



Geotechnical
Environmental
Water Resources
Ecological

Macroinvertebrate Report

Bear Creek Watershed Association

Submitted to:

Russell N. Clayshulte

Bear Creek Watershed Association

1529 S. Telluride St.

Aurora, CO 80017

Submitted by:

GEI Consultants, Inc.

Ecological Division

4601 DTC Boulevard, Suite 900

Denver, CO 80237

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Project 071340



1.0 Summary

Enclosed are the results of the analyses of the 11 benthic macroinvertebrate samples collected August 23 and 24, 2016. Data are reported as number of organisms per square meter. The invertebrates were identified to the lowest possible taxonomic level.

Colorado state protocols recommend that samples with greater than 360 individuals counted in the subsample be randomly resampled using a computer program to a fixed 300 organism count. Site 14a-Morrison, Site 13a-Idledale, Site 9-O'Fallon, Site 8b-BCC, Site 5-Little Bear, Site 3a-Keys, Site 2a-Golden Willow, and Site 90-Wadsworth had more than 360 individuals counted in the subsample. Based on this, a Monte Carlo simulation was performed on the data for these samples prior to calculation of the MMI scores (Vinson and Hawkins 1996; Carter and Resh 2001). In some of the simulated data sets, taxa that were present in low numbers were not included in the fixed count subsample, decreasing the total taxa richness of the sample.

All samples were checked for large and rare taxa, but data are only reported for samples with large and rare taxa present. The large and rare taxa are included in the subsample count.

Report approved by:



Sarah Skigen-Caird, Ecology Division
Manager and QA/QC Officer



Natalie Love, Laboratory Director

2.0 QA/QC Summary

For quality assurance, the Laboratory Supervisor or an experienced technician checked all sorted samples and results were documented for ten percent of the samples. These procedures indicated over 97 percent thoroughness for sorting.

Quality assurance for identifications and enumerations (Whittaker 1975; Stribling et al. 2003) was randomly conducted on ten percent of the samples and indicated at least 95 percent agreement for taxonomic and count accuracy.

Date Received: 8/24/2016

Date Processing Started: 9/15/2016

Table 1: QA Requirement Summary

QA Requirement	Yes	No	Note
Chain of Custody received complete	x		
Macroinvertebrate Extraction QA within acceptable 5% difference	x		Sample rechecked due to first QA fail.
Macroinvertebrate Identification QA within acceptable 5% difference	x		

Table 2: Macroinvertebrate QA Performance

# of Samples for QA	Initial Extractions		Re-Extractions		Identifications	
	Sample %	Acceptable %	Sample %	Acceptable %	Sample %	Acceptable %
1	94.6*	95	97.3	95	95.9	95

*If more than 5% of the total originally extracted organisms are found, then extraction continues in those portions picked, and the sample is rechecked until less than 5% of the total originally extracted are found.

3.0 Results

3.1 Sample Results

See attached Excel Spreadsheet

Appendix A

Excel spreadsheets with results of macroinvertebrate analyses

DATA: MACROINVERTEBRATE DENSITY
 Client: BEAR CREEK WATERSHED ASSOCIATION
 Sampled: 8/24/2016
 Site: **SITE 15a-BCP**

TAXA

	MMI KICK (#/sq.meter)	Subsample Picked (30%)	Large & Rare*
INSECTA			
EPHEMEROPTERA	273	82	
Acentrella turbida	3	1	
Baetis tricaudatus	270	81	
PLECOPTERA	18	5	1
Perlidae	18	5	1
COLEOPTERA	144	43	
Optioservus divergens	57	17	
Optioservus quadrimaculatus	57	17	
Zaitzevia parvula	30	9	
TRICHOPTERA	428	128	1
Arctopsyche sp.	8	2	1
Cheumatopsyche sp.	27	8	
Glossosomatidae	7	2	
Hydropsyche sp.	370	111	
Lepidostoma sp.	10	3	
Leucotrichia pictipes	3	1	
Rhyacophila sp.	3	1	
DIPTERA	246	74	
Brillia sp.	7	2	
Cardiocladius sp.	20	6	
Cricotopus sp.	20	6	
Diamesa sp.	13	4	
Eukiefferiella sp.	33	10	
Orthocladius/Cricotopus gr.	43	13	
Polypedilum sp.	33	10	
Prosimulium sp.	13	4	
Rheotanytarsus sp.	20	6	
Simulium sp.	37	11	
Tvetenia sp.	7	2	
HYDRACARINA	17	5	
Sperchon sp.	17	5	
NEMATODA	7	2	
Unid. Nematoda	7	2	

DATA: MACROINVERTEBRATE DENSITY
 Client: BEAR CREEK WATERSHED ASSOCIATION
 Sampled: 8/24/2016
 Site: **SITE 15a-BCP**

TAXA	MMI KICK (#/sq.meter)	Subsample Picked (30%)	Large & Rare*
ANNELEIDA			
OLIGOCHAETA	6	3	
Eiseniella tetraedra	3	1	
Enchytraeidae	3	1	
TOTAL (#/sq.meter)	1,139	341	2
NUMBER OF TAXA	28		
SHANNON-WEAVER (H')	3.40		
TOTAL EPT TAXA	10		
EPT INDEX (% of Total Taxa)	36		
EPHEMEROPTERA ABUNDANCE (% of Total Density)	24		
MMI Score		67	

*Large and rare organisms are taxa not found in the subsample. These organisms are added to subsample calculations to determine Total (#/sq. meter).

DATA: MACROINVERTEBRATE DENSITY
 Client: BEAR CREEK WATERSHED ASSOCIATION
 Sampled: 8/24/2016
 Site: **SITE 14a-Morrison**

TAXA	MMI KICK (#/sq.meter)	Subsample Picked (20%)	Large & Rare*	300-Count Simulation
INSECTA				
EPHEMEROPTERA	990	198		152
Acentrella turbida	5	1		1
Baetis tricaudatus	955	191		147
Heptageniidae	10	2		1
Leptophlebiidae	20	4		3
PLECOPTERA	26	5	1	6
Claassenia sabulosa	16	3	1	4
Sweltsa sp.	10	2		2
COLEOPTERA	170	34		23
Optioservus castanipennis	30	6		4
Optioservus divergens	60	12		8
Zaitzevia parvula	80	16		11
TRICHOPTERA	440	88		72
Cheumatopsyche sp.	15	3		3
Glossosoma sp.	50	10		7
Hydropsyche sp.	350	70		58
Lepidostoma sp.	5	1		1
Leucotrichia pictipes	10	2		1
Rhyacophila rotunda	10	2		2
DIPTERA	280	56		45
Cardiocladius sp.	20	4		3
Cricotopus sp.	25	5		5
Diamesa sp.	75	15		12
Eukiefferiella sp.	45	9		7
Neoplasta sp.	5	1		1
Orthocladius/Cricotopus gr.	50	10		8
Polypedilum sp.	20	4		3
Rheocricotopus sp.	5	1		1
Simulium sp.	30	6		4
Tvetenia sp.	5	1		1
HYDRACARINA	5	1		--
Unid. Hydracarina	5	1		--
ANNELIDA				
OLIGOCHAETA	15	3		3
Lumbriculidae	15	3		3

DATA: MACROINVERTEBRATE DENSITY
 Client: BEAR CREEK WATERSHED ASSOCIATION
 Sampled: 8/24/2016
 Site: **SITE 14a-Morrison**

TAXA	MMI KICK (#/sq.meter)	Subsample Picked (20%)	Large & Rare*	300-Count Simulation
TOTAL (#/sq.meter)	1,926	385	1	301
NUMBER OF TAXA	27			26
SHANNON-WEAVER (H')	2.81			2.82
TOTAL EPT TAXA	12			12
EPT INDEX (% of Total Taxa)	44			46
EPHEMEROPTERA ABUNDANCE (% of Total Density)	51			50
MMI Score				72

*Large and rare organisms are taxa not found in the subsample. These organisms are added to subsample calculations to determine Total (#/sq. meter).

DATA: MACROINVERTEBRATE DENSITY
 Client: BEAR CREEK WATERSHED ASSOCIATION
 Sampled: 8/24/2016
 Site: **SITE 13a-IDLEDALE**

TAXA

	MMI KICK (#/sq.meter)	Subsample Picked (10%)	300-Count Simulation
INSECTA			
EPHEMEROPTERA	1,810	181	67
Acentrella sp.	30	3	2
Baetis flavistriga complex	10	1	--
Baetis tricaudatus	1,670	167	63
Leptophlebiidae	100	10	2
PLECOPTERA	60	6	3
Perlidae	10	1	--
Skwala americana	50	5	3
COLEOPTERA	330	33	14
Optioservus castanipennis	30	3	3
Optioservus divergens	230	23	9
Optioservus quadrimaculatus	70	7	2
TRICHOPTERA	4,780	478	195
Cheumatopsyche sp.	120	12	3
Glossosoma sp.	170	17	11
Hydropsyche sp.	1,150	115	51
Lepidostoma sp.	3,310	331	129
Leucotrichia pictipes	20	2	1
Rhyacophila rotunda gr.	10	1	--
DIPTERA	520	52	15
Conchapelopia/Thienemannimyia gr.	10	1	1
Diamesa sp.	240	24	7
Eukiefferiella sp.	10	1	--
Euryhopsis sp.	10	1	--
Microtendipes sp.	10	1	1
Orthocladius/Cricotopus gr.	10	1	--
Parametrioctenus sp.	10	1	--
Polypedilum sp.	70	7	2
Simulium sp.	110	11	2
Thienemanniella sp.	10	1	--
Tvetenia sp.	30	3	2
HYDRACARINA	80	8	3
Atractides sp.	10	1	--
Sperchon sp.	70	7	3
CRUSTACEA			
ISOPODA	10	1	1
Caecidotea communis	10	1	1

DATA: MACROINVERTEBRATE DENSITY
 Client: BEAR CREEK WATERSHED ASSOCIATION
 Sampled: 8/24/2016
 Site: **SITE 13a-IDLEDALE**

TAXA	MMI KICK (#/sq.meter)	Subsample Picked (10%)	300-Count Simulation
NEMATODA	10	1	1
Unid. Nematoda	10	1	1
ANNELIDA			
OLIGOCHAETA	10	1	1
Eiseniella tetraedra	10	1	1
TOTAL (#/sq.meter)	7,610	761	300
NUMBER OF TAXA	31		22
SHANNON-WEAVER (H')	2.64		2.60
TOTAL EPT TAXA	12		9
EPT INDEX (% of Total Taxa)	39		41
EPHEMEROPTERA ABUNDANCE (% of Total Density)	24		22
MMI Score			50

No large and rare taxa present in sample.

DATA: MACROINVERTEBRATE DENSITY
 Client: BEAR CREEK WATERSHED ASSOCIATION
 Sampled: 8/24/2016
 Site: **SITE 12-LAIR O'BEAR**

TAXA

	MMI KICK (#/sq.meter)	Subsample Picked (10%)
INSECTA		
EPHEMEROPTERA	1,420	142
Baetis tricaudatus	1,390	139
Ephemerellidae	10	1
Leptophlebiidae	20	2
COLEOPTERA	40	4
Optioservus divergens	40	4
TRICHOPTERA	1,760	176
Cheumatopsyche sp.	30	3
Hydropsyche sp.	280	28
Lepidostoma sp.	1,440	144
Leucotrichia pictipes	10	1
DIPTERA	250	25
Atherix pachypus	10	1
Cardiocladius sp.	20	2
Diamesa sp.	30	3
Polypedilum sp.	120	12
Rheotanytarsus sp.	10	1
Simulium sp.	60	6
HYDRACARINA	70	7
Atractides sp.	30	3
Sperchon sp.	40	4
CRUSTACEA		
AMPHIPODA	10	1
Gammarus lacustris	10	1
TOTAL (#/sq.meter)	3,550	355
NUMBER OF TAXA	17	
SHANNON-WEAVER (H')	2.14	
TOTAL EPT TAXA	7	
EPT INDEX (% of Total Taxa)	41	
EPHEMEROPTERA ABUNDANCE (% of Total Density)	40	
MMI Score		46

No large and rare taxa present in sample.

DATA: MACROINVERTEBRATE DENSITY
 Client: BEAR CREEK WATERSHED ASSOCIATION
 Sampled: 8/24/2016
 Site: **SITE 9-O'FALLON**

TAXA

	MMI KICK (#/sq.meter)	Subsample Picked (10%)	300-Count Simulation
INSECTA			
EPHEMEROPTERA	5,020	502	198
Acentrella sp.	50	5	1
Baetis flavistriga complex	30	3	--
Baetis tricaudatus	4,320	432	172
Ephemerella aurivillii	170	17	8
Ephemerella tibialis	180	18	6
Heptageniidae	20	2	1
Paraleptophlebia sp.	250	25	10
PLECOPTERA	50	5	1
Perlodidae	40	4	1
Zapada cinctipes	10	1	--
COLEOPTERA	140	14	7
Optioservus divergens	140	14	7
TRICHOPTERA	1,780	178	60
Cheumatopsyche sp.	100	10	3
Hydropsyche sp.	1,210	121	43
Lepidostoma sp.	430	43	11
Leucotrichia pictipes	20	2	1
Rhyacophila sp.	20	2	2
DIPTERA	1,010	101	29
Atherix pachypus	10	1	--
Conchapelopia/Thienemannimyia gr.	10	1	1
Diamesa sp.	30	3	--
Eukiefferiella sp.	10	1	1
Polypedilum sp.	380	38	9
Prosimulium sp.	50	5	--
Rheotanytarsus sp.	10	1	1
Simulium sp.	510	51	17
HYDRACARINA	80	8	3
Atractides sp.	20	2	--
Sperchon sp.	60	6	3
CRUSTACEA			
ISOPODA	10	1	1
Caecidotea communis	10	1	1
NEMATODA	10	1	1
Unid. Nematoda	10	1	1

DATA: MACROINVERTEBRATE DENSITY
Client: BEAR CREEK WATERSHED ASSOCIATION
Sampled: 8/24/2016
Site: **SITE 9-O'FALLON**

TAXA

	MMI KICK (#/sq.meter)	Subsample Picked (10%)	300-Count Simulation
TOTAL (#/sq.meter)	8,100	810	300
NUMBER OF TAXA	27		21
SHANNON-WEAVER (H')	2.56		2.39
TOTAL EPT TAXA	14		12
EPT INDEX (% of Total Taxa)	52		57
EPHEMEROPTERA ABUNDANCE (% of Total Density)	62		66
MMI Score			57

No large and rare taxa present in sample.

DATA: MACROINVERTEBRATE DENSITY
 Client: BEAR CREEK WATERSHED ASSOCIATION
 Sampled: 8/24/2016
 Site: **SITE 8b-BCC**

TAXA

	MMI KICK (#/sq.meter)	Subsample Picked (10%)	300-Count Simulation
INSECTA			
EPHEMEROPTERA	1,850	185	115
Baetis tricaudatus	1,760	176	110
Ephemerellidae	50	5	3
Heptageniidae	10	1	1
Leptophlebiidae	30	3	1
PLECOPTERA	40	4	3
Nemouridae	10	1	--
Skwala americana	30	3	3
COLEOPTERA	180	18	15
Optioservus sp.	180	18	15
TRICHOPTERA	1,760	176	92
Glossosoma sp.	30	3	2
Hydropsyche sp.	1,660	166	86
Lepidostoma sp.	40	4	2
Leucotrichia pictipes	10	1	1
Rhyacophila coloradensis gr.	20	2	1
DIPTERA	1,050	105	68
Antocha monticola	10	1	1
Atherix pachypus	70	7	5
Conchapelopia/Thienemannimyia gr.	50	5	5
Diamesa sp.	70	7	4
Polypedilum sp.	580	58	38
Prosimulium sp.	140	14	9
Simulium sp.	130	13	6
HYDRACARINA	30	3	2
Sperchon sp.	30	3	2
NEMATODA	30	3	3
Unid. Nematoda	30	3	3
ANNELIDA			
OLIGOCHAETA	20	2	2
Nais sp.	20	2	2

DATA: MACROINVERTEBRATE DENSITY
Client: BEAR CREEK WATERSHED ASSOCIATION
Sampled: 8/24/2016
Site: **SITE 8b-BCC**

TAXA

	MMI KICK (#/sq.meter)	Subsample Picked (10%)	300-Count Simulation
TOTAL (#/sq.meter)	4,960	496	300
NUMBER OF TAXA	22		21
SHANNON-WEAVER (H')	2.60		2.71
TOTAL EPT TAXA	11		10
EPT INDEX (% of Total Taxa)	50		48
EPHEMEROPTERA ABUNDANCE (% of Total Density)	37		38
MMI Score			59

No large and rare taxa present in sample.

DATA: MACROINVERTEBRATE DENSITY
 Client: BEAR CREEK WATERSHED ASSOCIATION
 Sampled: 8/24/2016
 Site: **SITE 5-LITTLE BEAR**

TAXA

	MMI KICK (#/sq.meter)	Subsample Picked (10%)	300-Count Simulation
INSECTA			
EPHEMEROPTERA	870	87	63
Baetis tricaudatus	780	78	58
Ephemerella dorothea/excrucians	60	6	3
Paraleptophlebia sp.	30	3	2
PLECOPTERA	80	8	5
Skwala americana	50	5	3
Sweltsa sp.	10	1	--
Zapada cinctipes	20	2	2
COLEOPTERA	310	31	17
Optioservus divergens	310	31	17
TRICHOPTERA	2,420	242	160
Cheumatopsyche sp.	540	54	33
Hydropsyche sp.	1,820	182	121
Hydroptila sp.	20	2	2
Lepidostoma sp.	20	2	2
Rhyacophila coloradensis gr.	20	2	2
DIPTERA	750	75	55
Atherix pachypus	10	1	1
Brillia sp.	20	2	2
Conchapelopia/Thienemannimyia gr.	120	12	9
Cricotopus sp.	100	10	7
Diamesa sp.	20	2	2
Eukiefferiella sp.	40	4	3
Hexatoma sp.	10	1	1
Nanocladius sp.	20	2	2
Orthocladius/Cricotopus gr.	70	7	5
Pagastia sp.	40	4	3
Parachironomus sp.	20	2	2
Polypedilum sp.	20	2	1
Rheocricotopus sp.	20	2	2
Simulium sp.	20	2	1
Tvetenia sp.	220	22	14
CRUSTACEA			
ISOPODA	10	1	--
Caecidotea communis	10	1	--

DATA: MACROINVERTEBRATE DENSITY
Client: BEAR CREEK WATERSHED ASSOCIATION
Sampled: 8/24/2016
Site: **SITE 5-LITTLE BEAR**

TAXA

	MMI KICK (#/sq.meter)	Subsample Picked (10%)	300-Count Simulation
TOTAL (#/sq.meter)	4,440	444	300
NUMBER OF TAXA	28		26
SHANNON-WEAVER (H')	2.97		3.01
TOTAL EPT TAXA	11		10
EPT INDEX (% of Total Taxa)	39		38
EPHEMEROPTERA ABUNDANCE (% of Total Density)	20		21
MMI Score			75

No large and rare taxa present in sample.

DATA: MACROINVERTEBRATE DENSITY
 Client: BEAR CREEK WATERSHED ASSOCIATION
 Sampled: 8/24/2016
 Site: **SITE 3a-KEYS**

TAXA

	MMI KICK (#/sq.meter)	Subsample Picked (10%)	300-Count Simulation
INSECTA			
EPHEMEROPTERA	2,610	261	158
Baetis tricaudatus	2,550	255	153
Ephemereallidae	60	6	5
COLEOPTERA	460	46	20
Optioservus divergens	350	35	14
Optioservus quadrimaculatus	110	11	6
TRICHOPTERA	410	41	22
Brachycentrus americanus	10	1	--
Glossosoma sp.	30	3	2
Hydropsyche sp.	360	36	20
Lepidostoma sp.	10	1	--
DIPTERA	1,500	150	86
Antocha monticola	20	2	1
Conchapelopia/Thienemannimyia gr.	160	16	7
Cricotopus sp.	120	12	4
Hexatoma sp.	10	1	--
Orthocladius/Cricotopus gr.	80	8	2
Pagastia sp.	40	4	3
Parametricnemus sp.	40	4	2
Polypedilum sp.	750	75	52
Prosimulium sp.	160	16	11
Simulium sp.	120	12	4
HYDRACARINA	280	28	14
Atractides sp.	20	2	2
Lebertia sp.	60	6	5
Sperchon sp.	200	20	7
TOTAL (#/sq.meter)	5,260	526	300
NUMBER OF TAXA	21		18
SHANNON-WEAVER (H')	2.78		2.59
TOTAL EPT TAXA	6		4
EPT INDEX (% of Total Taxa)	29		22
EPHEMEROPTERA ABUNDANCE (% of Total Density)	50		53
MMI Score			37

No large and rare taxa present in sample.

DATA: MACROINVERTEBRATE DENSITY
 Client: BEAR CREEK WATERSHED ASSOCIATION
 Sampled: 8/24/2016
 Site: **SITE 2a-GOLDEN WILLOW**

TAXA	MMI KICK (#/sq.meter)	Subsample Picked (10%)	Large & Rare*	300-Count Simulation
INSECTA				
EPHEMEROPTERA	1,830	183		85
Acentrella sp.	10	1		--
Baetis tricaudatus	1,090	109		50
Drunella doddsi	20	2		2
Drunella spinifera	170	17		8
Ephemerellidae	360	36		19
Rhithrogena hageni	180	18		6
PLECOPTERA	260	26		10
Perlodidae	70	7		2
Skwala americana	60	6		3
Sweltsa sp.	100	10		4
Zapada cinctipes	30	3		1
COLEOPTERA	870	87		41
Heterlimnius corpulentus	20	2		1
Optioservus castanipennis	500	50		23
Optioservus divergens	330	33		17
Zaitzevia parvula	20	2		--
TRICHOPTERA	581	58	1	32
Arctopsyche sp.	11	1	1	1
Brachycentrus americanus	10	1		1
Glossosoma sp.	30	3		2
Hydropsyche sp.	500	50		25
Lepidostoma sp.	30	3		3
DIPTERA	2,972	297	2	132
Antocha monticola	30	3		1
Cricotopus sp.	270	27		9
Eukiefferiella sp.	1,510	151		70
Hexatoma sp.	12	1	2	2
Neoplasta sp.	30	3		1
Orthocladius/Cricotopus gr.	270	27		11
Pagastia sp.	90	9		3
Pericoma sp.	10	1		--
Polypedilum sp.	450	45		20
Potthastia sp.	90	9		4
Prosimulium sp.	180	18		8
Simulium sp.	30	3		3
HYDRACARINA	70	7		2
Lebertia sp.	40	4		2
Protzia sp.	10	1		--
Sperchon sp.	20	2		1

DATA: MACROINVERTEBRATE DENSITY
 Client: BEAR CREEK WATERSHED ASSOCIATION
 Sampled: 8/24/2016
 Site: **SITE 2a-GOLDEN WILLOW**

TAXA	MMI KICK (#/sq.meter)	Subsample Picked (10%)	Large & Rare*	300-Count Simulation
TOTAL (#/sq.meter)	6,583	658	3	303
NUMBER OF TAXA	34			30
SHANNON-WEAVER (H')	3.83			3.81
TOTAL EPT TAXA	15			14
EPT INDEX (% of Total Taxa)	44			47
EPHEMEROPTERA ABUNDANCE (% of Total Density)	28			28
MMI Score				65

*Large and rare organisms are taxa not found in the subsample. These organisms are added to subsample calculations to determine Total (#/sq. meter).

DATA: MACROINVERTEBRATE DENSITY
 Client: BEAR CREEK WATERSHED ASSOCIATION
 Sampled: 8/23/2016
 Site: **SITE 58-ABOVE SRR**

TAXA

	MMI KICK (#/sq.meter)	Subsample Picked (20%)	Large & Rare*
INSECTA			
EPHEMEROPTERA	1,090	218	
Acentrella sp.	5	1	
Baetis tricaudatus	495	99	
Cinygmula sp.	5	1	
Drunella coloradensis	35	7	
Drunella doddsi	130	26	
Epeorus longimanus	85	17	
Ephemerella aurivillii	35	7	
Rhithrogena hageni	300	60	
PLECOPTERA	61	12	1
Hesperoperla pacifica	41	8	1
Sweltsa sp.	20	4	
COLEOPTERA	155	31	
Heterlimnius corpulentus	155	31	
TRICHOPTERA	115	23	
Arctopsyche sp.	25	5	
Chimarra utahensis	5	1	
Lepidostoma sp.	5	1	
Rhyacophila brunnea/vao	5	1	
Rhyacophila pellisa/valuma	75	15	
DIPTERA	211	42	1
Ceratopogoninae	5	1	
Cricotopus sp.	15	3	
Dicranota sp.	5	1	
Eukiefferiella sp.	5	1	
Hexatoma sp.	6	1	1
Orthocladius/Cricotopus gr.	5	1	
Prosimulium sp.	15	3	
Simulium sp.	105	21	
Stempellinella sp.	35	7	
Thienemanniella sp.	5	1	
Tvetenia sp.	10	2	
HYDRACARINA	5	1	
Sperchon sp.	5	1	

DATA: MACROINVERTEBRATE DENSITY
 Client: BEAR CREEK WATERSHED ASSOCIATION
 Sampled: 8/23/2016
 Site: **SITE 58-ABOVE SRR**

TAXA	MMI KICK (#/sq.meter)	Subsample Picked (20%)	Large & Rare*
TOTAL (#/sq.meter)	1,637	327	2
NUMBER OF TAXA	28		
SHANNON-WEAVER (H')	3.40		
TOTAL EPT TAXA	15		
EPT INDEX (% of Total Taxa)	54		
EPHEMEROPTERA ABUNDANCE (% of Total Density)	67		
MMI Score		67	

*Large and rare organisms are taxa not found in the subsample. These organisms are added to subsample calculations to determine Total (#/sq. meter).

DATA: MACROINVERTEBRATE DENSITY
 Client: BEAR CREEK WATERSHED ASSOCIATION
 Sampled: 8/24/2016
 Site: **SITE 90-WADSWORTH**

TAXA

	MMI KICK (#/sq.meter)	Subsample Picked (20%)	Large & Rare*	300-Count Simulation
INSECTA				
EPHEMEROPTERA	1,520	304		168
Acentrella sp.	80	16		11
Baetis flavistriga complex	110	22		11
Baetis tricaudatus	1,035	207		118
Fallceon quilleri	195	39		19
Tricorythodes explicatus	100	20		9
ODONATA	1		1	1
Progomphus integer	1		1	1
TRICHOPTERA	755	151		88
Cheumatopsyche sp.	295	59		38
Hydropsyche sp.	420	84		46
Lepidostoma sp.	5	1		1
Leptoceridae	5	1		1
Leucotrichia pictipes	25	5		2
Rhyacophila sp.	5	1		--
DIPTERA	365	73		43
Cardiocladius sp.	10	2		1
Cricotopus bicinctus	65	13		8
Cricotopus trifascia	90	18		8
Eukiefferiella sp.	55	11		6
Orthocladius/Cricotopus gr.	75	15		11
Rheocricotopus sp.	30	6		3
Simulium sp.	40	8		6
CRUSTACEA				
ISOPODA	5	1		1
Caecidotea communis	5	1		1
DECAPODA	1		1	1
Orconectes sp.	1		1	1

DATA: MACROINVERTEBRATE DENSITY
 Client: BEAR CREEK WATERSHED ASSOCIATION
 Sampled: 8/24/2016
 Site: **SITE 90-WADSWORTH**

TAXA	MMI KICK (#/sq.meter)	Subsample Picked (20%)	Large & Rare*	300-Count Simulation
TOTAL (#/sq.meter)	2,647	529	2	302
NUMBER OF TAXA	21			20
SHANNON-WEAVER (H')	3.00			3.02
TOTAL EPT TAXA	11			10
EPT INDEX (% of Total Taxa)	52			50
EPHEMEROPTERA ABUNDANCE (% of Total Density)	57			56
MMI Score				55

*Large and rare organisms are taxa not found in the subsample. These organisms are added to subsample calculations to determine Total (#/sq. meter).

Table 1: Multimetric Index (MMI) scores for Bear Creek sites (Biotype 1- Transitional) sampled in August 2016. Attainment and impairment thresholds for sites in Biotype 1 are 52 and 42, respectively.

	Site 15a-BCP	Site 14a-Morrison	Site 13a-Idledale	Site 12-Lair O'Bear	Site 9-O'Fallon	Site 8b-BCC	Site 5-Little Bear	Site 3a-Keys	Site 2a-Golden Willow	Site 58-Above SRR	Site 90-Wadsworth
Site Variables											
Ecoregion	21d	21d	21c	21c	21c	21c	21c	21c	21c	21c	25l
Elevation (meters)	1,731	1,766	1,959	1,999	2,076	2,117	2,151	2,165	2,264	2,546	1,639
Slope	0.03	0.03	0.01	0.01	0.02	0.03	0.02	0.02	0.01	0.02	0.01
MMI Metric Values											
Percent non-insect taxa	14	4	18	18	14	14	0	17	7	4	10
EP taxa ¹	3	6	4	3	7	5	5	2	9	10	5
Percent Chironomidae	17	13	4	5	4	16	17	23	39	5	12
Percent Sensitive Family Plains	48	29	23	10	21	34	59	14	23	12	28
Predator, Shredder Taxa	9	8	6	7	6	8	12	6	10	10	4
Clinger Taxa ¹	11	10	7	8	9	11	9	8	14	13	4
MMI Metric Scores											
Percent non-insect taxa	49	86	35	37	49	49	100	41	76	87	64
EP taxa ¹	45	75	41	28	66	42	40	7	76	69	72
Percent Chironomidae	76	82	95	94	96	78	76	66	43	95	83
Percent Sensitive Family Plains	78	47	38	17	34	56	95	22	38	19	46
Predator, Shredder Taxa	64	57	43	50	43	57	86	43	71	71	29
Clinger Taxa ¹	92	82	45	51	55	70	51	41	87	61	38
Total MMI Score	67	72	50	46	57	59	75	37	65	67	55
Additional Metrics											
Hilsenhoff Biotic Index	4.68	4.70	2.88	3.36	4.46	4.60	4.47	5.04	4.83	2.71	5.04
Shannon-Diversity Index	3.40	2.82	2.60	2.14	2.39	2.71	3.01	2.59	3.81	3.40	3.02

¹ = Elevation adjusted metric