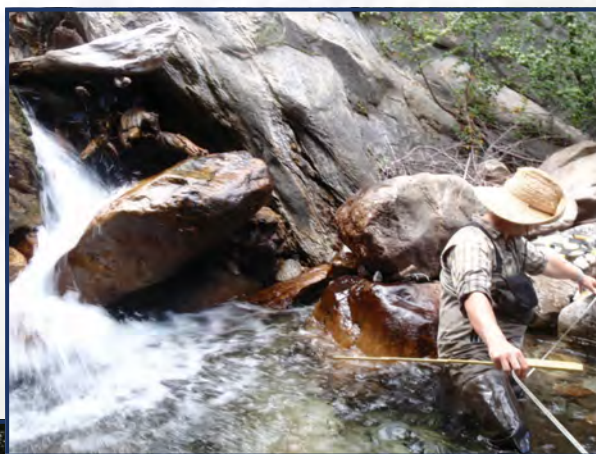


Appendix E

Baseline Aquatic Habitat Monitoring Survey

Pine Creek Baseline Aquatic Habitat Monitoring Survey

Final Report of 2012 Results



March 2013

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Attachment C – SoCal B-IBI Scores

Attachment D – Field Data Sheets

Attachment E – Representative Site Photos

Attachment F – CDFW ABL External QC Report

INTRODUCTION

In the fall of 2012, ECORP was contracted by Glenn Lukos Associates, Inc. to conduct a baseline aquatic habitat survey using Surface Water Ambient Monitoring Program (SWAMP) sampling protocols and including a benthic macroinvertebrate (BMI) bioassessment assessment of Pine Creek above and below its confluence with Morgan Creek, in the vicinity of the Pine Creek Tungsten Mine near Bishop, Inyo County, California. Pine Creek Mine, LLC has filed an application to construct and operate a hydroelectric plant to generate electricity using spring water that accumulates. There is currently a concrete plug at the entrance to the mine shaft that allows water to accumulate. A pipe running through the concrete plug in the mine shaft allows water to exit the mine into Morgan Creek which drains immediately downstream into Pine Creek.

Location and Setting

Pine Creek is approximately 22.0 kilometers (km) (13.7 miles [mi]) in length and flows from its headwaters at Pine Creek Pass at an elevation of 11,120 feet (ft) through Upper Pine Lake, Pine Lake, and eventually drains into Lower Rock Creek just before its confluence with the Owens River within the Owens River Basin (Figure 1). Pine Creek Mine is located approximately 27.2 km (16.9 mi) to the west of Bishop, California. The mine is located just upstream from its confluence with Morgan Creek at an approximate elevation of 7,800 ft. Morgan Creek is an ephemeral creek that is approximately 4.3 km (2.7 mi) in length and flows from its headwaters at an elevation of 9,200 feet to its confluence with Pine Creek just downstream from Pine Creek Mine. Spring snowpack melt and naturally occurring artesian groundwater springs are the main contributors to stream flow.

METHODS

Physical habitat data collection and benthic macroinvertebrate sampling methods conformed to SWAMP's standard targeted riffle composite (TRC) method for documenting and describing benthic macroinvertebrate assemblages within sampling sites.

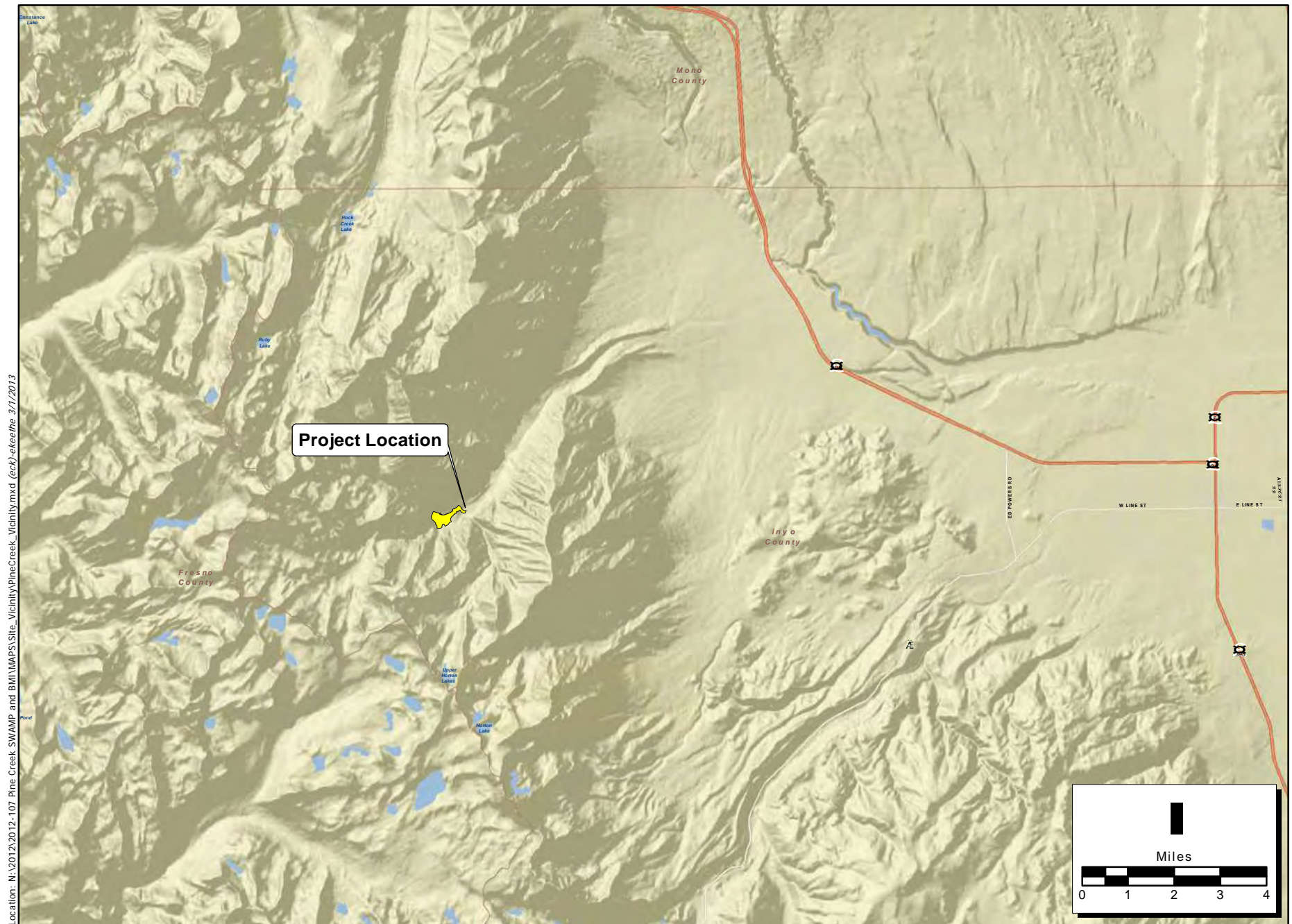


Figure 1. Project Vicinity

2012-107 Pine Creek SWAMP and BMI Assessment

Physical Habitat Characterization

Two stream reaches (sites), each measuring 150 meters (m) in length, were selected during the Pine Creek Baseline Aquatic Habitat Monitoring Survey conducted on 10 and 11 September 2012 (Figure 2). One site was established in Pine Creek upstream from its confluence with Morgan Creek and served as the reference site (control site) for the study. The control site was located slightly outside the project area because streamflow in Pine Creek became subsurface within the project area. The control site was therefore located upstream and slightly outside of the project area because it was the only location in which a 150-m sampling reach could be located above the confluence with Morgan Creek.

A second site was established in Pine Creek downstream from the confluence with Morgan Creek and served as the potentially-affected site (experimental site) for the study. This site was selected based on its proximity to the confluence with Morgan Creek and the ability of surveyors to safely work within the stream channel.

In an effort to minimize any anomalous readings, water quality readings were collected prior to instream surveys. A multi-probe water quality meter (HORIBA Model U-52) was utilized to record water temperature, conductivity, salinity, dissolved oxygen (DO), total dissolved solids (TDS), pH, turbidity, and oxidation-reduction potential. The water quality meter was calibrated according to the manufacturer's instructions prior to the survey, and the data were tabulated according to site location and date of collection.






Physical habitat (PHAB) characteristics at each site location were evaluated, measured, and recorded using California's State Water Resources Control Board (SWRCB) SWAMP procedures (Ode 2007). According to SWAMP protocols, PHAB characteristics that are measured in streams less than 10 m wide should be based on a 150-m reach with sub-samples collected along 11 transects and 10 inter-transects.

At each transect, a tape measure was extended perpendicularly across the stream to measure the wetted width, bankfull width, and bankfull height dimensions. Along these transect lines, distance from left bank, depth, substrate size class, percent cobble embeddedness, presence of



**Figure 2.
Project Area Map**

Map Features

-  Survey Area
-  Jurisdictional Streams
-  Discharge Point
-  Control Site
-  Experimental Site

coarse particulate organic matter (CPOM), microalgae thickness, presence of attached macroalgae, presence of unattached macroalgae, and presence of aquatic macrophytes were recorded at predetermined locations (left and right banks, center, and left and right centers). Canopy cover was measured by taking four readings (center left, center upstream, center right, and center downstream) using a densiometer. Visual estimates of riparian vegetation, instream habitat complexity, human influence, and bank stability were also recorded. The evaluation of riparian bank vegetation and instream habitat complexity was provided using the SWAMP Stream Habitat Characterization forms rating scale from 0 to 4. The rating scale is arranged as follows:

0 = Absent	(0%)
1 = Sparse	(<10%)
2 = Moderate	(10-40%)
3 = Heavy	(41-75%)
4 = Very Heavy	(>75%)

At each inter-transect, a tape measure was extended perpendicularly across the stream to measure the wetted width. Along these transect lines, distance from left bank, depth, substrate size class, percent cobble embeddedness, presence of coarse particulate organic matter (CPOM), microalgae thickness, presence of attached macroalgae, presence of unattached macroalgae, and presence of aquatic macrophytes were recorded at predetermined locations (left and right banks, center, and left and right centers). Visual estimates of the percentage of flow habitats present were also recorded.

Streamflow discharge data were collected at the downstream extent of each site. Water discharge was measured using a Marsh-McBirney Flo-Mate 2000 electromagnetic flowmeter (FLO-MATE 2000). The flowmeter was calibrated according to the manufacturer's instructions prior to the survey, and the data were tabulated according to site location and date of collection. Surveyors also recorded evidence of any recent rainfall or fires in the area, in addition to the dominant surrounding land use.

The slope of the entire reach was measured using a hand-held inclinometer. Additional habitat characteristics including rankings of epifaunal substrate/cover, sediment deposition, and channel alteration were recorded using the following scale:

20-16	= Optimal	(>70%)
15-11	= Suboptimal	(41-70%)
10-6	= Marginal	(20-40%)
5-0	= Poor	(<20%)

BMI Collection

Within each site, a total of eight kick samples were collected within eight distinct riffle habitats using a 0.02-inch diameter mesh D-framed kicknet. Each of the eight subsamples covered one square foot of the stream bottom, and were used to form one composite sample for each site. Sub-samples were taken from a defined "core area" within each riffle, and surveyors were careful to avoid edges along channel margins as well as the upstream or downstream edges of the riffle. Samples were collected starting at the most downstream riffle unit and proceeding upstream to minimize instream disturbance.

All samples were preserved with 95-percent ethanol, and properly labeled with time, date, and site location. Samples were delivered to the EcoAnalysts laboratory, where each sample was then rinsed in a standard No. 35 sieve (0.5 mm) and transferred to a tray with four, square-inch grids for subsampling. In cases where BMI abundance exceeded 100 organisms per grid, half grids were delineated to assure that a minimum of three discrete areas within the tray of benthic material were subsampled. A total of at least 500 BMIs were subsampled from a minimum of five grids, or five half grids.

All organisms were removed from the subsample and identified to Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT) Level 2 protocol (Richards and Rogers 2006). Subsampled BMIs were identified by a taxonomist approved by the California Department of Fish and Wildlife (CDFW), (formerly California Department of Fish and Game), for U.S. Environmental Protection Agency (USEPA) evaluations using standard aquatic

macroinvertebrate identification keys. Following the data collection and sample processing, all data were subject to quality assurance/quality control (QA/QC) procedures including, but not limited to, spot-checks of data and review of electronic data for completeness. Standard biological metrics (as outlined in Ode et al. 2005) plus any additional relevant metrics (regional IBI), were calculated for each reach and presented in graphical or tabular form. Finally, the CDFW Aquatic Bioassessment Laboratory (ABL) was contracted to perform an external QC review of the sample identification. Twenty percent of the samples collected (or one sample, if five samples or less are collected) were randomly selected for QC by the taxonomist and sent to the CDFW ABL for taxonomic verification.

RESULTS

The following section provides an overview of the BMI results (all sampling reaches combined) obtained during the survey effort in fall 2012; general descriptions of sampling reaches including physical habitat conditions (based on fall surveys); and specific BMI results, by sampling reach, for the survey efforts.

During the fall 2012 surveys, an estimated 5,157 BMIs were collected from the two sampling sites, representing 51 distinct taxa and 11 orders. Of this total, 1,291 BMIs were identified during the sample processing effort.

Habitat and substrate characteristics for both sites are provided in Attachment A. Raw BMI data and summary metrics are presented in Attachment B. The SoCal B-IBI scores for each site are provided in Attachment C. Additionally, copies of field data sheets completed for the fall surveys are included in Attachment D. Attachment E includes representative site photos.

Control Site

The control sampling site is located on Pine Creek upstream from the Pine Creek Mine at UTM coordinates 11S 0349226 E, 4135902 N and an elevation of 7,961 ft. The downstream end of the 150-m sampling site is located approximately 520 m upstream from its confluence with Morgan Creek. The control site is within a high gradient mountain creek with a slope of

19.56%, with an average streamflow of 2.9 cubic feet per second (cfs). Water temperature was 14.35 degrees Celsius (°C), dissolved oxygen was 8.24 milligrams per liter (mg/L), and pH was 9.68 within the site (Table 1). Cascades/falls and riffles were the primary instream habitats with substrates dominated by cobble and both small and large boulders. Bankfull widths ranged from 3.8 to 9.2 m, with both stable and vulnerable banks. Stream depths ranged from near zero to 110 centimeters (cm). Canopy cover was intermediate with an average of 34.1% and consisted primarily of water birch riparian scrub with minimal deposits of coarse particulate organic matter (CPOM) in the stream channel. Riparian vegetation consisted of miner's dogwood (*Cornus* sp.), mountain dogwood (*Cornus* sp.), mountain alder (*Alnus* sp.), water birch (*Betula* sp.), California buckeye (*Aesculus* sp.), buckthorn (*Rhamnus* sp.), and slippery elm (*Ulmus* sp.). Emergent vegetation was absent throughout the reach. Human influence within and adjacent to the reach was evident by the trash and landfill present, along with a bridge that extends over the reach. The surrounding land use was forest and mining.

The three RBP scores for this reach were in the Optimal range. Epifaunal substrate cover scored a 17 (Optimal), sediment deposition consistently scored a 19 (Optimal), and the channel alteration parameter consistently scored 19 (Optimal) (see Attachment A). The SoCal B-IBI score for this reach was in the 'Fair' condition category (see Attachment B, Figure 3).

Community metrics indicated a balanced benthic community, as indicated by the Shannon Diversity Index (SDI) (see Attachment B, Figure 4). The stonefly, *Zapada cinctipes* dominated the benthic community, comprising 15% of the community (see Attachment B, Figure 5). The Tolerance Value (2.7) was lower than that observed for the experimental site (see Attachment B, Figure 6). Intolerant Organisms accounted for 56% of the community (see Attachment B, Figure 7). The high number of Intolerant Organisms directly affected the Tolerance Value.

Correspondingly, Tolerant Organisms comprised 3.5% of the community. Additionally, EPT and Sensitive EPT indices exceeded 60% of the community (see Attachment B, Figure 8).

Table 1. General Physical Habitat Characteristics and Water Quality Measurements, Fall 2012

		Fall 2012	
Sampling Information		Pine Creek	Pine Creek
		Control	Experimental
		9/10/2012	9/11/2012
		13:30	10:05
		150m	150m
		0.03	0.07
		8.24	9.17
		14.35	10.64
		0.00	0.00
		9.68	9.44
		0.00	0.00
		183.00	134.00
0.02	0.05		
Notable field conditions		Control	Experimental
		N	N
		N	N
		FOREST/INDUSTRIAL	FOREST

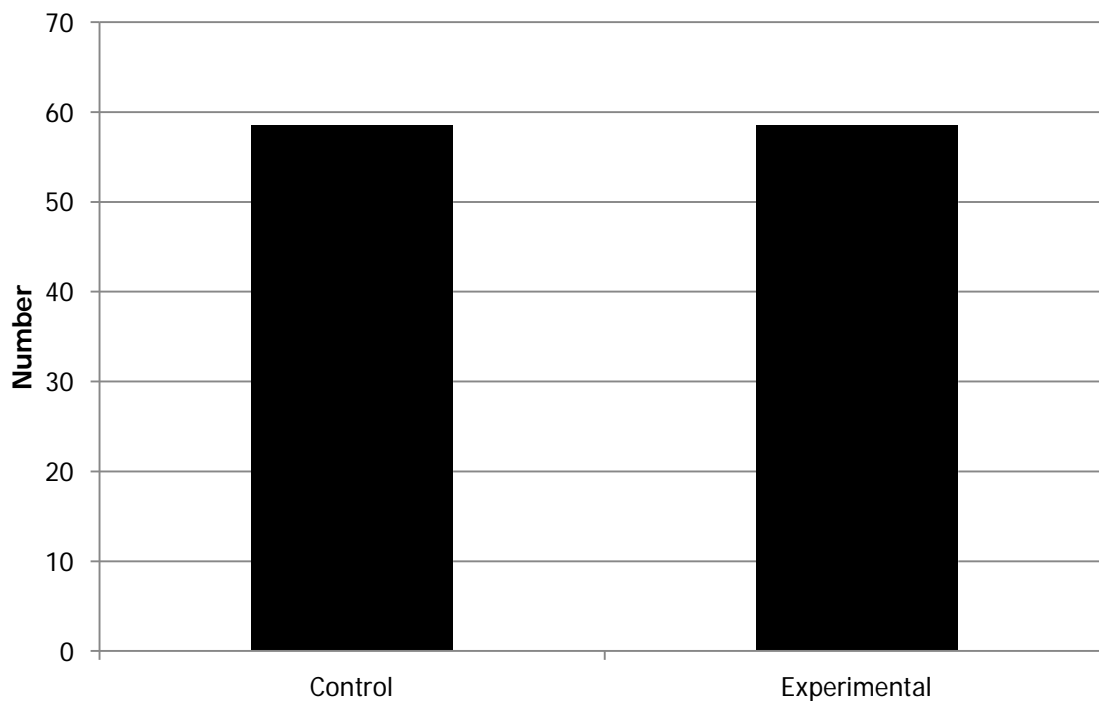


Figure 3. Index of Biological Integrity (B-IBI) for Pine Creek Benthic Macroinvertebrate Study, Fall 2012.

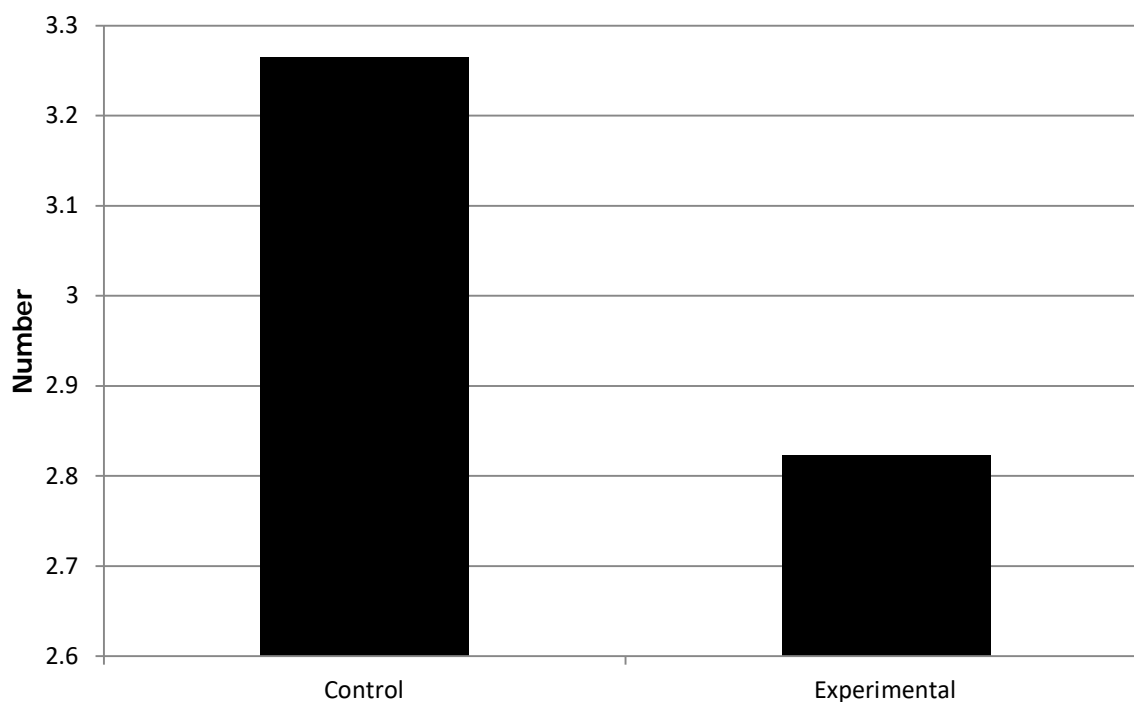


Figure 4. Shannon Diversity Index for Pine Creek Benthic Macroinvertebrate Study, Fall 2012.

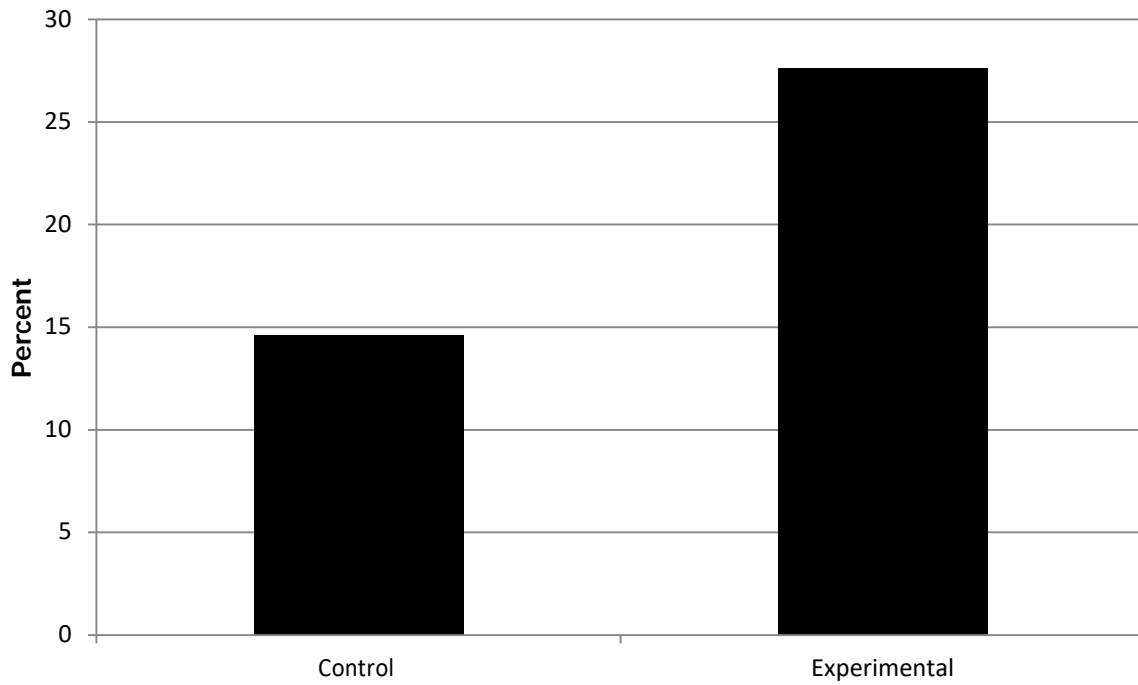


Figure 5. Percent Dominant Taxa for Pine Creek Benthic Macroinvertebrate study, Fall 2012.

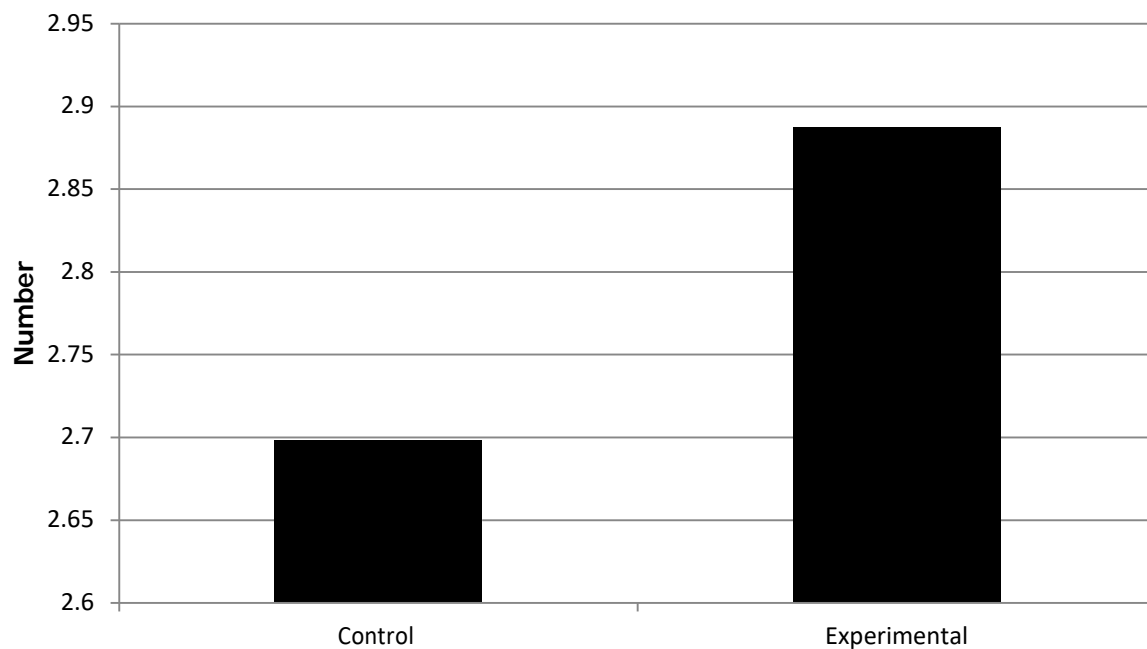


Figure 6. Tolerance Value for Pine Creek Benthic Macroinvertebrate Study, Fall 2012.

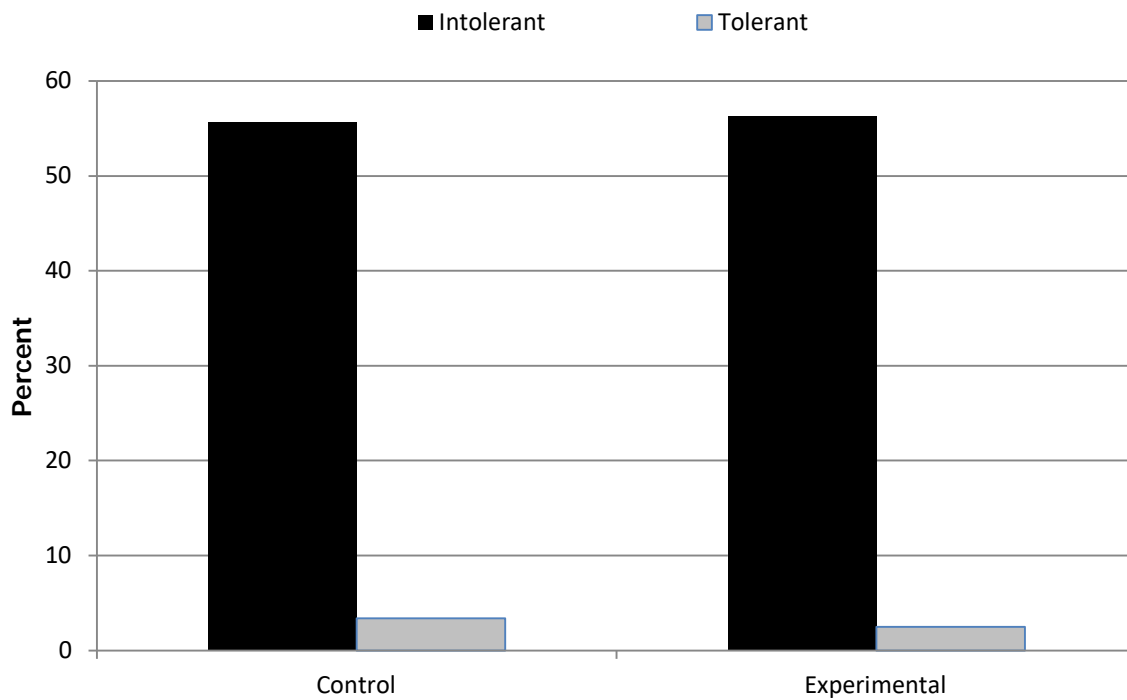


Figure 7. Tolerance Indices for Pine Creek benthic Macroinvertebrate Study, Fall 2012.

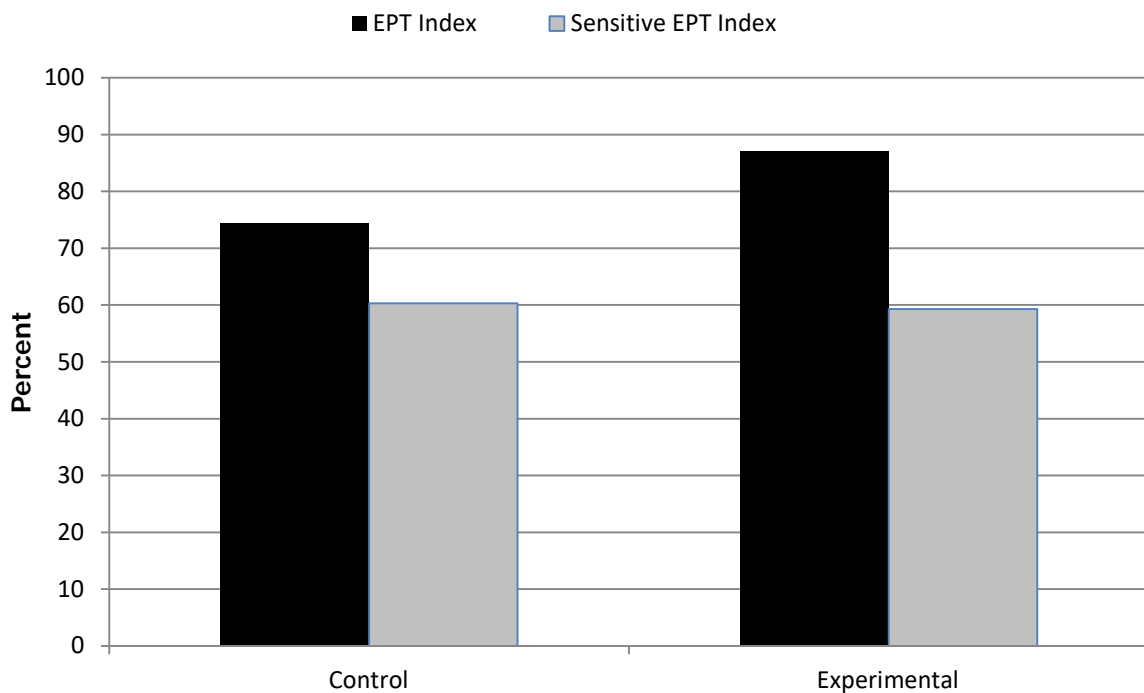


Figure 8. EPT Indices for Pine Creek Benthic Macroinvertebrate Study, Fall 2012.

Functional Feeding Group metrics indicated that the community was co-dominated by three feeding groups; Predators, Collector-gatherers, and Shredders exceed 20% of the community (see Attachment B, Figure 9). Additionally, Scrapers comprised about 20% of the community.

Experimental Site

The experimental sampling site is located on Pine Creek downstream from the Pine Creek Mine at UTM coordinates 11S 0350045 E, 4136395 N and an elevation of 7,475 ft. The upstream end of the 150-m sampling site is located approximately 370 m downstream from its confluence with Morgan Creek. The experimental sampling site is within a high gradient mountain creek with a slope of 11.73% and an average streamflow of 17.7 cfs. Water temperature was 10.64 °C, dissolved oxygen was 9.17 mg/L, and pH was 9.44 within the site (Table 1). Rapids was the primary instream habitat type with substrates dominated by cobble and both small and large boulders (Attachment A). Bankfull widths ranged from 4.2 to 6.6 m, with both stable and vulnerable banks present. Stream depths ranged from near zero to 110 cm. Canopy cover was dense and averaged 75.3%. The riparian corridor consisted primarily of water birch riparian scrub, which included elderberry (*Sambucus* sp.), box elder (*Acer* sp.), mountain maple (*Acer* sp.), and ash (*Fraxinus* sp.), with minimal deposits of CPOM in the stream channel. Emergent vegetation was sparse throughout the reach. Human influence within and adjacent to the reach was evident by the trash present. The surrounding land use was forest.

The three Rapid Bioassessment Protocol (RBP) scores for this reach were in the Optimal range. Epifaunal substrate cover scored a 19 (Optimal), sediment deposition consistently scored a 19 (Optimal), and the channel alteration parameter consistently scored 19 (Optimal) (see Attachment A). The SoCal B-IBI score for this reach was in the 'Fair' condition category (see Attachment B, Figure 3).

Community metrics indicate that the benthic community was relatively balanced, as evidenced by the Shannon Diversity Index (SDI) (see Attachment B, Figure 4). The stonefly, *Zapada cinctipes* dominated the benthic community, comprising 28% of the community (see Attachment B, Figure 5). The mayfly, *Beatis* sp. comprised 17% of the community and was the second most abundant organism at this site. The Tolerance Value was slightly higher than was

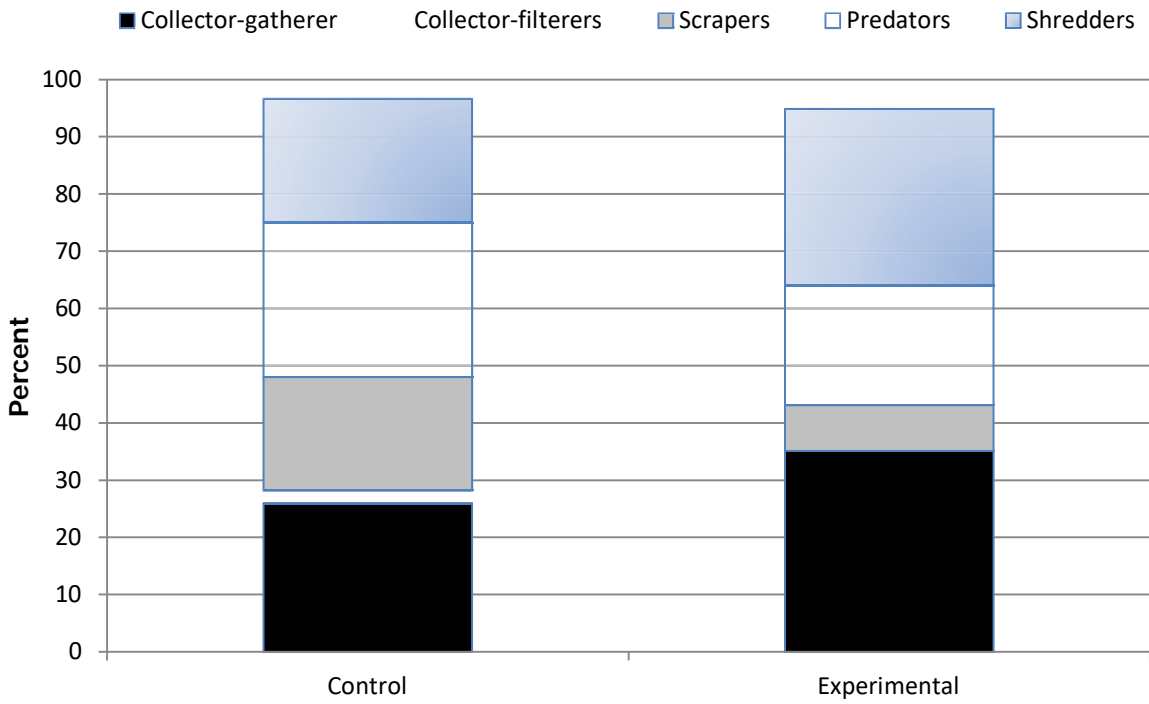


Figure 9. Functional Feeding Group Metrics for Pine Creek Benthic Macroinvertebrate Study, Fall 2012.

observed at the reference site, however, both scored less than 3.0 (see Attachment B, Figure 6). Intolerant Organisms accounted for 56% of the community (see Attachment B, Figure 7). The high number of Intolerant organisms directly affected the Tolerance Value. Correspondingly, Tolerant Organisms comprised 2.5% of the community. Additionally, the EPT Index exceeded 85% and Sensitive EPT Index exceeded 59% of the community (see Attachment B, Figure 8).

Functional Feeding Group metrics indicated that the community was dominated by the three groups; Collector-gatherers, Shredders and Predators. The Collector-gatherers and Shredders each comprised greater than 30% of the community (see Attachment B, Figure 9). Scrapers comprised about 8% of the community.

The experimental site was randomly selected for external QC of taxa identification and counts by the CDFW ABL in Chico. The external QC found only minor discrepancies in the counts of six taxa. There was only one instance where the original ID was disputed by the ABL, and five instances where the original ID was placed at a different taxonomic level. The CDFW ABL external QC report is included in Attachment F.

DISCUSSION

Results from the BMI bioassessment surveys indicated the sites were relatively similar, based upon IBI scores. However, streamflow at the experimental site was approximately six times the flow at the control site, due to a tributary entering Pine Creek between the two sites. Riparian canopy at the experimental site was also about twice that observed at the control site. However, the slope was much higher at the control site. Taxa Richness was higher at the control site as was the Shannon Diversity Index, indicating the control site had a more balanced community compared to the experimental site. Tolerance values were similar between sites, as were percent Intolerant and Tolerant organisms. The control site had a lower EPT Index, however the Sensitive EPT values were similar between sites, with a difference of only 1%. Mayfly and trichoptera taxa were more abundant at the control site, while the experimental site had more stonefly taxa. Abundance estimates were higher at the experimental site.

Substrate composition varied between the two sites; bedrock abundance at the control site was twice that observed at the experimental site. Larger substrates (boulder/bedrock) were more abundant (10%) at the control site and preferred BMI substrates (gravel/cobble) were more abundant (10%) at the experimental site. Habitat composition differed between the two reaches with cascades/falls comprising four times the habitat at the control site. Rapids comprised more than two times the habitat at the experimental site than that observed at the control site.

The following discussion provides an assessment and comparison of the BMI communities present at the control site relative to the communities at the experimental site.

Control Site

The SoCal B-IBI for the control site also scored in the 'Fair' range, indicating a degree of similarity between the two sites. However, the SDI at the control reach was higher than observed at the experimental site. This higher score indicates a relatively more balanced community than observed at the experimental site. Taxa richness also scored higher at this site. The EPT Indices exceeded 60% of the community at this site and many of these organisms were 'sensitive' to pollution. The benthic community was more evenly distributed as described by the Functional Feeding Groups. Four feeding group metrics were about 20% or more of the community, with only a minor percentage of Collector-filterers comprising the community. Predators, Collector-gatherers, Shredders, and then Scrapers were the four most abundant groups in the community, compared to three of these at the experimental site. The Tolerance Value was also lower at this site.

The control site also had a much higher percentage of large substrate types than observed at the experimental site. However, gravels and cobbles still comprised 40% of the substrate, which are favorable habitat for EPT taxa. Fines were a minor component of the substrate and probably had little effect on the benthic communities at this site. One of the biggest differences between the sites was the riparian canopy cover, which was half as abundant at this site compared to the experimental site.

Experimental Site

The SoCal B-IBI score for the experimental site was in the 'Fair' category. In addition to the reach location, substrates in the reach were dominated by cobble and small boulder with little fine substrates. Substrates of cobble, small boulder and coarse gravels are a stable base and preferred substrates for benthic macroinvertebrate communities, especially the orders Ephemeroptera, Plecoptera, and Trichoptera (EPT Taxa) (Hines 1970). The EPT Taxa are sensitive to most types of water pollution, and the number of individuals in these groups decline with decreasing water quality, as does Taxa Richness (Reice and Wohlenberg 2001). However, the EPT taxa were the most abundant organisms in this reach. The dominant taxa was *Zapada cinctipes*, an intolerant stonefly which is sensitive to pollution. The mayfly *Baetis* sp., was the second most dominant taxa, however *Baetis* sp. is not considered a sensitive organism. This reach also had more stonefly taxa than observed in the control reach, and many of the genera observed were also intolerant species. This reach was also dominated by three of the Functional Feeding Group metrics, Percent Collector-gatherers, Shredders and Predators with a few Scrapers. No Collector-filterers were collected in this reach. The SDI was lowest at this site, but indicated a fairly balanced community. Nonetheless, the two sites both appear to be in good condition as determined by the BMI metrics and B-IBI scores.

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ATTACHMENT A

Physical Habitat and Substrate Characteristics, Fall 2012

Attachment A. Physical Habitat and Substrate Characteristics, Fall 2012

Habitat Composition

	Cascade/ Falls	Rapid	Riffle	Run	Glide	Pool	Dry	Total
Control	28	16.5	27	12.5	12	3.5	0.5	100
Experimenta	7	42.5	22.5	18	6.5	3.5	0	100

Substrate Composition

	Wood	Sand	Gravel Fine	Gravel Coarse	Cobble	Small Boulder	Large Boulder	Bedrock Rough	Bedrock Smooth	Total
Control	1.0	4.8	9.5	10.5	20.0	22.9	20.0	11.4	0.0	100.0
Experimenta	1.9	3.8	5.7	13.3	31.4	23.8	16.2	1.0	2.9	100.0

Embeddedness

	Control	Experimenta
Average	37.6	34.8

Canopy Cover

	Control	Experimenta
Average	34.1	75.3

Creek Flow

	Control	Experimenta
Average	2.9	17.7

Additional Habitat Characterization

	Control	Experimenta
Epifaunal Substrate / Cover	17	19
Sediment Depositio	19	19
Channel Alteratio	19	19

ATTACHMENT B

Raw BMI Data and Summary Metrics

Pine Creek BMI Data 2012

	CTV	FFG	Pine Creek Control 6275.1-1	Pine Creek Experimental 6275.1-2
PHYLUM ARTHROPODA				
Class Insecta				
Coleoptera (Larvae)				
Elmidae	4	cg		1
Diptera				
Chironomidae	6			
Tanytarsini	6	cg		
<i>Microspecta sp.</i>	7	cg	4	5
<i>Rheotanytarsus sp.</i>	6	cf	1	
Diamesinae	2	cg		
Diamesini				
<i>Diamesa sp.</i>	5	cg	1	
Orthoclaadiinae	5	cg		
<i>Brillia sp.</i>	5	sh	15	4
<i>Chaetocladius sp.</i>	6	cg		2
<i>Cricotopus sp.</i>	7	cg		2
<i>Eukiefferiella devonica gr.</i>		om	4	4
<i>Eukiefferiella gracei gr.</i>		om	2	
<i>Orthocladus sp.</i>	6	cg		1
<i>Orthocladus (Symp.) lignicola</i>			1	
<i>Orthocladus complex</i>			2	2
<i>Paraphaenocladus 'n. sp.'</i>			1	
<i>Parorthocladus sp.</i>				1
<i>Rheocricotopus sp.</i>	6	om	3	1
<i>Tvetenia bavarica grp.</i>	5	cg	15	3
Dixidae	2	cg		
<i>Dixa sp.</i>	2	cg	1	
Empididae	6	p	3	2
<i>Chelifera /Metachela sp.</i>	6	p	22	5
<i>Clinocera sp.</i>	6	p	1	
<i>Wiedemannia sp.</i>	6	p	20	9
Simuliidae	6	cf		
<i>Simulium sp.</i>	6	cf	4	
Thaumaleidae		sc	1	
<i>Thaumalea sp.</i>		sc		
Tipulidae	3		1	
<i>Dicranota sp.</i>	3	p	2	
Megaloptera				
Corydalidae	0	p		
<i>Orohermes crepusculus</i>	0	p	3	2
Ephemeroptera				
Baetidae	4	cg		
<i>Baetis sp.</i>	5	cg	75	112
<i>Baetis tricaudatus</i>	6	cg	8	51
Ephemerellidae	1	cg		
<i>Caudatella sp.</i>	1	cg	9	4
<i>Caudatella hystrix</i>	1	cg	11	1
<i>Drunella doddsi</i>	0	cg	20	26
<i>Drunella spinifera</i>	0	p	6	1
Heptageniidae	4	sc	1	
<i>Epeorus sp.</i>	0	sc	90	27
<i>Ironodes sp.</i>	3	sc	34	21
<i>Rhithrogena sp.</i>	0	sc	2	3
Leptophlebiidae	2	cg	5	
Plecoptera				
Chloroperlidae	1	p	12	22
Nemouridae	2	sh	19	4
<i>Malenka sp.</i>	2	sh		1
<i>Zapada cinctipes</i>	2	sh	95	177
<i>Zapada columbina</i>	2	sh	7	2
Peltoperlidae	1	sh		1
<i>Yoraperla sp.</i>	1	sh		9
Perlidae	1	p	9	2
<i>Calineuria californica</i>	2	p	2	

	CTV	FFG	Pine Creek Control	Pine Creek Experimental
<i>Doroneuria baumanni</i>	1	p	4	3
<i>Hesperoperla sp.</i>	2	p		11
<i>Hesperoperla hoguei</i>	2	p		3
Perlodidae	2	p	1	1
<i>Frisonia picticeps</i>	2	p	9	26
Pteronarcyidae	0	om		
<i>Pteronarcella sp.</i>	0	om		1
Trichoptera				1
Hydropsychidae	4	cf		
Arctopsychinae			6	14
<i>Arctopsyche sp.</i>	1	p		5
<i>Arctopsyche californica</i>	1	p	1	4
<i>Parapsyche sp.</i>	0	p	9	6
Hydroptilidae	4	ph		
<i>Nothotrichia shasta</i>	4	ph	1	
Lepidostomatidae	1	sh		
<i>Lepidostoma sp.</i>	1	sh	4	
Philopotamidae	3	cf		
<i>Dolophilodes sp.</i>	2	cf	8	
Rhyacophilidae	0	p		
<i>Rhyacophila sp.</i>	0	p	5	5
<i>Rhyacophila betteni gr</i>	0	p	4	
<i>Rhyacophila brunnea gr</i>	0	p	24	10
<i>Rhyacophila hyalinata gr</i>	0	p		2
<i>Rhyacophila vofixa gr.</i>	0	p	1	
Uenoidae	0	sc	1	
<i>Oligophlebodes sp.</i>	0	cg		2
Subphylum Chelicerata				
Class Arachnoidea				
Acari				
Hygrobatidae	5	p		
<i>Hygrobates sp.</i>	8	p	2	
Hydrovolziidae				
Lebertiidae	5	p		
<i>Lebertia sp.</i>	8	p	2	2
Sperchontidae	5	p	1	1
<i>Sperchon sp.</i>	8	p	11	3
<i>Sperchonopsis sp.</i>	8	p	6	8
Torrenticolidae	5	p		
<i>Testudacarus sp.</i>	5	p	4	1
<i>Torrenticola sp.</i>	5	p	12	
Subphylum Crustacea				
Class Ostracoda				
Ostracoda	8	c		3
Cyprididae	8	c		
PHYLUM MOLLUSCA				
Class Bivalvia				
Pelecypoda	8	cf		
Sphaeriidae	8	cf	1	
PHYLUM PLATYHELMINTHES				
Class Turbellaria			1	6
Class Oligochaeta	5	cg	20	15

Pine Creek Summary Metrics, Fall 2012

	Control	Experimental
B-IBI	58.6	58.6
Abundance	2080	3077
Taxa Richness	62	55
Dominant Taxon	14.6	27.6
EPT Taxa	31	32
EPT Index	74.3	87.1
Sensitive EPT Index	60.3	59.3
Ephemeroptera Taxa	11	9
Plecoptera Taxa	9	14
Trichoptera Taxa	11	8
Dipteran Taxa	20	13
Percent Dipteran	16.0	6.4
Non-Insect Taxa	10	8
Percent Non-Insect	9.2	6.1
Percent Chironomidae	7.5	3.9
Percent Hydropsychidae	2.5	4.5
Percent Baetidae	12.8	25.4
Shannon Diversity	3.27	2.82
Tolerance Value	2.7	2.9
Intolerant	55.7	56.3
Tolerant	3.4	2.5
Collector-gatherer	26.0	35.1
Collector-filterers	2.2	0.0
Scrapers	19.8	8.0
Predators	27.1	20.9
Shredders	21.5	30.9
OTHER	1.5	0.9
Piercer herbivore	0.2	0.0
Macrophyte herbivore	0.0	0.0
Omnivore	1.4	0.9
Xylophage	0.0	0.0

ATTACHMENT C

SoCal B-IBI Scores

ECORP Pine Creek SWAMP Benthos2012

Southern California B-IBI. EcoRegion = Southern CA Mountains

Data electronically subsampled to 550 count and certain taxa rolled-up for IBI calculations
(Metrics shown on this page are calculated using CA specific attributes.)

Stream	Pine Creek		Pine Creek	
Site	Control		Experimental	
Time	13:30		10:05	
Sample Date	09-10-2012		09-11-2012	
Percent Subsampled	550 cnt		550 cnt	
EcoAnalysts Sample ID	6275.1-1		6275.1-2	
	Value	Score	Value	Score
Coleoptera Taxa	0.0	0	0.0	0
EPT Taxa	19.0	10	17.0	9
Predator Taxa	17.0	10	13.0	10
% Collector Individuals	28.8	0	35.0	0
% Intolerant Individuals	59.1	10	59.8	10
% Non-Insect Taxa	24.3	6	25.0	6
% Tolerant Taxa	20.6	5	19.2	6
SoCalB-IBI	58.6		58.6	

Score	Rating
0 - 19	Very Poor
20 - 39	Poor
40 - 59	Fair
60 - 79	Good
80 - 100	Very Good

ATTACHMENT D

Field Data Sheets

REACH DOCUMENTATION

Standard Reach Length (wetted width ≤ 10 m) = 150 m Distance between transects = 15 m
 Alternate Reach Length (wetted width > 10 m) = 250 m Distance between transects = 25 m

Project Name: Pine CreekDate: SEPT 10 / 2012Sample
Collection Time: 1330Stream Name: ? C.C.

Site Name/ Description:

Site Code: Pine Creek Control (upstream)

Crew Members:

Latitude (actual - decimal degrees): $^{\circ}$ N 37.35753

datum:

NAD83

other:

GPS Device: Garmin 60CSXLongitude (actual - decimal degrees): $^{\circ}$ W 118.70256

AMBIENT WATER QUALITY MEASUREMENTS

* Turbidity, silica, oxygen saturation, and air temp are optional; calibration date required on page 24

Actual Reach Length (m)
(see reach length guidelines at top of form)

Water Temp (Deg C)	pH	TDS Alkalinity (mg/L) g/L	Turbidity (ntu)*	Oxygen Sat. (%)*
<u>14.35</u>	<u>9.68</u>	<u>0.017</u>	<u>Ø</u>	<u>N/A</u>
Dissolved O ₂ (mg/L)	Specific Conduct (µS/cm)	Salinity (ppt)	OPC Silica (mV)*	Air Temp (Deg C)*
<u>8.24</u>	<u>0.028</u>	<u>Ø</u>	<u>183</u>	<u>26.0</u>

Explanation:

DISCHARGE MEASUREMENTS

1st measurement = left bank (looking downstream)

check if discharge measurements not possible

(explain in field notes section) ☐

VELOCITY AREA METHOD (preferred)

cal. date

Transect Width (m): 3.90

BUOYANT OBJECT METHOD (use ONLY if velocity area method not possible)

Distance from Left Bank (cm)	Depth (cm)	Velocity (ft/sec)	Distance from Left Bank (cm)	Depth (cm)	Velocity (ft/sec)	Float 1	Float 2	Float 3
<u>10</u>	<u>0.5'</u>	<u>-6.2</u>	<u>11</u>	<u>260</u>	<u>1.0</u>			
<u>35</u>	<u>1.0</u>	<u>0.09</u>	<u>12</u>	<u>285</u>	<u>0.9</u>			
<u>60</u>	<u>1.2</u>	<u>0.4</u>	<u>13</u>	<u>310</u>	<u>0.6</u>			
<u>85</u>	<u>1.3</u>	<u>0.76</u>	<u>14</u>	<u>335</u>	<u>0.5</u>			
<u>110</u>	<u>1.1</u>	<u>0.3</u>	<u>15</u>					
<u>131</u>	<u>0.8</u>	<u>0.01</u>	<u>16</u>					
<u>151</u>	<u>1.0</u>		<u>17</u>					
<u>186'</u>	<u>1.0</u>	<u>0.30</u>	<u>18</u>					
<u>210</u>	<u>0.9</u>	<u>0.53</u>	<u>19</u>					
<u>235</u>	<u>0.9</u>	<u>0.81</u>	<u>20</u>					

NOTABLE FIELD CONDITIONS (check one box per topic)

Evidence of recent rainfall (enough to increase surface runoff)	NO	<input checked="" type="checkbox"/>	minimal	<input type="checkbox"/>	>10% flow increase	<input type="checkbox"/>
Evidence of fires in reach or immediately upstream (≤ 500 m)	NO	<input checked="" type="checkbox"/>	< 1 year	<input type="checkbox"/>	< 5 years	<input type="checkbox"/>
Dominant landuse/ landcover in area surrounding reach	Agriculture	<input type="checkbox"/>	Forest	<input checked="" type="checkbox"/>	Rangeland	<input type="checkbox"/>
	Urban/Industrial	<input checked="" type="checkbox"/>	Suburb/Town	<input type="checkbox"/>	Other	<input type="checkbox"/>

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed to attain target count of 25 measure-in %)

1	2	3	4	5	6	7	8	9	10	11	12	13
<u>10</u>	<u>15</u>	<u>30</u>	<u>20</u>	<u>25</u>	<u>25</u>	<u>30</u>	<u>10</u>	<u>10</u>	<u>15</u>	<u>35</u>	<u>25</u>	<u>45</u>
14	15	16	17	18	19	20	21	22	23	24	25	
<u>40</u>	<u>10</u>	<u>80</u>	<u>55</u>	<u>20</u>	<u>45</u>	<u>80</u>	<u>10</u>	<u>5</u>	<u>75</u>	<u>60</u>	<u>25</u>	

Site Code:

Pine Creek Central

Date: Sept 10 / 2012

 AUTO LEVEL
 CLINOMETER
 HAND LEVEL
 OTHER

SLOPE and BEARING FORM (transect based - for Full PHAB only)

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)				
	Stadia rod measurements	Slope (%) or Elevation Difference cm <input checked="" type="checkbox"/> % <input type="checkbox"/>	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements	Slope or Elevation Difference cm <input checked="" type="checkbox"/> % <input type="checkbox"/>	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K	(eye) 1 63			68°						
J	83	8.5		66°		[...], Q	-2.0		45	
I	1q	1,q		(0°)		: t3	\ Sc		43	
H	4t	11io		7d		55	.16%		45	
G	3.i	1'oL		(0q'		-42	205		44	
F	150	113		1d		1g	147		50	
E	t/3	1"20		12-		1	-15,			
D	2,1 7	1"2, 1		70 90		q.5	C:g			
C		1'31		90					90	
B		'8		85		67	106		90	
A		175 1		88					90	
		47 64 99		85 86		4.5	5d		90	

 additional
 calculation
 area

 (-45)
 13 → 55 → (-42) → 16 → 7 → 95 → 41 → 57 → 95 moved onto grid Total slope = 19.85%

ADDITIONAL HABITAT CHARACTERIZATION

High Gradient ☒Low Gradient ☐

Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover (50% for low-gradient streams); mix of submerged logs, undercut banks, cobble or other stable habitat.	40-70% mix of stable habitat (30-50% for low-gradient streams); well-suited for full colonization potential.	20-40% mix of stable habitat (10-30% in low-gradient streams); substrate frequently disturbed or removed.	Less than 20% stable habitat (10% in low-gradient streams); lack of habitat is obvious; substrate unstable or lacking.
Score:	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition (<20% in low-gradient streams).	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected (20-50% in low-gradient streams).	Moderate deposition of new gravel, sand, or fine sediment on bars; 30-50% of the bottom affected (50-80% in low-gradient streams).	Heavy deposits of fine material; increased bar development; more than 50% of the bottom changing frequently (>80% in low-gradient streams).
Score:	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or in minor stream with normal pattern.	Some channelization present, (e.g., bridge abutments); evidence of past channelization (>20yrs) may be present but recent channelization not present.	Channelization may be extensive; on bankments or shoring structures present on both banks; 40 to 80% of stream reach disrupted.	Banks shored with gabion or cement; Over 80% of the stream reach channelized and disrupted; instream habitat greatly altered or removed entirely.
Score:	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Site Code: >...<, t:41<, c:,,,1,	Site Name: p... Cr->...K-...<...>...<...>...	Date: 09/10/2012
Wetted Width (m): 3.1	Bankfull Width (m): <...>...D	Bankfull Height (m): 0.72

Transect A

Transect Substrates										
Position	Dist from L.B. (m)	Depth (cm)	mm/size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	1	SB	—	P (A)	1	P (A) D	P (A) D	P (A) D	0 = No microalgae present
Left Center	0.75	0		—	p (f)	2		p (C) D	P @ D	1 = Present but not visible
Center	1.5		C.,C,		P (R)		p (1) D	p (A) D	p (1) D	2 = Present and visible but <1mm. Rubbing fingers on surface produces a brownish tint on them.
Right Center	2.25	1q	<.6	—	p (f)		p D	P d, D	p .& D	3 = 1-5mm
Right Bank	3.	2	SB	—	P (R)	1	P (A) D	P (A) D	P (R) D	4 = 5-20mm
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)										5 = >20mm
										UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code)
										D = Dry, not assessed

RIPARIAN VEGETATION (facing downstream)		Vegetation Class		Left Bank		Right Bank	
0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)		Upper Canopy (>5 m high)					
Trees and saplings >5 m high		0 1 2 3 4		0 1 2 3 4		0 1 2 3 4	
Lower Canopy (0.5 m-5 m high)							
All vegetation 0.5 m to 5 m		0 1 2 3 4		0 1 2 3 4		0 1 2 3 4	
Ground Cover (<0.5 m high)							
Woody shrubs & saplings <0.5 m		0 (1) 2 3 4		0 2 3 4		0 2 3 4	
Herbs/ grasses		G) 2 3 4		0 (C) 2 3 4		0 2 3 4	
Barren, bare soil/duff		0 2 3 4				4	

INSTREAM HABITAT COMPLEXITY		0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)	
Filamentous Algae	0 1 2 3 4	0 1 2 3 4	
Aquatic Macrophytes/ Emergent Vegetation		2 3 4	
Boulders		4	
Woody Debris >0.3 m		4	
Woody Debris <0.3 m	0 (1) 2 3 4	0 1 2 3 4	
Undercut Banks	0 2 3 4	0 2 3 4	
Overhang. Vegetation	0 G) 2 3 4	0 2 3 4	
Live Tree Roots	0 0) 2 3 4	0 2 3 4	
Artificial Structures	0 2 3 4	0 2 3 4	

DENSIOMETER READINGS (0-17) count covered dots	
Center Left	15
Center Upstream	13
Center Right	
Center Downstream	+
Optional	
Left Bank	
Right Bank	

HUMAN INFLUENCE (circle only the closest to wetted channel)		Left Bank		Channel		Right Bank	
0 = Not Present B = On Bank C = Between Bank & 10m from Channel P = >10m-50m from Channel Channel (record Yes or No)							
Walls/ Rip-rap/ Dams		P C B (C)		Y (C)		B C P	
Buildings		P C B (C)		Y (C)		B C P	
Pavement/ Cleared Lot		(P) C B				B C P	
Road/ Railroad		P C B				B C P	
Pipes (Inlet/ Outlet)		P C B				B C P	
Landfill/ Trash		P C B				B C P	
Park/ Lawn		P C B				B C P	
Row Crop		P C B				B C P	
Pasture/ Range		P C B				B C P	
Logging Operations		P C B (C)				B C P	
Mining Activity		(P) C B 0		Y (C)		B C P	
Vegetation Management		P C B (C)				B C P	
Bridges/ Abutments		P C B (C)		Y (C)		B C P	
Orchards/ Vineyards		P C B (C)				B C P	

BANK STABILITY			
Left Bank	eroded	stable	(C)
Right Bank	eroded	stable	(C)

TAKE
Hfif'OOM>ff
(check box if taken & record photo code)

Downstream (optional!)

Upstream (required)

Site Code: <u>Pine Creek Control</u>	Site Name: <u>p₁ Creek</u>	Date: <u>09/10/2012</u>
Wetted Width (m): <u>2.6</u>	Bankfull Width (m): <u>4.1</u>	Bankfull Height (m): <u>0.8</u>

Transect B

Transect Substrates										
Position	Dist from T.B (m)	Depth (cm)	mm/size class	% Cobble Embed	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	1	ls/c					P (A) D	P (A) D	0 = No microalgae present, Feels rough, not slimy.
Left Center	.7	16	Qit.		p (ti)	O		P (III) D	P (tf) D	1 = FROTHY, BUT NOT VISIBLE. Feels slimy.
Center	1.3	16	(...?)	0	P (0)	O	P (2) D	P (II) D	p (I) D	2 = Present and visible but <1mm. Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
Right Center	2.0	16	SA		p (fl)	D	p (U) D	p (G) D	p (#) D	3 = 1-5mm
Right Bank	2.6	4	SA	—	P (0)	10	P (0) D	P (0) D	P (0) D	4 = 5-20mm
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)										
5 = >20mm UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code) D = Dry - not assessed										

RIPARIAN VEGETATION (facing downstream)	0 = Absent (0%)	1 = Sparse (<10%)	2 = Moderate (10-40%)	3 = Heavy (40-75%)	4 = Very Heavy (>75%)
Herbs/grasses	0	0	0	0	0
Vegetation Class	0	0	0	0	0
Barren, bare soil/duff	0	0	0	0	0
Upper Canopy (>5 m high)	0	0	0	0	0
Trees and saplings >5 m high	0	1	2	3	4
Lower Canopy (0.5 m-5 m high)	0	0	0	0	0
All vegetation 0.5 m to 5 m	0	1	2	3	4
Ground Cover (<0.5 m)	0	0	0	0	0

INSTREAM COMPLEXITY	0 = Absent (0%)	1 = Sparse (<10%)	2 = Moderate (10-40%)	3 = Heavy (40-75%)	4 = Very Heavy (>75%)
Aquatic Macrophytes/Emergent Vegetation	0	0	0	0	0
Boulders	0	0	0	0	0
Flume Debris <0.3 m	0	0	0	0	0
Woody Debris <0.3 m	0	0	0	0	0
Undercut Banks	0	0	0	0	0
Overhang, Vegetation	0	0	0	0	0
live Tree Roots	0	0	0	0	0
Artificial Structures	0	0	0	0	0

DENSIMETER READINGS (0-17) <i>count covered dots</i>	
Center	0
Center Upstream	D
Center Right	—
Center Downstream	Z...
Optional	
Left Bank	
Right Bank	

HUMAN INFLUENCE (circle only the closest to wetted channel)	0 = Not Present	B = On Bank	C = Between Bank & 10m from Channel	P = >10m - 50m from Channel (record Yes or No)
Walls/Rip-rap Dams	P	C	0	Y
Buildings	P	C	B	Y
Pavement/Cleared Lot	P	C	B	0
Road/Railroad	P	C	B	Y
Pipes (Inlet/Outlet)	P	C	B	
Landfill/Trash	P	C	B	
Park/Lawn	P	C	B	
Row Crop	P	C	B	
Pasture/Range	P	C	B	
Logging Operations	P	C	B	
Mining Activity	P	C	B	
Vegetation Management	P	C	B	Y
Bridges/Abutments	P	C	B	Y
Orchards/Vineyards	P	C	B	Y

BANK STABILITY			
Sketch the bank stability of the following river reaches.			
Left Bank	eroded	vegetated	stable
Right Bank	eroded	eroded	stable

Inter-Transect: BC

Wetted Width (m): 4.4

Inter-Transect Substrates										
Position	Dist. from BB (m)	Depth (cm)	mm/size class	% Cobble Embed.	GPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	30	SB	4	P A	0	P A D	P A D	P A D	0 - No microalgae present. Feels rough, not slimy.
Left Center	1.1	6		2.0	p (!)	cJ	P A D	P A D	P A D	1 - Present but not visible. Feels slimy.
Center	2.2	5	1.1 F	--&--	P @	C)	P @ D	p liS) D	P A D	2 - Present and visible but <1mm. Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
Right Center	3.3	11	6f	—		0	P K' D	P 6 D	P A D	3 - 1-5mm.
Right Bank	4.4	8	6f	—	P A	0	P A D	P A D	P A D	4 - 5-20mm.
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred).										5 - >20mm.
										UD - Cannot determine if microalgae present. Substrate too small or covered with silt (formerly Z code).
										D = Dry, not assessed

FLOW HABITATS (% between transects, total = 100%)	
Channel Type	%
Cascade/Falls	0
Rapid	0
Riffle	60
Run	0
Glide	40
Pool	0
Dry	0

Site Code: <u>01000 (1/- C,.....)</u>	Site Name: <u>>..... C<-</u>	Date: <u>09/10/2012</u>
Wetted Width (m): <u>2.8</u>	Bankfull Width (m): <u>3.0</u>	Bankfull Height (m): <u>0.5</u>
		Transect C

Location	Distance from Left Bank (m)	Distance from Right Bank (m)	Substrate	Channel	Bankfull	Bankfull	Bankfull	Bankfull	Bankfull	Bankfull
Left Bank	0	1	GF	—	P 0	0	P 0 D	P 0 D	p D	D
Left Center	0.7	12	XB		p &	1	P 0 D	P 0 D	p t./i D	
Center	1.4	1	XB		p JD	1)	P @. D	P . D	p iA. D	
Right Center	2.1	87	CB	10	P 0	1	P (!) D	p W. D	P ell. D	
Right Bank	2.8	26	CB	30	P 0	1	P 0 D	P 0 D	P 0 D	

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

Legend:
 1 = Present but not visible, Feels slimy
 2 = Present and visible but <1mm, Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail
 3 = 1-5mm
 4 = 5-20mm
 5 = >20mm
 UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code)
 D = Dry, not assessed

Vegetation	Left Bank	Channel	Right Bank
Upper Canopy (>5 m high)			
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)			
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)			
Woody shrubs & saplings <0.5 m	0 (j) 2 3		
Herbs/ grasses	0 tJ> 2 3		
Barren, bare soil/ duff	0).. 2		

Bankfull	Channel	Right Bank
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4	0 1 2 3 4
Boulders	0 1 2 3 4	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4	0 1 2 3 4
Woody Debris <0.3 m	0 6) 2 3 4	0 1 2 3 4
Undercut Banks	0 2 3 4	0 1 2 3 4
Overhang Vegetation	0 2 3 4	0 1 2 3 4
live Tree Roots	0 (!) 2 3 4	0 1 2 3 4
Artificial Structures	0 2 3 4	0 1 2 3 4

Channel	Left	Center	Right	Downstream
Center Left	0			
Center Upstream		4		
Center Right			1	
Center Downstream				0

HUMAN INFLUENCE (circle only the closest to wetted channel)	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B N	Y N	N B C P
Buildings	P C B		B C P
Pavement/ Cleared Lot	P C B		B C P
Road/ Railroad	P C B		B C P
Pipes (Inlet/ Outlet)	P C B		B C P
Landfill/ trash	P C B		C P
Park/ Lawn	P C B		C P
Row Crop	P C B		C P
Pasture/ Range	P C B		C P
Logging Operations	P C B		C P
Mining Activity	P C B		C P
Vegetation Management	P C B		B . p
Bridges/ Abutments	P C B		B C p
Orchards/ Vineyards	P C B		B C p

Bank Stability	Left Bank	Channel	Right Bank
Left Bank	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
Right Bank	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4

Inter-Transect: CD										Wetted Width (m): 4.6
Inter-Transect Substrates										
Position	Dist. from L.B. (m)	Depth (cm)	mm/size class	% Cobble Embedded	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	1	GC	---	P @	0	P @ D	P @ D	P @ D	0 - No microalgae present. Feels rough, not slimy.
Left Center	1.1	0	(e)	-	p l)	l>		P ff D	P @ D	1 - Present but not visible.
Center	2.3	32	\$		p (l)	0	p ,il D	p .@ D	P \$, D	2 - Present and visible but < 1mm. Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
Right Center	3.4	0	4	-	p @	b	P li) D		P i D	3 - 1-5mm.
Right Bank	4.6	3	CB	80	P @	0	P @ D	P @ D	P @ D	4 - 5-20mm.
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred).										5 - >20mm.
										UD - Cannot determine if microalgae present; substrate too small or covered with silt (formerly Z code).
										D - Dry, not assessed

FLOW HABITATS (% between transects, total = 100%)	
Channel Type	%
Cascade/Falls	15
Rapid	25
Riffle	45
Run	0
Glide	15
Pool	10
Dry	0

Site Code: <u>Pine Creek Control</u>	Site Name: <u>Pine Creek</u>	Date: <u>09/10/2012</u>
Wetted Width (m): <u>3.4</u>	Bankfull Width (m): <u>4.1</u>	Bankfull Height (m): <u>0.65</u>
Transect D		

Transect Substrates										
Position	Dist from LB (m)	Depth (cm)	mm/size class	% Cobble Embed	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	2	x8	—	P/A	0	P	D	P	D
Left Center	.8	15	86			0	P	D	P	A D
Center	1.7	24	c.	—		0	P	D	P	D
Right Center	2.5	52	@v.	—		0			P	D
Right Bank	3.4	5	CB	10	P/V	0	P	A D	P	V D
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)										
0 = No microalgae present 1 = Present but not visible 2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail 3 = 1-5mm 4 = 5-20mm 5 = >20mm UD = Cannot determine if microalgae present substrate too small or covered with silt (formerly Z code) D = Dry, not assessed										

RIPARIAN VEGETATION (facing downstream)		0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)	
Vegetation Class	Left Bank	Right Bank	
Upper Canopy (>5 m high)			
Trees and saplings >5 m high	0 ① 2 3 4	① 1 2 3 4	
Lower Canopy (0.5 m-5 m high)			
All vegetation 0.5 m to 5 m	0 1 2 ③ 4	0 1 ② 3 4	
Ground Cover (<0.5 m high)			
Woody shrubs & saplings <0.5 m	0 ① ② 3 4	0 ① 2 3 4	
Herbs/ grasses	0 ③ 2 3 4	⑨ 2 3 4	
Barren, bare soil/ duff	0	3 4	0 2 4

INSTREAM HABITAT COMPLEXITY	0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)
Filamentous Algae	0 1 ② 3 4
Aquatic Macrophytes/ Emergent Vegetation	3 4
Boulders	2 Cl) 4
Woody Debris >0.3 m	2 3 4
Woody Debris <0.3 m	a, 3 4
Undercut Banks	0 Cl) 2 3 4
Overhang. Vegetation	0 1 (3) 3 4
Live Tree Roots	0 ID 2 3 4
Artificial Structures	0 1 2 3 4

DENSIMETER READINGS (0-17) count covered dots	
Center	11-
Center Upstream	1/-
Center Right	1-/-
Center Downstream	lt,,-
Optional	
Left Bank	
Right Bank	

HUMAN INFLUENCE (circle only the closest to wetted channel)	0 = Not Present B = On Bank C = Between Bank & 10m from Channel P = >10m - 50m from Channel (record Yes or No)		
	Left Bank	Channel	Right Bank
Walls/Rip-rap/ Dams	P C B ③	Y ③	A B C P
Buildings	p B ③	Y ③	A B C P
Pavement/ Cleared Lot	p C B		B C P
Road/ Railroad	P C B		B C P
Pipes (Inlet/ Outlet)	P C B		B C P
Landfill/ Trash	P C B		B C p
Park/ Lawn	P C B		B C P
Row Crop	p C B		B C P
Pasture/ Range	p C		B C P
Logging Operations	P C B		B C P
Mining Activity	P C B		B C P
Vegetation Management	P C B		B C P
Bridges/ Abutments	p C B		B C P
Orchards/ Vineyards	p C B		B C P

BANK STABILITY			
Left Bank	eroded	unstable	③
Right Bank	eroded	unstable	③

Inter-Transect: DE										Wetted Width (m): 4.6
Inter-Transect Substrates										
Position	Distance from LB (m)	Depth (cm)	mm/size class	% Cobble Embed	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	3	GF	—	P 0	0	P 0 D	P 0 D	P 0 D	0 = No microalgae present Feels rough, not slimy 1 = Present but not visible Feels slimy 2 = Present and visible but < 1mm. Rubbing fingers on surface produces a brownish tint on them scraping leaves visible trail.
Center	1.1	18	iB		p 1	0	p 0 D	p 0 D	p 0 D	3 = 1-5mm 4 = 5-20mm 5 = >20mm UD = Cannot determine if microalgae present substrate too small or covered with silt (formerly Z code) D = Dry, not assessed
Center	2.3	12	iB		p 6.1	0	P 0 D	P 0 D	p 0 D	
Right Center	3.4	5	s.e.	—	p 1		p 0 D	p 0 D	p 0 D	
Right Bank	4.6	35	CB	25	P 0	0	P 0 D	P 0 D	P 0 D	
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)										

FLOW HABITATS	
(X = between transects, total = 100%)	
Channel Type	%
Cascade/Falls	60
Rapid	20
Riffle	10
Run	0
Glide	10
Pool	0
Dry	0

Site Code: <u>11A Creek Control</u>	Site Name: <u>P - Creek</u>	Date: <u>09/10/2012</u>
Wetted Vv1dth (m): <u>4.8</u>	Bankfull Width (m): <u>5.3</u>	Bankfull Height (m): <u>0.75</u>
Transect E		

Transect Substrates										
Position	Dist from LB (in)	Depth (cm)	mm/size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	5	S11J		^	0	P D	P D	P D	0 = No microalgae present Feels rough, not slimy.
Left Center	1.2	15	S11>	—	P S	.0	P D	P D	P D	1 = Present but not visible Feels slimy.
Center	2.4	10	&t c,	—	P JO	6	P D	P D	P D	2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them; scraping leaves visible trail.
Right Center	3.6	0	&l>		P ll>	1>	P D	P D	P D	3 = 1-5mm; 4 = 5-20mm; 5 = >20mm;
Right Bank	4.8	3	S8	~	P 0	6	P D	P D	P D	UD = Cannot determine if microalgae present; substrate too small or covered with silt (formerly Z code).

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

D = Dir. not assessed

RIPARIAN VEGETATION (facing downstream)		0 = Absent (0%) 3 = Heavy (40-75%) 1 = Sparse (<10%) 4 = Very Heavy (>95%) 2 = Moderate (10-40%)	
Vegetation Class	Left Bank	Right Bank	
Upper Canopy (>5 m high)			
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4	
Lower Canopy (0.5 m-5 m high)			
All vegetation 0.5 m to 5 m	0 2 3 4	0 (D)	
Woody shrubs & saplings <0.5 m	0 G) 2 3 4	0 6)	
Herbs/ grasses	0 (j) 2 3 4	(S)	
Barren, bare soil/duff	0 2 4	0	

INSTREAM HABITAT COMPLEXITY	0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)
Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	
Boulders	
Woody Debris >0.3 m	
Woody Debris <0.3 m	2 3 4
Undercut Banks	0 2 3 4
Overhang, Vegetation	0 1 CD 3 4
Live Tree Roots	0 (j) 2 3 4
Artificial Structures	0 1 2 3 4

DENSIOMETER READINGS (0-17) <i>count covered pots</i>	
Center	1b
Center Upstream	1Lf
Center Right	0
Center Downstream	15
Left Bank	
Right Bank	

HUMAN INFLUENCE (circle only the closest to wetted channel)	0 = Not Present B = On Bank C = between Bank & 10m from Channel P = > 10m + 50m from Channel Channel (record Yes or No)											
	Left Bank				Channel	Right Bank						
Walls/ Rip-rap/ Dams	P	C	B	0	Y			B	C	P		
Buildings	P	C	B	0	Y			B	C	P		
Pavement/ Cleared Lot	P	C	B	0				B	C	P		
Road/ Railroad	P	C	B	0	Y	N		B	C	P		
Pipes (Inlet/ Outlet)	P	C	B	0	Y	N		B	C	P		
Landfill/ Trash	P	C	B	0	Y	N		B	C	P		
Park/ Lawn	P	C						B	C	P		
Row Crop	P	C	B					B	C	P		
Pasture/ Range	P	C	B					B	C	P		
Logging Operations	P	C	B					B	C	P		
Mining Activity	P	C	B					B	C	P		
Vegetation Management	P	C	B					B	C	P		
Bridges/ Abutments	P	C	B					B	C	P		
Orchards/ Vineyards	P	C	B					B	C	P		

<h1> HAND STABILITY </h1> <p> 1. How many times did you use the hand stability device? 2. How many times did you use the hand stability device? 3. How many times did you use the hand stability device? </p>			
Left Hand	enabled	disabled	width
Right Hand	enabled	disabled	width

Inter-Transect: EF										Wetted Width (m): 3.1
Inter-Transect Substrates										
Position	Dist. from LB (m)	Depth (cm)	mm/size class	% Cobble Embedded	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	31	CB	15	P 0	0	P 0 D	P 0 D	P 0 D	0 = No microalgae present. Feels rough, not slimy. 1 = Present but not visible. Feels slimy. 2 = Present and visible but <1mm. Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
Left Center	0.7	49	SB	—	P 0	C1	P ii? D	P 0 D	P 0 D	3 = 1-5mm. 4 = 5-20mm. 5 = >20mm.
Center	1.5	37	XB	—	P 0	C1	{.}) A D	P 0 D	P 0 D	UD = Cannot determine if microalgae present; substrate too small or covered with silt (formerly Z code).
Right Center	2.2	8	SB	—	P 0	0	(1) A D	P 0 D	P 0 D	D = Dry; not assessed
Right Bank	3.1	15	CB	80	P 0	0	P 0 D	P 0 D	P 0 D	

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size-class categories listed on the supplemental page (direct measurements preferred).

Calculations	
CPOM	1.00
Microalgae	5
Macroalgae	S
Macrophytes	SD
Substrate	0
Water	
Other	

Site Code: >J- & J c., d.; - I	Site Name: ? , - , Creek	Date: 09/10/2012
Wetted Width (m): 2.4	Bankfull Width (m): 4.0	Bankfull Height (m): 0.77
Transect F		

Transect Substrates										
Position	Dist from LB (m)	Depth (cm)	mm/size class	% Cobble Embed	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Bank	D	48	CB	10	P A	0	P A D	P A D	P A D	0 = No microalgae present. Feels rough; not slimy.
Left Center	0.1 p		S-E			0	P ft) D	^ D	P A D	1 = Present but not visible. Feels slimy.
Center	1.2-		i,		P i		P D	P Q. N	P A D	2 = Present and visible but <1mm. Rubbing fingers on surface produces a brownish tint on them. Scraping leaves visible trail.
Right Center	1.3		e,		P		P Q, D	p (A D	P A D	3 = 1-5mm.
Right Bank	2.4	30	XB	-	P A	1	P Q D	P A D	P A D	4 = 5-20mm.
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)										5 = >20mm.
										UD = Cannot determine if microalgae present; substrate too small or covered with silt (formerly Z code).
										D = Dry, not assessed

RIPARIAN VEGETATION (facing downstream)		INSTREAM HABITAT COMPLEXITY		DENSIMETER READINGS (0-17) count covered dots	
0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)		0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)			
Vegetation Class	Left Bank	Right Bank			
Upper Canopy (>5 m high)					
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4	Filamentous Algae	0 1 2 3 4	Center Left
Lower Canopy (0.5 m-5 m high)					
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4	Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4	Center Upstream
Ground Cover (<0.5 m high)					
Woody shrubs & saplings <0.5 m	0 6) 2 3	0 2 3 4	Boulders	0 2 3	Center Right
Herbs/ grasses	0 0 2 3	0 (j) 2 3 4	Woody Debris >0.3 m	0 2 3	Center
Barren, bare soil/ duff	0 2 3	0 2 3 4	Woody Debris <0.3 m	0 (i) 2 3 4	Center Downstream
			Undercut Banks	0 2 3 4	Optical
			Overhang Vegetation	0 1 2 3 4	Left Bank
			live Tree Roots	0 (j) 2 3 4	Right Bank
			Artificial Structures	(S) t 2 3 4	

HUMAN INFLUENCE (circle only the closest to wetted channel)		Left Bank		Channel	Right Bank	
0 = Not Present B = On Bank C = between Bank & 10m from Channel P = >10m - 50m from Channel Channel (record Yes or No)						
Walls/ Rip-rap/ Dams		P C B A		Y N	A B C P	
Buildings		P C B A		Y N	A B C P	
Pavement/ Cleared Lot		P C B			B C P	
Road/ Railroad		P C B			B C	
Pipes (inlet/ Outlet)		P C B			B C P	
Landfill/ Trash		P C B			B C P	
Park/ Lawn		P C B			B C P	
Row Crop		P C B			B C P	
Pasture/ Range		P C B			B C P	
Logging Operations		P C B			B C P	
Mining Activity		P C B			B C P	
Vegetation Management		P C B			B C P	
Bridges/ Abutments		P C B			B C P	
Orchards/ Vineyards		P C B			B C P	

Bank Stability			
Left Bank	eroded	substrate	0 1 2 3 4
Right Bank	eroded	substrate	0 1 2 3 4

<p>TAKE</p> <p>—PH6re6ftAPH5—</p> <p>(check box if taken & record photo code)</p> <p>Downstream (required)</p> <p>Upstream (required)</p>

Inter-Transect: FG						Wetted Width (m): 2.4				
Inter-Transect Substrates										
Position	Dist. from L.B. (m)	Depth (cm)	mm/size class	Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	2	GF	—	P @	0	P @ D	P @ D	P @ D	0 = No microalgae present. Feels rough, not slimy. 1 = Present but not visible. Feels slimy.
Left Center	0.6	12.				0	p (!) D	P @ D	P @ D	2 = Present and visible but <1mm. Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
Center	1.2	11?	>e,		P (il)	0	(!) A D		p D	3 = 1-5mm 4 = 5-20mm 5 = >20mm
Right Center	1.8	10		—	P @	0	P III D	p @ D	p @ D	UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code)
Right Bank	2.4	5	RR		P @	0	P @ D	P @ D	P @ D	D = Dry, not assessed

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

FLOW HABITATS	
(%, between transects, total = 100%)	
Channel Type	%
Cascade/Falls	40
Rapid	15
Riffle	10
Run	25
Glide	5
Pool	5
Dry	0

Site Code: P₁-Cr (1,1,1) Site Name: ft ... CrALDate: 09/10/2012

Wetted Width (m):

3.5

Bankfull Width (m):

5.6

Bankfull Height (m):

0.6

Transect G

Transect Substrates										
Position	Dist from L.B (m)	Depth (cm)	mm/size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	22..						P @ D	P @ D	0 = No microalgae present. Feels rough, not slimy.
Left Center	0.8	(p			P III		P @ D	P D	P If D	Feels slimy.
Center	1.7	2.7, St			P (III)	O	@ A D	p @ D	P If D	2 = Present and visible but < 1mm. Rubbing fingers on surface produces a brownish tint or film, scraping leaves visible trail.
Right Center	2.5	12- (e,			P (I)	()	d) A D	p (I) D	p (I) D	3 = 1-5mm.
Right Bank	3.5	2	RR		P (A)	O	P (A) D	P (A) D	P (A) D	4 = 5-20mm.
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)										5 = >20mm.
										UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
										D = Dry, not assessed

RIPARIAN VEGETATION (facing downstream)		0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)	
Vegetation Class	Left Bank	Right Bank	
Upper Canopy (>5 m high)			
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4	
Lower Canopy (0.5 m-5 m high)			
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4	
Ground Cover (<0.5 m high)			
Woody shrubs & saplings <0.5 m	0 (j) 2 3	(j) 2 3 4	
Herbs/grasses	0 & 2 3	G) 2 3 4	
Barren, bare soil/ duff	0 2 3	2 3	

INSTREAM HABITAT COMPLEXITY		0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)	
Filamentous Algae	0 1 2 3 4		
Aquatic Macrophytes/ Emergent Vegetation	2 3 4		
Boulders	2 3 4		
Woody Debris >0.3 m	2 3 4		
Woody Debris <0.3 m	2 3 4		
Undercut Banks	2 3 4		
Overhang. Vegetation	2 3 4		
Live Tree Roots	2 3 4		
Artificial Structures	2 3 4		

DENSIOMETER READINGS (0-17) count covered dots	
Center Left	11
Center Upstream	2-
Center Right	1
Center Downstream	()
Optional	
Left Bank	
Right Bank	

HUMAN INFLUENCE (circle only the closest to wetted channel)	0 = Not Present B = On Bank C = Between Bank & 10m from Channel P = >10m - <50m from Channel Channel (record Yes or No)		
	Left Bank	Channel	Right Bank
Walls/Rip-rap/Dams	P C B 0	Y 0	0 B C P
Buildings	P C B 0	Y 0	0 B C P
Pavement/ Cleared Lot	P C B 0		0 B C P
Road/ Railroad	P C B 0	Y 0	0 B C P
Pipes (Inlet/ Outlet)	P C B 0	Y 0	0 B C P
Landfill/ Trash	P C B 0	Y 0	0 B C P
Park/ Lawn	P C B 0		0 p B C
Row Crop	P C B 0		0 p B C
Pasture/ Range	P C B 0		0 p B C
Logging Operations	P C B 0		0 p B C
Mining Activity	P C B 0		0 p B C
Vegetation Management	P C B 0		0 p B C
Bridges/ Abutments	P C B 0		0 p B C
Orchards/ Vineyards	P C B 0		0 p B C

BANK STABILITY			
Left Bank	eroded	stable	0 1 2 3 4
Right Bank	eroded	stable	0 1 2 3 4

Inter-Transect: GH										Wetted Width (m): 5.2
Inter-Transect Substrates										
Position	Dist. from I-B (m)	Depth (cm)	mm/size class	% Cobble Embedded	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	4	1, 6			0	P A D	P A D	P A D	0 - No microalgae present Feels rough, not slimy
Left Center	1.3	0	1, 6		p: ,il	0	p <ill. D		p 'lt/ D	1 - Present but not visible Feels slimy
Center	2.6	19			p (!)		p D	p /: D	P la) D	2 - Present and visible but 1 mm. Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail
Right Center	3.9	7		75'	P @	0	(g) A D	p (:) D	P e'g D	3 - 1-5mm
Right Bank	5.2	3	RR	—	P A	0	P A D	P A D	P A D	4 - 5-20mm 5 - >20mm UD - Cannot determine if microalgae present substrate too small or covered with silt (formerly Z code) D = Dry, not assessed

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

FLOW HABITATS (% between transects, total 100%)	
Channel Type	%
Cascade/Falls	55
Rapid	25
Rifle	5
Run	10
Glide	0
Pool	5
Dry	0

Site Code: <i>fr'tle.. Q',,dt {;,,/,,/</i>	Site Name: <i>Pine Creek</i>	Date: <i>09/1/0/2012</i>
Wetted Width (m): <i>3.2</i>	Bankfull Width (m): <i>5.4</i>	Bankfull Height (m): <i>0.75</i>

Transect H

Transect Substrates										
Position	Dist. from LB (m)	Depth (cm)	mm/size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached		Macroalgae Unattached	
Left Bank	0	3	CB	30		O	P	A	D	P
Left Center	0.8	14	Cf	40	P fy	O	P	D	P	D
Center	1.6	2.0	se		P t9	O	P	D	P	D
Right Center	2.4	17	5e		P ©	Ci	P	D	P	D
Right Bank	3.2	5	SA	—	P A	O	P	A	D	P

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

Microalgae Thickness Codes:
 0 = No microalgae present
 1 = Feels rough, not slimy
 2 = Feels slimy
 3 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them; scraping leaves visible trail
 4 = 1-5mm
 5 = 5-20mm
 6 = >20mm
 UD = Cannot determine if microalgae present; substrate too small or covered with silt (formerly Z code)
 D = Dry; not assessed

RIPARIAN VEGETATION (facing downstream)	0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)	
Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	① 1 2 3 4	① 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0	
Woody shrubs & saplings <0.5 m	② 2 3 4	0 (f) 2
Herbs/ grasses	0 1D 2 3 4	0 © 2 3
Barren, bare soil/ duff	0 2 3	0 2 3

INSTREAM HABITAT COMPLEXITY	0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)
Filamentous Algae	0 ① 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	
Boulders	
Woody Debris >0.3 m	
Woody Debris <0.3 m	2 3 4
Undercut Banks	2 3 4
Overhang, Vegetation	2 3 4
LIVE TREE ROOTS	2 3 4
Artificial Structures	0 2 3 4

DENSIMETER READINGS (0-17) count covered dots	
Center	0
Center Upstream	0
Center Right	0
Center Downstream	0
Optional	
Left Bank	
Right Bank	

HUMAN INFLUENCE (circle only the closest to wetted channel)	0 = Not Present B = On Bank C = Between Banks & 10m from Channel P = >10m + >50m from Channel Channel (record Yes or No)
	Left Bank Channel Right Bank
Walls/ Rip-rap/ Dams	P C B ① Y ① B C P
Buildings	P C B ① Y ① B C P
Pavement/ Cleared Lot	P C B ① Y ① B C P
Road/ Railroad	P C R ① Y ① B C P
Pipes (inlet/ Outlet)	P C B ① Y ① B C P
Landfill/ Trash	P C B ① Y ① B C P
Park/ Lawn	P C B ① Y ① B C P
Row Crop	P C B ① Y ① B C P
Pasture/ Range	P C B ① Y ① B C P
Logging Operations	P C B ① Y ① B C P
Mining Activity	P C B ① Y ① B C P
Vegetation Management	P C B ① Y ① B C P
Bridges/ Abutments	P C B ① Y ① B C P
Orchards/ Vineyards	P C B ① Y ① B C P

BANK STABILITY			
Left Bank	eroded	stable	eroded
Right Bank	eroded	stable	eroded

Inter-Transect: HI						Wetted Width (m): 5.2				
Inter-Transect Substrates										
Position	Dist from EB (m)	Depth (cm)	mm/size-class	% Gobble-Pebbles	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	41	RR	—	P 0	0	P A D	P A D	P A D	0 = No microalgae present Feels rough, not slimy. 1 = Present but not visible Feels slimy. 2 = Present and visible but
Left Center	1.3	92	x6			-0	P A D	P A D	P A D	3 = 1-5mm. Rubbing fingers on surface produces a brownish tint on them. scraping leaves visible trail.
Center	2.6	91	...		p (fJ)	0	P A D	P A D	P A D	4 = 5-20mm.
Right Center	4.0	36		1.10		0	P A D	P A D	P A D	5 = >20mm.
Right Bank	5.2	1	...			10	P A D	P A D	P A D	UD = Cannot determine if microalgae present; substrate too small or covered with silt. (formerly Z code). D = Dry, not assessed.

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

FLOW HABITATS (% between transects; total=100%)	
Channel Type	%
Cascade/Falls	2.5
Rapid	2.5
Riffle	35
Run	10
Glide	0
Pool	5
Dry	0

Site Code: p,,,i C,r,t,jf., W,Jt.. (

Site Name: 'P,,,n.-., C,r:..

Date: 09/10/2012

Wetted Width (m):

5.4

Bankfull Width (m):

6.0

Bankfull Height (m):

.65

Transect I

	0	2	4	6	8	10	12	14	16	18	20
Center	2.7	1.1	se	—	P 0	0	P 0 D	P 0 D	P 0 D	P 0 D	P 0 D
Right Center	4.0	1.8	G:ic	—	P 0	0	P 0 D	P 0 D	P 0 D	P 0 D	P 0 D
Right Bank	5.4	5	SA	—	P 0	0	P 0 D	P 0 D	P 0 D	P 0 D	P 0 D

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

Legend:
 0 = 1-5mm
 1 = 5-20mm
 2 = 20-60mm
 3 = 60-120mm
 4 = 120-250mm
 5 = 250-500mm
 6 = 500-1000mm
 7 = 1000-2000mm
 8 = 2000-4000mm
 9 = 4000-8000mm
 10 = 8000-16000mm
 11 = 16000-32000mm
 12 = 32000-64000mm
 13 = 64000-128000mm
 14 = 128000-256000mm
 15 = 256000-512000mm
 16 = 512000-1024000mm
 17 = 1024000-2048000mm
 18 = 2048000-4096000mm
 19 = 4096000-8192000mm
 20 = 8192000-16384000mm
 21 = 16384000-32768000mm
 22 = 32768000-65536000mm
 23 = 65536000-131072000mm
 24 = 131072000-262144000mm
 25 = 262144000-524288000mm
 26 = 524288000-1048576000mm
 27 = 1048576000-2097152000mm
 28 = 2097152000-4194304000mm
 29 = 4194304000-8388608000mm
 30 = 8388608000-16777216000mm
 31 = 16777216000-33554432000mm
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Inter-Transect: IJ										Wetted Width (m): 5.6
Inter-Transect Substrates										
Position	Dist. from L-B (m)	Depth (cm)	num. size class	% Cobble Embedded	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	①	16	Gf	—	P ①	< ①	P ① D	P ① D	P ① D	0 - No microalgae present. Feels rough, not slimy. 1 - Present but not visible. Feels slimy.
Left Center	1.4	0			p 13 >) >	P @ D	P @ D	p @ D	2 - Present and visible but < 1mm. Rubbing fingers on surface produces a brownish tint on them. scraping leaves visible (rare).
Center	2.8	2-	cR.,	"10	P '9	(!)	P @ D	Pu)) D	P 1111 D	3 - 1-5mm 4 - 5-20mm 5 - >20mm
Right Center	4.2	32	Gf?	10	P @	'6	P 41 D	P (11) D	p ti) D	UD - Cannot determine if microalgae present. Substrate too small or covered with silt. (formerly Z code)
Right Bank	5.6	31	RR	—	P ①	2	P ① D	P ① D	P ① D	D - Dry, not assessed
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurement is preferred).										

FLOW HABITATS	
(% between transects, total = 100%)	
Channel Type	%
Cascade/Falls	25
Rapid	30
Riffle	35
Run	5
Glide	0
Pool	0
Dry	0

35

Site Code: MDMJ	Site Name: Creek Control	Date: 09/10/2012
Wetted Width (m): 7.8	Bankfull Width (m): 9.2	Bankfull Height (m): 0.90
Transect J		

Transect Substrates										
Position	Dist from LB (m)	Depth (cm)	mm/size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	2	SA		P @	0	P @ D	P @ D	P @ D	0 = No microalgae present Feels rough, not slimy
Left Center	2.0	15	e-6	30	P/P	6	p .f& D	p < D	p D	1 = Present but not visible Feels slimy
Center	3.9	2.5			P @		P D /	D.	p : D	2 = Present and visible but <1mm. Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail
Right Center	5.9	1	RR	—	P @		P e0 D	D.	D.	3 = 1-5mm 4 = 5-20mm 5 = >20mm
Right Bank	7.8	1	RR	—	P @	0	P A D /	P @ D.	P @ D	UD = Cannot determine if microalgae present; substrate too small or covered with silt (formerly Z code) D = Dry, not assessed

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

RIPARIAN VEGETATION (facing downstream)		Vegetation Class		Left Bank		Right Bank	
0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)		Upper Canopy (>5 m high)					
Trees and saplings >5 m high				0 1 2 3 4		0 1 2 3 4	
Lower Canopy (0.5 m-5 m high)							
All vegetation 0.5 m to 5 m				0 1 2 3 4		0 6 2 3 4	
Ground Cover (<0.5 m high)							
Woody shrubs & saplings <0.5 m				0 1 2 3		0 6 2 3	
Herbs/grasses				0 tD 2 3		0 © 2 3	
Barren, bare soil/duff				0 2 3		0 2 3	

INSTREAM HABITAT COMPLEXITY		DENSIMETER READINGS (0-17) count covered dots	
Filamentous Algae		0 1 2 3 4	Center 0
Aquatic Macrophytes/ Emergent Vegetation			Center Upstream 3
Boulders			Center Right 1
Woody Debris >0.3 m			center Downstream 0
Woody Debris <0.3 m		3 4	
Undercut Banks		0 1 2 3 4	
Overhang. Vegetation		@ 2 3 4	
Live Tree Roots		2 3 4	
Artificial Structures		2 3 4	

HUMAN INFLUENCE (circle only the closest to wetted channel)		Left Bank		Channel	Right Bank	
0 = Not Present B = On Bank C = Between Bank & 10m from Channel P = >10m <50m from Channel Channel (record Yes or No)						
Walls/Rio-rap/Dams		P C B	0	Y N	0 B C P	
Buildings		P C B	0	Y N	0 B C P	
Pavement/Cleared Lot		P C B	0		0 B C P	
Road/Railroad		P C B	0	Y N	0 B C P	
Pipes (Inlet/Outlet)		P C B	0	Y N	0 B C P	
Landfill/Trash		P C B	0	Y N	0 B C P	
Park/Lawn		P C B	0		0 B C P	
Row Crop		P C B			B C P	
Pasture/Range		P C B			B C P	
Logging Operations		P C B			B C P	
Mining Activity		P C B			B C P	
Vegetation Management		P C B			B C P	
Bridges/Abutments		P C B			B C P	
Orchards/Vineyards		P C B			B C P	

Bank Stability			
Left Bank	eroded	stable	0
Right Bank	eroded	stable	0

...?1-... s+vvdv,,", / --LleJ (rt.,-l.,)

Inter-Transect: JK										Wetted Width (m): 5.5
Inter-Transect Substrates										
Position	Dist. from L.B. (m)	Depth (cm)	mm/size class	% Cobble/bed	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	8	GF	—	P 0	0	P 0 D	P 0 D	P 0 D	0 - No microalgae present. Feels rough, not slimy.
Left Center	1.4	45	Cl.	10	p 6>	0	P 0 D	P 0 D	P 0 D	1 - Present but not visible. Feels slimy.
Center	2.7	10	c.h	0	p 1?	0	p 1 D	p 1 D	p 0 D	2 - Does not feel like a trail. 3 mm. Rubbing fingers on surface produces a brownish tint on them. scraping leaves visible trail.
Right Center	4.1	0	Y.f.	—	p f9	D	p jil D	D	p 0 D	3 - 1-5mm.
Right Bank	5.5	4	RR	—	P 0	0	P 0 D	P 0 D	P 0 D	4 - 6-20mm.
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred).										5 - >20mm.
										UD - Cannot determine if microalgae present; substrate too small or covered with silt (formerly Z code).
										D - Dry; not assessed.

FLOW HABITATS	
(% between transects total = 100%)	
Channel Type	%
Cascade/Falls	10 15
Rapid	20
Rifle	30
Run	25
Glide	0
Pool	10 5 10
Dry	0

Site Code: i fr.ult- t.,Jri,	Site Name: Pine Creek	Date: 1/1/2012
Wetted Width (m): 1.7	Bankfull Width (m): 4.5	Bankfull Height (m): 0.80

Transect K

Transect Substrates										
Position	Dist. from LB (m)	Depth (cm)	mm/size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	5	RR	—	P 0	—	P 0 D	P 0 D	P 0 D	0 = No microalgae present. Peels right - not alive.
Left Center	1.0	8	XB		P	..&-	P 1/2 D	D	P (P) D	1 = Present but not visible. Peels easily.
Center	2.1	9	XB		F	--e-	Ⓡ A D	D	p f, > D	2 = Present and visible but <1mm. Rubbing fingers on surface produces a brownish tint on them.
Right Center	3.1	10	GC	—	P		P D		P III D	3 = 1-5mm.
Right Bank	4.2	4	RR	—	P 0	—	P 0 D	P 0 D	P 0 D	4 = 5-20mm.
										5 = >20mm.
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)										U = Cannot determine if microalgae present. Substrate too small or covered with silt (formerly Z code).
										D = Dry, not assessed

RIPARIAN VEGETATION (facing downstream)		Vegetation Class		Left Bank		Right Bank	
0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)		Upper Canopy (>5 m high)					
Trees and saplings >5 m high		0 1 2 3 4		0 1 2 3 4			
Lower Canopy (0.5 m-5 m high)							
All vegetation 0.5 m to 5 m		0 1 2 3 4		0 1 2 3 4			
Ground Cover (<0.5 m high)							
Woody shrubs & saplings <0.5 m		0 fl 2 3		0 (j) 2 3 4			
Herbs/grasses		0 <9 2 3		0 3 4			
Barren, bare soil/ duff		0 2 3		0 2 3 4			

INSTREAM HABITAT COMPLEXITY		Densimeter Readings (0-17) count covered dots	
Filamentous Algae		0 1 2 3 4	Center 0
Aquatic Macrophytes/ Emergent Vegetation			Center Upstream 2..
Boulders		0 1 2 3	Center Right II
Woody Debris >D.3 m		0 CD 2 3	Center Downstream 0
Woody Debris <0.3 m		0 (D) 2 3 4	Left Bank
Undercut Banks		2 3 4	Right Bank
Overhang. Vegetation		2 3 4	
Live Tree Roots		2 3 4	
Artificial Structures		2 3 4	

HUMAN INFLUENCE (circle only the closest to wetted channel)		Left Bank		Channel		Right Bank	
Walls/ Rip-rap/ Dams		P C B 0		Y N 0		B C P	
Buildings		P C B 0		Y N 0		B C P	
Pavement/ Cleared Lot		P C B				B C P	
Road/ Railroad		P C B				B C P	
Pipes (Inlet/ Outlet)		P C B				B C P	
Landfill/ Trash		P C B				B C P	
Park/ Lawn		P C B				B C	
Row Crop		P C B				P B C	
Pasture/ Range		P C				B C	
Logging Operations		P C B 0		Y 0		B C	
Mining Activity		P C B 0		Y 0		P	
Vegetation Management		P C B 0				B C	
Bridges/ Abutments		P C B				B C P	
Orchards/ Vineyards		P C B				B C P	

BANK STABILITY			
Left Bank	eroded	vegetation	erosion
Right Bank	eroded	vegetation	erosion

TAKE PHOTOGRAPHS
(check box if taken & record photo code)

Downstream (required) ☒

Upstream (optional)

Site Code: <u>Pine Creek Contal</u>		Date: <u>09/10/2012</u>		Analyte	Equipment & Calibration Date		
BENTHIC INVERTEBRATE SAMPLES				pH	Cal date: / /		
Collection Method (indicate standard or margin-center-margin)		Replicate	# Jars	Water temp	Cal date: / /		
RWB (standard)	RWB (MCM)	<u>TRC</u>	1	dissolved oxygen	Cal date: /		
RWB (standard)	RWB (MCM)	TRC	2	oxygen sat	Cal date: /		
RWB (standard)	RWB (MCM)	TRC		specific cond	Cal date: • /		
RWB (standard)	RWB (MGM)	TRC		Salinity	Cal date: /		
Field Notes/ Comments: <i>r,.;i'){''''...l\$1,wrrrowe* collf>,v,ve,o,l5; t,-l.,_ie-, birch, pines</i> <i>o-A- '00'-\l-... s:4"-S,</i>				Alkalinity	Cal date: / /		
				Turbidity	Cal date: / /		
				Silica	Cal date: / /		
				Air temp	Cal date: / /		
				Velocity	Cal date: / /		
ALGAE SAMPLES				Water and Sediment Chemistry Samples			
Collection Method (circle one or write new method if applicable)	SWAMP EMAP	SWAMP EMAP	SWAMP EMAP	SWAMP EMAP	Check if a WATER chemistry grab sample was collected (nutrients, SSC, etc.) Check if a DUPLICATE WATER chemistry grab sample was collected Check if a SEDIMENT chemistry sample was collected Check if a DUPLICATE SEDIMENT chemistry sample was collected Sed Coll. Device: SCOOP CORE GRAB Material: Stainless Steel Polyethylene Polycarbonate Other Sediment Collection Depth (cm): 2 or 5 Create Lab. Collection records for each checked box for integrated and grab water chemistry samples.	D	
Collection Device (sum # of transects per device)	Rep. 1	Rep. 2	Rep.	Rep.			
Rubber Delimiter (area=12.6cm')							
PVC Delimiter (area=12.6cm')							
Syringe Scrubber (area=5.3cm')							
Other area=							
Number of transects sampled: (0, 11)							
Composite Volume (mL)							
Assemblage ID volume (diatoms) (50 ml tube)							
Assemblage ID volume (soft algae) (50 ml tube)							
Check if Qualitative Algae sample was collected with soft algae/diatom sample required even if macroalgae not visible	D	D	D	D			
Check if a water chem. integrated sample was collected (chi, AFDM)	D	D	di	D			
Chlorophyll volume use GF/F filter (25 ml preferred volume)							
Ash Free Dry Mass use GF/F filter (AFDM volume (25 ml preferred vol))							
ADDITIONAL PHOTOGRAPHS							
Description	Photo Code	Description	Photo Code	Description	Photo Code	Description	Photo Code

REACH DOCUMENTATION		Standard Reach Length (wetted width ≥ 10 m) = 150 m Distance between transects = 15 m	
Alternate Reach Length (wetted width > 10 m) = 250 m Distance between transects = 25 m			
Project Name: <u>Pine Creek SWAMP BIOASSESSMENT</u>	Date: <u>SEPT 11 / 2012</u>	Sample Collection Time: <u>/ 006</u>	
Stream Name: <u>1.0 (1.0.0.K)</u>	Site Name/ Description:		
Site Code: <u>11 = C<.....ILC,U</u>	Crew Members: <u>IN&- C.../L.EEJe i) S O Ca- lveAU- .../1.1ar. ""</u>		
Latitude (actual - decimal degrees): <u>°N 31.36217</u>		datum: <u>NAD83</u>	
Longitude (actual - decimal degrees): <u>°W 118.69334</u>		other: <u>GPS Device: GARMIN CSX60</u>	

AMBIENT WATER QUALITY MEASUREMENTS					* Turbidity, silica, oxygen saturation, and air temp are optional - calibration date required on page 24	Actual Reach Length (m) (see reach length guidelines at top of form)
Water Temp (Deg C)	pH	Alkalinity (eq/L)	Turbidity (ntu)*	Oxygen Sat (%)*		
<u>10.64</u>	<u>9.44</u>	<u>0.048</u>	<u>0</u>			<u>150</u>
Dissolved O ₂ (mg/L)	Specific Conduct (µS/cm)	Salinity (ppt)	Silica (mg/L)	Air Temp (Deg C)*	Explanation:	
<u>9.17</u>	<u>0.074</u>	<u>0</u>	<u>134</u>	<u>16.0</u>		

DISCHARGE MEASUREMENTS										check if discharge measurements not possible (explain in field notes section) <input type="checkbox"/>			
1 st measurement = left bank (looking downstream)													
VELOCITY AREA METHOD (preferred)					cal. date	Transect Width (m): <u>4.0 2.2</u>		BUOYANT OBJECT METHOD (use ONLY if velocity area method not possible)					
	Distance from Left Bank (cm)	Depth (cm)	Velocity (ft/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (ft/sec)		Float 1	Float 2	Float 3		
1	40	1.7	0.43	11	110	1.1	2.88						
2	70	1.6	0.11	12	130		3.15						
3	120	3.1	0.77	13	150	1.8	3.27						
4	150	3.2	0.26	14	110	1.3	3.42						
5	180	3.2	0	15	190	0.4	2.47						
6	210	2.9		16	210	0.1	2.11						
7				17									
8	40	0.4	0.3	18									
9	70	0.7	3.13	19									
10	90	0.9	3.63	20									

NOTABLE FIELD CONDITIONS (check one box per topic)					
Evidence of recent rainfall (enough to increase surface runoff)	NO	<input checked="" type="checkbox"/>	minimal	<input type="checkbox"/>	>10% flow increase
Evidence of fires in reach or immediately upstream (<500 m)	NO	<input checked="" type="checkbox"/>	<1 year	<input type="checkbox"/>	<5 years
Dominant landuse/ landcover in area surrounding reach	Agriculture	<input type="checkbox"/>	Forest	<input checked="" type="checkbox"/>	Rangeland
	Urban/Industrial	<input type="checkbox"/>	Suburb/Town	<input type="checkbox"/>	Other

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES	1	2	3	4	5	6	7	8	9	10	11	12	13
(carry over from transect forms if needed to attain target count of 25; measure in %)	20	5	5	0	10	40	60	15	35	10	10	5	25
	14	15	16	17	18	19			22	23	24	25	
	80	60	30	5	30	10	5	15	25	25	15	30	

Site Code: <u>Line Creek Exp</u>		Date: <u>09/11/2012</u>																			
SLOPE and BEARING FORM (transect based - for Full PHAB only)																					
AUTOLEVEL <input type="checkbox"/> CLINOMETER <input checked="" type="checkbox"/> HANDLEVEL <input type="checkbox"/> OTHER <input type="checkbox"/>																					
Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)															
	Stadia rod measurements	Slope (%) or Elevation Difference cm <input checked="" type="checkbox"/> % <input type="checkbox"/>	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements	Slope or Elevation Difference cm <input checked="" type="checkbox"/> % <input type="checkbox"/>	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)											
K	66	97				46	117														
J	58	105				-:1°{	173														
I	38	125				2	119														
H	53	110				130															
G	38	125																			
F	73	90																			
E	511	105																			
D	4	159																			
C	71	92																			
B	17	146																			
A	42	121																			
additional calculation area	$1759 \div 15,000 (100\%) = 11.726\%$																				
ADDITIONAL HABITAT CHARACTERIZATION						High Gradient <input checked="" type="checkbox"/>		Low Gradient <input type="checkbox"/>													
Parameter	Optimal					Suboptimal					Marginal					Poor					
Epifaunal Substrate/ Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover (50% for low gradient streams); mix of submerged logs, undercut banks, cobble or other stable habitat					40-70% mix of stable habitat (30-50% for low gradient streams); well suited for full colonization potential					20-40% mix of stable habitat (10-30% in low gradient streams); substrate frequently disturbed or removed					Less than 20% stable habitat (10% in low gradient streams); lack of habitat is obvious; substrate unstable or lacking					
Score:	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition (<20% in low gradient streams)					Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected (20-50% in low gradient streams)					Moderate deposition of new gravel, sand, or fine sediment on bars; 30-60% of the bottom affected (50-70% in low gradient streams)					Heavy deposits of fine material; increased bar development; more than 60% of the bottom changing frequently (>80% in low gradient streams)					
Score:	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Channel Alteration	Channelization or dredging absent; or minimal stream with normal pattern					Some channelization present (e.g., bridge abutments); evidence of past channelization (>20yrs) may be present but recent channelization not present					Channelization may be extensive; embankments or shoring structures present on both banks; 40 to 80% of stream reach disrupted					Banks shored with gabion or cement; Over 80% of the stream reach channelized and disrupted; instream habitat greatly altered or removed entirely					
Score:	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Site Code: f, , , , , c, ai, ,	Site Name: 7, Creek	Date: 09/11/2012
Wetted Width (m): 5.6	Bankfull Width (m): 7.1	Bankfull Height (m): 4

Transect A

Transect Substrates										
Position	Dist from LB (m)	Depth (cm)	mm/size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	10	GC	--	P @	0	P @ D	P @ D	P @ D	0 = No microalgae present.
Left Center	1.4	41	SB	--	P fJ	1, ,	p <lll D	p ft) D	(!) A D	1 = Present but not visible. Feels silty.
Center	2.8	35	WD		P ti)	0	p ,E} D	p l) D	p (lll D	2 = Present and visible but <1mm. Rubbing fingers on surface produces a brownish tint on them. Scraping leaves visible trail.
Right Center	4.2	12	CB	30	P i l)	P	P (j, D	r 6 D	p 6) D	3 = 1-5mm.
Right Bank	5.6	10	CB	50	P A	0	P A D	P A D	P A D	4 = 5-20mm.
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred).										5 = >20mm.
										UD = Cannot determine if microalgae present. Substrate too small or covered with silt (formerly Z code).
										D = Dry, not assessed.

RIPARIAN VEGETATION (facing downstream)		INSTREAM HABITAT COMPLEXITY		DENSIOMETER READINGS (0-17) count covered dots	
0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)		0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)			
Vegetation Class	Left Bank	Right Bank	Filamentous Algae	0 1 2 3 4	Center Left 8
Upper Canopy (>5 m high)			Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4	Center Upstream 1.5
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4	Boulders	0 1 2 3	Center Right 14
Lower Canopy (0.5 m-5 m high)			Woody Debris >0.3 m	0 Ci) 2 3 4	Center Downstream 10
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4	Woody Debris <0.3 m	0 (j) 2 3 4	Optional
Ground Cover (<0.5 m high)			Undercut Banks	0 2 3 4	Left Bank
Woody shrubs & saplings <0.5 m	0 (D) 2 3 4	0 G) 2 3 4	Overhang. Vegetation	0 (i) 2 3 4	Right Bank
Herbs/grasses	0 3 4	0 GI 2 3 4	Live Tree Roots	0 CD 2 3 4	
Barren, bare soil/duff	0 3 4	0 2 4	Artificial Structures	2 3 4	

HUMAN INFLUENCE (circle only the closest to wetted channel)		Left Bank		Channel	Right Bank	
Walls/Rip-rap/ Dams	P C B	P C B	Y	P B C P		
Buildings	P C B	P C B		B C P		
Pavement/ Cleared Lot	P C B	P C B		B C P		
Road/ Railroad	P C B	P C B		B C		
Pipes (Inlet/ Outlet)	P C B	P C B		B C P		
Landfill/ Trash	P C B	P C B		B C P		
Park/ Lawn	P C B	P C B		B C P		
Row Crop	P C B	P C B		B C P		
Pasture/ Range	P C B	P C B		B C		
Logging Operations	P C	P C		B C P		
Mining Activity	P C B	P C B		B C		
Vegetation Management	P C B	P C B		P		
Bridges/ Abutments	P C B	P C B		B C P		
Orchards/ Vineyards	P C B	P C B		B C P		

BANK STABILITY			
Left Bank	eroded	stable	eroded
Right Bank	eroded	stable	eroded

TAKE PHOTOGRAPHS (check box if taken & record photo code)	
Downstream (optional)	<input checked="" type="checkbox"/>
Upstream (required)	<input type="checkbox"/>

sheet metal = ck, ., L

Inter-Transect: AB

Wetted Width (m): 4.5

Inter-Transect Substrates										
Position	Dist. from LB (m)	Depth (cm)	mm/size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	4	SB	—	P @	1	P @ D	P A D	P A D	0 = No microalgae present Feels rough, not slimy. 1 = Present but not visible. Feels slimy. 2 = Present and visible but not rubbing fingers on surface produces a brownish tint on them. scraping leaves visible trail.
Left Center	1.1	2.2	0	10		0	P D	P D	P A D	3 = 1-5mm 4 = 5-20mm 5 = >20mm UD = Cannot determine if microalgae present. Substrate too small or covered with silt (formerly Z code).
Center	2.1	1	1/2 e		P i	0	(!) A b	P D	P A D	D = Dry, not assessed
Right Center	3.3	31	SB	—	P (R)			P D	P A D	
Right Bank	4.5	3	AS	—	P @	0	P @ D	P A D	P A D	

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

FLOW HABITATS (% between transects total = 100%)	
Channel Type	%
Cascade/Falls	L/S
Rapid	55
Riffle	15
Run	0
Glide	1
Pool	0
Dry	0

Site Code: tr.u)c., Ex	Site Name: P	Date: 09/11/2012
Wetted Width (m): 12.2	Bankfull Width (m): 5.1	Bankfull Height (m): .42

Transect B

Transect Substrates										
Position	Dist from LB (m)	Depth (cm)	mm/size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	19	CB	40	P 0	0	P 0 D	P 0 D	P 0 D	0 = No microalgae present
Left Center	1.0	2--		—	P	0	D	P 0 D	<(!) A D	1 = Present but not visible. Feels slimy.
Center	2.1	0	x1,		P (J)	0	P D	P @ D	P @ D	2 = Present and visible but <1mm. Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
Right Center	3.1	8'	56	—	P 0	0	P le) D	P li!! D	P (b D	3 = 1-5mm
Right Bank	4.2	30	XB	—	P 0	1	P 0 D	P 0 D	P 0 D	4 = 5-20mm
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred).										5 = >20mm
										UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
										D = Dry; not assessed

RIPARIAN VEGETATION (facing downstream)		INSTREAM HABITAT COMPLEXITY		DENSIOMETER READINGS (0-17) count covered dots	
0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)		0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)			
Vegetation Class	Left Bank	Right Bank	Filamentous Algae	0 1 2 3 4	Center Left
Upper Canopy (>5 m high)					
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4	Aquatic Macrophytes/ Emergent Vegetation	2 3 4	Center Left 14
Lower Canopy (0.5 m-5 m high)					
All vegetation 0.5 m to 5 m	0 2 @ 4		Boulders	0 2 4	Center Upstream III
Ground					
Woody shrubs & saplings <0.5 m	0 (J) 2 3 4	0 (I) 2 3 4	Woody Debris >0.3 m	0 2 3 4	Center Right 17
Herbs/ grasses	0 (y) 3 4	0 CD 2 3 4	Woody Debris <0.3 m	0 (iJ) 2 3 4	Center Downstream 9
Barren, bare soil/ duff	0 0 3 4	0 2 G> 4	Undercut Banks	0 2 3 4	
			Overhang, Vegetation	0 -C 2 3 4	
			Live Tree Roots	0 Ci) 2 3 4	
			Artificial Structures	2 3 4	

HUMAN INFLUENCE (circle only the closest to wetted channel)		Left Bank		Channel	Right Bank	
0 = Not Present B = On Bank C = Between Bank & 10m from Channel P = >10m <50m from Channel Channel (record Yes or No)						
Walls/ Rip-rap/ Dams		P C B	0	Y	0 B C P	
Buildings		P C B	0	Y	0 B C P	
Pavement/ Cleared Lot		P C B			B C P	
Road/ Railroad		P C B			B C P	
Pipes (Inlet/ Outlet)		P C B			B C P	
Landfill/ Trash		P C B			B C P	
Park/ Lawn		P C B			B C P	
Row Crop		P C B			B C P	
Pasture/ Range		P C B			B C P	
Logging Operations		P C B			B C P	
Mining Activity		P C B			B C P	
Vegetation Management		P C B			B C P	
Bridges/ Abutments		P C B			B C P	
Orchards/ Vineyards		P C B			B C P	

BANK STABILITY			
Left Bank	eroded	circled	stable
Right Bank	eroded	circled	stable

Inter-Transsect: BC

Ward Web ID: 3, 4

Left Bank	0	5	SB		P @	0	P @ D	P @ D	P @ D
Left Center	0.8	—	5e		p f))	D	p @ D	P @ D	P @ D
Center	1.7	3	1'-6		P @	0	p , D	p @ D	: p @ D
Right Center	2.5	65	5e,			0	P D		P @ D
Right Bank	3.4	39	9c	—	P @	0	P @ D	P @ D	P @ D

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size-class categories listed on the supplemental page (direct measurements preferred)

1 = Present but not visible
 2 = Feels slimy
 2 = Present and visible but < 1mm; Rubbing fingers on surface produces a brownish tint on them; scraping leaves visible trail
 3 = 1-5mm
 4 = 5-20mm
 5 = > 20mm
 UD = Cannot determine if microalgae present; substrate too small or covered with silt (formerly Z code)
 D = Dry, not assessed

Substrate Size	n
0	55
10	10
5	0
0	0

Inter-Transect: CD										Wetted Width (m): 3.2
Inter-Transect Substrates										
Position	Dist. from L-B (m)	Depth (cm)	mm/size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	.0		Gib				D	P D	P A D	0 = No microalgae present Feels rough, not slimy. 1 = Present but not visible Feels slimy
Left Center	4.8	25	e,	—	P tlz		P D	P D	P 0 D	2 = Present and visible but < 1mm. Rubbing fingers on surface produces a brownish tint on them
Center	1.6	0	1/8		P (el	b	P D	P D	Ⓡ A D	3 = 1-5mm 4 = 5-20mm 5 = > 20mm 6 = UD
Right Center	2.1	0	1/8	—	P (ff	b	P D	P D	P 6) D	UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code)
Right Bank	3.2	1	CB	10	P 0	0	P A D	P A D	P 0 D	D = Dry, not assessed

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred).

Channel Type	Channel Type
1	0
2	0
3	15
4	0
5	0
6	0
7	0
8	0
9	0
10	0

Site Code: V ¹ --V _{1,2,3}		Site Name: P ₁ ve Creek		Date: Of r.J.i:1 2012
Wetted Width (m): 3.6	Bankfull Width (m): 4.7	Bankfull Height (m): .38	Transect D	

Transect Substrates										
Position	Dist from LB (m)	Depth (cm)	mm/size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	19	CB	55	P A	0	P A D	P A D	P A D	0 = No microalgae present. Feels rough, not slimy.
Left Center	0.9	32	SB	—	P A	0	P A D	P D	P D	1 = Present but not visible. Feels slimy.
Center	1.8	0	XB	—	P A	0	P A D	P D	P D	2 = Present and visible but <1mm. Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
Right Center	2.7	12	CB	50	P A	0	P A D	P D	P D	3 = 1-5mm.
Right Bank	3.6	2	SA	—	P A	0	P A D	P D	P A D	4 = 5-20mm.
										5 = >20mm.

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).

0 = Only not assessed

RIPARIAN VEGETATION (facing downstream) Woody shrubs & saplings 0.5 m - 5 m	0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%)					3 = Heavy (40-75%) 4 = Very Heavy (>75%)									
	Vegetation Class					0	1	2	3	4	0	1	2	3	4
Herbs/ grasses	Upper Canopy (25 m high)					0	1	2	3	4	0	1	2	3	4
Trees and saplings	Lower Canopy (0.5 m - 5 m high)					0	1	2	3	4	0	1	2	3	4
All vegetation 0.5 m to 5 m	Ground Cover (<0.5 m high)					0	1	2	3	4	0	1	2	3	4

INSTREAM HABITAT COMPLEXITY	0 = Absent (0%) 1 = Sparse (1-10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (75-100%)				
	0	1	2	3	4
Filamentous Algae	0	1	2	3	4
Aquatic Macrophytes/ Emergent Vegetation			2	3	4
Boulders	0		2		4
Woody Debris >C.3 m	0	1	2	3	4
Woody Debris <0.3 m	0	CD	2	3	4
Undercut Banks	0		2	3	4
Overhang. Vegetation	0	C)	2	3	4
Live Tree Roots	0		2	3	4
Artificial Structures	0	1	2	3	4

DENSIMETER READINGS (0-17) <i>count covered dots</i>	
Center	1b
Center Upstream	15
Center Right	1h
Center Downstream	h
Optional	
Left Bank	
Right Bank	

HUMAN INFLUENCE (circle only the closest to wetted channel)	0 = Not Present B = On Bank C = Between Bank & 10m from Channel P = > 10m + > 50m from Channel Channel (record Yes or No)									
	Left Bank				Channel	Right Bank				
Walls/ Rip-rap/ Dams	P	C	B	P	Y	N	P	B	C	P
Buildings	P	C	B	P	Y	N	P	B	C	P
Pavement/ Cleared Lot	P	C	B						C	P
Road/ Railroad	P	C	B					B	C	P
Pipes (Inlet/ Outlet)	P	C	B					B	C	P
Landfill/ Trash	P	C	B					B	C	P
Park/ Lawn	P	C	B					B	C	P
Row Crop	P	C	B					B	C	P
Pasture/ Range	P	C	B					B	C	P
Logging Operations	P	C	B					B	C	P
Mining Activity	P	C	B					B	C	P
Vegetation Management	P	C	B					B	C	
Bridges/ Abutments	P	C	B					P		
Orchards/ Vineyards	P	C	B					B	C	P

BANK STABILITY			
How do you think the stability of the banking system will change in the next 12 months?			
Very Stable	Stable	Unstable	Very Unstable
Very Stable	Stable	Unstable	Very Unstable

Inter-Transect: DE										Wetted Width (m): 4.2
Inter-Transect Substrates										
Position	Dist. from LB (m)	Depth (cm)	mm size class	% Cobble Embed	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	3	SB	—	P 6	0	P 1 D	P 1 D	P 1 D	0 - No microalgae present. Feels rough, not slimy.
Left Center	1.0	44	0.0	L/S			P D	D	P D	1 - Present, but not visible. Feels slimy.
Center	2.1	48	C	---	P		P D	D	P D	2 - Present and visible. < 1mm. Rubbing fingernail on surface produces a brownish tint on them; scraping leaves visible trail.
Right Center	3.1	2	< 0.5		P		P D	D	P D	3 - 1-5mm.
Right Bank	4.2	7	GF	—	0 A	0	P 1 D	P 1 D	P 1 D	4 - 5-20mm.
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred).										5 - > 20mm.
										UD - Cannot determine if microalgae present; substrate too small or covered with silt (formerly Z code).
										D - Dry, not assessed

Substrate Size	Frequency
E	
L/S	
2-0	
15	
10	

Site Code: <u>Pine Creek Exp</u>	Site Name: <u>Pine Creek</u>	Date: <u>09/11/2012</u>
Wetted Width (m): <u>4.0</u>	Bankfull Width (m): <u>4.8</u>	Bankfull Height (m): <u>0.5</u>
Transect E		

Transect Substrates														
Position	Dist from LB (m)	Depth (cm)	mm/size class	% Cobble Embed	CPOM	Microalgae Thickness Code	Macroalgae Attached		Macroalgae Unattached		Macrophytes	Microalgae Thickness Codes		
Left Bank	0	4	GF		P		P	D	P	A	D	0 = No microalgae present Faint brownish tint only 1 = Present but not visible Feels silty 2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail 3 = 1-5mm 4 = 5-20mm 5 = >20mm UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code) D = Dry, not assessed		
Left Center	1	27	CB	0	P		P	D	P		D			
Center	2	50	SB	—	P	0	P	D	P		D			
Right Center	3	36	SB		P	0	P	D	P		D			
Right Bank	4.0	13	GC	—	P	A	0	P	A	D	P		A	D
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)														

RIPARIAN VEGETATION (facing downstream)		INSTREAM HABITAT COMPLEXITY		DENSIOMETER READINGS (0-17) count covered dots		
0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)		0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)				
Vegetation Class	Left Bank	Right Bank	Filamentous Algae	2 3 4	Center Left	3
Upper Canopy (>5 m high)			Aquatic Macrophytes/ Emergent Vegetation	2 3 4	Center Upstream	4
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4	Boulders	2 3 4	Center Right	15
Lower Canopy (0.5 m-5 m high)			Woody Debris >0.3 m	2 3 4	Center Downstream	6
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4	Woody Debris <0.3 m	2 3 4	Optional	
Ground Cover (<0.5 m high)			Undercut Banks	0 1 2 3 4	Left Bank	
Woody shrubs & saplings <0.5 m	0 (G) 2 3 4	0 (I) 2 3 4	Overhang Vegetation	0 (I) 2 3 4	Right Bank	
Herbs/ grasses	0 (9) 2 3 4	0 2 @ 4	Live Tree Roots	(R) 2 3 A		
Barren, bare soil/ duff	0 2 @ 4	0 (i) 2 3 4	Artificial Structures	0 2 3 4		

HUMAN INFLUENCE (circle only the closest to wetted channel)		Left Bank		Channel	Right Bank	
0 = Not Present B = On Bank C = Between Bank & 10m from Channel P = >10m <50m from Channel Channel (record Yes or No)						
Walls/ Rip-rap/ Dams		P C B 0		Y N	0 B C P	
Buildings		P C B			B C P	
Pavement/ Cleared Lot		P C B			B C P	
Road/ Railroad		P C B			B C P	
Pipes (Inlet/ Outlet)		P C B			B C P	
Landfill/ Trash		P C B			B C P	
Park/ Lawn		P C B			B C P	
Row Crop		P C B			B C P	
Pasture/ Range		P C B			B C P	
Logging Operations		P C B			B C P	
Mining Activity		P C B			B C	
Vegetation Management		P C B			P	
Bridges/ Abutments		P C B			B C P	
Orchards/ Vineyards		P C B			B C P	

Bank Stability			
Left Bank	eroded	stable	undisturbed
Right Bank	eroded	stable	undisturbed

r., l., 6 bs. • = p.o.o I & /s

Inter-Transect: EF							Wetted Width (m): 6.2			
Inter-Transect Substrates										
Position	Dist. from L.B. (m)	Depth (cm)	mm/size-class	% Cobble/Bricke	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	10	c.e.	20	P A	0	P A D	P A D	P A D	1 = Present but not visible. Peaks slimy.
Left Center	1.5	4g	se.	--		0	P D	P D	P A D	2 = Present and visible but <1mm. Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
Center	3.1	5	;;;		P	0	P D	P D	P A D	3 = 1-5mm
Right Center	4.6	13	CJ/	to	P		P D	P A D	P A D	4 = 5-20mm
Right Bank	6.2	16	GC	—	P A	0	P A D	P A D	P A D	5 = >20mm
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred).										UD = Cannot determine if microalgae present; substrate too small or covered with silt. (formerly Z code)
										D = Dry, not assessed

Flow Velocity	
Velocity	5
Velocity	45
Velocity	40
Velocity	5
Velocity	5
Velocity	0
Velocity	0

Site Code: <u>Pine Creek Exp.</u>	Site Name: <u>Pine Creek</u>	Date: <u>09/11/2012</u>
Wetted Width (m): <u>3.8</u>	Bankfull Width (m): <u>4.2</u>	Bankfull Height (m): <u>0.33</u>

Transect F

Transect Substrates										
Position	Dist. from LB (m)	Depth (cm)	mm/size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0		<1B	15		0	P A D	P A D	P A D	0 = No microalgae present. Feels rough, not slimy.
Left Center	0.1	2--	se.	—	P	P	P D	P D	P A D	1 = Present and visible but < 1mm. Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
Center	1.1	3"	C-6	70	P	0	P D	P D	P D	2 = Present and visible but > 1mm. Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
Right Center	2.7	3	xe.	—	P	0	P D	P D	P D	3 = 1-5mm.
Right Bank	3.8	6	SA	—	P	0	P A D	P A D	P A D	4 = 5-20mm.
										5 = >20mm.

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code)
D = Dry - not assessed

RIPARIAN VEGETATION (facing downstream)		Vegetation Class		Left Bank		Right Bank		INSTREAM HABITAT COMPLEXITY		DENSIMETER READINGS (0-17) count covered pots	
0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)		Vegetation Class		Left Bank		Right Bank		Filamentous Algae		Center	
		Upper Canopy (>5 m high)		0 1 2 3 4		0 1 2 3 4		Aquatic Macrophytes Emergent Vegetation		1f	
		Lower Canopy (0.5 m-5 m high)		0 1 2 3 4		0 1 2 3 4		Boulders		Center Upstream	
		All vegetation 0.5 m to 5 m		0 1 2 3 4		0 1 2 3 4		Woody Debris >0.3 m		17	
		Woody shrubs & saplings <0.5 m		0 (i) 2 3 4		0 3 4		Woody Debris <0.3 m		Center Right	
		Herbs/grasses		0 2 6 4		0 (j) 3 4		Undercut Banks		Center Downstream	
		Barren, bare soil/duff		0 (D) 2 3 4		0 3 4		Overhang, Vegetation		Optional	
								Live Tree Roots		Left Bank	
								Artificial Structures		Right Bank	

HUMAN INFLUENCE (circle only the closest to wetted channel)	Left Bank			Channel	Right Bank		
	Walls/Rip-rap/Dams	P C B 0	Y	0	B C P		
Buildings	P C B 0	Y	0	B C P			
Pavement/Cleared Lot	P C B			B C P			
Road/Railroad	P C B			B C P			
Pipes (Inlet/Outlet)	P C B			B C P			
Landfill/Trash	P C B			B C P			
Park/Lawn	P C B			B C P			
Row Crop	P C B			B C P			
Pasture/Range	P C B			B C P			
Logging Operations	P C B			B C P			
Mining Activity	P C B			B C P			
Vegetation Management	P C B			B C P			
Bridges/Abutments	P C B			B C P			
Orchards/Vineyards	P C B			B C P			

BANK STABILITY			
Left Bank	eroded	unstable	stable
Right Bank	eroded	unstable	stable

TAKE	
—PH9	(check box if taken & record photo code)
Downstream (required)	
Upstream (required)	.gi.

Inter-Transect: FG

Wetted Width (m): 3.4

Inter-Transect Substrates

Position	Dist. from LB (m)	Depth (cm)	mm size class	% Cobble Embed.	CROM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	1	GF	—	P A	0	P A D	P A D	P A D	0 = No microalgae present. Feels rough, not slimy. 1 = Present but not visible. Feels slimy. 2 = Present and visible but < 1mm. Rubbing fingers on surface produces a brownish tint on them. Scraping leaves visible trail.
Left Center	0.8	37	CB	60	P A	0	P D	P D	P D	3 = 1-5mm. 4 = 6-20mm. 5 = > 20mm.
Center	1.7	1	XB	—	P	1	P D	P D	P D	UD = Cannot determine if microalgae present. Substrate too small or covered with silt. (formerly Z-code)
Right Center	2.5	32	CB	20	P	0	P A D	P D	P D	D = Dry, not assessed.
Right Bank	3.4	3	CB	75	P A	0	P A D	P A D	P A D	
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred).										

Flow Habitat	
Channel Type	0
Channel Width	20
Channel Depth	65
Channel Velocity	10
Channel Slope	5
Channel Bank	0

Site Code: <u>V., Creek Exp</u>	Site Name: <u>G.L. Creek</u>	Date: <u>09/11/2012</u>
Wetted Width (m): <u>5.0</u>	Bankfull Width (m): <u>7.5</u>	Bankfull Height (m): <u>0.25</u>
		Transect G

Transect Substrates										
Position	Dist. from L.B. (m)	Depth (cm)	mm/size class	% Cobble Embed	GPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	35	11F		P A	0	P A D	P A D	P A D	0 = No microalgae present. Feels rough, not slimy.
Left Center	1.2	10	Ge		P	(J)	P D	P D	P D	Feels slimy.
Center	2.5		(1?)	2...0	P		P D	P D	P D	2 = Present and visible but <1mm. Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trails.
Right Center	3.7	32	CB	40	P	19	P D		P D	3 = 1-5mm.
Right Bank	5.0	44	CB	80	P A	6	P A D	P A D	P A D	4 = 5-20mm.
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred).										5 = >20mm.
										UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
										D = Dry, not assessed

RIPARIAN VEGETATION (facing downstream)		Vegetation Class		Left Bank		Right Bank	
0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)		Upper Canopy (>5 m high)					
Trees and saplings >5 m high		0 1 2 3 4		0 1 2 3 4			
Lower Canopy (0.5 m to 5 m high)							
All vegetation 0.5 m to 5 m		0 6) 2					
Woody shrubs & saplings <0.5 m		0					
Herbs/grasses		0 (y 3 4		0 <D 2 3 4			
Barren, bare soil/duff		0 2 3 4		0 2 3 4			

INSTREAM HABITAT COMPLEXITY		0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)	
Filamentous Algae	0 1 2 3 4		
Aquatic Macrophytes/ Emergent Vegetation		4	
Boulders		4	
Woody Debris >0.3 m		4	
Woody Debris <0.3 m		2 3 4	
Undercut Banks		2 3 4	
Overhang. Vegetation	0	2 3 4	
Live Tree Roots	0	2 3 4	
Artificial Structures	0	2 3 4	

DENSI-METER READINGS (0-17) count covered dots	
Center Left	15
Center Upstream	14
Center Right	12
Center Downstream	13
Left Bank	
Right Bank	

HUMAN INFLUENCE (circle only the closest to wetted channel)		Left Bank		Channel		Right Bank	
Walls/Rip-rap/Dams		P C B		Y		P C B	
Buildings		P C B		Y		P C B	
Pavement/Cleared Lot		P C B				P C B	
Road/Railroad		P C B				P C B	
Pipes (Inlet/Outlet)		P C B				P C B	
Landfill/Trash		P C B				P C B	
Park/Lawn		P C B				P C B	
Row Crop		P C B				P C B	
Pasture/Range							
Logging Operations							
Mining Activity							
Vegetation Management							
Bridges/Abutments							
Orchards/Vineyards		P C B				P C	

SLAB STABILITY			
Left Bank	stable	stable	stable
Right Bank	stable	stable	stable

Inter-Transsect: GH						Wetted Width (m): 4.6				
Inter-Transsect Substrates										
Position	Dist. from LB (m)	Depth (cm)	mm/size class	% Cobble Buried	CROM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	3	WD	—	P A	0	P A D	P A D	Ⓟ A D	0 = No microalgae present Feels rough, not slimy. 1 = Present but not visible Feels slimy. 2 = Present and visible but not > 1mm. Rubbing fingers on surface produces a brownish tint on them. Scraping leaves visible trail. 3 = 1-5mm 4 = 5-20mm 5 = > 20mm UD = Cannot determine if microalgae present substrate too small or covered with silt (formerly 2 code) D = Dry, not assessed
Left Center	1.1	26	CB	10	P A	0	P D	P D	P f P	
Center	2.3	26	CB	35	P A	0	P D	P D	P lf p	
Right Center	3.4	31	XB	—	P A	1)	P D	P D	A D	
Right Bank	4.6	24	GC	—	P A	0	P A D	P A D	P A D	
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred).										

FLOW HABITATS	
(Percent of transects total = 100%)	
Channel Type	%
Cascade/Falls	0
Rapid	5
Riffle	45
Run	30
Glide	5
Pool	15
Dry	0

Site Code: <u>Pine Creek Exp</u>	Site Name: <u>Pine Creek</u>
Wetted Width (m): <u>4.4</u>	Bankfull Width (m): <u>4.7</u> Bankfull Height (m): <u>0.5</u>

Date: 04 Jul 2012**Transect H**

Transect Substrates																
Position	Dist from LB (m)	Depth (cm)	mm/size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached		Macroalgae Unattached		Macrophytes	Microalgae Thickness Codes				
Left Bank	0	51	XB	—	P A	0	P	A	D	P	A	D	0 = No microalgae present. Feels rough, not slimy. 1 = Present but not visible. Feels slimy. 2 = Present and visible but < 1mm. Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail. 3 = 1-5mm. 4 = 5-20mm. 5 = >20mm. UD = Cannot determine if microalgae present. substrate too small or covered with silt (formerly Z code). D = Dry - not assessed.			
Left Center	1.1	106	CB	5	P		P		D	P		D		P	A	D
Center	2.2	110	XB	—	P	0	P		D	P		D		P	A	D
Right Center	3.3	103	SB	—	P A	0	P		D	P		D		P	A	D
Right Bank	4.4	95	SB	—	P A	0	P	A	D	P	A	D		P	A	D
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)																

RIPARIAN VEGETATION (facing downstream)	0 = Absent (0%) 3 = Heavy (40-75%) 1 = Sparse (<10%) 4 = Very Heavy (>75%) 2 = Moderate (10-40%)														
	Vegetation Class					Left Bank					Right Bank				
	Upper Canopy (>5 m high)														
	Trees and saplings >5 m high	0	1	2	3	4	0	1	2	3	4				
Lower Canopy (0.5 m-5 m high)															
All vegetation 0.5 m to 5 m	0	1	2	3	4	0	1	2	3	4					
Ground Cover (<0.5 m high)															
Woody shrubs & saplings <0.5 m	0	@	3	4		0	@	2	3	4					
Herbs/ grasses	0	CD	2	3	4	0	(b	3	4						
Borrcn, bare soil/ duff	0		3	4		0	2	(i)	4						

INSTREAM HABITAT COMPLEXITY	0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)				
	0	1	2	3	4
Filamentous Algae	0	1	2	3	4
Aquatic Macrophytes/ Emergent Vegetation				3	4
Boulders	0		2		4
Woody Debris >0.3 m	0		2	3	4
Woody Debris <0.3 m	0	(V)	2	3	4
Undercut Banks	@	1	2	3	4
Overhang Vegetation	@	1	2	3	4
Live Tree Roots	(I)		2	3	4
Artificial Structures	0		2	3	4

DENSIOMETER READINGS (0-17) count covered dots	
Center Left	17
Center Upstream	15
Center Right	11
Center	1h
Optional	
Left Bank	
Right Bank	

HUMAN INFLUENCE (circle only the closest to wetted channel)	0 = Not Present B = On Bank C = Between Bank & 10m from Channel P = >10m <50m from Channel Channel (record Yes or No)									
	Left Bank				Channel	Right Bank				
Walls/Rip-rap/Dams	P	C	B	0	Y	N	0	B	C	P
Buildings	P	C	B					B	C	P
Pavement/Cleared Lot	P	C	B					B	C	P
Road/Railroad	P	C	B					B	C	P
Pipes (Inlet/Outlet)	P	C	B					B	C	P
Landfill/Trash	P	C	B					B	C	P
Park/Lawn	P	C	B					B	C	P
Row Crop	P	C	B					B	C	P
Pasture/Range	P	C	B					B	C	P
Logging Operations	P	C	B					B	C	P
Mining Activity	P	C	B	a				B	C	P
Vegetation Management	P	C	B	a				B	C	P
Bridges/Abutments	P	C	B					B	C	P
Orchards/Vineyards	P	C	B					B	C	P

Habitat Stability			
Left Bank	eroded	stable	1
Right Bank	eroded	stable	1

-1,ro--..+ r 00 / v./,) 1<.dl\$, kt.,-

Inter-Transect: HI										Wetted Width (m): 5.0
Inter-Transect Substrates										
Position	Dist. from L-B (m)	Depth (cm)	mm/size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	6	GF	—	P A	0	P A D	P A D	P A D	0 - No microalgae present. Feels rough, not slimy.
Center	1.2	2-7;				0	P A D	P A D	P A D	1 - Present but not visible. Feels slimy.
Center	2.5	13			P	D	P A D	P A D	P A D	2 - Present and visible but <1mm. Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
Right Center	3.7	11	XB	—	P	<D	P A D	P A D	P A D	3 - 1-5mm.
Right Bank	5.0	10	RR	—	P A	0	P A D	P A D	P A D	4 - 6-20mm.
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred).										5 - >20mm.
										UD - Cannot determine if microalgae present. Substrate too small or covered with silt (formerly Z code).
										D - Dry; not assessed

FLOW HABITATS (% between transects, total = 100%)	
Channel Type	%
Cascade/Falls	5
Rapid	40
Riffle	5
Run	20 30
Glide	5 10
Pool	5 10
Dry	0

SWAMP Stream Habitat Characterization Form

FULL VERSION

Revision Date: January 9, 2012

Site Code: <u>Yule Creek Exp</u>	Site Name: <u>O-Creek</u>	Date: <u>09/11/2012</u>
Wetted Width (m): <u>4.5</u>	Bankfull Width (m): <u>1</u>	Bankfull Height (m): <u>4.5</u>

Transect I

Transect Substrates										
Position	Dist from LB (m)	Depth (cm)	min/size class	% Cobble Embed	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	33	CB	65	P	0	P A D	P A D	P A D	0 = No microalgae present
Left Center	1.1	34	SB	—	P	0	P A D	P A D	P D	1 = Present but not visible, feels slimy
Center	2.2	36	CB	60	P	fl	P A D	P A D	P D	2 = Microalgae visible but < 1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail
Right Center	3.3	28	XB	—	P	0	P A D	P A D	P D	3 = 1-5mm
Right Bank	4.5	5	CB	90	P A	6	P A D	P A D	P D	4 = 5-20mm
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)										5 = >20mm
										UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code)
										D = Dry, not assessed

RIPARIAN VEGETATION (facing downstream)		0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)	
Vegetation Class	Left Bank	Right Bank	
Upper Canopy (>5 m high)			
Woody shrubs & saplings	0 1 2 3 4	0 1 2 3 4	
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4	
Lower Canopy (0.5 m-5 m high)			
Herbs/grasses	0 1 2 3 4	0 1 2 3 4	
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4	
Barren, bare soil/duff	0 1 2 3 4	0 1 2 3 4	
Ground Cover (<0.5 m high)			

INSTREAM HABITAT COMPLEXITY	0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)	
Filamentous Algae	0 1 2 3 4	
Aquatic Macrophytes/ Emergent Vegetation	2 3 4	
Boulders	0 1 2 4	
Woody Debris >0.3 m	0 1 2 3 4	
Woody Debris <0.3 m	0 1 2 3 4	
Undercut Banks	2 3 4	
Overhang Vegetation	1 2 3 4	
Live Tree Roots	0 1 2 3 4	
Artificial Structures	2 3 4	

DENSIMETER READINGS (0-17) count covered dots	
Center	
Center Upstream	2..
Center Right	12..
Center	11..
Left Bank	
Right Bank	

HUMAN INFLUENCE (circle only the closest to wetted channel)	0 = Not Present B = On Bank C = Between Bank & 10m from Channel P = >10m-50m from Channel Channel (record Yes or No)		
	Left Bank	Channel	Right Bank
Walls/Riprap/Dams	P C B 0	Y N	P B C P
Buildings	P C B 0	Y N	P B C P
Pavement/Cleared Lot	P C B		B C P
Road/Railroad	P C B		B C P
Pipes (Inlet/Outlet)	P C B		B C P
Landfill/Trash	P C B		0 B C P
Park/Lawn	P C B		0 B C P
Row Crops	P C B		0 B C P
Pasture/Range	P C B		B C P
Logging Operations	P C B		B C P
Mining Activity	P C B		B C P
Vegetation Management	P C B		B C P
Bridges/Abutments	P C B		B C P
Orchards/Vineyards	P C B		B C P

BANK STABILITY				
Left Bank	eroded	eroded	eroded	eroded
Right Bank	eroded	eroded	eroded	eroded

Inter-Transect: IJ

Wetted Width (m): 3.1

Inter-Transect Substrates

Position	Dist. from LB (m)	Depth (cm)	mm/size class	% Cobble Embog.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	43	XB	—	P	0	P A D	P A D	P A D	0 = No microalgae present. Feels rough, not slimy. 1 = Present but not visible. Feels slimy. 2 = Present and visible. Rill.
Left Center	0.7	70	SB		P	0	P A D	P A D	P A D	3 = 1-5mm. Rubbing fingers on surface produces a brownish tint on them. 4 = 5-20mm. scraping leaves visible trail.
Center	1.5	84	SB	—	P		P A D	P A D	P A D	5 = >20mm.
Right Center	2.2	9	XB		P		P A D	P A D	P A D	UD = Cannot determine if microalgae present. Substrate too small or covered with silt (formerly Z code).
Right Bank	3.1	40	3	—	P	1	P A D	P A D	P A D	D = Dry, not assessed.

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred).

Flow Habitat	Flow Habitat
15	20
42	
5	
15	
10	
0	
0	

Site Code: <u>Pine Creek Exp</u>	Site Name: <u>Pine Creek</u>	Date: <u>09/11/2012</u>
Wetted Width (m): <u>5.6</u>	Bankfull Width (m): <u>5.9</u>	Bankfull Height (m): <u>0.4</u>
Transect J		

Transect Substrates										
Position	Dist from L.B (m)	Depth (cm)	mm/size class	% Cobble Bmbed	GPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	5	RS	—	P @	0	P A D	P D	P A D	0 = No microalgae present. Feels smooth - no film. 1 = Present but not visible. Feels slimy. 2 = Present and visible but <4mm. Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail. 3 = 1-5mm. 4 = 5-20mm. 5 = >20mm. UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code). D = Dry - not assessed.
Left Center	1.4	2	GC	—	P A	0	P D	P D	P A D	
Center	2.8	35	CB	70	P @	0	P D	P D	P A D	
Right Center	4.2	30	SB	—	P @	1	P D	P D	P A D	
Right Bank	5.6	2	RS	—	P A	0	P V D	P A D	P A D	
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)										

RIPARIAN VEGETATION (facing downstream)		0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)	
Vegetation Class	Left Bank	Right Bank	
Upper Canopy (>5 m high)			
Trees and saplings >5 m high	0 1 2 <u>4</u> 4	0 1 <u>2</u> 3 4	
Lower Canopy (0.5 m-5 m high)			
All vegetation 0.5 m to 5 m	0		
Woody shrubs & saplings <0.5 m	0 <u>ti</u> 3 4	0 @ 3 4	
Herbs/grasses	0 <u>0</u> 3 4	0 <1> 3 4	
Barren, bare soil/duff	0 2 3 4	0 @ 3 4	

INSTREAM HABITAT COMPLEXITY		0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)	
Filamentous Algae	0 <u>1</u> 2 3 4		
Aquatic Macrophytes/ Emergent Vegetation		3 4	
Boulders		4	
Woody Debris >0.3 m	0	4	
Woody Debris <0.3 m	0 <1> 2 3 4		
Undercut Banks	0 2 3 4		
Overhang, Vege:ation	0 <u>0</u> 2 3 4		
Live Tree Roots	0 <1> 2 3 4		
Artificial Structures	0 1 2 3 4		

DENSIMETER READINGS (0-17) count covered dots	
Center	12-
Center Upstream	7
Center Right	
Center Downstream	10
Left Bank	
Right Bank	

HUMAN INFLUENCE (circle only the closest to wetted channel)		0 = Not Present B = On Bank O = Between bank & 10m from Channel P = >10m - <60m from Channel Channel (record Yes or No)	
	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B <u>0</u>	Y <u>1</u>	P B C P
Buildings	P C B <u>0</u>	Y <u>1</u>	P B C P
Pavement/ Cleared Lot	P C B <u>0</u>		P B C P
Road/ Railroad	P B		P B C P
Pipes (Inlet/ Outlet)	P C B		P B C P
Landfill/ Trash	P C B		P B C P
Park/ Lawn	P C B		P B C P
Row Crop	P C B		P B C P
Pasture/ Range	P C B		P B C P
Logging Operations	P C B		P B C P
Mining Activity	P C B		P B C P
Vegetation Management	P C B		P B C P
Bridges/ Abutments	P C B		P B C P
Orchards/ Vineyards	P C B		P B C P

Bank Stability			
Left Bank	eroded	stable	<u>4</u>
Right Bank	eroded	stable	<u>4</u>

12, "to W S"lvf ... 4'

Inter-Transect: JK						Wetted Width (m): 5.4				
Inter-Transect Substrates										
Position	Dist from LB (m)	Depth (cm)	mm/size class	% Cobble Embedded	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	5	SA	—	P @	0	P A D	P A D	P A D	0 = No microalgae present. Eels rough, not slimy.
Left Center	1.3	3	2C		@ A	0	P A D	P A D	P A D	1 = Present but not visible. Eels slimy.
Center	2.6	S3		5	—	0	P A D	P A D	P A D	2 = Present and visible but <1mm. Rubbing fingers on surface produces a brownish tint on them. Scraping leaves visible trail.
Right Center	3.9	1.1	se.	—	P @	0	P A D	P A D	P A D	3 = 1-5mm.
Right Bank	5.4	26	CB	85	P @	0	P A D	P A D	P A D	4 = 5-20mm.
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred).										5 = >20mm.
										UD = Cannot determine if microalgae present. Substrate too small or covered with silt (formerly Z code).
										D = Dry, not assessed

FLOW HABITATS	
(% between transects, total 100%)	
Channel Type	%
Cascade/Falls	10
Rapid	10
Riffle	5
Run	65
Glide	10
Pool	0
Dry	0

5
5
35
5

Site Code: <u>Pine Creek Exp</u>	Site Name: <u>Pine Creek</u>	Date: <u>09/11/2012</u>
Wetted Width (m): <u>4.7</u>	Bankfull Width (m): <u>5.9</u>	Bankfull Height (m): <u>0.4</u>

Transect K

Transect Substrates										
Position	Dist from LB (m)	Depth (cm)	mm/size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes	Microalgae Thickness Codes
Left Bank	0	6	SA	—	P A	0	P A D	P A D	P A D	0 = No microalgae present. Feels rough, not slimy.
Center	1.1	19	CB	50	P	0	P A D	P A D	P A D	1 = Present but not visible. Feels slimy.
Center	2.3	39	SB		P	0	P A D	P A D	P A D	2 = Present but not visible. Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
Right Center	3.5	45	CB	00	P	0	P A D	P A D	P A D	3 = 1-5mm.
Right Bank	4.7	6	GC	—	P A	0	P A D	P A D	P A D	4 = 6-20mm.
Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)										5 = >20mm.
										U = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
										D = Dry, not assessed

RIPARIAN VEGETATION (facing downstream)		0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)	
Vegetation Class	Left Bank	Right Bank	
Upper Canopy (>5 m high)			
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4	
Lower Canopy (0.5 m-5 m high)			
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4	
Ground Cover (<0.5 m high)			
Woody shrubs & saplings <0.5 m	0 1 2 3 4	0 1 2 3 4	
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4	
Barren, bare soil/ duff	0 2 4	0 2 4	

INSTREAM HABITAT COMPLEXITY		0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)	
Filamentous Algae	0 1 2 3 4		
Aquatic Macrophytes/ Emergent Vegetation	2 3 4		
Boulders	0 4		
Woody Debris >0.3 m	0 4		
Woody Debris <0.3 m	0 1 2 3 4		
Undercut Banks	0 2 3 4		
Overhang, Vegetation	0 1 2 3 4		
Live Tree Roots	0 1 2 3 4		
Artificial Structures	0 1 2 3 4		

DENSIMETER READINGS (0-17) count covered dots	
Center	16
Left	16
Center Upstream	10
Center Right	10
Center Downstream	11
Right Bank	

HUMAN INFLUENCE (circle only the closest to wetted channel)		0 = Not Present B = On Bank C = Between Bank & 10m from Channel P = >10m < 60m from Channel Channel record Yes or No	
	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B 0	Y N	A B C P
Buildings	P B 0	Y N	A B C P
Pavement/ Cleared Lot	P C B		C P
Road/ Railroad	P C B		B C P
Pipes (Inlet/ Outlet)	P C B		B C P
Landfill/ Trash	P C B		B C P
Park/ Lawn	P C B		B C P
Row Crop	P C B		B C P
Pasture/ Range	P C B		B C P
Logging Operations	P C B		B C P
Mining Activity	P C B		B C P
Vegetation Management	P C		B C P
Bridges/ Abutments	P C B 0	Y N	B C P
Orchards/ Vineyards	P C B 0		B C P

Bank Stability			
Left Bank	eroded	stable	0.5
Right Bank	eroded	stable	0.5

f.i.s,
" 5
![GO\.

TAKE PHOTOS (check box if taken & record photo code)	
Downstream (required)	
Upstream (optional)	

Site Code: Pond Creek ExpDate: 09/11/2012

Analyte

Equipment & Calibration Date

BENTHIC INVERTEBRATE SAMPLES

Collection Method (indicate standard or margin-center-margin)			Replicate	# Jars
RWB (standard)	RWB (MCM)	<u>TRC</u>	1	1
RIJVB (standard)	RWB (MCM)	TRC	2	
RWB (standard)	RWB (MCM)	TRC		
RWB (standard)	RWB (MCM)	TRC		

Field Notes/ Comments:

pH	Cal date: / /
Water temp	Cal date: / /
dissolved oxygen	Cal date: / /
oxygen sat	Cal date: / /
specific cond	Cal date: / /
Salinity	Cal date: / /
Alkalinity	Cal date: / /
Turbidity	Cal date: / /
Silica	Cal date: / /
Air temp	Cal date: / /
Velocity	Cal date: / /

ALGAE SAMPLES

Collection Method (circle one or write new method if applicable)	SWAMP EMAP	SWAMP EMAP	SWAMP EMAP	SWAMP EMAP
Collection Device (sum # of transects per device)	Rep. 1	Rep. 2	Rep.	Rep.
Rubber Delimiter (area=12.6cm')				
PVC Delimiter (area=12.6cm')				
Syringe Scrubber (area=5.3cm')				
Other area:				
Number of transects sampled (0-11)				
Composite Volume (L)				
Assemblage 1b volume (diatom) (50 ml tube)				
Assemblage 1D volume (soft algae) (50 ml tube)				
Check if Qualitative Algae sample was collected with soft algae/diatom sample re. Ured even if macroalae not visible (check if water chem, integrated sample was collected (chi, AFDM))	D	D	D	D
Chlorophyll a volume use GF/F filter (25 mL (preferred volume))				
Ash Free Dry Mass use GF/F filter (AFDM) volume (25 mL (preferred vol))				

Water and Sediment Chemistry Samples

check if a WATER chemistry grab sample was collected (nutrients, SSC, etc.)	D
Check if a DUPLICATE WATER chemistry grab sample was collected	D
Check if a SEDIMENT chemistry sample was collected	D
Check if a DUPLICATE PEP chemistry sample was collected	D
Device: SCOP_C:ORE GRAB	
Material: Stainless Steel Polyethylene9 PolyCarbonate Other	
Sediment Collection Depth (cm): 2 or 5	
Create Lab Collection record for each check: id box for Integrated and grab Water chemistry samples	

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

ATTACHMENT E

Representative Site Photos



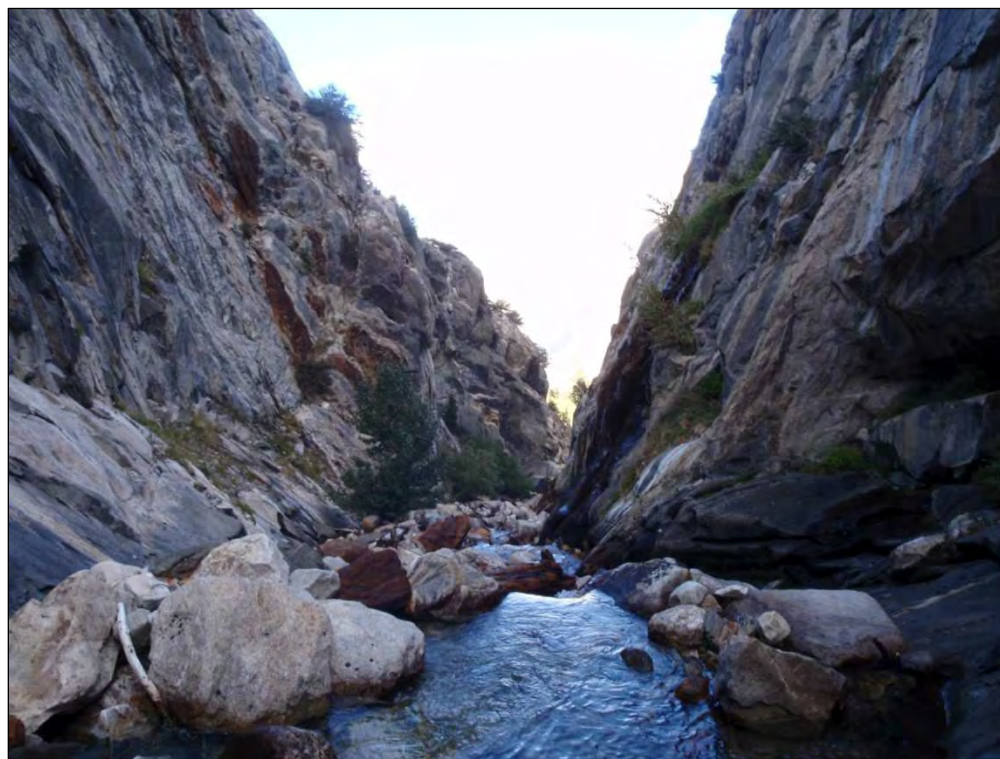
A) Pine Creek Mine adjacent to the control site.



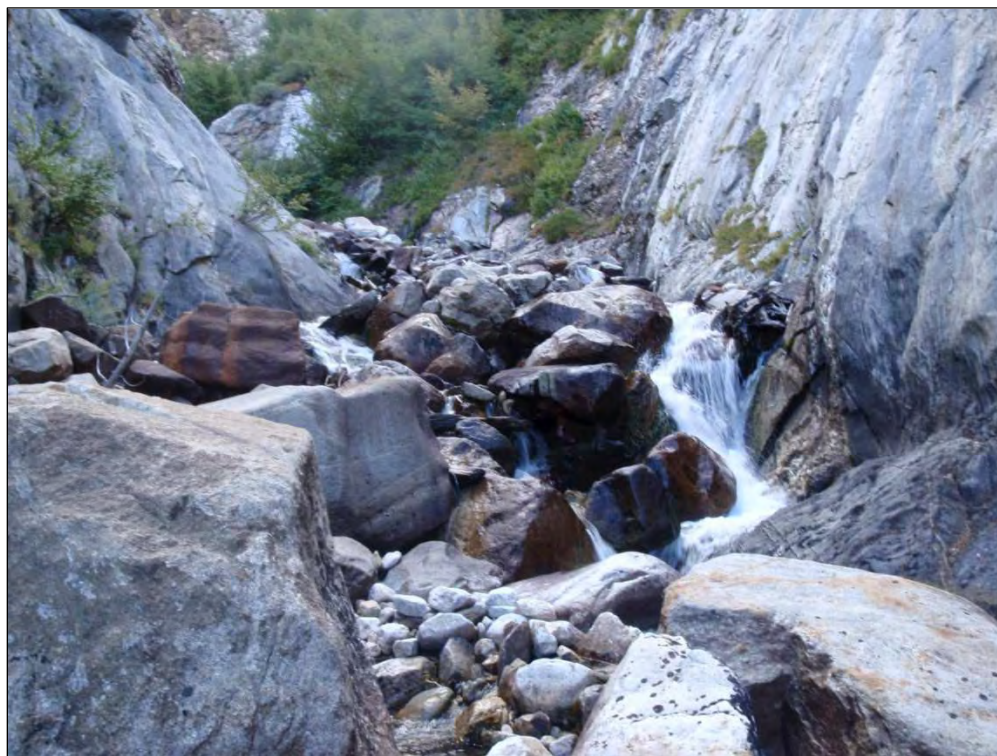
B) The downstream transect of the control site facing downstream.



C) The downstream transect of the control site facing upstream.



D) The upstream transect of the control site facing downstream.



E) The upstream transect of the control site facing upstream.



F) The downstream transect of the experimental site facing downstream.



G) The downstream transect of the experimental site facing upstream.



H) The upstream transect of the experimental site facing downstream.



I) The upstream transect of the experimental site facing upstream.



J) Dry stream channel downstream from the control site adjacent to the mine.



K) A BMI sample collected within the control site.



L) A bridge crossing over the lower section of the control site.



M) Old mining debris left in the stream channel within the control site.



N) An ECORP biologist taking water quality readings in the control site.

ATTACHMENT F

CDFW ABL External QC Report



DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY-CHICO
CALIFORNIA STATE UNIVERSITY, CHICO
CHICO, CA 95929-0555
530-898-4792

27 February 2013

Adam Schroeder
ECORP Consulting, Inc.
1801 Park Court Place, B-103
Santa Ana, CA 92701

Dear Adam,

Attached are the results of my QC analysis of 1 sample submitted from the Pine Creek project. The results are presented in five summary tables. This QC analysis was performed in accordance to the Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT)'s Standard Taxonomic Effort Document (STE) 1 March 2011 version (Richards and Rogers, 2011).

There were two instances of "tagalong" organisms. These are defined as specimens accidentally included in a vial of organisms of another taxon and are marked as "Probable sorting error" in the attached Listing of Taxonomic Discrepancies file.

Specimens originally identified as *Drunella spinifera* were earlier instars. The advice we've been given (for example, the mayfly workshop manual, Jacobus and Randolph, 2005; materials from the workshop given at Long Beach earlier this year) has been to identify only the later instars to species and leave the earlier ones at *Drunella grandis/spinifera*.

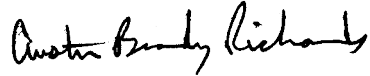
A damaged early instar *Calineuria californica* (Banks) nymph was misidentified as Perlodidae. Leaving this specimen at family level would be perfectly understandable given the condition, but the presence of filamentous gills on the thorax send the specimen to Perlidae instead of Perlodidae (Stewart and Stark, 2002).

The specimens originally identified as *Hesperoperla hoguei* do not appear to be either *H. pacifica* (mushroom-shaped light area anterior to compound eyes, few intercalary spinules on abdominal segments) or *H. hoguei* (inverted W-shaped light area and many intercalary spinules) but intermediate between the two (Baumann and Stark, 1980). John Sandberg of the ABL has been monitoring a site in the North Fork of the Feather River drainage in which both *Hesperoperla* species are present, based on adult collections. Nymphs from the site exhibit the same intermediate characters state as your specimens, perhaps as a result of hybridization. For these reasons, I suggest leaving these *Hesperoperla* specimens at genus.

Two specimens originally identified as *Orohermes crepusculus* included one mature and one immature specimen. Since head color patterns develop in later instars and generally several corydalid genera can co-occur in a given stream, I would personally leave the earlier instar specimen at Corydalidae.

I welcome any questions or comments you may have concerning this report.

Sincerely,

A handwritten signature in black ink that reads "Austin Brady Richards". The signature is written in a cursive, flowing style.

Austin Brady Richards
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Literature Cited

- Baumann, R. W. and B. P. Stark. 1980. *Hesperoperla hoguei*, a new species of stonefly from California (Plecoptera: Perlidae). Great Basin Naturalist 40:63-67.
- Richards, A. B., and D. C. Rogers. 2011. Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT) List of Freshwater Macroinvertebrate Taxa from California and Adjacent States including Standard Taxonomic Effort Levels. Version: 1 March 2011. SAFIT. Retrieved 1 September 2011 from: <http://safit.org/ste.html>
- Stewart, K. W. and B. P. Stark. 2002. Nymphs of North American stonefly genera (Plecoptera). Columbus, Ohio, The Caddis Press.

Comparative Taxonomic Listing of all Submitted Samples

Samples submitted by ECORP Consulting, Inc. for Project: Pine Creek

Report prepared by Brady Richards, CDFG ABL-Chico, 2/22/2013

Taxonomist	Sample no.	Vial no.	Original ID	Original Count	Stage	ABL Count	ABL ID
B. LaVoie	6275.1-2						
		1	Baetis	112	L	1	Zapada cinctipes
		1	Baetis	112	L	112	Baetis
		2	Baetis tricaudatus	51	L	51	Baetis tricaudatus
		2	Baetis tricaudatus	51	L	1	Nemouridae
		3	Caudatella hystrix	1	L	1	Caudatella hystrix
		4	Caudatella	4	L	4	Caudatella
		5	Drunella doddsii	26	L	26	Drunella doddsii
		6	Drunella spinifera	1	L	1	Drunella grandis/spinifera
		7	Epeorus	27	L	27	Epeorus
		8	Ironodes	21	L	18	Ironodes
		9	Rhithrogena	3	L	3	Rhithrogena
		10	Chloroperlidae	22	L	22	Chloroperlidae
		11	Doroneuria baumanni	3	L	3	Doroneuria baumanni
		12	Frisonia picticeps	26	L	25	Frisonia picticeps
		13	Hesperoperla hoguei	3	L	3	Hesperoperla
		14	Hesperoperla	11	L	11	Hesperoperla
		15	Malenka	1	L	1	Malenka
		16	Nemouridae	4	L	4	Nemouridae
		17	Peltoperlidae	1	L	1	Peltoperlidae
		18	Perlidae	2	L	2	Perlidae
		19	Perlodidae	1	L	1	Calineuria californica
		20	Pteronarcella	1	L	1	Pteronarcella
		21	Yoraperla	9	L	9	Yoraperla
		22	Zapada cinctipes	177	L	175	Zapada cinctipes
		23	Zapada columbiana	2	L	2	Zapada columbiana
		24	Elmidae	1	A	1	Elmidae

Taxonomist	Sample no.	Vial no.	Original ID	Original Count	Stage	ABL Count	ABL ID
B. LaVoie	6275.1-2	25	Orohermes crepusculus	2	L	1	Orohermes crepusculus
		25	Orohermes crepusculus	2	L	1	Corydalidae
		26	Brillia	4	L	4	Brillia
		27	Chaetocladius	2	L	2	Chaetocladius
		28	Cricotopus	2	L	2	Cricotopus
		29	Eukiefferiella devonica group	4	L	4	Eukiefferiella devonica group
		30	Micropsectra	5	L	5	Micropsectra
		31	Orthocladius complex	2	L	2	Orthocladius complex
		32	Orthocladius	1	L	1	Orthocladius
		33	Parorthocladius	1	L	1	Parorthocladius
		34	Rheocricotopus	1	L	1	Rheocricotopus
		35	Tvetenia bavarica group	3	L	3	Tvetenia bavarica group
		36	Chelifera/Metachela	5	L	5	Chelifera/Metachela
		37	Empididae	2	P	2	Empididae
		38	Wiedemannia	9	L	9	Wiedemannia
		39	Arctopsyche californica	4	L	4	Arctopsyche californica
		40	Arctopsyche	5	L	5	Arctopsyche
		41	Arctopsychinae	14	L	14	Arctopsychinae
		42	Oligophlebodes	2	L	2	Oligophlebodes
		43	Parapsyche	6	L	6	Parapsyche
		44	Rhyacophila brunnea group	10	L	10	Rhyacophila brunnea group
		45	Rhyacophila hyalinata group	2	L	2	Rhyacophila hyalinata group
		46	Rhyacophila	5	L	5	Rhyacophila
		47	Trichoptera	1	P	1	Trichoptera
		48	Oligochaeta	15	X	15	Oligochaeta
		49	Lebertia	2	X	2	Lebertia
		50	Sperchon	3	X	3	Sperchon

Taxonomist	Sample no.	Vial no.	Original ID	Original Count	Stage	ABL Count	ABL ID
B. LaVoie	6275.1-2	51	Sperchonopsis	8	X	8	Sperchonopsis
		52	Sperchontidae	1	X	1	Sperchontidae
		53	Testudacarus	1	X	1	Testudacarus
		54	Ostracoda	3	X	3	Ostracoda
		55	Turbellaria	6	X	5	Turbellaria

Listing of Enumeration Discrepancies

Samples submitted by ECORP Consulting, Inc. for Project: Pine Creek

Report prepared by Brady Richards, CDFG ABL-Chico, 2/22/2013

	Sample #	Vial #	Original ID	# Counted		Difference (Original - QC)
				Original	QC	
Minor Counting Discrepancies	6275.1-2	1	Baetis	112	113	-1
		2	Baetis tricaudatus	51	52	-1
		8	Ironodes	21	18	3
		12	Frisonia picticeps	26	25	1
		22	Zapada cinctipes	177	175	2
		55	Turbellaria	6	5	1

Listing of Taxonomic Discrepancies

Samples submitted by ECORP Consulting, Inc. for Project: Pine Creek
Report prepared by Brady Richards, CDFG ABL-Chico, 2/22/2013

Final ID Sample #	Vial #	Original ID	Taxonomic level QC Final ID	# Organisms of dispute	Comments
6275.1-2					
Disputed ID	19	Perlodidae	Calineuria californica Family	1	This disputed ID also represents a difference in taxonomic precision.
QC ID not in Master Taxa List	6	Drunella spinifera	Drunella	1	
Probable sorting error	1	Baetis	Zapada cinctipes	Order	1 This disputed ID also represents a difference in taxonomic precision.
	2	Baetis tricaudatus	Nemouridae	Order	1 This disputed ID also represents a difference in taxonomic precision.
Original ID more precise	13	Hesperoperla hoguei	Hesperoperla	3	
	25	Orohermes crepusculus	Corydalidae	1	

Summary of Taxonomic and Enumeration Discrepancies

Samples submitted by ECORP Consulting, Inc. for Project: Pine Creek

Report prepared by Brady Richards, CDFG ABL-Chico, 2/22/2013

Sample	Total Taxa	Taxonomic Discrepancies						Counting Discrepancies			
		<u>Taxonomic Precision</u>									
		<u>Relative to QC</u>									
		Disputed ID		More precise		Less Precise		<u>Major</u>		<u>Minor</u>	
		<i>f</i> *	<i>n</i> **	<i>f</i>	<i>n</i>	<i>f</i>	<i>n</i>	<i>f</i>	<i>d</i> ***	<i>f</i>	<i>d</i>
6275.1-2	55	1	1	2	4	-	-	-	-	6	9

* = the frequency of occurrence of the discrepancy, in number of samples

** = the number of organisms affected (by QC Lab counts) *n*

*** = the sum total of (absolute value of) differences in counts *d*

f

QC Report - Disputed IDs only

Samples submitted by ECORP Consulting, Inc. for Project: Pine Creek

Report prepared by Brady Richards, CDFG ABL-Chico, 2/22/2013

<i>Sample #</i>	<i>Vial #.</i>	<i>Original ID</i>	<i>QC ID</i>	<i>comments</i>
6275.1-2	19	Perlodidae	Calineuria californica	This disputed ID also represents a difference in taxonomic precision.