4 receiving streams during defined storm events. Sampling occurs at three sites in the Pringle Creek Watershed (continuous instream monitoring sites PRI12, PRI3, and CLK1). Data collected is intended 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 is a new monitoring element that is expected to continue beyond the current MS4 Permit cycle; ultimately providing a dataset for long-term trending and spatial analyses.

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

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

Data for this monitoring element are provided in Table 10.

2.4 Stormwater Monitoring

The City has collected water quality samples from a number of sites throughout the MS4 system since 1995. Following the current monitoring plan and strategy, there are three monitoring sites, one for each of the land uses of residential, commercial, and industrial use. The commercial and industrial sites are new, while the residential site was also sampled during the previous MS4 Permit cycle. Data from this monitoring element are intended to be aggregated with previous data from similar land use types. The aggregated datasets will be used to characterize MS4 stormwater runoff pollutant concentrations.

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

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

Data for this monitoring element are provided in Table 11.

2.5 Pesticide Monitoring

Monitoring for the presence of pesticides in MS4 stormwater runoff is a new requirement of the MS4 Permit. Pesticide monitoring occurs at the same three sites where Stormwater monitoring is conducted. Consistent with Table B-1 of the MS4 Permit, halogenated pesticide and chlorinated herbicide screens are performed. For the July 1st, 2011, thru June 30th, 2012, reporting period, one set of pesticide samples were collected at each of the three sites. In addition to the requirements of Table B-1, additional analyses included: organophosphorous, organosulfur, organonitrogen, phenylurea, and carbamate pesticide screens. This resulted in a screening for 188 pesticides at each site.

Detected pesticides are summarized in Table 12, and a complete data report is provided in Attachment A.

2.6 Stormwater-Mercury Monitoring

Monitoring of low-level mercury and methyl mercury (total recoverable and dissolved) in MS4 discharges during storm events is a new requirement of the MS4 Permit. Monitoring occurs twice per year at the residential and commercial land use sites for Stormwater and Pesticide

monitoring. EPA Method 1669 ultra clean sampling protocol was followed to collect all samples.

Due to the monitoring plan not being approved by the DEQ until June 29th, 2011, and insufficient runoff-producing rain events, staff were unable to conduct sampling during the summer of 2011. However, both a winter and summer storm was sampled in 2012.

The DEQ provided a table[3] that contained the parameters listed below that DEQ staff collect during low-level mercury sampling. It was decided that it would be in the best interest of the city to collect these additional parameters while performing the low-level mercury monitoring. However, since the table of parameters was received after the collection of samples for the winter storm, Staff were only able to collect these additional parameters during the June 2012 sampling event. For all future low-level mercury monitoring, City staff will collect the following surrogate parameters:

- TSS
- Dissolved Organic Carbon (DOC)
- Total Organic Carbon (TOC)
- Sulfate
- Temperature
- pH
- Redox
- DO
- Alkalinity
- Conductivity
- Light Extinction Coefficient

Mercury data collected for this monitoring element are provided in Table 13 and additional data collected are provided in Table 14.

2.7 Benthic Macroinvertebrate Monitoring

Benthic Macroinvertebrate Monitoring is a new requirement of the MS4 Permit. Sampling for this monitoring element was conducted at sites along Pringle and Clark Creeks. The three sites, two on Pringle Creek and one on Clark Creek, were selected because of their close proximity to where benthic macroinvertebrate and physical habitat data were collected during 2000 and 2001.

The City utilized a consultant, Pacific Habitat Services, to collect benthic macroinvertebrates and physical habitat data, and also conduct fish sampling. Data collection was performed in June 2012, and is anticipated to occur again in June 2013 at the same sites. A summary of collected data is provided in Tables 15 through 17, and the complete data report is provided in Appendix B.

[3] Table provided in an email, dated May 7th, 2012, from Agnes Lut, Oregon DEQ Willamette Basin Phase 2 Mercury TMDL Coordinator.

In addition to the benthic macroinvertebrate monitoring required by the MS4 Permit, the same consultant conducted benthic macroinvertebrate sampling, physical habitat collection, and fish sampling in the vicinity of Waln Creek and Battle Creek. A technical memorandum and collected data are provided in Attachment C. Sampling was conducted in September 2011 to provide a "before" look at aquatic conditions and communities in these two streams prior to development of a large restoration project. The project included widening, terracing, and reshaping a portion of Waln Creek to add sinuosity, as well as adding large root balls and native plants to sections of both streams. The restoration project began in the summer of 2012. A similar data collection effort will occur once the project is completed and stabilized.

2.8 Willamette River Water Quality Data

Willamette River Water Quality Data is collected by staff at the City's Willow Lake Water Pollution Control Facility upstream and downstream of the treatment plant to document any affects that the effluent may have on the Willamette River. This monitoring *is not* a requirement of the MS4 Permit, nor is it identified in the monitoring plan. However, collected data are being provided because the Willamette River water quality sampling program is referenced in the City of Salem Stormwater Management Plan 2010 (Best Management Practice MON1 Task 2).

Willamette River water quality data are provided in Table 18.

3.0 EPA Additions to the 2010 303(d) Integrated Report

In April 2012, City staff reviewed the Environmental Protection Agency's (EPA) proposed additions to the 2010 303(d) Integrated Report. A number of discrepancies were found, and as a result, concerns and comments were provided in a letter to the EPA. A copy of the letter, dated April 27th, 2012, is provided in Attachment D. To date, the City has not received any response from the EPA on the comments provided or a final determination of whether additional waters will be added to the 2010 303(d) Integrated Report.

4.0 Conclusion

The City completed monitoring required for this reporting year by the MS4 Permit, and is on track to meet all of the minimum monitoring requirements due before MS4 Permit expiration (December 29, 2015). Cumulatively, data collected throughout this MS4 Permit cycle will be utilized to meet monitoring objectives identified in the City's monitoring plan, while also supporting data analyses that will be conducted in preparation of a MS4 Permit renewal package.

Table 1.

Progress Towards Completion of Table B-1 Environmental Monitoring Elements

Monitoring Type	# of sites	Total "Events" Needed	Completed 2010/2011	Completed 2011/2012	Remaining
Monthly Instream	21	48 / site	12[1]	12[1]	24[1]
Continuous Instream	10	On going	NA	NA	NA
Instream Storm	3	25 / site	0[3]	6	19
Stormwater (MS4)	3	15 / site	0[3]	4	11
Pesticides	3	4 / site	0[3]	1	3
Mercury	2	2 / site / year	0[3]	2	2[2]
Macroinvertebrates	3	2 / site	0[3]	1	1

[1] 5 of the 21 sites had less than 12 data collection events due to no flow or access issues; however, all sites are on pace to meet the minimum permit requirements

[2] Following Table B-1 Special Condition #6 of the City's NPDES MS4 permit, the City anticipates requesting of the Department to eliminate the mercury and methyl mercury monitoring requirement after two years of monitoring.

[3] Because the monitoring plan was not approved by the Department until June 29th, 2011, no sampling was conducted for this element

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

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
MIC3	North Salem High School
MIC12	Turner Rd SE
PRI3[1]	Pringle Park
PRI12[1]	Trelstad Ave SE

[1] Instream Storm sampling done at these sites

Stormwater / Pesticides / Mercury	
Site Id	Site Location
Electric	Electric St. SE and Summer St. SE
Hilfiker	Hilfiker Ln. SE and Commercial St. SE
Salem Industrial[1]	Salem Industrial Dr. NE and Hyacinth St. NE

[1] Mercury monitoring not done at this site

Willamette River	
Site ID	Site Location (Approximate River Mile)
Wheatland Ferry	71
Spongs Landing	77
WLTP[1]	78
Sunset Park	81
Mill Creek	82.9
Railroad Bridge[2]	83

[1] Willow Lake Pollution Control Facility- 150 feet downstream from effluent diffuser

[2] Field duplicates taken at this site

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

Table 3.
Parameters for Each Monitoring Element

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

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

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

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*, Croisan Creek*, Glenn Creek*, West Fork Little Pudding River*
	October 1- May 31	Spawning: Not less than 11.0 mg/L or 95% saturation	Gibson Creek*□ , Glenn Creek
	October 15 - May 15	Spawning: Not less than 11.0 mg/L or 95% saturation	Mill Creek, Pringle Creek*[1], Shelton Ditch*
	Year Around (Non-spawning)	Cold water: Not less than 8.0 mg/L or 90% saturation	Battle Creek*, Croisan Creek*, Clark Creek, Pringle Creek[2]
		Cool water: Not less than 6.5 mg/L	Claggett Creek*, Glenn Creek*, Mill Creek, Pringle Creek[1], Shelton Ditch, West Fork Little Pudding River
pH	Year Around	Must be within the range of 6.5 to 8.5 pH units	All Monitoring Streams
Temperature	October 15 - May 15	Salmon and steelhead spawning: 13˚C 7-day average maximum	Mill Creek*, Pringle Creek[1], 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
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*[3]
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*[3]
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*[3]

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

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

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

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

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

[3] Applies to Pringle Creek from river mile 0 to 6.2

Table 5.
Median Values for Monthly Instream Sites (Reporting Year 2011/12)

Station	Number of Samples	Temperature (C)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTUs)	pH (S.U.)	E. Coli (MPN/100 mL)	NO_3+NO_2-N (mg/L)	BOD_{stream} (mg/L)
BAT 1	12	10.1	10.5	47.2	9.2	7.2	254.0	0.75	1.25
BAT 12	12	9.3	10.4	42.4	7.2	7.3	216.5	0.60	1.04
CGT 1	12	13.4	9.9	195.5	5.0	7.0	122.5	0.23	2.00
CGT 5	10	9.7	8.5	117.0	13.6	7.0	518.0	0.26	1.82
CLA 1	12	11.6	10.6	89.7	5.3	7.0	287.0	0.79	2.00
CLA 10	12	12.3	9.9	69.9	4.4	7.0	278.0	1.40	1.79
CRO 1	12	9.1	10.6	69.3	8.4	7.1	326.5	0.47	1.22
CRO 10	12	9.6	9.6	49.9	8.0	7.2	43.5	0.42	1.17
GIB 1	12	11.7	9.8	88.2	9.1	7.0	82.0	1.21	1.41
GIB 15	12	11.4	9.9	94.7	10.0	7.1	83.5	2.10	1.23
GLE 1	12	11.4	9.5	98.3	8.1	7.0	269.5	0.84	1.59
GLE 10	12	10.6	10.5	66.3	8.0	7.2	56.0	0.82	1.03
LPW 1	8	9.5	10.6	173.3	15.6	6.9	375.0	0.54	1.64
MIC 1	12	11.0	10.7	73.2	6.3	7.2	186.0	0.81	1.47
MIC 10	12	10.3	11.0	72.0	6.6	7.1	120.5	0.85	1.47
MRA 1	12	11.0	11.2	73.7	6.9	7.0	146.0	0.82	1.62
MRA 10	12	10.5	10.3	73.2	6.9	6.8	170.5	0.79	1.37
PRI 1	12	10.8	11.2	72.8	6.7	7.0	166.0	0.83	1.61
PRI 5	12	11.3	10.6	81.0	5.8	7.1	164.5	0.75	1.84
SHE 1	12	10.6	11.0	73.1	7.1	7.0	96.0	0.82	1.42
SHE 10	11	10.9	10.6	69.6	7.2	6.7	129.0	0.79	2.00

Table 6.

Water Quality Criteria Exceedances for Monthly Instream Sites (Reporting Year 2011/12)

Station	Number of Samples	DO	pH	E. Coli			Copper		Lead		Zinc	
				Total #	Dry[2]	Rain[3]	Total	Dissolved	Total	Dissolved	Total	Dissolved
BAT 1	12	5	1	3	3	0						
BAT 12	12	2	0	1	1	0						
CGT 1	12	4	0	5	2	3						
CGT 5	10	4	0	7	4	3						
CLA 1	12	0	1	5	2	3	3	1	0	0	2	0
CLA 10	12	0	0	4	2	2	3	0	0	0	2	0
CRO 1	12	3	0	3	2	1						
CRO 10	12	1	1	0	0	0						
GIB 1	12	6[1]	1	2	0	2						
GIB 15	12	4[1]	0	2	2	0						
GLE 1	12	3	2	4	2	2						
GLE 10	12	3	0	1	1	0						
LPW 1	8	4	0	4	2	2						
MIC 1	12	3	0	1	0	1						
MIC 10	12	2	0	2	1	1						
MRA 1	12	NA	2	2	1	1						
MRA 10	12	NA	4	1	0	1						
PRI 1	12	1	3	1	0	1	0	0	0	0	1	0
PRI 5	12	3	2	2	1	1	0	1	0	0	1	0
SHE 1	12	2	3	1	0	1						
SHE 10	11	2	5	2	1	1						

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

NA = Not available (City staff was unable to find dissolved oxygen water quality criteria associated with this waterbody)

[1] City staff was unable to find year around 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

Table 7.
Monthly Instream Data

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours
BAT 1	7/19/2011	10:55	Cloudy/No Rain	SC	15.5	8.45	51.4	8.4	6.41	1046	0.64	2		0.01
BAT 1	8/16/2011	11:10	Sunny	SC	16.6	8.39	54.6	9	6.64	816	0.39	2		0
BAT 1	9/20/2011	11:00	Sunny	JVH	14.6	7.31	65	14.8	7.03	1553	0.38	2.7		0
BAT 1	10/18/2011	11:10	Sunny	JVH	11.2	9.35	54.5	9.5	7	228	0.54	2		0
BAT 1	11/8/2011	10:50	Sunny	JVH	8.6	10.19	53.5	8.6	7.18	179	0.5	0.87		0.04
BAT 1	12/6/2011	11:05	Cloudy/No Rain	JVH	5.4	11.37	47.5	7.2	7.44	108	1.02	1.29		0
BAT 1	1/24/2012	11:00	Heavy Rain	JVH	7.6	10.89	41.2	25.6	7.53	248	1.29	1.14		0.41
BAT 1	2/14/2012	11:05	Cloudy/No Rain	JVH	7.6	10.9	45.7	12.2	7.2	70	1.06	0.8		0.04
BAT 1	3/13/2012	11:25	Heavy Rain	JVH	6.4	11.06	40.6	22.3	7.22	365	0.86	1.23		1.76
BAT 1	4/17/2012	11:30	Cloudy/No Rain	JVH	8.9	10.87	44.2	6.6	7.26	99	1.05	1.04		0
BAT 1	5/15/2012	11:15	Sunny	JVH	12.6	10.01	43.6	7.5	7.32	326	0.91	0.74	Ducks, Geese upstream	0
BAT 1	6/12/2012	11:20	Cloudy/No Rain	JVH	13.9	9.24	46.8	9.4	7.22	260	0.58	1.27		0.14
Median					**10.05**	**10.1**	**47.15**	**9.2**	**7.21**	**254**	**0.75**	**1.25**		

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours
BAT 12	7/19/2011	10:30	Cloudy/No Rain	SC	15.5	9.07	44.7	7	6.56	308	0.36	2		0.01
BAT 12	8/16/2011	10:35	Sunny	SC	16.2	8.92	47.7	9.6	6.75	308	0.17	2		0
BAT 12	9/20/2011	10:45	Sunny	JVH	14.2	8.66	55.7	10	7.14	205	0.08	2		0
BAT 12	10/18/2011	10:50	Sunny	JVH	10.1	9.93	48.5	8.7	7.21	921	0.21	2		0
BAT 12	11/8/2011	10:30	Sunny	JVH	8.0	10.45	46.6	6	7.29	272	0.21	0.81		0.04
BAT 12	12/6/2011	10:45	Cloudy/No Rain	JVH	5.4	11.78	42.5	4.6	7.48	63	1.04	1.12		0
BAT 12	1/24/2012	10:40	Heavy Rain	JVH	7.4	10.9	41.5	17.8	7.47	54	1.73	0.95		0.41
BAT 12	2/14/2012	10:45	Cloudy/No Rain	JVH	7.2	11.22	42.2	4.9	7.27	38	1.29	0.8		0.04
BAT 12	3/13/2012	11:05	Heavy Rain	JVH	6.1	11.1	39.7	15.4	7.21	48	1.27	0.68		1.76
BAT 12	4/17/2012	11:15	Cloudy/No Rain	JVH	8.5	11.05	38.5	5.9	7.3	57	1.02	1.2		0
BAT 12	5/15/2012	11:00	Sunny	JVH	12.0	10.27	38.5	6.8	7.3	228	0.82	0.72		0
BAT 12	6/12/2012	11:00	Cloudy/No Rain	JVH	13.4	9.77	40	7.3	7.4	238	0.37	0.82		0.14
Median					**9.3**	**10.36**	**42.35**	**7.15**	**7.28**	**216.5**	**0.60**	**1.04**		

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

Table 7.
Monthly Instream Data

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours
CGT 1	7/19/2011	13:45	Cloudy/No Rain	SC	19.8	7.45	191.1	4.0	6.84	108	0.23	2		0.01
CGT 1	8/16/2011	13:35	Sunny	SC	22.8	8.11	232	4.8	6.97	2420	0.11	2		0
CGT 1	9/20/2011	13:35	Sunny	JVH	19.4	9.95	243	4	7.08	687	0.07	2		0
CGT 1	10/18/2011	13:50	Sunny	JVH	14.9	7.67	238	3.7	6.98	58	0.14	2	dam upstream	0
CGT 1	11/8/2011	13:35	Cloudy/No Rain	JVH	11.3	5.75	209.6	3.9	6.99	23	0.12	1.45	dam upstream	0.03
CGT 1	12/6/2011	13:55	Cloudy/No Rain	JVH	6.1	7.77	199.8	3.9	7.04	24	0.51	1.49		0.01
CGT 1	1/24/2012	13:55	Heavy Rain	JVH	7.1	10.93	52.6	22.2	7.28	613	0.46	2.1		0.38
CGT 1	2/14/2012	13:40	Cloudy/No Rain	JVH	8.0	9.86	155.6	11.7	6.82	101	0.68	1.2		0.09
CGT 1	3/13/2012	13:55	Heavy Rain	JVH	6.3	11.74	64	26.6	7.22	1203	0.42	2.16		1.63
CGT 1	4/17/2012	13:55	Cloudy/No Rain	JVH	11.9	10.64	169.5	5.2	6.85	137	0.4	1.94		0
CGT 1	5/15/2012	13:55	Sunny	JVH	20.6	12.09	228	6.8	7.18	45	0.17	2.91		0
CGT 1	6/12/2012	13:55	Cloudy/No Rain	JVH	18.1	10.34	174.2	6.9	7.06	687	0.22	2.44		0.14
Median					**13.4**	**9.91**	**195.45**	**5**	**7.02**	**122.5**	**0.23**	**2**		

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours
CGT 5	7/19/2011	13:25	Cloudy/No Rain	SC	17.3	6.15	120.6	9.3	6.84	579	0.14	2		0.01
CGT 5	8/16/2011	13:20	Sunny	SC									No Flow	0
CGT 5	9/20/2011	13:20	Sunny	JVH									No Flow	0
CGT 5	10/18/2011	13:30	Sunny	JVH	12.4	3.89	98.7	36.9	7.01	435	0.05	2.8	dam upstream	0
CGT 5	11/8/2011	13:05	Cloudy/No Rain	JVH	8.9	7.32	72.4	10.8	7.09	107	0.05	1.46	dam upstream	0.03
CGT 5	12/6/2011	13:40	Cloudy/No Rain	JVH	2.3	9.66	149.9	16.3	7.18	345	0.46	1.59		0.01
CGT 5	1/24/2012	13:25	Heavy Rain	JVH	7.3	10.74	59	24.5	7.27	548	0.59	1.61		0.38
CGT 5	2/14/2012	13:25	Cloudy/No Rain	JVH	8.1	11.1	139.4	21.7	6.87	238	0.74	1.45		0.09
CGT 5	3/13/2012	13:40	Cloudy/No Rain	JVH	6.5	11.65	66.7	26.8	6.98	548	0.52	1.96		1.63
CGT 5	4/17/2012	13:40	Cloudy/No Rain	JVH	10.5	11.8	151.2	6	6.91	488	0.33	2		0
CGT 5	5/15/2012	13:35	Sunny	JVH	16.1	5.89	217.8	8.4	6.9	579	0.09	1.67		0
CGT 5	6/12/2012	13:35	Cloudy/No Rain	JVH	16.8	7.42	113.3	10.8	7.02	1986	0.19	2.32		0.14
Median					**9.7**	**8.54**	**116.95**	**13.55**	**7.00**	**518**	**0.26**	**1.82**		

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

Table 7.
Monthly Instream Data

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours	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
CLA 1	7/19/2011	10:50	Cloudy/No Rain	BF	16.1	9.27	90.5	4.2	6.98	313	0.88	2		0.01	<0.0050	<0.0050	<0.0005	<0.0010	0.0115	<0.0100	30
CLA 1	8/16/2011	10:55	Sunny	JVH	16.2	9.3	93.7	3	7.03	166	0.65	2		0	<0.0025	<0.0025	<0.0005	<0.0005	0.003	<0.0025	30
CLA 1	9/20/2011	11:10	Sunny	BF	15.4	9.43	94.1	7.8	6.86	1120	0.57	2		0	<0.0050	<0.0050	<0.0005	<0.0005	<0.0100	<0.0100	30
CLA 1	10/18/2011	11:30	Sunny	BF	12.7	10.08	91.3	3.3	6.5	261	0.76	2		0	<0.002	<0.0025	<0.0010	<0.0010	0.004	0.0026	28
CLA 1	11/8/2011	10:35	Cloudy/No Rain	BF	10.3	10.82	89.1	1.7	5.9	248	0.82	0.66		0.04	<0.0025	<0.0025	<0.0010	<0.0010	0.0053	0.0047	30
CLA 1	12/6/2011	11:15	Cloudy/No Rain	BF	7	11.82	93.3	6.5	6.75	85	1.06	1.36		0	<0.0025	<0.0025	<0.0005	<0.0005	0.0062	0.0056	26
CLA 1	1/24/2012	10:40	Heavy Rain	BF	7.8	11.43	50.6	27.3	6.97	866	0.57	2.21		0.41	0.0047	<0.0025	0.0037	<0.0010	0.031	0.0133	16
CLA 1	2/14/2012	10:40	Sunny	BF	9	11.09	88.8	9.5	7.09	461	1.27	1.25		0.04	0.0026	<0.0025	0.0008	<0.0005	0.0209	0.0106	34
CLA 1	3/13/2012	11:30	Heavy Rain	BF	6	11.85	46.7	30.5	7.15	548	0.62	2.71		1.76	0.0061	<0.0025	0.0049	<0.0005	0.0569	0.0192	14
CLA 1	4/17/2012	11:10	Cloudy/No Rain	BF	10.5	11.24	90.2	3.8	7.1	148	1.13	1.39		0	<0.0025	<0.0025	<0.0005	<0.0005	0.009	0.0085	29
CLA 1	5/15/2012	11:00	Sunny	BF	13.5	10.28	87.9	4.5	7.57	222	1	1.13		0	<0.00250	<0.00250	<0.0005	<0.0005	0.0113	0.0085	26
CLA 1	6/12/2012	10:15	Light Rain	BF	14.9	9.29	71.7	6	7.22	2420	0.68	2.97		0.14	0.0074	0.006	<0.0010	<0.0010	0.0126	0.0103	23
Median					**11.6**	**10.55**	**89.65**	**5.25**	**7.01**	**287**	**0.79**	**2**									**28.5**

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours	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
CLA 10	7/19/2011	9:00	Cloudy/No Rain	SC	14.9	9.15	69.7	4.1	6.57	1120	1.62	2		0.01	<0.0050	<0.0025	0.0005	<0.0010	0.0126	<0.0100	18
CLA 10	8/16/2011	9:15	Sunny	SC	15.6	9.16	70.7	4.7	6.71	308	1.41	2		0	<0.0025	<0.0025	<0.0005	<0.0005	0.0036	0.0029	20
CLA 10	9/20/2011	9:40	Sunny	JVH	14.8	9.14	73.6	5.5	6.97	1120	1.29	2		0	<0.0050	<0.0050	<0.0005	<0.0005	<0.0100	<0.0100	21
CLA 10	10/18/2011	9:50	Sunny	JVH	13.6	9.43	70.1	3.7	6.96	205	1.48	2		0	<0.002	<0.0025	<0.0005	<0.0005	0.005	0.0039	21
CLA 10	11/8/2011	9:35	Cloudy/No Rain	JVH	12.1	9.96	68.7	3.2	7.11	248	1.37	0.54		0.04	<0.0025	<0.0025	<0.0005	<0.0010	0.0058	0.005	20
CLA 10	12/6/2011	9:50	Cloudy/No Rain	JVH	10.1	10.27	70.9	2.3	7.04	34	1.57	1		0	<0.0025	<0.0025	<0.0005	<0.0005	0.008	0.0061	21
CLA 10	1/24/2012	9:45	Heavy Rain	JVH	7.6	11.26	38.5	20.1	7.12	1986	0.91	1.58		0.41	0.0033	<0.0025	0.0019	<0.0010	0.0211	0.011	12
CLA 10	2/14/2012	9:50	Cloudy/No Rain	JVH	8.9	10.61	56.1	56.5	6.93	387	0.77	2.43	turbid	0.04	0.007	<0.0025	0.0024	<0.0005	0.0544	0.0177	28
CLA 10	3/13/2012	10:15	Heavy Rain	JVH	8.4	10.73	60.5	11.4	6.91	1553	1.39	0.9		1.76	<0.0025	<0.0025	<0.0005	<0.0005	0.0144	0.0116	16
CLA 10	4/17/2012	10:10	Cloudy/No Rain	JVH	10.5	10.34	71	2.5	6.92	31	1.65	1.12		0	<0.0025	<0.0025	<0.0005	<0.0005	0.0067	0.0075	16
CLA 10	5/15/2012	9:55	Sunny	JVH	12.4	9.86	69	3.7	6.97	22	1.71	0.87		0	0.0066	0.0038	<0.0005	<0.0005	0.0088	0.0096	21
CLA 10	6/12/2012	9:55	Light Rain	JVH	13.5	9.01	71.1	5.2	7.01	197	1.33	4.16		0.14	0.0033	0.0025	<0.0010	<0.0010	0.0211	0.0196	21
Median					**12.25**	**9.91**	**69.9**	**4.4**	**6.97**	**278**	**1.4**	**1.79**									**20.5**

Note: Data in red exceed applicable water quality criteria (see Table 4). Medians not calculated for metals due to the large number of censored values

Table 7.
Monthly Instream Data

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours
CRO 1	7/19/2011	9:25	Cloudy/No Rain	SC	15.4	8.36	81.5	8.7	6.92	345	0.4	2		0.01
CRO 1	8/16/2011	9:45	Sunny	SC	15.4	7.24	90.6	20.5	6.88	517	0.33	2	shallow	0
CRO 1	9/20/2011	10:00	Sunny	JVH	13.7	7.28	97.5	9.1	7.04	308	0.26	2		0
CRO 1	10/18/2011	10:05	Sunny	JVH	9.5	9.74	89.9	5.9	7.07	345	0.37	2		0
CRO 1	11/8/2011	9:55	Cloudy/No Rain	JVH	7.5	10.71	84.2	3.8	7.22	1414	0.27	0.71		0.04
CRO 1	12/6/2011	10:05	Cloudy/No Rain	JVH	4	12.19	69.6	3.5	7.31	86	0.85	1.51		0
CRO 1	1/24/2012	10:00	Heavy Rain	JVH	7.5	11.45	53.2	25.7	7.26	126	1.31	0.89		0.41
CRO 1	2/14/2012	10:05	Cloudy/No Rain	JVH	7.1	11.57	61.4	8.1	7.03	55	0.92	0.82		0.04
CRO 1	3/13/2012	10:35	Heavy Rain	JVH	6.5	11.48	57.8	26.3	7.25	155	0.93	0.92		1.76
CRO 1	4/17/2012	10:35	Cloudy/No Rain	JVH	8.7	11.4	59.7	5.5	7.06	23	0.63	1.33		0
CRO 1	5/15/2012	10:10	Sunny	JVH	12.2	10.39	64.1	6.3	6.98	345	0.54	0.94		0
CRO 1	6/12/2012	10:10	Cloudy/No Rain	JVH	13.6	9.5	68.9	9.5	7.13	1733	0.31	1.1		0.14
Median					**9.1**	**10.55**	**69.25**	**8.4**	**7.07**	**326.5**	**0.47**	**1.22**		

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours
CRO 10	7/19/2011	9:50	Cloudy/No Rain	SC	14.7	8.7	59.8	7.5	6.45	61	0.3	2		0.01
CRO 10	8/16/2011	10:10	Sunny	SC	14.4	8.11	67	8.5	6.52	64	0.25	2		0
CRO 10	9/20/2011	10:25	Sunny	JVH	12.8	8.73	71.3	10.9	7.03	172	0.14	2	stagnant	0
CRO 10	10/18/2011	10:30	Sunny	JVH	10.4	8.8	62.8	10.8	7.03	140	0.19	2		0
CRO 10	11/8/2011	10:15	Sunny	JVH	8	9.26	59.8	5	7.19	19	0.08	1.2		0.04
CRO 10	12/6/2011	10:30	Cloudy/No Rain	JVH	4.6	11.32	49.4	4.3	7.2	19	0.94	1.53		0
CRO 10	1/24/2012	10:20	Heavy Rain	JVH	7.3	11.18	46.7	20.3	7.47	22	1.56	1		0.41
CRO 10	2/14/2012	10:25	Cloudy/No Rain	JVH	6.9	11.25	45.6	6.5	7.11	10	1.03	0.51		0.04
CRO 10	3/13/2012	10:50	Heavy Rain	JVH	6.1	11.38	45.3	21	7.29	55	1.24	1.05		1.76
CRO 10	4/17/2012	10:55	Cloudy/No Rain	JVH	8.7	11.01	43.5	6.6	7.13	11	0.7	1.14		0
CRO 10	5/15/2012	10:45	Sunny	JVH	12.6	9.76	46.3	7.1	7.28	32	0.54	0.75		0
CRO 10	6/12/2012	10:30	Cloudy/No Rain	JVH	13.2	9.35	50.4	8.9	7.2	261	0.27	0.87		0.14
Median					**9.55**	**9.56**	**49.9**	**8**	**7.16**	**43.5**	**0.42**	**1.17**		

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

Table 7.
Monthly Instream Data

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours
GIB 1	7/19/2011	11:35	Cloudy/No Rain	BF	17.2	7.95	104.4	8.2	6.91	131	0.97	2		0
GIB 1	8/16/2011	13:15	Sunny	JVH	16.3	7.84	111.1	7.5	6.98	59	0.58	2	stagnant	0
GIB 1	9/20/2011	13:20	Sunny	BF	15.8	7.36	116.3	9.9	6.89	93	0.33	2	slow current	0
GIB 1	10/18/2011	13:20	Sunny	BF	12.9	9.22	121.1	21.1	7.17	81	1.09	2		0
GIB 1	11/8/2011	12:35	Cloudy/No Rain	BF	8.5	10.18	116.8	5.3	6.1	59	1.13	0.92		0
GIB 1	12/6/2011	13:20	Cloudy/No Rain	BF	4.5	11.94	86.3	5.8	7.37	14	1.37	1.52		0
GIB 1	1/24/2012	13:15	Heavy Rain	BF	8.5	10.84	71.8	28.2	7.07	83	1.59	1.03		0.31
GIB 1	2/14/2012	12:45	Cloudy/No Rain	BF	8.9	10.94	78.7	10.7	6.85	488	1.63	1.06		0.16
GIB 1	3/13/2012	13:20	Cloudy/No Rain	BF	7.1	11.11	70.5	45.7	7.25	921	1.29	1.39		1.47
GIB 1	4/17/2012	13:15	Cloudy/No Rain	BF	10.5	10.85	78.8	7.3	7.15	14	1.48	1.43		0
GIB 1	5/15/2012	13:10	Sunny	BF	16.8	9.4	80.1	12.5	7.33	76	1.36	0.79		0
GIB 1	6/12/2012	13:00	Light Rain	BF	16	8.55	90.1	8.3	7.02	118	0.83	1.01		0.1
Median					**11.7**	**9.79**	**88.2**	**9.1**	**7.05**	**82**	**1.21**	**1.41**		

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours
GIB 15	7/19/2011	13:45	Cloudy/No Rain	BF	17.9	8.51	113.8	NA	7.06	190	2.58	2	Turbidity sensor error. No readings.	0
GIB 15	8/16/2011	13:35	Sunny	JVH	20.2	7.94	112.8	15.6	7.13	816	1.57	2		0
GIB 15	9/20/2011	13:35	Sunny	BF	17.1	8.3	117.3	31.2	7.2	2420	0.61	2.3	little flow	0
GIB 15	10/18/2011	13:40	Sunny	BF	12.6	9.1	95	18	7.11	161	1.01	2		0
GIB 15	11/8/2011	12:46	Cloudy/No Rain	BF	7.9	10.44	103.6	5.2	6.55	53	0.81	1.22		0
GIB 15	12/6/2011	13:30	Cloudy/No Rain	BF	4.6	11.61	94.4	8	7.25	26	2.54	1.59		0
GIB 15	1/24/2012	13:30	Heavy Rain	BF	8.6	10.86	81.7	29.8	7.05	46	2.48	0.8		0.31
GIB 15	2/14/2012	13:10	Cloudy/No Rain	BF	8.3	11.22	87.5	9.7	6.52	33	2.17	1.11		0.16
GIB 15	3/13/2012	13:30	Heavy Rain	BF	7.4	11.19	73.6	48.4	7.26	248	1.68	1.07		1.47
GIB 15	4/17/2012	13:30	Cloudy/No Rain	BF	10.2	11.11	88.6	6	7.33	19	2.44	1.23		0
GIB 15	5/15/2012	13:20	Sunny	BF	16.1	9.43	90.6	10	7.28	114	2.34	1.23		0
GIB 15	6/12/2012	13:20	Light Rain	BF	16.3	9	99.3	8.2	7.15	43	2.03	1		0.1
Median					**11.4**	**9.94**	**94.7**	**10**	**7.14**	**83.5**	**2.1**	**1.23**		

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

Table 7.
Monthly Instream Data

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours
GLE 1	7/19/2011	11:55	Cloudy/No Rain	BF	16.1	8.55	112.6	8.9	6.95	387	0.93	2		0
GLE 1	8/16/2011	13:00	Sunny	JVH	17.2	7.81	126.4	7.4	7	435	0.67	2	stagnant	0
GLE 1	9/20/2011	13:00	Sunny	BF	15.9	7.82	137.9	8.8	6.6	435	0.57	2	almost dry	0
GLE 1	10/18/2011	13:00	Sunny	BF	12.8	9.15	120.4	11	6.72	156	0.71	2		0
GLE 1	11/8/2011	12:15	Cloudy/No Rain	BF	9.9	9.79	107.4	5.5	6.07	194	0.45	1.14		0
GLE 1	12/6/2011	13:00	Cloudy/No Rain	BF	5.3	11.83	105.6	3.6	7.36	29	1.27	1.58		0
GLE 1	1/24/2012	13:00	Heavy Rain	BF	8.2	11.1	75	30.2	7.01	148	1.51	1.21		0.31
GLE 1	2/14/2012	12:30	Sunny	BF	8.2	11.2	81.3	24.1	6.1	345	1.24	1.62		0.16
GLE 1	3/13/2012	13:00	Cloudy/No Rain	BF	7	11.38	69.2	38.6	7.15	411	0.98	1.37		1.47
GLE 1	4/17/2012	13:00	Cloudy/No Rain	BF	9.9	11.18	80.3	6.3	7.44	23	1.41	1.5		0
GLE 1	5/15/2012	12:45	Sunny	BF	16.2	9.22	87.9	5.6	6.95	172	0.74	1.09		0
GLE 1	6/12/2012	12:45	Light Rain	BF	15.2	9.09	91	6.6	7.26	488	0.68	1.59		0.1
Median					**11.35**	**9.51**	**98.3**	**8.1**	**6.98**	**269.5**	**0.84**	**1.59**		

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours
GLE 10	7/19/2011	14:25	Cloudy/No Rain	BF	14.6	9.47	72.4	NA	6.83	88	0.57	2	Turbidity error. No readings.	0
GLE 10	8/16/2011	13:55	Sunny	JVH	15	8.56	91.6	5.2	7.02	276	0.32	2		0
GLE 10	9/20/2011	13:55	Sunny	BF	13.9	8.47	118.8	26.9	7.25	1553	0.06	2		0
GLE 10	10/18/2011	14:00	Sunny	BF	11.7	8.24	89.8	3.8	7.45	129	0.14	2		0
GLE 10	11/8/2011	13:10	Cloudy/No Rain	BF	8	10.87	78.8	4.5	6.75	58	0.13	0.99		0
GLE 10	12/6/2011	14:00	Cloudy/No Rain	BF	4.8	11.98	68.6	4.4	7.3	26	1.16	1.06		0
GLE 10	1/24/2012	13:50	Heavy Rain	BF	8	11.26	53.8	19.5	7.24	25	1.8	0.82		0.31
GLE 10	2/14/2012	13:30	Cloudy/No Rain	BF	7.7	11.38	56.2	12.7	6.65	31	1.28	0.79		0.16
GLE 10	3/13/2012	13:50	Heavy Rain	BF	6.9	11.46	54.9	40.1	7.37	125	1.56	0.97		1.47
GLE 10	4/17/2012	13:50	Cloudy/No Rain	BF	9.4	11.21	53.9	8	7.24	14	1.29	1.12		0
GLE 10	5/15/2012	13:45	Sunny	BF	13.2	10.09	57.2	8.1	7.43	54	1.03	0.74		0
GLE 10	6/12/2012	13:45	Light Rain	BF	13.6	10	64	6.6	7.6	52	0.61	0.81		0.1
Median					**10.55**	**10.48**	**66.3**	**8**	**7.25**	**56**	**0.82**	**1.03**		

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

Table 7.
Monthly Instream Data

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours	TSS
LPW 1	7/19/2011	13:00	Cloudy/No Rain	SC	18.4	4.25	152.2	26.2	6.7	770	0.14	7.3	Looks really bad and stagnant	0.01	27
LPW 1	8/16/2011	13:10	Sunny	SC									No Flow	0	
LPW 1	9/20/2011	13:10	Sunny	JVH									No Flow	0	
LPW 1	10/18/2011	13:15	Sunny	JVH									No Flow	0	
LPW 1	11/8/2011	12:45	Cloudy/No Rain	JVH									No Flow	0.03	
LPW 1	12/6/2011	13:00	Cloudy/No Rain	JVH	3.3	10.76	189.8	13.9	7.15	489	0.63	1.56		0.01	10
LPW 1	1/24/2012	13:00	Heavy Rain	JVH	7.3	10.42	85.1	36.4	7.21	261	1.27	1.18		0.38	18
LPW 1	2/14/2012	13:05	Light Rain	JVH	8.2	13.43	197.5	17.3	6.74	65	1.48	1.18	TSS dumped at lab	0.09	
LPW 1	3/13/2012	13:15	Cloudy/No Rain	JVH	6.5	12.14	78.6	58.2	6.93	866	1	1.99		1.63	44
LPW 1	4/17/2012	13:15	Light Rain	JVH	10.8	11.66	164.8	4.3	6.9	238	0.44	1.81		0	4
LPW 1	5/15/2012	13:10	Sunny	JVH	16.6	8.38	277	5.4	6.91	166	0.22	1.36		0	5
LPW 1	6/12/2012	13:10	Cloudy/No Rain	JVH	16.3	5.21	181.8	5.5	6.9	866	0.11	1.72		0.14	20
Median					**9.5**	**10.59**	**173.3**	**15.6**	**6.91**	**375**	**0.54**	**1.64**			**18**

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours
MIC 1	7/19/2011	8:30	Cloudy/No Rain	SC	16.5	9.18	61.6	8.6	7.03	261	0.51	2		0.01
MIC 1	8/16/2011	8:45	Sunny	SC	17.9	9.06	62.2	5.5	7.06	140	0.23	2		0
MIC 1	9/20/2011	9:10	Sunny	JVH	15.5	9.6	56	6.5	7.13	225	0.1	2		0
MIC 1	10/18/2011	9:25	Sunny	JVH	11.4	10.4	84.6	3.8	7.13	276	0.53	2		0
MIC 1	11/8/2011	9:10	Cloudy/No Rain	JVH	8.4	11.32	85.1	3.6	7.2	125	0.77	1.19		0.04
MIC 1	12/6/2011	9:20	Cloudy/No Rain	JVH	4.4	12.66	96.6	3.5	7.23	147	2.99	1.47		0
MIC 1	1/24/2012	9:20	Heavy Rain	JVH	7.4	11.56	77	21.3	7.19	127	2.76	0.91		0.41
MIC 1	2/14/2012	9:20	Light Rain	JVH	7.3	11.67	89.7	7.6	6.92	130	2.59	1.01		0.04
MIC 1	3/13/2012	9:40	Heavy Rain	JVH	5	11.89	68.7	118	7.2	1986	1.32	2.13	high flow, turbid	1.76
MIC 1	4/17/2012	9:45	Cloudy/No Rain	JVH	10.5	10.98	81.6	10.9	7.16	345	1.52	1.47		0
MIC 1	5/15/2012	9:25	Sunny	JVH	15.6	9.48	69.4	4.1	7.19	99	0.85	1.01		0
MIC 1	6/12/2012	9:30	Cloudy/No Rain	JVH	15.7	9.51	57.6	6	7.25	260	0.47	1.06		0.14
Median					**10.95**	**10.69**	**73.2**	**6.25**	**7.18**	**186**	**0.81**	**1.47**		

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

Table 7.
Monthly Instream Data

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours
MIC 10	7/19/2011	11:25	Cloudy/No Rain	SC	16.2	9.48	53.6	8.4	7.08	210	0.36	2		0.01
MIC 10	8/16/2011	11:40	Sunny	SC	18	9.58	53	6.1	7.1	102	0.22	2		0
MIC 10	9/20/2011	12:50	Sunny	JVH	15.8	10.18	49.1	6.5	7.28	86	0.08	2		0
MIC 10	10/18/2011	11:30	Sunny	JVH	11.1	10.64	74.9	4.9	7.18	137	0.53	2		0
MIC 10	11/8/2011	11:15	Sunny	JVH	8.1	11.76	83.4	4.2	7.19	104	0.89	0.95		0.04
MIC 10	12/6/2011	11:30	Cloudy/No Rain	JVH	4.4	12.56	90.4	4.2	7.19	53	3.11	1.34		0
MIC 10	1/24/2012	11:20	Heavy Rain	JVH	7.1	10.88	77.2	21.7	7.03	88	2.99	0.81		0.41
MIC 10	2/14/2012	11:30	Light Rain	JVH	7.2	11.37	85	7.3	6.9	88	2.79	1.22		0.04
MIC 10	3/13/2012	11:45	Heavy Rain	JVH	4.7	11.34	69.1	67.2	6.95	830	1.72	1.94		1.76
MIC 10	4/17/2012	11:50	Cloudy/No Rain	JVH	9.5	11.38	77.5	8.4	7.04	240	1.52	1.59		0
MIC 10	5/15/2012	11:40	Sunny	JVH	14.5	11.17	59	6.7	7.29	435	0.8	1.31		0
MIC 10	6/12/2012	11:40	Cloudy/No Rain	JVH	14.8	9.82	54.9	6.5	7.12	179	0.43	1.06		0.14
Median					**10.3**	**11.025**	**72**	**6.6**	**7.11**	**120.5**	**0.85**	**1.47**		

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours
MRA 1	7/19/2011	10:10	Cloudy/No Rain	BF	16.3	9.45	61	8.4	7.01	261	0.46	2		0.01
MRA 1	8/16/2011	10:20	Sunny	JVH	18	9.3	60.9	6.1	7.18	172	0.22	2		0
MRA 1	9/20/2011	10:05	Sunny	BF	15.4	9.82	52.8	6.7	7.15	131	0.06	2.2		0
MRA 1	10/18/2011	10:30	Sunny	BF	11.1	10.75	75.8	7	6.25	299	0.49	2		0
MRA 1	11/8/2011	9:55	Cloudy/No Rain	BF	8.3	11.62	85	4.2	6.05	91	0.84	0.96		0.04
MRA 1	12/6/2011	10:30	Cloudy/No Rain	BF	4.4	12.83	98.1	4	7.27	87	3	1.56		0
MRA 1	1/24/2012	10:05	Heavy Rain	BF	7.2	11.73	78.3	30	6.66	76	2.75	0.93		0.41
MRA 1	2/14/2012	10:15	Light Rain	BF	7.2	11.94	90.3	9.1	7.05	88	2.66	0.68		0.04
MRA 1	3/13/2012	10:20	Heavy Rain	BF	5.5	12	71.5	91.8	6.68	2420	1.25	2.08		1.76
MRA 1	4/17/2012	10:30	Cloudy/No Rain	BF	10.9	11.83	81.2	11.8	7.39	548	1.74	1.67		0
MRA 1	5/15/2012	10:15	Sunny	BF	15.9	10	68.6	5.9	7.49	161	0.8	1.1		0
MRA 1	6/12/2012	9:50	Light Rain	BF	15.6	9.23	55.1	5	6.9	77	0.41	1.2		0.14
Median					**11**	**11.185**	**73.65**	**6.85**	**7.03**	**146**	**0.82**	**1.62**		

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

Table 7.
Monthly Instream Data

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours
MRA 10	7/19/2011	9:35	Cloudy/No Rain	BF	16.1	8.83	61.1	7.7	7.39	345	0.42	2		0.01
MRA 10	8/16/2011	9:35	Sunny	JVH	17.7	8.63	61.4	5.5	7.04	162	0.18	2		0
MRA 10	9/20/2011	9:25	Sunny	BF	15	9.11	52.7	7.5	6.8	179	0.05	2.5		0
MRA 10	10/18/2011	9:40	Sunny	BF	10.6	9.88	75.9	6.1	6.3	328	0.48	2		0
MRA 10	11/8/2011	9:20	Cloudy/No Rain	BF	8.1	10.64	86	4.7	5.8	147	0.81	1.07		0.04
MRA 10	12/6/2011	9:45	Cloudy/No Rain	BF	4.3	12.34	98.3	4.3	6.4	74	3.01	1.54		0
MRA 10	1/24/2012	9:30	Heavy Rain	BF	7.3	11.2	79.7	21	6.81	93	2.86	1.13		0.41
MRA 10	2/14/2012	9:40	Light Rain	BF	7.1	11.44	90.5	8.1	7.06	88	2.64	1		0.04
MRA 10	3/13/2012	9:45	Heavy Rain	BF	4.9	11.49	70.5	123	6.3	2420	1.45	1.13		1.76
MRA 10	4/17/2012	9:55	Cloudy/No Rain	BF	10.3	11.33	82	10.5	6.77	248	1.73	1.99		0
MRA 10	5/15/2012	9:35	Sunny	BF	15.4	9.63	68.7	5	6.86	142	0.77	1.14		0
MRA 10	6/12/2012	9:20	Light Rain	BF	15.7	8.78	57.4	6.2	7.01	260	0.38	1.2	almost shut off	0.14
Median					**10.45**	**10.26**	**73.2**	**6.85**	**6.81**	**170.5**	**0.79**	**1.37**		

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours	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
PRI 1	7/19/2011	9:50	Cloudy/No Rain	BF	16.2	9.49	60.5	6.4	7.45	326	0.44	2		0.01	<0.0050	<0.0050	<0.0002	<0.0010	0.0146	<0.0100	21
PRI 1	8/16/2011	10:00	Sunny	JVH	17.9	9.58	60.2	5.4	7.17	86	0.24	2		0	<0.0025	<0.0025	<0.0005	<0.0005	<0.0025	<0.0025	21
PRI 1	9/20/2011	9:40	Sunny	BF	15.3	9.82	54	8.4	6.93	276	0.05	2		0	<0.0050	<0.0050	<0.0005	<0.0005	<0.0100	<0.0100	20
PRI 1	10/18/2011	10:00	Sunny	BF	11.2	11.01	76.7	4.4	7.1	185	0.47	2		0	<0.002	<0.0025	<0.0010	<0.0010	<0.002	<0.0025	28
PRI 1	11/8/2011	9:35	Cloudy/No Rain	BF	8.4	11.67	86.4	3.4	5.85	66	0.81	0.85		0.04	0.0052	0.0025	<0.0010	<0.0010	0.0025	<0.0025	31
PRI 1	12/6/2011	10:00	Cloudy/No Rain	BF	4.4	12.87	95.8	6.5	7.11	104	2.9	1.63		0	<0.0025	<0.0025	0.0006	<0.0005	0.0038	0.0025	32
PRI 1	1/24/2012	9:45	Heavy Rain	BF	7.4	11.5	75.5	25	6.1	166	2.52	1.38		0.41	0.0035	<0.0025	0.001	<0.0010	0.039	0.0196	25
PRI 1	2/14/2012	10:00	Light Rain	BF	7	11.83	90.3	8.2	6.82	93	2.68	0.88		0.04	<0.0025	<0.0025	<0.0005	<0.0005	0.0265	0.0196	33
PRI 1	3/13/2012	10:05	Heavy Rain	BF	5.1	11.85	70.1	130	6.1	1300	1.38	2.56		1.76	0.003	<0.0025	0.0012	<0.0005	0.0262	0.0136	22
PRI 1	4/17/2012	10:10	Cloudy/No Rain	BF	10.3	11.31	81.5	9.9	6.95	261	1.5	1.58		0	<0.0025	<0.0025	<0.0005	<0.0005	0.0097	0.0083	28
PRI 1	5/15/2012	9:45	Sunny	BF	15.2	9.9	66.7	6.1	7.32	88	0.85	1		0	<0.00250	<0.00250	<0.0005	<0.0005	0.0053	0.004	27
PRI 1	6/12/2012	9:40	Light Rain	BF	15.7	9.47	59.7	6.9	6.95	166	0.49	1.14		0.14	<0.0025	<0.0025	<0.0010	<0.0010	0.0065	0.0056	22
Median					**10.75**	**11.16**	**72.8**	**6.7**	**6.95**	**166**	**0.83**	**1.61**									**26**

Note: Data in red exceed applicable water quality criteria (see Table 4). Medians not calculated for metals due to the large number of censored values

Table 7.
Monthly Instream Data

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours	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
PRI 5	7/19/2011	11:00	Cloudy/No Rain	BF	18.1	8.81	76	4.1	7.05	236	0.43	2		0.01	0.0059	<0.0050	0.0005	<0.0010	0.046	<0.0100	84
PRI 5	8/16/2011	11:00	Sunny	JVH	18.8	8.74	80.6	4	7.09	291	0.25	2		0	<0.0025	<0.0025	<0.0010	<0.0010	0.0026	<0.0025	28
PRI 5	9/20/2011	11:20	Sunny	BF	17	8.95	83.9	3.9	7.1	921	0.12	2		0	0.0097	<0.0050	0.0033	<0.0005	0.0602	<0.0100	31
PRI 5	10/18/2011	11:20	Sunny	BF	11.8	10.22	81.4	6.6	6.35	98	0.51	2		0	0.004	<0.0025	0.0033	<0.0010	0.035	<0.0025	35
PRI 5	11/8/2011	10:45	Cloudy/No Rain	BF	9	10.95	82.2	4	6.22	156	0.73	1.28		0.04	<0.0025	<0.0025	<0.0010	<0.0010	0.0045	0.0038	37
PRI 5	12/6/2011	11:25	Cloudy/No Rain	BF	5.7	11.9	91.3	8.4	6.88	44	1.22	1.53		0	<0.0025	<0.0025	<0.0005	<0.0005	0.0083	0.0053	31
PRI 5	1/24/2012	10:45	Heavy Rain	BF	7.7	11.05	71	24.3	6.85	326	0.8	1.33		0.41	0.0031	<0.0025	0.0011	<0.0010	0.0198	0.0105	24
PRI 5	2/14/2012	11:00	Sunny	BF	8	11.4	89.5	7.5	6.71	41	1.06	1		0.04	<0.0025	<0.0025	<0.0005	<0.0005	0.015	0.0113	35
PRI 5	3/13/2012	11:15	Heavy Rain	BF	6.5	11.14	65.3	30.5	7.08	173	0.9	1.51		1.76	0.0031	<0.0025	0.0011	<0.0005	0.0267	0.0147	23
PRI 5	4/17/2012	11:00	Cloudy/No Rain	BF	10.8	11.46	78	7.2	7.5	75	0.89	1.84		0	<0.0025	<0.0025	<0.0005	<0.0005	0.0073	0.0061	25
PRI 5	5/15/2012	10:45	Sunny	BF	16.2	10.14	83.7	3.7	7.33	62	0.76	1.93		0	<0.00250	<0.00250	<0.0005	<0.0005	0.0102	0.0069	29
PRI 5	6/12/2012	10:20	Light Rain	BF	16	9.14	71.1	5	7.17	411	0.49	1.83		0.14	0.0076	0.0057	<0.0010	<0.0010	0.0188	0.0176	25
Median					**11.3**	**10.585**	**81**	**5.8**	**7.07**	**164.5**	**0.75**	**1.835**									**30**

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours
SHE 1	7/19/2011	10:30	Cloudy/No Rain	BF	16.1	9.39	57.8	15.7	7.02	236	0.43	2		0.01
SHE 1	8/16/2011	10:35	Sunny	JVH	17.7	9.2	57.3	5.1	6.99	82	0.24	2		0
SHE 1	9/20/2011	10:20	Sunny	BF	15.2	9.76	52.2	7.7	6.3	249	0.11	2		0
SHE 1	10/18/2011	11:00	Sunny	BF	10.9	10.68	75.8	6.5	6.68	53	0.47	2		0
SHE 1	11/8/2011	10:15	Cloudy/No Rain	BF	8.1	11.48	87.2	4.3	6.08	58	0.8	0.8		0.04
SHE 1	12/6/2011	10:45	Cloudy/No Rain	BF	4.2	12.82	94.9	5.5	6.11	292	3.02	1.3		0
SHE 1	1/24/2012	10:20	Heavy Rain	BF	7.7	11.48	78.8	21	6.77	20	2.8	0.79		0.41
SHE 1	2/14/2012	10:30	Sunny	BF	7.2	11.64	89.3	11.1	7.21	99	2.79	0.82		0.04
SHE 1	3/13/2012	10:30	Heavy Rain	BF	5.1	11.77	70.4	95.4	7.02	2420	1.46	2.31		1.76
SHE 1	4/17/2012	10:45	Cloudy/No Rain	BF	10.2	11.33	81.2	9.3	7.23	219	1.56	1.54		0
SHE 1	5/15/2012	10:30	Sunny	BF	15.2	9.86	64.7	4.4	7.52	64	0.84	1.15		0
SHE 1	6/12/2012	10:00	Light Rain	BF	15.5	9.53	58.1	6	7.05	93	0.45	0.93		0.14
Median					**10.55**	**11.005**	**73.1**	**7.1**	**7.01**	**96**	**0.82**	**1.42**		

Note: Data in red exceed applicable water quality criteria (see Table 4). Medians not calculated for metals due to the large number of censored values

Table 7.
Monthly Instream Data

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	FLAG?	Rainfall previous 24 hours
SHE 10	7/19/2011	9:10	Cloudy/No Rain	BF	16	9.41	56.8	9.4	7.32	411	0.4	2		0.01
SHE 10	8/16/2011	9:15	Sunny	JVH	17.5	9.37	56.7	5.4	6.98	129	0.31	2		0
SHE 10	9/20/2011	9:10	Sunny	BF	15	9.81	51.7	7.2	6.42	236	0.05	2		0
SHE 10	10/18/2011	9:25	Sunny	BF	10.9	10.64	78.2	4.4	6.4	84	0.5	2		0
SHE 10	11/8/2011	9:00	Cloudy/No Rain	BF	8.1	11.45	86.4	3.9	5.88	56	0.87	1.02		0.04
SHE 10	12/6/2011	9:30	Cloudy/No Rain	BF	4.7	12.62	93.6	4.9	5.92	218	3.05	1.44		0
SHE 10	1/24/2012	9:26	Heavy Rain	BF									No sample road closed	0.41
SHE 10	2/14/2012	9:20	Light Rain	BF	7.4	11.58	88.6	7.9	7.13	99	2.83	1.24		0.04
SHE 10	3/13/2012	9:30	Heavy Rain	BF	5.2	11.58	69.6	176	5.85	1686	1.49	2.83		1.76
SHE 10	4/17/2012	9:45	Cloudy/No Rain	BF	10.2	11.29	80.7	29.5	6.65	249	1.58	2.37		0
SHE 10	5/15/2012	9:20	Sunny	BF	14.9	10.03	64.1	7.8	6.8	84	0.79	1.16		0
SHE 10	6/12/2012	9:00	Light Rain	BF	15.3	9.62	57.3	6.3	6.7	116	0.5	1.09		0.14
Median					**10.9**	**10.64**	**69.6**	**7.2**	**6.65**	**129**	**0.79**	**2**		

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

Table 7.
Monthly Instream Data

Site ID	Date	Time	Weather	Sampler Initials	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (MPN/ 100 mL)	NO2&NO3 (mg/L)	BOD (mg/L)	Winkler DO (mg/L)	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	FLAG
GIB 15 Dup	7/19/2011	13:45	Cloudy/No Rain	BF	17.9	8.51	114		7.1	579	2.56	2	Winkler DO = 9.0								Turbidity sensor error. No
CRO 10 Dup	7/19/2011	9:50	Cloudy/No Rain	SC	14.7	8.7	59.8	7.9	6.47	73	0.31	2	Winkler DO = 8.72								
BAT 12 Dup	8/16/2011	10:35	Sunny	SC	16.2	8.92	47.7	9.4	6.66	387	0.17	2	Winkler DO = 9.0								
GLE 10 Dup	8/16/2011	13:55	Sunny	JVH	15	8.56	91.6	5.1	7.04	517	0.32	2	Winkler DO = 9.0								
SHE 10 Dup	9/20/2011	9:10	Sunny	BF	15	9.81	51.7	7.3	6.41	238	0.06	2	Winkler DO = 10.0								
BAT 1 Dup	9/20/2011	11:00	Sunny	JVH	14.6	7.31	65	15.3	6.91	1203	0.37	2.3	Winkler DO = 7.0								
MIC 10 Dup	10/18/2011	11:30	Sunny	JVH	11.1	10.65	74.9	5.1	7.19	148	0.52	2	Winkler DO = 10.71								
MRA 10 Dup	10/18/2011	9:40	Sunny	BF	10.6	9.87	75.9	6.1	6.35	272	0.43	2	Winkler DO = 9.80								
PRI 1 Dup	11/8/2011	9:35	Cloudy/No	BF	8.4	11.66	86.4	3.3	5.82	70	0.79	1	Winkler DO = 11.61	0.0052	0.0025	<0.0010	<0.0010	<0.0025	<0.0025	31	
CGT 5 Dup	11/8/2011	13:05	Cloudy/No Rain	JVH	8.9	7.32	72.4	10.7	7.01	98	0.56	1.29	Winkler DO = 7.27								
MRA 1 Dup	12/6/2011	10:35	Cloudy/No Rain	BF	4.4	12.85	95.6	4	7.3	80	3.01	1.45	Winkler DO = 12.83								
LPW 1 Dup	12/6/2011	13:00	Cloudy/No Rain	JVH	3.3	10.78	189.9	13.9	7.09	365	0.62	1.34	Winkler DO = 11.11								
CGT 5 Dup	1/24/2012	13:25	Heavy Rain	JVH	7.3	10.74	59.1	24.4	7.04	411	0.61	1.55	Winkler DO = 10.60								
SHE 1 Dup	1/24/2012	10:20	Heavy Rain	BF	7.7	11.49	78.7	21	6.75	67	2.81	0.85	Winkler DO = 11.40								
CGT 1 Dup	2/14/2012	13:40	Cloudy/No Rain	JVH	8	9.86	155.6	11.8	6.81	105	0.68	1.26	Winkler DO = 9.84								
CLA 1 Dup	2/14/2012	10:40	Sunny	BF	9	11.1	89	11	7.25	238	1.19	1.1	Winkler DO = 11.10	0.0072	0.0025	0.0006	<0.0005	0.0212	0.0101	32	
PRI 5 Dup	3/13/2012	11:15	Heavy	BF	6.5	11.16	65.2	30.4	7.09	276	0.84	1.34	Winkler DO = 11.15	0.0033	<0.0025	0.0011	<0.0005	0.0277	0.0151	22	
MIC 1 Dup	3/13/2012	9:40	Heavy Rain	JVH	5	11.89	68.7	118	7.2	2420	1.36	2.62	Winkler DO = 11.66								
GLE 1 Dup	4/17/2012	13:01	Cloudy/No Rain	BF	9.9	11.2	80.2	6.3	7.4	26	1.44	1.21	Winkler DO = 11.16								
CLA 10Dup	4/17/2012	10:10	Cloudy/No Rain	JVH	10.5	10.34	71	2.4	6.77	16	1.65	1.24	Winkler DO = 10.55	<0.0025	<0.0025	<0.0005	<0.0005	0.0084	0.0067	20	
CRO 1 Dup	5/15/2012	10:10	Sunny	JVH	12.2	10.39	64.1	6.2	7.02	387	0.51	0.78	Winkler DO = 11								
GIB 1 Dup	5/15/2012	13:08	Sunny	BF	16.8	9.4	57.4	8.2	7.46	43	1.38	0.93	Winkler DO = 10								
CRO 10 Dup	6/12/2012	10:30	Cloudy/No Rain	JVH	13.2	9.36	50.4	8.7	7.05	172	0.23	1.07	Winkler DO = 9.30								
GIB 15 Dup	6/12/2012	13:20	Light Rain	BF	16.3	9.01	99.3	8	7.16		1.98	0.75	Winkler DO = 9.00								

Table 8.
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 9.
Monthly Medians Values for Continuous Instream Data

Monthly Medians for Turbidity at Continuous Instream Sites

	Jul 2011	Aug 2011	Sep 2011	Oct 2011	Nov 2011	Dec 2011	Jan 2012	Feb 2012	Mar 2012	Apr 2012	May 2012	Jun 2012
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	NA	NA	20.25	20.93	10.87	8.60	21.28	12.19	NA	8.18	12.25	14.20
BAT12	8.64	6.97	6.95	8.67	7.78	5.19	15.50	8.17	15.06	10.77	9.02	9.59
CLK1	5.13	4.99	5.70	4.34	5.97	3.30	6.28	6.11	21.23	4.73	4.53	4.82
CLK12	5.36	7.58	8.61	5.00	4.67	2.98	4.17	4.44	NA	4.42	5.25	6.32
GLE3	NA	8.40	9.10	6.00	10.50	4.10	9.50	NA	13.10	8.50	5.30	6.00
GLE12	8.30	6.30	8.60	2.30	1.70	2.60	11.10	7.70	NA	9.30	3.00	2.40
MIC3	9.38	7.92	7.55	6.06	10.13	5.90	13.22	8.19	13.36	9.93	9.09	10.77
MIC12	10.43	9.86	NA	NA	13.20	NA	NA	NA	NA	NA	9.04	10.13
PRI3	5.39	NA	5.48	6.59	8.31	4.69	11.35	9.36	NA	7.54	3.72	6.63
PRI12	10.33	NA	11.37	11.27	NA	7.40	18.58	18.11	30.69	11.23	8.24	8.94

Monthly Medians for Specific Conductivity at Continuous Instream Sites

	Jul 2011	Aug 2011	Sep 2011	Oct 2011	Nov 2011	Dec 2011	Jan 2012	Feb 2012	Mar 2012	Apr 2012	May 2012	Jun 2012
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	53.9	61.2	62.2	56.0	54.6	51.1	48.3	47.8	45.7	44.2	44.4	47.9
BAT12	46.8	48.9	52.9	49.4	44.6	41.7	39.5	45.5	36.6	40.1	43.7	40.5
CLK1	95.5	98.1	101.4	93.2	90.4	94.4	95.8	95.2	92.9	89.7	87.4	88.0
CLK12	72.2	73.6	76.5	73.0	72.0	73.0	76.3	75.7	75.5	72.4	69.7	68.1
GLE3	NA	128.0	134.0	125.0	112.0	109.0	87.0	93.0	97.0	88.0	95.0	109.0
GLE12	77.0	101.0	129.0	91.0	81.0	68.0	63.0	59.0	63.0	59.0	62.0	67.0
MIC3	62.2	62.2	54.5	83.1	97.2	97.9	87.1	93.0	81.0	81.8	70.4	56.9
MIC12	57.0	54.4	58.7	71.5	93.2	90.7	91.4	85.8	75.0	75.7	74.3	53.4
PRI3	89.6	97.2	96.8	94.1	93.3	99.4	95.8	93.7	84.0	84.1	87.8	86.3
PRI12	66.1	66.3	60.9	102.3	104.3	96.0	86.3	85.3	69.5	71.0	71.3	72.9

Presented median values consist of A and B grade data

NA = 60% of the continuous record for a given month is not represented by A and B grade data

Table 9.
Monthly Medians Values for Continuous Instream Data

Monthly Medians for Temperature at Continuous Instream Sites

	Jul 2011	Aug 2011	Sep 2011	Oct 2011	Nov 2011	Dec 2011	Jan 2012	Feb 2012	Mar 2012	Apr 2012	May 2012	Jun 2012
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	16.24	17.47	16.22	13.11	9.38	6.53	7.86	7.72	8.14	10.23	12.06	14.07
BAT12	15.72	16.79	14.82	11.50	7.58	5.56	7.07	6.83	7.30	9.34	11.10	13.38
CLK1	16.29	17.28	16.75	14.30	11.10	7.96	9.26	9.14	9.54	11.57	13.10	14.58
CLK12	15.03	16.05	16.06	14.63	12.38	10.46	10.32	10.13	10.06	11.01	12.27	13.56
GLE3	NA	16.97	15.92	13.19	9.69	6.46	7.95	8.11	8.66	11.15	12.9	14.69
GLE12	14.32	15.59	15.14	11.85	7.96	5.35	7.18	7.30	7.77	9.81	10.97	12.38
MIC3	18.40	19.95	17.15	13.10	8.57	5.07	6.75	7.23	7.77	11.41	13.42	15.53
MIC12	17.80	19.42	16.60	12.75	8.95	5.61	7.10	7.45	8.00	11.44	13.05	15.63
PRI3	18.35	18.98	17.63	13.81	9.92	6.37	8.00	8.18	8.86	12.09	14.41	15.58
PRI12	17.60	18.57	16.39	12.93	9.13	6.33	7.91	7.89	9.02	9.45	13.22	15.57

Monthly Medians for pH at Continuous Instream Sites

	Jul 2011	Aug 2011	Sep 2011	Oct 2011	Nov 2011	Dec 2011	Jan 2012	Feb 2012	Mar 2012	Apr 2012	May 2012	Jun 2012
Station Name	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH
BAT3	6.65	6.91	6.70	6.39	6.75	6.83	6.38	6.57	6.55	6.51	6.82	6.95
BAT12	6.83	7.31	7.31	NA	6.99	7.20	6.99	7.33	6.79	7.25	7.17	7.20
CLK1	6.93	7.09	6.94	7.32	7.13	7.22	7.15	7.00	6.58	6.93	7.12	NA
CLK12	6.73	6.79	6.90	6.86	6.84	7.13	6.87	6.77	6.48	6.48	6.65	6.07
GLE3	NA	7.43	7.50	7.45	7.20	7.32	7.07	7.14	7.05	7.12	7.15	7.14
GLE12	7.18	7.22	7.05	7.20	7.12	7.08	7.08	7.10	7.12	7.14	7.12	7.27
MIC3	6.96	7.50	7.45	7.70	7.51	7.61	7.48	7.69	7.48	7.46	7.67	7.63
MIC12	7.25	7.11	7.15	7.32	7.18	7.20	6.83	7.05	6.83	7.02	7.19	7.17
PRI3	7.16	7.15	7.32	7.17	7.16	7.43	7.51	7.59	7.21	7.35	7.43	7.54
PRI12	6.61	6.49	6.44	7.03	6.87	6.66	6.51	6.46	6.20	6.27	6.91	7.09

Presented median values consist of A and B grade data

NA = 60% of the continuous record for a given month is not represented by A and B grade data

Table 9.
Monthly Medians Values for Continuous Instream Data

Monthly Medians for Dissolved Oxygen at Continuous Instream Sites

	Jul 2011	Aug 2011	Sep 2011	Oct 2011	Nov 2011	Dec 2011	Jan 2012	Feb 2012	Mar 2012	Apr 2012	May 2012	Jun 2012
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	8.72	7.99	7.59	8.57	9.30	11.16	11.00	11.14	NA	10.33	9.84	9.17
BAT12	9.31	8.77	8.71	10.34	11.55	12.52	11.89	11.85	11.68	11.16	10.58	9.93
CLK1	9.29	9.13	9.14	9.60	10.49	11.66	11.29	11.30	11.02	10.44	9.91	9.47
CLK12	9.09	9.03	8.89	9.28	9.92	10.23	10.48	10.52	10.53	10.18	9.68	9.07
GLE3	NA	8.86	8.94	9.93	11.08	11.86	10.78	11.46	11.40	10.80	10.18	9.60
GLE12	9.65	9.11	8.71	10.23	11.06	11.75	NA	11.71	NA	10.92	10.67	10.08
MIC3	8.95	8.60	9.16	9.78	10.84	12.49	11.91	11.78	11.45	10.81	10.12	9.65
MIC12	8.85	8.67	9.47	10.03	10.61	12.21	11.24	11.29	10.92	10.27	9.87	9.53
PRI3	8.57	8.14	8.49	9.41	10.44	11.89	11.66	11.52	11.22	10.35	9.36	8.57
PRI12	8.53	8.17	8.58	9.02	9.26	10.54	10.29	10.35	9.91	10.01	9.23	8.64

Monthly Medians for Stage at Continuous Instream Sites

	Jul 2011	Aug 2011	Sep 2011	Oct 2011	Nov 2011	Dec 2011	Jan 2012	Feb 2012	Mar 2012	Apr 2012	May 2012	Jun 2012
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	4.17	4.08	4.06	4.11	4.31	4.36	5.31	4.71	5.65	4.81	4.47	4.32
BAT12	4.09	3.95	3.83	3.99	4.09	4.42	4.88	5.06	5.34	5.10	4.94	4.83
CLK1	3.94	3.90	3.89	4.07	4.24	4.07	4.38	4.34	4.65	4.35	4.25	4.19
CLK12	3.98	3.97	3.96	3.98	4.11	4.02	4.19	4.12	4.36	4.12	4.07	4.02
GLE3	4.17	4.1	4.07	4.17	4.4	4.27	4.79	4.65	5.43	4.75	4.5	NA
GLE12	0.70	0.63	0.60	0.69	0.74	0.79	0.97	0.94	1.21	1.05	0.87	0.80
MIC3	5.37	5.23	5.10	4.97	5.32	5.34	6.49	5.95	7.01	6.24	5.75	5.97
MIC12	7.22	7.11	7.15	6.80	6.93	7.09	8.20	7.85	8.61	7.93	7.53	7.45
PRI3	4.24	4.17	4.15	4.21	4.36	4.31	4.62	4.54	4.90	4.56	4.39	4.34
PRI12	4.41	4.27	4.28	4.05	4.22	4.17	4.64	4.42	5.26	4.78	4.32	4.25

Presented median values consist of A and B grade data

NA = 60% of the continuous record for a given month is not represented by A and B grade data

Table 10.
Instream Storm Monitoring Data

Site Name: CLK1
Site Description: Lower Clark Creek just before 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	NO3+NO2	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
10/04/2011 17:47	770.1	9.33	6.69	15.7	50.3														
10/04/2011 17:57 - dup		9.33	6.7	15.7	49.9														
10/05/2011 11:30						53.8	0.0105	0.0047	0.0997	0.0285	0.0066	< 0.0010	17	0.105	0.39	0.034	0.209	4.0	65
11/16/2011 08:45	1986.3	10.67	6.93	9.65	76.07														
11/16/2011 08:46 - dup	1300	10.7	6.95	9.64	76.23														
11/17/2011 08:20						73.8	0.0045	< 0.0025	0.0404	0.0191	0.0069	< 0.0010	30	< 0.050	0.64	0.048	0.125	3.5	30.8
12/27/2011 16:54	1046.2	11.03	7.21	9.1	86.33														
12/29/2011 09:58						43.4	0.007	< 0.002	0.061	0.017	0.0056	< 0.0005	17	< 0.050	0.44	0.029	0.213	2.35	70.5
03/29/2012 13:32	6130	10.64	6.66	11	61.5														
03/30/2012 10:01						52.9	0.0069	< 0.0025	0.06	0.0181	0.0076	< 0.0005	20	< 0.050	0.81	0.032	0.203	2.3	81
04/19/2012 10:51	8164	10.73	7.12	10.94	48.82														
04/20/2012 09:25						73.1	0.0048	< 0.0025	0.0354	0.0128	0.0029	< 0.0005	23	< 0.050	0.96	0.014	0.106	3.87	33
06/07/2012 05:56	816	9.76	7.14	13.9	50.79														
06/08/2012 08:27						48.2	0.0081	< 0.0025	0.0613	0.0249	0.0128	< 0.0010	32	< 0.050	0.48	0.019	0.208	3.59	81.2
Median	**1300**	**10.66**	**6.94**	**10.97**	**56.15**	**53.35**	**0.00695**	**NA**	**0.0605**	**0.0186**	**0.0068**	**NA**	**21.5**	**NA**	**0.56**	**0.0305**	**0.2055**	**3.55**	**67.8**

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	NO3+NO2	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
10/04/2011 18:12	770.1	8.91	7.2	15.4	76.9														
10/05/2011 12:00						70.7	0.0048	0.0026	0.0232	0.0078	0.0019	< 0.0010	24	< 0.050	0.3	0.023	0.107	2.7	26
11/16/2011 09:11	172.2	10.54	7.08	8.23	87.34														
11/17/2011 09:00						76.2	0.0075	< 0.0025	0.0593	0.0191	0.0107	< 0.0010	31	< 0.050	0.44	0.037	0.214	QNS	QNS
12/27/2011 17:22	95.9	11.26 (11.06)	7.29	7.7	103.8														
12/29/2011 10:12						QNS	0.022	< 0.002	0.182	0.03	0.0197	0.0006	QNS	< 0.050	0.89	QNS	QNS	QNS	QNS
03/29/2012 13:46	2420	10.99	6.82	10.2	72.3														
03/30/2012 10:25						51.5	0.0071	< 0.0025	0.0607	0.0213	0.0056	< 0.0005	20	< 0.050	0.63	0.02	0.218	2.39	97
04/19/2012 11:23	1986	10.68 (10.55)	7.2	11.04	68.03														
04/20/2012 09:39						82.6	0.0062	0.0031	0.0136	0.008	0.0008	< 0.0005	29	< 0.050	0.93	0.011	0.042	1.44	10.5
06/07/2012 06:22	921	9.19	7.17	14.5	65.6														
06/07/2012 06:23 - dup	687	9.18	7.16	14.5	65.02														
06/08/2012 08:11						63.1	0.0037	< 0.0025	0.0278	0.0163	0.0034	< 0.0010	26	< 0.050	0.54	0.016	0.102	2.09	32
Median	**770.1**	**9.19**	**7.17**	**11.04**	**72.3**	**70.7**	**0.00665**	**NA**	**0.04355**	**0.0177**	**0.0045**	**NA**	**26**	**NA**	**0.585**	**0.02**	**0.107**	**2.24**	**29.0**

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	NO3+NO2	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
10/04/2011 18:43	307.6	8.97 (8.75)	6.86	13.5	69														
10/05/2011 10:05						74.4	0.0068	0.0026	0.0195	0.0062	0.0006	< 0.0010	25	0.108	0.57	0.027	0.098	< 2.0	12
11/16/2011 09:34	161.6	9.56	6.66	7.4	111.9														
11/17/2011 10:25						94	0.0064	0.0025	0.0342	0.0138	0.0035	< 0.0010	39	< 0.050	0.93	0.024	0.17	2.6	34.8
12/27/2011 18:06	108.1	10.24	6.82	7.7	89.6														
12/27/2011 18:08 - dup	105																		
12/29/2011 09:16						71.6	0.005	< 0.002	0.017	0.006	0.0015	< 0.0005	28	< 0.050	1.02	0.022	0.216	1.57	45.5
03/29/2012 14:09	25	10.95	6.71	9.9	70.7														
03/30/2012 09:05						67.1	0.0032	< 0.0025	0.013	0.008	0.0009	< 0.0005	24	< 0.050	1.28	0.021	0.143	1.27	27
04/19/2012 12:22	135	10.22	6.82	10.29	77.82														
04/20/2012 08:43						81.9	< 0.0025	< 0.0025	0.0165	0.0083	< 0.0005	< 0.0005	29	< 0.050	1.37	0.01	0.042	0.84	10
06/07/2012 06:47	119	8.35	6.8	13.2	76.05														
06/08/2012 08:53						83.7	0.0067	0.0038	0.0324	0.0227	< 0.0010	< 0.0010	37	< 0.050	0.9	0.01	0.036	1.19	9.6
Median	**119**	**10.22**	**6.81**	**10.10**	**76.94**	**78.15**	**0.0064**	**0.0026**	**0.01825**	**0.00815**	**0.0012**	**NA**	**28.5**	**NA**	**0.975**	**0.0215**	**0.1205**	**1.27**	**19.5**

NA= Median not calculated because ≥ 50% of values were censored values QNS= Quantity not Sufficient Data in red exceed applicable water quality criteria (see Table 4) Data in blue are QA/QC dissolved oxygen readings done using Winkler Titration

Table 11.
Stormwater Monitoring Data

Site Name: / Land use Type:	Electric / Residential																		
Sample Collection Date/Time	**E. Coli**	**Diss. Oxygen**	**pH**	**temp**	**Sp. Cond, field**	**Sp. Cond, comp**	**Cu**	**Cu diss**	**Zn**	**Zn diss**	**Pb**	**Pb diss**	**Hardness**	**NH3**	**NO3+NO2**	**Ortho P**	**TP**	**BOD5**	**TSS**
mm/dd/yyyy HH:MM	MPN/100 mL	mg/L	S.U	˚C	µS/cm	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
10/04/2011 17:11	866.4	9.18	6.59	17.3	41.1														
10/4/2011 17:12 - dup	920.8																		
10/05/2011 11:00						37.4	0.0081	0.0049	0.0288	0.0164	0.0026	< 0.0010	13	< 0.050	0.22	0.075	0.178	4.9	27.5
11/16/2011 07:03	1046.2	10.56	6.97	11.3	67.41														
11/17/2011 08:40						70.5	0.005	0.0035	0.038	0.0298	0.0031	< 0.0010	23	< 0.050	0.67	0.148	0.21	7.4	12
03/29/2012 13:00	1733	10.59	6.57	11.6	35														
03/30/2012 09:37						38.4	0.0056	< 0.0025	0.0345	0.0214	0.0036	< 0.0005	15	< 0.050	0.4	0.047	0.214	2.7	37
04/19/2012 11:05	13000	10.62	6.69	11.68	23.97														
04/19/2012 11:06 dup	17330	10.62	6.73	12.21	26.59														
04/20/2012 09:12						63.3	0.0042	< 0.0050	0.0211	0.0158	0.0012	< 0.0005	21	< 0.050	0.74	0.046	0.089	3.6	11
Median	**1389.6**	**10.59**	**6.69**	**11.68**	**35**	**50.85**	**0.0053**	**0.0042**	**0.03165**	**0.0189**	**0.00285**	**NA**	**18**	**NA**	**0.535**	**0.061**	**0.194**	**4.25**	**19.75**

Site Name: / Land use Type:	Hilfiker / Commercial																		
Sample Collection Date/Time	**E. Coli**	**Diss. Oxygen**	**pH**	**temp**	**Sp. Cond, field**	**Sp. Cond, comp**	**Cu**	**Cu diss**	**Zn**	**Zn diss**	**Pb**	**Pb diss**	**Hardness**	**NH3**	**NO3+NO2**	**Ortho P**	**TP**	**BOD5**	**TSS**
mm/dd/yyyy HH:MM	MPN/100 mL	mg/L	S.U	˚C	µS/cm	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
10/04/2011 16:38	920.8	9.09	6.57	16.5	30.7														
10/04/2011 16:44 - dup		9.17	6.33	16.2	27.9														
10/05/2011 10:30						15.8	0.0122	0.0034	0.0746	0.0277	0.007	< 0.0010	6	0.154	< 0.05	0.014	0.184	4.6	61
11/16/2011 07:32	10460	11.82	6.38	7.28	37.19														
11/17/2011 09:20						25.1	0.0092	0.0058	0.1131	0.089	0.008	0.0021	13	0.062	0.14	0.053	0.139	15.1	23.6
03/29/2012 12:36	118	9.03	6.11	12	45.8														
03/30/2012 09:21						26	0.0075	0.0025	0.0598	0.0345	0.0051	< 0.0005	10	0.051	0.41	< 0.010	0.109	2.9	46
04/19/2012 10:45	248	10.53	6.38	11.37	11.98														
04/20/2012 08:57						14	0.0061	0.0028	0.0501	0.0274	0.0027	< 0.0005	6	0.07	0.15	0.01	0.074	7.0	25.5
Median	**584.4**	**9.17**	**6.38**	**12.00**	**30.70**	**20.45**	**0.00835**	**0.0031**	**0.0672**	**0.0311**	**0.00605**	**NA**	**8**	**0.066**	**0.15**	**0.014**	**0.124**	**5.8**	**35.75**

Site Name: / Land use Type:	Salem Industrial / Industrial																		
Sample Collection Date/Time	**E. Coli**	**Diss. Oxygen**	**pH**	**temp**	**Sp. Cond, field**	**Sp. Cond, comp**	**Cu**	**Cu diss**	**Zn**	**Zn diss**	**Pb**	**Pb diss**	**Hardness**	**NH3**	**NO3+NO2**	**Ortho P**	**TP**	**BOD5**	**TSS**
mm/dd/yyyy HH:MM	MPN/100 mL	mg/L	S.U	˚C	µS/cm	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
10/04/2011 19:16	866.4	8.25	6.01	14.7	31.7														
10/05/2011 12:30						32.6	0.0089	0.0046	0.1394	0.1127	0.0011	< 0.0010	11	< 0.050	0.15	0.052	0.208	2.8	24
11/16/2011 10:12	365.4	10.59	6.27	9.2	35.61														
11/17/2011 10:57						40.1	0.010	0.0041	0.129	0.0769	0.0037	< 0.0010	30	< 0.050	0.12	0.046	0.23	4.9	49.6
03/29/2012 09:30	44	10.47	6.93	9	28.7														
03/29/2012 9:31 - dup	68	10.54	6.86	8.8	25.7														
03/30/2012 10:53						25.7	0.0109	0.0033	0.167	0.133	0.002	< 0.0005	14	< 0.050	0.05	0.027	0.344	4.0	75
04/19/2012 11:55	291	9.93	6.52	11.5	20.37														
04/20/2012 10:18						24.2	0.0179	0.0059	0.137	0.094	0.0025	< 0.0005	11	< 0.050	0.08	0.026	0.319	4.2	109
Median	**291**	**10.47**	**6.52**	**9.2**	**28.70**	**29.15**	**0.01045**	**0.00435**	**0.1382**	**0.10335**	**0.00225**	**NA**	**12.5**	**NA**	**0.1**	**0.0365**	**0.2745**	**4.1**	**62.3**

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

Table 12.
Pesticide Monitoring Data

Sample Date	Time:	Site Name	Land Use Type	Analyte	Amount Detected (µg/L)	Limit of Quantitation (µg/L)
4/16/2012	7:02	Electric	Residential	2,4-D	0.26	0.08
4/16/2012				MCPA	0.38	0.08
4/16/2012	7:04	Electric Dup	Residential	2,4-D	0.26	0.08
4/16/2012				MCPA	0.36	0.08
4/16/2012	6:48	Hilfiker	Commercial	Diuron	0.29	0.12
4/16/2012				2,4-D	0.093	0.08
4/16/2012	7:28	Salem Industrial	Industrial	Propiconazole	1.1	0.20
4/16/2012				Ethofumesate	0.35	0.30
4/16/2012				2,4-D	0.087	0.08

Note: Results only given for those analytes that were detected. See Attachement A for full suite of compounds that were analyzed

Table 13.

Mercury Monitoring Data

Sample Date	Time:	Site Name	Analyte	Result (ng/L)	MDL (ng/L)	MRL (ng/L)
2/28/2012	17:45	Electric-blank	Total Hg	U	0.15	0.40
2/28/2012	17:49	Electric-native	Total Hg	4.47	0.15	0.41
	18:04		Diss. Hg	1.63	0.15	0.40
	17:57		Total MeHg	0.147	0.02	0.05
	18:15		Diss. MeHg	0.085	0.02	0.05
	17:52	Electric-dup	Total Hg	4.32	0.15	0.40
	18:12		Diss. Hg	9.17	0.3	0.81
	18:01		Total MeHg	0.136	0.02	0.05
	18:19		Diss. MeHg	0.082	0.02	0.05
2/28/2012	16:51	Hilfiker-blank	Total Hg	U	0.15	0.41
2/28/2012	16:56	Hilfiker-native	Total Hg	4.32	0.62	1.66
	17:08		Diss. Hg	2.14	0.15	0.40
	17:03		Total MeHg	0.221	0.02	0.05
	17:14		Diss. MeHg	0.14	0.02	0.05
2/28/2012	16:59	Hilfiker-dup	Total Hg	8.79	0.62	1.66
	17:12		Diss. Hg	1.99	0.15	0.40
	17:06		Total MeHg	0.184	0.02	0.05
	17:17		Diss. MeHg	0.132	0.02	0.05

Note: Brooks Rand Labs used for analysis. Samples not composited and were field filtered in lab by City of Salem staff

Sample Date	Time:	Site Name	Analyte	Result (ng/L)	MDL (ng/L)	MRL (ng/L)
6/4/2012	7:37	Electric-blank	Total Hg	ND	0.08	0.50
6/4/2012	7:41	Electric-native	Total Hg	4.87	0.08	0.50
	7:47		Diss. Hg	3.02	0.08	0.50
	7:52		Total MeHg	0.139	0.026	0.05
	7:57		Diss. MeHg	0.088	0.026	0.05
	7:44	Electric-dup	Total Hg	4.89	0.08	0.50
	7:50		Diss. Hg	3.02	0.08	0.50
	7:55		Total MeHg	0.116	0.026	0.05
	7:59		Diss. MeHg	0.081	0.026	0.05
6/4/2012	7:06	Hilfiker-native	Total Hg	6.28	0.08	0.50
	7:08		Diss. Hg	4.63	0.08	0.50
	7:10		Total MeHg	0.139	0.026	0.05
	7:13		Diss. MeHg	0.086	0.026	0.05

Note: Frontier Global Sciences used for analysis. Samples were composited to help eliminate discrepancies in data due to length of time between total and dissolved Hg and MeHg sample collection

U= Result is ≤ the MDL ND = Non Detect

Table 14.
Mercury Monitoring - Additional Data

Site Name:	Electric						
Sample Date/Time:	**Sulfate**	**TSS**	**Alkalinity**	**DOC**	**TOC**	**pH**	**Sp. Cond**
06/04/2012 08:03	3.79	3.60	23.40				
06/04/2012 08:04				5.25			
06/04/2012 08:06					5.51		
06/04/2012 08:10						6.86	78.50
Site Name:	**Electric-duplicate**						
Sample Date/Time:	**Sulfate**	**TSS**	**Alkalinity**	**DOC**	**TOC**	**pH**	**Sp. Cond**
06/04/2012 08:08	3.92	U	21.90				
06/04/2012 08:09				5.08			
06/04/2012 08:15						6.86	80.40
Site Name:	**Hilfiker**						
Sample Date/Time:	**Sulfate**	**TSS**	**Alkalinity**	**DOC**	**TOC**	**pH**	**Sp. Cond**
06/04/2012 07:15	0.80	3.60	U				
06/04/2012 07:16				4.46			
06/04/2012 07:18					5.34		
06/04/2012 07:20						6.20	23.76
Reporting Limit:	**0.10 mg/L**	**2.0 mg/L**	**4.0 mg/L**	**0.5 mg/L**	**0.5 mg/L**		

U= Not detected at specified reporting limit

Note: CH2MHill used for analysis; pH and specific conductivity are field measurements

Table 15.

Benthic Macroinvertebrate Monitoring Data (Reporting Year 2011/12)

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

Metric	Clark Creek		East Fork Pringle Creek		Pringle Creek	
	Value	Score[a]	Value	Score[a]	Value	Score[a]
Total Number of Taxa[b]	30	3	35	3	34	3
Number of Ephemeroptera Taxa[b]	1	1	1	1	1	1
Number of Plecoptera Taxa[b]	0	1	0	1	0	1
Number of Trichoptera Taxa[b]	1	1	0	1	2	1
Number of Long-lived Taxa[b]	3	3	3	3	4	3
Number of Intolerant Taxa[b]	2	1	1	1	1	1
Percent Tolerant Taxa[c]	20.13	3	51.49	1	17.85	5
Percent Predators[b]	4.63	1	3.12	1	1.46	1
Number of Clinger Taxa[b]	6	1	10	1	10	1
Percent Dominance (3 Taxa)[c]	46.99	5	63.65	3	53.36	3
Total BIBI Score[d]:	**n/a**	**20**	**n/a**	**16**	**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

Source: "Results of Benthic Macroinvertebrate Sampling, Fish Sampling, and Physical Habitat Data Collection for Pringle Creek and Clark Creek in Salem, Oregon", Pacific Habitat Services, Inc.; June 28, 2012. See Attachment B

Table 16.

Benthic Macroinvertebrate Monitoring Data (Reporting Year 2011/12)

Other Community Composition Metrics that are Indicative of Biological Condition

Metric	Clark Creek		East Fork Pringle		Pringle Creek	
	Value	Score[a]	Value	Score[a]	Value	Score[a]
Total Abundance[b]	998	L	1840	H	2736	H
EPT Taxa Richness[b]	2	L	1	L	3	L
Predator Richness[b]	4	L	6	L	2	L
Scraper Richness[b]	2	L	3	L	3	L
Shredder Richness[b]	2	L	1	L	2	L
Percent Intolerant Taxa[b]	20.37	H	1.48	L	0.29	L
Percent *Baetis tricaudatus*[c]	8.33	H	0.59	H	7.75	H
Percent Collector[c]	76.39	L	43.77	M	66.08	L
Percent Parasite[c]	0.93	H	2.97	H	1.61	H
Percent Oligochaeta[c]	18.75	L	6.23	L	24.42	L
Number of Tolerant taxa[c]	9	M	12	L	10	L
Percent Simuliidae[c]	3.47	H	12.02	L	4.97	H
Percent Chironomidae	55.09	L	25.22	M	50.73	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

Source: "Results of Benthic Macroinvertebrate Sampling, Fish Sampling, and Physical Habitat Data Collection for Pringle Creek and Clark Creek in Salem, Oregon", Pacific Habitat Services, Inc.; June 28, 2012. See Attachment B

Table 17.

Benthic Macroinvertebrate Monitoring Data (Reporting Year 2011/12)

Fish Sampling Results

Fish Species	Sampling Reach		
	East Fork Pringle Creek	Clark Creek	Pringle Creek[a]
Sculpin	14	52	-
Redside Shiner	47	52	-
Three-spine Stickleback	3	-	-
Cutthroat trout	1	-	-
Speckled Dace	35	7	-
Total	**100**	**111**	**-**

Notes: a. Reach not sampled because necessary permit from NMFS could not be obtained in time to meet schedule constraints.

Source: "Results of Benthic Macroinvertebrate Sampling, Fish Sampling, and Physical Habitat Data Collection for Pringle Creek and Clark Creek in Salem, Oregon", Pacific Habitat Services, Inc.; June 28, 2012. See Attachment B

Table 18.

Willamette River Water Quality Data

Willamette River at River Mile 83																
	Date	Alkalinity	BODs	Sp. Cond, field	DO	DO %Saturation	Ecoli,QT	NH3-ISE, lo-level	NO3+NO2	pH, field	TDS calc.	Temp, field	T-Phos	TS	TSS	Turb, field
Site Name	m/dd/yyyy	mg/L	mg/L	µS/cm	mg/L		MPN/100mL	mg/L	mg/L	S.U	mg/L	ºC	mg/L	mg/L	mg/L	NTU
Railroad Bridge	7/26/2011	25	0.58	49.7	8.9	96	5	< 0.05	0.16	7.44	57	18.8	0.034	60	3.2	1.72
Railroad Bridge	8/9/2011	24	0.50	50.6	9.1	96	10	< 0.05	0.13	7.48	60	18.2	0.038	64	3.6	2.32
Railroad Bridge	8/16/2011	26	0.56	49.7	9.2	98	1	< 0.05	0.1	7.4	57	18.4	0.032	61	4	2.42
Railroad Bridge	9/13/2011	24	0.93	47.4	9.3	96	11	< 0.05	0.07	7.43	52	17.2	0.035	61	8.8	3.43
Railroad Bridge	9/27/2011	22	0.60	46.4	9.7	97	13	< 0.05	0.08	7.31	51	15.3	0.036	59	8.4	3.02
Railroad Bridge	10/11/2011	24	0.70	45.6	9.9	96	22	< 0.05	0.09	7.34	49	13.9	0.047	57	7.6	3.75
Railroad Bridge	11/15/2011	25	0.77	49.1	10.9	97	9	< 0.05	0.09	7.27	61	10.1	0.03	65	3.6	2.68
Railroad Bridge	2/28/2012	23	1.43	49.2	11.6	94	28	< 0.05	0.39	7.23	64	6.3	0.052	72	8	11.4
Railroad Bridge	4/24/2012	21	0.68	38.9	10.0	94	20	< 0.05	0.22	7.3	52	12.6	0.04	60	8	8.31
Railroad Bridge	5/22/2012	24	1.01	46.9	10.3	96	28	< 0.05	0.16	7.3	48	12.4	0.029	52	3.6	3.6
Railroad Bridge	5/29/2012	23	0.75	40.7	10.7	99	24	< 0.05	0.07	7.3	43	12.0	0.032	48	5.2	5.47
Railroad Bridge	6/12/2012	26	0.73	38.3	10.1	98	21	< 0.05	0.07	7.29	45	14.1	0.034	52	7.2	6.27
Railroad Bridge	6/19/2012	27	0.54	45.0	9.7	98	10	< 0.05	0.11	7.23	54	15.8	0.025	58	4.4	2.39
	Median	**24**	**0.7**	**46.9**	**9.9**	**96**	**13.4**	**N/A**	**0.1**	**7.3**	**52.2**	**14.1**	**0.034**	**60**	**5.2**	**3.43**

Willamette River at River Mile 83 (Field Duplicate taken at Railroad Bridge)																
	Date	Alkalinity	BODs	Sp. Cond, field	DO	DO %Saturation	Ecoli,QT	NH3-ISE, lo-level	NO3+NO2	pH, field	TDS calc.	Temp, field	T-Phos	TS	TSS	Turb, field
Site Name	m/dd/yyyy	mg/L	mg/L	µS/cm	mg/L		MPN/100mL	mg/L	mg/L	S.U	mg/L	ºC	mg/L	mg/L	mg/L	NTU
Field Duplicate	7/26/2011	25	0.63	49.8	8.9	95	4	< 0.05	0.14	7.46	63	18.8	0.033	66	3.2	1.93
Field Duplicate	8/9/2011	24	0.50	50.5	9.1	96	4	< 0.05	0.12	7.48	75	18.2	0.036	79	4	2.26
Field Duplicate	8/16/2011	26	0.57	50.1	9.2	98	2	< 0.05	0.1	7.51	60	18.3	0.033	64	4.4	1.78
Field Duplicate	9/13/2011	24	0.86	47.4	9.3	96	11	< 0.05	0.06	7.45	52	17.2	0.035	59	6.8	3.91
Field Duplicate	9/27/2011	24	0.51	46.4	9.8	98	9	< 0.05	0.08	7.39	51	15.3	0.037	59	7.6	2.82
Field Duplicate	10/11/2011	24	0.62	45.5	9.8	96	25	< 0.05	0.08	7.37	52	13.9	0.048	59	7.2	4.11
Field Duplicate	11/15/2011	25	0.87	49.0	10.8	96	3	< 0.05	0.08	7.37	61	10.1	0.032	64	2.8	2.9
Field Duplicate	2/28/2012	23	1.37	49.3	11.6	94	12	< 0.05	0.32	7.28	63	6.3	0.052	70	7.2	11.6
Field Duplicate	4/24/2012	21	0.75	39.0	10.0	94	10	< 0.05	0.19	7.31	51	12.6	0.041	59	8	8.52
Field Duplicate	5/22/2012	24	0.94	46.8	10.5	98	19	< 0.05	0.16	7.32	53	12.4	0.028	57	4	2.75
Field Duplicate	5/29/2012	24	0.74	40.9	10.5	98	20	< 0.05	0.06	7.35	50	12.1	0.032	56	5.6	5.07
Field Duplicate	6/12/2012	26	0.62	38.2	10.0	97	23	< 0.05	0.06	7.33	42	14.1	0.033	49	6.8	6.43
Field Duplicate	6/19/2012	27	0.57	44.9	9.7	98	10	< 0.05	0.11	7.3	55	15.8	0.027	59	3.6	2.7
	Median	**24**	**0.63**	**46.8**	**9.8**	**96**	**10**	**N/A**	**0.1**	**7.37**	**53**	**14.1**	**0.033**	**59**	**5.6**	**2.9**

Note: Willamette River monitoring is not identified in the City's Surface and Stormwater Monitoring Plan: however, it is identified in the City of Salem Stormwater Management Plan 2010

Table 18.

Willamette River Water Quality Data

Willamette River at River Mile 82.9																
	Date	Alkalinity	BODs	Sp. Cond, field	DO	DO %Saturation	Ecoli,QT	NH3-ISE, lo-level	NO3+NO2	pH, field	TDS calc.	Temp, field	T-Phos	TS	TSS	Turb, field
Site Name	m/dd/yyyy	mg/L	mg/L	µS/cm	mg/L		MPN/100mL	mg/L	mg/L	S.U	mg/L	ºC	mg/L	mg/L	mg/L	NTU
Mill Creek	7/26/2011	26	0.79	50.2	9.4	100	161	< 0.05	0.28	7.6	69	18.4	0.05	75	6.4	5.42
Mill Creek	8/9/2011	26	0.66	50.6	9.4	98	29	< 0.05	0.15	7.48	62	17.7	0.041	68	5.6	3.17
Mill Creek	8/16/2011	26	0.60	50.3	9.0	96	72	< 0.05	0.18	7.56	54	18.1	0.041	59	4.8	4.03
Mill Creek	9/13/2011	24	0.83	42.4	9.4	98	172	< 0.05	0.12	7.53	46	17.6	0.049	53	6.8	5.52
Mill Creek	9/27/2011	25	1.53	45.0	9.8	99	687	< 0.05	0.16	7.42	59	15.5	0.061	68	9.2	9.04
Mill Creek	10/11/2011	32	1.22	58.2	10.0	97	980	< 0.05	0.44	7.46	68	14.0	0.07	76	8.4	7.51
Mill Creek	11/15/2011	32	1.21	64.5	11.2	98	89	< 0.05	0.57	7.38	77	9.4	0.06	79	2.4	3.16
Mill Creek	2/28/2012	23	1.54	66.4	12.1	98	23	< 0.05	2.14	7.33	70	6.4	0.04	73	3.2	7.49
Mill Creek	4/24/2012	**No Sample**														
Mill Creek	5/22/2012	25	1.34	47.7	10.3	96	727	< 0.05	0.69	7.33	51	12.4	0.049	59	7.6	7.37
Mill Creek	5/29/2012	24	0.67	44.1	10.6	99	29	< 0.05	0.14	7.38	52	12.2	0.033	57	4.8	4.61
Mill Creek	6/12/2012	26	0.85	45.2	9.6	97	345	< 0.05	0.53	7.32	48	15.8	0.043	56	8	7.09
Mill Creek	6/19/2012	28	0.73	43.9	9.8	97	162	< 0.05	0.48	7.37	54	14.8	0.048	61	6.8	6.56
	Median	**26**	**0.84**	**48.95**	**9.8**	**98**	**161.35**	**N/A**	**0.36**	**7.4**	**56.5**	**15.15**	**0.0485**	**64.5**	**6.6**	**6.04**

Willamette River at River Mile 81																
	Date	Alkalinity	BODs	Sp. Cond, field	DO	DO %Saturation	Ecoli,QT	NH3-ISE, lo-level	NO3+NO2	pH, field	TDS calc.	Temp, field	T-Phos	TS	TSS	Turb, field
Site Name	m/dd/yyyy	mg/L	mg/L	µS/cm	mg/L		MPN/100mL	mg/L	mg/L	S.U	mg/L	ºC	mg/L	mg/L	mg/L	NTU
Sunset Park	7/26/2011	25	0.66	50.0	9.2	99	11	< 0.05	0.16	7.52	67	19.0	0.036	73	5.6	2.88
Sunset Park	8/9/2011	26	0.54	52.1	9.4	101	11	0.06	0.1	7.55	58	18.6	0.036	63	4.8	2.51
Sunset Park	8/16/2011	26	0.61	50.9	9.3	100	3	< 0.05	0.1	7.49	57	18.6	0.034	62	4.8	2.52
Sunset Park	9/13/2011	25	0.83	47.5	9.5	99	12	< 0.05	0.06	7.47	56	17.3	0.036	65	8.8	4.17
Sunset Park	9/27/2011	24	0.70	46.3	9.7	97	76	< 0.05	0.08	7.43	56	15.3	0.037	62	5.6	3.14
Sunset Park	10/11/2011	24	0.68	46.2	9.9	96	67	< 0.05	0.08	7.43	54	13.9	0.048	61	6.8	4.33
Sunset Park	11/15/2011	25	0.83	49.7	11.2	99	10	< 0.05	0.08	7.34	59	10.1	0.032	63	3.6	2.66
Sunset Park	2/28/2012	23	1.43	50.7	11.6	94	20	< 0.05	0.44	7.28	66	6.2	0.053	73	6.8	11.1
Sunset Park	4/24/2012	22	0.85	40.0	10.1	95	26	< 0.05	0.22	7.22	56	12.8	0.042	64	8	8.18
Sunset Park	5/22/2012	26	0.95	47.4	10.4	98	78	< 0.05	0.2	7.33	52	12.5	0.029	56	4.4	3.36
Sunset Park	5/29/2012	24	0.65	40.6	10.6	99	23	< 0.05	0.11	7.36	49	12.2	0.034	54	5.2	4.83
Sunset Park	6/12/2012	25	0.65	39.0	10.0	98	30	< 0.05	0.08	7.33	45	14.3	0.034	51	6.4	5.85
Sunset Park	6/19/2012	31	0.69	45.3	9.8	99	18	< 0.05	0.13	7.32	56	15.9	0.027	60	4	4.11
	Median	**25**	**0.69**	**47.4**	**9.9**	**99**	**20**	**N/A**	**0.1**	**7.36**	**56**	**14.3**	**0.036**	**62**	**5.6**	**4.11**

Note: Willamette River monitoring is not identified in the City's Surface and Stormwater Monitoring Plan: however, it is identified in the City of Salem Stormwater Management Plan 2010

Table 18.

Willamette River Water Quality Data

Willamette River at River Mile 78																
	Date	Alkalinity	BODs	Sp. Cond, field	DO	DO %Saturation	Ecoli,QT	NH3-ISE, lo-level	NO3+NO2	pH, field	TDS calc.	Temp, field	T-Phos	TS	TSS	Turb, field
Site Name	m/dd/yyyy	mg/L	mg/L	µS/cm	mg/L		MPN/100mL	mg/L	mg/L	S.U	mg/L	ºC	mg/L	mg/L	mg/L	NTU
WLTP 150 feet	7/26/2011	26	0.67	52.8	9.1	98	4	0.13	0.14	7.53	77	19.1	0.053	82	4.8	1.89
WLTP 150 feet	8/9/2011	27	0.60	55.2	9.2	99	5	0.15	0.12	7.5	65	18.6	0.051	69	4	2.42
WLTP 150 feet	8/16/2011	27	0.65	55.4	9.4	101	3	0.18	0.11	7.46	56	18.7	0.055	61	5.2	2.44
WLTP 150 feet	9/13/2011	26	0.92	49.7	9.4	97	6	0.08	0.06	7.45	57	17.3	0.046	66	8.8	2.94
WLTP 150 feet	9/27/2011	25	0.58	49.9	9.8	98	30	0.08	0.09	7.42	55	15.3	0.044	60	4.8	3.7
WLTP 150 feet	10/11/2011	25	0.69	47.7	10.0	97	34	0.11	0.09	7.47	49	13.9	0.058	57	7.6	3.87
WLTP 150 feet	11/15/2011	25	0.86	51.3	10.8	96	6	0.17	0.1	7.36	68	10.1	0.044	72	3.6	2.86
WLTP 150 feet	2/28/2012	24	1.94	50.9	11.8	96	12	0.05	0.41	7.34	64	6.4	0.057	71	7.2	11.9
WLTP 150 feet	4/24/2012	23	0.79	39.8	10.1	95	12	< 0.05	0.22	7.25	54	12.7	0.043	61	7.2	8.21
WLTP 150 feet	5/22/2012	26	0.86	47.7	10.5	98	36	< 0.05	0.18	7.34	36	12.5	0.034	40	3.6	3
WLTP 150 feet	5/29/2012	25	0.72	41.3	10.6	99	23	0.06	0.1	7.36	53	12.2	0.041	58	5.2	5.11
WLTP 150 feet	6/12/2012	24	0.64	40.2	10.0	98	23	< 0.05	0.08	7.29	46	14.3	0.035	52	6.4	4.83
WLTP 150 feet	6/19/2012	32	0.65	46.3	9.8	100	17	0.05	0.11	7.34	58	16.0	0.035	62	4	2.76
	Median	**25**	**0.69**	**49.7**	**10**	**98**	**12**	**0.09**	**0.11**	**7.36**	**56**	**14.3**	**0.044**	**61**	**5.2**	**3**

Willamette River at River Mile 77																
	Date	Alkalinity	BODs	Sp. Cond, field	DO	DO %Saturation	Ecoli,QT	NH3-ISE, lo-level	NO3+NO2	pH, field	TDS calc.	Temp, field	T-Phos	TS	TSS	Turb, field
Site Name	m/dd/yyyy	mg/L	mg/L	µS/cm	mg/L		MPN/100mL	mg/L	mg/L	S.U	mg/L	ºC	mg/L	mg/L	mg/L	NTU
Spongs Landing	7/26/2011	24	0.66	51.4	9.4	101	8	0.05	0.17	7.59	67	19.1	0.041	72	4.8	1.92
Spongs Landing	8/9/2011	26	0.60	53.3	9.4	101	4	0.09	0.13	7.55	60	18.7	0.048	64	4	3.13
Spongs Landing	8/16/2011	27	0.61	53.9	9.5	102	3	0.10	0.1	7.58	60	18.8	0.046	64	4.4	2.02
Spongs Landing	9/13/2011	25	0.84	48.6	9.5	99	11	0.05	0.06	7.53	55	17.3	0.041	61	6.4	3.01
Spongs Landing	9/27/2011	25	0.54	48.3	9.8	98	21	0.06	0.08	7.45	55	15.3	0.042	60	4.8	3.05
Spongs Landing	10/11/2011	24	0.78	47.2	10.0	97	33	0.08	0.08	7.51	47	14.0	0.056	55	8	3.89
Spongs Landing	11/15/2011	26	1.05	50.1	10.9	97	5	0.06	0.09	7.49	60	10.1	0.036	64	3.6	2.82
Spongs Landing	2/28/2012	23	1.41	50.3	11.8	96	11	0.06	0.38	7.36	66	6.4	0.057	74	7.6	11.5
Spongs Landing	4/24/2012	22	0.82	40.5	10.1	95	16	< 0.05	0.23	7.3	52	12.7	0.042	60	8	8.55
Spongs Landing	5/22/2012	26	1.04	47.7	10.4	98	50	< 0.05	0.17	7.39	36	12.5	0.032	40	4.4	3.25
Spongs Landing	5/29/2012	24	0.73	40.9	10.7	100	25	< 0.05	0.1	7.42	52	12.2	0.039	57	5.2	4.85
Spongs Landing	6/12/2012	28	0.72	38.8	10.1	99	15	< 0.05	0.06	7.38	39	14.3	0.037	45	6.4	5.32
Spongs Landing	6/19/2012	32	0.66	45.6	9.9	101	12	< 0.05	0.11	7.4	55	16.0	0.031	59	4	2.79
	Median	**25**	**0.73**	**48.3**	**10**	**99**	**12**	**0.06**	**0.1**	**7.45**	**55**	**14.3**	**0.041**	**60**	**4.8**	**3.13**

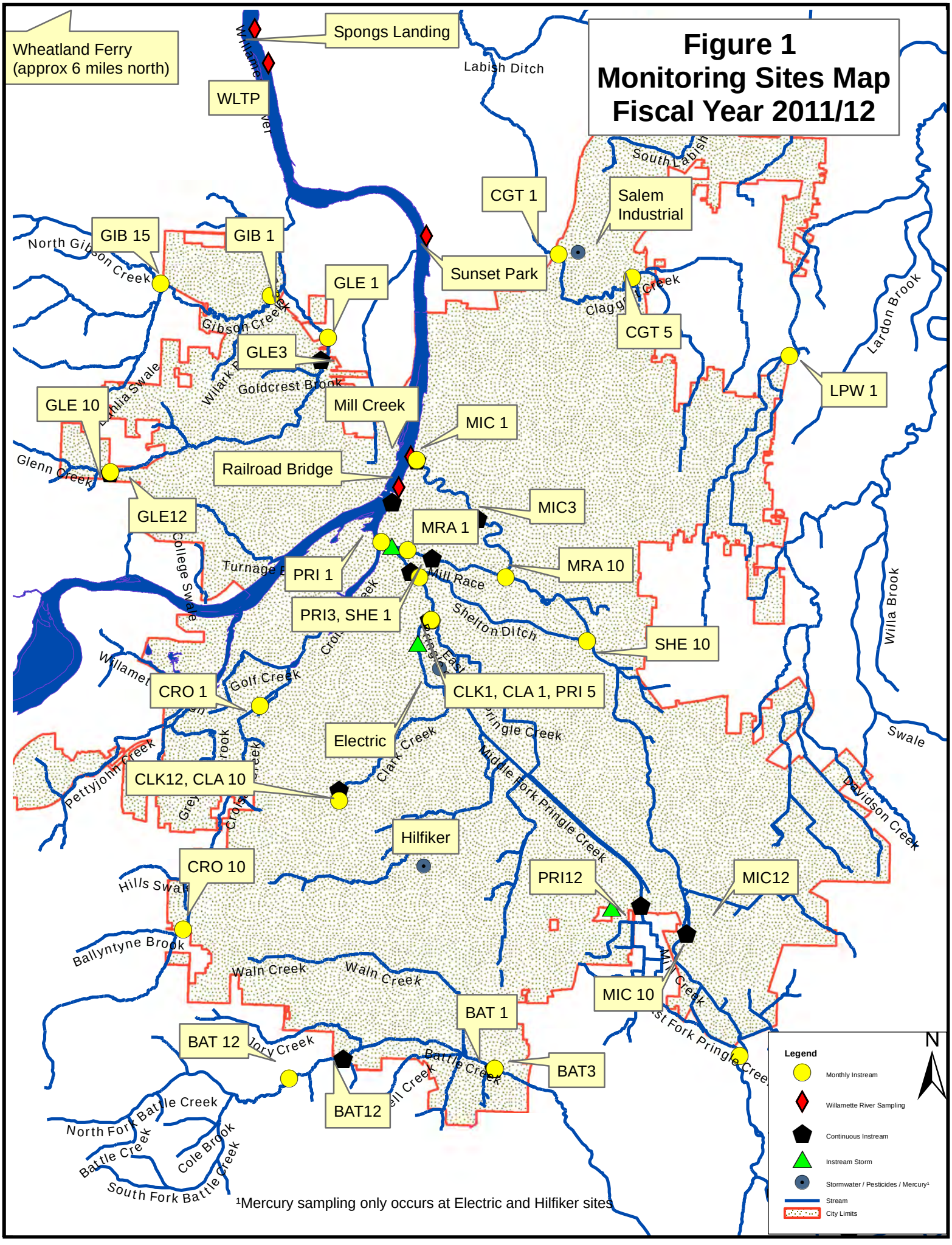
Note: Willamette River monitoring is not identified in the City's Surface and Stormwater Monitoring Plan: however, it is identified in the City of Salem Stormwater Management Plan 2010

Table 18.

Willamette River Water Quality Data

Willamette River at River Mile 71																
	Date	Alkalinity	BODs	Sp. Cond, field	DO	DO %Saturation	Ecoli,QT	NH3-ISE, lo-level	NO3+NO2	pH, field	TDS calc.	Temp, field	T-Phos	TS	TSS	Turb, field
Site Name	m/dd/yyyy	mg/L	mg/L	µS/cm	mg/L		MPN/100mL	mg/L	mg/L	S.U	mg/L	ºC	mg/L	mg/L	mg/L	NTU
Wheatland Ferry	7/26/2011	24	0.72	52.6	9.1	99	10	0.07	0.19	7.49	59	19.4	0.047	63	3.6	2.33
Wheatland Ferry	8/9/2011	27	0.68	54.0	9.2	99	6	0.08	0.14	7.54	63	19.0	0.045	67	3.6	2.62
Wheatland Ferry	8/16/2011	27	0.77	53.7	9.4	102	2	0.06	0.12	7.51	60	19.0	0.048	65	5.2	2.07
Wheatland Ferry	9/13/2011	25	0.95	49.4	9.3	97	14	< 0.05	0.08	7.46	65	17.4	0.046	72	6.8	3.04
Wheatland Ferry	9/27/2011	25	0.60	47.6	9.8	98	20	< 0.05	0.09	7.41	56	15.4	0.043	63	7.2	3.29
Wheatland Ferry	10/11/2011	25	0.70	48.0	10.0	97	36	0.07	0.09	7.49	51	14.0	0.056	59	7.6	3.88
Wheatland Ferry	11/15/2011	**No Sample**														
Wheatland Ferry	2/28/2012	25	1.45	52.1	11.8	96	26	0.07	0.4	7.34	59	6.4	0.06	67	7.6	11.6
Wheatland Ferry	4/24/2012	23	0.85	40.0	10.1	95	11	< 0.05	0.2	7.21	57	12.8	0.044	64	7.2	7.88
Wheatland Ferry	5/22/2012	27	0.97	49.1	10.4	98	32	< 0.05	0.19	7.32	42	12.5	0.034	46	3.6	3.33
Wheatland Ferry	5/29/2012	24	0.68	40.8	10.7	100	22	< 0.05	0.09	7.32	51	12.3	0.043	56	4.8	6.07
Wheatland Ferry	6/12/2012	28	0.77	39.9	10.1	99	19	< 0.05	0.09	7.28	41	14.3	0.041	48	6.8	5.34
Wheatland Ferry	6/19/2012	32	0.72	46.3	9.8	100	8	< 0.05	0.14	7.43	56	16.1	0.035	61	4.8	2.3
	Median	**25**	**0.75**	**48.55**	**9.9**	**98.5**	**16.25**	**0.07**	**0.13**	**7.42**	**56.5**	**14.85**	**0.0445**	**63**	**6**	**3.31**

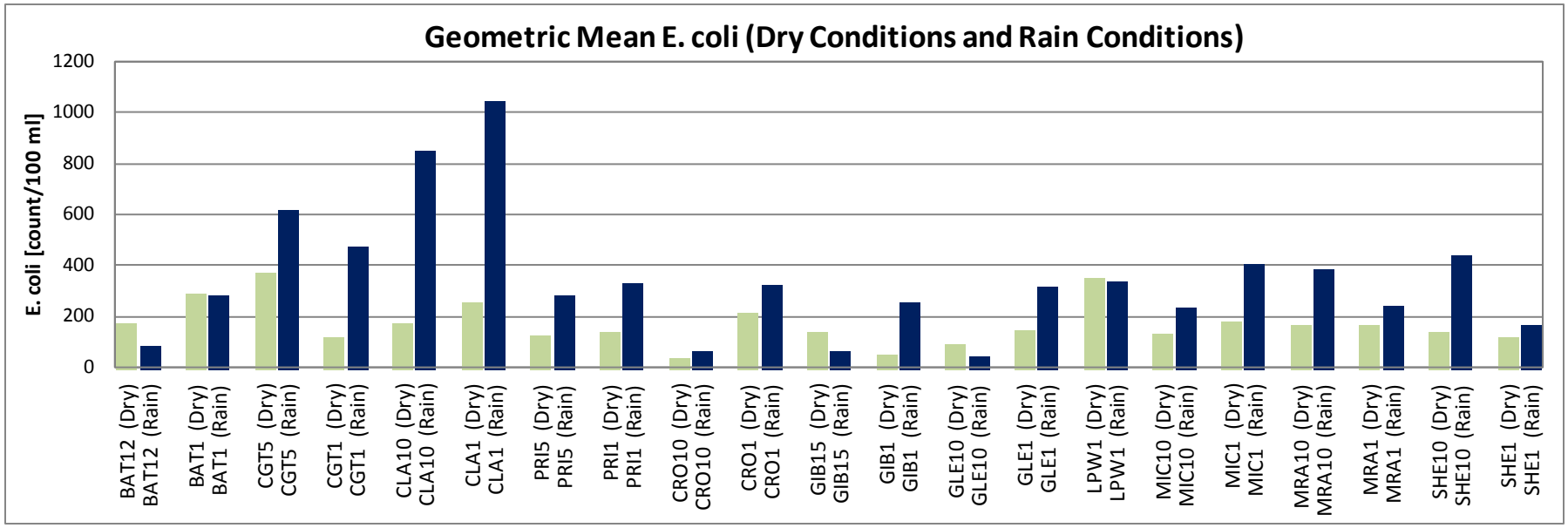
Note: Willamette River monitoring is not identified in the City's Surface and Stormwater Monitoring Plan: however, it is identified in the City of Salem Stormwater Management Plan 2010

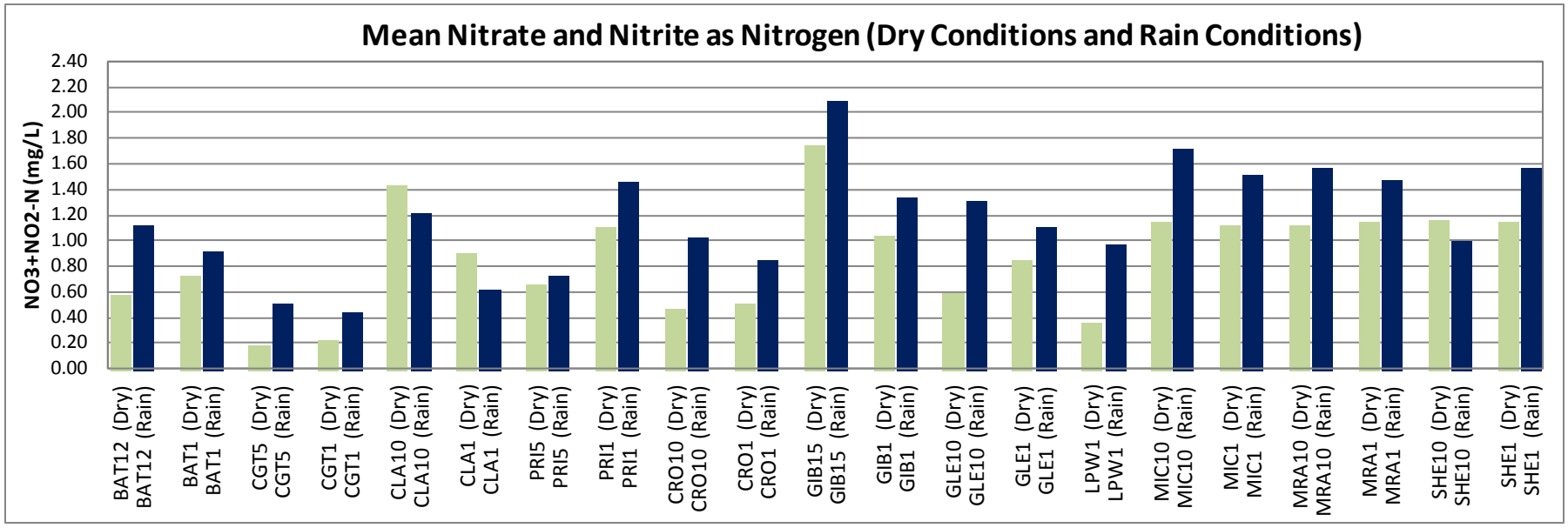


¹Mercury sampling only occurs at Electric and Hilfiker sites

Figure 2

Monthly Instream Mean Value Comparison for Dry and Rain Conditions (Reporting Year 2011/12)

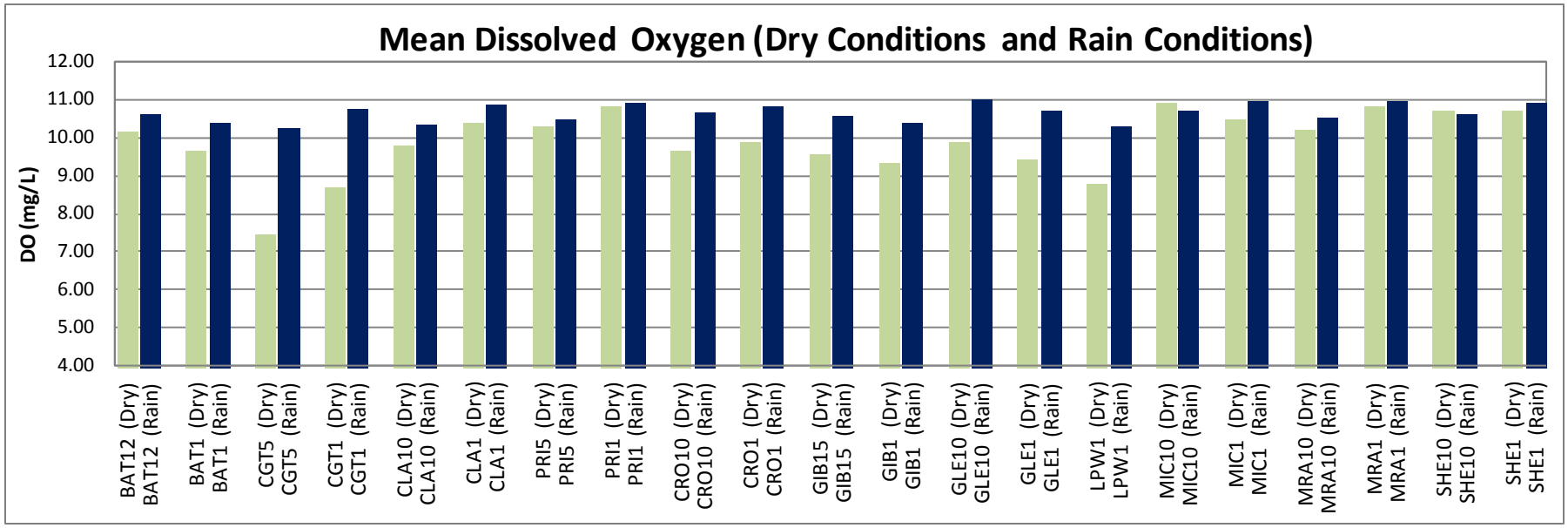


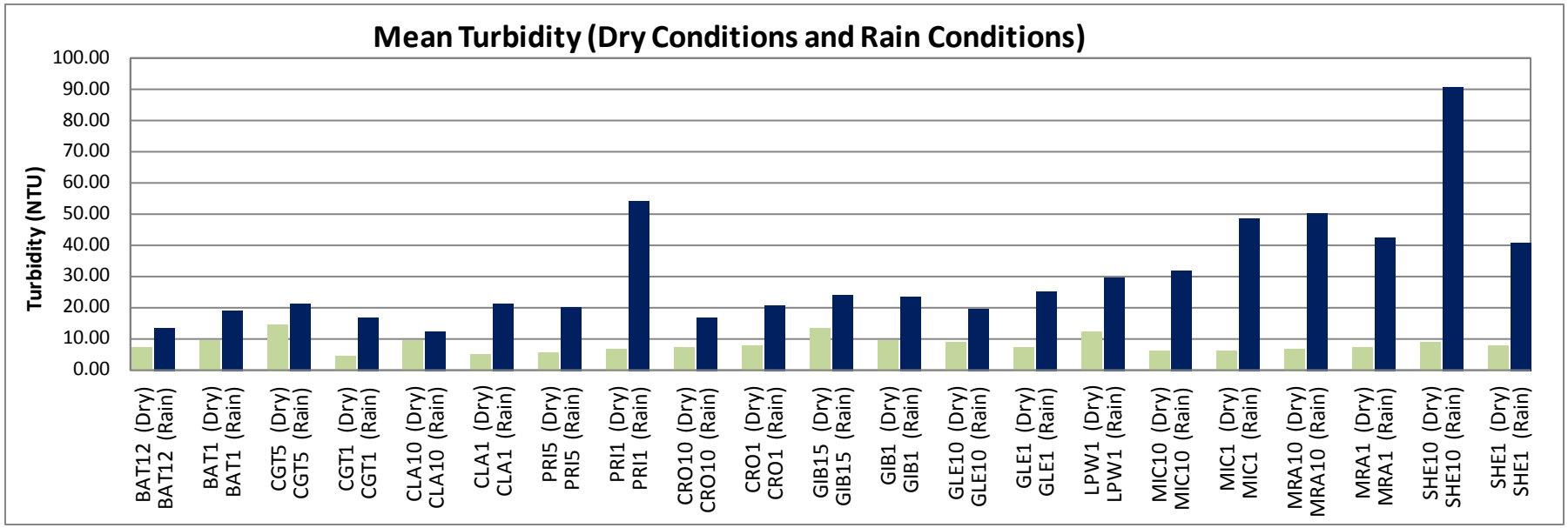


Dry conditions defined as less than 0.05 inches and rain conditions defined as greater than or equal to 0.05 inches of rainfall in the 24 hours prior to sample collection

Figure 2

Monthly Instream Mean Value Comparison for Dry and Rain Conditions (Reporting Year 2011/12)

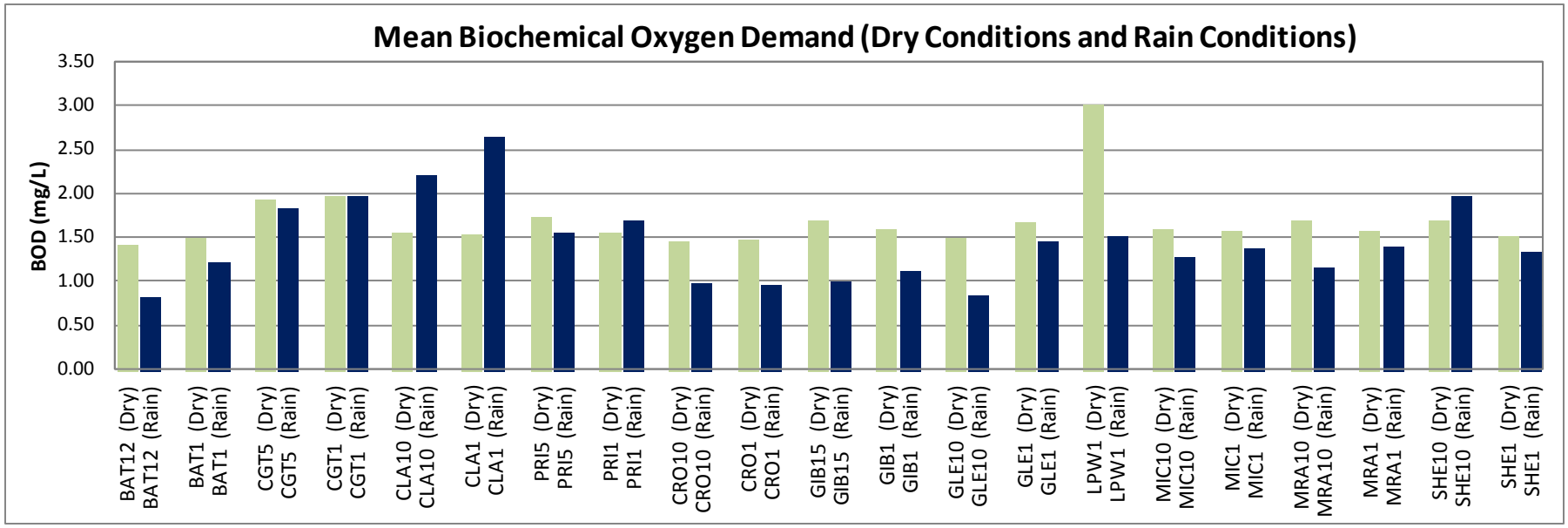


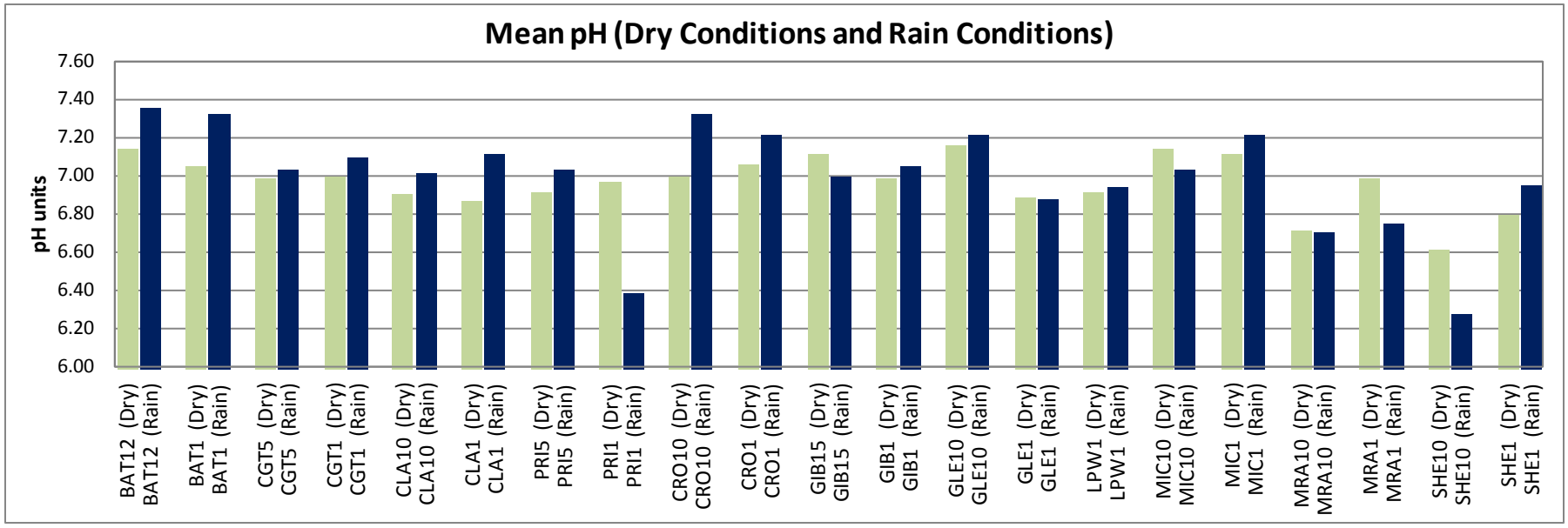


Dry conditions defined as less than 0.05 inches and rain conditions defined as greater than or equal to 0.05 inches of rainfall in the 24 hours prior to sample collection

Figure 2

Monthly Instream Mean Value Comparison for Dry and Rain Conditions (Reporting Year 2011/12)

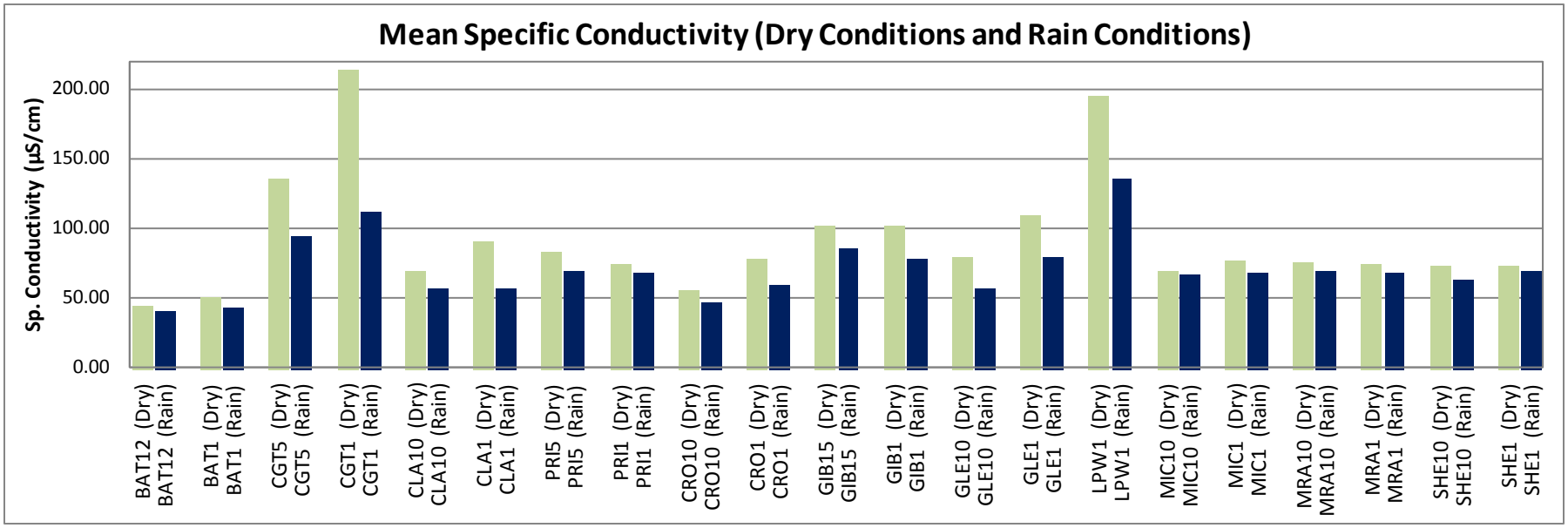




Dry conditions defined as less than 0.05 inches and rain conditions defined as greater than or equal to 0.05 inches of rainfall in the 24 hours prior to sample collection

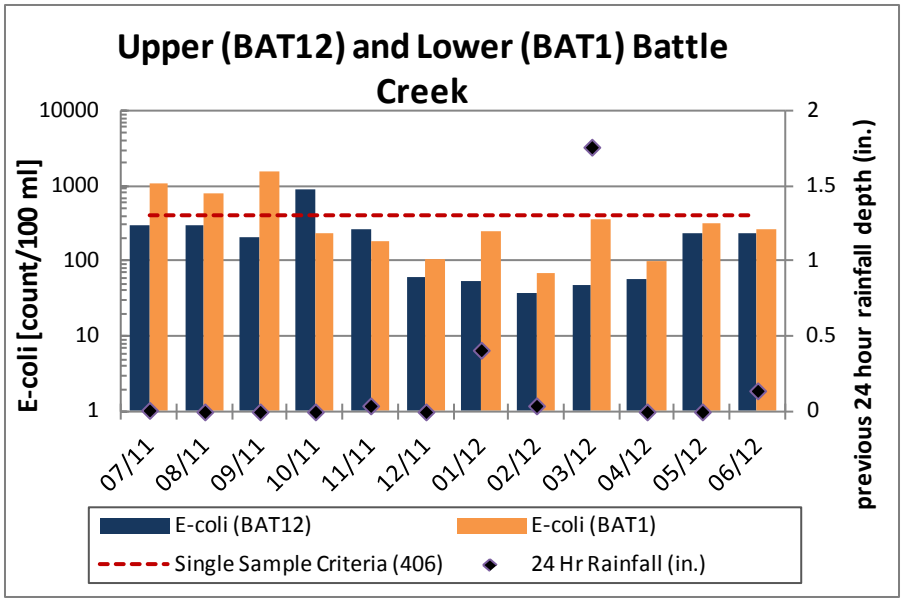
Figure 2

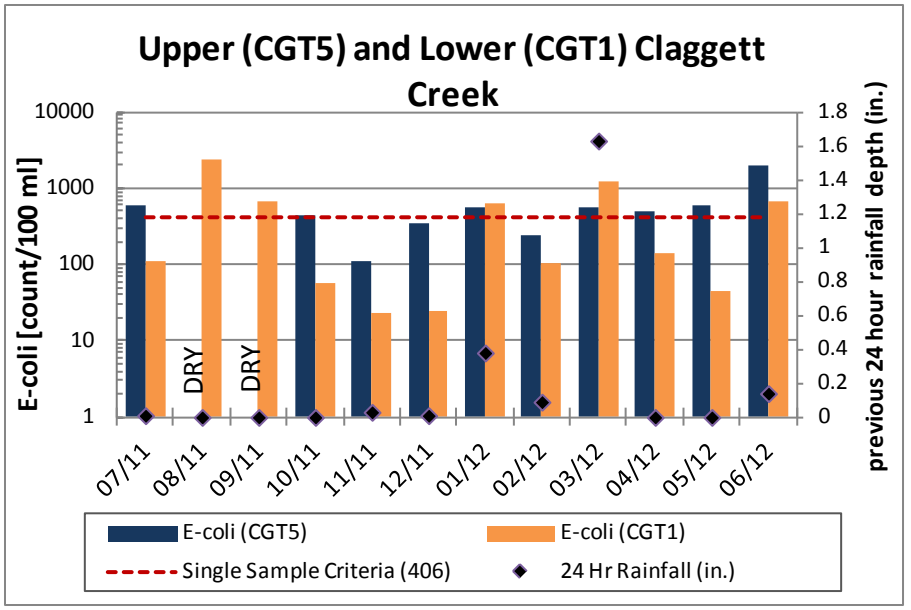
Monthly Instream Mean Value Comparison for Dry and Rain Conditions (Reporting Year 2011/12)

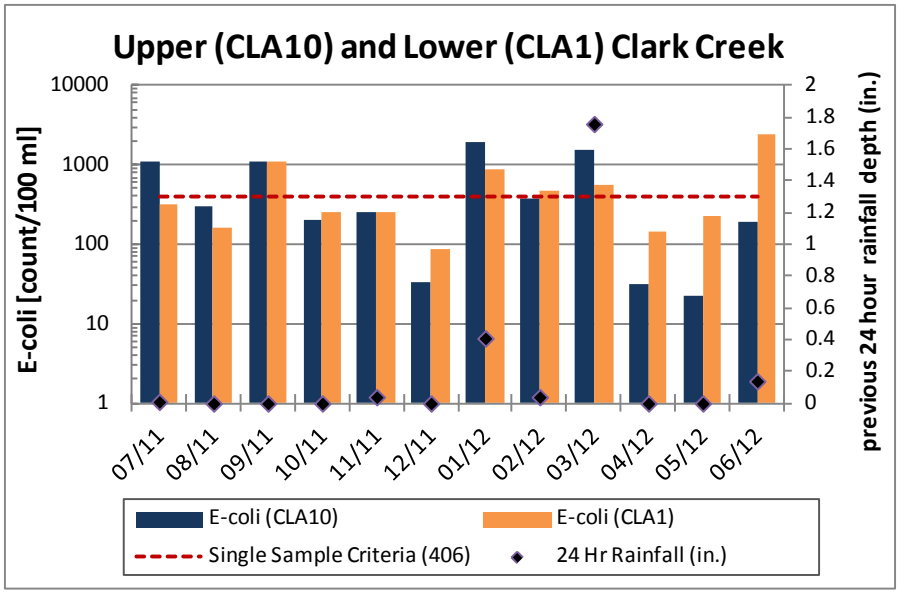


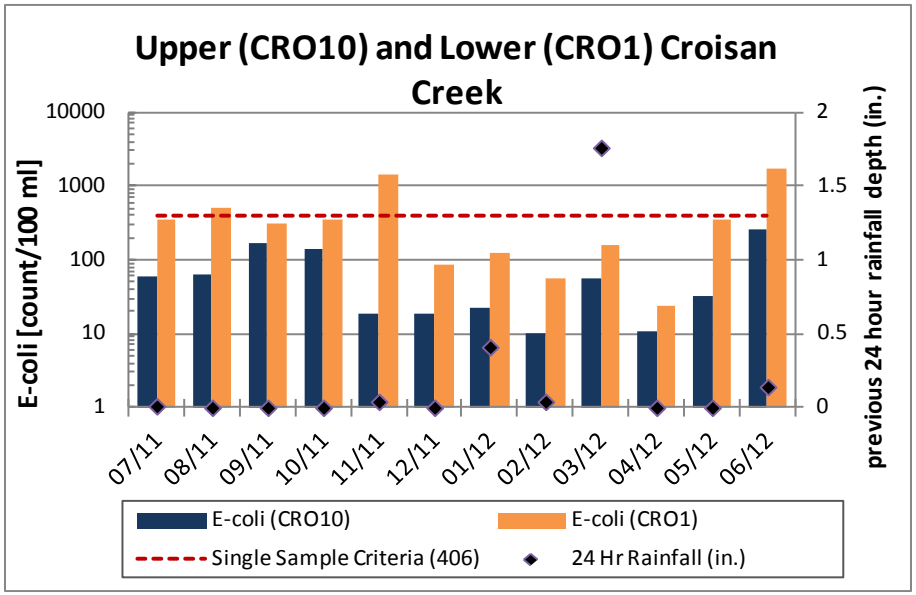
Dry conditions defined as less than 0.05 inches and rain conditions defined as greater than or equal to 0.05 inches of rainfall in the 24 hours prior to sample collection

Figure 3
Monthly Instream E. Coli Upstream / Downstream Site Comparison





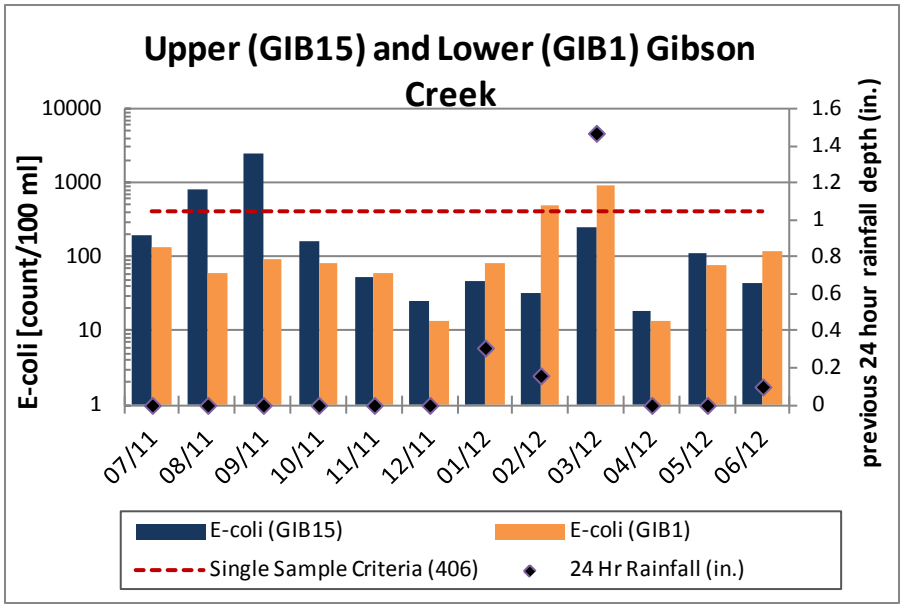


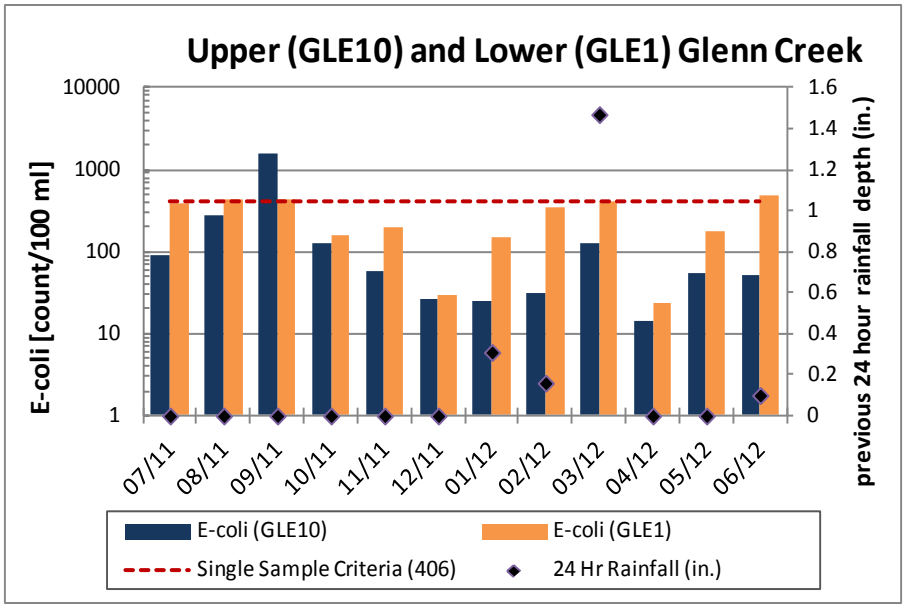


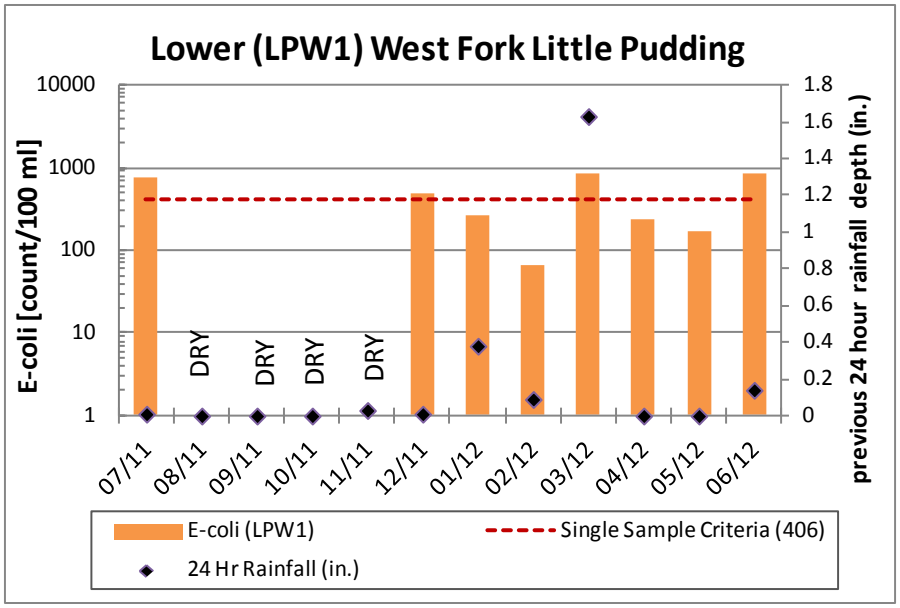
If 24 hour rainfall depth prior to sample collection differed between upstream and downstream sites, the average rainfall was used

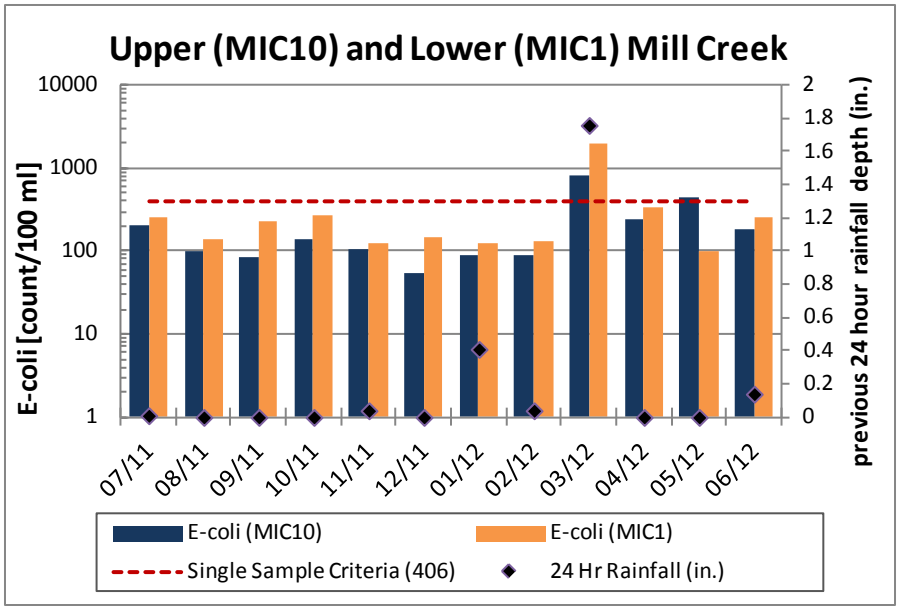
Figure 3

Monthly Instream E. Coli Upstream / Downstream Site Comparison





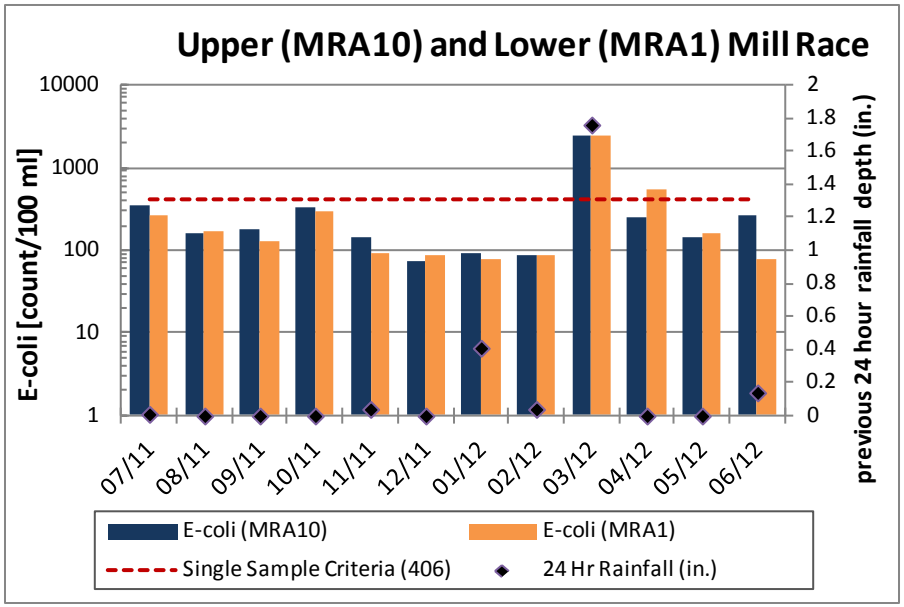


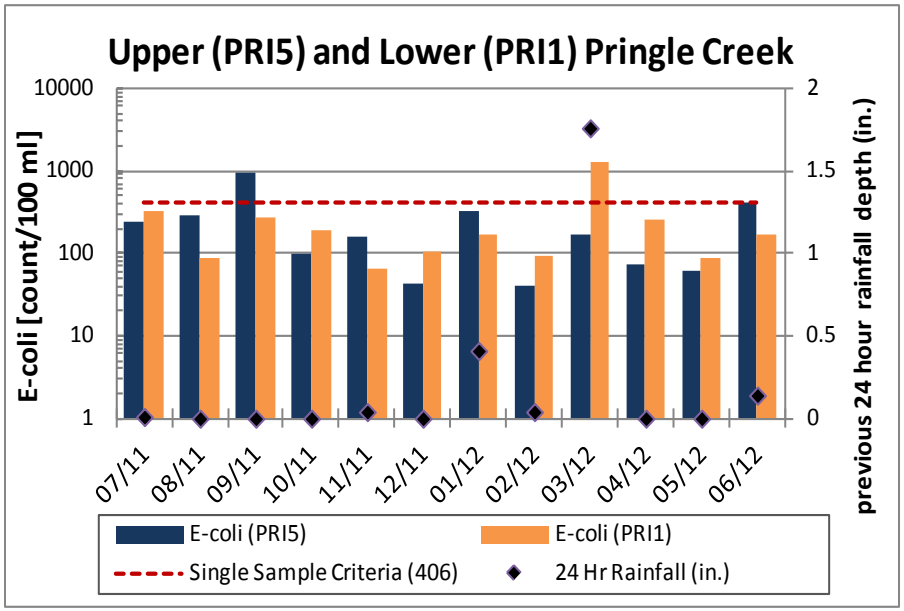


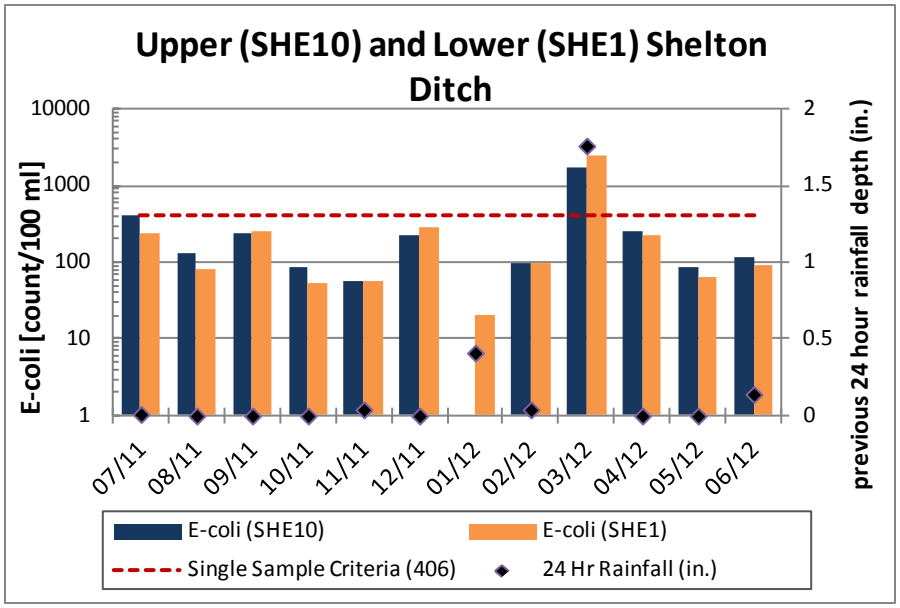
If 24 hour rainfall depth prior to sample collection differed between upstream and downstream sites, the average rainfall was used

Figure 3

Monthly Instream E. Coli Upstream / Downstream Site Comparison



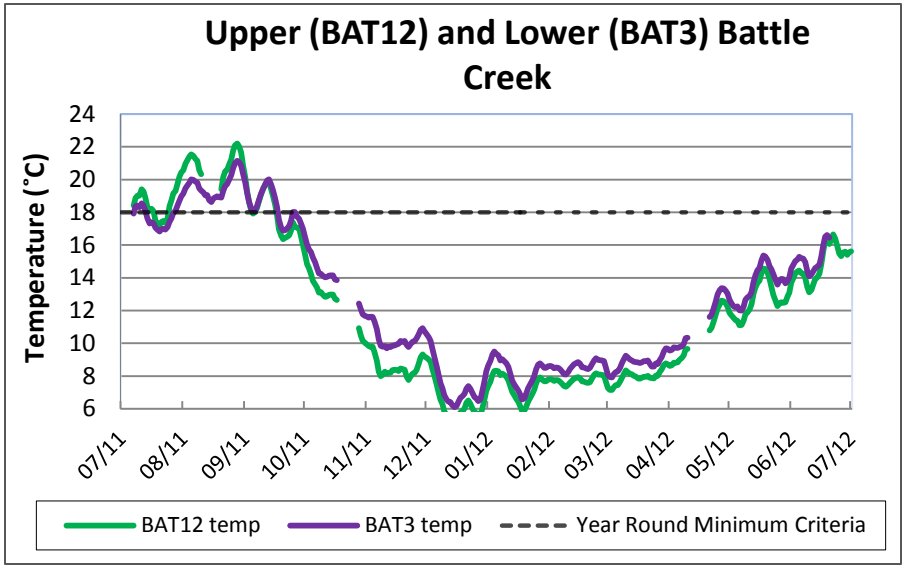


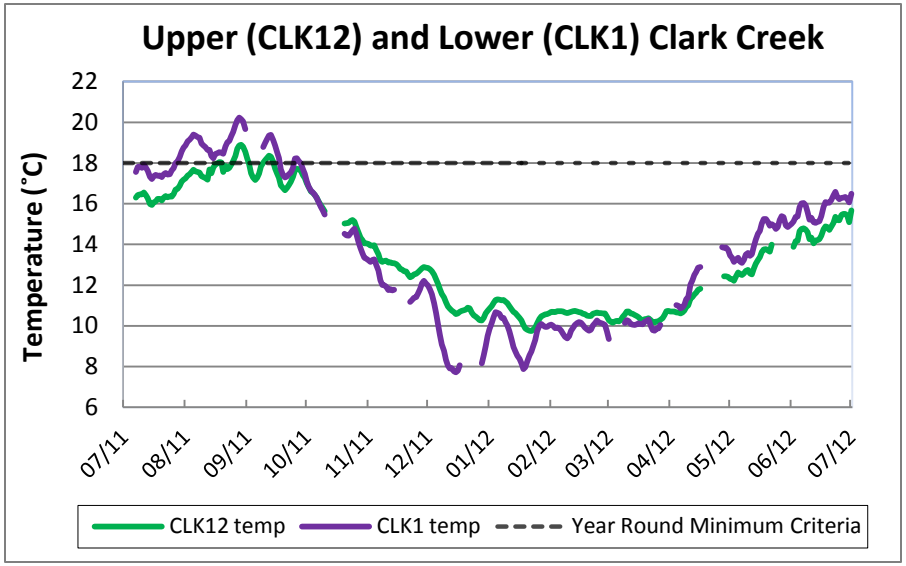


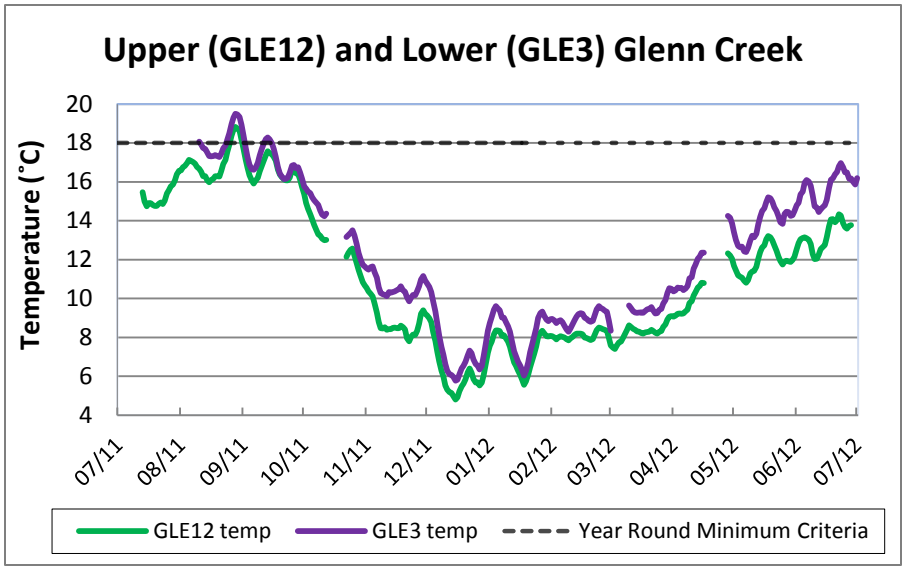
If 24 hour rainfall depth prior to sample collection differed between upstream and downstream sites, the average rainfall was used

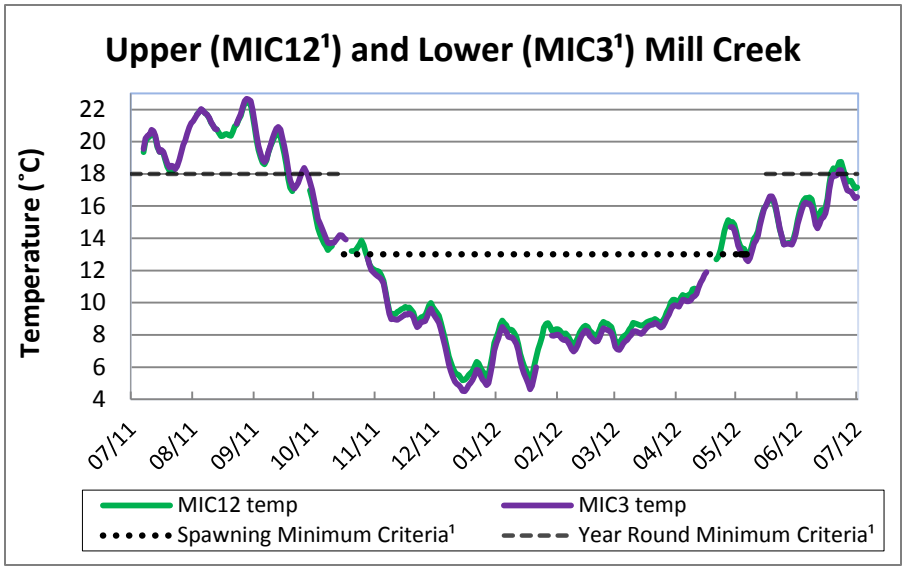
Figure 4

Continuous Instream Temperature 7-Day Moving Average Maximum









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

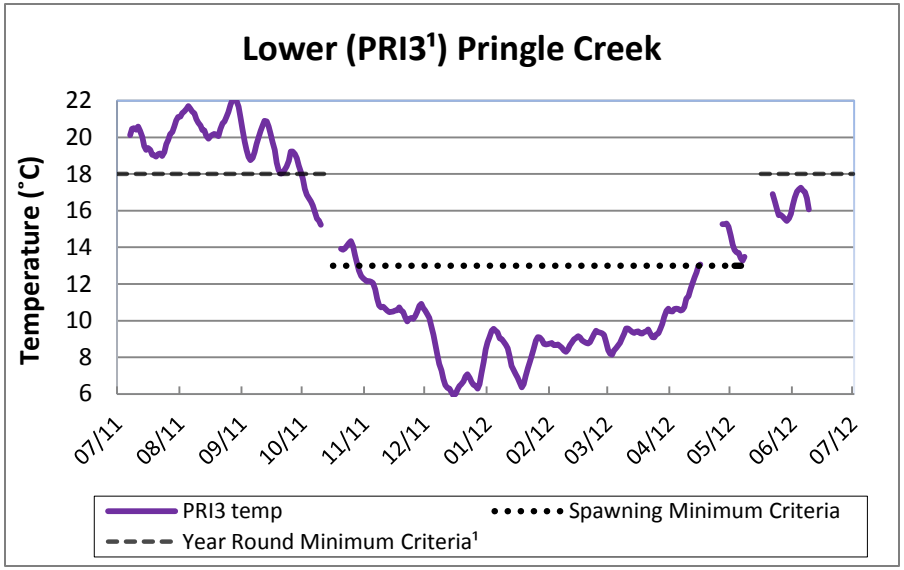
Temperature Criteria as defined in OAR 340-041-0028 and OAR-340-0340, Tables 340A and 340B

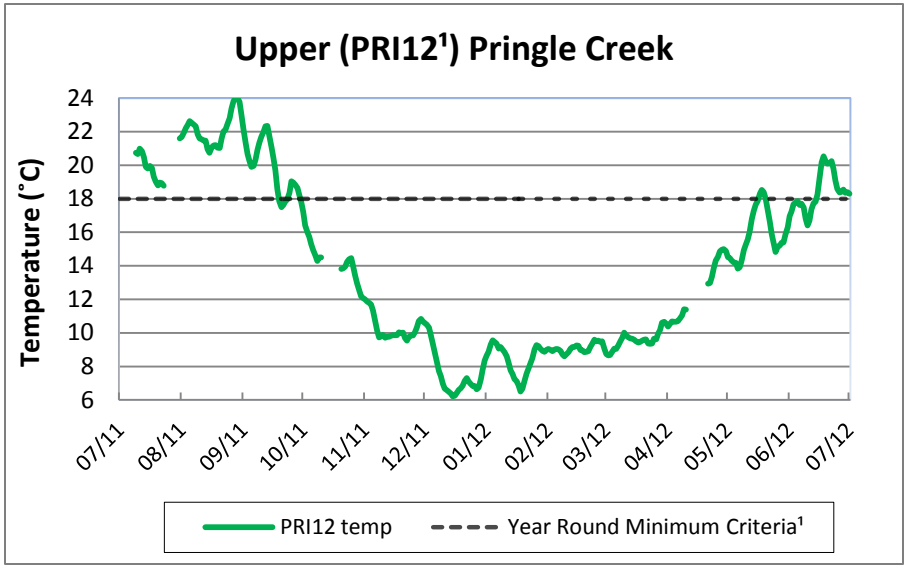
- Spawning Minimum Criteria for applicable streams may not exceed 7-day average maximum of 13˚C
- Year Round Minimum Criteria may not exceed 7-day average maximum of 18˚C

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

Figure 4

Continuous Instream Temperature 7-Day Moving Average Maximum





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

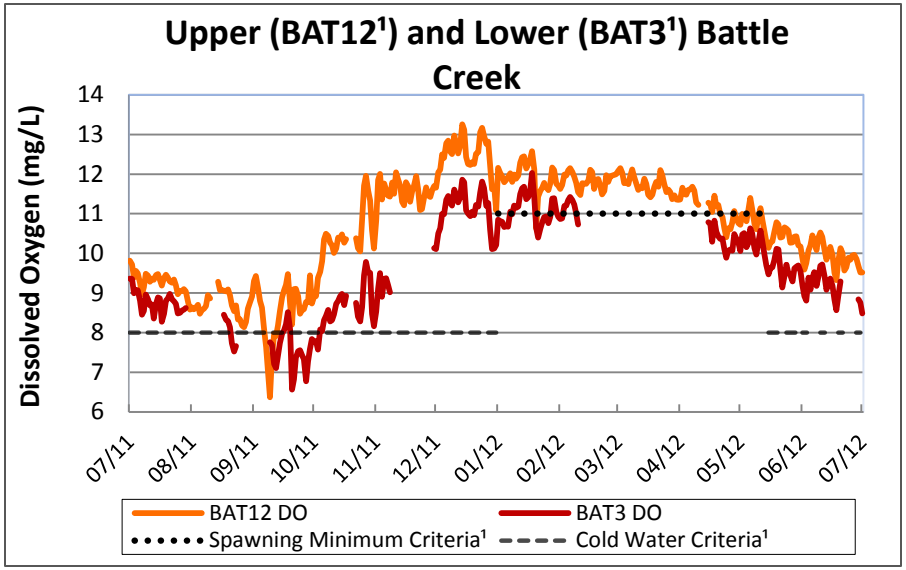
Temperature Criteria as defined in OAR 340-041-0028 and OAR-340-0340, Tables 340A and 340B

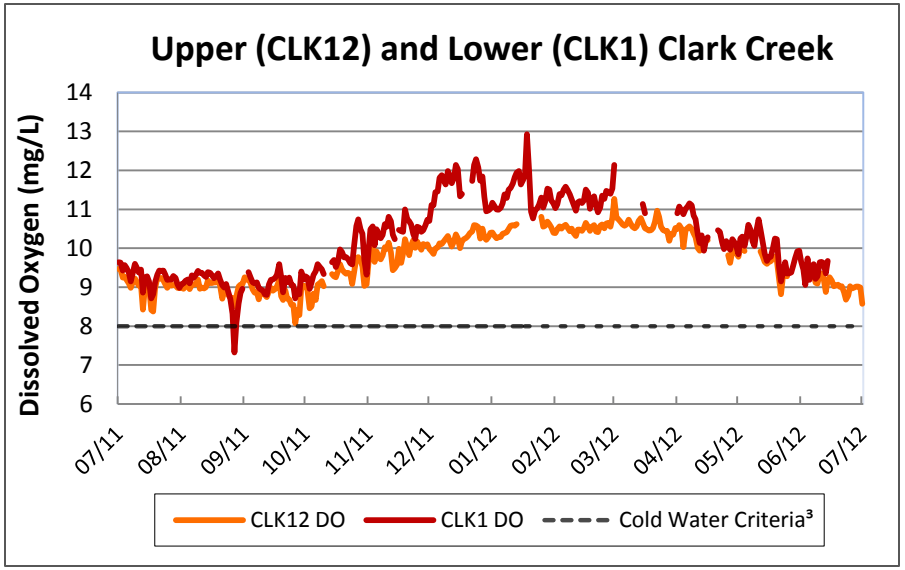
- Spawning Minimum Criteria for applicable streams may not exceed 7-day average maximum of 13˚C
- Year Round Minimum Criteria may not exceed 7-day average maximum of 18˚C

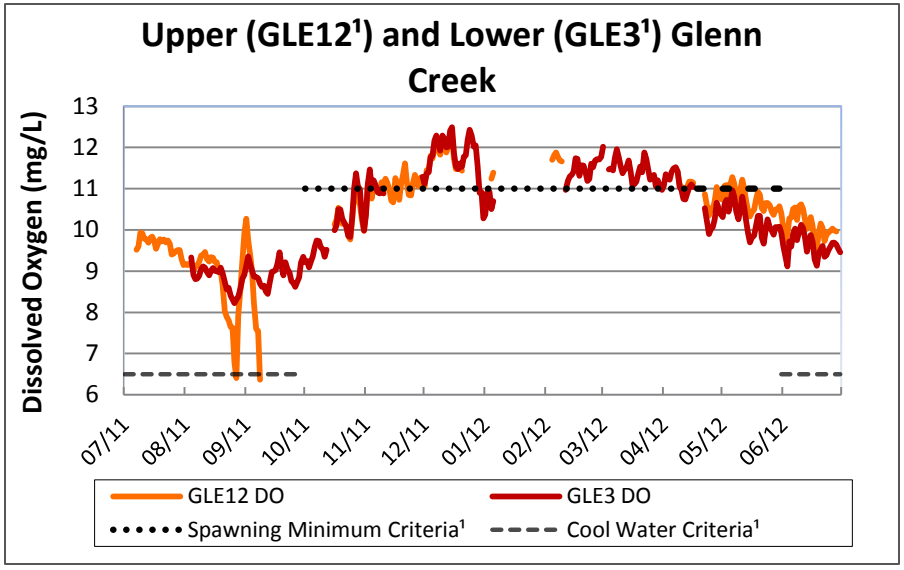
[1] Oregon's 2010 Integrated Report Section 303(d) listed

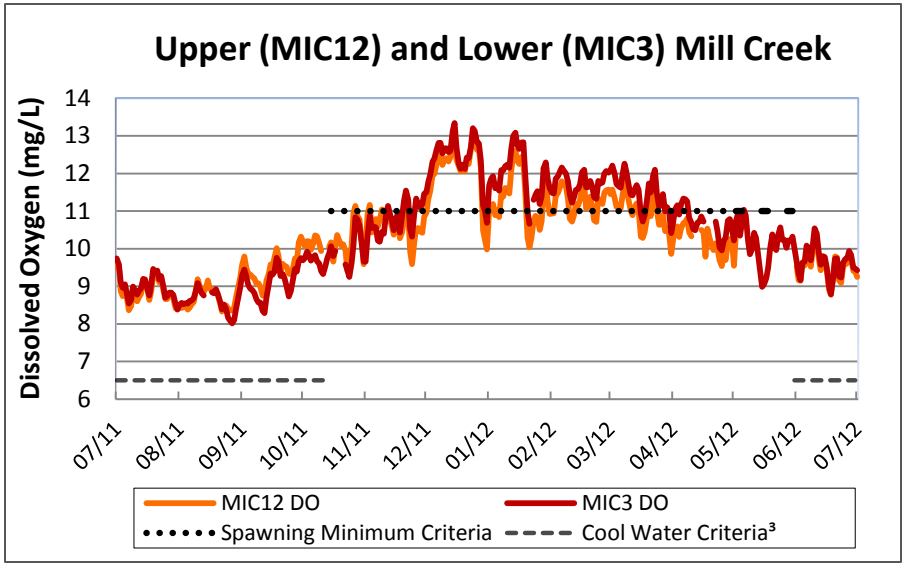
Figure 5

Continuous Instream Dissolved Oxygen Daily Mean









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

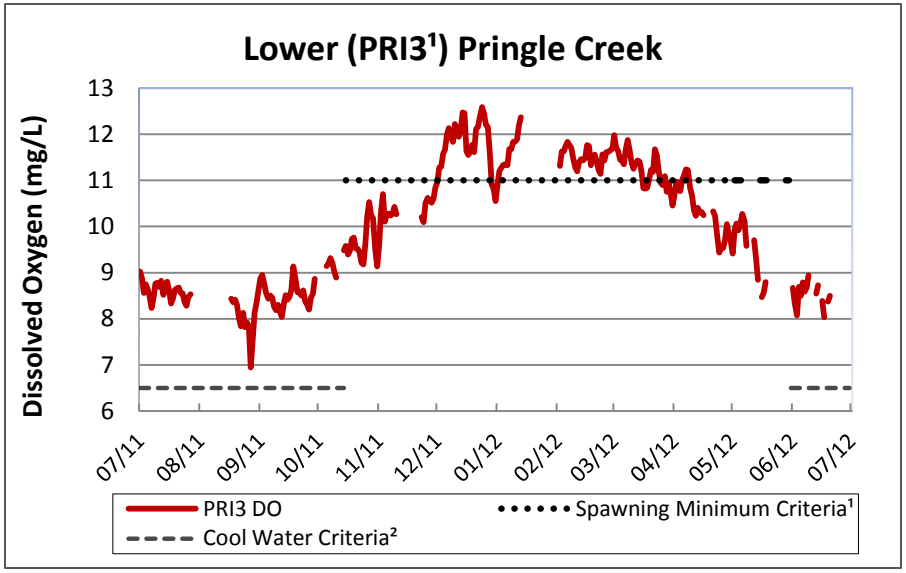
DO Criteria as defined in OAR 340-041-0016 and OAR-340-0340, Tables 340A and 340B

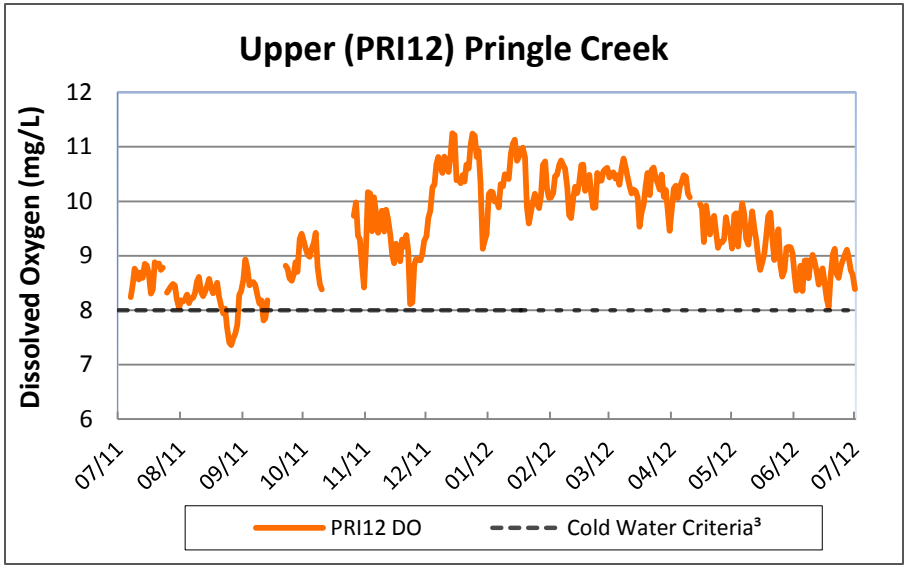
- Spawning Minimum Criteria for applicable streams may not be less than 11 mg/L
- Cold Water Criteria for applicable streams may not be less than 8 mg/L
- Cool Water Criteria for applicable streams may not be less than 6.5 mg/L

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

[3] Oregon's 2010 Integrated Report, Category 3

Figure 5
Continuous Instream Dissolved Oxygen Daily Mean





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

- Spawning Minimum Criteria for applicable streams may not be less than 11 mg/L
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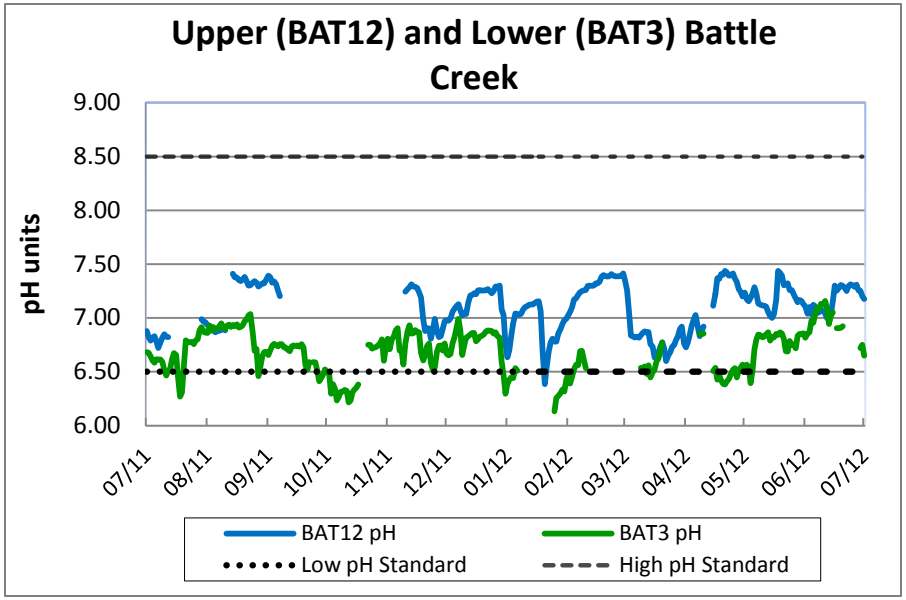
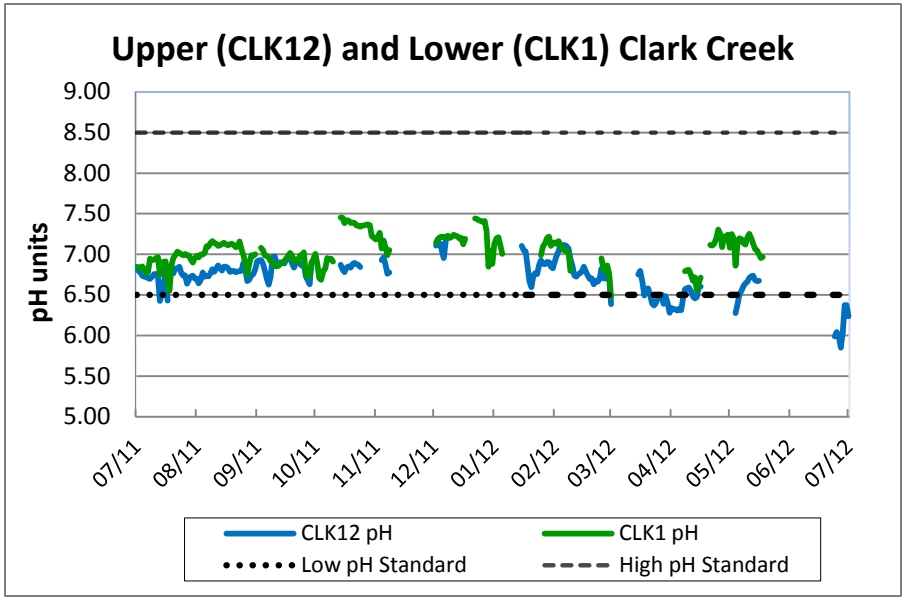
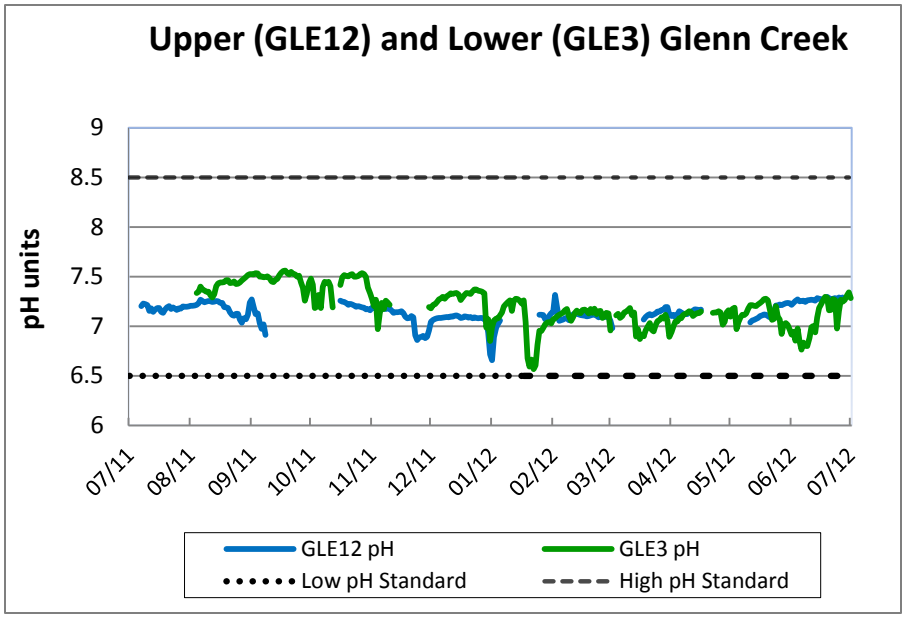
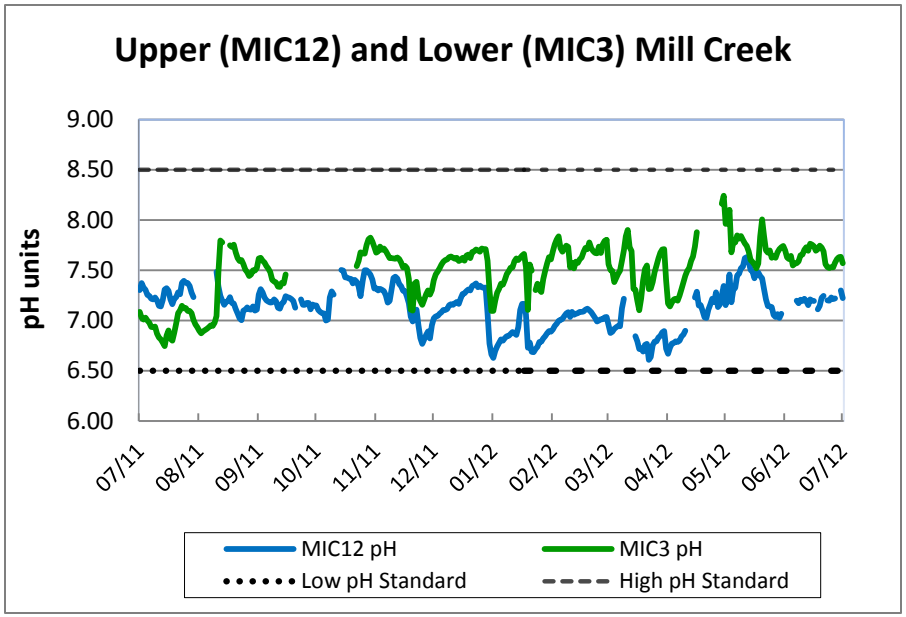
[1] Oregon's 2010Integrated Report Section 303(d) listed
[2] Oregon's 2010 Integrated Report, Category 2
[3] Oregon's 2010 Integrated Report, Category 3

Figure 6
Continuous Instream pH Daily Mean



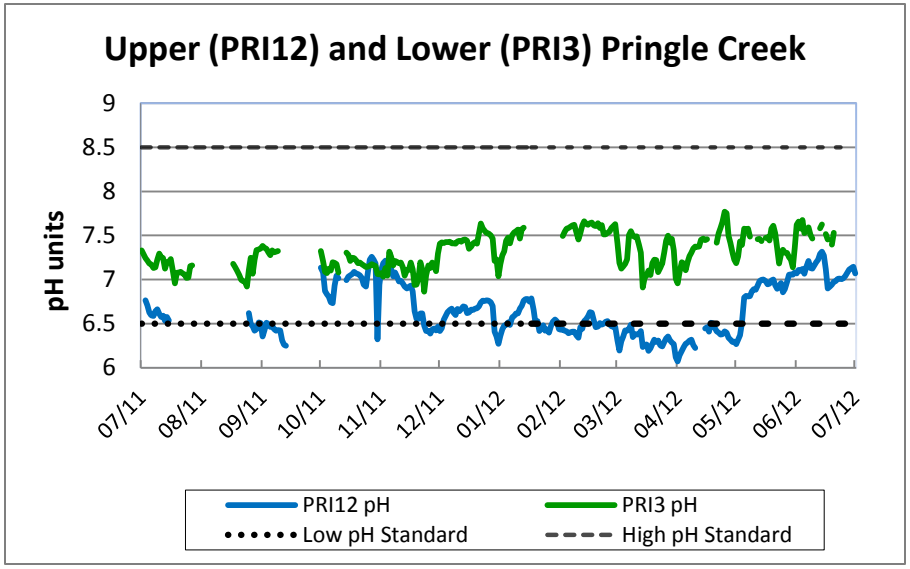






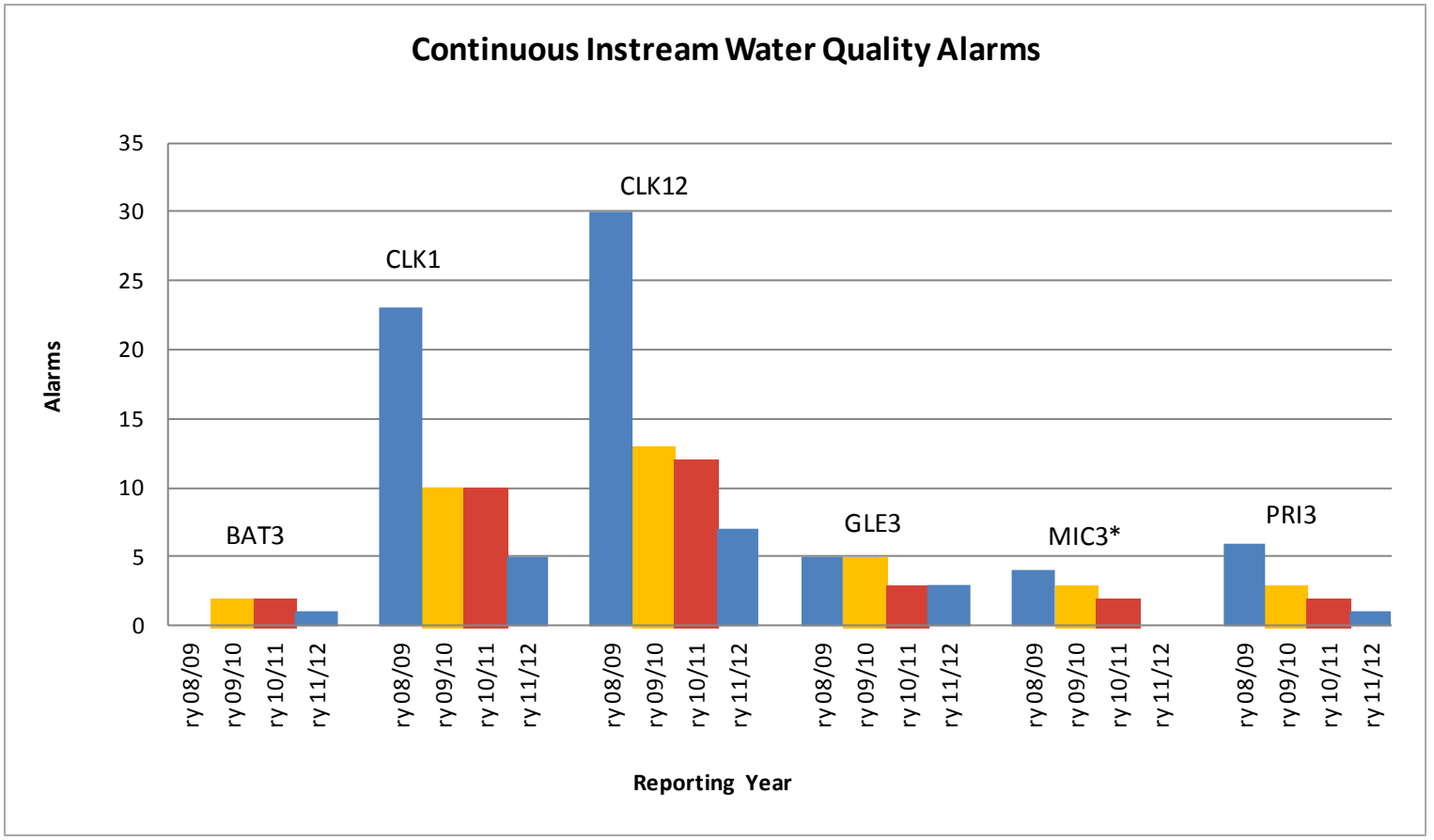
Presented pH data consists of A and B grade data with greater than or equal to 80% of data points collected per day
As defined in OAR 341-041-0035, Water Quality Standards for the Willamette Basin, pH may not fall outside the ranges of 6.5 to 8.5

Figure 6
Continuous Instream pH Daily Mean



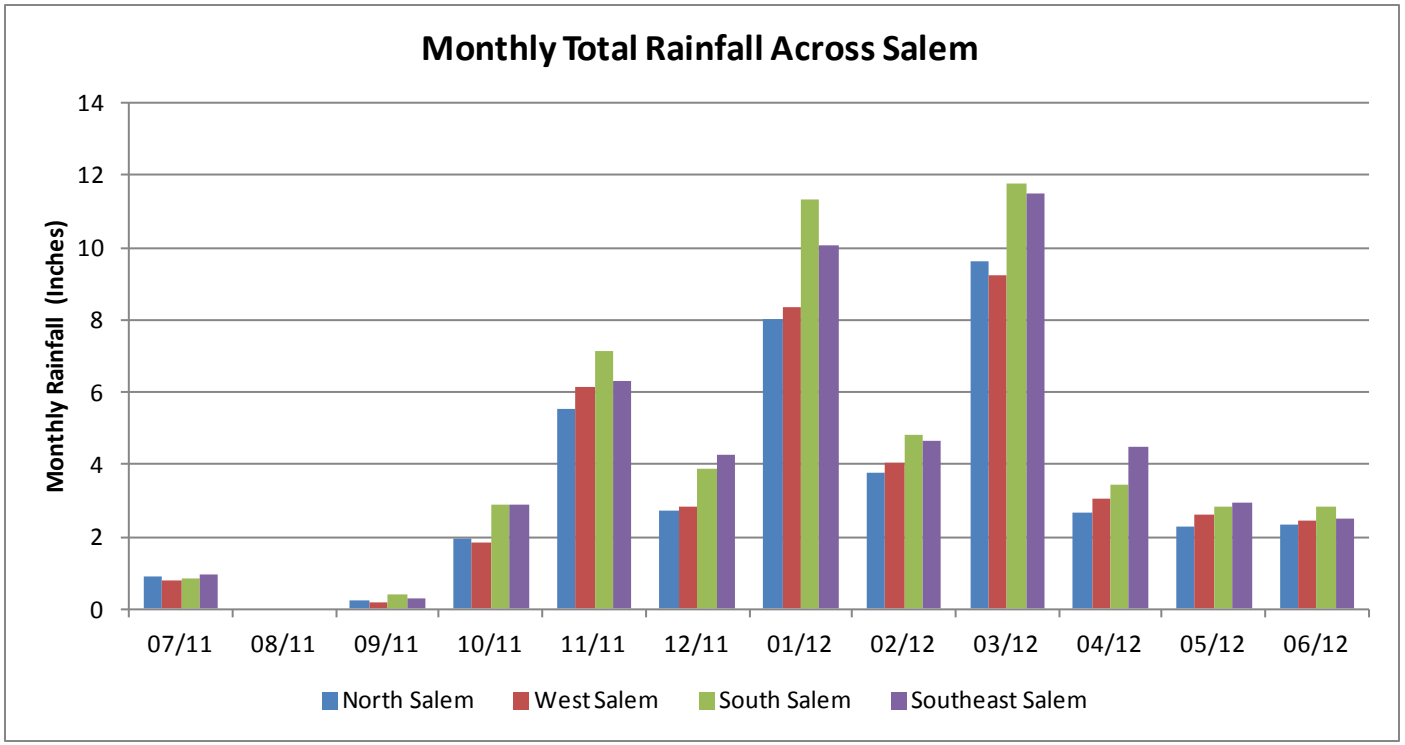
Presented pH data consists of A and B grade data with greater than or equal to 80% of data points collected per day
As defined in OAR 341-041-0035, Water Quality Standards for the Willamette Basin, pH may not fall outside the ranges of 6.5 to 8.5

Figure 7
Continuous Instream Water Quality Alarms



*MIC3 and MIC1 have been combined and labeled MIC3. Both stations are downstream of outfalls within the City's jurisdiction on Mill Creek.
Note: The alarm counts have been filtered , based on best professional judgment, to remove alarms resulting from: rain events, non-prohibited activities identified in Schedule A.4.a.xii in the City's NPDES MS4 permit, permitted activities during the in-water work period, and wildlife activity.

Figure 8
Monthly Total Rainfall Across Salem



Rainfall data is from rain gauges maintained by City of Salem

ATTACHMENT A. Analytical Report for Pesticide Screening, Pacific Agricultural Laboratory (May 1, 2012).

Pacific Agricultural Laboratory
12505 N.W. Cornell Rd. • Portland, OR 97229-5651 • Ph 503.626.7943 • Fx 503.641.0644

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

Report Number: P120261
Report Date: May 01, 2012
Client Project ID: [none]

Analytical Report

Client Sample ID: Electric
Matrix: water

PAL Sample ID: P120261-01
Sample Date: 4/16/12

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
Method: Multiresidue Profile					
4/19/12	4/27/12	MR Pesticides	Not Detected	See Analyte List	

Surrogate Recovery: 84 %
Surrogate Recovery Range: 32-160
(DCBP used as Surrogate)

Client Sample ID: Electric Dup
Matrix: water

PAL Sample ID: P120261-02
Sample Date: 4/16/12

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
Method: Multiresidue Profile					
4/19/12	4/27/12	MR Pesticides	Not Detected	See Analyte List	

Surrogate Recovery: 86 %
Surrogate Recovery Range: 32-160
(DCBP used as Surrogate)

Client Sample ID: Salem Industrial
Matrix: water

PAL Sample ID: P120261-03
Sample Date: 4/16/12

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
Method: Multiresidue Profile					
4/19/12	4/27/12	Propiconazole	1.1 ug/L	0.20 ug/L	
4/19/12	4/20/12	Ethofumesate	0.35 ug/L	0.30 ug/L	
4/19/12	4/27/12	Other Pesticides	Not Detected	See Analyte List	

Surrogate Recovery: 82 %
Surrogate Recovery Range: 32-160
(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: P120261
Report Date: May 01, 2012
Client Project ID: [none]

Analytical Report

Client Sample ID: Hilfiker
Matrix: water

PAL Sample ID: P120261-04
Sample Date: 4/16/12

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
Method: Multiresidue Profile					
4/19/12	4/26/12	Diuron	0.29 ug/L	0.12 ug/L	
4/19/12	4/27/12	Other Pesticides	Not Detected	See Analyte List	

Surrogate Recovery: 72 %
Surrogate Recovery Range: 32-160
(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: P120261
Report Date: May 01, 2012
Client Project ID: [none]

Quality Assurance

Method Blank Data **Matrix:** water

Extraction Date	Analysis Date	Batch QC Sample #	Analyte	% Recovery	Expected % Recovery	Notes
Method: Multiresidue Profile						
4/18/12	4/27/12	2041802-BLK1	MR Pesticides	Not Detected	<LoQ	

Blank Spike Data **Matrix:** water

Extraction Date	Analysis Date	Batch QC Sample #	Analyte	% Recovery	Expected % Recovery	Notes
4/18/12	4/20/12	2041802-BS1	Atrazine	88	49-100	
4/18/12	4/20/12	2041802-BSD1	Atrazine	76	49-100	
4/18/12	4/26/12	2041802-BS1	Bendiocarb	82	11-100	
4/18/12	4/26/12	2041802-BSD1	Bendiocarb	84	11-100	
4/18/12	4/24/12	2041802-BS1	Diazinon	112	34-145	
4/18/12	4/24/12	2041802-BSD1	Diazinon	115	34-145	
4/18/12	4/27/12	2041802-BS1	Dieldrin	91	48-152	
4/18/12	4/27/12	2041802-BSD1	Dieldrin	94	48-152	
4/18/12	4/20/12	2041802-BS1	Ethofumesate	91	51-101	
4/18/12	4/20/12	2041802-BSD1	Ethofumesate	87	51-101	
4/18/12	4/24/12	2041802-BS1	Ethoprop	102	39-126	
4/18/12	4/24/12	2041802-BSD1	Ethoprop	101	39-126	
4/18/12	4/26/12	2041802-BS1	Monuron	82	46-122	
4/18/12	4/26/12	2041802-BSD1	Monuron	85	46-122	
4/18/12	4/27/12	2041802-BS1	Oxadiazon	109	71-129	
4/18/12	4/27/12	2041802-BSD1	Oxadiazon	113	71-129	

Rick Jordan, Laboratory Manager

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City of Salem
1410 20th St. SE Building 2
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Report Number: P120261
Report Date: May 01, 2012
Client Project ID: [none]

Project Information

Methodology Employed

Modified EPA 8081B (GC-ECD)
Modified EPA 8141B (GC-FPD)
Modified EPA 8270D (GC-MS SIM)
Modified EPA 8321B (HPLC-MS)

Analyte Information

Method: Modified EPA 8321B (HPLC-MS)
DCPMU is the primary breakdown product of Diuron.

Rick Jordan, Laboratory Manager

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City of Salem
1410 20th St. SE Building 2
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Report Number: P120261
Report Date: May 01, 2012
Client Project ID: [none]

Multiresidue Analyte List

Organophosphorous and Organosulfur Pesticides

Analyte	Reporting Limit	Analyte	Reporting Limit
Aspon	0.30 ug/L	Azinphos-methyl	0.30 ug/L
Carbofenothion	0.30 ug/L	Chlorfenvinphos	0.30 ug/L
Chlorpyrifos-methyl	0.30 ug/L	Coumaphos	0.30 ug/L
Demeton	0.30 ug/L	Diazinon	0.30 ug/L
Dichlorofenthion	0.30 ug/L	Dichlorvos	0.30 ug/L
Dicrotophos	0.30 ug/L	Dimethoate	0.30 ug/L
Disulfoton	0.30 ug/L	EPN	0.30 ug/L
Ethion	0.30 ug/L	Ethoprop	0.30 ug/L
Famphur	0.30 ug/L	Fenamiphos	0.30 ug/L
Fenitrothion	0.30 ug/L	Fensulfothion	0.30 ug/L
Fenthion	0.30 ug/L	Malathion	0.30 ug/L
Merphos	0.30 ug/L	Methidathion	0.30 ug/L
Mevinphos	0.30 ug/L	Monocrotophos	0.30 ug/L
Parathion	0.30 ug/L	Parathion methyl	0.30 ug/L
Phorate	0.30 ug/L	Phosmet	0.30 ug/L
Phosphamidon	0.30 ug/L	Pirimiphos-methyl	0.30 ug/L
Ronnel	0.30 ug/L	Sulprofos	0.30 ug/L
Terbufos	0.30 ug/L	Tetrachlorvinphos	0.30 ug/L
Tokuthion	0.30 ug/L	Trichloronate	0.30 ug/L
Chlorpyrifos	0.080 ug/L	Propargite	0.60 ug/L

Rick Jordan, Laboratory Manager

Pacific Agricultural Laboratory
12505 N.W. Cornell Rd. • Portland, OR 97229-5651 • Ph 503.626.7943 • Fx 503.641.0644

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

Report Number: P120261
Report Date: May 01, 2012
Client Project ID: [none]

Halogenated Pesticides

Analyte	Reporting Limit	Analyte	Reporting Limit
Acetochlor	0.20 ug/L	Alachlor	0.080 ug/L
Aldrin	0.080 ug/L	Benfluralin	0.080 ug/L
Bifenthrin	0.080 ug/L	a-BHC	0.080 ug/L
b-BHC	0.080 ug/L	d-BHC	0.080 ug/L
g-BHC	0.080 ug/L	Captafol	0.080 ug/L
Captan	0.20 ug/L	Chlordane	0.80 ug/L
Chlorobenzilate	0.20 ug/L	Chloroneb	0.20 ug/L
Chlorothalonil	0.080 ug/L	Cyfluthrin	0.80 ug/L
Cyhalothrin	0.80 ug/L	Cypermethrin	0.80 ug/L
p,p'-DDD	0.080 ug/L	p,p'-DDE	0.080 ug/L
p,p'-DDT	0.080 ug/L	Dacthal	0.080 ug/L
Deltamethrin	0.80 ug/L	Dichlobenil	0.080 ug/L
Dicloran	0.080 ug/L	Dicofol	0.20 ug/L
Dieldrin	0.080 ug/L	Dithiopyr	0.080 ug/L
Endosulfan I	0.080 ug/L	Endosulfan II	0.080 ug/L
Endosulfan sulfate	0.080 ug/L	Endrin	0.080 ug/L
Endrin aldehyde	0.080 ug/L	Endrin ketone	0.080 ug/L
Esfenvalerate	0.080 ug/L	Ethalfluralin	0.080 ug/L
Etridiazole	0.080 ug/L	Fenarimol	0.080 ug/L
Fenvalerate	0.080 ug/L	Flutolanil	0.80 ug/L
Folpet	0.20 ug/L	Heptachlor	0.080 ug/L
Heptachlor epoxide	0.080 ug/L	Hexachlorobenzene	0.080 ug/L
Iprodione	0.080 ug/L	Methoxychlor	0.080 ug/L
Metolachlor	0.20 ug/L	Mirex	0.080 ug/L
Norflurazon	0.080 ug/L	Ovex	0.080 ug/L
Oxadiazon	0.080 ug/L	Oxyfluorfen	0.080 ug/L
PCNB	0.080 ug/L	Permethrin	0.80 ug/L
Prodiamine	0.080 ug/L	Pronamide	0.080 ug/L
Propachlor	0.20 ug/L	Propanil	0.080 ug/L
Propiconazole	0.20 ug/L	Terbacil	0.080 ug/L
Toxaphene	4.0 ug/L	Trifloxystrobin	0.080 ug/L
Triflumizole	0.080 ug/L	Trifluralin	0.080 ug/L
Vinclozalin	0.080 ug/L		

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Report Number: P120261
Report Date: May 01, 2012
Client Project ID: [none]

Organonitrogen Pesticides

Analyte	Reporting Limit	Analyte	Reporting Limit
Ametryn	0.30 ug/L	Amitraz	0.60 ug/L
Atrazine	0.30 ug/L	Azoxystrobin	0.12 ug/L
Bensulide	0.12 ug/L	Boscalid	0.12 ug/L
Bromacil	0.12 ug/L	Bromopropylate	0.60 ug/L
Carfentrazone-ethyl	0.12 ug/L	Clothianidin	0.12 ug/L
Cyanazine	0.60 ug/L	Diclofop-methyl	0.60 ug/L
Dimethenamid	0.30 ug/L	Diphenylamine	0.12 ug/L
Ethofumesate	0.30 ug/L	Fenbuconazole	0.60 ug/L
Fenoxaprop-ethyl	0.60 ug/L	Fipronil	0.60 ug/L
Fluazifop-p-butyl	0.60 ug/L	Fludioxonil	0.60 ug/L
Flumioxazin	0.12 ug/L	Fluometuron	0.12 ug/L
Fluroxypyr-meptyl	0.30 ug/L	Hexazinone	0.30 ug/L
Imidacloprid	0.12 ug/L	Isoxaben	0.12 ug/L
Mefenoxam	0.30 ug/L	Metalaxyl	0.30 ug/L
Metribuzin	0.60 ug/L	Myclobutanil	0.60 ug/L
Napropamide	0.60 ug/L	Pendimethalin	0.080 ug/L
Pirimicarb	0.30 ug/L	Prometon	0.60 ug/L
Prometryn	0.30 ug/L	Propazine	0.30 ug/L
Pyraclostrobin	0.12 ug/L	Pyridaben	0.60 ug/L
Pyrimethanil	0.12 ug/L	Sethoxydim	6.0 ug/L
Simazine	0.60 ug/L	Simetryn	0.30 ug/L
Sulfentrazone	0.12 ug/L	Tebuconazole	0.60 ug/L
Tebuthiuron	0.60 ug/L	Thiabendazole	0.12 ug/L
Triadimefon	0.60 ug/L		

Phenylurea Pesticides

Analyte	Reporting Limit	Analyte	Reporting Limit
DCPMU	0.12 ug/L	Diuron	0.12 ug/L
Fenuron	0.12 ug/L	Linuron	0.12 ug/L
Monuron	0.12 ug/L	Neburon	0.12 ug/L
Siduron	0.12 ug/L		

Carbamate Pesticides

Analyte	Reporting Limit	Analyte	Reporting Limit
3-Hydroxycarbofuran	0.12 ug/L	Aldicarb	0.12 ug/L
Aldicarb Sulfone	0.12 ug/L	Aldicarb sulfoxide	0.12 ug/L
Bendiocarb	0.12 ug/L	Carbaryl	0.12 ug/L
Carbofuran	0.12 ug/L	Fenobucarb	0.12 ug/L
Methiocarb	0.12 ug/L	Methomyl	0.12 ug/L
Oxamyl	0.12 ug/L	Propoxur	0.12 ug/L
Thiobencarb	0.12 ug/L		

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City of Salem
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Report Number: P120261
Report Date: May 01, 2012
Client Project ID: [none]

Analytical Report

Client Sample ID: Electric
Matrix: water

PAL Sample ID: P120261-01
Sample Date: 4/16/12

Method: EPA Method 8321B, Phenoxy Herbicides (HPLC-MS)

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
4/18/12	4/23/12	2,4,5-T	Not Detected	0.080 ug/L	
4/18/12	4/23/12	2,4,5-TP	Not Detected	0.080 ug/L	
4/18/12	4/23/12	2,4-D	0.26 ug/L	0.080 ug/L	
4/18/12	4/23/12	2,4-DB	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Acifluorfen	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Bentazon	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Clopyralid	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Dicamba	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Dichlorprop	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Dinoseb	Not Detected	0.080 ug/L	
4/18/12	4/23/12	MCPA	0.38 ug/L	0.080 ug/L	
4/18/12	4/23/12	MCPP	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Picloram	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Quinclorac	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Triclopyr	Not Detected	0.080 ug/L	

Surrogate Recovery: 67 %
Surrogate Recovery Range: 22-111
(DCPAA used as Surrogate)

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City of Salem
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Report Number: P120261
Report Date: May 01, 2012
Client Project ID: [none]

Analytical Report

Client Sample ID: Electric Dup
Matrix: water

PAL Sample ID: P120261-02
Sample Date: 4/16/12

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
Method: EPA Method 8321B, Phenoxy Herbicides (HPLC-MS)					
4/18/12	4/23/12	2,4,5-T	Not Detected	0.080 ug/L	
4/18/12	4/23/12	2,4,5-TP	Not Detected	0.080 ug/L	
4/18/12	4/23/12	2,4-D	0.26 ug/L	0.080 ug/L	
4/18/12	4/23/12	2,4-DB	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Acifluorfen	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Bentazon	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Clopyralid	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Dicamba	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Dichlorprop	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Dinoseb	Not Detected	0.080 ug/L	
4/18/12	4/23/12	MCPA	0.36 ug/L	0.080 ug/L	
4/18/12	4/23/12	MCPP	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Picloram	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Quinclorac	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Triclopyr	Not Detected	0.080 ug/L	

Surrogate Recovery: 70 %
Surrogate Recovery Range: 22-111
(DCPAA used as Surrogate)

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12505 N.W. Cornell Rd. • Portland, OR 97229-5651 • Ph 503.626.7943 • Fx 503.641.0644

City of Salem
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Report Number: P120261
Report Date: May 01, 2012
Client Project ID: [none]

Analytical Report

Client Sample ID: Salem Industrial
Matrix: water

PAL Sample ID: P120261-03
Sample Date: 4/16/12

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
Method: EPA Method 8321B, Phenoxy Herbicides (HPLC-MS)					
4/18/12	4/23/12	2,4,5-T	Not Detected	0.080 ug/L	
4/18/12	4/23/12	2,4,5-TP	Not Detected	0.080 ug/L	
4/18/12	4/23/12	2,4-D	0.087 ug/L	0.080 ug/L	
4/18/12	4/23/12	2,4-DB	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Acifluorfen	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Bentazon	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Clopyralid	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Dicamba	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Dichlorprop	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Dinoseb	Not Detected	0.080 ug/L	
4/18/12	4/23/12	MCPA	Not Detected	0.080 ug/L	
4/18/12	4/23/12	MCPP	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Picloram	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Quinclorac	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Triclopyr	Not Detected	0.080 ug/L	

Surrogate Recovery: 66 %
Surrogate Recovery Range: 22-111
(DCPAA used as Surrogate)

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12505 N.W. Cornell Rd. • Portland, OR 97229-5651 • Ph 503.626.7943 • Fx 503.641.0644

City of Salem
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Report Number: P120261
Report Date: May 01, 2012
Client Project ID: [none]

Analytical Report

Client Sample ID: Hilfiker
Matrix: water

PAL Sample ID: P120261-04
Sample Date: 4/16/12

Extraction Date	Analysis Date	Analyte	Amount Detected	Limit of Quantitation	Notes
Method: EPA Method 8321B, Phenoxy Herbicides (HPLC-MS)					
4/18/12	4/23/12	2,4,5-T	Not Detected	0.080 ug/L	
4/18/12	4/23/12	2,4,5-TP	Not Detected	0.080 ug/L	
4/18/12	4/23/12	2,4-D	0.093 ug/L	0.080 ug/L	
4/18/12	4/23/12	2,4-DB	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Acifluorfen	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Bentazon	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Clopyralid	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Dicamba	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Dichlorprop	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Dinoseb	Not Detected	0.080 ug/L	
4/18/12	4/23/12	MCPA	Not Detected	0.080 ug/L	
4/18/12	4/23/12	MCPP	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Picloram	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Quinclorac	Not Detected	0.080 ug/L	
4/18/12	4/23/12	Triclopyr	Not Detected	0.080 ug/L	

Surrogate Recovery: 69 %
Surrogate Recovery Range: 22-111
(DCPAA used as Surrogate)

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Report Number: P120261
Report Date: May 01, 2012
Client Project ID: [none]

Quality Assurance

Method Blank Data **Matrix:** water

Extraction Date	Analysis Date	Batch QC Sample #	Analyte	% Recovery	Expected % Recovery	Notes
4/17/12	4/23/12	2041701-BLK1	2,4,5-T	Not Detected	< 0.080 ug/L	
4/17/12	4/23/12	2041701-BLK1	2,4,5-TP	Not Detected	< 0.080 ug/L	
4/17/12	4/23/12	2041701-BLK1	2,4-D	Not Detected	< 0.080 ug/L	
4/17/12	4/23/12	2041701-BLK1	2,4-DB	Not Detected	< 0.080 ug/L	
4/17/12	4/23/12	2041701-BLK1	Acifluorfen	Not Detected	< 0.080 ug/L	
4/17/12	4/23/12	2041701-BLK1	Bentazon	Not Detected	< 0.080 ug/L	
4/17/12	4/23/12	2041701-BLK1	Clopyralid	Not Detected	< 0.080 ug/L	
4/17/12	4/23/12	2041701-BLK1	Dicamba	Not Detected	< 0.080 ug/L	
4/17/12	4/23/12	2041701-BLK1	Dichlorprop	Not Detected	< 0.080 ug/L	
4/17/12	4/23/12	2041701-BLK1	Dinoseb	Not Detected	< 0.080 ug/L	
4/17/12	4/23/12	2041701-BLK1	MCPA	Not Detected	< 0.080 ug/L	
4/17/12	4/23/12	2041701-BLK1	MCPP	Not Detected	< 0.080 ug/L	
4/17/12	4/23/12	2041701-BLK1	Picloram	Not Detected	< 0.080 ug/L	
4/17/12	4/23/12	2041701-BLK1	Quinclorac	Not Detected	< 0.080 ug/L	
4/17/12	4/23/12	2041701-BLK1	Triclopyr	Not Detected	< 0.080 ug/L	

Blank Spike Data **Matrix:** water

Extraction Date	Analysis Date	Batch QC Sample #	Analyte	% Recovery	Expected % Recovery	Notes
4/17/12	4/23/12	2041701-BS1	2,4-D	87	41-133	
4/17/12	4/23/12	2041701-BSD1	2,4-D	87	41-133	
4/17/12	4/23/12	2041701-BS1	Dicamba	91	38-122	
4/17/12	4/23/12	2041701-BSD1	Dicamba	89	38-122	
4/17/12	4/23/12	2041701-BS1	Triclopyr	83	46-111	
4/17/12	4/23/12	2041701-BSD1	Triclopyr	83	46-111	

Analyte Information

Method: EPA Method 8321B, Phenoxy Herbicides (HPLC-MS)
Chlorinated acids were converted to free acids. Residues were quantitated as free acids.

Rick Jordan, Laboratory Manager

ATTACHMENT B. Results of Benthic Macroinvertebrate Sampling, Fish Sampling, and Physical Habitat Data Collection for Pringle Creek and Clark Creek in Salem, Oregon; Pacific Habitat Services, Inc. (June 28, 2012).

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

Prepared for

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

Prepared by

Craig Tumer
Dale Groff
Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070
(503) 570-0800
(503) 570-0855 FAX

PHS Project Number: 5029

June 28, 2012

TABLE OF CONTENTS

1.0 INTRODUCTION

This report describes the results of the benthic macroinvertebrate sampling, fish sampling, and physical habitat characterization conducted in May and June 2012, fulfilling the "Benthic Macroinvertebrate Monitoring" requirements listed in Table B-1 of the City of Salem's NPDES MS4 Permit. The field methodology and parameter collection used during this study follow procedures identified in the "Technical Memorandum for the City of Salem's MS4 Permit Requirements for Benthic Macroinvertebrate Sampling and Hydromodification Assessment" (Pacific Habitat Services, Inc., March 21, 2011). Benthic macroinvertebrate sampling was conducted on May 24, 2012; fish sampling was conducted on June 13, 2012; and physical habitat characterization was conducted on June 12, 14, and 26, 2012. This memorandum provides the baseline existing conditions against which the results of future sampling efforts will be compared and will include the following:

- A description of sampling sites;
- Data from field sampling; and
- Summary of results and discussion of how the data might be used in the future to track changes in the project-area stream reaches.

2.0 STUDY AREA DESCRIPTION

In May and June 2012, PHS collected data on benthic macroinvertebrate communities, fish presence, and physical habitat characteristics at three sample reaches within the City of Salem. Each of the sample locations are in close proximity to previous macroinvertebrate sampling that was conducted during the 2000/2001 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 sampling locations were chosen because they meet the required sampling reach length (40 times the channel width or minimum of 150 meters), are fairly accessible, and are located near continuous water quality monitoring stations (or where a data sonde could be securely deployed). General descriptions of the reaches are provided below and the locations are depicted on Figures 1, 2, and 3 (Appendix A).

The East Fork Pringle Creek sampling reach is located downstream (north) of Trelstad Avenue SE and continuous monitoring station PRI12, 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 upstream of continuous monitoring station PRI3. 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 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 the 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.

PHS identified the upstream end of the East Fork Pringle Creek reach (PC1) downstream of the pool below the culverts under Trelstad Avenue SE and flagged it as Transect "K". One-half-inch-diameter PVC pipe was pounded into the ground at the top of the bank on either side of the stream so that the transect crosses the stream perpendicular to the stream flow at the transect location. The PVC pipe was marked with "K" to indicate Transect K. Using a tape measure, PHS measured 15 meters downstream from Transect K and marked this spot as Transect J. PHS proceeded downstream with the tape measure and flagged the positions of 9 additional transects labeled "I" through "A", with Transect A being the transect marking the downstream limits of the sampling reach. PHS used the same general procedure to mark transects along the Clark

Creek and mainstem Pringle Creek sample reaches. For Clark Creek, measurement began at Transect A, the downstream end of the reach, at a point approximately 50 meters upstream of the detention basin control structure, which is located south of Hoyt Street SE, and transects were located every 15 meters along the reach. At the mainstem Pringle Creek reach, Transect K was located approximately 10 meters downstream of the confluence of Clark Creek and Pringle Creek, and transects were located every 29.25 meters. Following the identification of all transects along all sampling reaches, PHS located the endpoints of each transect using a handheld GPS. An electronic file of the transect locations will be provided to the City of Salem for future reference. Figure 4 shows representative transect layout along the East Fork Pringle Creek Reach.

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 indicated that the turn-around time for such a permit would require a minimum of six months. Because of time constraints, PHS did not pursue the permit from the NMFS, and therefore, fish sampling was not conducted on the mainstem Pringle Creek reach. Fish sampling was conducted on the East Fork Pringle Creek and Clark Creek sampling reaches.

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 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.
- Water Surface Slope – Water surface slope is calculated for each of the ten intervals between transects within the assessment reach.
- 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.

Water Surface Slope

The water surface slope was measured by "backsighting" downstream between transects (e.g., transect "K" to "J", "J" to "I", etc.). The EMAP-SW protocol recommends using a clinometer to measure slope. However, because of the very shallow slopes of the streams within the project area, a clinometer was not used for this project.

For this project, the water surface slope was measured by two people, each with a surveyor's rod held vertically in the center of the stream at the upstream cross section and the next cross section downstream. The elevation of the water surface was measured to the nearest 0.01 feet and later converted to the metric equivalent for both the upstream and downstream transects. The person at the upstream cross section placed a level against the surveyor's rod and backsighted to the downstream rod, recording the elevation of the level on the upstream rod and the corresponding elevation on the downstream rod. These readings were then used to calculate the water surface slope between the transects. If it was not possible to see from one transect to the next due to the stream curvature, streamside vegetation, distance, or low light levels, supplementary slope measurements were taken between the transects.

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 conducted on May 24, 2012, and the benthic macroinvertebrate samples were processed by Aquatic Biology Associates, Inc. (ABA) in Corvallis, Oregon. 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.

Data and results from ABA's analysis are provided in Appendix B. The results of the BIBI scoring for each of the sample reaches are summarized in Table 1 and 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)

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]	30	3	35	3	34	3
Number of Ephemeroptera Taxa[b]	1	1	1	1	1	1
Number of Plecoptera Taxa[b]	0	1	0	1	0	1
Number of Trichoptera Taxa[b]	1	1	0	1	2	1
Number of Long-lived Taxa[b]	3	3	3	3	4	3
Number of Intolerant Taxa[b]	2	1	1	1	1	1
Percent Tolerant Taxa[c]	20.13	3	51.49	1	17.85	5
Percent Predators[b]	4.63	1	3.12	1	1.46	1
Number of Clinger Taxa[b]	6	1	10	1	10	1
Percent Dominance (3 Taxa)[c]	46.99	5	63.65	3	53.36	3
Total BIBI Score[d]:	**n/a**	**20**	**n/a**	**16**	**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

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 each 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. Only one mayfly taxon was recorded within each of the sample reaches. Such low numbers 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. The absence of stonefly taxa recorded within the assessment 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 very low numbers of caddisfly taxa recorded within the assessment 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 moderate scores given for total number of long-lived taxa in each of the sampling reaches indicates 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 given 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 and moderate scores given for the percent tolerant taxa in the East Fork Pringle Creek and Clark Creek sampling reaches indicate some level of disturbance within the assessment reaches.

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.

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 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 16 to 20, in the low range for biological integrity.

4.1.1 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 Table 2. 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 Table 2 (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 2. Other Community Composition Metrics that are Indicative of Biological Condition

Metric	Clark Creek		East Fork Pringle Creek (PC1)		Pringle Creek (PC2)	
	Value	Score[a]	Value	Score[a]	Value	Score[a]
Total Abundance[b]	998	L	1840	H	2736	H
EPT Taxa Richness[b]	2	L	1	L	3	L
Predator Richness[b]	4	L	6	L	2	L
Scraper Richness[b]	2	L	3	L	3	L
Shredder Richness[b]	2	L	1	L	2	L
Percent Intolerant Taxa[b]	20.37	H	1.48	L	0.29	L
Percent *Baetis tricaudatus*[c]	8.33	H	0.59	H	7.75	H
Percent Collector[c]	76.39	L	43.77	M	66.08	L
Percent Parasite[c]	0.93	H	2.97	H	1.61	H
Percent Oligochaeta[c]	18.75	L	6.23	L	24.42	L
Number of Tolerant taxa[c]	9	M	12	L	10	L
Percent Simuliidae[c]	3.47	H	12.02	L	4.97	H
Percent Chironomidae	55.09	L	25.22	M	50.73	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 3 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.

Five fish taxa were identified within the two reaches in which fish were surveyed. All fish collected at both reaches were native to the Willamette river watershed, and appeared healthy except for the cutthroat trout (~90mm), which had a lesion on its left operculum. Redside shiners captured on Clark Creek ranged up to approximately130mm, which seems very large for such a small stream. PHS expected to find cutthroat and lamprey on Clark Creek since the reach has a nicely developed riparian canopy to shade the stream and reasonable habitat, however, they were not found during this sampling effort, suggesting that there may be some unknown temperature or other seasonally occurring water quality issue that was not reflected in the data collected during this analysis.

Table 3. Results of Fish Sampling for Project Area Sampling Reaches

Fish Species	Sampling Reach		
	East Fork Pringle Creek	Clark Creek	Pringle Creek[a]
Sculpin	14	52	-
Redside Shiner	47	52	-
Three-spine Stickleback	3	-	-
Cutthroat trout	1	-	-
Speckled Dace	35	7	-
Total	**100**	**111**	**-**

Notes: a. Reach not sampled because necessary permit from NMFS could not be obtained in time to meet schedule constraints.

4.3 Physical Habitat Characterization

Physical habitat data were collected to provide baseline information that could be compared with future data to assess changes and trends in water quality and the hydromodification in the streams. Data related to thalweg profile and presence of large woody debris, for each of the sampling reaches are provided on data forms derived from those provided in the EMAP-SW protocol. Data forms for each of the sampling reaches are in Appendices C, D, and E, respectively.

Because of the shallow slope of the project area streams, PHS determined the water surface slope using a level and surveyor's rods rather than a clinometer, as described in the methodology section above. Therefore, the EMAP-SW data sheet for slope measurement was not used. Slope data for the four sampling reaches are presented in Table 4, below.

Table 4. Water Surface Slopes for the Four Project-Area Sampling Reaches

Transect	Water Surface Slope (Percent)		
	Clark Creek	East Fork Pringle Creek (PC1)	Pringle Creek (PC2)
A to B	1.22	1.69	2.11
B to C	1.12	1.58	1.57
C to D	1.00	0.93	0.71
D to E	0.89	0.96	0.98
E to F	1.32	1.52	1.02
F to G	1.56	1.24	0.84
G to H	1.58	0.85	2.66
H to I	1.65	0.77	0.94
I to J	1.32	0.93	1.56
J to K	0.24	0.26	1.29
Reach Average	**1.19**	**1.07**	**1.37**

The slope of the stream reach may be useful in three different ways. First, the overall stream gradient gives an indication of potential water velocities and stream power, which are in turn important controls on aquatic habitat and sediment transport within the reach. Second, the spatial variability of stream gradient is a measure of habitat complexity, as reflected in the diversity of water velocities and sediment sizes within the stream reach. Lastly, the water surface slope allows computation of residual pool depths and volumes from the multiple depth and width measurements taken in the thalweg profile.

The EMAP-SW protocol for physical habitat characterization is useful for longitudinal studies of changes in channel morphology due to urban changes in the stream hydrograph. Water depths at regular intervals along the thalweg are provided on the "Thalweg Profile & Woody Debris Form" for each of the sampled reaches. With the assumption of linear water surface slope between the 11 sample transects within the reach, a detailed longitudinal profile of the stream bed thalweg can be drawn from the assessment data. Such a profile could be compared to profiles drawn from subsequent year's data to assess changes in the stream profile over time. Downstream discharge can be correlated with mean water depths over the sample reach to yield an average relative rating curve for the reach. Thalweg and water surface slope profiles for each sampling reach are provided in Figures 5, 6, and 7 in Appendix A.

Changes in the flow regime are likely to alter the longitudinal relations of bedforms within a sampled reach, so that repeated monitoring will record the changes in bed geometry as the stream bed is altered. Fourier analysis of the inferred relative bed elevations will reveal changes in the distribution of streambed features resulting from changes in the hydrograph.

Wetted width data are listed on the "Thalweg Profile & Woody Debris Form" and on the "Channel/Riparian Cross-Section Form" for each of the sampled reaches. Changes in the low-flow wetted width can be expected to result from hydrograph changes resulting from changes in surface properties of the watershed. While not so detailed as the bedform data, these data can be expected to show channel changes resulting from altered flow regimes. Comparison of the baseline data contained in this report to data obtained in subsequent monitoring efforts can document changes in the stream over time.

Substrate size is one of the most important determinants of habitat character for fish and macroinvertebrates in streams. Substrate data for each transect within the sampled reaches are provided on the "Channel/Riparian Cross-Section Form". Along with bedform (e.g., riffles and pools), substrate influences the hydraulic roughness and consequently the range of water velocities in the channel. It also influences the size range of interstices that provide living space and cover for macroinvertebrates, salamanders, and sculpins. Substrate characteristics are often sensitive indicators of the effects of human activities on streams. Decreases in the mean substrate size and increases in the percentage of fine sediments, for example, may destabilize channels and indicate changes in the rates of upland erosion and sediment supply. Within the sampled reaches, substrates were quite variable. Substrates in Clark and East Fork Pringle Creek were dominated by fine gravels, sands, and finer sediments. In portions of the Clark Creek reach, substrates were dominated by hardpan consisting of consolidated clay layers, with fine silt dominating the substrate composition in deeper, slower-moving portions of the stream. Substrates in mainstem Pringle Creek were dominated by gravels and cobbles, with varying degrees of embeddedness throughout the reach.

Other channel morphology data, including bank angles, undercut measurements, bankfull heights, and incision heights are provided on the "Channel/Riparian Cross-Section Form" for each of the sampled reaches. The recorded bank angles from the edge of the low-flow wetted channel will show changes to the banks resulting from flows at or in excess of the bankfull discharge. If the channel is not greatly incised, bankfull channel height and incision height will be the same. However, if the channel is incised greatly, the bankfull level will be below the level of the first terrace of the valley floodplain, making bankfull channel height smaller than incision height. Throughout the East Fork Pringle Creek and Clark Creek reaches, the channels are relatively deeply incised under current conditions.

Qualitative assessments of riparian vegetation and land use characteristics along each of the sampled reaches are provided on the "Channel/Riparian Cross-Section Form" and the "Riparian 'Legacy' Trees and Invasive Alien Plants" forms. While these data cannot be used to directly describe hydromodification of the stream, the visual estimations of riparian condition are useful for evaluating the health and level of disturbance of the stream corridor. They also provide an indication of the present and future potential for various types of organic inputs and shading, which are important contributors to water quality and the aquatic ecosystem. Riparian canopy cover over a stream is important not only in its role in moderating stream temperatures through shading, but also as an indicator of conditions that control bank stability and the potential for inputs of coarse and fine particulate organic material. Organic inputs from riparian vegetation become food for stream organisms and structure to create and maintain complex channel habitat.

The field evaluation of the presence and proximity of various important types of human land use activities in the stream riparian area may be used in combination with mapped watershed land use information to assess the potential degree of disturbance of the sample stream reaches.

4.4 Summary

This report presents the results of benthic macroinvertebrate sampling, fish sampling, and physical habitat characterization conducted within three sampled reaches in the vicinity of existing monitoring stations operated by the City of Salem. This data is intended as baseline data against which the results of future monitoring efforts can be compared to assess the changes and trends in water quality and hydromodification.

Benthic Invertebrate Index of Biological Integrity (BIBI) scores derived from the benthic macroinvertebrate sampling effort indicate some level of water quality degradation in each of the three sampled reaches. Low biological integrity scores are often recorded in streams located within urban environments. Fish species were recorded during fish sampling efforts of Clark Creek and East Fork Pringle Creek. No non-native fish species were recorded.

Physical habitat characteristics of the three stream reaches examined by this study vary considerably; however, each of the reaches shows the effects of human influence. The East Fork Pringle Creek reach has been channelized into a straightened channel. Clark Creek skirts the edge of Gilmore Field and may have been channelized into its current location at some point in the past. The channels of both streams are somewhat incised. A control structure downstream of the reach turns Clark Creek and the adjacent Gilmore Field into a detention facility, preventing flooding of downstream neighborhoods, during high-flow events. Mainstem Pringle Creek is less incised than the other two reaches; however, portions of the bank are constrained by concrete and block retaining walls where the stream occurs in close proximity to private residences.

Substrates within the three reaches vary, as would be expected of streams of different sizes. Substrates within East Fork Pringle Creek and Clark Creek are dominated by fine gravel and other fine sediments. The substrate within portions of Clark Creek, however, is dominated by hardpan clay, indicating scour during high-flow events. The substrate within mainstem Pringle Creek is dominated by coarse gravel and cobbles.

In addition to substrate size class, data was collected on water depth, wetted width, bankfull height, bankfull width, bank angle, surface water slope and other measurements, as described above. Comparison of the results of future monitoring events with the baseline data collected in 2012 can be used to document changes in stream condition over time.

5.0 REFERENCES

Oregon Department of Environmental Quality. June 30, 2010. *Water Monitoring and Assessment Mode of Operations Manual* (*MOMs*), Version 3.3, DEQ03-LAB-0036-SOP, Laboratory and Environmental Assessment Division, Hillsboro, Oregon.

Peck, D.V., J.M. Lazorchak, and D.J. Klemm (editors). Unpublished draft. *Environmental Monitoring and Assessment Program -Surface Waters: Western Pilot Study Field Operations Manual for Wadeable Streams.* EPA/XXX/X-XX/XXXX. U.S. Environmental Protection Agency, Washington, D.C.

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

Figures

6/28/12
PHS #5029

Location of East Fork Pringle Creek Sampling Reach, Salem, Oregon.

FIGURE 1

Pacific Habitat Services, Inc.

Y:\AUTOCAD\4200\4268 Salem Shade\shade mapping\buffer and shade categories 110908.dwg, Fig 1 E Frk Pringle, 6/28/2012 2:22:53 PM

5/28/12
PHS #5029

Location of Pringle Creek Sampling Reach, Salem, Oregon.

FIGURE 2

Pacific Habitat Services, Inc.

Y:\AUTOCAD\4200\4268 Salem Shade\shade mapping\buffer and shade categories 110908.dwg, Fig 2 Pringle, 6/28/2012 2:25:34 PM

5/29/12
PHS #5029

Location of Clark Creek Sampling Reach, Salem, Oregon.

FIGURE 3

Pacific Habitat Services, Inc.

Y:\AUTOCAD\4200\4268 Salem Shade\shade mapping\buffer and shade categories 110908.dwg, Fig 3 Clark, 6/28/2012 2:28:49 PM

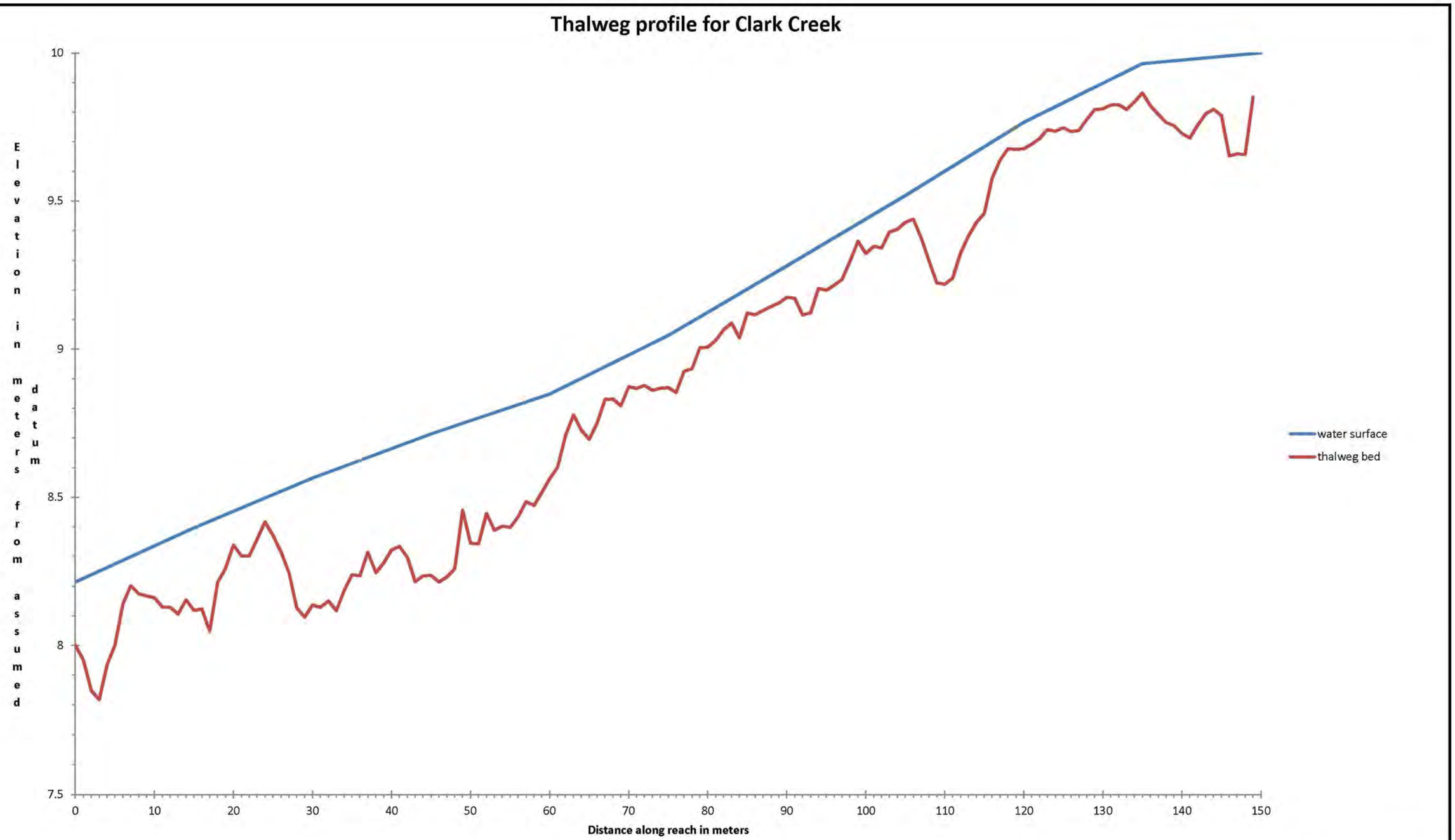
3/23/12
PHS #4891

Transect Layout along East Fork Pringle Creek, Salem, Oregon.

FIGURE 4

Pacific Habitat Services, Inc.

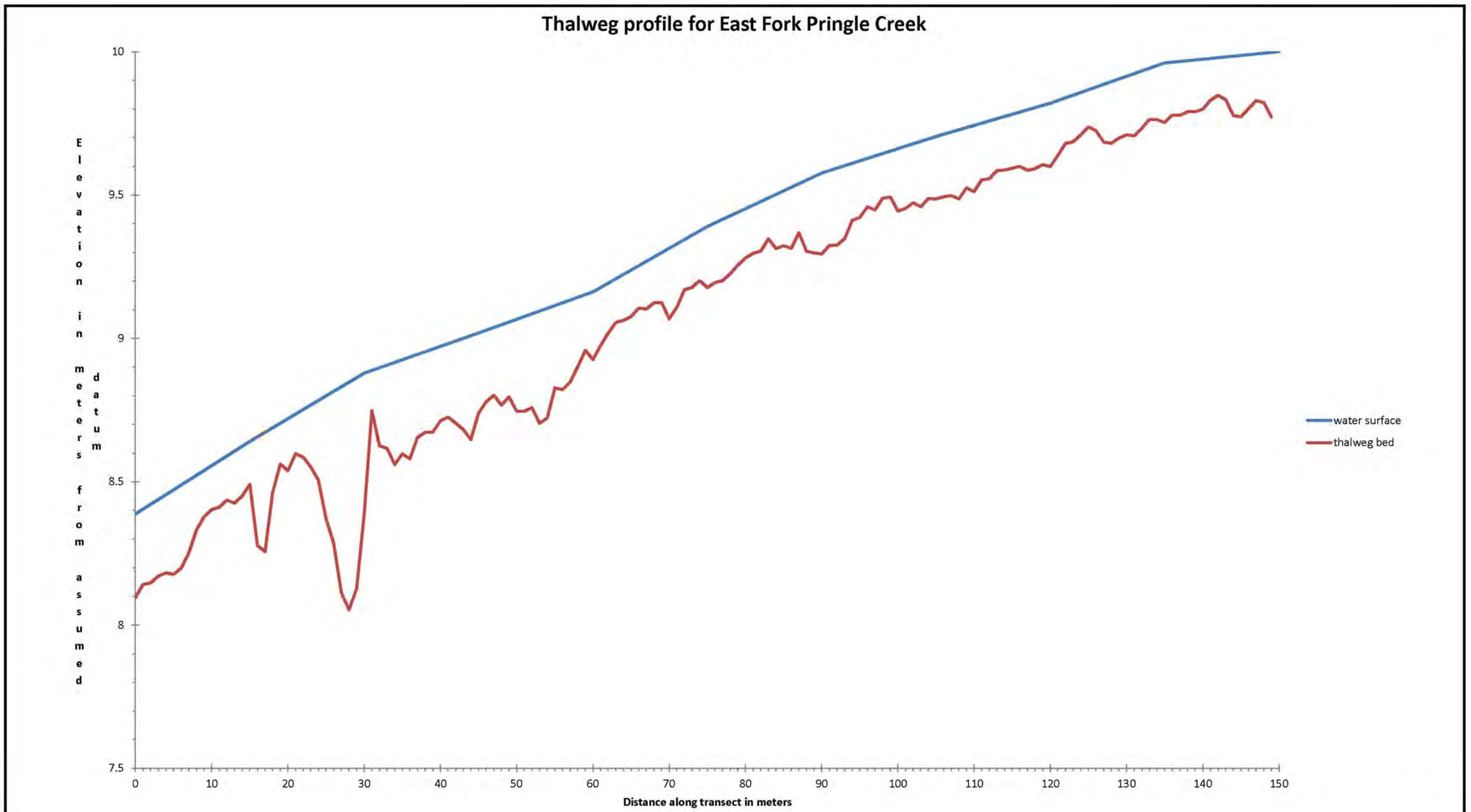
Y:\AUTOCAD\4200\4268 Salem Shade\shade mapping\buffer and shade categories 110908.dwg, Fig 4 Transects, 6/28/2012 2:33:42 PM



PHS #5029
6/28/12

Thalweg profile for Clark Creek Sampling Reach, Salem, Oregon.

FIGURE 5

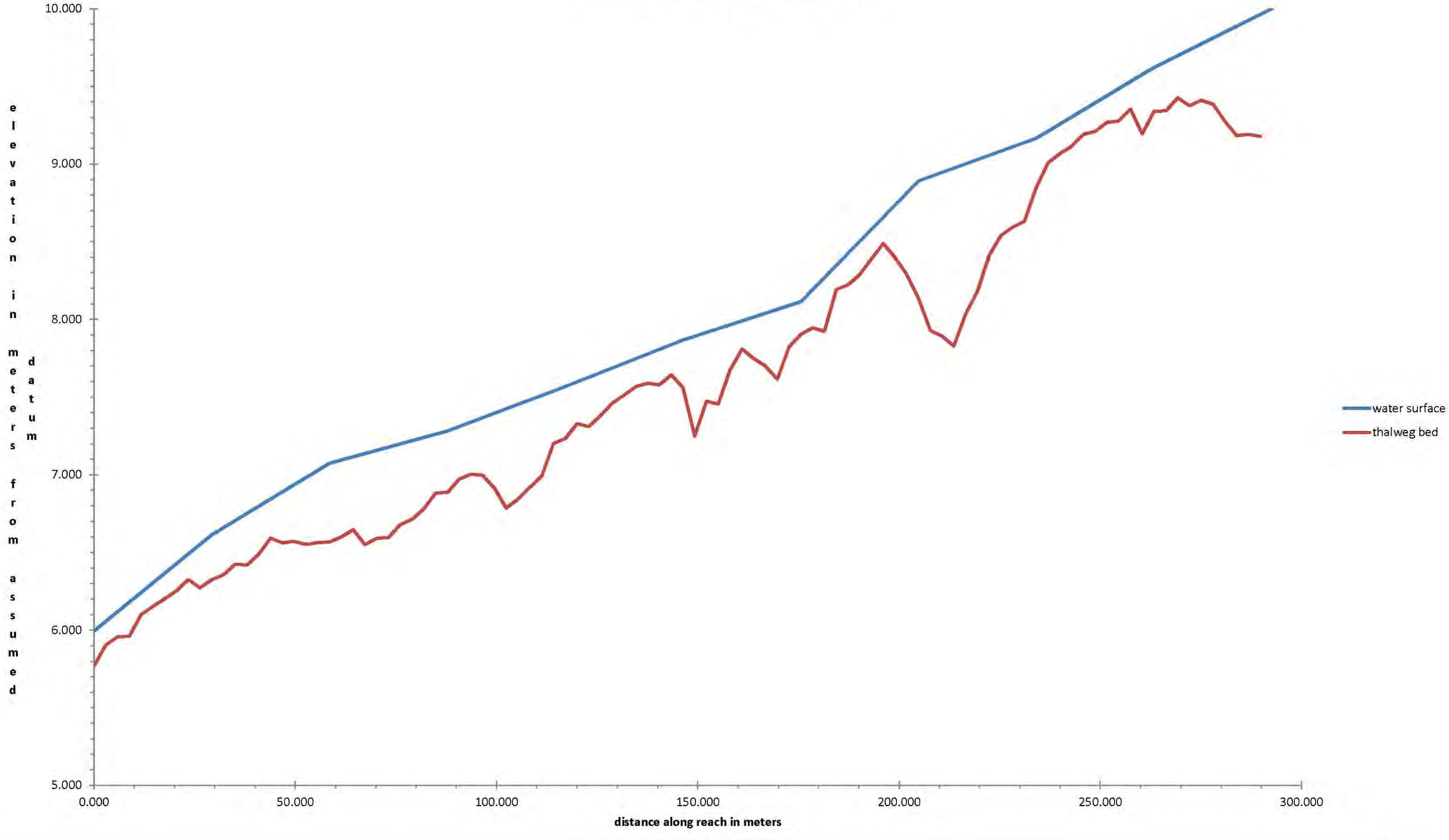


PHS #5029
6/28/12

Thalweg profile for East Fork Pringle Creek Sampling Reach, Salem, Oregon.

FIGURE 6

Thalweg profile for Pringle Creek



PHS #5029
6/28/12

Thalweg profile for Pringle Creek Sampling Reach, Salem, Oregon.

FIGURE 7

Appendix B

Benthic Macroinvertebrate

Sampling Data

Client	**Pacific Habitat Services, Wilsonville, OR**
Client contact	Craig Tumer, ct@pacifichabitat.com
Project	**Clark and Pringle Creeks monitoring**
Project location	Salem, Oregon
Project objectives	Benthic biomonitoring for in-stream projects

Laboratory

Aquatic Biology Associates, Inc. (ABA	3490 NW Deer Run Street, Corvallis, OR 97330
http://www.aquaticbio.com/	
Robert Wisseman	general taxonomy, bobwisseman@mac.com
James DiGiulio	Chironomidae taxonomy, digiulio@peak.org
Jon Lee	mite taxonomy, jlee@humboldt1.com

Sampling protocol

Sampling gear	D-frame net
Mesh size	500 micron
Square area sampled	11 square feet
Habitat sampled	erosional

Laboratory protocol

Mesh size	500 micron
Subsampling target count	500 organism minimum
Subsampling device	Caton tray
Sorting efficacy	95+%
Standard taxonomic effort	Pacific Northwest level 2 (unpublished)
Chironomidae (midges)	genus/species group
Oligochaeta (segmented worms)	class Oligochaeta
Acari (mites)	subclass Acari
Taxa abundances	converted to a full sample and 1 square meter basis

Data analysis

Standard taxonomic effort (STE)	Version 2 ABA
Taxa traits (e.g. feeding group, etc.)	Version 2 ABA (see "Traits" tab in this output for documentation)

Programmed in R by Adam and Robert Wisseman
Version 2 of ABA STE and taxa traits is a draft version still under development.
Abundances converted to a standard full sample (if subsampled) and one square meter basis.

Explanation of sheets

Abundances are converted to a full sample (if subsampled) and one square meter basis
Indices= Karr benthic index of biological integrity (Karr BIBI), a general index for Pacific Northwest streams
Metrics= extensive list of metrics derived from taxonomic groups present, their abundances and ecological traits
Abundance= taxa abundances converted to a full sample (if subsampled) and one square meter basis
Percent abundance= percent contribution of each taxon to the total benthic community
Long output= record type file in Excel with taxon abundances converted to a full sample and one square meter basis
Traits= complete project taxa list and documentation of taxonomic hierarchy and ecological traits used for metrics
Metric explanation= documentation of how metrics are calculated
Record file= raw data file in record format in Excel

Date run:
Mon Jun 25 13:12:49 2012
Analysis program in developmental phase.

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

OR: City of Salem. Clark and Pringle Creeks. For Pacific Habitat Services, Wilsonville, OR.

Sampling method: riffle habitat, D-frame net, composite sample, 11 square feet total area , 500 micron mesh.

Subsampling: 500 organism minimum or entire sample. Level 3 PNW standard taxonomic effort.

Abundances adjusted to a full sample and square meter basis.

	Site	Clark Creek		Pringle Creek		Pringle Creek	
	Site code	1		1		2	
	Date	5/24/2012		5/24/2012		5/24/2012	
	METRIC	Value	Score	Value	Score	Value	Score
D	Total number of taxa	30	3	35	3	34	3
D	Number Ephemeroptera taxa	1	1	1	1	1	1
D	Number Plecoptera taxa	0	1	0	1	0	1
D	Number Trichoptera taxa	1	1	0	1	2	1
D	Number of long-lived taxa	3	3	3	3	4	3
D	Number of intolerant taxa	2	1	1	1	1	1
I	% Tolerant taxa	20.13	3	51.49	1	17.85	5
D	% Predator	4.63	1	3.12	1	1.46	1
D	Number of clinger taxa	6	1	10	1	10	1
I	% Dominance (3 taxa)	46.99	5	63.65	3	53.36	3
	TOTAL SCORE		20		16		20
	BIOLOGICAL CONDITION CATEGORY		Low		Low		Low

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)	998		1840		2736	
D	EPT taxa richness	2		1		3	
D	Predator richness	4		6		2	
D	Scraper richness	2		3		3	
D	Shredder richness	2		1		2	
D	%Intolerant taxa	20.37		1.48		0.29	
I	*% Baetis tricaudatus*	8.33		0.59		7.75	
I	%Collector	76.39		43.77		66.08	
I	%Parasite	0.93		2.97		1.61	
I	%Oligochaeta	18.75		6.23		24.42	
I	Number tolerant taxa	9		12		10	
I	%Simuliidae	3.47		12.02		4.97	
I	%Chironomidae	55.09		25.22		50.73	

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

Waterbody	Clark Creek	Pringle Creek	Pringle Creek
Site	1	1	2
Date	2012-05-24	2012-05-24	2012-05-24
Subsample count	432	674	684
Subsample correction factor to full sample	2.31	2.73	4
Area correction factor to square meter	1	1	1
SUMMARY METRICS			
Total taxa richness	30	35	34
Total abundance	998	1840	2736
EPT taxa richness	2	1	3
EPT abundance	102	11	288
DOMINANCE AND DIVERSITY			
% Dominant taxa	19.91	42.73	24.42
% Top 3 taxa	46.99	63.65	53.36
Shannon-Weaver Diversity (loge)	2.75	2.25	2.6
Shannon-Weaver Diversity (log2)	3.96	3.24	3.76
TOLERANT AND INTOLERANT TAXA			
% Total tolerant taxa	15.05	59.94	10.82
Total tolerant taxa richness	10	12	10
Total tolerant taxa abundance	150	1103	296
% Highly tolerant taxa	0.93	0.74	0.58
Highly tolerant taxa richness	2	2	2
Highly tolerant taxa abundance	9	14	16
% Moderately tolerant taxa	14.12	59.2	10.23
Moderately tolerant taxa richness	8	10	8
Moderately tolerant taxa abundance	141	1089	280
% Total intolerant taxa	20.37	1.48	0.29
Total intolerant taxa richness	2	1	1
Total intolerant taxa abundance	203	27	8
% Highly intolerant taxa	0	0	0
Highly intolerant taxa richness	0	0	0
Highly intolerant taxa abundance	0	0	0
% Moderately Intolerant taxa	20.37	1.48	0.29
Moderately intolerant taxa richness	2	1	1
Moderately intolerant taxa abundance	203	27	8
VOLTINISM (length of life cycle)			
% Semivoltine (> 1 year life cycle)	5.09	48.52	4.97
% Univoltine (1 year life cycle)	22.69	11.57	26.9
% Multivoltine (< 1 year life cycle)	72.22	39.91	68.13
Semivoltine taxa abundance	51	893	136
Univoltine taxa abundance	226	213	736
Multivoltine taxa abundance	721	734	1864

Waterbody	Clark Creek	Pringle Creek	Pringle Creek
Site	1	1	2
Date	2012-05-24	2012-05-24	2012-05-24
Semivoltine taxa richness	2	4	4
Univoltine taxa richness	6	6	5
Multivoltine taxa richness	22	25	25
GROWTH AND DEVELOPMENT			
% Fast seasonal life cycle	69.44	38.13	64.47
% Slow seasonal life cycle	30.56	56.68	33.92
% Nonseasonal life cycle	0	5.19	1.61
OCCURRENCE IN DRIFT			
% Rare in drift	32.64	60.24	32.89
% Common in drift	0.46	1.93	3.51
% Abundant in drift	66.9	37.83	63.6
SIZE AT MATURITY			
% Small size at maturity	66.9	44.96	68.42
% Medium size at maturity	28.01	11.72	28.07
% Large size at maturity	5.09	43.32	3.51
Small size at maturity abundance	668	827	1872
Medium size at maturity abundance	280	216	768
Large size at maturity abundance	51	797	96
Small size at maturity taxa richness	20	26	24
Medium size at maturity taxa richness	8	7	7
Large size at maturity taxa richness	2	2	3
RHEOPHILY AND HABITAT AFFINITY			
% Depositional only	8.1	4.01	21.93
% Depositional and erosional	88.43	83.98	73.1
% Erosional	3.47	12.02	4.97
THERMAL PREFERENCE			
% Cold stenothermal and cool eurythermal	20.37	1.48	0.29
% Cool/warm eurythermal	79.4	98.22	98.98
% Warm eurythermal	0.23	0.3	0.73
NON-INSECT AND INSECT ORDERS			
% Non-insect invertebrates	28.47	60.83	30.85
% Ephemeroptera (mayflies)	8.33	0.59	7.75
% Odonata (damsel- and dragonflies)	0	0	0
% Plecoptera (stoneflies)	0	0	0
% Hemiptera (true bugs)	0	0	0
% Megaloptera (alderflies and hellgramites)	0	0	0
% Trichoptera (caddisflies)	1.85	0	2.78
% Lepidoptera (moths)	0	0	0
% Coleoptera (beetles)	0	0.45	0
% Diptera (total)(true flies)	61.34	38.13	58.63
% Chironomidae (true flies- midges)	55.09	25.22	50.73

Waterbody	Clark Creek	Pringle Creek	Pringle Creek
Site	1	1	2
Date	2012-05-24	2012-05-24	2012-05-24
Non-insect taxa richness	7	7	10
Ephemeroptera taxa richness	1	1	1
Odonata taxa richness	0	0	0
Plecoptera taxa richness	0	0	0
Hemiptera taxa richness	0	0	0
Megaloptera taxa richness	0	0	0
Trichoptera taxa richness	1	0	2
Lepidoptera taxa richness	0	0	0
Coleoptera taxa richness	0	3	0
Diptera (total) taxa richness	21	24	21
Chironomidae taxa richness	17	21	16
Non-insect abundance	284	1119	844
Ephemeroptera abundance	83	11	212
Odonata abundance	0	0	0
Plecoptera abundance	0	0	0
Hemiptera abundance	0	0	0
Megaloptera abundance	0	0	0
Trichoptera abundance	18	0	76
Lepidoptera abundance	0	0	0
Coleoptera abundance	0	8	0
Diptera (total) abundance	612	702	1604
Chironomidae abundance	550	464	1388
INDICATOR TAXA			
Mollusca (snails and bivalves) taxa richness	2	4	5
Crustacea taxa richness	1	0	2
Baetidae (mayfly) taxa richness	1	1	1
Ephemerellidae (mayfly) taxa richness	0	0	0
Heptageniidae (mayfly) taxa richness	0	0	0
Nemouridae (stonefly) taxa richness	0	0	0
Rhyacophilidae (caddisfly) taxa richness	0	0	0
Hydropsychidae (caddisfly) taxa richness	0	0	0
Elmidae (riffle beetle) taxa richness	0	1	0
Oligochaeta (segmented worms) abundance	187	115	668
Mollusca abundance	39	950	108
Crustacea abundance	46	0	24
Acari (mites) abundance	5	35	24
Baetidae abundance	83	11	212
Baetis tricaudatus (mayfly) abundance	83	11	212
Ephemerellidae abundance	0	0	0
Heptageniidae abundance	0	0	0
Nemouridae abundance	0	0	0

Waterbody	Clark Creek	Pringle Creek	Pringle Creek
Site	1	1	2
Date	2012-05-24	2012-05-24	2012-05-24
Rhyacophililidae abundance	0	0	0
Hydropsychidae taxa abundance	0	0	0
Elmidae abundance	0	3	0
Simuliidae abundance	35	221	136
Tanytarsini midge abundance	0	5	100
% Oligochaeta (segmented worms)	18.75	6.23	24.42
% Mollusca	3.94	51.63	3.95
% Crustacea	4.63	0	0.88
% Acari	0.46	1.93	0.88
% Baetidae	8.33	0.59	7.75
% Baetis tricaudatus	8.33	0.59	7.75
% Ephemerellidae	0	0	0
% Heptageniidae	0	0	0
% Nemouridae	0	0	0
% Rhyacophilidae	0	0	0
% Hydropsychidae	0	0	0
% Elmidae	0	0.15	0
% Simuliidae	3.47	12.02	4.97
% Tanytarsini	0	0.3	3.65
FEEDING GROUPS			
Predator taxa richness	4	6	2
Parasite taxa richness	2	2	2
Collector-gatherer taxa richness	17	17	18
Collector-filterer taxa richness	1	3	3
Collector (total) taxa richness	18	20	21
Piercer herbivore taxa richness	0	0	1
Macrophyte herbivore taxa richness	1	2	1
Shredder taxa richness	2	1	2
Scraper taxa richness	2	3	3
Omnivore taxa richness	1	1	2
Unknown taxa richness	0	0	0
Predator abundance	46	57	40
Parasite abundance	9	55	44
Collector-gatherer abundance	728	489	1624
Collector-filterer abundance	35	317	184
Collector (total) abundance	762	805	1808
Piercer herbivore abundance	0	0	60
Macrophyte herbivore abundance	53	25	60
Shredder abundance	39	11	84
Scraper abundance	58	101	612
Omnivore abundance	30	786	28

Waterbody	Clark Creek	Pringle Creek	Pringle Creek
Site	1	1	2
Date	2012-05-24	2012-05-24	2012-05-24
Unknown abundance	0	0	0
% Predator	4.63	3.12	1.46
% Parasite	0.93	2.97	1.61
% Collector-gatherer	72.92	26.56	59.36
% Collector-filterer	3.47	17.21	6.73
% Collector (total)	76.39	43.77	66.08
% Piercer herbivore	0	0	2.19
% Macrophyte herbivore	5.32	1.34	2.19
% Shredder	3.94	0.59	3.07
% Scraper	5.79	5.49	22.37
% Omnivore	3.01	42.73	1.02
% Unknown	0	0	0
HABIT			
Skater taxa richness	0	0	0
Planktonic taxa richness	0	0	0
Diver taxa richness	0	0	0
Swimmer taxa richness	2	1	3
Clinger taxa richness	7	11	12
Sprawler taxa richness	11	12	11
Climber taxa richness	1	2	1
Burrower taxa richness	9	9	7
Unknowns taxa richness	0	0	0
Skater abundance	0	0	0
Planktonic abundance	0	0	0
Diver abundance	0	0	0
Swimmer abundance	51	35	48
Clinger abundance	261	1177	1380
Sprawler abundance	210	281	400
Climber abundance	18	5	16
Burrower abundance	457	341	892
Unknowns abundance	0	0	0
% Skater	0	0	0
% Planktonic	0	0	0
% Diver	0	0	0
% Swimmer	5.09	1.93	1.75
% Clinger	26.16	63.95	50.44
% Sprawler	21.06	15.28	14.62
% Climber	1.85	0.3	0.58
% Burrower	45.83	18.55	32.6
% Unknown	0	0	0

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

							Waterbody	Clark Creek	Pringle Creek	Pringle Creek
							Site	1	1	2
							Date	2012-05-24	2012-05-24	2012-05-24
Taxon	Stage	Insect?	Origin	Higher classification	Order	Family	Common name	Abundance	Abundance	Abundance
Turbellaria	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	x	flat worms	2		
Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	5	19	20
Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	187	115	668
Fluminicola	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Lithoglyphidae	snails	9	68	28
Physa	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Physidae	snails			12
Ferrissia	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Planorbidae	snails		3	4
Juga	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Pleuroceridae	snails	30	786	24
Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams		93	40
Crangonyx	U	non-insect	Aquatic	Crustacea: Amphipoda	x	Crangonyctidae	scuds	46		20
Pacifastacus	U	non-insect	Aquatic	Crustacea: Decapoda	x	Astacidae	crayfish			4
Acari	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	5	35	24
Baetis tricaudatus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	83	11	212
Hydroptila	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydroptilidae	caddisflies			60
Lepidostoma-panel case larvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	18		16
Microcylloepus	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Elmidae	riffle beetles		3	
Gyrinus	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Gyrinidae	whirligig beetles		3	
Haliplus	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Haliplidae	crawling water beetles		3	
Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	5	5	4
Dixella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Dixidae	dixid midges			4
Psychoda	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Psychodidae	moth flies	2		4
Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	35	221	136
Tipula	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21	11	68
Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21	5	84
Alotanypus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges		33	
Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	49	22	72
Chironomus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	7	3	
Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	5	27	8
Cricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges		27	164
Cryptochironomus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	5	3	
Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21	164	20
Eukiefferiella devonica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges		5	8
Heterotrissocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	5		
Limnophyes	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	14	22	120
Metriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	12		
Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges		3	92
Parakiefferiella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges			20
Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21		8
Paratanytarsus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges		3	8
Paratendipes	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges		35	
Phaenopsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	49	30	580
Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	53	22	60
Procladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges		11	

							Waterbody	Clark Creek	Pringle Creek	Pringle Creek
							Site	1	1	2
							Date	2012-05-24	2012-05-24	2012-05-24
Taxon	Stage	Insect?	Origin	Higher classification	Order	Family	Common name	Abundance	Abundance	Abundance
Prodiamesa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Prodiamesinae	midges	199	27	8
Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	42	14	100
Smittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	5		
Synorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	12	3	
Thienemannimyia complex	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	35	3	36
Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges		3	

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

							Waterbody	Clark Creek	Pringle Creek	Pringle Creek
							Site	1	1	2
							Date	2012-05-24	2012-05-24	2012-05-24
Taxon	Stage	Insect?	Origin	Higher classification	Order	Family	Common name	% abundance	% abundance	% abundance
Turbellaria	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	x	flat worms	0.23		
Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	0.46	1.04	0.73
Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	18.75	6.23	24.42
Fluminicola	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Lithoglyphidae	snails	0.93	3.71	1.02
Physa	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Physidae	snails			0.44
Ferrissia	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Planorbidae	snails		0.15	0.15
Juga	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Pleuroceridae	snails	3.01	42.73	0.88
Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams		5.04	1.46
Crangonyx	U	non-insect	Aquatic	Crustacea: Amphipoda	x	Crangonyctidae	scuds	4.63		0.73
Pacifastacus	U	non-insect	Aquatic	Crustacea: Decapoda	x	Astacidae	crayfish			0.15
Acari	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	0.46	1.93	0.88
Baetis tricaudatus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	8.33	0.59	7.75
Hydroptila	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydroptilidae	caddisflies			2.19
Lepidostoma-panel case larvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	1.85		0.58
Microcylloepus	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Elmidae	riffle beetles		0.15	
Gyrinus	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Gyrinidae	whirligig beetles		0.15	
Haliplus	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Haliplidae	crawling water beetles		0.15	
Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	0.46	0.3	0.15
Dixella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Dixidae	dixid midges			0.15
Psychoda	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Psychodidae	moth flies	0.23		0.15
Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	3.47	12.02	4.97
Tipula	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	2.08	0.59	2.49
Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	2.08	0.3	3.07
Alotanypus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges		1.78	
Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	4.86	1.19	2.63
Chironomus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	0.69	0.15	
Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0.46	1.48	0.29
Cricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges		1.48	5.99
Cryptochironomus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	0.46	0.15	
Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	2.08	8.9	0.73
Eukiefferiella devonica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges		0.3	0.29
Heterotrissocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0.46		
Limnophyes	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	1.39	1.19	4.39
Metriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	1.16		
Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges		0.15	3.36
Parakiefferiella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges			0.73
Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	2.08		0.29
Paratanytarsus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges		0.15	0.29
Paratendipes	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges		1.93	
Phaenopsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	4.86	1.63	21.2
Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	5.32	1.19	2.19
Procladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges		0.59	
Prodiamesa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Prodiamesinae	midges	19.91	1.48	0.29
Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	4.17	0.74	3.65
Smittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0.46		
Synorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	1.16	0.15	
Thienemannimyia complex	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	3.47	0.15	1.32
Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges		0.15	

Waterbody	Site	Date	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Clark Creek	1	2012-05-24	Turbellaria	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	x	flat worms	2.31
Clark Creek	1	2012-05-24	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	4.62
Pringle Creek	1	2012-05-24	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	19.11
Pringle Creek	2	2012-05-24	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	20
Clark Creek	1	2012-05-24	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	187.11
Pringle Creek	1	2012-05-24	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	114.66
Pringle Creek	2	2012-05-24	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	668
Clark Creek	1	2012-05-24	Fluminicola	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Lithoglyphidae	snails	9.24
Pringle Creek	1	2012-05-24	Fluminicola	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Lithoglyphidae	snails	68.25
Pringle Creek	2	2012-05-24	Fluminicola	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Lithoglyphidae	snails	28
Pringle Creek	2	2012-05-24	Physa	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Physidae	snails	12
Pringle Creek	1	2012-05-24	Ferrissia	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Planorbidae	snails	2.73
Pringle Creek	2	2012-05-24	Ferrissia	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Planorbidae	snails	4
Clark Creek	1	2012-05-24	Juga	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Pleuroceridae	snails	30.03
Pringle Creek	1	2012-05-24	Juga	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Pleuroceridae	snails	786.24
Pringle Creek	2	2012-05-24	Juga	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Pleuroceridae	snails	24
Pringle Creek	1	2012-05-24	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	92.82
Pringle Creek	2	2012-05-24	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	40
Clark Creek	1	2012-05-24	Crangonyx	U	non-insect	Aquatic	Crustacea: Amphipoda	x	Crangonyctidae	scuds	46.2
Pringle Creek	2	2012-05-24	Crangonyx	U	non-insect	Aquatic	Crustacea: Amphipoda	x	Crangonyctidae	scuds	20
Pringle Creek	2	2012-05-24	Pacifastacus	U	non-insect	Aquatic	Crustacea: Decapoda	x	Astacidae	crayfish	4
Clark Creek	1	2012-05-24	Acari	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	4.62
Pringle Creek	1	2012-05-24	Acari	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	35.49
Pringle Creek	2	2012-05-24	Acari	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	24
Clark Creek	1	2012-05-24	Baetis tricaudatus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	83.16
Pringle Creek	1	2012-05-24	Baetis tricaudatus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.92
Pringle Creek	2	2012-05-24	Baetis tricaudatus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	212
Pringle Creek	2	2012-05-24	Hydroptila	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydroptilidae	caddisflies	60
Clark Creek	1	2012-05-24	Lepidostoma-panel case larvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	18.48
Pringle Creek	2	2012-05-24	Lepidostoma-panel case larvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	16
Pringle Creek	1	2012-05-24	Microcylloepus	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Elmidae	riffle beetles	2.73
Pringle Creek	1	2012-05-24	Gyrinus	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Gyrinidae	whirligig beetles	2.73
Pringle Creek	1	2012-05-24	Haliplus	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Haliplidae	crawling water beetles	2.73
Clark Creek	1	2012-05-24	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	4.62
Pringle Creek	1	2012-05-24	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	5.46
Pringle Creek	2	2012-05-24	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	4
Pringle Creek	2	2012-05-24	Dixella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Dixidae	dixid midges	4
Clark Creek	1	2012-05-24	Psychoda	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Psychodidae	moth flies	2.31
Pringle Creek	2	2012-05-24	Psychoda	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Psychodidae	moth flies	4
Clark Creek	1	2012-05-24	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	34.65
Pringle Creek	1	2012-05-24	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	221.13
Pringle Creek	2	2012-05-24	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	136
Clark Creek	1	2012-05-24	Tipula	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	20.79
Pringle Creek	1	2012-05-24	Tipula	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.92
Pringle Creek	2	2012-05-24	Tipula	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	68
Clark Creek	1	2012-05-24	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	20.79

Waterbody	Site	Date	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Pringle Creek	1	2012-05-24	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	5.46
Pringle Creek	2	2012-05-24	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	84
Pringle Creek	1	2012-05-24	Alotanypus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	32.76
Clark Creek	1	2012-05-24	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	48.51
Pringle Creek	1	2012-05-24	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.84
Pringle Creek	2	2012-05-24	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	72
Clark Creek	1	2012-05-24	Chironomus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	6.93
Pringle Creek	1	2012-05-24	Chironomus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	2.73
Clark Creek	1	2012-05-24	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	4.62
Pringle Creek	1	2012-05-24	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	27.3
Pringle Creek	2	2012-05-24	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	8
Pringle Creek	1	2012-05-24	Cricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	27.3
Pringle Creek	2	2012-05-24	Cricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	164
Clark Creek	1	2012-05-24	Cryptochironomus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	4.62
Pringle Creek	1	2012-05-24	Cryptochironomus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	2.73
Clark Creek	1	2012-05-24	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	20.79
Pringle Creek	1	2012-05-24	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	163.8
Pringle Creek	2	2012-05-24	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	20
Pringle Creek	1	2012-05-24	Eukiefferiella devonica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	5.46
Pringle Creek	2	2012-05-24	Eukiefferiella devonica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	8
Clark Creek	1	2012-05-24	Heterotrissocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	4.62
Clark Creek	1	2012-05-24	Limnophyes	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	13.86
Pringle Creek	1	2012-05-24	Limnophyes	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.84
Pringle Creek	2	2012-05-24	Limnophyes	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	120
Clark Creek	1	2012-05-24	Metriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	11.55
Pringle Creek	1	2012-05-24	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	2.73
Pringle Creek	2	2012-05-24	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	92
Pringle Creek	2	2012-05-24	Parakiefferiella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	20
Clark Creek	1	2012-05-24	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	20.79
Pringle Creek	2	2012-05-24	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	8
Pringle Creek	1	2012-05-24	Paratanytarsus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	2.73
Pringle Creek	2	2012-05-24	Paratanytarsus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	8
Pringle Creek	1	2012-05-24	Paratendipes	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	35.49
Clark Creek	1	2012-05-24	Phaenopsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	48.51
Pringle Creek	1	2012-05-24	Phaenopsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	30.03
Pringle Creek	2	2012-05-24	Phaenopsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	580
Clark Creek	1	2012-05-24	Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	53.13
Pringle Creek	1	2012-05-24	Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	21.84
Pringle Creek	2	2012-05-24	Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	60
Pringle Creek	1	2012-05-24	Procladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	10.92
Clark Creek	1	2012-05-24	Prodiamesa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Prodiamesinae	midges	198.66
Pringle Creek	1	2012-05-24	Prodiamesa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Prodiamesinae	midges	27.3
Pringle Creek	2	2012-05-24	Prodiamesa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Prodiamesinae	midges	8
Clark Creek	1	2012-05-24	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	41.58
Pringle Creek	1	2012-05-24	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	13.65
Pringle Creek	2	2012-05-24	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	100

Waterbody	Site	Date	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Clark Creek	1	2012-05-24	Smittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	4.62
Clark Creek	1	2012-05-24	Synorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	11.55
Pringle Creek	1	2012-05-24	Synorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	2.73
Clark Creek	1	2012-05-24	Thienemannimyia complex	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	34.65
Pringle Creek	1	2012-05-24	Thienemannimyia complex	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	2.73
Pringle Creek	2	2012-05-24	Thienemannimyia complex	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	36
Pringle Creek	1	2012-05-24	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	2.73

Taxon	Stage	Insect.	Origin	Higher.classification	Order	Family	Common.name	Range	Feeding.Group	CA.feeding.group	Habit	Tolerance	CTI.tolerance	PSSB.toler	CA.toleran	HDG.toler	PSSB.long	Voltinism	Developm	Occurrenc	Size.at.ma	Rheophily	Thermal.pr	a	b
Turbellaria	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	x	flat worms	0	PR	PR	CL	0.0	0	0	4	0	0	2	2	1	2	2	2	0.0082	2.168
Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	0	PA	PR	BU	0.0	0	0	6	0	0	2	2	1	2	2	2	0.0758	0.74
Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	0	CG	CG	BU	0.0	0	0	5	0	0	2	2	1	2	2	2	0.0758	0.74
Juga	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Pleuroceridae	snails	0	OM	SC	CL	MT	0	0	7	0	0	1	2	1	3	2	2	0.0208	3.03
Fluminicola	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Lithoglyphidae	snails	0	SC	SC	CL	MT	0	0	5	0	0	2	2	1	2	2	2	0.0208	3.03
Crangonyx	U	non-insect	Aquatic	Crustacea: Amphipoda	x	Crangonyctidae	scuds	0	CG	CG	SW	MT	0	0	4	0	0	3	2	1	2	2	2	0.0058	3.015
Acari	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	0	PA	PR	SW	0.0	0	0	5	0	0	3	2	2	1	2	2	0.053	2.494
Baetis tricaudatus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	0	CG	CG	CL	0.0	0	0	6	0	0	3	1	3	1	2	2	0.0053	2.875
Lepidostoma-panel case larvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	0	SH	SH	CM	0.0	0	0	1	0	0	2	1	1	2	1	2	0.0079	2.649
Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	0	PR	PR	SP	0.0	0	0	6	0	0	2	1	1	2	2	2	0.0025	2.469
Psychoda	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Psychodidae	moth flies	0	CG	CG	BU	HT	0	0	10	0	0	3	1	1	1	1	3	0.0025	2.692
Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	0	CF	CF	CL	0.0	0	0	6	0	0	3	1	3	1	3	2	0.002	3.011
Tipula	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	0	SH	SH	BU	0.0	0	0	4	0	0	1	2	1	3	2	2	0.0029	2.681
Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	0	CG	CG	BU	0.0	0	0	6	0	0	3	1	3	1	2	2	0.0018	2.617
Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0	CG	SH	SP	0.0	0	0	5	0	0	3	1	3	1	2	2	0.0018	2.617
Chironomus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	0	CG	CG	BU	HT	0	0	10	0	0	3	1	3	2	1	2	0.0018	2.617
Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0	CG	CG	SP	0.0	0	0	7	0	0	3	1	3	1	2	2	0.0018	2.617
Cryptochironomus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	0	PR	PR	SP	MT	0	0	8	0	0	3	1	3	1	1	2	0.0018	2.617
Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0	CG	OM	SP	MT	0	0	8	0	0	3	1	3	1	2	2	0.0018	2.617
Heterotrissocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0	CG	CG	SP	MI	0	0	0	0	0	3	1	3	1	2	1	0.0018	2.617
Limnophyes	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0	CG	CG	SP	MT	0	0	8	0	0	3	1	3	1	2	2	0.0018	2.617
Metriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0	CG	CG	BU	MT	0	0	5	0	0	3	1	3	1	2	2	0.0018	2.617
Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0	CG	CG	SP	0.0	0	0	5	0	0	3	1	3	1	2	2	0.0018	2.617
Phaenopsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	0	SC	SC	CL	0.0	0	0	7	0	0	3	1	3	1	1	2	0.0018	2.617
Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	0	MH	MH	CL	0.0	0	0	6	0	0	3	1	3	1	2	2	0.0018	2.617
Prodiamesa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Prodiamesinae	midges	0	CG	CG	BU	MI	0	0	3	0	0	3	1	3	1	2	1	0.0018	2.617
Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0	CG	CG	SP	0.0	0	0	6	0	0	3	1	3	1	2	2	0.0018	2.617
Smittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0	CG	CG	BU	MT	0	0	6	0	0	3	1	3	1	2	2	0.0018	2.617
Synorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0	CG	CG	SP	0.0	0	0	2	0	0	3	1	3	1	2	2	0.0018	2.617
Thienemannimyia complex	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	0	PR	PR	SP	0.0	0	0	6	0	0	3	1	3	1	2	2	0.0018	2.617
Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	0	CF	CF	BU	0.0	0	0	8	0	0	1	3	1	1	2	2	0.0163	2.477
Ferrissia	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Planorbidae	snails	0	SC	SC	CL	MT	0	0	6	0	0	3	2	1	1	2	2	0.0208	3.03
Microcylloepus	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Elmidae	riffle beetles	0	CG	CG	CL	MT	0	0	4	0	0	1	3	1	1	2	3	0.0074	2.879
Gyrinus	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Gyrinidae	whirligig beetles	0	PR	PR	CM	MT	0	0	5	0	0	2	2	1	2	2	2	0.0077	2.91
Haliplus	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Haliplidae	crawling water beetles	0	MH	MH	CM	MT	0	0	5	0	0	2	2	1	2	1	3	0.0077	2.91
Alotanypus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	0	PR	PR	BU	0.0	0	0	7	0	0	3	1	3	1	2	2	0.0018	2.617
Cricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0	CG	CG	CL	0.0	0	0	7	0	0	3	1	3	1	2	2	0.0018	2.617
Eukiefferiella devonica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0	CG	OM	SP	0.0	0	0	8	0	0	3	1	3	1	2	2	0.0018	2.617
Paratanytarsus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	0	CF	CF	CL	0.0	0	0	6	0	0	3	1	3	1	2	2	0.0018	2.617
Paratendipes	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	0	CG	CG	BU	MT	0	0	8	0	0	3	1	3	1	1	2	0.0018	2.617
Procladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	0	PR	PR	SP	HT	0	0	9	0	0	3	1	3	1	2	2	0.0018	2.617
Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0	CG	CG	SP	0.0	0	0	5	0	0	3	1	3	1	2	2	0.0018	2.617
Physa	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Physidae	snails	0	CG	SC	CL	HT	0	0	8	0	0	3	2	2	2	2	3	0.0208	3.03
Pacifastacus	U	non-insect	Aquatic	Crustacea: Decapoda	x	Astacidae	crayfish	0	OM	OM	SP	0.0	0	0	6	0	0	1	3	1	3	2	2	0.0147	3.626
Hydroptila	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydroptilidae	caddisflies	0	PH	PH	CL	MT	0	0	6	0	0	3	2	2	1	2	2	0.0056	2.839
Dixella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Dixidae	dixid midges	0	CG	CG	SW	MT	0	0	2	0	0	3	1	3	1	2	3	0.0018	2.617
Parakiefferiella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	0	CG	CG	SP	0.0	0	0	4	0	0	3	1	3	1	2	2	0.0018	2.617
Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	0	CG	CG	CL	0.0	0	0	7	0	0	3	1	3	1	2	2	0.0018	2.617

Explanation of metrics	All abundances and biomass converted to a full sample and 1 square meter basis.
Subsample count (raw)	Total count of subsample prior to correction factors being applied for subsampling and conversion to a 1 square meter basis.
Subsample correction factor to full sample	Multiplier to convert subsample abundances to a full sample basis, e.g. if 1/2 the sample was sorted, then the subsample correction is X2.
Area correction factor to square meter	Converts abundances of full sample to a 1 square meter basis, e.g. if 8 square feet was sampled, then the conversion to 1 square meter is X1.345
SUMMARY METRICS	
Total taxa richness	Total count of unique taxa in sample.
Total abundance	Total abundance in sample converted to a full sample and 1 square meter basis.
Total biomass (mg)	Total biomass in full sample adjusted to a 1 square meter basis as calculated by length/mass regressions.
EPT taxa richness	Taxa richness in the insect orders Ephemeroptera+Plecoptera+Trichoptera, or mayflies+stoneflies+caddisflies.
EPT abundance	
EPT biomass (mg)	
DOMINANCE AND DIVERSITY	Metrics that examine how dominated the community is by a single or few taxa.
% Dominant taxa	The % contribution of the most numerous taxon.
Biomass dominant taxa (mg)	
% Top 3 taxa	The % contribution of the 3 most numerous taxa.
Biomass top 3 taxa (mg)	
Shannon-Weaver Diversity (loge)	Information theory index that examines how evenly abundance is allocated among the taxa present in the community.
Shannon-Weaver Diversity (log2)	
TOLERANT AND INTOLERANT TAXA	Based on habitat association and best professional judgement (Wisseman unpublished). Water temperature and dissolved oxygen are the dominant environmental factors.
% Total tolerant taxa	Sum of the moderately and highly tolerant taxa. Taxa found frequently in habitats with warm water temperature and low dissolved oxygen. Eurythermal.
Total tolerant taxa richness	
Total tolerant taxa abundance	
Total tolerant taxa biomass (mg)	
% Highly tolerant taxa	Taxa highly tolerant of warm water and very low dissolved oxygen. Found often in stagnant and highly eutrophic habitat.
Highly tolerant taxa richness	
Highly tolerant taxa abundance	
Highly tolerant taxa biomass (mg)	
% Moderately tolerant taxa	Taxa moderately tolerant of warm water and low dissolved oxygen.
Moderately tolerant taxa richness	
Moderately tolerant taxa abundance	
Moderately tolerant taxa biomass (mg)	
% Total intolerant taxa	Sum of moderately intolerant and highly intolerant taxa. Cool and cold water biota found in habitats with high dissolved oxygen.
Total intolerant taxa richness	
Total intolerant taxa abundance	
Total intolerant taxa biomass (mg)	
% Highly intolerant taxa	Taxa generally found in habitats with year-round cold water temperatures and very high dissolved oxygen. Indicative of bull trout zone. Cold water biota, cold stenotherms.
Highly intolerant taxa richness	
Highly intolerant taxa abundance	
Highly intolerant taxa biomass (mg)	
% Moderately intolerant taxa	Taxa generally found in cool water habitats, cold to cool water eurythermal. Indicative of general salmonid zone.
Moderately intolerant taxa richness	
Moderately intolerant taxa abundance	
Moderately intolerant taxa biomass (mg)	
VOLTINISM (length of life cycle)	Modified from Poff et al. 2006
% Semivoltine (> 1 year life cycle)	Taxa where a significant proportion of individuals require more than one year to complete their life cycle.
% Univoltine (1 year life cycle)	Taxa where most individuals exhibit a one year life cycle.
% Multivoltine (< 1 year life cycle)	Taxa where a significant proportion of the population has more than one generation a year.
Semivoltine taxa abundance	
Univoltine taxa abundance	
Multivoltine taxa abundance	
Semivoltine taxa richness	

Univoltine taxa richness	
Multivoltine taxa richness	
Semivioltine taxa biomass (mg)	
Univoltine taxa biomass (mg)	
Multivoltine taxa biomass (mg)	
GROWTH AND DEVELOPMENT	Modified from Poff et al. 2006
% Fast seasonal life cycle	Taxa that grow and mature over a few months or a single season.
% Slow seasonal life cycle	Taxa where growth and maturation extends over several seasons.
% Nonseasonal life cycle	Taxa that exhibit asynchronous seasonal development, with multiple life stages present during most of the year.
OCCURRENCE IN DRIFT	Modified from Poff et al. 2006
% Rare in drift	Found rarely in stream drift. Drift occurs during catastrophic events (e.g. floods).
% Common in drift	Found commonly in stream drift.
% Abundant in drift	Dominant in stream drift, behavioral drifters.
SIZE AT MATURITY	Modified from Poff et al. 2006
% Small size at maturity	<9 mm long at maturity
% Medium size at maturity	9-16 mm long at maturity
% Large size at maturity	> 16 mm long at maturity
Small size at maturity abundance	
Medium size at maturity abundance	
Large size at maturity abundance	
Small size at maturity taxa richness	
Medium size at maturity taxa richness	
Large size at maturity taxa richness	
Small size at maturity taxa biomass (mg)	
Medium size at maturity taxa biomass (mg)	
Large size at maturity taxa biomass (mg)	
RHEOPHILY AND HABITAT AFFINITY	Modified from Poff et al. 2006
% Depositional only	Occurs primarily in lentic habitats, stream pools and alcoves, or low gradient slowly flowing streams.
% Depositional and erosional	Stream taxa found in both pools and riffles, though usually in protected pockets in riffles.
% Erosional	Stream taxa associated with moderate to fast water current.
THERMAL PREFERENCE	Modified from Poff et al. 2006
% Cold stenothermal and cool eurythermal	
% Cool/warm eurythermal	
% Warm eurythermal	
NON-INSECT AND INSECT ORDERS	
% Non-insect invertebrates	Hydroids, vermiform taxa, mollusks, crustaceans and mites.
% Ephemeroptera (mayflies)	
% Odonata (damsel- and dragonflies)	
% Plecoptera (stoneflies)	
% Hemiptera (true bugs)	
% Megaloptera (alderflies & hellgramites)	
% Trichoptera (caddisflies)	
% Lepidoptera (moths)	
% Coleoptera (beetles)	
% Diptera (total)(true flies)	Inclusive of the Chironomidae.
% Chironomidae (true flies-midges)	Dominant and ubiquitous aquatic dipteran family.
Non-insect taxa richness	
Ephemeroptera taxa richness	
Odonata taxa richness	
Plecoptera taxa richness	

Hemiptera taxa richness	
Megaloptera taxa richness	
Trichoptera taxa richness	
Lepidoptera taxa richness	
Coleoptera taxa richness	
Diptera (total) taxa richness	
Chironomidae taxa richness	
Non-insect abundance	
Ephemeroptera abundance	
Odonata abundance	
Plecoptera abundance	
Hemiptera abundance	
Megaloptera abundance	
Trichoptera abundance	
Lepidoptera abundance	
Coleoptera abundance	
Diptera (total) abundance	
Chironomidae abundance	
Non-insect biomass (mg)	
Ephemeroptera biomass (mg)	
Odonata biomass (mg)	
Plecoptera biomass (mg)	
Hemiptera biomass (mg)	
Megaloptera biomass (mg)	
Trichoptera biomass (mg)	
Lepidoptera biomass (mg)	
Coleoptera biomass (mg)	
Diptera (total) biomass (mg)	
Chironomidae biomass (mg)	
INDICATOR TAXA	
Mollusca (snails and bivalves) taxa richness	
Crustacea taxa richness	Benthic taxa include Ostracoda, Amphipoda, Isopoda, Decapoda, and the Chydoridae (Cladocera), but not water column associated microcrustaceans (e.g. Daphnidae and Copepoda)
Baetidae (mayfly) taxa richness	Common, ubiquitous and diverse family of minnow-like mayfles.
Ephemerellidae (mayfly) taxa richness	Common, ubiquitous and diverse family of mayflies with most taxa associated with cool-cold montane rivers. Many taxa intolerant.
Heptageniidae (mayfly) taxa richness	Common, ubiquitous and diverse family of mayflies. Rheophilic, scraper mayflies found over a broad longitudinal range in montane and foothill rivers and streams.
Nemouridae (stonefly) taxa richness	Common, ubiquitous, and diverse family of stoneflies. Broadly distributed along river systems with peak diversity in small, forested streams.
Rhyacophilidae (caddisfly) taxa richness	Common, ubiquitous and very diverse family of caddisflies. Primarily predators. Broadly distributed along river systems with peak diversity in small to mid-size, cool/cold montane streams.
Hydropsychidae (caddisfly) taxa richness	Common, ubiquitous, and diverse family of net spinning caddisflies.
Elmidae (riffle beetle) taxa richness	Common, ubiquitous, and diverse family of aquatic beetles.
Oligochaeta (segmented worms) abundance	
Mollusca abundance	
Crustacea abundance	
Acari (mites) abundance	
Baetidae abundance	
Baetis tricaudatus (mayfly) abundance	
Ephemerellidae abundance	
Heptageniidae abundance	
Nemouridae abundance	
Rhyacophilidae abundance	
Hydropsychidae taxa abundance	
Elmidae abundance	

Simuliidae (blackfly) abundance	
Tanytarsini (midge) abundance	
% Oligochaeta (segmented worms)	
% Mollusca	
% Crustacea	
% Acari	
% Baetidae	
% Baetis tricaudatus	
% Ephemerellidae	
% Heptageniidae	
% Nemouridae	
% Rhyacophilidae	
% Hydropsychidae	
% Elmidae	
% Simuliidae	
% Tanytarsini	
Oligochaeta biomass (mg)	
Mollusca biomass (mg)	
Crustacea biomass (mg)	
Acari biomass (mg)	
Baetidae biomass (mg)	
Baetis tricaudatus biomass (mg)	
Ephemerellidae biomass (mg)	
Heptageniidae biomass (mg)	
Nemouridae biomass (mg)	
Rhyacophilidae biomass (mg)	
Hydropsychidae biomass (mg)	
Elmidae biomass (mg)	
Simuliidae biomass (mg)	
Tanytarsini biomass (mg)	
FEEDING GROUPS	Functional feeding groups based on the mechanism by which taxa feed. Modified from Merritt et al. 2008.
Predator taxa richness	Taxa that are primarily predators, consuming living animal tissue by engulfing prey or piercing prey tissues and sucking fluids. Excluding parasites.
Parasite taxa richness	External parasites of invertebrates (e.g. Acari or mites), or internal parasites (e.g. Nemata or roundworms).
Collector-gatherer taxa richness	Utilize mouthparts and other structures to "gather" fine particulate organic matter (FPOM) that is mostly detritus but may include algae, bacteria, small animals, etc.
Collector-filterer taxa richness	Utilize nets, mothparts or other structures to capture and consume FPOM suspended in the water column. FPOM may include algae, bacteria, small animals, etc.
Collector (total) taxa richness	Sum of the collector-gatherer and collector-filterer.
Piercer herbivore taxa richness	Also called Macrophyte piercers. Pierce living tissue of aquatic macrophytes and suck fluids, e.g. some Hydroptilidae.
Macrophyte herbivore taxa richness	Chewers and miners of living macrophytes. Considered a subclass of shredders in Merritt et al. 2008.
Shredder taxa richness	Consume (chew) coarse particulate organic matter (CPOM) such as decaying leaves and wood.
Scraper taxa richness	"Scrape" periphyton (attached algae) and associated material from hard surfaces.
Omnivore taxa richness	Taxa exhibiting multiple feeding mechanisms (above), with no one mechanism clearly dominant.
Unknown taxa richness	No information available on how and what taxon feeds on.
Predator abundance	
Parasite abundance	
Collector-gatherer abundance	
Collector-filterer abundance	
Collector (total) abundance	
Piercer herbivore abundance	
Macrophyte herbivore abundance	
Shredder abundance	
Scraper abundance	
Omnivore abundance	
Unknown abundance	
% Predator	
% Parasite	

% Collector-gatherer	
% Collector-filterer	
% Collector (total)	
% Piercer herbivore	
% Macrophyte herbivore	
% Shredder	
% Scraper	
% Omnivore	
% Unknown	
Predator biomass (mg)	
Parasite biomass (mg)	
Collector-gatherer biomass (mg)	
Collector-filterer biomass (mg)	
Collector (total) biomass (mg)	
Piercer herbivore biomass (mg)	
Macrophyte herbivore biomass (mg)	
Shredder biomass (mg)	
Scraper biomass (mg)	
Omnivore biomass (mg)	
Unknown biomass (mg)	
HABIT	Mode of existence.
Skater taxa richness	Adapted for "skating" on the wayter surface. Generally excluded from benthic data sets.
Planktonic taxa richness	Inhabit the water column in lentic water or slow moving streams. Generally excluded from benthic data sets.
Diver taxa richness	Swim in the water column and along the benthos, but return to the water surface to obtain oxygen. Gnerally excluded from benthic data sets.
Swimmer taxa richness	Exhibit fishlike swimming in lotic or lentic waters, but return to the benthos between bursts of swimming. Included in benthic data sets.
Clinger taxa richness	Taxa that have behavioral (e.g. net spinners) or morphological adaptations (e.g. claws) to attach to hard substrates in faster water current.
Sprawler taxa richness	Found on the surface of fine sediments or floating leaves of macrophytes.
Climber taxa richness	Found on leaves and stems of aquatic macrophytes or submerged branches and roots.
Burrower taxa richness	Burrow into fine sediments or tunnel into plant stems, leaves or roots (miners)
Unknowns taxa richness	Not able to classify as above.
Skater abundance	
Planktonic abundance	
Diver abundance	
Swimmer abundance	
Clinger abundance	
Sprawler abundance	
Climber abundance	
Burrower abundance	
Unknowns abundance	
% Skater	
% Planktonic	
% Diver	
% Swimmer	
% Clinger	
% Sprawler	
% Climber	
% Burrower	
% Unknown	
Skater biomass (mg)	
Planktonic biomass (mg)	
Diver biomass (mg)	
Swimmer biomass (mg)	
Clinger biomass (mg)	
Sprawler biomass (mg)	
Climber biomass (mg)	

Burrower biomass (mg)	
Unknowns biomass (mg)	
STATE OF CALIFORNIA DESIGNATIONS	Traits coding according to CAMLnet January 27, 2003. List of California macroinvertebrate taxa and standard taxonomic effort.
CA % Sensitive EPT	Ephemeroptera, Plecoptera and Trichoptera with California Tolerance Value (CTV) of 0-2 on a 0-10 scaling.
CA % Intolerant individuals	All invertebrates with a CTV of 0-2 on a 0-10 scaling.
CA % Tolerant individuals	All invertebrates with a CTV of 8-10 on a 0-10 scaling.
CA weighted tolerance value	Calculates the Hilsenhoff Biotic Index using the California Toilerance Values (CTV)
CA % Predators	Primary designation of predator as classed by CA.
CA % Gatherers	Primary designation of gatherer as classed by collector-gatherer by CA.
CA % Filterers	Primary designation of fileter as classed by collector-filterer by CA.
CA % Scrapers	Primary designation of scraper as classed by CA.
CA % Shredders	Primary designation of shredder as classed by CA.

Waterbody	Site	Date	Taxon	Abundance	Stage	Subsample.correction.factor	Area.correction.factor
Clark Creek	1	05/24/2012 00:00:00	Turbellaria	1	U	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Nemata	2	U	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Oligochaeta	81	U	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Juga	13	U	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Fluminicola	4	U	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Crangonyx	20	U	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Acari	2	U	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Baetis tricaudatus	36	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Lepidostoma-panel case larvae	8	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Ceratopogoninae	2	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Psychoda	1	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Simulium	15	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Tipula	9	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Chironomidae	9	P	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Brillia	21	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Chironomus	3	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Corynoneura	2	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Cryptochironomus	2	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Eukiefferiella claripennis group	9	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Heterotrissocladius	2	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Limnophyes	6	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Metriocnemus	5	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Parametriocnemus	9	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Phaenopsectra	21	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Polypedilum	23	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Prodiamesa	86	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Rheocricotopus	18	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Smittia	2	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Synorthocladius	5	L	2.31	1
Clark Creek	1	05/24/2012 00:00:00	Thienemannimyia complex	15	L	2.31	1
Pringle Creek	1	05/24/2012 00:00:00	Nemata	7	U	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Oligochaeta	42	U	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Pisidium	34	U	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Ferrissia	1	U	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Juga	288	U	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Fluminicola	25	U	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Acari	13	U	2.73	1

Waterbody	Site	Date	Taxon	Abundance	Stage	Subsample.correction.factor	Area.correction.factor
Pringle Creek	1	05/24/2012 00:00:00	Baetis tricaudatus	4	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Microcylloepus	1	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Gyrinus	1	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Haliplus	1	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Ceratopogoninae	2	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Simulium	81	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Tipula	4	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Chironomidae	2	P	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Alotanypus	12	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Brillia	8	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Chironomus	1	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Corynoneura	10	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Cricotopus	10	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Cryptochironomus	1	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Eukiefferiella claripennis group	60	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Eukiefferiella devonica group	2	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Limnophyes	8	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Micropsectra	1	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Paratanytarsus	1	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Paratendipes	13	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Phaenopsectra	11	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Polypedilum	8	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Procladius	4	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Prodiamesa	10	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Rheocricotopus	5	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Synorthocladius	1	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Thienemannimyia complex	1	L	2.73	1
Pringle Creek	1	05/24/2012 00:00:00	Tvetenia bavarica group	1	L	2.73	1
Pringle Creek	2	05/24/2012 00:00:00	Nemata	5	U	4	1
Pringle Creek	2	05/24/2012 00:00:00	Oligochaeta	167	U	4	1
Pringle Creek	2	05/24/2012 00:00:00	Pisidium	10	U	4	1
Pringle Creek	2	05/24/2012 00:00:00	Ferrissia	1	U	4	1
Pringle Creek	2	05/24/2012 00:00:00	Physa	3	U	4	1
Pringle Creek	2	05/24/2012 00:00:00	Juga	6	U	4	1
Pringle Creek	2	05/24/2012 00:00:00	Fluminicola	7	U	4	1
Pringle Creek	2	05/24/2012 00:00:00	Crangonyx	5	U	4	1
Pringle Creek	2	05/24/2012 00:00:00	Acari	6	U	4	1

Waterbody	Site	Date	Taxon	Abundance	Stage	Subsample.correction.factor	Area.correction.factor
Pringle Creek	2	05/24/2012 00:00:00	Pacifastacus	1	U	4	1
Pringle Creek	2	05/24/2012 00:00:00	Baetis tricaudatus	53	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Hydroptila	15	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Lepidostoma-panel case larvae	4	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Dixella	1	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Ceratopogoninae	1	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Psychoda	1	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Simulium	34	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Tipula	17	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Chironomidae	21	P	4	1
Pringle Creek	2	05/24/2012 00:00:00	Brillia	18	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Corynoneura	2	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Cricotopus	41	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Eukiefferiella claripennis group	5	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Eukiefferiella devonica group	2	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Limnophyes	30	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Micropsectra	23	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Parakiefferiella	5	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Parametriocnemus	2	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Paratanytarsus	2	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Phaenopsectra	145	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Polypedilum	15	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Prodiamesa	2	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Rheocricotopus	25	L	4	1
Pringle Creek	2	05/24/2012 00:00:00	Thienemannimyia complex	9	L	4	1

Appendix C

Physical Habitat Data

East Fork Pringle Creek

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: E. Fork Pringle Crk DATE: 6/12/12

TRANSECT: ☒ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m)x.x: 1.0m | Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[1] Present (Y/ N)	BAR WIDTH[1] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	29.2	2.4	N		N	GL	N	N	N		
1	26.3		N		N	GL	N	N	N		
2	27.4		N		N	GL	N	N	N		
3	26.7		N		N	GL	N	N	N		
4	27.3		N		N	GL	N	N	N		
5	29.5	-	N	-	N	GL	N	N	N		
6	29.0		N		N	GL	N	N	N		
7	25.4	217	N	N/A	N	GL	N	N	N		
8	19.0		N		N	RI	N	N	N		
9	16.1		N		N	RI	N	N	N		
10	15.3		N		N	RI	N	N	N		
11	16.2		N		N	RI	N	N	N		
12	15.4		N		N	RI	N	N	N		
13	18.1		N		N	RI	N	N	N		
14	17.3		N		N	RI	N	N	N		Yellow jacket nest at transect B in dense vegetation.

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	GF	GC	GC	FN		

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length) | **CHECK IF ALL UNMARKED BOXES ARE ZERO** X | **FLAG**

Diameter Large End	Pieces All/Part in Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m	Pieces Bridge Above Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: E. Fork Pringle Crk DATE: 6/12/12

TRANSECT: ☐ A-B ☒ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m)x.x: 1.0m | Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[2] Present (Y/ N)	BAR WIDTH[2] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	15.0	164	N	-	N	RI	N	N	N		
1	37.9		N		N	GL	N	N	N		
2	41.6		N		N	GL	N	N	N		
3	22.5		N		N	RI	N	N	N		
4	14.3		N		N	RI	N	N	N		
5	18.1	-	N		N	RI	N	N	N		
6	13.8		N		N	RI	N	N	N		
7	16.6	180	N		N	GL	N	N	N		
8	21.6		N		N	GL	N	N	N		
9	27.8		N		N	PL	N	N	N		
10	42.7		N		N	PL	N	N	N		
11	53.0		N		N	PL	N	N	N		
12	71.7		N		N	PL	N	N	N		
13	79.2		N		N	PL	N	N	N		
14	73.5		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	GC	GC	GC	FN		

FLAG	COMMENTS

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: E. Fork Pringle Crk DATE: 6/12/12

TRANSECT: ☐ A-B ☐ B-C ☒ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m)x.x: 1.0m | Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[1] Present (Y/ N)	BAR WIDTH[1] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	49.0	2.77	N		N	GL	N	N	N		
1	14.0		N		N	GL	N	N	N		Concrete sluice
2	27.2		N		N	GL	N	N	N		
3	29.1		N		N	GL	N	N	N		
4	35.6		N		N	GL	N	N	N		
5	32.8	-	N	-	N	GL	N	N	N		
6	35.5		N		N	GL	N	N	N		
7	28.9	2.09	N		N	GL	N	N	N		
8	28.1		N		N	GL	N	N	N		
9	28.9		N		N	GL	N	N	N		
10	25.9		N		N	GL	N	N	N		
11	25.6		N		N	GL	N	N	N		
12	28.6		N		N	GL	N	N	N		
13	31.8		N		N	GL	N	N	N		
14	36.2		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	GC	GC	GF	FN		

FLAG	COMMENTS

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

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PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: E. Fork Pringle Crk DATE: 6/12/12

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☒ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m)x.x: 1.0m | Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[4] Present (Y/ N)	BAR WIDTH[4] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	27.9	2.03	N	-	N	GL	N	N	N		
1	24.9		N		N	GL	N	N	N		
2	23.6		N		N	GL	N	N	N		
3	28.0		N		N	GL	N	N	N		
4	26.1		N		N	GL	N	N	N		
5	32.0	-	N	-	N	GL	N	N	N		
6	33.0		N		N	GL	N	N	N		
7	32.7	2.05	N		N	GL	N	N	N		
8	39.1		N		N	GL	N	N	N		
9	38.2		N		N	GL	N	N	N		
10	28.7		N		N	GL	N	N	N		
11	30.2		N		N	GL	N	N	N		
12	28.5		N		N	GL	N	N	N		
13	24.1		N		N	GL	N	N	N		
14	19.4		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT	FLAG
	7	FN	GF	GF	GF	FN	

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length) | **CHECK IF ALL UNMARKED BOXES ARE ZERO** X | **FLAG**

Diameter Large End	Pieces All/Part in Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m	Pieces Bridge Above Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: E. Fork Pringle Crk DATE: 6/12/12

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☒ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m) x.x: 1.0m | Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[5] Present (Y/ N)	BAR WIDTH[5] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	23.6	1.56	N		N	RI	N	N	N		
1	20.2		N		N	RI	N	N	N		
2	17.4		N		N	RI	N	N	N		
3	15.2		N		N	RI	N	N	N		
4	16.0		N		N	RI	N	N	N		
5	16.2	-	N	-	N	RI	N	N	N		
6	14.8		N		N	RI	N	N	N		
7	16.6	2.47	N		N	RI	N	N	N		
8	16.0		N		N	RI	N	N	N		
9	17.4		N		N	RI	N	N	N		
10	24.6		N		N	RI	N	N	N		
11	22.1		N		N	RI	N	N	N		
12	17.5		N		N	RI	N	N	N		
13	18.2		N		N	GL	N	N	N		
14	17.4		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT	FLAG
	7	FN	CB	CB	GC	FN	

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
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Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length) | **CHECK IF ALL UNMARKED BOXES ARE ZERO** X | **FLAG**

Diameter Large End	Pieces All/Part in Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m	Pieces Bridge Above Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: E. Fork Pringle Crk DATE: 6/12/12

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☒ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m) x.x: 1.0m | Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[6] Present (Y/ N)	BAR WIDTH[6] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	21.3	1.68	N	-	N	GL	N	N	N		
1	20.8		N		N	GL	N	N	N		
2	21.4		N		N	GL	N	N	N		
3	20.3		N		N	GL	N	N	N		
4	18.5		N		N	GL	N	N	N		
5	17.2	-	N	-	N	GL	N	N	N		
6	16.8		N		N	GL	N	N	N		
7	17.3	2.40	N	-	N	GL	N	N	N		
8	14.3		N		N	GL	N	N	N		
9	18.9		N		N	GL	N	N	N		
10	191		N		N	GL	N	N	N		
11	21.3		N		N	GL	N	N	N		
12	17.1		N		N	GL	N	N	N		
13	24.8		N		N	GL	N	N	N		
14	26.6		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	GC	GC	GC	FN		

FLAG	COMMENTS

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

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PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: E. Fork Pringle Crk DATE: 6/12/12

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☒ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m) x.x: 1.0m | Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[7] Present (Y/ N)	BAR WIDTH[7] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	28.2	2.33	N	-	N	GL	N	N	N		
1	26.1		N		N	GL	N	N	N		
2	26.8		N		N	GL	N	N	N		
3	25.4		N		N	GL	N	N	N		
4	19.9		N		N	GL	N	N	N		
5	19.7	-	N	-	N	GL	N	N	N		
6	16.9		N		N	GL	N	N	N		
7	18.8	2.58	N		N	GL	N	N	N		
8	15.6		N		N	GL	N	N	N		
9	16.1		N		N	GL	N	N	N		
10	21.8		N		N	GL	N	N	N		Downstream of 12” RCP discharge, likely drain from field
11	21.7		N		N	GL	N	N	N		
12	20.6		N		N	GL	N	N	N		
13	22.8		N		N	GL	N	N	N		
14	20.8		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	GV	CB	GC	FN		

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
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LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: E. Fork Pringle Crk DATE: 6/12/12

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☒ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m) x.x: 1.0m — Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[a] Present (Y/ N)	BAR WIDTH[a] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	21.8	2.58	N	-	N	GL	N	N	N		
1	21.8		N		N	GL	N	N	N		
2	22.2		N		N	GL	N	N	N		
3	24.1		N		N	GL	N	N	N		
4	21.1		N		N	GL	N	N	N		
5	23.1	-	N	-	N	GL	N	N	N		
6	19.8		N		N	GL	N	N	N		
7	20.2	2.40	N	-	N	GL	N	N	N		
8	18.1		N		N	GL	N	N	N		
9	18.7		N		N	GL	N	N	N		
10	18.8		N		N	GL	N	N	N		
11	18.9		N		N	GL	N	N	N		
12	21.1		N		N	GL	N	N	N		
13	21.3		N		N	GL	N	N	N		
14	20.7		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	GC	GC	GC	FN		

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
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LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length) — **CHECK IF ALL UNMARKED BOXES ARE ZERO** X — **FLAG**

Diameter Large End	Pieces All/Part in Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m	Pieces Bridge Above Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: E. Fork Pringle Crk DATE: 6/12/12

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☒ H-I ☐ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m) x.x: 1.0m | Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[0] Present (Y/ N)	BAR WIDTH[0] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	22.1	2.78	N	-	N	RI	N	N	N		
1	19.1		N		N	RI	N	N	N		
2	15.9		N		N	RI	N	N	N		
3	16.3		N		N	GL	N	N	N		
4	14.8		N		N	GL	N	N	N		
5	12.9	-	N	-	N	GL	N	N	N		
6	15.2		N		N	GL	N	N	N		
7	20.1	2.82	N		N	GL	N	N	N		
8	21.5		N		N	GL	N	N	N		
9	20.6		N		N	GL	N	N	N		
10	20.4		N		N	GL	N	N	N		
11	21.7		N		N	GL	N	N	N		
12	19.9		N		N	GL	N	N	N		
13	17.8		N		N	GL	N	N	N		
14	18.8		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	GC	GC	GC	GC	GF		

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length) | **CHECK IF ALL UNMARKED BOXES ARE ZERO** X | **FLAG**

Diameter Large End	Pieces All/Part in Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m	Pieces Bridge Above Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: E. Fork Pringle Crk DATE: 6/12/12

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☒ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m)x.x: 1.0m | Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[10] Present (Y/ N)	BAR WIDTH[10] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	20.8	2.43	N		N	GL	N	N	N		
1	18.4		N		N	GL	N	N	N		
2	18.8		N		N	GL	N	N	N		
3	17.8		N		N	GL	N	N	N		
4	18.1		N		N	GL	N	N	N		
5	17.4	-			N	GL	N	N	N		
6	14.6		N		N	GL	N	N	N		
7	13.1	2.18	N		N	GL	N	N	N		
8	14.9		N		N	GL	N	N	N		
9	20.7		N		N	GL	N	N	N		
10	21.4		N		N	GL	N	N	N		
11	18.8		N		N	GL	N	N	N		
12	16.3		N		N	GL	N	N	N		
13	17.3		N		N	GL	N	N	N		
14	22.6		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	GC	GC	GF	FN		

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length) | **CHECK IF ALL UNMARKED BOXES ARE ZERO** ☐ | **FLAG**

Diameter Large End	Pieces All/Part in Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m	Pieces Bridge Above Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: E. Fork Pringle Crk	DATE: 6/14/12	**TRANSECT:**	☒ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.60	26.2	GC	50	
Ctr	1.20	24.8	GF	60	
RCtr	1.80	25.7	GF	40	
Right	2.40	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		Flag
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	0 **1** 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	**0** 1 2 3 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 3 **4**	0 1 2 **3** 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	0 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 2 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	

HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	0 P **C** B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	79	0.00	
Right	296	0.13	
Wetted Width xxx.x m		2.40	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		2.95	
Bankfull Height xx.x m		0.62	
Incised Height xx.x m		0.98	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

	Flag			Flag	
CenUp	12		CenR	12	
CenL	7		Left		
CenDwn	12		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: E. Fork Pringle Crk DATE: 6/14/12	**TRANSECT:**	☐ **A** ☒ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** **X-tra Side Channel** ☐ ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.41	13.8	GC	10	
Ctr	0.82	15.1	GF	5	
RCtr	1.23	15.4	GF	5	
Right	1.64	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	**0** 1 2 3 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 3 **4**	0 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 3 **4**	0 1 2 3 **4**	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	0 P **C** B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	86	0	
Right	273	0.45	
Wetted Width xxx.x m		1.64	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		2.68	
Bankfull Height xx.x m		0.35	
Incised Height xx.x m		0.97	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	11		CenR	13	
CenL	9		Left	-	
CenDwn	7		Right	-	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: E. Fork Pringle Crk DATE: 6/14/12	**TRANSECT:**	☐ **A** ☐ **B** ☒ **C** ☐ **D** ☐ **E** ☐ **F** **X-tra Side Channel** ☐ ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.69	34.2	OT	0	OT
Ctr	1.38	56.4	CB	20	
RCtr	2.07	46.3	GF	95	
Right	2.77	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	0 1 **2** 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 **1** 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 2 **3** 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 2 **3** 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	0 P C **B**	0 P C **B**	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	0 **P** C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	83	0	
Right	74	0.16	
Wetted Width xxx.x m		2.77	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		3.73	
Bankfull Height xx.x m		0.87	
Incised Height xx.x m		1.42	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

	Flag			Flag	
CenUp	17		CenR	12	
CenL	10		Left		
CenDwn	9		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: E. Fork Pringle Crk	DATE: 6/14/12	**TRANSECT:**	☐ A ☐ B ☐ C ☒ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.51	23.8	GF	50	
Ctr	1.02	23.5	GF	50	
RCtr	1.53	26.5	GF	30	
Right	2.03	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		Flag
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 **1** 2 3 4	0 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 2 3 **4**	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	0 P **C** B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	80	0	
Right	38	0	
Wetted Width xxx.x m		2.03	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		3.70	
Bankfull Height xx.x m		0.73	
Incised Height xx.x m		1.42	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	6		CenR	9	
CenL	9		Left		
CenDwn	10		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

RM

SITE ID: E. Fork Pringle Crk	DATE: 6/14/12	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☒ E ☐ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.39	18.2	GC	25	
Ctr	0.78	21.6	GC	25	
RCtr	1.17	19.4	GC	35	
Right	1.56	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

FISH COVER/OTHER		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	0 **1** 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	0 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	**0** 1 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 2 3 **4**	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	

HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	**0** P **C** B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	46	0	
Right	80	0	
Wetted Width xxx.x m		1.56	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		3.54	
Bankfull Height xx.x m		0.73	
Incised Height xx.x m		1.20	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	0		CenR	6	
CenL	9		Left		
CenDwn	7		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: E. Fork Pringle Crk	DATE: 6/14/12	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☒ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.42	18.2	GC	10	
Ctr	0.84	15.1	GC	10	
RCtr	1.26	16.4	GC	10	
Right	1.68	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	0 **1** 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 **1** 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 **1** 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 2 **3** 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	0 P **C** B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	52	0	
Right	56	0	
Wetted Width xxx.x m		1.68	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		3.34	
Bankfull Height xx.x m		0.63	
Incised Height xx.x m		1.05	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	2		CenR	3	
CenL	8		Left		
CenDwn	3		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: E. Fork Pringle Crk	DATE: 6/14/12	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F **X-tra Side Channel** ☒ G ☐ H ☐ I ☐ J ☐ K ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.58	21.8	GF	70	
Ctr	1.16	24.3	GF	50	
RCtr	1.74	21.1	GC	80	
Right	2.33	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	0 1 **2** 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	**0** 1 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 2 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	0 P **C** B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	63	0	
Right	59	0	
Wetted Width xxx.x m		2.33	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		3.73	
Bankfull Height xx.x m		0.69	
Incised Height xx.x m		1.18	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	0		CenR	4	
CenL	2		Left		
CenDwn	0		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: E. Fork Pringle Crk	DATE: 6/14/12	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☒ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	GC	80	
LCtr	0.65	14.0	GF	80	
Ctr	1.30	17.7	GF	40	
RCtr	1.95	18.9	GF	60	
Right	2.58	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		Flag
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 2 **3** 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	**0** 1 2 3 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 2 **3** 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	0 **1** 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	0 P **C** B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	77	0	
Right		0	
Wetted Width xxx.x m		2.58	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		3.45	
Bankfull Height xx.x m		0.71	
Incised Height xx.x m		1.25	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	3		CenR	3	
CenL	2		Left		
CenDwn	0		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: E. Fork Pringle Crk DATE: 6/14/12	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** **X-tra Side Channel** ☐ ☐ **G** ☐ **H** ☒ **I** ☐ **J** ☐ **K**

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.70	14.2	GC	40	
Ctr	1.40	15.4	GC	20	
RCtr	2.10	13.7	GF	50	
Right	2.78	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 2 **3** 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	0 P **C** B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	56	0	
Right	61	0	
Wetted Width xxx.x m		2.78	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		3.68	
Bankfull Height xx.x m		0.73	
Incised Height xx.x m		1.20	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	14		CenR	10	
CenL	15		Left		
CenDwn	11		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: E. Fork Pringle Crk	DATE: 6/14/12	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☒ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.61	15.2	GF	30	
Ctr	1.22	12.2	GF	70	
RCtr	1.83	19.1	GC	40	
Right	2.43	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	0 **1** 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	0 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	**0** 1 2 3 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 2 **3** 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	0 P **C** B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	57	0	
Right	73	0	
Wetted Width xxx.x m		2.43	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		3.74	
Bankfull Height xx.x m		0.56	
Incised Height xx.x m		1.08	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	6		CenR	8	
CenL	5		Left		
CenDwn	4		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: E. Fork Pringle Crk	DATE: 6/14/12	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J ☒ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.69	9.9	GF	20	
Ctr	1.38	16.2	GF	20	
RCtr	2.07	12.6	GC	70	
Right	2.75	0	GC	50	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		Flag
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	0 1 **2** 3 4	
Overhanging Veg. = <1 m of Surface	**0** 1 2 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 **3** 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 **1** 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 2 **3** 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	0 P **C** B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	59	0	
Right	54	0	
Wetted Width xxx.x m		2.75	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		3.84	
Bankfull Height xx.x m		0.67	
Incised Height xx.x m		1.18	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	17		CenR	15	
CenL	16		Left		
CenDwn	16		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

RIPARIAN "LEGACY" TREES AND INVASIVE ALIEN PLANTS

SITE ID: E. Fork Pringle Crk DATE: 6/14/12

TRAN	LARGEST LEGACY TREE VISIBLE FROM THIS STATION						ALIEN PLANT SPECIES PRESENT IN LEFT AND RIGHT RIPARIAN PLOTS				
	Trees not Visible	DBH (m)	Height (m)	Dist. from wetted margin (m)	Type	Taxonomic Category	Check all that are present				
A	☐	☒0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☒<5 ☐5-15 ☐15-30 ☐>30	0	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Ash	☐ None	☒RC Grass ☐Engl Ivy ☐Ch Grass	☐Salt Ced ☐CanThis ☐M This	☒Hblack ☐Teasel ☐Spurge	☐G Reed ☐C Burd ☐Rus Ol
B	☐	☒0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☒<5 ☐5-15 ☐15-30 ☐>30	0	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Ash	☐ None	☒RC Grass ☐Engl Ivy ☐Ch Grass	☐Salt CEd ☒Can This ☐M This	☐Hblack ☐Teasel ☐Spurge	☐G Reed ☐C Burd ☐Rus Ol
C	☒	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30	0	☐Deciduous ☐Coniferous ☐Broadleaf Evergreen		☐ None	☒RC Grass ☐Engl Ivy ☐Ch Grass	☐Salt Ced ☐Can This ☐M This	☐Hblack ☒Teasel ☐Spurge	☐G Reed ☐C Burd ☐Rus Ol

INSTRUCTIONS

Legacy trees are defined as the largest tree within your search area, which is as far as you can see, but within maximum limits as follows:

Wadeable Streams: Confine search to no more than 50 m from left and right bank and extending upstream to next transect (for 'K' look upstream 4 channel widths)

Non-wadeable Rivers: Confine search to no more than 100 m from left and right bank and extending both upstream and downstream as far as you can see confidently.

Alien Plants: Confine search to riparian plots on left and right bank

Wadeable Streams: 10 m x 10 m

Non-wadeable Rivers: 10 m x 20 m

Not all aliens are to be identified in all states. See Field Manual and Plant Identification Guide.

TAXONOMIC CATEGORIES
Acacia/Mesquite Alder/Birch Ash Maple/Box elder Oak Poplar/Cottonwood Sycamore Willow Unknown or Other Deciduous
Cedar/Cypress/Sequoia Fir (including Douglas Fir and Hemlock) Juniper Pine Spruce Unknown or Other Deciduous
Unknown or Other Broadleaf Evergreen
Snag (Dead tree of any species)

ALIEN SPECIES		
RC Grass	Reed Canarygrass	*Phalaris arundinacea*
Engl Ivy	English Ivy	*Hedera Helix*
ChGrass	Cheat Grass	*Bromus tectorum*
Salt Ced	Salt Cedar	*Tamarix spp.*
Can This	Canada thistle	*Cirsium arvense*
M This	Musk thistle	*Carduus nutans*
Hblack	Himalayan blackberry	*Rubus discolor*
Teasel	Teasel	*Dipsacus fullonum*
Spurge	Leafy spurge	*Euphorbia esula*
G Reed	Giant Reed	*Arundo donax*
C Burd	Common burdock	*Arctium minus*
Rus Ol	Russian-olive	*Elaeagnus angustifolia*

COMMENTS

Transects D to K continued on next page

RIPARIAN "LEGACY" TREES AND INVASIVE ALIEN PLANTS

SITE ID: E. Fork Pringle Crk DATE: 6/14/12

TRAN	LARGEST LEGACY TREE VISIBLE FROM THIS STATION						ALIEN PLANT SPECIES PRESENT IN LEFT AND RIGHT RIPARIAN PLOTS	
	Trees not Visible	DBH (m)	Height (m)	Dist. from wetted margin (m)	Type	Taxonomic Category	Check all that are present	
D	☒	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30		☐Deciduous ☐Coniferous ☐Broadleaf Evergreen		☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐CanThis ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
E	☒	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30		☐Deciduous ☐Coniferous ☐Broadleaf Evergreen		☐ None	☒RC Grass ☐Salt CEd ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
F	☐	☒0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☒<5 ☐5-15 ☐15-30 ☐>30	10m	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Cottonwood	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
G	☐	☒0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☒<5 ☐5-15 ☐15-30 ☐>30	20m	☐Deciduous ☒Coniferous ☐Broadleaf Evergreen	Pine	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
H	☐	☒0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☒<5 ☐5-15 ☐15-30 ☐>30	10m	☐Deciduous ☐Coniferous ☐Broadleaf Evergreen	Cottonwood	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
I	☐	☒0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☒<5 ☐5-15 ☐15-30 ☐>30	1	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Maple	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
J	☐	☒0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	2	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Oak	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
K	☐	☒0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☒<5 ☐5-15 ☐15-30 ☐>30	0	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Willow	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol

Appendix D

Physical Habitat Data

Clark Creek

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Clark Crk DATE: 6/12/12

TRANSECT: ☒ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m)x.x: 1.0m | Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[1] Present (Y/ N)	BAR WIDTH[1] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	21.4	2.44	N	-	N	GL	N	N	N		
1	27.5		N		N	PL	F	N	N		
2	39.1		N		N	PL	F	N	N		
3	43.4		N		N	PL	F	N	N		
4	32.8		N		N	PL	F	N	N		
5	27.4	-	N	-	N	GL	N	N	N		
6	14.9				N	RI	N	N	N		
7	9.8	2.62	N		N	RI	N	N	N		
8	13.8		N		N	GL	N	N	N		
9	15.7		N		N	GL	N	N	N		
10	17.5		N		N	GL	N	N	N		
11	21.9		N		N	GL	N	N	N		
12	23.2		N		N	GL	N	N	N		
13	26.7		N		N	GL	N	N	N		
14	23.1		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	GF	GF	GF	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Clark Crk DATE: 6/12/12

TRANSECT: ☐ A-B ☒ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m)x.x: 1.0m | Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[2] Present (Y/ N)	BAR WIDTH[2] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	27.9	2.92	N	-	N	GL	N	N	N		
1	28.5		N		N	GL	N	N	N		
2	37.1		N		N	GL	N	N	N		
3	21.8		N		N	RI	N	N	N		
4	18.2		N		N	RI	N	N	N		
5	11.4	-	N	-	N	RI	N	N	N		
6	16.2		N		N	RI	N	N	N		
7	17.3	2.40	Y	0.40	N	RI	N	N	N		
8	12.8		N		N	RI	N	N	N		
9	8.1		N		N	GL	N	N	N		
10	13.7		N		N	GL	N	N	N		
11	20.4		N		N	PL	F	N	N		
12	28.6		N		N	PL	F	N	N		
13	41.6		N		N	PL	F	N	N		
14	45.8		N		N	PL	F	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	GF	GF	GF	HP		

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length) | **CHECK IF ALL UNMARKED BOXES ARE ZERO** X | **FLAG**

Diameter Large End	Pieces All/Part in Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m	Pieces Bridge Above Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Clark Crk DATE: 6/12/12

TRANSECT: ☐ A-B ☐ B-C ☒ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m)x.x: 1.0m | Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[1] Present (Y/ N)	BAR WIDTH[1] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	42.8	1.96	N	-	N	PL	F	N	N		
1	44.6		N		N	PL	F	N	N		
2	43.5		N		N	PL	F	N	N		
3	47.7		N		N	PL	F	N	N		
4	41.9		N		N	PL	F	N	N		
5	37.6	-	N	-	N	PL	F	N	N		
6	38.9		N		N	PP	F	N	N		
7	32.0	1.70	N	-	N	GL	N	N	N		
8	39.9		N		N	GL	N	N	N		
9	37.6		N		N	GL	N	N	N		
10	34.2		N		N	GL	N	N	N		
11	34.0		N		N	GL	N	N	N		
12	38.7		N		N	PL	F	N	N		
13	47.9		N		N	PL	F	N	N		
14	46.9		N		N	PL	F	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	GF	HP	HP	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Clark Crk DATE: 6/12/12

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☒ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m)x.x: 1.0m | Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[4] Present (Y/ N)	BAR WIDTH[4] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	47.8	1.92	N	-	N	PL	N	N	N		
1	50.9		N		N	PL	N	N	N		
2	50.1		N		N	PL	N	N	N		
3	48.2		N		N	GL	N	N	N		
4	29.3		N		N	GL	N	N	N		
5	41.4	-	N		N	GL	N	N	N		
6	42.5		N		N	GL	N	N	N		
7	33.1	1.50	N		N	GL	N	N	N		
8	39.7		N		N	GL	N	N	N		
9	39.2		N		N	GL	N	N	N		
10	40.5		N		N	GL	N	N	N		
11	37.9		N		N	GL	N	N	N		
12	33.6		N		N	GL	N	N	N		
13	35.8		N		N	GL	N	N	N		
14	32.3		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	OT	SA	HP	HP		

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length) | **CHECK IF ALL UNMARKED BOXES ARE ZERO** X | **FLAG**

Diameter Large End	Pieces All/Part in Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m	Pieces Bridge Above Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Clark Crk DATE: 6/12/12

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☒ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m) x.x: 1.0m | Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[5] Present (Y/ N)	BAR WIDTH[5] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	28.6	1.76	N	N	N	GL	N	N	N	N	
1	26.0		N		N	RI	N	N	N	N	
2	16.7		N		N	RI	N	N	N	N	
3	11.0		N		N	RI	N	N	N	N	
4	17.5		N		N	RI	N	N	N	N	
5	21.8	-	N		N	RI	N	N	N	N	
6	17.7		N		N	RI	N	N	N	N	
7	11.1	2.21	N		N	RI	N	N	N	N	
8	12.2		N		N	RI	N	N	N	N	
9	15.8		N		N	RI	N	N	N	N	
10	10.7		N		N	RI	N	N	N	N	
11	12.6		N		N	RI	N	N	N	N	
12	12.9		N		N	GL	N	N	N	N	
13	15.9		N		N	GL	N	N	N	N	
14	16.5		N		N	GL	N	N	N	N	

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	SA	GF	GF	GF		

FLAG	COMMENTS

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Clark Crk DATE: 6/12/12

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☒ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m) x.x: 1.0m — Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[6] Present (Y/ N)	BAR WIDTH[6] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	17.6	1.32	N/A	-	N	GL	N	N	N		
1	20.8		N		N	GL	N	N	N		
2	15.3		N		N	RI	N	N	N		
3	15.9		N		N	RI	N	N	N		
4	10.4		N		N	RI	N	N	N		
5	11.8	-	N	-	N	RI	N	N	N		
6	11.0		Y		N	RI	N	N	N		
7	9.0	2.75	N	-	N	RI	N	N	N		
8	8.3		N		N	RI	N	N	N		
9	14.9		N		N	RI	N	N	N		
10	8.1		N		N	GL	N	N	N		
11	10.2		N		N	GL	N	N	N		
12	10.3		N		N	GL	N	N	N		
13	10.6		N		N	GL	N	N	N		
14	10.9		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	GF	GF	GF	HP		

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length) — **CHECK IF ALL UNMARKED BOXES ARE ZERO** X — **FLAG**

Diameter Large End	Pieces All/Part in Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m	Pieces Bridge Above Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Clark Crk DATE: 6/12/12

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☒ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m) x.x: 1.0m | Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[7] Present (Y/ N)	BAR WIDTH[7] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	10.6	2.42	N	-	N	GL	N	N	N		
1	12.5		N		N	GL	N	N	N		
2	19.7		N		N	GL	N	N	N		
3	20.6		N		N	GL	N	N	N		
4	13.9		N		N	GL	N	N	N		
5	16.1	-	N	-	N	GL	N	N	N		
6	16.0		N		N	GL	N	N	N		
7	15.6	2.5	N		N	GL	N	N	N		
8	11.1		N		N	GL	N	N	N		
9	5.9		N		N	GL	N	N	N		
10	11.7		N		N	GL	N	N	N		
11	10.8		N		N	GL	N	N	N		
12	12.9		N		N	GL	N	N	N		
13	9.1		N		N	GL	N	N	N		
14	9.8		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	GF	GF	GF	FN		

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

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LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length) | **CHECK IF ALL UNMARKED BOXES ARE ZERO** X | **FLAG**

Diameter Large End	Pieces All/Part in Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m	Pieces Bridge Above Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Clark Crk	DATE: 6/12/12	**TRANSECT:**	☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☒ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m) x.x: 1.0m — Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[1] Present (Y/ N)	BAR WIDTH[1] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	9.1	2.53	N		N	GL	N	N	N		
1	9.6		N		N	GL	N	N	N		
2	17.6		N		N	GL	N	N	N		
3	26.9		N		N	PL	F	N	N		
4	36.1		N		N	PL	F	N	N		
5	38.2	-	N	-	N	PL	F	N	N		
6	37.8		N		N	PL	F	N	N		
7	30.9	2.28	N	-	N	PL	F	N	N		
8	26.8		N		N	GL	N	N	N		
9	23.9		N		N	GL	N	N	N		
10	22.5		N		N	GL	N	N	N		
11	12.3		N		N	RI	N	N	N		
12	7.8		N		N	RI	N	N	N		
13	5.6		N		N	RI	N	N	N		
14	7.5		N		N	RI	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	SA	GF	GF	FN		

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
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Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	X	**FLAG**	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Clark Crk DATE: 6/12/12

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☒ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m) x.x: 1.0m | Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[1] Present (Y/ N)	BAR WIDTH[1] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	8.9	2.69	N	-	N	RI	N	N	N		
1	8.7		N		N	RI	N	N	N		
2	8.1		N		N	RI	N	N	N		
3	6.4		N		N	RI	N	N	N		
4	8.3		N		N	RI	N	N	N		
5	8.4	-	N	-	N	RI	N	N	N		
6	11.1		n		N	RI	N	N	N		
7	11.9	2.73	N	-	N	RI	N	N	N		
8	9.5		N		N	RI	N	N	N		
9	7.6		N		N	RI	N	N	N		
10	8.6		N		N	RI	N	N	N		
11	8.7		N		N	GL	N	N	N		
12	9.9		N		N	GL	N	N	N		
13	12.8		N		N	GL	N	N	N		
14	11.6		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	GF	GF	GF	HP		

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length) | **CHECK IF ALL UNMARKED BOXES ARE ZERO** X | **FLAG**

Diameter Large End	Pieces All/Part in Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m	Pieces Bridge Above Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Clark Crk DATE: 6/12/12

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☒ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m)x.x: 1.0m | Total Reach Length (m) 150m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[10] Present (Y/ N)	BAR WIDTH[10] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	9.9	3.20	N	-	N	GL	N	N	N		
1	14.4		N		N	GL	N	N	N		
2	17.6		N		N	GL	N	N	N		
3	20.6		N		N	GL	N	N	N		
4	21.9		N		N	GL	N	N	N		
5	24.8	-	N	-	N	GL	N	N	N		
6	26.5		N		N	GL	N	N	N		
7	22.4	2.61	N		N	GL	N	N	N		
8	18.9		N		N	GL	N	N	N		
9	17.6		N		N	GL	N	N	N		
10	19.9		N		N	GL	N	N	N		
11	33.8		N		N	PL	R	N	N		
12	33.4		N		N	PL	R	N	N		
13	33.8		Y		N	PL	R	N	N		
14	14.7		Y		N	RI	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	GF	GF	GF	FN		

FLAG	COMMENTS

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Clark Crk	DATE: 6/14/12	**TRANSECT:**	☒ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** **X-tra Side Channel** ☐ ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.61	5.8	GF	20	
Ctr	1.22	14.1	GF	30	
RCtr	1.83	16.0	SA	100	
Right	2.44	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%)
1=Sparse (<10%)
2=Moderate (10-40%)
3=Heavy (40-75%)
4=Very Heavy (>75%)
(circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%)
1=Sparse (<10%)
2=Moderate (10-40%)
3=Heavy (40-75%)
4=Very Heavy (>75%)

D=Deciduous
C=Coniferous
E=Broadleaf Evergreen
M=Mixed
N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	0 1 **2** 3 4	
Small Trees (Trunk <0.3 m DBH)	0 1 **2** 3 4	0 1 **2** 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 2 **3** 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	0 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	46	0	
Right	59	0	
Wetted Width xxx.x m		2.44	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		3.47	
Bankfull Height xx.x m		0.78	
Incised Height xx.x m		1.14	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	14		CenR	17	
CenL	15		Left		
CenDwn	15		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Clark Crk	DATE: 6/14/12	**TRANSECT:**	☐ A ☒ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.73	8.1	GF	70	
Ctr	1.46	28.8	GF	20	
RCtr	2.19	16.9	HP	0	
Right	2.92	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	0 1 **2** 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 **1** 2 3 4	0 **1** 2 3 4	
Small Trees (Trunk <0.3 m DBH)	0 1 **2** 3 4	0 1 **2** 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 **3** 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 2 **3** 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	0 **1** 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	63	0	
Right	76	0	
Wetted Width xxx.x m		2.92	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		3.86	
Bankfull Height xx.x m		0.91	
Incised Height xx.x m		1.37	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	14		CenR	11	
CenL	17		Left		
CenDwn	14		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Clark Crk	DATE: 6/14/12	**TRANSECT:**	☐ A ☐ B ☒ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.49	32.1	FN	100	
Ctr	0.98	39.0	HP	0	
RCtr	1.47	23.9	HP	0	
Right	1.96	0	HO	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	0 **1** 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 1 2 **3** 4	0 1 2 **3** 4	
Small Trees (Trunk <0.3 m DBH)	0 1 **2** 3 4	0 1 **2** 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 **1** 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 2 **3** 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	47	0	
Right	272	0.08	
Wetted Width xxx.x m		1.96	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		2.41	
Bankfull Height xx.x m		0.75	
Incised Height xx.x m		1.31	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	15		CenR	17	
CenL	17		Left		
CenDwn	17		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Clark Crk	DATE: 6/14/12	**TRANSECT:**	☐ A ☐ B ☐ C ☒ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.48	45.2	GF	40	
Ctr	0.96	33.6	GF	60	
RCtr	1.44	18.9	GF	80	
Right	1.92	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 1 **2** 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	0 **1** 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	K	K	F1
Right	57	0	
Wetted Width xxx.x m		1.92	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		2.52	
Bankfull Height xx.x m		0.85	
Incised Height xx.x m		1.42	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	10		CenR	11	
CenL	13		Left		
CenDwn	10		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Clark Crk	DATE: 6/14/12	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☒ E ☐ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.44	17.1	FN	100	
Ctr	0.88	23.8	GF	80	
RCtr	1.32	18.4	HP	0	
Right	1.76				

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 2 **3** 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	0 **1** 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 3 **4**	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	0 1 2 **3** 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	K	0	F1
Right	297	0.20	
Wetted Width xxx.x m		1.76	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		2.74	
Bankfull Height xx.x m		0.49	
Incised Height xx.x m		1.25	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

	Flag			Flag	
CenUp	10		CenR	9	
CenL	13		Left		
CenDwn	11		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

RM

SITE ID: Clark Crk	DATE: 6/14/12	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☒ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.33	14.1	GF	0	
Ctr	0.66	8.2	GF	10	
RCtr	0.99	4.0	GF	20	
Right	1.32	0	GF	20	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	66	0	
Right	18	0	
Wetted Width xxx.x m		1.32	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		2.98	
Bankfull Height xx.x m		0.45	
Incised Height xx.x m		0.98	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

	Flag				Flag
CenUp	17		CenR	17	
CenL	17		Left		
CenDwn	17		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	**Comments**

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	0 1 2 **3** 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 **1** 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 **1** 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 2 **3** 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	0 **1** 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Clark Crk	DATE: 6/14/12	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F **X-tra Side Channel** ☒ G ☐ H ☐ I ☐ J ☐ K ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.61	8.1	GF	0	
Ctr	1.22	6.6	GF	0	
RCtr	1.83	6.9	GF	90	
Right	2.42	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		Flag
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	0 **1** 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 1 2 **3** 4	0 1 **2** 3 4	
Small Trees (Trunk <0.3 m DBH)	0 1 **2** 3 4	0 1 2 **3** 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	0 **1** 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	286	0.12	
Right	66	0	
Wetted Width xxx.x m		2.42	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		2.56	
Bankfull Height xx.x m		0.44	
Incised Height xx.x m		0.94	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	17		CenR	14	
CenL	17		Left		
CenDwn	17		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Clark Crk	DATE: 6/14/12	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F **X-tra Side Channel** ☐ ☐ G ☒ H ☐ I ☐ J ☐ K

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.63	2.9	GF	30	
Ctr	1.26	5.9	GF	40	
RCtr	1.89	7.8	GF	50	
Right	2.53	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%)
1=Sparse (<10%)
2=Moderate (10-40%)
3=Heavy (40-75%)
4=Very Heavy (>75%)
(circle one)

		Flag
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%)
1=Sparse (<10%)
2=Moderate (10-40%)
3=Heavy (40-75%)
4=Very Heavy (>75%)

D=Deciduous
C=Coniferous
E=Broadleaf Evergreen
M=Mixed
N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 1 **2** 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	0 1 2 **3** 4	0 1 **2** 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 2 **3** 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	0 P C B	0 P C B	
Buildings	0 P C B	0 P C B	
Pavement/Cleared Lot	0 P C B	0 P C B	
Road/Railroad	0 P C B	0 P C B	
Pipes (Inlet/Outlet)	0 P C B	0 P C B	
Landfill/Trash	0 P C B	0 P C B	
Park/Lawn	0 P C B	0 P **C** B	
Row Crops	0 P C B	0 P C B	
Pasture/Range/Hay Field	0 P C B	0 P C B	
Logging Operations	0 P C B	0 P C B	
Mining Activity	0 P C B	0 P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	44	0	
Right	281	0.06	
Wetted Width xxx.x m		2.53	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		2.94	
Bankfull Height xx.x m		0.53	
Incised Height xx.x m		1.06	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	17		CenR	17	
CenL	16		Left		
CenDwn	17		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Clark Crk	DATE: 6/14/12	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☒ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.67	6.9	GF	0	
Ctr	1.34	7.8	GF	0	
RCtr	2.01	4.1	GF	10	
Right	2.69	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		Flag
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	0 **1** 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 1 **2** 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	0 1 **2** 3 4	0 1 2 **3** 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 **1** 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 2 **3** 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	0 1 **2** 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	24	0	
Right	333	0.25	
Wetted Width xxx.x m		2.69	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		3.52	
Bankfull Height xx.x m		0.38	
Incised Height xx.x m		1.14	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

	Flag			Flag	
CenUp	15		CenR	17	
CenL	17		Left		
CenDwn	17		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Clark Crk	DATE: 6/14/12	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☒ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.80	11.8	GF	40	
Ctr	1.60	9.2	GF	10	
RCtr	2.40	6.9	GF	90	
Right	3.20	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 1 **2** 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E **M** N	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	0 1 **2** 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	0 1 **2** 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	0 **1** 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	41	0	
Right	72	0	
Wetted Width xxx.x m		3.20	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		3.66	
Bankfull Height xx.x m		0.47	
Incised Height xx.x m		1.20	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	17		CenR	17	
CenL	16		Left		
CenDwn	17		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Clark Crk	DATE: 6/14/12	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J ☒ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.90	8.1	GF	0	
Ctr	1.80	0	K	K	F2
RCtr	2.70	6.8	GF	70	
Right	3.60	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	K	K	F1
Right	65	0	
Wetted Width xxx.x m		3.60	
Bar Width xx.x m		0.93	
Bankfull Width xxx.x m		3.83	
Bankfull Height xx.x m		0.36	
Incised Height xx.x m		1.21	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

	Flag			Flag	
CenUp	17		CenR	17	
CenL	17		Left		
CenDwn	13		Right		

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E **M** N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 1 **2** 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	0 1 2 **3** 4	0 1 **2** 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	D C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 1 2 **3** 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	0 **1** 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

RIPARIAN "LEGACY" TREES AND INVASIVE ALIEN PLANTS

SITE ID: Clark Crk DATE: 6/14/12

TRAN	LARGEST LEGACY TREE VISIBLE FROM THIS STATION						ALIEN PLANT SPECIES PRESENT IN LEFT AND RIGHT RIPARIAN PLOTS				
	Trees not Visible	DBH (m)	Height (m)	Dist. from wetted margin (m)	Type	Taxonomic Category	Check all that are present				
A	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	1	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Cherry	☐ None	☒RC Grass ☐Engl Ivy ☐Ch Grass	☐Salt Ced ☐CanThis ☐M This	☒Hblack ☐Teasel ☐Spurge	☐G Reed ☐C Burd ☐Rus Ol
B	☐	☐0-0.1 ☐.75-2 ☒.1-.3 ☐>2 ☐.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	0	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Maple	☐ None	☒RC Grass ☐Engl Ivy ☐Ch Grass	☐Salt CEd ☐Can This ☐M This	☒Hblack ☐Teasel ☐Spurge	☐G Reed ☐C Burd ☐Rus Ol
C	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	20	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Cherry	☐ None	☒RC Grass ☐Engl Ivy ☐Ch Grass	☐Salt Ced ☐Can This ☐M This	☒Hblack ☐Teasel ☐Spurge	☐G Reed ☐C Burd ☐Rus Ol

INSTRUCTIONS

Legacy trees are defined as the largest tree within your search area, which is as far as you can see, but within maximum limits as follows:

Wadeable Streams: Confine search to no more than 50 m from left and right bank and extending upstream to next transect (for 'K' look upstream 4 channel widths)

Non-wadeable Rivers: Confine search to no more than 100 m from left and right bank and extending both upstream and downstream as far as you can see confidently.

Alien Plants: Confine search to riparian plots on left and right bank

Wadeable Streams: 10 m x 10 m

Non-wadeable Rivers: 10 m x 20 m

Not all aliens are to be identified in all states. See Field Manual and Plant Identification Guide.

TAXONOMIC CATEGORIES
Acacia/Mesquite
Alder/Birch
Ash
Maple/Box elder
Oak
Poplar/Cottonwood
Sycamore
Willow
Unknown or Other Deciduous
Cedar/Cypress/Sequoia
Fir (including Douglas Fir and Hemlock)
Juniper
Pine
Spruce
Unknown or Other Deciduous
Unknown or Other Broadleaf Evergreen
Snag (Dead tree of any species)

ALIEN SPECIES		
RC Grass	Reed Canarygrass	*Phalaris arundinacea*
Engl Ivy	English Ivy	*Hedera Helix*
ChGrass	Cheat Grass	*Bromus tectorum*
Salt Ced	Salt Cedar	*Tamarix spp.*
Can This	Canada thistle	*Cirsium arvense*
M This	Musk thistle	*Carduus nutans*
Hblack	Himalayan blackberry	*Rubus discolor*
Teasel	Teasel	*Dipsacus fullonum*
Spurge	Leafy spurge	*Euphorbia esula*
G Reed	Giant Reed	*Arundo donax*
C Burd	Common burdock	*Arctium minus*
Rus Ol	Russian-olive	*Elaeagnus angustifolia*

COMMENTS

Transects D to K continued on next page

RIPARIAN "LEGACY" TREES AND INVASIVE ALIEN PLANTS

SITE ID: Clark Crk DATE: 6/14/12

TRAN	LARGEST LEGACY TREE VISIBLE FROM THIS STATION						ALIEN PLANT SPECIES PRESENT IN LEFT AND RIGHT RIPARIAN PLOTS	
	Trees not Visible	DBH (m)	Height (m)	Dist. from wetted margin (m)	Type	Taxonomic Category	Check all that are present	
D	☐	☐0-0.1 ☐.75-2 ☒.1-.3 ☐>2 ☐.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	20	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Ash	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐CanThis ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
E	☐	☐0-0.1 ☐.75-2 ☒.1-.3 ☐>2 ☐.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	1	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Ash	☐ None	☐RC Grass ☐Salt CEd ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
F	☐	☐0-0.1 ☐.75-2 ☒.1-.3 ☐>2 ☐.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	1	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Maple	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
G	☐	☐0-0.1 ☐.75-2 ☒.1-.3 ☐>2 ☐.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	1	☐Deciduous ☐Coniferous ☐Broadleaf Evergreen	Ash	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
H	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	25	☐Deciduous ☒Coniferous ☐Broadleaf Evergreen	Douglas Fir	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
I	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	25	☐Deciduous ☒Coniferous ☐Broadleaf Evergreen	Douglas Fir	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☒Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
J	☐	☐0-0.1 ☒.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☒>30	10	☐Deciduous ☒Coniferous ☐Broadleaf Evergreen	Douglas Fir	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
K	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☐5-15 ☐15-30 ☒>30	20	☐Deciduous ☒Coniferous ☐Broadleaf Evergreen	Douglas Fir	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☒Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol

Appendix E

Physical Habitat Data

Pringle Creek

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Pringle	DATE: 6/26/12	**TRANSECT:**	☒ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY | Increment (m)x.x: 2.9 m | Total Reach Length (m) 292.68 m

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[1] Present (Y/ N)	BAR WIDTH[1] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	21.2	10.32	Y	4.73	N	RI	N	N	N		
1	22.5		Y		N	RI	N	N	N		
2	15.3		Y		N	RI	N	N	N		
3	16.2		Y		N	RI	N	N	N		
4	22.0		Y		N	RI	N	N	N		
5	14.3	13.57	N	-	N	R	N	N	N		
6	15.1		N		N	GL	N	N	N		
7	16.5	-	N	-	N	GL	N	N	N		
8	17.4		N		N	GL	N	N	N		
9	16.4		N		N	GL	N	N	N		
10	-										
11	-										
12	-										
13	-										
14	-										Yellow jacket nest at transect B in dense vegetation.

SUBSTRATE	**Station (5 or 7)**	**LFT**	**LCTR**	**CTR**	**RCTR**	**RGT**		**FLAG**
	5	FN	CB	CB	CB	FN		

FLAG	**COMMENTS**

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	**X**	**FLAG**	

	Pieces All/Part in Bankfull Channel			**Pieces Bridge Above Bankfull Channel**		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Pringle DATE: 6/26/12 **TRANSECT:** ☐ A-B ☒ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m)x.x: | Total Reach Length (m)

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[2] Present (Y/ N)	BAR WIDTH[2] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	27.9	9.40	N	-	N	GL	N	N	N		
1	28.9		N		N	GL	N	N	N		
2	30.4		N		N	GL	N	N	N		
3	28.1		N		N	GL	N	N	N		
4	33.2		N		N	GL	N	N	N		
5	30.8	8.59	N	-	N	GL	N	N	N		
6	25.2		N		N	GL	N	N	N		
7	32.8	-	N	-	N	PD	F	N	N		Upstream of manmade dam of cobble
8	36.4		N		N	PD	F	N	N		Upstream of manmade dam of cobble
9	43.1		N		N	PD	F	N	N		
10	-										
11	-										
12	-										
13	-										
14	-										

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	5	FN	CB	CB	CB	FN		

FLAG	COMMENTS

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Pringle DATE: 6/26/12 **TRANSECT:** ☐ A-B ☐ B-C ☒ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m)x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[1] Present (Y/ N)	BAR WIDTH[1] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	46.4	8.89	N	-	N	PD	F	N	N		
1	50.6		N		N	PD	F	N	N		
2	49.4		N		N	PL	F	N	N		
3	46.9		N		N	PL	F	N	N		
4	58.6		N		N	PL	F	N	N		
5	56.6	7.77	N	-	N	PL	F	N	N		
6	58.1		N		N	PL	F	N	N		
7	51.9	-	N	-	N	PL	F	N	N		
8	50.6		N		N	PL	F	N	N		
9	46.0		N		N	PL	F	N	N		
10	-										
11	-										
12	-										
13	-										
14	-										

SUBSTRATE	**Station (5 or 7)**	**LFT**	**LCTR**	**CTR**	**RCTR**	**RGT**	**FLAG**
	5	GF	GC	GC	CB	WD	

FLAG	**COMMENTS**

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	**X**	**FLAG**	

	Pieces All/Part in Bankfull Channel			**Pieces Bridge Above Bankfull Channel**		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	1 1					
0.3-0.5 m						
0.5-0.8 m						
>0.8 m						

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Pringle DATE: 6/26/12

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☒ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m)x.x: — Total Reach Length (m)

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[4] Present (Y/ N)	BAR WIDTH[4] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	37.8	8.59	N	-	N		N	N	N		
1	39.5		N		N		N	N	N		
2	33.9		N		N		N	N	N		
3	33.5		N		N		N	N	N		
4	37.1		N		N		N	N	N		
5	48.2	7.77	N	-	N		N	N	N		
6	63.9		N		N		N	N	N		
7	61.0	-	N	-	N		N	N	N		
8	56.3		N		N		N	N	N		
9	51.9		N		N		N	N	N		
10	-										
11	-										
12	-										
13	-										
14	-										

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	5	CB	CB	CB	CB	FN		

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length) — **CHECK IF ALL UNMARKED BOXES ARE ZERO** X — **FLAG**

Diameter Large End	Pieces All/Part in Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m	Pieces Bridge Above Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m
0.1-<0.3 m						
0.3-0.5 m						
0.5-0.8 m						
>0.8 m						

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Pringle DATE: 6/26/12

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☒ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m) x.x: — Total Reach Length (m)

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[5] Present (Y/ N)	BAR WIDTH[5] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	33.8	6.96	N	-	N	GL	N	N	N		
1	33.5		N		N	GL	N	N	N		
2	26.9		N		N	GL	N	N	N		
3	31.8		N		N	GL	N	N	N		
4	27.7		N		N	GL	N	N	N		
5	22.6	7.22	N	-	N	GL	N	N	N		
6	20.5		N		N	GL	N	N	N		
7	18.0	-	N	-	N	GL	N	N	N		
8	18.8		N		N	GL	N	N	N		
9	22.8		N		N	GL	N	N	N		
10	-										
11	-										
12	-										
13	-										
14	-										

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	5	CB	GC	GC	GC	GC		

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length) — **CHECK IF ALL UNMARKED BOXES ARE ZERO** X — **FLAG**

Diameter Large End	Pieces All/Part in Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m	Pieces Bridge Above Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m
0.1-<0.3 m	11 2					
0.3-0.5 m						
0.5-0.8 m						
>0.8 m						

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Pringle DATE: 6/26/12

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☒ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m) x.x: — Total Reach Length (m)

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[6] Present (Y/ N)	BAR WIDTH[6] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	19.4	7.09	N/A	-	N	GL	N	N	N		
1	30.6		N		N	PL	F	N	N		
2	64.2		N		N	PL	F	N	N		
3	44.4		N		N	PL	F	N	N		
4	48.6		N		N	PL	F	N	N		
5	29.1	6.35	N	-	N	GL	N	N	N		
6	18.2		N		N	GL	N	N	N		
7	26.7	-	N	-	N	GL	N	N	N		
8	340		N		N	GL	N	N	N		
9	45.0		N		N	GL	N	N	N		
10	-										
11	-										
12	-										
13	-										
14	-										

SUBSTRATE	**Station (5 or 7)**	**LFT**	**LCTR**	**CTR**	**RCTR**	**RGT**		**FLAG**
	5	GF	GC	GC	GC	FN		

FLAG	**COMMENTS**

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	**X**	**FLAG**	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Pringle DATE: 6/26/12

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☒ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m) x.x: — Total Reach Length (m)

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[7] Present (Y/ N)	BAR WIDTH[7] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	26.6	6.66	N	-	N	RI	N	N	N		
1	21.0		Y		N	RI	N	Y	N		
2	24.6		Y		N	RI	N	Y	N		
3	34.6		Y		N	RI	N	Y	N		
4	15.5		Y		N	RI	N	Y	N		
5	20.2	18.80	Y	12.04	N	RI	N	Y	N		
6	21.5		Y		N	RI	N	Y	N		
7	19.0	-	Y	*	N	RI	N	Y	N		
8	16.9		Y		N	RI	N	Y	N		
9	33.6		Y		N	GL	N	Y	N		
10	-										
11	-										
12	-										
13	-										
14	-										

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	5	GC	CB	FN	CB	FN		

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length) — **CHECK IF ALL UNMARKED BOXES ARE ZERO** ☐ — **FLAG**

Diameter Large End	Pieces All/Part in Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m	Pieces Bridge Above Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m
0.1-<0.3 m	1 1					
0.3-0.5 m						
0.5-0.8 m						
>0.8 m						

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Pringle DATE: 6/26/12 **TRANSECT:** ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☒ H-I ☐ I-J ☐ J-K

THALWEG PROFILE For Transect A-B ONLY | Increment (m) x.x: | Total Reach Length (m)

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[1] Present (Y/ N)	BAR WIDTH[1] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	52.6	10.72	N	-	N	GL	N	N	N		Concrete wall on right bank
1	75.6		N		N	PL	F	N	N		Concrete wall on right bank
2	99.0		N		N	PL	F	N	N		Concrete wall on right bank
3	105.3		N		N	PL	F	N	N		Concrete wall on right bank
4	114.4		N		N	PL	F	N	N		Concrete wall on right bank
5	96.4	5.41	N	-	N	PL	F	N	N		Concrete wall on right bank
6	84.7		N		N	PL	F	N	N		Concrete wall on right bank
7	64.3	-	N	-	N	PL	F	N	N		Concrete wall on right bank
8	54.2		N		N	GL	N	N	N		Concrete wall on right bank
9	51.6		N		N	GL	N	N	N		Concrete wall on right bank
10	-										
11	-										
12	-										
13	-										
14	-										

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	5	FN	GC	GC	GF	OT		

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length) | **CHECK IF ALL UNMARKED BOXES ARE ZERO** X | **FLAG**

Diameter Large End	Pieces All/Part in Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m	Pieces Bridge Above Bankfull Channel: Length 1.5-5 m	5-15 m	>15 m
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Pringle DATE: 6/26/12 **TRANSECT:** ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☒ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m) x.x: | Total Reach Length (m)

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[1] Present (Y/ N)	BAR WIDTH[1] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	50.7	7.24	N	-	N	GL	N	N	N		Concrete wall on right bank
1	31.6		N		N	RI	N	N	N		Concrete wall on right bank
2	20.3		N		N	RI	N	N	N		Concrete wall on right bank
3	19.0		N		N	RI	N	N	N		No wall
4	18.9		N		N	RI	N	N	N		
5	15.7	11.33	N	-	N	RI	N	N	N		
6	18.4				N	GL	N	N	N		
7	17.2	-	N	-	N	GL	N	N	N		
8	20.9		N		N	GL	N	N	N		Under pedestrian bridge
9	17.8		N		N	GL	N	N	N		
10	-										
11	-										
12	-										
13	-										
14	-										

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	5	FN	GC	CB	CB	FN		

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: Pringle DATE: 6/26/12

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☒ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m)x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[10] Present (Y/ N)	BAR WIDTH[10] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	38.2	8.59	N	-	N	GL	N	N	N		
1	28.3		N		N	GL	N	N	N		Immediately down from manmade cobble dam
2	31.8		N		N	PL	F	N	N		
3	27.3		N		N	PL	F	N	N		
4	36.1		N		N	PL	F	N	N		
5	36.4	8.08	N	-	N	PL	F	N	N		
6	42.6		N		N	PL	F	N	N		
7	57.4	-	N	-	N	PL	F	N	N		
8	70.4		N		N	PL	F	N	N		
9	73.4		N		N	PL	F	N	N		
10	-										
11	-										
12	-										
13	-										
14	-										

SUBSTRATE	**Station (5 or 7)**	**LFT**	**LCTR**	**CTR**	**RCTR**	**RGT**	**FLAG**
	5	GF	GC	CB	GC	FN	

FLAG	**COMMENTS**

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

LARGE WOODY DEBRIS (≥10 cm small end diameter; ≥1.5 m length) | **CHECK IF ALL UNMARKED BOXES ARE ZERO** x | **FLAG**

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Pringle	DATE: 6/26/12	**TRANSECT:**	☒ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** **X-tra Side Channel** ☐ ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	2.58	18.0	GC	10	
Ctr	5.16	0	GC	10	
RCtr	7.74	2.0	GC	0	
Right	10.32	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	0 1 **2** 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	229	0.39	
Right	59	0	
Wetted Width xxx.x m		10.32	
Bar Width xx.x m		4.73	
Bankfull Width xxx.x m		70.62	
Bankfull Height xx.x m		0.58	
Incised Height xx.x m		0.58	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	12		CenR	13	
CenL	13		Left	K	
CenDwn	14		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	**Comments**

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 1 **2** 3 4	0 1 **2** 3 4	
Small Trees (Trunk <0.3 m DBH)	0 **1** 2 3 4	0 1 **2** 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 **1** 2 3 4	
Barren, Bare Dirt or Duff	0 **1** 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Pringle	DATE: 6/26/12	**TRANSECT:**	☐ A ☒ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	2.35	18.5	GC	20	
Ctr	4.70	14.3	GC	5	
RCtr	7.05	21.0	CB	20	
Right	9.40	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 1 **2** 3 4	0 1 2 **3** 4	
Small Trees (Trunk <0.3 m DBH)	0 **1** 2 3 4	0 1 **2** 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 **3** 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 **1** 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 2 3 4	0 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 3 4	0 1 2 3 4	
Barren, Bare Dirt or Duff	0 1 2 3 4	0 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	288	0.13	
Right	43	0	
Wetted Width xxx.x m		9.40	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		10.37	
Bankfull Height xx.x m		0.43	
Incised Height xx.x m		0.43	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	11		CenR	14	
CenL	9		Left	K	
CenDwn	12		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Pringle	DATE: 6/26/12	**TRANSECT:**	☐ A ☐ B ☒ C ☐ D ☐ E ☐ F **X-tra Side Channel** ☐ ☐ G ☐ H ☐ I ☐ J ☐ K

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	2.22	13.5	GF	20	
Ctr	4.44	26.0	GC	20	
RCtr	6.66	39.5	CB	0	
Right	8.89	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	0 **1** 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 1 2 **3** 4	0 1 2 **3** 4	
Small Trees (Trunk <0.3 m DBH)	0 1 **2** 3 4	0 1 **2** 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	**0** 1 2 3 4	
Barren, Bare Dirt or Duff	0 1 **2** 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P **C** B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	21	0	
Right	306	0.30	
Wetted Width xxx.x m		8.89	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		9.86	
Bankfull Height xx.x m		0.70	
Incised Height xx.x m		0.70	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

	Flag			Flag	
CenUp	17		CenR	16	
CenL	17		Left	K	
CenDwn	15		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Pringle	DATE: 6/26/12	**TRANSECT:**	☐ A ☐ B ☐ C ☒ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	2.15	38.3	GC	30	
Ctr	4.30	30.8	GF	50	
RCtr	6.45	25.1	GC	70	
Right	8.59	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	0 1 **2** 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	0 1 **2** 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	71	0	
Right	26	0	
Wetted Width xxx.x m		8.59	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		9.60	
Bankfull Height xx.x m		0.36	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

	Flag			Flag	
CenUp	11		CenR	13	
CenL	13		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Pringle	DATE: 6/26/12	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☒ E ☐ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	CB	50	
LCtr	1.74	29.2	CB	50	
Ctr	3.48	23.8	GC	40	
RCtr	5.22	19.9	GC	50	
Right	6.96	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		Flag
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D **C** E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 1 **2** 3 4	0 1 2 **3** 4	
Small Trees (Trunk <0.3 m DBH)	0 **1** 2 3 4	0 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 **1** 2 3 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 **1** 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	0 **1** 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	83	0	
Right	287	0.15	
Wetted Width xxx.x m		6.96	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		7.52	
Bankfull Height xx.x m		0.62	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	13		CenR	14	
CenL	14		Left	K	
CenDwn	11		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

RM

SITE ID: Pringle	DATE: 6/26/12	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☒ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	GC	50	
LCtr	1.77	17.8	GC	10	
Ctr	3.54	21.1	GC	10	
RCtr	5.31	21.0	GF	40	
Right	7.09	0	GF	20	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

FISH COVER/OTHER		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	0 1 **2** 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D **C** E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 1 **2** 3 4	0 1 2 **3** 4	
Small Trees (Trunk <0.3 m DBH)	0 1 **2** 3 4	0 **1** 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 **1** 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	0 **1** 2 3 4	0 **1** 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	64	0	
Right	414	0	
Wetted Width xxx.x m		7.09	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		8.87	
Bankfull Height xx.x m		0.75	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

	Flag			Flag	Flag
CenUp	14		CenR	14	
CenL	13		Left	K	
CenDwn	12		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Pringle	DATE: 6/26/12	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☒ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	1.67	2	GC	0	
Ctr	3.34	22.8	CB	0	
RCtr	5.01	39.6	CB	0	
Right	6.66	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		Flag
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D **C** E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 **1** 2 3 4	0 **1** 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	0 **1** 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 2 **3** 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	0 **1** 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	4	0	
Right	284	0.10	
Wetted Width xxx.x m		6.66	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		9.68	
Bankfull Height xx.x m		0.66	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	11		CenR	8	
CenL	8		Left	K	
CenDwn	5		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Pringle	DATE: 6/26/12	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F **X-tra Side Channel** ☐ ☐ G ☒ H ☐ I ☐ J ☐ K

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	2.68	0	GF	10	
Ctr	5.36	7.7	GC	20	
RCtr	8.04	22.8	GC	5	
Right	10.72	0	OT	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		Flag
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 2 **3** 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	0 1 **2** 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	D C **E** M N	
Woody Shrubs and Saplings	0 1 2 **3** 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	**0** 1 2 3 4	
Barren, Bare Dirt or Duff	0 **1** 2 3 4	**0** 1 2 3 4	

HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	280	0.16	
Right	90	0	
Wetted Width xxx.x m		10.72	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		11.08	
Bankfull Height xx.x m		0.82	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	7		CenR	13	
CenL	3		Left	K	
CenDwn	3		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments
F1	Concrete wall

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Pringle	DATE: 6/26/12	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☒ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	2.21	16.0	GC	95	
Ctr	4.42	31.5	GC	75	
RCtr	6.63	46.3	CB	10	
Right	7.24	0	OT	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		Flag
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	0 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	0 1 **2** 3 4	0 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	D C **E** M N	
Woody Shrubs and Saplings	0 **1** 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 **1** 2 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	52	0	
Right	90	0	
Wetted Width xxx.x m		7.24	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		7.34	
Bankfull Height xx.x m		0.82	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	10		CenR	3	
CenL	9		Left	K	
CenDwn	1		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments
F1	Concrete and block wall

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Pringle	DATE: 6/26/12	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☒ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	GF	80	
LCtr	2.15	26.8	CB	5	
Ctr	4.30	6.4	GF	20	
RCtr	6.45	5.8	GC	40	
Right	8.59	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	0 **1** 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 1 2 **3** 4	0 1 **2** 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	0 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 **1** 2 3 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	0 1 2 **3** 4	**0** 1 2 3 4	

HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	308	0.21	
Right	304	0.30	
Wetted Width xxx.x m		8.59	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		8.69	
Bankfull Height xx.x m		0.62	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

	Flag			Flag	
CenUp	17		CenR	16	
CenL	17		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: Pringle	DATE: 6/26/12	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J ☒ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	2.28	73.7	CB	50	
Ctr	4.56	58.6	GC	50	
RCtr	6.84	39.7	GF	80	
Right	7.49	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		Flag
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	0 1 **2** 3 4	
Small Trees (Trunk <0.3 m DBH)	0 1 2 **3** 4	0 1 **2** 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	D C E M N	
Woody Shrubs and Saplings	0 1 2 **3** 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 1 2 **3** 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 **P** C B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	K	-	F1
Right	33	0	
Wetted Width xxx.x m		7.49	
Bar Width xx.x m		-	
Bankfull Width xxx.x m		8.16	
Bankfull Height xx.x m		1.02	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

	Flag			Flag	
CenUp	7		CenR	8	
CenL	15		Left	K	
CenDwn	12		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments
F1	Dense blackberries

RIPARIAN "LEGACY" TREES AND INVASIVE ALIEN PLANTS

SITE ID: Pringle DATE: 6/26/12

TRAN	LARGEST LEGACY TREE VISIBLE FROM THIS STATION						ALIEN PLANT SPECIES PRESENT IN LEFT AND RIGHT RIPARIAN PLOTS				
	Trees not Visible	DBH (m)	Height (m)	Dist. from wetted margin (m)	Type	Taxonomic Category	Check all that are present				
A	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	10	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Oak	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☒Engl Ivy ☐CanThis ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol			
B	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	5	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Ash	☐ None	☒RC Grass ☐Salt CEd ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol			
C	☐	☐0-0.1 ☒.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	1	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Ash	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol			

INSTRUCTIONS

Legacy trees are defined as the largest tree within your search area, which is as far as you can see, but within maximum limits as follows:

Wadeable Streams: Confine search to no more than 50 m from left and right bank and extending upstream to next transect (for 'K' look upstream 4 channel widths)

Non-wadeable Rivers: Confine search to no more than 100 m from left and right bank and extending both upstream and downstream as far as you can see confidently.

Alien Plants: Confine search to riparian plots on left and right bank

Wadeable Streams: 10 m x 10 m

Non-wadeable Rivers: 10 m x 20 m

Not all aliens are to be identified in all states. See Field Manual and Plant Identification Guide.

TAXONOMIC CATEGORIES
Acacia/Mesquite Alder/Birch Ash Maple/Box elder Oak Poplar/Cottonwood Sycamore Willow Unknown or Other Deciduous
Cedar/Cypress/Sequoia Fir (including Douglas Fir and Hemlock) Juniper Pine Spruce Unknown or Other Deciduous
Unknown or Other Broadleaf Evergreen
Snag (Dead tree of any species)

ALIEN SPECIES		
RC Grass	Reed Canarygrass	*Phalaris arundinacea*
Engl Ivy	English Ivy	*Hedera Helix*
ChGrass	Cheat Grass	*Bromus tectorum*
Salt Ced	Salt Cedar	*Tamarix spp.*
Can This	Canada thistle	*Cirsium arvense*
M This	Musk thistle	*Carduus nutans*
Hblack	Himalayan blackberry	*Rubus discolor*
Teasel	Teasel	*Dipsacus fullonum*
Spurge	Leafy spurge	*Euphorbia esula*
G Reed	Giant Reed	*Arundo donax*
C Burd	Common burdock	*Arctium minus*
Rus Ol	Russian-olive	*Elaeagnus angustifolia*

COMMENTS

Transects D to K continued on next page

RIPARIAN "LEGACY" TREES AND INVASIVE ALIEN PLANTS

SITE ID: Pringle DATE: 6/26/12

TRAN	LARGEST LEGACY TREE VISIBLE FROM THIS STATION						ALIEN PLANT SPECIES PRESENT IN LEFT AND RIGHT RIPARIAN PLOTS	
	Trees not Visible	DBH (m)	Height (m)	Dist. from wetted margin (m)	Type	Taxonomic Category	Check all that are present	
D	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☐5-15 ☐15-30 ☒>30	7	☐Deciduous ☒Coniferous ☐Broadleaf Evergreen	Douglas Fir	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐CanThis ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
E	☐	☐0-0.1 ☒.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☒>30	2	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Cottonwood	☐ None	☒RC Grass ☐Salt CEd ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
F	☐	☐0-0.1 ☒.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	10	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Cottonwood	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☒Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
G	☐	☐0-0.1 ☒.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	10	☐Deciduous ☒Coniferous ☐Broadleaf Evergreen	Douglas Fir	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☒Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
H	☐	☐0-0.1 ☒.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30		☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Maple	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
I	☐	☐0-0.1 ☒.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☒>30		☐Deciduous ☒Coniferous ☐Broadleaf Evergreen	Douglas Fir	☐ None	☒RC Grass ☐Salt Ced ☐Hblack ☐G Reed ☒Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
J	☐	☐0-0.1 ☒.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30	2	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Maple	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
K	☐	☐0-0.1 ☒.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☒>30	15	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Cottonwood	☐ None	☐RC Grass ☐Salt Ced ☐Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol

ATTACHMENT C. Results of Benthic Macroinvertebrate Sampling, Fish Sampling, and Physical Habitat Data Collection for Waln Creek and Battle Creek in Salem, Oregon; Pacific Habitat Services (February 29, 2012).

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

Prepared for

City of Salem
Attn: Heather Dimke
Public Works Department
555 Liberty Street SE
Salem, Oregon 97301

Prepared by

Craig Tumer
Dale Groff
Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070
(503) 570-0800
(503) 570-0855 FAX

PHS Project Number: 4891

February 29, 2012

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1.0 INTRODUCTION

PHS has developed a study design for a multi-year macroinvertebrate, fish, and physical data sampling and assessment effort to document the effects of proposed stream and floodplain restoration effort on Waln Creek. The field methodology and parameter collection will follow procedures identified in the "Technical Memorandum for the City of Salem's MS4 Permit Requirements for Benthic Macroinvertebrate Sampling and Hydromodification Assessment" (Pacific Habitat Services, Inc., March 21, 2011).

This report describes the results of the benthic macroinvertebrate sampling, fish sampling, and physical habitat characterization conducted in Fall 2011. Benthic macroinvertebrate sampling was conducted on September 29, 2011; fish sampling was conducted on September 28, 2011; and physical habitat characterization was conducted on October 6, October 26, November 10, December 1, December 7, and December 9, 2011 . This memorandum also provides the baseline existing conditions against which the results of future sampling efforts will be compared and will include the following:

- A description of sampling sites and rationale for site selection;
- Data from field sampling;
- Summary of results and discussion of how the data might be used in the future to track changes in the project-area stream reaches; and
- Description of recommended future sampling activities (post-restoration in 2012+).

2.0 STUDY AREA DESCRIPTION

The project study area is located at the site of the former Battle Creek Golf Course in Salem, Oregon. As part of the redevelopment of the former golf course site, a portion of Waln Creek will be relocated to the east of the current channel alignment. Under existing conditions, this portion of Waln Creek has been channelized and straightened. The stream is somewhat incised, and weirs have been placed across the channel in several locations. The stream floods frequently during periods of heavy precipitation. The relocated channel alignment will be more meandering, and floodplain terraces adjacent to the relocated channel will restore some of the streams flood function.

In Fall 2011, PHS collected data on benthic macroinvertebrate communities, fish presence, and physical habitat characteristics that could be used as baseline information for assessing the success of the Waln Creek stream restoration activities. These data were collected on four sample reaches, as described below and depicted on Figure 1 (Appendix A):

- **WC1:** Waln Creek, immediately upstream of its confluence with Battle Creek;
- **WC2:** Waln Creek, upstream of SE Wiltsey Road;
- **BC1:** 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;
- **BC2:** Battle Creek, upstream of the Waln Creek/Battle Creek confluence and in the vicinity of previous City of Salem sampling efforts.

Reach WC1 is the reach of Waln Creek that will be relocated to the east of its current location. This reach was sampled in order to provide baseline data against which data from the relocated stream channel can be compared. Following the relocation of Waln Creek, this reach will no longer be part of the active stream channel. Reach WC1 will move to the relocated stream channel, immediately upstream from Waln Creek's confluence with Battle Creek in subsequent sampling years.

Reach WC2 is located approximately 1000 feet upstream of Reach WC1, 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 (between Reaches WC1 and WC2, Waln Creek is dammed and unsuitable for sampling.

Reach BC1 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 Reach BC1. Data collected in this stream was collected to document changes that might occur in Battle Creek following the Waln Creek restoration project.

Reach BC2 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 Reach BC2. 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.

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 four sampling reaches within the project area.

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 both Battle and Waln Creeks are less than four meters, PHS determined that the reach length for each of the four project-area reaches is 150 meters.

PHS identified the downstream end of the lower Battle Creek reach (BC1) and flagged it as Transect "A". One-half-inch-diameter PVC pipe was pounded into the ground at the top of the bank on either side of the stream so that the transect crossed the stream perpendicular to the stream flow at the transect location. The PVC pipe was marked with "BC1-A" to indicate Battle Creek, Reach 1, Transect A. Using a tape measure, PHS measured 15 meters upstream from Transect A and marked this spot as Transect B, as described above for Transect A. PHS proceeded upstream with the tape measure and flagged the positions of 9 additional transects labeled "C" through "K", with Transect K being the transect marking the upper limits of the sampling reach. PHS used the same procedure to mark transects along the remaining three sample reaches. Following the identification of all transects along all four reaches, PHS located the endpoints of each transect using a handheld GPS. An electronic file of the transect locations will be provided to the City of Salem for future reference. Figure 2 shows the transect layout along Reach BC1.

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 filled out the online permit application (https://apps.nmfs.noaa.gov/) and obtained the necessary Oregon STP from ODFW.

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 person operating the electrofishing with a dip net to retrieve stunned fish. All retrieved fish were transferred to a five-gallon bucket for later processing. The five gallon bucket was fitted with an aquarium air pump to supply oxygen to the water in the bucket and minimize stress on the captured fish. 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.

Portions of reaches BC1, BC2, and particularly WC1 had dense thickets of vegetation overhanging the channel at the time of the fish sampling effort. The dense, tangled vegetation low over the stream channel made it impossible to navigate portions of the channel with the backpack electrofishing unit. Because the purpose of the fish survey was to document the species of fish present within the project area streams and not to estimate the population size of fish within the stream, only the accessible portions of the sampling reaches were sampled with the backpack electrofisher. As such, only a very small portion of Reach WC1 was sampled due to the extent of the vegetation obscuring the stream channel.

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 four stream reaches within the project area. 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 channel 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.
- Water Surface Slope – Water surface slope is calculated for each of the ten intervals between the transects within the assessment reach.
- 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 of the transects.

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 one-meter intervals between the 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" 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. This procedure 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.

Water Surface Slope

The water surface slope was measured by "backsighting" downstream between transects (e.g., transect "K" to "J", "J" to "I", etc.). The EMAP-SW protocol recommends using a clinometer to measure slope. However, because of the very shallow slopes of the streams within the project area, a clinometer was not used for this project.

For this project, the water surface slope was measured by two people, each with a surveyor's rod held vertically in the center of the stream at the upstream cross section and the next cross section downstream. The elevation of the water surface was measured to the nearest 0.01 feet and later converted to the metric equivalent for both the upstream and downstream transects. The person at the upstream cross section placed a level against the surveyor's rod and backsighted to the downstream rod, recording the elevation of the level on the upstream rod and the corresponding elevation on the downstream rod. These readings were then used to calculate the water surface slope between the transects. If it was not possible to see from one transect to the next due to the stream curvature, streamside vegetation or low light levels, supplementary slope measurements were taken between the transects.

Substrate Size/Channel Dimensions

At the transect, a surveyor's rod was extended across the channel perpendicular to the flow, with the "zero" end at the left bank. 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 very 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 the riparian area 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.

Instream Fish Cover, Algae, and Aquatic Macrophytes

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 macrophytes - 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 instream 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, gravelled, 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 conducted on September 29, 2011, and the benthic macroinvertebrate samples were processed by Aquatic Biology Associates, Inc. (ABA) in Corvallis, Oregon. Each sample was scored according to the Benthic Index of Biological Integrity (BIBI), modified from Kerr 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.

Data and results from ABA's analysis are provided in Appendix B. The results of the BIBI scoring for each of the sample reaches are summarized in Table 1 and summarized 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)

Metric	Battle Creek 1		Battle Creek 2		Waln Creek 1		Waln Creek 2	
	Value	Score[a]	Value	Score[a]	Value	Score[a]	Value	Score[a]
Total Number of Taxa[b]	31	3	26	3	33	3	34	3
Number of Ephemeroptera Taxa[b]	1	1	0	1	1	1	1	1
Number of Plecoptera Taxa[b]	1	1	1	1	0	1	0	1
Number of Trichoptera Taxa[b]	1	1	1	1	1	1	1	1
Number of Long-lived Taxa[b]	4	3	3	3	3	3	3	3
Number of Intolerant Taxa[b]	3	3	2	1	2	1	3	3
Percent Tolerant Taxa[c]	30.88	3	38.04	3	34.96	3	43.48	3
Percent Predators[b]	13.33	3	9.35	1	19.81	3	20.86	5
Number of Clinger Taxa[b]	8	1	7	1	8	1	9	1
Percent Dominance (3 Taxa)[c]	45.97	5	45.67	5	34.03	5	38.78	5
Total BIBI Score[d]:	**n/a**	**24**	**n/a**	**20**	**n/a**	**22**	**n/a**	**26**
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 each 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 very low numbers of mayfly taxa recorded within the assessment 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. The very low numbers of stonefly taxa recorded within the assessment reaches are 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 very low numbers of caddisfly taxa recorded within the assessment 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 moderate scores given for total number of long-lived taxa in each of the sampling reaches indicates 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 moderate scores given for the number of intolerant taxa in each of the sampling reaches indicate some level of 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 moderate scores given for the percent tolerant taxa in each of the sampling reaches indicate some level of disturbance within the assessment reaches.

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.

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 very 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 the other metrics examined, the scores for percent dominance within all of the sample reaches were within the “high” category.

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 20 to 26, in the upper low to moderate range for biological integrity.

4.1.1 Other Stream Assessment Metrics

ABA provided scores for fourteen 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 Table 2. 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 eight metrics listed in Table 2 (Hilsenhoff biotic index, 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, many of the scores were in the moderate to high range, indicating impaired biological integrity for project-area streams.

Table 2. Other Community Composition Metrics that are Indicative of Biological Condition

Metric	Battle Creek 1		Battle Creek 2		Waln Creek 1		Waln Creek 2	
	Value	Score[a]	Value	Score[a]	Value	Score[a]	Value	Score[a]
Total Abundance[b]	285	L	589	M	429	L	1150	H
EPT Taxa Richness[b]	3	L	2	L	2	L	2	L
Predator Richness[b]	8	L	6	L	7	L	9	L
Scraper Richness[b]	4	L	4	L	4	L	5	L
Shredder Richness[b]	3	L	3	L	3	L	3	L
Percent Intolerant Taxa[b]	7.02	M	7.81	M	8.15	M	3.65	L
Hilsenhoff Biotic Index[c]	6.06	L	6.14	L	6.68	L	6.81	L
Percent *Baetis tricaudatus*[c]	0	H	0	H	0	H	0	H
Percent Collector[c]	42.81	M	35.83	M	52.21	M	42.78	M
Percent Parasite[c]	12.63	L	11.55	L	3.97	M	6.60	L
Percent Oligochaeta[c]	5.61	M	2.04	H	4.66	M	1.22	H
Number of Tolerant taxa[c]	11	L	8	M	11	L	14	L
Percent Simuliidae[c]	0	H	0	H	0.93	H	0	H
Percent Choronomidae[c]	51.93	L	37.86	L	70.40	L	37.57	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 3 summarizes the results of the fish sampling efforts within the project-sampling 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. Six fish taxa were identified across all four sampling reaches. One cutthroat trout within Reach BC1 was notable. As noted above, portions of Reaches BC1, BC2, and BC3 could not be sampled with the backpack electrofisher because of dense, tangled vegetation hanging low over the water surface. A large portion of Reach WC1 was not accessible for sampling, and therefore, only five sculpin were caught during the fish sampling effort. Additionally, a large school of shiners was observed within Reach WC1 during the benthic macroinvertebrate sampling effort.

Table 3. Results of Fish Sampling for Project Area Sampling Reaches

Fish Species	Sampling Reach			
	Battle Creek 1[a]	Battle Creek 2[a]	Waln Creek 1[a]	Waln Creek 2
Sculpin	4	7	5	11
Shiner	45	14	X[b]	90
Largescale sucker	3	1	0	0
Cutthroat trout	1	0	0	0
Dace	0	0	0	7
Lamprey	0	0	0	3
Total	**53**	**22**	**5+**	**111**

Notes: a. Unable to sample reach completely with electrofishing equipment due to low, dense, overhanging vegetation.
b. Shiners observed within reach but not collected with the electrofishing equipment.

4.3 Physical Habitat Characterization

Physical habitat data was collected to provide baseline information that could be compared with future data following completion of restoration efforts at Battle and Waln Creeks—particularly Waln Creek immediately upstream of its confluence with Battle Creek. Data related to thalweg profile, presence of large woody debris, for each of the sampling reaches are provided on data forms derived from those provided in the EMAP-SW protocol. Data forms for each of the sampling reaches are in Appendices C, D, E, and F, respectively.

Because of the shallow slope of the project area streams, PHS determined the water surface slope using a level and surveyor's rods rather than a clinometer, as described in the methodology section above. Therefore, the EMAP-SW data sheet for slope measurement was not used. Slope data for the four sampling reaches are presented in Table 4, below.

Table 4. Water Surface Slopes for the Four Project-Area Sampling Reaches

Transect	Water Surface Slope			
	BC1	**BC2**	**WC1**	**WC2**
A to B	*	0.83	0.16	0.20
B to C	*	0.75	0.69	0.65
C to D	0.37	0.73	0.83	1.02
D to E	0.98	1.67	0.61	0.14
E to F	2.13	1.22	1.52	0.12
F to G	0.37	1.08	0.81	2.11
G to H	0.43	0.51	0.71	0.33
H to I	1.20	0.57	0.83	1.34
I to J	0.51	0.51	1.00	0.60
J to K	0.24	1.46	0.57	1.00
Reach Average	**0.78**	**0.93**	**0.77**	**0.75**

Notes: Slope data was not collected between transects A and C due to the presence of yellow jacket nests on the stream banks in this area.

The slope of the stream reach may be useful in three different ways. First, the overall stream gradient gives an indication of potential water velocities and stream power, which are in turn important controls on aquatic habitat and sediment transport within the reach. Second, the spatial variability of stream gradient is a measure of habitat complexity, as reflected in the diversity of water velocities and sediment sizes within the stream reach. Lastly, the water surface slope allows computation of residual pool depths and volumes from the multiple depth and width measurements taken in the thalweg profile.

The EMAP-SW protocol for physical habitat characterization is useful for longitudinal studies of changes in channel morphology due to urban changes in the stream hydrograph. Water depths at one-meter intervals along the thalweg are provided on the "Thalweg Profile & Woody Debris Form" for each of the sampled reaches. With the assumption of linear water surface slope between the 11 sample transects within the reach, a detailed longitudinal profile of the stream bed thalweg can be drawn from the assessment data. Such a profile could be compared to profiles drawn from subsequent year's data to assess changes in the stream profile over time. Downstream discharge can be correlated with mean water depths over the sample reach to yield an average relative rating curve for the reach.

Changes in the flow regime are likely to alter the longitudinal relations of bedforms within a sampled reach, so that repeated monitoring will record the changes in bed geometry as the stream bed is altered. Fourier analysis of the inferred relative bed elevations will reveal changes in the distribution of streambed features resulting from changes in the hydrograph.

Wetted width data are listed on the "Thalweg Profile & Woody Debris Form" and on the "Channel/Riparian Cross-Section Form" for each of the sampled reaches. Changes in the low-flow wetted width can be expected to result from hydrograph changes resulting from changes in surface properties of the watershed. While not so detailed as the bedform data, these data can be expected to show channel changes resulting from altered flow regimes. Comparison of the baseline data contained in this report to data obtained in subsequent monitoring efforts can document changes in the stream over time.

Substrate size is one of the most important determinants of habitat character for fish and macroinvertebrates in streams. Substrate data for each transect within the sampled reaches are provided on the "Channel/Riparian Cross-Section Form". Along with bedform (e.g., riffles and pools), substrate influences the hydraulic roughness and consequently the range of water velocities in the channel. It also influences the size range of interstices that provide living space and cover for macroinvertebrates, salamanders, and sculpins. Substrate characteristics are often sensitive indicators of the effects of human activities on streams. Decreases in the mean substrate size and increases in the percentage of fine sediments, for example, may destabilize channels and indicate changes in the rates of upland erosion and sediment supply. Within the sampled reaches, substrates were quite variable, but generally showed evidence of disturbance, as would be expected for urban streams. Throughout large sections of the sampled reaches, substrates were dominated by silt and other fine-grained sediments. In large sections of the Battle Creek reaches, substrates were dominated by hardpan consisting of consolidated clay layers, with fine silt dominating the substrate composition in deeper, slower-moving portions of the stream.

Other channel morphology data, including bank angles, undercut measurements, bankfull heights, and incision heights are provided on the "Channel/Riparian Cross-Section Form" for each of the sampled reaches. The recorded bank angles from the edge of the low-flow wetted channel will show changes to the banks resulting from flows at or in excess of the bankfull discharge. If the channel is not greatly incised, bankfull channel height and incision height will be the same. However, if the channel is incised greatly, the bankfull level will be below the level of the first terrace of the valley floodplain, making bankfull channel height smaller than incision height. Throughout most of the sampled reaches, particularly on Battle Creek, the channels are relatively deeply incised under current conditions.

Qualitative assessments of riparian vegetation and land use characteristics along each of the sampled reaches are provided on the "Channel/Riparian Cross-Section Form" and the "Riparian 'Legacy' Trees and Invasive Alien Plants" forms. While these data cannot be used to directly describe hydromodification of the stream, the visual estimations of riparian condition are useful for evaluating the health and level of disturbance of the stream corridor. They also provide an indication of the present and future potential for various types of organic inputs and shading, which are important contributors to water quality and the aquatic ecosystem. Riparian canopy cover over a stream is important not only in its role in moderating stream temperatures through shading, but also as an indicator of conditions that control bank stability and the potential for inputs of coarse and fine particulate organic material. Organic inputs from riparian vegetation become food for stream organisms and structure to create and maintain complex channel habitat. The field evaluation of the presence and proximity of various important types of human land use activities in the stream riparian area may be used in combination with mapped watershed land use information to assess the potential degree of disturbance of the sample stream reaches.

4.4 Future Sampling Efforts

This report presents the results of benthic macroinvertebrate sampling, fish sampling, and physical habitat characterization conducted within four sampled reaches in the vicinity of proposed restoration activities on Waln Creek. This data is intended as baseline data against which the results of future monitoring efforts can be compared to assess the success and effects of the proposed restoration on Waln Creek.

The Waln Creek relocation and restoration activities are scheduled to occur in the 2012 construction work season with work in the stream occurring during the June 1 to October 15 in-water work period. To document changes in Waln Creek and Battle Creek that might be the result of the restoration efforts on Waln Creek, subsequent sampling will need to be conducted following completion of the restoration activities. It's recommended that initial post-construction monitoring be completed in late summer or early fall 2013, after benthic macroinvertebrates and fish have had time to colonize the relocated stream channel. After that, monitoring may be conducted yearly for a period of a minimum of five years, or as required by project permits, to document the success of the stream restoration and potential effects to Battle Creek downstream of the project site.

5.0 REFERENCES

Oregon Department of Environmental Quality. June 30, 2010. *Water Monitoring and Assessment Mode of Operations Manual* (*MOMs*), Version 3.3, DEQ03-LAB-0036-SOP, Laboratory and Environmental Assessment Division, Hillsboro, Oregon.

Peck, D.V., J.M. Lazorchak, and D.J. Klemm (editors). Unpublished draft. *Environmental Monitoring and Assessment Program -Surface Waters: Western Pilot Study Field Operations Manual for Wadeable Streams.* EPA/XXX/X-XX/XXXX. U.S. Environmental Protection Agency, Washington, D.C.

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

Appendix A

Figures

3/23/12
PHS #4891

Location of Sampling Reaches along Waln Creek and Battle Creek, Salem, Oregon.

FIGURE 1

Pacific Habitat Services, Inc.

3/23/12
PHS #4891

Transect Layout along Sampling Reach BC1, Battle Creek, Salem, Oregon.

FIGURE 2

Pacific Habitat Services, Inc.

Appendix B

Benthic Macroinvertebrate

Sampling Data

Battle Creek, Site 1, September 29, 2011

OR: City of Salem. For Pacific Habitat Services,Inc., Wilsonville, OR.
Benthic invertebrates, D-net, 11 square foot composite, 500 micron.
Abundance for full sample & m2. BY ABA, Inc., FILE: 11PHS01

IDENTIFICATION CODE	11PHS01
CORRECTION FACTOR	1

Taxon	Abundance	%
Nemata	1	0.35
Oligochaeta	16	5.61
Pisidium	12	4.21
Ferrissia	1	0.35
Fluminicola	3	1.05
Juga	43	15.09
Caecidotea	5	1.75
Acari	35	12.28
TOTAL: NON INSECTS	116	40.70
Coenagrion/Enallagma	1	0.35
TOTAL: ODONATA	1	0.35
Paraleptophlebia	1	0.35
TOTAL: EPHEMEROPTERA	1	0.35
Sweltsa	1	0.35
TOTAL: PLECOPTERA	1	0.35
Sialis	1	0.35
TOTAL: MEGALOPTERA	1	0.35
Lepidostoma-panel case larvae	12	4.21
TOTAL: TRICHOPTERA	12	4.21
Lara avara	2	0.70
Optioservus	1	0.35
TOTAL: COLEOPTERA	3	1.05
Ceratopogoninae	2	0.70
TOTAL: DIPTERA	2	0.70
Chironomidae-pupae	5	1.75
Cryptochironomus	9	3.16
Heterotrissocladius	18	6.32
Micropsectra	2	0.70
Paramerina	9	3.16
Paratendipes	1	0.35
Polypedilum	17	5.96
Procladius	7	2.46
Prodiamesa	1	0.35
Rheocricotopus	1	0.35
Stempellinella	4	1.40
Tanytarsus	6	2.11
Thienemannimyia Complex	4	1.40
Tribelos	53	18.60
Zavrelimyia	11	3.86
TOTAL: CHIRONOMIDAE	148	51.93
GRAND TOTAL	285	100.00

Battle Creek, Site 1, September 29, 2011
OR: City of Salem. For Pacific Habitat Services,Inc., Wilsonville, OR.
Benthic invertebrates, D-net, 11 square foot composite, 500 micron.
Abundance for full sample & m2. BY ABA, Inc., FILE: 11PHS01

Total invertebrate abundance	= 285.0	EPT abundance	= 14.0
Total number of taxa	= 31	Number EPT taxa	= 3
Hilsenhoff Biotic Index	= 6.06	Brillouin H	= 2.59

TAXONOMIC GROUP	#TAXA	ABUNDANCE	PERCENT
Non-insects	8	116.0	40.69
Odonata	1	1.0	0.35
Ephemeroptera	1	1.0	0.35
Plecoptera	1	1.0	0.35
Hemiptera	0	0.0	0.00
Megaloptera	1	1.0	0.35
Trichoptera	1	12.0	4.21
Lepidoptera	0	0.0	0.00
Coleoptera	2	3.0	1.05
Misc. Diptera	1	2.0	0.70
Chironomidae	15	148.0	51.93

FEEDING GROUP	#TAXA	ABUNDANCE	PERCENT
Predator	8	38.0	13.33
Parasite	2	36.0	12.63
Collector-gatherer	9	104.0	36.49
Collector-filterer	2	18.0	6.32
Macrophyte-herbivore	0	0.0	0.00
Piercer-herbivore	0	0.0	0.00
Scraper	4	48.0	16.84
Shredder	2	14.0	4.91
Xylophage	0	0.0	0.00
Omnivore	2	18.0	6.31
Unknown	2	9.0	3.15

DOMINANT TAXON	ABUNDANCE	PERCENT
Tribelos	53.0	18.60
Juga	43.0	15.09
Acari	35.0	12.28
Heterotrissocladius	18.0	6.32
Polypedilum	17.0	5.96
SUBTOTAL 5 DOMINANTS	166.0	58.25
Oligochaeta	16.0	5.61
Pisidium	12.0	4.21
Lepidostoma-panel case lar	12.0	4.21
Zavrelimyia	11.0	3.86
Cryptochironomus	9.0	3.16
TOTAL 10 DOMINANTS	226.0	79.30

INDICATOR ASSEMBLAGE	#TAXA	ABUNDANCE	PERCENT
A Tolerant taxa	11	88.0	30.88
B InTolerant taxa	3	20.0	7.02

Battle Creek, Site 1, September 29, 2011
OR: City of Salem. For Pacific Habitat Services,Inc., Wilsonville, OR.
Benthic invertebrates, D-net, 11 square foot composite, 500 micron.
Abundance for full sample & m2. BY ABA, Inc., FILE: 11PHS01

RATIOS OF TAX. GROUP ABUNDANCES

EPT/Chironomidae	= 0.09
Hydropsychidae/Total Trichoptera	= 0.00
Baetidae/Total Ephemeroptera	= 0.00

RATIOS OF FFG ABUNDANCES

Scraper/Collector-filter	= 2.67
Scraper/(Scraper + C.-filterer)	= 0.73
Shredder/Total organisms	= 0.05

Biotic Condition Index

Community Tolerance Quotient (a)	= 97.93
Community Tolerance Quotient (d)	= 102.91

DIVERSITY MEASURES

Shannon H (loge)	= 2.75
Shannon H (log2)	= 3.97
Evenness	= 0.80
Simpson D	= 0.09

COMMUNITY VOLTINISM ANALYSIS

TYPE	ABUNDANCE	PERCENT
Multivoltine	147.0	51.58
Univoltine	75.0	26.32
Semivoltine	63.0	22.11

Battle Creek, Site 2, September 29, 2011

OR: City of Salem. For Pacific Habitat Services,Inc., Wilsonville, OR.
Benthic invertebrates, D-net, 11 square foot composite, 500 micron.
Abundance for full sample & m2. BY ABA, Inc., FILE: 11PHS02

IDENTIFICATION CODE	11PHS02
CORRECTION FACTOR	1

Taxon	Abundance	%
Nemata	6	1.02
Oligochaeta	12	2.04
Pisidium	67	11.38
Sphaerium	1	0.17
Ferrissia	1	0.17
Fluminicola	65	11.04
Juga	119	20.20
Acari	62	10.53
TOTAL: NON INSECTS	333	56.54
Sweltsa	16	2.72
TOTAL: PLECOPTERA	16	2.72
Lepidostoma-panel case larvae	6	1.02
TOTAL: TRICHOPTERA	6	1.02
Lara avara	2	0.34
Optioservus	5	0.85
TOTAL: COLEOPTERA	7	1.19
Chelifera/Metachela	2	0.34
Muscidae	2	0.34
TOTAL: DIPTERA	4	0.68
Chironomidae-pupae	11	1.87
Corynoneura	1	0.17
Cryptochironomus	20	3.40
Heterotrissocladius	43	7.30
Paracladopelma	1	0.17
Paramerina	4	0.68
Polypedilum	42	7.13
Procladius	1	0.17
Prodiamesa	3	0.51
Stempellinella	3	0.51
Tribelos	83	14.09
Zavrelimyia	11	1.87
TOTAL: CHIRONOMIDAE	223	37.86
GRAND TOTAL	589	100.00

Battle Creek, Site 2, September 29, 2011
OR: City of Salem. For Pacific Habitat Services,Inc., Wilsonville, OR.
Benthic invertebrates, D-net, 11 square foot composite, 500 micron.
Abundance for full sample & m2. BY ABA, Inc., FILE: 11PHS02

Total invertebrate abundance	= 589.0	EPT abundance	= 22.0
Total number of taxa	= 26	Number EPT taxa	= 2
Hilsenhoff Biotic Index	= 6.14	Brillouin H	= 2.40

TAXONOMIC GROUP	#TAXA	ABUNDANCE	PERCENT
Non-insects	8	333.0	56.55
Odonata	0	0.0	0.00
Ephemeroptera	0	0.0	0.00
Plecoptera	1	16.0	2.72
Hemiptera	0	0.0	0.00
Megaloptera	0	0.0	0.00
Trichoptera	1	6.0	1.02
Lepidoptera	0	0.0	0.00
Coleoptera	2	7.0	1.19
Misc. Diptera	2	4.0	0.68
Chironomidae	12	223.0	37.87

FEEDING GROUP	#TAXA	ABUNDANCE	PERCENT
Predator	6	55.0	9.35
Parasite	2	68.0	11.55
Collector-gatherer	6	143.0	24.28
Collector-filterer	2	68.0	11.55
Macrophyte-herbivore	0	0.0	0.00
Piercer-herbivore	0	0.0	0.00
Scraper	4	190.0	32.26
Shredder	2	8.0	1.36
Xylophage	0	0.0	0.00
Omnivore	1	42.0	7.13
Unknown	3	15.0	2.55

DOMINANT TAXON	ABUNDANCE	PERCENT
Juga	119.0	20.20
Tribelos	83.0	14.09
Pisidium	67.0	11.38
Fluminicola	65.0	11.04
Acari	62.0	10.53
SUBTOTAL 5 DOMINANTS	396.0	67.24
Heterotrissocladius	43.0	7.30
Polypedilum	42.0	7.13
Cryptochironomus	20.0	3.40
Sweltsa	16.0	2.72
Oligochaeta	12.0	2.04
TOTAL 10 DOMINANTS	529.0	89.83

INDICATOR ASSEMBLAGE	#TAXA	ABUNDANCE	PERCENT
A Tolerant taxa	8	224.0	38.04
B InTolerant taxa	2	46.0	7.81

Battle Creek, Site 2, September 29, 2011
OR: City of Salem. For Pacific Habitat Services,Inc., Wilsonville, OR.
Benthic invertebrates, D-net, 11 square foot composite, 500 micron.
Abundance for full sample & m2. BY ABA, Inc., FILE: 11PHS02

RATIOS OF TAX. GROUP ABUNDANCES
EPT/Chironomidae = 0.10
Hydropsychidae/Total Trichoptera = 0.00
Baetidae/Total Ephem. undefined. Total Ephem.=0

RATIOS OF FFG ABUNDANCES
Scraper/Collector-filter = 2.79
Scraper/(Scraper + C.-filterer) = 0.74
Shredder/Total organisms = 0.01

Biotic Condition Index
Community Tolerance Quotient (a) = 100.50
Community Tolerance Quotient (d) = 100.24

DIVERSITY MEASURES
Shannon H (loge) = 2.48
Shannon H (log2) = 3.58
Evenness = 0.76
Simpson D = 0.11

COMMUNITY VOLTINISM ANALYSIS

TYPE	ABUNDANCE	PERCENT
Multivoltine	235.2	39.94
Univoltine	122.8	20.84
Semivoltine	231.0	39.22

Waln Creek, Site 1, September 29, 2011

OR: City of Salem. For Pacific Habitat Services,Inc., Wilsonville, OR.
Benthic invertebrates, D-net, 11 square foot composite, 500 micron.
Abundance for full sample & m2. BY ABA, Inc., FILE: 11PHS03

IDENTIFICATION CODE	11PHS03
CORRECTION FACTOR	1

Taxon	Abundance	%
Nemata	2	0.47
Oligochaeta	20	4.66
Pisidium	13	3.03
Ferrissia	27	6.29
Fluminicola	3	0.70
Menetus	13	3.03
Juga	13	3.03
Caecidotea	2	0.47
Acari	15	3.50
TOTAL: NON INSECTS	108	25.17
Coenagrion/Enallagma	6	1.40
TOTAL: ODONATA	6	1.40
Paraleptophlebia	2	0.47
TOTAL: EPHEMEROPTERA	2	0.47
Lepidostoma-panel case larvae	2	0.47
TOTAL: TRICHOPTERA	2	0.47
Lara avara	2	0.47
TOTAL: COLEOPTERA	2	0.47
Dixella	1	0.23
Empididae	1	0.23
Ephydridae	1	0.23
Simulium	4	0.93
TOTAL: DIPTERA	7	1.63
Chironomidae-pupae	5	1.17
Alotanypus	6	1.40
Corynoneura	6	1.40
Cryptochironomus	27	6.29
Heterotrissocladius	27	6.29
Micropsectra	74	17.25
Nanocladius	2	0.47
Paramerina	10	2.33
Parametriocnemus	2	0.47
Paratanytarsus	21	4.90
Polypedilum	17	3.96
Procladius	45	10.49
Prodiamesa	8	1.86
Thienemannimyia Complex	23	5.36
Tribelos	17	3.96
Zavrelimyia	12	2.80
TOTAL: CHIRONOMIDAE	302	70.40
GRAND TOTAL	429	100.00

Waln Creek, Site 1, September 29, 2011
OR: City of Salem. For Pacific Habitat Services,Inc., Wilsonville, OR.
Benthic invertebrates, D-net, 11 square foot composite, 500 micron.
Abundance for full sample & m2. BY ABA, Inc., FILE: 11PHS03

Total invertebrate abundance	= 429.0	EPT abundance	= 4.0
Total number of taxa	= 33	Number EPT taxa	= 2
Hilsenhoff Biotic Index	= 6.68	Brillouin H	= 2.85

TAXONOMIC GROUP	#TAXA	ABUNDANCE	PERCENT
Non-insects	9	108.0	25.18
Odonata	1	6.0	1.40
Ephemeroptera	1	2.0	0.47
Plecoptera	0	0.0	0.00
Hemiptera	0	0.0	0.00
Megaloptera	0	0.0	0.00
Trichoptera	1	2.0	0.47
Lepidoptera	0	0.0	0.00
Coleoptera	1	2.0	0.47
Misc. Diptera	4	7.0	1.62
Chironomidae	16	302.0	70.40

FEEDING GROUP	#TAXA	ABUNDANCE	PERCENT
Predator	7	85.0	19.81
Parasite	2	17.0	3.97
Collector-gatherer	13	207.0	48.25
Collector-filterer	2	17.0	3.96
Macrophyte-herbivore	0	0.0	0.00
Piercer-herbivore	0	0.0	0.00
Scraper	4	56.0	13.05
Shredder	2	4.0	0.94
Xylophage	0	0.0	0.00
Omnivore	1	17.0	3.96
Unknown	2	26.0	6.07

DOMINANT TAXON	ABUNDANCE	PERCENT
Micropsectra	74.0	17.25
Procladius	45.0	10.49
Ferrissia	27.0	6.29
Cryptochironomus	27.0	6.29
Heterotrissocladius	27.0	6.29
SUBTOTAL 5 DOMINANTS	200.0	46.61
Thienemannimyia Complex	23.0	5.36
Paratanytarsus	21.0	4.90
Oligochaeta	20.0	4.66
Polypedilum	17.0	3.96
Tribelos	17.0	3.96
TOTAL 10 DOMINANTS	298.0	69.45

INDICATOR ASSEMBLAGE	#TAXA	ABUNDANCE	PERCENT
A Tolerant taxa	11	150.0	34.96
B InTolerant taxa	2	35.0	8.15

Waln Creek, Site 1, September 29, 2011
OR: City of Salem. For Pacific Habitat Services,Inc., Wilsonville, OR.
Benthic invertebrates, D-net, 11 square foot composite, 500 micron.
Abundance for full sample & m2. BY ABA, Inc., FILE: 11PHS03

RATIOS OF TAX. GROUP ABUNDANCES

EPT/Chironomidae	= 0.01
Hydropsychidae/Total Trichoptera	= 0.00
Baetidae/Total Ephemeroptera	= 0.00

RATIOS OF FFG ABUNDANCES

Scraper/Collector-filter	= 3.29
Scraper/(Scraper + C.-filterer)	= 0.77
Shredder/Total organisms	= 0.01

Biotic Condition Index

Community Tolerance Quotient (a)	= 101.12
Community Tolerance Quotient (d)	= 105.08

DIVERSITY MEASURES

Shannon H (loge)	= 2.99
Shannon H (log2)	= 4.31
Evenness	= 0.86
Simpson D	= 0.07

COMMUNITY VOLTINISM ANALYSIS

TYPE	ABUNDANCE	PERCENT
Multivoltine	243.5	56.76
Univoltine	151.0	35.20
Semivoltine	34.5	8.04

Waln Creek, Site 2, September 29, 2011

OR: City of Salem. For Pacific Habitat Services,Inc., Wilsonville, OR.
Benthic invertebrates, D-net, 11 square foot composite, 500 micron.
Abundance for full sample & m2. BY ABA, Inc., FILE: 11PHS04

IDENTIFICATION CODE	11PHS04
CORRECTION FACTOR	2

Taxon	Abundance	%
Nemata	2	0.17
Oligochaeta	14	1.22
Helobdella stagnalis	2	0.17
Pisidium	154	13.39
Ferrissia	8	0.70
Fluminicola	108	9.39
Physa	94	8.17
Menetus	162	14.09
Juga	16	1.39
Crangonyx	6	0.52
Caecidotea	4	0.35
Acari	74	6.43
TOTAL: NON INSECTS	644	56.00
Baetis tricaudatus	20	1.74
TOTAL: EPHEMEROPTERA	20	1.74
Sialis	10	0.87
TOTAL: MEGALOPTERA	10	0.87
Lepidostoma-panel case larvae	18	1.57
TOTAL: TRICHOPTERA	18	1.57
Dixella	18	1.57
Muscidae	8	0.70
TOTAL: DIPTERA	26	2.26
Chironomidae-pupae	10	0.87
Alotanypus	130	11.30
Brillia	2	0.17
Cryptochironomus	2	0.17
Heterotrissocladius	26	2.26
Macropelopia	6	0.52
Micropsectra	34	2.96
Orthocladius Complex	2	0.17
Paramerina	8	0.70
Polypedilum	16	1.39
Procladius	58	5.04
Prodiamesa	6	0.52
Rheocricotopus	2	0.17
Tanytarsus	8	0.70
Thienemannimyia Complex	68	5.91
Tribelos	48	4.17
Zavrelimyia	6	0.52
TOTAL: CHIRONOMIDAE	432	37.57
GRAND TOTAL	1150	100.00

Waln Creek, Site 2, September 29, 2011
OR: City of Salem. For Pacific Habitat Services,Inc., Wilsonville, OR.
Benthic invertebrates, D-net, 11 square foot composite, 500 micron.
Abundance for full sample & m2. BY ABA, Inc., FILE: 11PHS04

Total invertebrate abundance	= 1150.0	EPT abundance	= 38.0
Total number of taxa	= 34	Number EPT taxa	= 2
Hilsenhoff Biotic Index	= 6.81	Brillouin H	= 2.76

TAXONOMIC GROUP	#TAXA	ABUNDANCE	PERCENT
Non-insects	12	644.0	55.99
Odonata	0	0.0	0.00
Ephemeroptera	1	20.0	1.74
Plecoptera	0	0.0	0.00
Hemiptera	0	0.0	0.00
Megaloptera	1	10.0	0.87
Trichoptera	1	18.0	1.57
Lepidoptera	0	0.0	0.00
Coleoptera	0	0.0	0.00
Misc. Diptera	2	26.0	2.27
Chironomidae	17	432.0	37.54

FEEDING GROUP	#TAXA	ABUNDANCE	PERCENT
Predator	9	240.0	20.86
Parasite	2	76.0	6.60
Collector-gatherer	12	330.0	28.69
Collector-filterer	2	162.0	14.09
Macrophyte-herbivore	0	0.0	0.00
Piercer-herbivore	0	0.0	0.00
Scraper	4	294.0	25.57
Shredder	2	20.0	1.74
Xylophage	0	0.0	0.00
Omnivore	2	18.0	1.56
Unknown	1	10.0	0.87

DOMINANT TAXON	ABUNDANCE	PERCENT
Menetus	162.0	14.09
Pisidium	154.0	13.39
Alotanypus	130.0	11.30
Fluminicola	108.0	9.39
Physa	94.0	8.17
SUBTOTAL 5 DOMINANTS	648.0	56.34
Acari	74.0	6.43
Thienemannimyia Complex	68.0	5.91
Procladius	58.0	5.04
Tribelos	48.0	4.17
Micropsectra	34.0	2.96
TOTAL 10 DOMINANTS	930.0	80.85

INDICATOR ASSEMBLAGE	#TAXA	ABUNDANCE	PERCENT
A Tolerant taxa	14	500.0	43.48
B InTolerant taxa	3	42.0	3.65

Waln Creek, Site 2, September 29, 2011
OR: City of Salem. For Pacific Habitat Services,Inc., Wilsonville, OR.
Benthic invertebrates, D-net, 11 square foot composite, 500 micron.
Abundance for full sample & m2. BY ABA, Inc., FILE: 11PHS04

RATIOS OF TAX. GROUP ABUNDANCES

EPT/Chironomidae	= 0.09
Hydropsychidae/Total Trichoptera	= 0.00
Baetidae/Total Ephemeroptera	= 1.00

RATIOS OF FFG ABUNDANCES

Scraper/Collector-filter	= 1.81
Scraper/(Scraper + C.-filterer)	= 0.64
Shredder/Total organisms	= 0.02

Biotic Condition Index

Community Tolerance Quotient (a)	= 104.18
Community Tolerance Quotient (d)	= 103.81

DIVERSITY MEASURES

Shannon H (loge)	= 2.82
Shannon H (log2)	= 4.07
Evenness	= 0.80
Simpson D	= 0.08

COMMUNITY VOLTINISM ANALYSIS

TYPE	ABUNDANCE	PERCENT
Multivoltine	421.0	36.61
Univoltine	521.0	45.30
Semivoltine	208.0	18.09

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

OR: City of Salem. For Pacific Habitat Services, Inc., Wilsonville, OR. By Aquatic Biology Associates, Inc.

Sampling method: D-frame net, composite sample, 11 points, 1 m^2 total area , 500 micron mesh.

Subsampling: 500 organism minimum or entire sample. Level 3 PNW standard taxonomic effort.

Abundances adjusted to a full sample and square meter basis.

	Site	Battle Creek 1		Battle Creek 2		Waln Creek 1		Waln Creek 2	
	Date	9/29/2011		9/29/2011		9/29/2011		9/29/2011	
	METRIC	Value	Score	Value	Score	Value	Score	Value	Score
D	Total number of taxa	31	3	26	3	33	3	34	3
D	Number Ephemeroptera taxa	1	1	0	1	1	1	1	1
D	Number Plecoptera taxa	1	1	1	1	0	1	0	1
D	Number Trichoptera taxa	1	1	1	1	1	1	1	1
D	Number of long-lived taxa	4	3	3	3	3	3	3	3
D	Number of intolerant taxa	3	3	2	1	2	1	3	3
I	% Tolerant taxa	30.88	3	38.04	3	34.96	3	43.48	3
D	% Predator	13.33	3	9.35	1	19.81	3	20.86	5
D	Number of clinger taxa	8	1	7	1	8	1	9	1
I	% Dominance (3 taxa)	45.97	5	45.67	5	34.03	5	38.78	5
	TOTAL SCORE		24		20		22		26
	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)	285		589		429		1150	
D	EPT taxa richness	3		2		2		2	
D	Predator richness	8		6		7		9	
D	Scraper richness	4		4		4		5	
D	Shredder richness	3		3		3		3	
D	%Intolerant taxa	7.02		7.81		8.15		3.65	
I	Hilsenhoff Biotic Index	6.06		6.14		6.68		6.81	
I	*% Baetis tricaudatus*	0		0		0		1.74	
I	%Collector	42.81		35.83		52.21		42.78	
I	%Parasite	12.63		11.55		3.97		6.6	
I	%Oligochaeta	5.61		2.04		4.66		1.22	
I	Number tolerant taxa	11		8		11		14	
I	%Simuliidae	0		0		0.93		0	
I	%Chironomidae	51.93		37.86		70.4		37.57	

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.

Appendix C

Physical Habitat Data

Battle Creek, Reach 1

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-1	DATE: 10/26/11	**TRANSECT:**	☒ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m)x.x: 1.0 — Total Reach Length (m): 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[1] Present (Y/ N)	BAR WIDTH[1] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	36.8	1.3	N		N	GL	N	N	N		
1	59.1		N		N	GL	N	N	N		
2	66.5		N		N	GL	N	N	N		
3	60.9		N		N	GL	N	N	N		
4	58.4		N		N	GL	N	N	N		
5	58.3		N		N	GL	N	N	N		
6	63.6		N		N	GL	N	N	N		
7	62.7	1.6	N		N	GL	N	N	N		
8	56.7		N		N	GL	N	N	N		
9	56.2		N		N	GL	N	N	N		
10	53.8		N		N	GL	N	N	N		
11	45.7		N		N	GL	N	N	N		
12	52.8		N		N	GL	N	N	N		
13	57.8		N		N	GL	N	N	N		
14	K		N		N	GL	N	N	N		Yellow jacket nest at transect B in dense vegetation.

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	HP	FN	FN	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m						
0.3-0.5 m						
0.5-0.8 m						
>0.8 m						

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-1 DATE: 10/26/11 **TRANSECT:** ☐ A-B ☒ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE For Transect A-B ONLY | Increment (m)x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[2] Present (Y/ N)	BAR WIDTH[2] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	K	K	N	N/A	K	GL	N	N	N		Yellow jacket nest at transect
1	K		N		K	GL	N	N	N		Yellow jacket nest at transect
2	42.2		N		Y	RI	N	N	N		
3	25.8		N		Y	RI	N	N	N		
4	37.3		N		Y	GL	N	N	N		
5	36.9	N/A	N		Y	GL	N	N	N		
6	47.1		N		Y	GL	N	N	N		
7	55.9	2.8	N		N	GL	N	N	N		
8	57.1		N		Y	GL	N	N	N		
9	55.8		N		Y	GL	N	N	N		
10	51.8		N		Y	GL	N	N	N		
11	49.9		N		Y	GL	N	N	N		
12	61.9		N		Y	RF	N	N	N		
13	28.8		N		Y	RI	N	N	N		
14	59.6		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	FN	FN	FN	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	X	**FLAG**	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-1	DATE: 10/26/11	**TRANSECT:**	☐ A-B ☐ B-C ☒ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m)x.x: 1.0 — Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[3] Present (Y/ N)	BAR WIDTH[3] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	47.6	1.8	N	N/A	Y	GL	N	N	N		
1	37.2		N		Y	GL	N	N	N		
2	37.7		N		Y	GL	N	N	N		
3	39.2		N		Y	GL	N	N	N		
4	33.9		N		Y	GL	N	N	N		
5	26.7	N/A	N	N/A	Y	GL	N	N	N		
6	20.5		N		Y	GL	N	N	N		
7	18.8	2.3	N	N/A	Y	GL	N	N	N		
8	19.6		N		Y	GL	N	N	N		
9	18.4		N		Y	GL	N	N	N		
10	18.4		N		Y	GL	N	N	N		
11	19.7		N		Y	GL	N	N	N		
12	19.2		N		Y	GL	N	N	N		
13	18.1		N		Y	GL	N	N	N		
14	17.4		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	FN	FN	FN	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
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PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-1	DATE: 10/26/11	**TRANSECT:**	☐ A-B ☐ B-C ☐ C-D ☒ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m)x.x: 1.0 — Total Reach Length (m): 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[4] Present (Y/ N)	BAR WIDTH[4] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	19.0	2.2	N	N/A	Y	GL	N	N	N		
1	21.8		N		Y	GL	N	N	N		
2	25.2		N		Y	GL	N	N	N		
3	23.6		N		Y	GL	N	N	N		
4	25.8		N		Y	GL	N	N	N		
5	25.6	N/A	N	N/A	Y	GL	N	N	N		
6	23.2		N		Y	GL	N	N	N		
7	36.1	2.0	N	N/A	Y	GL	N	N	N		
8	38.8		N		Y	GL	N	N	N		
9	24.2		N		Y	GL	N	N	N		
10	22.3		N		Y	GL	N	N	N		
11	19.2		N		Y	GL	N	N	N		
12	20.6		N		Y	GL	N	N	N		
13	22.9		N		Y	GL	N	N	N		
14	23.4		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	FN	FN	FN	FN		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

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PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-1 DATE: 10/26/11 **TRANSECT:** ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☒ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE For Transect A-B ONLY | Increment (m) x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[5] Present (Y/ N)	BAR WIDTH[5] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	28.7	1.8	N	N/A	Y	GL	N	N	N		
1	23.1		N		Y	GL	N	N	N		
2	22.2		N		Y	GL	N	N	N		
3	20.7		N		Y	GL	N	N	N		
4	20.2		N		Y	GL	N	N	N		
5	22.1	N/A	N	N/A	Y	GL	N	N	N		
6	21.9		N		Y	GL	N	N	N		
7	18.1	2.1	N	N/A	Y	GL	N	N	N		
8	29.1		N		Y	GL	N	N	N		
9	17.6		N		Y	RI	N	N	N		
10	38.2		N		Y	GL	N	N	N		
11	43.9		N		Y	GL	N	N	N		
12	38.1		N		Y	GL	N	N	N		
13	39.6		N		Y	GL	N	N	N		
14	37.4		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	FN	FN	FN	FN		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	X	**FLAG**	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
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Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-1 DATE: 10/26/11

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☒ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m) x.x: 1.0 — Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[6] Present (Y/ N)	BAR WIDTH[6] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	37.1	2.2	N/A	N	Y	GL	N	N	N		
1	36.2		N		Y	GL	N	N	N		
2	30.9		N		Y	GL	N	N	N		
3	26.2		N		N	RI	N	N	N		
4	25.4		N		N	RI	N	N	N		
5	33.3	N/A	N	N/A	N	RI	N	N	N		
6	26.1		N		N	RI	N	N	N		
7	33.6	2.7	N	N/A	N	RI	N	N	N		
8	40.3		N		N	RI	N	N	N		
9	31.7		N		N	RI	N	N	N		
10	34.8		N		N	RI	N	N	N		
11	18.1		N		N	GL	N	N	N		
12	26.6		N		N	GL	N	N	N		
13	26.2		N		N	GL	N	N	N		
14	24.3		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	HP	HP	HP	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	X	**FLAG**	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-1	DATE: 10/26/11	**TRANSECT:**	☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☒ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m) x.x: 1.0 — Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[7] Present (Y/ N)	BAR WIDTH[7] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	23.4	2.3	N	N/A	Y	GL	N	N	N		
1	21.8		N		Y	GL	N	N	N		
2	20.2		N		Y	GL	N	N	N		
3	26.6		N		Y	GL	N	N	N		
4	27.7		N		Y	GL	N	N	N		
5	28.8	N/A	N	N/A	Y	GL	N	N	N		
6	26.3		N		Y	GL	N	N	N		
7	26.6	2.5	N	N/A	Y	GL	N	N	N		
8	2.21		N		Y	GL	N	N	N		
9	2.46		N		Y	GL	N	N	N		
10	2.42		N		Y	GL	N	N	N		
11	2.48		N		Y	GL	N	N	N		
12	2.76		N		Y	GL	N	N	N		
13	1.95		N		Y	GL	N	N	N		
14	1.99		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	FN	FN	FN	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-1 DATE: 10/26/11 **TRANSECT:** ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☒ H-I ☐ I-J ☐ J-K

THALWEG PROFILE For Transect A-B ONLY | Increment (m) x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[8] Present (Y/ N)	BAR WIDTH[8] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	27.3	2.7	N	N/A	Y	GL	N	N	N		
1	25.8		N		N	RI	N	N	N		
2	20.4		N		Y	GL	N	N	N		
3	34.6		N		Y	GL	N	N	N		
4	36.6		N		Y	GL	N	N	N		
5	36.4	N/A	N	N/A	Y	GL	N	N	N		
6	33.9		N		Y	GL	N	N	N		
7	30.9	2.4	N	N/A	Y	GL	N	N	N		
8	26.8		N		Y	GL	N	N	N		
9	26.6		N		Y	GL	N	N	N		
10	27.7		N		Y	GL	N	N	N		
11	26.4		N		Y	GL	N	N	N		
12	29.6		N		Y	GL	N	N	N		
13	29.2		N		Y	GL	N	N	N		
14	23.1		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	FN	FN	FN	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-1 DATE: 10/26/11 **TRANSECT:** ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☒ I-J ☐ J-K

THALWEG PROFILE For Transect A-B ONLY | Increment (m) x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[9] Present (Y/ N)	BAR WIDTH[9] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	32.0	2.5	N	N/A	Y	GL	N	N	N		
1	32.2		N		Y	GL	N	N	N		
2	26.4		N		Y	GL	N	N	N		
3	27.8		N		Y	GL	N	N	N		
4	31.7		N		Y	GL	N	N	N		
5	30.4	N/A	N	N/A	Y	GL	N	N	N		
6	25.7				Y	GL	N	N	N		
7	24.7	2.7	N	N/A	Y	GL	N	N	N		
8	27.4		N		Y	GL	N	N	N		
9	32.8		N		Y	GL	N	N	N		
10	31.7		N		Y	GL	N	N	N		
11	31.9		N		Y	GL	N	N	N		
12	33.6		N		Y	GL	N	N	N		
13	27.0		N		Y	GL	N	N	N		
14	24.3		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	FN	FN	FN	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	X	**FLAG**	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
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Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-1 DATE: 10/26/11 **TRANSECT:** ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☒ J-K

THALWEG PROFILE For Transect A-B ONLY | Increment (m)x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[10] Present (Y/ N)	BAR WIDTH[10] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	31.8	2.5	N	N/A	Y	GL	N	N	N		
1	27.3		N		Y	GL	N	N	N		
2	24.9		N		Y	GL	N	N	N		
3	28.7		N		Y	GL	N	N	N		
4	318		N		Y	GL	N	N	N		
5	37.3	N/A	N	N/A	Y	GL	N	N	N		
6	30.6		N		Y	GL	N	N	N		
7	31.2	2.8	N	N/A	Y	GL	N	N	N		Waln Creek Intersection
8	41.9		N		N	GL	N	N	N		
9	40.7		N		N	GL	N	N	N		
10	39.1		N		N	GL	N	N	N		
11	37.4		N		N	GL	N	N	N		
12	21.1		N		N	RI	N	N	N		
13	25.9		N		Y	GL	N	N	N		
14	39.6		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	FN	FN	FN	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-1	DATE: 11/10/11	**TRANSECT:**	☒ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.31	33.4	GC	40	
Ctr	0.62	29.0	GF	60	
RCtr	0.93	17.0	HP	0	
Right	1.25	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	**0** 1 2 3 4	F1
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	F1

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D **C** E M N	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	0 1 **2** 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 3 **4**	0 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 1 2 3 **4**	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 2 **3** 4	
Barren, Bare Dirt or Duff	0 1 2 **3** 4	0 1 2 **3** 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	0 P **C** B	0 P **C** B	F2
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	83	0	
Right	67	0	
Welted Width xxx.x m		1.3	
Bar Width xx.x m		0	
Bankfull Width xxx.x m		1.8	
Bankfull Height xx.x m		0.9	
Incised Height xx.x m		1.4	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	13		CenR	17	
CenL	14		Left	K	
CenDwn	12		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments
F1	Bridge immediately downstream; overhanging vegetation immediately upstream of transect
F2	Bridge abutments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-1	DATE: 10/26/11	**TRANSECT:**	☐ **A** ☒ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.38	46.1	HP	0	
Ctr	0.76	57.9	HP	0	
RCtr	1.14	46.8	HP	0	
Right	1.51	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 2 3 **4**	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	90	0	
Right	90	0	
Welted Width xxx.x m		1.5	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		1.7	
Bankfull Height xx.x m		1.3	
Incised Height xx.x m		1.8	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	17		CenR	17	
CenL	17		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments
	2x4s, bottles, trash on surface

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 **1** 2 3 4	0 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 3 **4**	0 1 2 3 **4**	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 3 **4**	0 1 2 3 **4**	
Barren, Bare Dirt or Duff	0 **1** 2 3 4	0 **1** 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-1	DATE: 11/10/11	**TRANSECT:**	☐ A ☐ B ☒ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.49	35.2	HP	0	
Ctr	0.98	56.1	FN	100	
RCtr	1.47	54.4	FN	100	
Right	1.97	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 1 2 **3** 4	
Live Trees or Roots	0 1 **2** 3 4	
Overhanging Veg. = <1 m of Surface	0 1 2 **3** 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	77	0	
Right	64	0	
Welted Width xxx.x m		2.0	
Bar Width xx.x m		0	
Bankfull Width xxx.x m		2.8	
Bankfull Height xx.x m		1.3	
Incised Height xx.x m		1.7	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

	Flag				Flag
CenUp	17		CenR	17	
CenL	17		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments
	Measurements made on upstream side of debris/willow jam.

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 3 **4**	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	0 1 **2** 3 4	0 1 **2** 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-1	DATE: 11/10/11	**TRANSECT:**	☐ A ☐ B ☐ C ☒ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.70	24.2	SA	100	
Ctr	1.40	28.3	SA	100	
RCtr	2.10	20.8	FN	100	
Right	2.78	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	0 **1** 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 3 **4**	0 1 2 3 **4**	
Barren, Bare Dirt or Duff	0 **1** 2 3 4	0 **1** 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	0 P C B	
Park/Lawn	0 P **C** B	0 P C B	
Row Crops	**0** P C B	0 P C B	
Pasture/Range/Hay Field	**0** P C B	0 P C B	
Logging Operations	**0** P C B	0 P C B	
Mining Activity	**0** P C B	0 P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	66	0	
Right	78	0	
Welted Width xxx.x m		2.8	
Bar Width xx.x m		0	
Bankfull Width xxx.x m		3.1	
Bankfull Height xx.x m		0.9	
Incised Height xx.x m		1.4	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

	Flag			Flag	
CenUp	3		CenR	3	
CenL	4		Left	K	
CenDwn	4		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-1	DATE: 11/10/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☒ **E** ☐ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.59	33.3	GF	90	
Ctr	1.18	19.6	FN	100	
RCtr	1.77	13.9	FN	100	
Right	2.36	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 1 **2** 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	88	0	
Right	86	0	
Welted Width xxx.x m		2.4	
Bar Width xx.x m		0	
Bankfull Width xxx.x m		3.6	
Bankfull Height xx.x m		0.9	
Incised Height xx.x m		1.7	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	0		CenR	6	
CenL	3		Left	K	
CenDwn	5		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	**0** 1 2 3 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 3 **4**	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	0 **1** 2 3 4	0 **1** 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-1	DATE: 11/10/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☒ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.65	32.8	FN	100	
Ctr	1.30	40.7	SA	50	
RCtr	1.95	25.6	SA	50	
Right	2.58	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	0 **1** 2 3 4	0 **1** 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	67	0	
Right	71	0	
Welted Width xxx.x m		2.6	
Bar Width xx.x m		0	
Bankfull Width xxx.x m		3.1	
Bankfull Height xx.x m		0.8	
Incised Height xx.x m		1.1	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	13		CenR	14	
CenL	17		Left	K	
CenDwn	15		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-1	DATE: 11/10/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☒ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.56	24.8	GF	90	
Ctr	1.11	22.8	HP	0	
RCtr	1.67	17.8	FN	100	
Right	2.23	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	79	0	
Right	82	0	
Welted Width xxx.x m		2.2	
Bar Width xx.x m		0	
Bankfull Width xxx.x m		2.6	
Bankfull Height xx.x m		0.8	
Incised Height xx.x m		1.2	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	17		CenR	17	
CenL	17		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	0 1 **2** 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 3 **4**	0 1 2 3 **4**	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 **1** 2 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	0 **1** 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: bc-1	DATE: 11/10/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☐ **G** ☒ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.64	27.6	GF	10	
Ctr	1.28	24.6	GF	20	
RCtr	1.92	15.6	GF	30	
Right	2.57	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 1 **2** 3 4	
Live Trees or Roots	0 **1** 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	0 1 2 **3** 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	0 1 **2** 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 **3** 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 **1** 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 **1** 2 3 4	
Barren, Bare Dirt or Duff	0 1 **2** 3 4	0 1 **2** 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	67	0	
Right	70	0.1	
Welted Width xxx.x m		2.6	
Bar Width xx.x m		0	
Bankfull Width xxx.x m		3.4	
Bankfull Height xx.x m		0.9	
Incised Height xx.x m		1.6	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	14		CenR	17	
CenL	15		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-1	DATE: 11/10/11	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☒ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.66	24.8	FN	100	
Ctr	1.32	30.2	FN	100	
RCtr	1.98	27.8	FN	100	
Right	2.63	0	WD	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	0 **1** 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	54	0	
Right	67	0	
Welted Width xxx.x m		2.6	
Bar Width xx.x m		0	
Bankfull Width xxx.x m		3.7	
Bankfull Height xx.x m		1.0	
Incised Height xx.x m		1.6	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	17		CenR	17	
CenL	17		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	0 1 **2** 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	0 **1** 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 **3** 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
Barren, Bare Dirt or Duff	0 1 **2** 3 4	0 1 **2** 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-1	DATE: 11/10/11	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☒ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.65	30.4	FN	100	
Ctr	1.30	31.8	FN	100	
RCtr	1.95	27.6	FN	100	
Right	2.59	0	WD	50	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	0 1 **2** 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D **C** E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 1 **2** 3 4	0 1 2 **3** 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	0 **1** 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	0 **1** 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 **1** 2 3 4	
Barren, Bare Dirt or Duff	0 1 **2** 3 4	0 **1** 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	0 P C B	
Pavement/Cleared Lot	**0** P C B	0 P C B	
Road/Railroad	**0** P C B	0 P C B	
Pipes (Inlet/Outlet)	**0** P C B	0 P C B	
Landfill/Trash	**0** P C B	0 P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	0 P C B	
Pasture/Range/Hay Field	**0** P C B	0 P C B	
Logging Operations	**0** P C B	0 P C B	
Mining Activity	**0** P C B	0 P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	64	0	
Right	74	0	
Welted Width xxx.x m		2.6	
Bar Width xx.x m		0	
Bankfull Width xxx.x m		3.4	
Bankfull Height xx.x m		0.9	
Incised Height xx.x m		1.7	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

	Flag				Flag
CenUp	17		CenR	17	
CenL	17		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-1	DATE: 11/10/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☒ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.62	6.9	FN	100	
Ctr	1.24	36.9	HP	0	
RCtr	1.86	23.8	HP	0	
Right	2.46	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 2 **3** 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	73	0	
Right	84	0	
Welted Width xxx.x m		2.5	
Bar Width xx.x m		0	
Bankfull Width xxx.x m		3.0	
Bankfull Height xx.x m		1.0	
Incised Height xx.x m		1.3	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	8		CenR	6	
CenL	3		Left	K	
CenDwn	6		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

RIPARIAN "LEGACY" TREES AND INVASIVE ALIEN PLANTS

SITE ID: BC-1 DATE: 11/10/11

TRAN	LARGEST LEGACY TREE VISIBLE FROM THIS STATION						ALIEN PLANT SPECIES PRESENT IN LEFT AND RIGHT RIPARIAN PLOTS	
	Trees not Visible	DBH (m)	Height (m)	Dist. from wetted margin (m)	Type	Taxonomic Category	Check all that are present	
A	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	K	☐Deciduous ☒Coniferous ☐Broadleaf Evergreen	Pine	☐ None	☒RC Grass ☐Salt Ced ☐Hblack ☐G Reed ☐Engl Ivy ☐CanThis ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
B	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30	K	☐Deciduous ☐Coniferous ☐Broadleaf Evergreen	Pine	☐ None	☒RC Grass ☐Salt CEd ☐Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
C	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	>30m	☐Deciduous ☒Coniferous ☐Broadleaf Evergreen	Pine	☐ None	☒RC Grass ☐Salt Ced ☐Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol

INSTRUCTIONS

Legacy trees are defined as the largest tree within your search area, which is as far as you can see, but within maximum limits as follows:

Wadeable Streams: Confine search to no more than 50 m from left and right bank and extending upstream to next transect (for 'K' look upstream 4 channel widths)

Non-wadeable Rivers: Confine search to no more than 100 m from left and right bank and extending both upstream and downstream as far as you can see confidently.

Alien Plants: Confine search to riparian plots on left and right bank

Wadeable Streams: 10 m x 10 m
Non-wadeable Rivers: 10 m x 20 m

Not all aliens are to be identified in all states. See Field Manual and Plant Identification Guide.

TAXONOMIC CATEGORIES
Acacia/Mesquite Alder/Birch Ash Maple/Box elder Oak Poplar/Cottonwood Sycamore Willow Unknown or Other Deciduous
Cedar/Cypress/Sequoia Fir (including Douglas Fir and Hemlock) Juniper Pine Spruce Unknown or Other Deciduous
Unknown or Other Broadleaf Evergreen
Snag (Dead tree of any species)

ALIEN SPECIES		
RC Grass	Reed Canarygrass	*Phalaris arundinacea*
Engl Ivy	English Ivy	*Hedera Helix*
ChGrass	Cheat Grass	*Bromus tectorum*
Salt Ced	Salt Cedar	*Tamarix spp.*
Can This	Canada thistle	*Cirsium arvense*
M This	Musk thistle	*Carduus nutans*
Hblack	Himalayan blackberry	*Rubus discolor*
Teasel	Teasel	*Dipsacus fullonum*
Spurge	Leafy spurge	*Euphorbia esula*
G Reed	Giant Reed	*Arundo donax*
C Burd	Common burdock	*Arctium minus*
Rus Ol	Russian-olive	*Elaeagnus angustifolia*

COMMENTS

Transects D to K continued on next page

RIPARIAN "LEGACY" TREES AND INVASIVE ALIEN PLANTS

SITE ID: BC-1 DATE: 11/10/11

TRAN	LARGEST LEGACY TREE VISIBLE FROM THIS STATION						ALIEN PLANT SPECIES PRESENT IN LEFT AND RIGHT RIPARIAN PLOTS	
	Trees not Visible	DBH (m)	Height (m)	Dist. from wetted margin (m)	Type	Taxonomic Category	Check all that are present	
D	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	0	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Cottonwood	☐ None	☒RC Grass ☐Salt Ced ☐Hblack ☐G Reed ☐Engl Ivy ☐CanThis ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
E	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30	K	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Cottonwood, same as last	☐ None	☒RC Grass ☐Salt CEd ☐Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
F	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	>30m	☐Deciduous ☒Coniferous ☐Broadleaf Evergreen	Pine	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
G	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	0.5	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Alder	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
H	☐	☐0-0.1 ☐.75-2 ☒.1-.3 ☐>2 ☐.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	0.5	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Alder	☐ None	☐RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
I	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	0.5	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Alder	☐ None	☐RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
J	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	5m	☐Deciduous ☒Coniferous ☐Broadleaf Evergreen	Pine	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
K	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30	>50m	☐Deciduous ☐Coniferous ☐Broadleaf Evergreen	Pine, same as last	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol

Appendix D

Physical Habitat Data

Battle Creek, Reach 2

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-2 DATE: 12/7/11 **TRANSECT:** ☒ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE For Transect A-B ONLY | Increment (m) x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[1] Present (Y/ N)	BAR WIDTH[1] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	49.6	2.1	N		Y	GL	N	N	N		
1	53.6		N		N	GL	N	N	N		
2	59.5		N		N	GL	N	N	N		
3	61.4		N		N	GL	N	N	N		
4	59.6		N		N	GL	N	N	N		
5	36.2	N/A	N	N/A	Y	GL	N	N	N		
6	65.0		N		Y	GL	N	N	N		
7	62.8	1.9	N	N/A	Y	GL	N	N	N		
8	65.9		N		Y	GL	N	N	N		
9	63.8		N		Y	GL	N	N	N		
10	65.1		N		Y	GL	N	N	N		
11	59.8		N		Y	GL	N	N	N		
12	68.1		N		Y	GL	N	N	N		
13	73.9		N		N	GL	N	N	N		
14	K		N		K	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	FN	FN	FN	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-2 DATE: 12/7/11 **TRANSECT:** ☐ A-B ☒ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE For Transect A-B ONLY | Increment (m) x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[2] Present (Y/ N)	BAR WIDTH[2] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	68.3	1.8	N	N/A	N	GL	N	N	N		
1	61.8		N		N	GL	N	N	N		
2	60.3		N		Y	GL	N	N	N		
3	58.5		N		Y	GL	N	N	N		
4	55.7		N		Y	GL	N	N	N		
5	54.6	N/A	N	N/A	Y	GL	N	N	N		
6	45.4		N		N	GL	N	N	N		
7	43.8	2.2	N	N/A	N	GL	N	N	N		
8	49.4		N		N	GL	N	N	N		
9	61.7		N		N	GL	N	N	N		
10	67.9		N		N	GL	N	N	N		
11	66.4		N		Y	GL	N	N	N		
12	60.9		N		Y	GL	N	N	N		
13	42.3		N		Y	GL	N	N	N		
14	39.8		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	GF	GF	FN	FN		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-2 DATE: 12/7/11 **TRANSECT:** ☐ A-B ☐ B-C ☒ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE For Transect A-B ONLY | Increment (m) x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[3] Present (Y/ N)	BAR WIDTH[3] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	36.8	2.1	N	N/A	N	GL	N	N	N		
1	36.9		N		N	GL	N	N	N		
2	31.5		N		N	GL	N	N	N		Under wooden golf cart bridge
3	32.1		N		N	GL	N	N	N		Under wooden golf cart bridge
4	40.8		N		N	GL	N	N	N		
5	55.2	N/A	N	N/A	N	GL	N	N	N		
6	56.3		N		Y	GL	N	N	N		
7	58.1	1.8	N	N/A	Y	GL	N	N	N		
8	59.7		N		Y	GL	N	N	N		
9	51.3		N		Y	GL	N	N	N		
10	49.6		N		Y	GL	N	N	N		
11	43.9		N		Y	GL	N	N	N		
12	51.9		N		Y	GL	N	N	N		
13	52.4		N		Y	GL	N	N	N		
14	44.8		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	hp	hp	fn	fn	hp		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	X	**FLAG**	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-2 DATE: 12/7/11 **TRANSECT:** ☐ A-B ☐ B-C ☐ C-D ☒ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE For Transect A-B ONLY | Increment (m) x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[4] Present (Y/ N)	BAR WIDTH[4] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	55.1	2.2	N	N/A	Y	GL	N	N	N		
1	55.4		N		Y	GL	N	N	N		
2	57.1		N		Y	GL	N	N	N		
3	57.7		N		Y	GL	N	N	N		
4	56.5		N		Y	GL	N	N	N		
5	60.2	N/A	N	N/A	Y	GL	N	N	N		
6	49.5		N		Y	GL	N	N	N		
7	47.6	2.2	N	N/A	Y	GL	N	N	N		
8	45.2		N		N	GL	N	N	N		
9	41.8		N		N	GL	N	N	N		
10	57.0		N		N	GL	N	N	N		
11	51.6		N		N	GL	N	N	N		
12	59.6		N		N	GL	N	N	N		
13	58.6		N		N	GL	N	N	N		
14	59.7		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	FN	FN	HP	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	1					
0.3-0.5 m						
0.5-0.8 m						
>0.8 m						

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-2 DATE: 12/7/11 **TRANSECT:** ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☒ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE For Transect A-B ONLY | Increment (m) x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[5] Present (Y/ N)	BAR WIDTH[5] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	43.1	2.7	N	N/A	Y	GL	N	N	N		
1	51.8		N		Y	GL	N	N	N		
2	63.9		N		Y	GL	N	N	N		
3	60.4		N		N	GL	N	N	N		
4	56.0		N		Y	GL	N	N	N		
5	50.1	N/A	N	N/A	Y	GL	N	N	N		
6	51.3		N		N	GL	N	N	N		
7	55.6	2.6	N	N/A	Y	GL	N	N	N		
8	62.9		N		Y	GL	N	N	N		
9	64.7		N		Y	GL	N	N	N		
10	66.8		N		Y	GL	N	N	N		
11	70.7		N		Y	GL	N	N	N		
12	69.7		N		Y	GL	N	N	N		
13	74.1		N		Y	GL	N	N	N		
14	61.1		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	FN	FN	FN	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	1					
0.3-0.5 m						
0.5-0.8 m						
>0.8 m						

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-2 DATE: 12/7/11

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☒ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m) x.x: 1.0 — Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[6] Present (Y/ N)	BAR WIDTH[6] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	59.9	3.3	N	N/A	Y	GL	N	N	N		
1	53.9		N		Y	GL	N	N	N		
2	44.9		N		Y	GL	N	N	N		
3	52.6		N		Y	GL	N	N	N		
4	62.4		N		Y	GL	N	N	N		
5	62.9	N/A	N	N/A	Y	GL	N	N	N		
6	62.1		N		Y	GL	N	N	N		
7	63.6	1.4	N	N/A	Y	GL	N	N	N		
8	64.9		N		Y	GL	N	N	N		
9	64.8		N		Y	GL	N	N	N		
10	53.1		N		Y	GL	N	N	N		
11	67.1		N		Y	GL	N	N	N		
12	67.7		N		Y	GL	N	N	N		
13	67.1		N		Y	GL	N	N	N		
14	69.2		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	FN	FN	FN	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	X	**FLAG**	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-2 DATE: 12/7/11

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☒ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m) x.x: 1.0 — Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[7] Present (Y/ N)	BAR WIDTH[7] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	72.0	1.5	N	N/A	Y	GL	N	N	N		
1	49.3		N		N	GL	N	N	N		
2	55.0		N		N	GL	N	N	N		
3	55.7		N		Y	GL	N	N	N		
4	52.0		N		Y	GL	N	N	N		
5	65.5	N/A	N	N/A	Y	GL	N	N	N		
6	73.7		N		Y	GL	N	N	N		
7	70.8	2.9	N	N/A	Y	GL	N	N	N		
8	60.4		N		Y	GL	N	N	N		
9	48.5		N		Y	GL	N	N	N		
10	46.8		N		Y	GL	N	N	N		
11	53.9		N		Y	GL	N	N	N		
12	62.1		N		Y	GL	N	N	N		
13	60.6		N		Y	GL	N	N	N		
14	39.9		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	FN	FN	HP	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-2 DATE: 12/7/11 **TRANSECT:** ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☒ H-I ☐ I-J ☐ J-K

THALWEG PROFILE For Transect A-B ONLY | Increment (m) x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[8] Present (Y/ N)	BAR WIDTH[8] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	51.4	2.4	N	N/A	N	GL	N	N	N		
1	64.4		N		Y	GL	N	N	N		
2	63.0		N		Y	GL	N	N	N		
3	58.4		N		Y	GL	N	N	N		
4	56.6		N		Y	GL	N	N	N		
5	56.6	N/A	N	N/A	Y	GL	N	N	N		
6	67.8		N		Y	GL	N	N	N		
7	63.5	2.8	N	N/A	Y	GL	N	N	N		
8	61.6		N		Y	GL	N	N	N		
9	64.0		N		Y	GL	N	N	N		
10	45.2		N		Y	GL	N	N	N		
11	41.9		N		Y	GL	N	N	N		
12	45.3		N		Y	GL	N	N	N		
13	45.6		N		Y	GL	N	N	N		
14	46.6		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	FN	FN	FN	FN		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-2	DATE: 12/7/11	**TRANSECT:**	☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☒ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m) x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[9] Present (Y/ N)	BAR WIDTH[9] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	49.6	1.9	N	N/A	N	GL	N	N	N		
1	60.2		N		N	GL	N	N	N		
2	64.6		N		N	GL	N	N	N		
3	64.9		N		N	GL	N	N	N		
4	64.7		N		N	GL	N	N	N		
5	57.3	N/A	N	N/A	N	GL	N	N	N		
6	46.1		N		Y	GL	N	N	N		
7	44.9	2.2	N	N/A	Y	GL	N	N	N		
8	47.6		N		Y	GL	N	N	N		
9	55.4		N		Y	GL	N	N	N		
10	54.5		N		Y	GL	N	N	N		
11	57.0		N		Y	GL	N	N	N		
12	57.5		N		Y	GL	N	N	N		
13	51.9		N		N	GL	N	N	N		
14	43.6		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	FN	GF	FN	FN		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: BC-2	DATE: 12/7/11	**TRANSECT:**	☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☒ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m) x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[10] Present (Y/ N)	BAR WIDTH[10] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	45.1	2.8	N	N/A	N	GL	N	N	N		
1	51.0		N		N	GL	N	N	N		
2	69.5		N		Y	GL	N	N	N		
3	67.0		N		Y	GL	N	N	N		
4	60.6		N		Y	GL	N	N	N		
5	59.4	N/A	N	N/A	Y	GL	N	N	N		
6	59.4		N		Y	GL	N	N	N		
7	74.4	2.4	N	N/A	Y	GL	N	N	N		
8	78.4		N		Y	GL	N	N	N		
9	72.8		N		Y	GL	N	N	N		
10	54.5		N		Y	GL	N	N	N		
11	51.0		N		N	GL	N	N	N		
12	57.5		N		N	GL	N	N	N		
13	72.2		N		N	GL	N	N	N		
14	80.8		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	FN	FN	FN	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-2	DATE: 12/9/11	**TRANSECT:**	☒ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.53	25.8	FN	100	
Ctr	1.06	48.7	GF	50	
RCtr	1.59	31.9	HP	0	
Right	2.11	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	77	N/A	
Right	73	N/A	
Welted Width xxx.x m		2.1	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		2.7	
Bankfull Height xx.x m		0.9	
Incised Height xx.x m		2.1	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	5		CenR	14	
CenL	12		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 1 2 3 4	0 1 **2** 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 **1** 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 **1** 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	0 1 **2** 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-2	DATE: 12/9/11	**TRANSECT:**	☐ A ☒ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.45	35.8	HP	0	
Ctr	0.90	62.9	FN	100	
RCtr	1.35	54.7	FN	100	
Right	1.80	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 1 **2** 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 2 **3** 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	**0** 1 2 3 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	**0** 1 2 3 4	
Barren, Bare Dirt or Duff	0 **1** 2 3 4	0 **1** 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	70	N/A	
Right	90	N/A	
Welted Width xxx.x m		1.8	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		2.4	
Bankfull Height xx.x m		1.1	
Incised Height xx.x m		2.1	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	17		CenR	17	
CenL	12		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-2	DATE: 12/9/11	**TRANSECT:**	☐ A ☐ B ☒ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.54	32.6	HP	100	
Ctr	1.08	33.4	GF	30	
RCtr	1.62	32.6	GF	20	
Right	2.14	0	HP		

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	68	N/A	
Right	69	N/A	
Welted Width xxx.x m		2.1	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		2.8	
Bankfull Height xx.x m		2.5	U
Incised Height xx.x m		2.1	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	13		CenR	17	
CenL	5		Left	K	
CenDwn	15		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	**Comments**
U	Wooden golf cart bridge immediately upstream of transect

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 2 **3** 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-2	DATE: 12/9/11	**TRANSECT:**	☐ A ☐ B ☐ C ☒ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.55	42.0	HP	0	
Ctr	1.10	50.8	FN	100	
RCtr	1.65	30.9	HP	0	
Right	2.20	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 1 **2** 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 2 **3** 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	74	N/A	
Right	90	N/A	U
Welted Width xxx.x m		2.2	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		1.8	
Bankfull Height xx.x m		1.0	
Incised Height xx.x m		2.1	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	17		CenR	17	
CenL	13		Left	K	
CenDwn	11		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments
	New discharge pipe immediately upstream from transect

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	0 1 **2** 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 **1** 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 **1** 2 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-2	DATE: 12/9/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☒ **E** ☐ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.67	37.7	HP	0	
Ctr	1.34	33.1	GF	80	
RCtr	2.01	39.0	FN	100	
Right	2.68	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	0 **1** 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 1 **2** 3 4	
Live Trees or Roots	0 1 **2** 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	55	N/A	
Right	69	N/A	
Welted Width xxx.x m		2.7	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		3.5	
Bankfull Height xx.x m		0.8	
Incised Height xx.x m		2.1	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	17		CenR	17	
CenL	12		Left	K	
CenDwn	5		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments
	Log in stream downstream of transect

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 1 2 3 4	0 **1** 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 **3** 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	0 **1** 2 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-2	DATE: 12/9/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☒ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.83	50.3	HP	0	
Ctr	1.67	55.1	FN	100	
RCtr	2.49	30.1	FN	100	
Right	3.30	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D **C** E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 **1** 2 3 4	0 1 **2** 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 **3** 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	K	N/A	
Right	86	N/A	
Welted Width xxx.x m		3.3	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		3.5	
Bankfull Height xx.x m		1.0	
Incised Height xx.x m		2.0	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

	Flag			Flag	
CenUp	17		CenR	17	
CenL	17		Left	K	
CenDwn	14		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-2	DATE: 12/9/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☒ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.39	71.4	HP	0	
Ctr	0.78	58.9	HP	0	
RCtr	1.17	57.4	HP	0	
Right	1.54	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 1 **2** 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	K	N/A	
Right	K	N/A	
Welted Width xxx.x m		1.5	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		2.1	
Bankfull Height xx.x m		1.3	
Incised Height xx.x m		2.0	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	15		CenR	17	
CenL	6		Left	K	
CenDwn	13		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments
	Banks nearly vertical, densely covered with briars

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	D C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	**0** 1 2 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-2	DATE: 12/9/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☐ **G** ☒ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.59	0.33	HP	0	
Ctr	1.18	47.8	FN	100	
RCtr	1.77	40.9	FN	100	
Right	2.36	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 **1** 2 3 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 **1** 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 **1** 2 3 4	
Barren, Bare Dirt or Duff	0 1 **2** 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	52	N/A	
Right	K	N/A	F1
Welted Width xxx.x m		2.4	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		2.7	
Bankfull Height xx.x m		1.0	
Incised Height xx.x m		1.9	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	17		CenR	17	
CenL	17		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments
F1	Right bank nearly vertical-dense vegetation on bank

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-2	DATE: 12/9/11	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☒ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.49	29.6	FN	100	
Ctr	0.98	42.2	GF	50	
RCtr	1.47	44.8	HP	0	
Right	1.94	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 1 **2** 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 **3** 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	0 **1** 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	0 **1** 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	77	N/A	F1
Right	53	N/A	
Welted Width xxx.x m		1.9	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		3.2	
Bankfull Height xx.x m		0.9	
Incised Height xx.x m		2.0	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

	Flag				Flag
CenUp	6		CenR	2	
CenL	1		Left	K	
CenDwn	0		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments
F1	Left bank densely covered by Rubus discolor

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-2	DATE: 12/9/11	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☒ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.69	30.8	FN	100	
Ctr	1.38	44.6	GF	60	
RCtr	2.07	36.8	FN	100	
Right	2.76	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	0 1 **2** 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 **1** 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	0 1 **2** 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	K	N/A	F1
Right	71	N/A	
Welted Width xxx.x m		2.8	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		3.7	
Bankfull Height xx.x m		1.0	
Incised Height xx.x m		2.1	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

	Flag			Flag	
CenUp	17		CenR	17	
CenL	17		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments
F1	Tree hanging over stream, exposed tree roots

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: BC-2	DATE: 12/9/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☒ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	K	49.1	FN	100	
Ctr	K	81.6	FN	100	
RCtr	K	70.9	HP	0	
Right	K	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 1 **2** 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 2 3 **4**	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 3 **4**	0 1 2 3 **4**	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 **1** 2 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	K	N/A	F1
Right	K	N/A	F1
Welted Width xxx.x m		K	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		2.6	
Bankfull Height xx.x m		1.2	
Incised Height xx.x m		2.3	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	15		CenR	17	
CenL	17		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments
F1	Both banks densely vegetated with Rubus discolor

RIPARIAN "LEGACY" TREES AND INVASIVE ALIEN PLANTS

SITE ID: BC-2 DATE: 12/9/11

TRAN	LARGEST LEGACY TREE VISIBLE FROM THIS STATION						ALIEN PLANT SPECIES PRESENT IN LEFT AND RIGHT RIPARIAN PLOTS				
	Trees not Visible	DBH (m)	Height (m)	Dist. from wetted margin (m)	Type	Taxonomic Category	Check all that are present				
A	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	0	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Alder	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐CanThis ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol			
B	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30	K	☐Deciduous ☐Coniferous ☐Broadleaf Evergreen	Same tree as last transect	☐ None	☒RC Grass ☐Salt CEd ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol			
C	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30	10	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Ash	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol			

INSTRUCTIONS

Legacy trees are defined as the largest tree within your search area, which is as far as you can see, but within maximum limits as follows:

Wadeable Streams: Confine search to no more than 50 m from left and right bank and extending upstream to next transect (for 'K' look upstream 4 channel widths)

Non-wadeable Rivers: Confine search to no more than 100 m from left and right bank and extending both upstream and downstream as far as you can see confidently.

Alien Plants: Confine search to riparian plots on left and right bank

Wadeable Streams: 10 m x 10 m
Non-wadeable Rivers: 10 m x 20 m

Not all aliens are to be identified in all states. See Field Manual and Plant Identification Guide.

TAXONOMIC CATEGORIES
Acacia/Mesquite Alder/Birch Ash Maple/Box elder Oak Poplar/Cottonwood Sycamore Willow Unknown or Other Deciduous
Cedar/Cypress/Sequoia Fir (including Douglas Fir and Hemlock) Juniper Pine Spruce Unknown or Other Deciduous
Unknown or Other Broadleaf Evergreen
Snag (Dead tree of any species)

ALIEN SPECIES		
RC Grass	Reed Canarygrass	*Phalaris arundinacea*
Engl Ivy	English Ivy	*Hedera Helix*
ChGrass	Cheat Grass	*Bromus tectorum*
Salt Ced	Salt Cedar	*Tamarix spp.*
Can This	Canada thistle	*Cirsium arvense*
M This	Musk thistle	*Carduus nutans*
Hblack	Himalayan blackberry	*Rubus discolor*
Teasel	Teasel	*Dipsacus fullonum*
Spurge	Leafy spurge	*Euphorbia esula*
G Reed	Giant Reed	*Arundo donax*
C Burd	Common burdock	*Arctium minus*
Rus Ol	Russian-olive	*Elaeagnus angustifolia*

COMMENTS

Transects D to K continued on next page

RIPARIAN "LEGACY" TREES AND INVASIVE ALIEN PLANTS

SITE ID: BC-2 DATE: 12/9/11

TRAN	LARGEST LEGACY TREE VISIBLE FROM THIS STATION						ALIEN PLANT SPECIES PRESENT IN LEFT AND RIGHT RIPARIAN PLOTS	
	Trees not Visible	DBH (m)	Height (m)	Dist. from wetted margin (m)	Type	Taxonomic Category	Check all that are present	
D	☐	☐0-0.1 ☒.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	10	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Ash	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐CanThis ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
E	☐	☐0-0.1 ☒.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	15	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Ash	☐ None	☒RC Grass ☐Salt CEd ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
F	☐	☐0-0.1 ☒.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30	5	☐Deciduous ☐Coniferous ☐Broadleaf Evergreen	Ash	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
G	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	20	☐Deciduous ☒Coniferous ☐Broadleaf Evergreen	Pine	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
H	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	25	☐Deciduous ☒Coniferous ☐Broadleaf Evergreen	Pine	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
I	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	20	☐Deciduous ☒Coniferous ☐Broadleaf Evergreen	Cedar	☐ None	☐RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
J	☐	☐0-0.1 ☒.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	0	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Ash	☐ None	☐RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
K	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	0	☐Deciduous ☐Coniferous ☐Broadleaf Evergreen	Ash on bank upstream from transect	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol

Appendix E

Physical Habitat Data

Waln Creek, Reach 1

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-1	DATE: 12/1/11	**TRANSECT:**	☒ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m) x.x: 1.0 — Total Reach Length (m): 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[1] Present (Y/ N)	BAR WIDTH[1] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	47.6	1.4	N	N/A	Y	GL	N	N	N		
1	49.4		N		Y	GL	N	N	N		
2	48.2		N		Y	GL	N	N	N		
3	54.4		N		Y	GL	N	N	N		
4	55.1		N		N	GL	N	N	N		
5	56.5	N/A	N	N/A	N	GL	N	N	N		
6	61.3		N		N	GL	N	N	N		
7	62.6	2.0	N	N/A	N	GL	N	N	N		
8	62.3		N		N	GL	N	N	N		
9	66.8		N		N	GL	N	N	N		
10	69.9		N		N	GL	N	N	N		
11	62.8		N		N	GL	N	N	N		
12	60.9		N		N	GL	N	N	N		
13	65.9		N		N	GL	N	N	N		
14	65.2		N		N	GL	N	N	N		

SUBSTRATE	**Station (5 or 7)**	**LFT**	**LCTR**	**CTR**	**RCTR**	**RGT**		**FLAG**
	7	HP	HP	HP	HP	HP		

FLAG	**COMMENTS**

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	**X**	**FLAG**	

	Pieces All/Part in Bankfull Channel			**Pieces Bridge Above Bankfull Channel**		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-1	DATE: 12/1/11	**TRANSECT:**	☐ A-B ☒ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m) x.x: 1.0 — Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[2] Present (Y/ N)	BAR WIDTH[2] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	67.7	1.4	N	N/A	Y	GL	N	N	N		
1	70.6		N		Y	GL	N	N	N		
2	71.2		N		Y	GL	N	N	N		
3	67.1		N		Y	GL	N	N	N		
4	64.1		N		Y	GL	N	N	N		
5	63.7	N/A	N	N/A	Y	GL	N	N	N		
6	63.7		N		Y	GL	N	N	N		
7	55.8	1.6	N	N/A	Y	GL	N	N	N		
8	59.5		N		Y	GL	N	N	N		
9	60.3		N		Y	GL	N	N	N		
10	59.0		N		Y	GL	N	N	N		
11	58.5		N		Y	GL	N	N	N		
12	57.2		N		Y	GL	N	N	N		
13	K		N		Y	GL	N	N	N		
14	K		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	HP	HP	FN	FN		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-1 DATE: 12/1/11 **TRANSECT:** ☐ A-B ☐ B-C ☒ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE For Transect A-B ONLY | Increment (m) x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[3] Present (Y/ N)	BAR WIDTH[3] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	59.6	1.5	N	N/A	Y	GL	N	N	N		
1	57.6		N		Y	GL	N	N	N		
2	53.3		N		Y	GL	N	N	N		
3	50.4		N		Y	GL	N	N	N		
4	46.8		N		Y	GL	N	N	N		
5	37.4	N/A	N	N/A	Y	GL	N	N	N		
6	45.9		N		N	GL	N	N	N		
7	55.0	1.4	N	N/A	Y	GL	N	N	N		
8	64.9		N		Y	GL	N	N	N		
9	64.2		N		Y	GL	N	N	N		
10	64.0		N		Y	GL	N	N	N		
11	50.7		N		Y	GL	N	N	N		
12	66.9		N		Y	GL	N	N	N		
13	64.4		N		Y	GL	N	N	N		
14	65.6		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	FN	FN	FN	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	X	**FLAG**	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-1	DATE: 12/1/11	**TRANSECT:**	☐ A-B ☐ B-C ☐ C-D ☒ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m) x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[4] Present (Y/ N)	BAR WIDTH[4] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	56.7	1.5	N	N/A	N	GL	N	N	N		
1	57.2		N		N	GL	N	N	N		
2	58.1		N		N	GL	N	N	N		
3	57.8		N		N	GL	N	N	N		
4	59.4		N		N	GL	N	N	N		
5	62.2	N/A	N	N/A	N	GL	N	N	N		
6	66.1		N		N	GL	N	N	N		
7	64.2	1.3	N	N/A	N	GL	N	N	N		
8	63.8		N		N	GL	N	N	N		
9	59.4		N		N	GL	N	N	N		
10	52.8		N		N	GL	N	N	N		
11	53.3		N		N	GL	N	N	N		
12	35.0		N		Y	GL	N	N	N		
13	51.4		N		Y	GL	N	N	N		
14	56.1		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	HP	HP	HP	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	X	**FLAG**	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-1 DATE: 12/1/11 **TRANSECT:** ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☒ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE For Transect A-B ONLY | Increment (m) x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[5] Present (Y/ N)	BAR WIDTH[5] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	54.9	2.0	N	N/A	N	GL	N	N	N		
1	55.8		N		N	GL	N	N	N		
2	58.3		N		N	GL	N	N	N		
3	56.9		N		N	GL	N	N	N		
4	52.0		N		N	GL	N	N	N		
5	52.1	N/A	N	N/A	N	GL	N	N	N		
6	55.8		N		N	GL	N	N	N		
7	56.9	1.7	N	N/A	N	GL	N	N	N		
8	58.0		N		N	GL	N	N	N		
9	58.4		N		N	GL	N	N	N		
10	56.3		N		N	GL	N	N	N		
11	51.7		N		N	GL	N	N	N		
12	38.6		N		Y	GL	N	N	N		
13	44.2		N		Y	GL	N	N	N		
14	52.0		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	HP	HP	HP	HP		

FLAG	COMMENTS

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	X	**FLAG**	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	1 1					
0.3-0.5 m						
0.5-0.8 m						
>0.8 m						

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-1 DATE: 12/1/11

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☒ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m)x.x: 1.0 — Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[6] Present (Y/ N)	BAR WIDTH[6] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	55.1	2.1	N	N/A	Y	GL	N	N	N		
1	45.0		N		Y	GL	N	N	N		
2	59.6		N		Y	GL	N	N	N		
3	59.2		N		Y	GL	N	N	N		
4	51.4		N		Y	GL	N	N	N		
5	47.1	N/A	N	N/A	Y	GL	N	N	N		
6	50.4		N		Y	GL	N	N	N		
7	52.9	1.6	N	N/A	Y	GL	N	N	N		
8	59.7		N		Y	GL	N	N	N		
9	59.2		N		Y	GL	N	N	N		
10	59.4		N		Y	GL	N	N	N		
11	56.9		N		Y	GL	N	N	N		
12	57.7		N		Y	GL	N	N	N		
13	60.0		N		Y	GL	N	N	N		
14	39.6		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	FN	FN	FN	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	11 2					
0.3-0.5 m						
0.5-0.8 m						
>0.8 m						

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-1 DATE: 12/1/11

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☒ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m) x.x: 1.0 — Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[7] Present (Y/ N)	BAR WIDTH[7] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	61.6	2.2	N	N/A	Y	GL	N	N	N		
1	60.1		N		Y	GL	N	N	N		
2	59.3		N		Y	GL	N	N	N		
3	57.6		N		Y	GL	N	N	N		
4	63.9		N		Y	GL	N	N	N		
5	62.8	N/A	N	N/A	Y	GL	N	N	N		
6	62.4		N		Y	GL	N	N	N		
7	48.1	2.4	N	N/A	Y	GL	N	N	N		
8	48.1		N		Y	GL	N	N	N		
9	47.7		N		Y	GL	N	N	N		
10	45.5		N		Y	GL	N	N	N		
11	63.8		N		Y	GL	N	N	N		
12	64.4		N		Y	GL	N	N	N		
13	63.5		N		Y	GL	N	N	N		
14	65.5		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	FN	FN	FN	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	X	**FLAG**	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-1 DATE: 12/1/11 **TRANSECT:** ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☒ H-I ☐ I-J ☐ J-K

THALWEG PROFILE For Transect A-B ONLY | Increment (m)x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[8] Present (Y/ N)	BAR WIDTH[8] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	62.5	1.4	N	N/A	Y	GL	N	N	N		
1	62.9		N		Y	GL	N	N	N		
2	57.6		N		Y	GL	N	N	N		
3	48.1		N		N	GL	N	N	N		
4	56.5		N		Y	GL	N	N	N		
5	64.4	N/A	N	N/A	Y	GL	N	N	N		
6	66.0		N		Y	GL	N	N	N		
7	61.5	1.6	N	N/A	N	GL	N	N	N		
8	63.2		N		N	GL	N	N	N		
9	56.8		N		N	GL	N	N	N		
10	41.6		N		Y	GL	N	N	N		
11	44.8		N		Y	GL	N	N	N		
12	55.9		N		Y	GL	N	N	N		
13	56.4		N		Y	GL	N	N	N		
14	57.1		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	HP	HP	HP	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	X	**FLAG**	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-1	DATE: 12/1/11	**TRANSECT:**	☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☒ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m)x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[9] Present (Y/ N)	BAR WIDTH[9] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	58.5	1.9	N	N/A	Y	GL	N	N	N		
1	62.6		N		Y	GL	N	N	N		
2	59.9		N		Y	GL	N	N	N		
3	52.8		N		Y	GL	N	N	N		
4	52.4		N		Y	GL	N	N	N		
5	56.9	N/A	N	N/A	Y	GL	N	N	N		
6	57.7		N		Y	GL	N	N	N		
7	58.5	2.3	N	N/A	Y	GL	N	N	N		
8	63.6		N		Y	GL	N	N	N		
9	64.3		N		Y	GL	N	N	N		
10	64.8		N		Y	GL	N	N	N		
11	59.6		N		Y	GL	N	N	N		
12	58.5		N		Y	GL	N	N	N		
13	56.4		N		Y	GL	N	N	N		
14	50.6		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	FN	FN	FN	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-1 DATE: 12/1/11

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☒ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m)x.x: 1.0 — Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[10] Present (Y/ N)	BAR WIDTH[10] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	55.5	2.5	N	N/A	Y	GL	N	N	N		
1	60.1		N		Y	GL	N	N	N		
2	57.8		N		Y	GL	N	N	N		
3	48.7		N		Y	GL	N	N	N		
4	46.9		N		Y	GL	N	N	N		
5	45.8	N/A	N	N/A	Y	GL	N	N	N		
6	41.9		N		Y	GL	N	N	N		
7	46.5	1.9	N	N/A	Y	GL	N	N	N		
8	42.9		N		Y	GL	N	N	N		
9	51.9		N		Y	GL	N	N	N		
10	47.8		N		Y	GL	N	N	N		
11	43.5		N		Y	GL	N	N	N		
12	42.6		N		Y	GL	N	N	N		
13	40.2		N		N	GL	N	N	N		
14	42.5		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	FN	FN	FN	FN		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-1	DATE: 12/1/11	**TRANSECT:**	☒ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.35	40.6	FN	100	
Ctr	0.70	49.7	FN	100	
RCtr	1.05	49.5	FN	100	
Right	1.40	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 1 **2** 3 4	0 1 **2** 3 4	
Small Trees (Trunk <0.3 m DBH)	0 **1** 2 3 4	0 **1** 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 **1** 2 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 **1** 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 **1** 2 3 4	
Barren, Bare Dirt or Duff	0 **1** 2 3 4	0 **1** 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	66	0	
Right	64	0	
Welted Width xxx.x m		1.4	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		1.8	
Bankfull Height xx.x m		0.9	
Incised Height xx.x m		2.0	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	14		CenR	17	
CenL	17		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-1	DATE: 12/1/11	**TRANSECT:**	☐ **A** ☒ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.35	45.9	FN	100	
Ctr	0.70	63.0	FN	100	
RCtr	1.05	44.1	HP	0	
Right	1.40	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 2 3 **4**	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 3 **4**	0 1 2 3 **4**	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	80	0	
Right	74	0	
Welted Width xxx.x m		1.4	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		2.5	
Bankfull Height xx.x m		1.1	
Incised Height xx.x m		1.7	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	17		CenR	17	
CenL	14		Left	K	
CenDwn	13		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-1	DATE: 12/1/11	**TRANSECT:**	☐ A ☐ B ☒ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	039	49.7	HP	0	
Ctr	0.78	48.2	FN	100	
RCtr	1.17	46.6	HP	0	
Right	1.54	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

FISH COVER/OTHER		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 2 **3** 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 2 3 **4**	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	**0** 1 2 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	53	0	
Right	90	0	
Welted Width xxx.x m		1.5	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		2.6	
Bankfull Height xx.x m		1.0	
Incised Height xx.x m		1.7	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	17		CenR	17	
CenL	13		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-1	DATE: 12/1/11	**TRANSECT:**	☐ A ☐ B ☐ C ☒ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.39	47.5	HP	0	
Ctr	0.78	58.0	HP	0	
RCtr	1.17	51.0	HP	0	
Right	1.54	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	71	0	
Right	79	0	
Welted Width xxx.x m		1.5	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		1.7	
Bankfull Height xx.x m		1.2	
Incised Height xx.x m		1.7	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	16		CenR	17	
CenL	17		Left	K	
CenDwn	13		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D **C** E M N	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	0 1 **2** 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 3 **4**	0 1 2 3 **4**	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-1	DATE: 12/1/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☒ **E** ☐ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.49	42.8	HP	0	
Ctr	0.98	52.1	HP	0	
RCtr	1.48	43.7	HP	0	
Right	1.98	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 2 3 **4**	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	88	0	
Right	82	0	
Welted Width xxx.x m		1.98	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		2.13	
Bankfull Height xx.x m		1.10	
Incised Height xx.x m		2.01	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	17		CenR	12	
CenL	17		Left	K	
CenDwn	13		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 3 **4**	0 1 2 3 **4**	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	0 P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-1	DATE: 12/1/11	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☒ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.52	45.4	FN	100	
Ctr	1.04	54.8	FN	100	
RCtr	1.56	44.4	FN	100	
Right	2.06	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 1 **2** 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	0 1 **2** 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 3 **4**	0 1 2 3 **4**	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	0 **1** 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	70	0	
Right	90	0	
Welted Width xxx.x m		2.1	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		2.23	
Bankfull Height xx.x m		1.0	
Incised Height xx.x m		1.7	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	17		CenR	12	
CenL	17		Left	K	
CenDwn	11		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-1	DATE: 12/1/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☒ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.55	52.1	HP	0	
Ctr	1.10	58.9	GF	50	
RCtr	1.65	43.0	FN	100	
Right	2.20	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 1 **2** 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 2 **3** 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	0 **1** 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 3 **4**	0 1 2 3 **4**	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	84	0	
Right	61	0	
Welted Width xxx.x m		2.2	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		2.1	
Bankfull Height xx.x m		1.1	
Incised Height xx.x m		2.0	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	16		CenR	17	
CenL	17		Left	K	
CenDwn	13		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-1	DATE: 12/1/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☐ **G** ☒ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.36	50.5	FN	100	
Ctr	0.72	60.4	FN	100	
RCtr	1.08	44.0	HP	0	
Right	1.44	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

FISH COVER/OTHER		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 1 **2** 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 3 **4**	0 1 2 3 **4**	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	53	0	
Right	90	0	
Welted Width xxx.x m		1.4	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		1.7	
Bankfull Height xx.x m		1.1	
Incised Height xx.x m		1.9	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	13		CenR	17	
CenL	11		Left	K	
CenDwn	11		Right	*	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-1	DATE: 12/1/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☐ **G** ☐ **H** ☒ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	0.47	38.4	HP	0	
Ctr	0.94	52.9	FN	100	
RCtr	1.41	35.3	FN	100	
Right	1.88	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 2 3 **4**	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	**0** 1 2 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	72	0	
Right	61	0	
Welted Width xxx.x m		1.9	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		2.2	
Bankfull Height xx.x m		1.1	
Incised Height xx.x m		1.8	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	0		CenR	0	
CenL	0		Left	K	
CenDwn	0		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-1	DATE: 12/1/11	**TRANSECT:**	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☒ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	HP	0	
LCtr	0.63	42.8	HP	0	
Ctr	1.26	57.8	GF	80	
RCtr	1.89	41.6	FN	100	
Right	2.50	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	84	0	
Right	87	0	
Welted Width xxx.x m		2.5	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		3.1	
Bankfull Height xx.x m		1.2	
Incised Height xx.x m		1.8	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	11		CenR	13	
CenL	17		Left	K	
CenDwn	10		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 3 **4**	0 1 2 3 **4**	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-1	DATE: 12/1/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** **X-tra Side Channel** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☒ **K** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0	0	FN	100	
LCtr	K	26.0	FN	100	
Ctr	K	46.6	GF	30	
RCtr	K	39.7	HP	0	
Right	K	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 1 **2** 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	74	0	
Right	90	0	
Welted Width xxx.x m		K	
Bar Width xx.x m		N/A	
Bankfull Width xxx.x m		2.0	
Bankfull Height xx.x m		1.0	
Incised Height xx.x m		5.6	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	11		CenR	10	
CenL	4		Left	K	
CenDwn	0		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 **3** 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	0 P **C** B	0 P **C** B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

RIPARIAN "LEGACY" TREES AND INVASIVE ALIEN PLANTS

SITE ID: WC-1 DATE: 12/1/11

TRAN	LARGEST LEGACY TREE VISIBLE FROM THIS STATION						ALIEN PLANT SPECIES PRESENT IN LEFT AND RIGHT RIPARIAN PLOTS				
	Trees not Visible	DBH (m)	Height (m)	Dist. from wetted margin (m)	Type	Taxonomic Category	Check all that are present				
A	☒	☐0-0.1 ☐.75-2 ☒.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30	5	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Cherry	☐ None	☒RC Grass ☐Engl Ivy ☐Ch Grass	☐Salt Ced ☐CanThis ☐M This	☐Hblack ☐Teasel ☐Spurge	☐G Reed ☐C Burd ☐Rus Ol
B	☒	☐0-0.1 ☐.75-2 ☒.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30	20	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Same tree	☐ None	☒RC Grass ☐Engl Ivy ☐Ch Grass	☐Salt CEd ☐Can This ☐M This	☐Hblack ☐Teasel ☐Spurge	☐G Reed ☐C Burd ☐Rus Ol
C	☒	☐0-0.1 ☐.75-2 ☒.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30	30	☐Deciduous ☒Coniferous ☐Broadleaf Evergreen	Pine	☐ None	☒RC Grass ☐Engl Ivy ☐Ch Grass	☐Salt Ced ☐Can This ☐M This	☐Hblack ☐Teasel ☐Spurge	☐G Reed ☐C Burd ☐Rus Ol

INSTRUCTIONS

Legacy trees are defined as the largest tree within your search area, which is as far as you can see, but within maximum limits as follows:

Wadeable Streams: Confine search to no more than 50 m from left and right bank and extending upstream to next transect (for 'K' look upstream 4 channel widths)

Non-wadeable Rivers: Confine search to no more than 100 m from left and right bank and extending both upstream and downstream as far as you can see confidently.

Alien Plants: Confine search to riparian plots on left and right bank

Wadeable Streams: 10 m x 10 m

Non-wadeable Rivers: 10 m x 20 m

Not all aliens are to be identified in all states. See Field Manual and Plant Identification Guide.

TAXONOMIC CATEGORIES
Acacia/Mesquite
Alder/Birch
Ash
Maple/Box elder
Oak
Poplar/Cottonwood
Sycamore
Willow
Unknown or Other Deciduous
Cedar/Cypress/Sequoia
Fir (including Douglas Fir and Hemlock)
Juniper
Pine
Spruce
Unknown or Other Deciduous
Unknown or Other Broadleaf Evergreen
Snag (Dead tree of any species)

ALIEN SPECIES		
RC Grass	Reed Canarygrass	*Phalaris arundinacea*
Engl Ivy	English Ivy	*Hedera Helix*
ChGrass	Cheat Grass	*Bromus tectorum*
Salt Ced	Salt Cedar	*Tamarix spp.*
Can This	Canada thistle	*Cirsium arvense*
M This	Musk thistle	*Carduus nutans*
Hblack	Himalayan blackberry	*Rubus discolor*
Teasel	Teasel	*Dipsacus fullonum*
Spurge	Leafy spurge	*Euphorbia esula*
G Reed	Giant Reed	*Arundo donax*
C Burd	Common burdock	*Arctium minus*
Rus Ol	Russian-olive	*Elaeagnus angustifolia*

COMMENTS

Transects D to K continued on next page

RIPARIAN "LEGACY" TREES AND INVASIVE ALIEN PLANTS

SITE ID: WC-1 DATE: 12/1/11

TRAN	LARGEST LEGACY TREE VISIBLE FROM THIS STATION						ALIEN PLANT SPECIES PRESENT IN LEFT AND RIGHT RIPARIAN PLOTS	
	Trees not Visible	DBH (m)	Height (m)	Dist. from wetted margin (m)	Type	Taxonomic Category	Check all that are present	
D	☐	☐0-0.1 ☐.75-2 ☒.1-.3 ☐>2 ☐.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	5	☐Deciduous ☒Coniferous ☐Broadleaf Evergreen	Pine	☐ None	☒RC Grass ☐Salt Ced ☐Hblack ☐G Reed ☐Engl Ivy ☐CanThis ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
E	☐	☐0-0.1 ☐.75-2 ☒.1-.3 ☐>2 ☐.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	30	☐Deciduous ☐Coniferous ☐Broadleaf Evergreen	Same tree	☐ None	☒RC Grass ☐Salt CEd ☐Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
F	☐	☒0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	0	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Ash	☐ None	☒RC Grass ☐Salt Ced ☐Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
G	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	40	☐Deciduous ☐Coniferous ☐Broadleaf Evergreen	Pine	☐ None	☒RC Grass ☐Salt Ced ☐Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
H	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30	30	☐Deciduous ☐Coniferous ☐Broadleaf Evergreen	Pine	☐ None	☒RC Grass ☐Salt Ced ☐Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
I	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30	40	☐Deciduous ☐Coniferous ☐Broadleaf Evergreen	Pine	☐ None	☒RC Grass ☐Salt Ced ☐Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
J	☐	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☒.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30	40	☐Deciduous ☐Coniferous ☐Broadleaf Evergreen	Pine	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
K	☐	☐0-0.1 ☐.75-2 ☒.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30	40	☐Deciduous ☐Coniferous ☐Broadleaf Evergreen	Pine	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol

Appendix F

Physical Habitat Data

Waln Creek, Reach 2

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-2	DATE: 10/6/11	**TRANSECT:**	☒ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m) x.x: 1.0 — Total Reach Length (m): 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[1] Present (Y/ N)	BAR WIDTH[1] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	11.6	1.7	N	N/A	N	RI	N	N	N		Rip rap
1	14.0		N		N	RI	N	N	N		
2	18.9		N		N	PB	N	N	Y		
3	18.8		N		N	PB	N	N	Y		
4	15.2		N		N	PB	N	N	Y		
5	19.4	N/A	N	N/A	N	PB	N	N	Y		
6	28.5		N		N	PB	N	N	Y		
7	26.9	2.8	N	N/A	Y	PB	N	N	Y		
8	28.8		N		Y	PB	N	N	Y		
9	36.9		N		Y	PB	N	N	Y		
10	38.8		N		Y	PB	N	N	Y		
11	41.7		N		Y	PB	N	N	Y		
12	43.2		N		Y	PB	N	N	Y		
13	42.4		N		Y	PB	N	N	Y		
14	29.1		N		Y	PB	N	N	Y		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	FN	FN	FN	FN		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m						
0.3-0.5 m						
0.5-0.8 m						
>0.8 m						

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-2 DATE: 10/6/11

TRANSECT: ☐ A-B ☒ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m)x.x: 1.0 — Total Reach Length (m): 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[2] Present (Y/ N)	BAR WIDTH[2] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	25.8	2.7	N	N/A	Y	PB	N	N	Y		
1	27.1		N		Y	PB	N	N	Y		
2	31.3		N		Y	PB	N	N	Y		
3	26.8		N		Y	PB	N	N	Y		
4	18.8		N		Y	GL	N	N	N		
5	20.9	N/A	N	N/A	Y	GL	N	N	N		
6	19.4		N		Y	GL	N	N	N		
7	19.2	2.9	N	N/A	Y	GL	N	N	N		
8	25.8		N		Y	GL	N	N	N		
9	32.8		N		Y	GL	N	N	N		
10	29.2		N		Y	GL	N	N	N		
11	33.7		N		Y	GL	N	N	N		
12	34.8		N		Y	GL	N	N	N		
13	39.9		N		Y	GL	N	N	N		
14	38.8		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	FN	FN	FN	FN		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; (1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-2 DATE: 10/6/11 **TRANSECT:** ☐ A-B ☐ B-C ☒ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE For Transect A-B ONLY | Increment (m)x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[3] Present (Y/ N)	BAR WIDTH[3] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	32.0	2.8	N	N/A	Y	GL	N	N	N		
1	28.7		N		Y	GL	N	N	N		
2	30.1		N		Y	GL	N	N	N		
3	21.8		N		Y	GL	N	N	N		
4	17.9		N		Y	GL	N	N	N		
5	16.8	N/A	N	N/A	Y	GL	N	N	N		
6	14.9		N		Y	GL	N	N	N		
7	13.1	2.6	N	N/A	Y	GL	N	N	N		
8	10.1		N		Y	GL	N	N	N		
9	9.7		N		Y	GL	N	N	N		
10	17.2		N		Y	GL	N	N	N		
11	20.8		N		Y	GL	N	N	N		
12	22.8		N		Y	GL	N	N	N		
13	25.3		N		Y	GL	N	N	N		
14	20.7		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	SA	GF	GF	FN		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	X	**FLAG**	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-2	DATE: 10/6/11	**TRANSECT:**	☐ A-B ☐ B-C ☐ C-D ☒ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m)x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[4] Present (Y/ N)	BAR WIDTH[4] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	19.6	2.4	N	N/A	Y	GL	N	N	N		
1	21.3		N		Y	GL	N	N	N		
2	24.2		N		Y	GL	N	N	N		
3	20.2		N		Y	GL	N	N	N		
4	25.6		N		Y	GL	N	N	N		
5	29.2	N/A	N	N/A	Y	GL	N	N	N		
6	28.8		N		Y	GL	N	N	N		
7	24.8	2.4	N	N/A	Y	GL	N	N	N		
8	20.8		N		Y	GL	N	N	N		
9	19.7		N		Y	GL	N	N	N		
10	22.8		N		Y	GL	N	N	N		
11	23.1		N		Y	GL	N	N	N		
12	19.4		N		Y	GL	N	N	N		
13	24.3		N		Y	GL	N	N	N		
14	31.4		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	FN	GF	FN	FN		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-2 DATE: 10/6/11 **TRANSECT:** ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☒ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m) x.x: 1.0 — Total Reach Length (m): 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[5] Present (Y/ N)	BAR WIDTH[5] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	29.5	2.6	N	N/A	Y	GL	N	N	N		
1	27.0		N		Y	GL	N	N	N		
2	33.1		N		Y	GL	N	N	N		
3	37.7		N		Y	GL	N	N	N		
4	40.8		N		Y	GL	N	N	N		
5	36.9	N/A	N	N/A	Y	GL	N	N	N		
6	33.6		N		Y	GL	N	N	N		
7	35.8	2.6	N	N/A	Y	GL	N	N	N		
8	33.1		N		Y	GL	N	N	N		
9	35.1		N		Y	GL	N	N	N		
10	24.0		N		Y	GL	N	N	N		
11	35.1		N		Y	GL	N	N	N		
12	33.1		N		Y	GL	N	N	N		
13	32.6		N		Y	GL	N	N	N		
14	29.3		N		Y	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	FN	FN	FN	FN	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-2 DATE: 10/6/11

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☒ F-G ☐ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m) x.x: 1.0 — Total Reach Length (m): 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[6] Present (Y/ N)	BAR WIDTH[6] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	29.4	1.6	N	N/A	Y	GL	N	N	N		
1	30.7		N		Y	GL	N	N	N		
2	29.6		N		Y	GL	N	N	N		
3	23.1		N		N	GL	N	N	N		
4	15.7		N		N	GL	N	N	N		
5	13.7	N/A	N	N/A	N	GL	N	N	N		
6	16.1		N		N	GL	N	N	N		
7	18.2	1.5	N	N/A	N	GL	N	N	N		
8	20.0		N		N	GL	N	N	N		
9	21.7		N		N	GL	N	N	N		
10	23.1		N		N	GL	N	N	N		
11	13.9		N		N	GL	N	N	N		
12	12.3		N		N	GL	N	N	N		
13	13.8		N		N	GL	N	N	N		
14	14.6		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	HP	HP	GF	GF		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	**X**	**FLAG**	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-2	DATE: 10/6/11	**TRANSECT:**	☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☒ G-H ☐ H-I ☐ I-J ☐ J-K

THALWEG PROFILE — For Transect A-B ONLY — Increment (m) x.x: 1.0 — Total Reach Length (m): 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[7] Present (Y/ N)	BAR WIDTH[7] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	13.9	2.0	N	N/A	N	GL	N	N	N		
1	11.5		N		N	GL	N	N	N		
2	9.2		N		N	GL	N	N	N		
3	11.1		N		N	GL	N	N	N		
4	10.9		N		N	GL	N	N	N		
5	9.2	N/A	N	N/A	N	GL	N	N	N		
6	9.8		N		N	GL	N	N	N		
7	6.6	2.6	N	N/A	N	RI	N	N	N		
8	4.9		N		N	RI	N	N	N		
9	4.9		N		N	RI	N	N	N		
10	7.4		N		N	GL	N	N	N		
11	10.2		N		N	GL	N	N	N		
12	10.9		N		N	GL	N	N	N		
13	14.7		N		N	GL	N	N	N		
14	11.4		N		N	GL	N	N	N		

SUBSTRATE	**Station (5 or 7)**	**LFT**	**LCTR**	**CTR**	**RCTR**	**RGT**		**FLAG**
	7	FN	SA	GF	GF	FN		

FLAG	**COMMENTS**

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	**X**	**FLAG**	

	Pieces All/Part in Bankfull Channel			**Pieces Bridge Above Bankfull Channel**		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-2 DATE: 10/6/11 **TRANSECT:** ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☒ H-I ☐ I-J ☐ J-K

THALWEG PROFILE For Transect A-B ONLY | Increment (m) x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[8] Present (Y/ N)	BAR WIDTH[8] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	15.5	2.3	N	N/A	Y	GL	N	N	N		
1	12.3		N		Y	GL	N	N	N		
2	12.0		N		Y	GL	N	N	N		
3	12.1		N		Y	GL	N	N	N		
4	13.3		N		Y	GL	N	N	N		
5	11.8	N/A	N	N/A	Y	GL	N	N	N		
6	12.5		N		Y	GL	N	N	N		
7	11.3	1.7	N	N/A	N	GL	N	N	N		
8	10.2		N		N	GL	N	N	N		
9	15.1		N		N	GL	N	N	N		
10	13.8		N		N	GL	N	N	N		
11	8.9		N		N	RI	N	N	N		
12	7.3		N		N	RI	N	N	N		
13	10.8		N		N	RI	N	N	N		
14			N		N	RI	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	GF	GF	HP	HP		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	X	**FLAG**	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-2	DATE: 10/6/11	**TRANSECT:**	☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☒ I-J ☐ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m)x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[9] Present (Y/ N)	BAR WIDTH[9] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	15.0	2.2	N		N	GL	N	N	N		
1	16.7		N		N	GL	N	N	N		
2	14.8		N		N	GL	N	N	N		
3	12.8		N		N	GL	N	N	N		
4	13.1		N		N	GL	N	N	N		
5	14.3	N/A	N		N	GL	N	N	N		
6	11.8		N		N	GL	N	N	N		
7	13.4	2.3	N		N	GL	N	N	N		
8	21.8		N		N	GL	N	N	N		
9	31.2		N		N	GL	N	N	N		
10	15.6		N		N	GL	N	N	N		
11	19.2		N		N	GL	N	N	N		
12	20.8		N		N	GL	N	N	N		
13	24.9		N		N	GL	N	N	N		
14	23.7		N		N	GL	N	N	N		

SUBSTRATE	**Station (5 or 7)**	**LFT**	**LCTR**	**CTR**	**RCTR**	**RGT**		**FLAG**
	7	HP	HP	BL	GF	FN		

FLAG	**COMMENTS**

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	**CHECK IF ALL UNMARKED BOXES ARE ZERO**	**X**	**FLAG**	

	Pieces All/Part in Bankfull Channel			**Pieces Bridge Above Bankfull Channel**		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

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PHAB: THALWEG PROFILE & WOODY DEBRIS FORM STREAMS

SITE ID: WC-2 DATE: 10/6/11

TRANSECT: ☐ A-B ☐ B-C ☐ C-D ☐ D-E ☐ E-F ☐ F-G ☐ G-H ☐ H-I ☐ I-J ☒ J-K

THALWEG PROFILE

For Transect A-B ONLY | Increment (m) x.x: 1.0 | Total Reach Length (m) 150

STATION	THALWEG DEPTH (cm) (xx.x)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH[10] Present (Y/ N)	BAR WIDTH[10] XX.X	SOFT/ SMALL SEDIMENT (Y/N)	CHANNEL UNIT CODE	POOL FORM CODE	SIDE CHANNEL (Y/N)	BACK WATER (Y/N)	FLAG	COMMENTS
0	24.2	1.7	N	N/A	N	GL	N	N	N		
1	18.8		N		N	GL	N	N	N		
2	13.6		N		N	GL	N	N	N		
3	12.9		N		N	GL	N	N	N		
4	15.1		N		N	GL	N	N	N		
5	19.9	N/A	N	N/A	N	GL	N	N	N		
6	23.8		N		N	GL	N	N	N		
7	27.7	1.8	N	N/A	Y	GL	N	N	N		
8	18.8		N		Y	GL	N	N	N		
9	15.3		N		N	GL	N	N	N		
10	21.2		N		N	GL	N	N	N		
11	23.1		N		N	GL	N	N	N		
12	21.8		N		N	GL	N	N	N		
13	22.8		N		N	GL	N	N	N		
14	25.1		N		N	GL	N	N	N		

SUBSTRATE	Station (5 or 7)	LFT	LCTR	CTR	RCTR	RGT		FLAG
	7	HP	FN	FN	FN	FN		

FLAG	COMMENTS

LARGE WOODY DEBRIS ((10 cm small end diameter; ⟨1.5 m length)	CHECK IF ALL UNMARKED BOXES ARE ZERO	X	FLAG	

	Pieces All/Part in Bankfull Channel			Pieces Bridge Above Bankfull Channel		
Diameter Large End	**Length 1.5-5 m**	**5-15 m**	**>15 m**	**Length 1.5-5 m**	**5-15 m**	**>15 m**
0.1-<0.3 m	☐	☐	☐	☐	☐	☐
0.3-0.5 m	☐	☐	☐	☐	☐	☐
0.5-0.8 m	☐	☐	☐	☐	☐	☐
>0.8 m	☐	☐	☐	☐	☐	☐

SUBSTRATE SIZE CLASS CODES	POOL FORM CODES	CHANNEL UNIT CODES
RS = BEDROCK (SMOOTH)–(Larger than a car) RR = BEDROCK (ROUGH)-(Larger than a car) BL = BOULDER (250 to 400 mm)-(Basketball to car) CB = COBBLE (64 to 250 mm)-(Tennis ball to basketball) GC = COARSE GRAVEL (16 to 64mm)-(Marble to Tennis ball) GF = FINE GRAVEL (2 to 16mm)-(Ladybug to marble) SA = SAND (0.06 to 2mm)-(Gritty up to ladybug size) FN = SILT/CLAY/MUCK-(Not gritty) HP = HARDPAN-(Firm, Consolidated, Fine Substrate) WD = WOOD-(Any Size) OT = OTHER (Write comment on back of form)	N= Not a pool W= Large Woody Debris R = Rootwad B = Boulder or Bedrock F = Unknown, fluvial COMBINATIONS: Eg. WR, BR, WRB	PP = Pool, Plunge PT = Pool, Trench PL = Pool, Lateral Scour PB = Pool, Backwater PD = Pool, Impoundment GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel

Flag Codes: K = no measurement made, U= suspect measurement F1, F2, etc. – flags assigned by each field crew. Explain all flags in comments. 1 = Measure Bar Width at Station 0 and mid-station (5 or 7)

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-2	DATE: 10/6/11	**TRANSECT:**	☒ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0.00	0	BL	0	
LCtr	0.50	8.1	GF	0	
Ctr	1.00	9.4	CB	0	
RCtr	1.40	6.5	CB	0	
Right	1.80	0	OT	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	0 **1** 2 3 4	
Overhanging Veg. = <1 m of Surface	**0** 1 2 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	0 1 **2** 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	79	0.0	
Right	68	0.0	
Wetted Width xxx.x m		1.8	
Bar Width xx.x m		0.0	
Bankfull Width xxx.x m		6.7	
Bankfull Height xx.x m		0.6	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	13		CenR	17	
CenL	16		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	0 1 2 3 **4**	0 1 2 **B** 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 **1** 2 3 4	
Barren, Bare Dirt or Duff	0 1 **2** 3 4	0 1 **2** 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	0 **P** C B	0 P C **B**	
Buildings	**0** P C B	**0** P C B	
Pavement/Cleared Lot	**0** P C B	**0** P C B	
Road/Railroad	**0** P C B	0 P **C** B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-2	DATE: 10/6/11	**TRANSECT:**	☐ **A** ☒ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0.00	0	FN	100	
LCtr	0.68	22.7	FN	100	
Ctr	1.36	26.3	FN	100	
RCtr	2.04	34.3	FN	100	
Right	2.70	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	**0** 1 2 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	139	0.17	
Right	90	0.42	
Wetted Width xxx.x m		2.7	
Bar Width xx.x m		0.0	
Bankfull Width xxx.x m		3.8	
Bankfull Height xx.x m		0.6	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	14		CenR	15	
CenL	13		Left	K	
CenDwn	16		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	0 1 2 **3** 4	0 1 **2** 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 3 **4**	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	0 **1** 2 3 4	0 **1** 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	0 **P** C B	
Pavement/Cleared Lot	**0** P C B	0 **P** C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-2	DATE: 10/6/11	**TRANSECT:**	☐ A ☐ B ☒ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J ☐ K	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0.00	0	FN	100	
LCtr	0.70	20.8	FN	100	
Ctr	1.40	32.7	FN	100	
RCtr	2.10	27.2	FN	100	
Right	2.80	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)

		FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	0 **1** 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	0 1 **2** 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)
D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	0 1 **2** 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 2 3 **4**	
Barren, Bare Dirt or Duff	0 **1** 2 3 4	**0** 1 2 3 4	

HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	0 **P** C B	
Pavement/Cleared Lot	**0** P C B	0 **P** C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	138	0.18	
Right	107	0.19	
Wetted Width xxx.x m		2.8	
Bar Width xx.x m		0.0	
Bankfull Width xxx.x m		3.5	
Bankfull Height xx.x m		0.9	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	10		CenR	11	
CenL	16		Left	K	
CenDwn	12		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-2	DATE: 10/6/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☒ **D** ☐ **E** ☐ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0.00	0	HP	0	
LCtr	0.60	19.6	GF	100	
Ctr	1.20	20.0	SA	100	
RCtr	1.80	19.1	FN	100	
Right	2.40	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 **2** 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	43	0	
Right	120	0.07	
Wetted Width xxx.x m		2.4	
Bar Width xx.x m		0.0	
Bankfull Width xxx.x m		2.8	
Bankfull Height xx.x m		0.8	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	3		CenR	3	
CenL	4		Left	K	
CenDwn	1		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	0 **1** 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 3 **4**	0 1 2 3 **4**	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 **1** 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 2 **3** 4	0 1 2 **3** 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	0 **P** C B	
Pavement/Cleared Lot	**0** P C B	0 **P** C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-2	DATE: 10/6/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☒ **E** ☐ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0.00	0	FN	100	
LCtr	0.65	33.4	FN	100	
Ctr	1.30	33.3	FN	100	
RCtr	1.95	28.7	FN	100	
Right	2.60	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 2 3 4	
Undercut Banks	0 1 **2** 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	140	0.25	
Right	88	0.0	
Wetted Width xxx.x m		2.6	
Bar Width xx.x m		0.0	
Bankfull Width xxx.x m		2.9	
Bankfull Height xx.x m		0.8	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	8		CenR	1	
CenL	0		Left	K	
CenDwn	0		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	0 1 2 **3** 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 2 **3** 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	0 **P** C B	
Pavement/Cleared Lot	**0** P C B	0 **P** C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-2	DATE: 10/6/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☒ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0.00	0	HP	0	
LCtr	0.40	25.3	FN	100	
Ctr	0.80	31.3	GF	50	
RCtr	1.20	23.1	HP	50	
Right	1.60	0	HP		

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	50	0	
Right	73	0	
Wetted Width xxx.x m		1.6	
Bar Width xx.x m		0.0	
Bankfull Width xxx.x m		2.5	
Bankfull Height xx.x m		0.9	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	17		CenR	14	
CenL	15		Left	K	
CenDwn	11		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	0 1 **2** 3 4	
Small Trees (Trunk <0.3 m DBH)	0 **1** 2 3 4	0 1 **2** 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 **3** 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 1 **2** 3 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	0 **1** 2 3 4	0 **1** 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	0 **P** C B	
Pavement/Cleared Lot	**0** P C B	0 **P** C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-2	DATE: 10/6/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** **X-tra Side Channel** ☒ **G** ☐ **H** ☐ **I** ☐ **J** ☐ **K** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0.00	0	HP	0	
LCtr	0.50	5.3	HP	30	
Ctr	1.00	13.1	GF	30	
RCtr	1.50	3.9	HP	25	
Right	2.00	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	49	0	
Right	73	0	
Wetted Width xxx.x m		2.0	
Bar Width xx.x m		0.0	
Bankfull Width xxx.x m		3.1	
Bankfull Height xx.x m		0.7	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	14		CenR	15	
CenL	5		Left	K	
CenDwn	8		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	0 1 2 **3** 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	0 1 **2** 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 3 **4**	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 1 **2** 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	**0** 1 2 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	0 **P** C B	
Pavement/Cleared Lot	**0** P C B	0 **P** C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-2	DATE: 10/6/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☐ **G** ☒ **H** ☐ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0.00	0	HP	0	
LCtr	0.56	8.1	GF	20	
Ctr	1.12	9.6	GF	20	
RCtr	1.68	11.9	HP	0	
Right	2.25	0	FN	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	**0** 1 2 3 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	51	0	
Right	59	0	
Wetted Width xxx.x m		2.3	
Bar Width xx.x m		0.0	
Bankfull Width xxx.x m		3.4	
Bankfull Height xx.x m		0.7	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	17		CenR	17	
CenL	16		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	0 **1** 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	0 1 2 **3** 4	0 1 2 **3** 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 **3** 4	0 1 **2** 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 **1** 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	0 **1** 2 3 4	0 **1** 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	0 **P** C B	
Pavement/Cleared Lot	**0** P C B	0 **P** C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-2	DATE: 10/6/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☐ **G** ☐ **H** ☒ **I** ☐ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0.00	0	HP	0	
LCtr	0.55	12.7	GF	60	
Ctr	1.10	15.1	GF	10	
RCtr	1.65	10.3	HP	0	
Right	2.20	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 1 2 **3** 4	
Undercut Banks	**0** 1 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	44	0	
Right	90	0	
Wetted Width xxx.x m		2.2	
Bar Width xx.x m		0.0	
Bankfull Width xxx.x m		3.1	
Bankfull Height xx.x m		0.6	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	16		CenR	17	
CenL	15		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	**D** C E M N	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	0 **1** 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	0 **1** 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 **3** 4	0 1 2 3 **4**	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	0 **1** 2 3 4	0 **1** 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 1 **2** 3 4	0 **1** 2 3 4	
Barren, Bare Dirt or Duff	0 1 **2** 3 4	0 **1** 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	0 **P** C B	
Pavement/Cleared Lot	**0** P C B	0 **P** C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-2	DATE: 10/6/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☐ **G** ☐ **H** ☐ **I** ☒ **J** ☐ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0.00	0	HP	0	
LCtr	0.43	24.8	HP	0	
Ctr	0.86	23.7	HP	0	
RCtr	1.28	21.2	HP	0	
Right	1.70	0	FN	100	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	0 **1** 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	82	0	
Right	99	0.1	
Wetted Width xxx.x m		1.7	
Bar Width xx.x m		0.0	
Bankfull Width xxx.x m		2.8	
Bankfull Height xx.x m		0.8	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	16		CenR	17	
CenL	16		Left	K	
CenDwn	17		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES

0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)

D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None

RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 3 **4**	0 1 2 3 **4**	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	**0** 1 2 3 4	**0** 1 2 3 4	
Barren, Bare Dirt or Duff	0 1 **2** 3 4	**0** 1 2 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	0 **P** C B	
Pavement/Cleared Lot	**0** P C B	0 **P** C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

PHAB: CHANNEL/RIPARIAN CROSS-SECTION FORM – STREAMS

SITE ID: WC-2	DATE: 10/6/11	**TRANSECT:**	☐ **A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐ **F** ☐ **G** ☐ **H** ☐ **I** ☐ **J** ☒ **K**	**X-tra Side Channel** ☐

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB xx.xx m	Depth xxx cm	Size Class Code	Embed. 0-100%	Flag
Left	0.00	0	FN	100	
LCtr	0.67	17.0	FN	100	
Ctr	1.34	20.2	GF	20	
RCtr	2.01	18.2	GF	20	
Right	2.66	0	HP	0	

SUBSTRATE SIZE CLASS CODES	Embed. (%)
RS = Bedrock(Smooth)-(Larger than a car)	0
RR = Bedrock (Rough)-(Larger than a car)	0
BL = Boulder (250 to 400 mm)-(Basketball to car)	
CB = Cobble (64 to 250 mm)-(Tennis ball to basketball)	
GC = Coarse Gravel (16 to 64mm)-(Marble to Tennis ball)	
GF = Fine Gravel (2 to 16mm)-(Ladybug to marble)	
SA = Sand (0.06 to 2mm)-(Gritty up to ladybug size)	100
FN = Silt/Clay/Muck-(Not gritty)	100
HP = Hardpan-(Firm, Consolidated, Fine Substrate)	0
WD = Wood-(Any Size)	
OT = Other (Write comment below)	

FISH COVER/OTHER	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%) (circle one)	FLAG
Filamentous Algae	**0** 1 2 3 4	
Macrophytes	**0** 1 2 3 4	
Woody Debris >0.3 m (Big)	**0** 1 2 3 4	
Brush/Woody Debris <0.3 (Small)	**0** 1 2 3 4	
Live Trees or Roots	**0** 1 2 3 4	
Overhanging Veg. = <1 m of Surface	0 **1** 2 3 4	
Undercut Banks	0 **1** 2 3 4	
Boulders	**0** 1 2 3 4	
Artificial Structures	**0** 1 2 3 4	

BANK MEASUREMENTS

	Bank Angle 0-360	Undercut Dist. (m)	Flag
Left	120	0.1	
Right	87	0.0	
Wetted Width xxx.x m		2.7	
Bar Width xx.x m		0.0	
Bankfull Width xxx.x m		3.2	
Bankfull Height xx.x m		0.7	
Incised Height xx.x m		K	

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17 Max)

		Flag			Flag
CenUp	16		CenR	11	
CenL	14		Left	K	
CenDwn	9		Right	K	

Flag Codes: K= Sample not collected; U= Suspect sample; F1, F2, etc.= misc. flag assigned by field crew. Explain all flags in comment sections.

Flag	Comments

VISUAL RIPARIAN ESTIMATES	0=Absent (0%) 1=Sparse (<10%) 2=Moderate (10-40%) 3=Heavy (40-75%) 4=Very Heavy (>75%)	D=Deciduous C=Coniferous E=Broadleaf Evergreen M=Mixed N=None	
RIPARIAN VEGETATION COVER	Left Bank	Right Bank	Flag
	Canopy (>5 m high)		
Vegetation Type	D C E M **N**	D C E M **N**	
Big Trees (Trunk >0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
Small Trees (Trunk <0.3 m DBH)	**0** 1 2 3 4	**0** 1 2 3 4	
	Understory (0.5 to 5 m high)		
Vegetation Type	**D** C E M N	**D** C E M N	
Woody Shrubs and Saplings	0 1 2 **3** 4	0 1 2 3 **4**	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	**0** 1 2 3 4	
	Ground Cover (<0.5 m high)		
Woody Shrubs and Saplings	**0** 1 2 3 4	**0** 1 2 3 4	
Non-Woody Herbs, Grasses, Forbs	0 **1** 2 3 4	0 1 **2** 3 4	
Barren, Bare Dirt or Duff	0 **1** 2 3 4	0 1 **2** 3 4	
HUMAN INFLUENCE	0= Not Present P= >10 m C= Within 10 m B= On Bank		
	Left Bank	Right Bank	Flag
Wall/Dike/Revetment/ Riprap/Dam	**0** P C B	**0** P C B	
Buildings	**0** P C B	0 **P** C B	
Pavement/Cleared Lot	**0** P C B	0 **P** C B	
Road/Railroad	**0** P C B	**0** P C B	
Pipes (Inlet/Outlet)	**0** P C B	**0** P C B	
Landfill/Trash	**0** P C B	**0** P C B	
Park/Lawn	**0** P C B	**0** P C B	
Row Crops	**0** P C B	**0** P C B	
Pasture/Range/Hay Field	**0** P C B	**0** P C B	
Logging Operations	**0** P C B	**0** P C B	
Mining Activity	**0** P C B	**0** P C B	

RIPARIAN "LEGACY" TREES AND INVASIVE ALIEN PLANTS

SITE ID: WC-2 DATE: 10/6/11

TRAN	LARGEST LEGACY TREE VISIBLE FROM THIS STATION						ALIEN PLANT SPECIES PRESENT IN LEFT AND RIGHT RIPARIAN PLOTS				
	Trees not Visible	DBH (m)	Height (m)	Dist. from wetted margin (m)	Type	Taxonomic Category	Check all that are present				
A	☐	☐0-0.1 ☐.75-2 ☒.1-.3 ☐>2 ☐.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	0	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Willow	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed	☐Engl Ivy ☐CanThis ☐Teasel ☐C Burd	☐Ch Grass ☐M This ☐Spurge ☐Rus Ol	
B	☐	☒0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	1.0	☐Deciduous ☐Coniferous ☐Broadleaf Evergreen	Willow	☐ None	☒RC Grass ☐Salt CEd ☒Hblack ☐G Reed	☐Engl Ivy ☐Can This ☒Teasel ☐C Burd	☐Ch Grass ☐M This ☐Spurge ☐Rus Ol	
C	☐	☐0-0.1 ☐.75-2 ☒.1-.3 ☐>2 ☐.3-.75	☐<5 ☒5-15 ☐15-30 ☐>30	1.0	☐Deciduous ☐Coniferous ☐Broadleaf Evergreen	Willow	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed	☐Engl Ivy ☒Can This ☒Teasel ☐C Burd	☐Ch Grass ☐M This ☐Spurge ☐Rus Ol	

INSTRUCTIONS

Legacy trees are defined as the largest tree within your search area, which is as far as you can see, but within maximum limits as follows:

Wadeable Streams: Confine search to no more than 50 m from left and right bank and extending upstream to next transect (for 'K' look upstream 4 channel widths)

Non-wadeable Rivers: Confine search to no more than 100 m from left and right bank and extending both upstream and downstream as far as you can see confidently.

Alien Plants: Confine search to riparian plots on left and right bank

Wadeable Streams: 10 m x 10 m
Non-wadeable Rivers: 10 m x 20 m

Not all aliens are to be identified in all states. See Field Manual and Plant Identification Guide.

TAXONOMIC CATEGORIES
Acacia/Mesquite Alder/Birch Ash Maple/Box elder Oak Poplar/Cottonwood Sycamore Willow Unknown or Other Deciduous
Cedar/Cypress/Sequoia Fir (including Douglas Fir and Hemlock) Juniper Pine Spruce Unknown or Other Deciduous
Unknown or Other Broadleaf Evergreen
Snag (Dead tree of any species)

ALIEN SPECIES		
RC Grass	Reed Canarygrass	*Phalaris arundinacea*
Engl Ivy	English Ivy	*Hedera Helix*
ChGrass	Cheat Grass	*Bromus tectorum*
Salt Ced	Salt Cedar	*Tamarix spp.*
Can This	Canada thistle	*Cirsium arvense*
M This	Musk thistle	*Carduus nutans*
Hblack	Himalayan blackberry	*Rubus discolor*
Teasel	Teasel	*Dipsacus fullonum*
Spurge	Leafy spurge	*Euphorbia esula*
G Reed	Giant Reed	*Arundo donax*
C Burd	Common burdock	*Arctium minus*
Rus Ol	Russian-olive	*Elaeagnus angustifolia*

COMMENTS

Transects D to K continued on next page

RIPARIAN "LEGACY" TREES AND INVASIVE ALIEN PLANTS

SITE ID: WC-2 DATE: 10/6/11

TRAN	LARGEST LEGACY TREE VISIBLE FROM THIS STATION						ALIEN PLANT SPECIES PRESENT IN LEFT AND RIGHT RIPARIAN PLOTS	
	Trees not Visible	DBH (m)	Height (m)	Dist. from wetted margin (m)	Type	Taxonomic Category	Check all that are present	
D	☒	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30		☐Deciduous ☐Coniferous ☐Broadleaf Evergreen		☐ None	☐RC Grass ☐Salt Ced ☐Hblack ☐G Reed ☐Engl Ivy ☐CanThis ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
E	☒	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30		☐Deciduous ☐Coniferous ☐Broadleaf Evergreen		☐ None	☐RC Grass ☐Salt CEd ☐Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
F	☒	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30		☐Deciduous ☐Coniferous ☐Broadleaf Evergreen		☐ None	☐RC Grass ☐Salt Ced ☐Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
G	☐	☐0-0.1 ☒.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	K	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Cottonwood	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☒Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
H	☐	☐0-0.1 ☐.75-2 ☒.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	K	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Alder	☐ None	☐RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☒Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
I	☐	☐0-0.1 ☐.75-2 ☒.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☒15-30 ☐>30	K	☒Deciduous ☐Coniferous ☐Broadleaf Evergreen	Alder	☐ None	☒RC Grass ☐Salt Ced ☒Hblack ☐G Reed ☐Engl Ivy ☐Can This ☒Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
J	☒	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30		☐Deciduous ☐Coniferous ☐Broadleaf Evergreen		☐ None	☐RC Grass ☐Salt Ced ☐Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol
K	☒	☐0-0.1 ☐.75-2 ☐.1-.3 ☐>2 ☐.3-.75	☐<5 ☐5-15 ☐15-30 ☐>30		☐Deciduous ☐Coniferous ☐Broadleaf Evergreen		☐ None	☐RC Grass ☐Salt Ced ☐Hblack ☐G Reed ☐Engl Ivy ☐Can This ☐Teasel ☐C Burd ☐Ch Grass ☐M This ☐Spurge ☐Rus Ol

ATTACHMENT D. City of Salem Comments on EPA Proposed Additions to 2010 303(d) Integrated Report (April 27, 2012).

CITY OF Salem AT YOUR SERVICE

PUBLIC WORKS DEPARTMENT

1410 20th Street SE, Bldg #2 • Salem, OR 97302-1200 • Phone 503-588-6063 • Fax 503-588-6480

April 27, 2012

Jill Gable
Watershed Unit
U.S. Environmental Protection Agency, Region 10
1200 Sixth Avenue Suite 900 (OWW-134)
Seattle WA 98101-3140

SUBJECT: **City of Salem Comments to Proposed Revisions to Oregon's 2010 Impaired Waters List**

Dear Ms. Gable:

City of Salem Public Works Department staff have reviewed the Environmental Protection Agency's (EPA) proposed revisions to the 2010 list of impaired waters that was developed by the Oregon Department of Environmental Quality (ODEQ) as part of its 2010 Integrated Report. The purpose of this letter is to provide the EPA with comments about the proposed revisions.

Stream segments for which the comments pertain are within the jurisdictional boundaries of the City of Salem. Furthermore, each stream is also a receiving water body for the City's Municipal Separate Storm Sewer System.

Comments that follow are organized by the proposed listing parameter and applicable stream name(s), and are based on information provided by EPA at the following website: http://yosemite.epa.gov/R10/water.nsf/Public+Notices/oregon303d.

1. **Dissolved Oxygen—Glenn Creek (LLID No. 1230650449903)**

   a. *Proposed Listing:* Glenn Creek, dissolved oxygen: River miles 4.1 to 7, non-spawning cold water criteria: not less than 8.0 mg/L.

   b. *Comment:* The EPA has already approved a dissolved oxygen 303(d) listing, necessitating a Total Maximum Daily Load (TMDL) for Glenn Creek, river miles 0 to 7. The previous approval was for non-spawning **cool** water criteria (not less than 6.5 mg/L). The City questions if this new listing is in error because the EPA has already approved a cool water criteria that encompasses river miles 4.1 to 7.

2. **Dissolved Oxygen—Clark Creek (LLID No. 1230332449270)**

   a. *Proposed Listing:* Clark Creek, dissolved oxygen.

   b. *Comment:* A stream segment discrepancy was identified between EPA documents Enclosure 3: "Proposed Additions to Oregon's 2010 303(d) List" (PDF) and the supporting Excel data spreadsheet, "Dissolved Oxygen (Microsoft Excel Spreadsheet)." The PDF file shows the resident trout spawning criteria applicable stream segment identified as river mile 0 to 3.2, while the Excel spreadsheet shows the resident trout spawning criteria segment identified as river mile 0 to 1.9. The City questions if the PDF is in error because the PDF is based

on data in the spreadsheet. The City requests that the EPA correct this mistake prior to final approval.

3. **Dissolved Oxygen—Mill Creek (LLID No. 1230393449519)**

   a. *Proposed Listing:* Mill Creek, dissolved oxygen: River miles 0 to 19, resident trout spawning criteria: not less than 11.0 mg/L between January 1–May 15.

   b. *Comment:* The City requests clarification as to why the "resident trout dissolved oxygen spawning criteria" is proposed for listing, but the "salmon/steelhead spawning criteria" is not being proposed for listing for this stream segment. The ODEQ has identified that both trout and salmon/steelhead spawning dissolved oxygen criteria to be not less than 11.0 mg/L. The identified season for salmon/steelhead spawning for Mill Creek is October15–May15; however the listing is for January 1–May 15. It seems appropriate for the date range of the proposed listing to correspond with the date range of the salmon/steelhead spawning criteria.

4. **Biological Criteria—Claggett Creek (LLID No. 1230310450293), Clark Creek (LLID No. 1230332449270), Croisan Creek (LLID No. 1230550449257), Glenn Creek (LLID No. 1230650449903), and Pringle Creek Tributary (LLID No. 1230217449092)**

   a. *Proposed Listings:*

      i. Claggett Creek, biological criteria, river miles 0 to 5.2.

      ii. Clark Creek, biological criteria, river miles 0 to 1.9.

      iii. Croisan Creek, biological criteria, river miles 0 to 6.5.

      iv. Glenn Creek, biological criteria, river miles 0 to 7.

      v. Pringle Creek Tributary, biological criteria, river miles 0 to 2.8.

   b. *Comment:* The ODEQ identified the streams listed above as Category 3C, being that a pollutant causing the impairment is unknown and a TMDL cannot be developed. The City requests clarification as to how biological criteria 303(d) listings are justified, particularly if the pollutant causing the impairment is unknown and a TMDL cannot be developed.

The City of Salem thanks the EPA for providing an opportunity to submit comments on the proposed listings. If you have any questions, please contact me at jboyington@cityofsalem.net or 503-588-6063, extension 7730.

Sincerely,

Justin Boyington
Stormwater Flow Monitoring Analyst

VLS/DM:G:\Group\Files\CHRONO\2012\JB 042412 salem comment 303d adds.doc
By Email
cc: File: Chrono