

Supplemental Table 1. Underwater Ponar samples from Grand (Big) Traverse Bay and Little Traverse Bay. 2013 samples rounded to nearest 5%. Others have 3+ sub-counts, with Standard Deviations (SD) and Coefficients of Variation (CV). Predicted Cu concentrations given from Gay Pile standard (100% = 2863 ug/g, ppm). Ponar samples arranged by Latitude.

Latitude North	Longitude West	Date collected	Depth (m)	Station	% stampsand	Individual % stampsand counts				SD	CV	Predicted Cu concentration
						1st	2nd	3rd	4th, 5th			
47° 13.000	88° 09.000	7/11/13	10.4		0							0
47° 12.830	88° 08.670	7/11/13	10.2		0							0
47° 12.660	88° 10.420	5/29/13	1.6		90							2577
47° 12.640	88° 10.750	5/29/13	2.0		75							2147
47° 12.571	88° 10.682	7/17/19	3.0	GP049	66.5	67.8	66.4	65.4		1.2	1.8	1904
47° 12.550	88° 12.580	8/23/13	5.0		30							859
47° 12.526	88° 12.307	7/17/19	3.6	GP053	57.7	54.8	60.1	58.2		2.7	4.7	1652
47° 12.500	88° 12.450	5/29/13	3.5		100							2863
47° 12.481	88° 10.657	7/17/19	5.6	GP050	66.7	65.8	65.7	68.6		1.6	2.5	1910
47° 12.480	88° 11.250	5/29/13	2.3		100							2863
47° 12.477	88° 11.443	8/15/12	4.2	Gay 13	62.6	60.4	64.6	62.7		2.1	3.4	1792
47° 12.477	88° 12.443	8/15/12	3.5	Gay 13	58.9	61.6	57.5	57.5		2.4	4.0	1686
47° 12.450	88° 11.830	5/29/13	2.2		100							2863
47° 12.440	88° 12.500	8/23/13	5.1		90							2577
47° 12.440	88° 11.164	8/22/16	8.7	Gay-10	62.8	65.3	58.1	64.9		4.0	6.4	1798
47° 12.424	88° 12.152	9/20/16	7.3	B-2	77.9	72	78.3	83.3		5.7	7.3	2230
47° 12.416	88° 11.965	8/22/16	4.2	BRB-005	76.7	77.7	75.1	77.3		1.4	1.8	2196
47° 12.4124	88° 12.1516	9/9/16	7.3	station B(2)	77.9	67	65.2	74.5	61.2	5.6	7.2	2230
47° 12.352	88° 11.169	8/15/12	6.4	Gay 14	52.9	50.5	56.7	51.4		3.4	6.3	1515
47° 12.340	88° 11.860	5/29/13	3.3		100							2863
47° 12.333	88° 12.500	9/9/16	8.0	station D	77.8	82.6	80.8	77.9	69.8	5.7	7.3	2227
47° 12.333	88° 12.1667	9/9/16	7.9	station G	74.9	78.8	77.6	71	72.1	3.9	5.2	2144
47° 12.3312	88° 12.3418	9/9/16	8.5	station 1(A)	79.3	73	82.1	82.7		5.4	6.9	2270
47° 12.330	88° 12.120	5/29/13	6.1		55							1575
47° 12.330	88° 11.660	5/29/13	5.3		25							716
47° 12.330	88° 09.330	5/29/13	29.8		30							859
47° 12.327	88° 12.537	6/18/13	6.2		75							2147
47° 12.318	88° 12.468	6/18/13	6.5		50							1432
47° 12.310	88° 12.410	8/23/13	7.9		50							1432
47° 12.308	88° 12.022	6/18/13	6.3		75							2147
47° 12.293	88° 9.605	8/22/16	25.0	Gay-25	6.8	9.2	5.1	6		2.2	31.7	195

47°12.290	88°11.930	5/29/13	7.9		90							2577
47° 12.273	88° 11.993	9/20/16	8.5	station H-2	50.6	46.8	48.4	56	51	4.0	8.0	1449
47°12.250	88°11.950	5/29/13	6.3		65							1861
47° 12.246	88° 10.252	8/22/16	10.7	station ?	13.2	15.9	13	10.6		2.7	20.1	378
47° 12.243	88° 12.328	8/22/16	6	station 3	60.1	60.3	57.4	62.6		2.6	4.3	1721
47°12.220	88°11.830	5/29/13	7.9		60							1718
47° 12.219	88° 11.810	8/22/16	7.3	station 2	55.6	59.1	47.6	60.2		7.0	12.6	1592
47° 12.196	88° 5.861	8/22/16	49.8	Gay-50	3.7	5.6	2.7	2.8		1.6	44.5	106
47°12.190	88°11.300	5/29/13	10.6		25							716
47°12.190	88°11.040	5/29/13	12.9		10							286
47° 12.1854	88° 12.3077	9/20/16	8.5	station B	67							1918
47°12.180	88°11.620	5/29/13	7.5		50							1432
47°12.180	88°11.250	5/29/13	8.6		25							716
47° 12.177	88° 11.676	9/20/16	9.3	station J	35.6	33.2	35.5	38.2		2.5	7.0	1019
47°12.170	88°11.000	5/29/13	13.4		25							716
47° 12.170	88° 11.000	6/22/13	13.2		30							859
47°12.170	88°10.170	5/29/13	20.0		10							286
47° 12.170	88° 09.170	6/22/13	39.7	USB002	10.4	8.2	12.7	10.4		2.3	21.6	298
47° 12.167	88° 11.500	6/11/18	13	T-4	27.5	22.7	32.1	30		4.9	17.9	787
47° 12.1667	88° 12.500	9/9/16	7.8	station E	19.9	17.6	15.8	29.9	15.1, 21.7	6.1	30.6	570
47° 12.1667	88°12.1667	9/9/16	9.7	station H	39.3	39.5	38	45.5	34.1	4.7	12.0	1125
47° 12.126	88° 11.834	8/22/16	10.5	BRB-10	38.5	41.1	36.6	37.8		2.3	6.1	1102
47°12.122	88°12.808	8/15/12	3.4	Sta 3	63.5	62.9	60.6	67.1		3.3	5.2	1818
47° 12.114	88° 4.173	8/22/16	75.0	Gay-75	3.8	3.4	3.9	4.2		0.4	10.6	109
47°12.081	88°12.248	8/15/12	8.8	Gay 004	20.5	25	20	16.5		4.3	20.8	587
47°12.081	88°12.245	8/15/12	8.5	Sta 4	17.4	14.3	17.8	20.1		2.9	16.8	498
47°12.080	88°12.250	5/29/13	8.6		40							1145
47° 12.080	88° 12.420	8/23/13	7.4		10							286
47° 12.046	88° 9.882	9/23/17	24.3	BRB-25	5	2.6	5.6	6.8		2.2	43.3	143
47° 12.000	88° 12.333	9/9/16	10.7	station C	27.6	23.2	21.6	32.8	32.8	6.0	21.9	790
47° 12.000	88° 12.1667	9/9/16	9.2	station F	19.8	18.2	22.5	18.7		2.4	11.9	567
47° 12.000	88° 09.670	7/11/13	28.8		0							0
47°11.944	88°11.147	8/15/12	4.1	Sta 10	73.1	73.6	71.7	74.1		1.3	1.7	2093
47° 11.910	88° 8.367	9/23/17	48.7	BRB-50	6.7	5.7	6.7	7.7		1.0	14.9	192
47°11.880	88°12.520	5/29/13	7.0		30							859
47°11.870	88°13.017	8/15/12	3.7	Sta 2	64.3	65.2	62.7	65		1.4	2.2	1841
47°11.836	88°12.525	8/15/12	9.8	Sta 5	54.4	54.9	55.1	53.1		1.1	2.0	1557
47° 11.820	88° 13.400	8/23/13	5.2	T07W01	29.2	27.9	33.2	26.6		3.5	12.0	836

47° 11.667	88° 13.031	8/22/16	11.0	BR2-10	11.8	12.2	11.9	11.4	0.4	3.4	338
47°11.660	88°10.000	5/29/13	22.0		10						286
47 11.650	88°13.170	5/29/13	7.5		30						859
47° 11.630	88° 13.300	8/23/13	3.6		75						2147
47° 11.630	88° 13.270	8/23/13	8.6		60						1718
47° 11.630	88° 13.190	8/23/13	3.7		70						2004
47°11.611	88°13.214	8/15/12	8.9	Gay 001	51.4	54.7	51.1	48.5	3.1	6.1	1472
47°11.611	88°13.214	8/15/12	8.9	Sta 1	51.5	51.2	50	53.3	1.7	3.2	1474
47°11.598	88°12.774	8/15/12	11.5	Gay 6	19.6	18	21.1	19.6	1.6	7.9	561
47°11.598	88°12.774	8/15/12	13.4	Sta 6	10.1	9.4	12.1	8.8	1.8	17.4	289
47°11.598	88°12.261	8/15/12	6	Sta 7	74.3	75.6	70.3	76.9	3.5	4.7	2127
47°11.500	88°13.510	5/29/13	8.8		50						1432
47° 11.500	88° 13.190	8/23/13	10.1		40						1145
47° 11.500	88° 13.160	8/23/13	10.3		45						1288
47°11.500	88°12.920	5/29/13	8.5		30						859
47° 11.500	88° 12.833	5/26/17	9.1	S12	9.4						269
47° 11.500	88° 11.500	5/26/17	11.2	S18	9						258
47° 11.500	88° 11.000	6/22/13	22.0		5						143
47° 11.480	88° 12.790	8/23/13	12.7		20						573
47°11.390	88°13.900	5/29/13	4.7		65						1861
47° 11.386	88° 13.203	8/22/16	11.0	station 5	23	22.7	21.7	24.8	1.6	6.9	658
47° 11.340	88° 13.170	6/22/13	11.8		10						286
47° 11.340	88° 13.000	6/22/13	12.5		10						286
47° 11.340	88° 12.670	6/22/13	13.8		10						286
47° 11.340	88° 11.340	6/22/13	20.0		10						286
47° 11.333	88° 13.00	5/26/17	10.9	S1	15						429
47° 11.333	88° 12.833	5/26/17	10.9	S2	6						172
47° 11.333	88° 12.666	5/26/17	10.3	S3	7.1						203
47° 11.333	88° 12.166	5/26/17	11.2	S6	10.2						292
47° 11.296	88° 14.149	7/31/17	2.0	OP 8	26.4						756
47° 11.27	88° 14.106	7/31/17	4.2	OP 7	31.9						913
47° 11.253	88° 13.958	7/31/17	6.5	OP 3	44.9						1285
47°11.250	88°13.960	5/29/13	4.7		50						1432
47° 11.250	88° 13.919	7/31/17	7.4	OP 2	49.2						1409
47° 11.248	88° 14.002	7/31/17	5.8	OP 4	37.5						1074
47° 11.247	88° 14.053	7/31/17	5.1	OP 5	21						601
47° 11.241	88° 14.086	7/31/17	5.0	OP 6	34.1						976
47° 11.23	88° 14.244	7/31/17	2.1	OP 9	23.4						670

47° 11.230	88° 13.020	8/23/13	12.3		20							573
47° 11.199	88° 14.148	7/31/17	4.5	OP 19	12	19.6	9.1	13	6.3	5.8	48.0	344
47° 11.1975	88° 13.3958	6/11/18	13.0	C1	11.6	7.9	10.9	12.8	14.6	2.9	24.7	332
47° 11.166	88° 13.166	5/26/17	10.3	S16	8.1							232
47° 11.166	88° 13.00	5/26/17	10.3	S17	7.9							226
47° 11.166	88° 12.833	5/26/17	10.3	S9	8.9							255
47° 11.165	88° 13.972	7/31/17	7.8	OP 18	18.8	16.5	18	22		2.8	15.1	538
47° 11.15	88° 14.141	7/31/17	5.1	OP 10	17.2							492
47° 11.137	88° 13.885	7/31/17	9.2	OP 17	29.8	27.9	26.2	37.7	27.3	5.3	17.9	853
47° 11.0971	88° 14.0010	6/11/18	7.5	A2	43.2	41.4	42.2	46		2.5	5.7	1237
47° 11.097	88° 14.303	7/31/17	2.1	OP 11	9.7							278
47° 11.047	88° 13.008	8/22/16	11.0	station 4	36.6	36.3	46.4	27.2		9.6	26.2	1048
47° 11.022	88° 9.470	8/22/16	51.0	BR2-50	3.7	2.8	4.7	3.6		1.0	25.8	106
47° 11.000	88° 14.170	6/22/13	4.5		10							286
47° 11.000	88° 14.090	5/29/13	5.6		10							286
47° 11.000	88° 14.000	6/22/13	7.9		5							143
47° 11.000	88° 12.330	5/29/13	18.0		25							716
47° 11.000	88° 11.670	7/11/13	25.5		0							0
47° 10.9970	88° 13.9272	6/11/18	10.5	A3	42.9	36.6	46.1	44.9	44.2	4.3	10.0	1228
47° 10.991	88° 11.908	8/22/16	24.5	BR-2-25	7.9	5.6	8.3	9.9		2.2	27.5	226
47° 10.9822	88° 13.4975	6/11/18	14.0	B3	15.6	15.3	15.8	15.7		0.3	1.7	447
47° 10.986	88° 5.861	8/22/16	101.0	BR2-100	2.4	2.3	3.5	1.3		1.1	45.9	69
47° 10.9759	88° 13.5337	9/20/16	10.8	station N	11.3	8.5	13.1	12.2		2.4	21.6	324
47° 10.968	88° 14.213	7/31/17	4.5	OP 12	18.6	15.1	17.9	22.7		3.8	20.7	533
47° 10.834	88° 13.842	9/24/19	10.7	ES.T01	34.5	31	33.8	38.8		4.0	11.5	988
47° 10.830	88° 13.000	7/11/13	15.5		0							0
47° 10.830	88° 12.000	7/11/13	26.4		0							0
47° 10.800	88° 11.300	7/29/10	28.0	GA0018	25							716
47° 10.799	88° 14.376	7/31/17	1.9	OP 14	14.3	8.9	14.6	19.4		5.3	36.8	409
47° 10.794	88° 14.257	7/31/17	4.8	OP 13	24.9	18.6	42.1	26.7	3.4, 21, 22	9.0	36.0	713
47° 10.717	88° 12.428	6/18/13	22.7		0							0
47° 10.688	88° 13.130	6/18/13	22.5		10							286
47° 10.670	88° 14.170	6/22/13	6.9		0							0
47° 10.665	88° 13.811	9/24/19	11.3	ES.T03	32.2	34.8	33.8	28.1		3.6	11.2	922
47° 10.656	88° 14.000	9/24/19	10.3	ES.T02	37.6	35.8	37.9	39.1		1.7	4.4	1076
47° 10.590	88° 14.019	9/20/16	9.1	station O	15.9	23	11.7	13.6	15.3	5.0	31.2	455
47° 10.5153	88° 13.224	8/15/12	11.0	BGT 2	46.5	50.1	41.9	47.4		4.2	9.0	1331
47° 10.510	88° 13.968	6/11/18	13.5	A-4	6.6	4.8	8.1	7		1.7	25.5	189

47°10.506	88°13.826	9/24/19	11.5	ES.T06	8.1	7.6	9.1	7.7	0.8	10.4	232	
47° 10.500	88° 13.500	7/11/13	11.9		0						0	
47°10.497	88°13.976	9/24/19	11.4	ES.T05	11.9	13.7	8.2	13.7	3.2	26.7	341	
47°10.478	88°13.043	8/15/12	15.0	BGT 1	14.2	16.1	14.1	12.4	1.9	13.0	407	
47° 10.440	88° 13.822	8/22/16	10.6	station 7	18.2	19.5	14.9	20.1	2.8	15.6	521	
47°10.311	88°14.163	9/24/19	9.5	ES.T04	10.5	10	9.4	12	1.4	13.0	301	
47° 10.308	88° 13.203	6/18/13	14.6		5						143	
47°10.300	88°09.700	7/29/10	35.0		10						286	
47° 10.170	88° 13.670	6/22/13	12.8		5						143	
47° 10.000	88° 13.330	7/11/13	15.6		5						143	
47° 10.000	88° 12.670	7/11/13	29.3		15						429	
47°09.897	88° 14.330	6/18/13	6.1		5						143	
47° 9.833	88° 12.66	8/22/16	29.1	station 8	16.8	12.8	21.9	15.8	4.6	27.6	481	
47°09.800	88°12.200	7/29/10	20.0		25						716	
47°09.800	88°10.400	7/29/10	35.0		0						0	
47° 09.670	88° 14.170	6/22/13	9.4		15						429	
47° 09.670	88° 13.670	6/22/13	12.1		0						0	
47° 09.670	88° 13.170	6/22/13	19.6		5						143	
47° 09.670	88° 12.670	7/11/13	31.1	SDW002	5						143	
47° 09.670	88° 12.670	6/22/13	20.0		0						0	
47° 09.670	88° 12.330	7/11/13	35.6		5						143	
47° 9.582	88° 14.402	8/22/16	6.3	CSI-5	17.2	18	13.4	20.3	3.5	20.4	492	
47° 09.547	88° 14.300	6/18/13	9.4		10						286	
47° 9.351	88° 12.913	10/17/17	24.7	CSI-25	7.3	6.5	8.3	7.2	0.9	12.4	209	
47° 9.192	88° 11.945	10/17/17	55.9	CSI-50	6.1	4.5	8.5	5.2	2.1	35.0	175	
47° 9.259	88° 14.298	7/31/17	4.9	OP 15	14.5	12.2	13.9	17.5	2.7	18.7	415	
47° 9.244	88° 14.379	7/31/17	2.0	OP 16	7.9	5	9.6	9	2.5	31.7	226	
47°09.200	88°11.300	7/29/10	25.0		0						0	
47° 9.146	88° 11.689	10/17/17	72.2	CSI-75	6.2	5.8	4.3	8.5	2.1	34.3	178	
47° 7.695	88° 16.823	10/10/17	9.0	LTB 010	7.1	5.2	3.3	9.2	10.7	3.4	48.4	203

Supplemental Table 2. Manganese Correction. Variables include unadjusted % SS, Cu Concentration, Mn adjusted % SS. Corrected and uncorrected values are compared. Table 1 has underwater bay sites. Triple asterisks indicate direct Mn particle counts.

Latitude North	Longitude West	Date collected	Depth (m)	Station	% Stampsand	Cu conc. not adjusted for Mn	Mn adjusted % SS	Estimated Cu conc.	
47° 13.000	88° 09.000	7/11/13	10.4		0	0	0	0	*
47° 12.830	88° 08.670	7/11/13	10.2		0	0	0	0	*
47°12.660	88°10.420	5/29/13	1.6		90	2577	88.4	2531	**
47°12.640	88°10.750	5/29/13	2.0		75	2147	73.4	2101	**
47°12.571	88°10.682	7/17/19	3.0	GP049	65.5	1875	63.9	1829	***
47° 12.550	88° 12.580	8/23/13	5.0		30	859	28.4	813	**
47°12.526	88°12.307	7/17/19	3.6	GP053	57.7	1652	56.1	1606	***
47°12.500	88°12.450	5/29/13	3.5		100	2863	98.4	2817	**
47°12.481	88°10.657	7/17/19	5.6	GP048	64.9	1858	63.3	1812	***
47°12.480	88°11.250	5/29/13	2.3		100	2863	98.4	2817	**
47°12.477	88°11.443	8/15/12	4.2	Gay 13	62.6	1792	61	1746	***
47°12.477	88°12.443	8/15/12	3.5	Gay 13	58.9	1686	57.3	1640	**
47°12.450	88°11.830	5/29/13	2.2		100	2863	98.4	2817	**
47° 12.440	88° 12.500	8/23/13	5.1		90	2577	88.4	2531	**
47° 12.440	88° 11.164	8/22/16	8.7	Gay-10	62.8	1798	61.2	1752	**
47° 12.424	88° 12.152	9/20/16	7.3	B-2	77.9	2230	76.3	2184	**
47° 12.416	88° 11.965	8/22/16	4.2	BRB-005	76.7	2196	75.1	2150	**
47° 12.4124	88° 12.1516	9/9/16	7.3	station B(2)	77.9	2230	76.3	2184	***
47°12.352	88°11.169	8/15/12	6.4	Gay 14	52.9	1515	51.3	1469	***
47°12.340	88°11.860	5/29/13	3.3		100	2863	98.4	2817	**
47° 12.333	88° 12.500	9/9/16	8.0	station D	77.8	2227	76.2	2182	***
47° 12.333	88° 12.1667	9/9/16	7.9	station G	74.9	2144	73.3	2099	***
47° 12.3312	88° 12.3418	9/9/16	8.5	station 1(A)	79.3	2270	77.7	2225	***
47°12.330	88°12.120	5/29/13	6.1		55	1575	53.4	1529	**
47°12.330	88°11.660	5/29/13	5.3		25	716	23.4	670	**
47°12.330	88°09.330	5/29/13	29.8		30	859	28.4	813	**
47°12.327	88° 12.537	6/18/13	6.2		75	2147	73.4	2101	**
47° 12.318	88° 12.468	6/18/13	6.5		50	1432	48.4	1386	**
47° 12.310	88° 12.410	8/23/13	7.9		50	1432	48.4	1386	**
47° 12.308	88° 12.022	6/18/13	6.3		75	2147	73.4	2101	**
47° 12.293	88° 9.605	8/22/16	25.0	Gay-25	6.8	195	5.2	149	**

47°12.290	88°11.930	5/29/13	7.9		90	2577	88.4	2531	**
47° 12.273	88° 11.993	9/20/16	8.5	station H-2	50.6	1449	49	1403	***
47°12.250	88°11.950	5/29/13	6.3		65	1861	63.4	1815	**
47° 12.246	88° 10.252	8/22/16	10.7	station ?	13.2	378	11.6	332	**
47° 12.243	88° 12.328	8/22/16	6	station 3	60.1	1721	58.5	1675	**
47°12.220	88°11.830	5/29/13	7.9		60	1718	58.4	1672	**
47° 12.219	88° 11.810	8/22/16	7.3	station 2	55.6	1592	54	1546	***
47° 12.196	88° 5.861	8/22/16	49.8	Gay-50	3.7	106	2.1	60	**
47°12.190	88°11.300	5/29/13	10.6		25	716	23.4	670	**
47°12.190	88°11.040	5/29/13	12.9		10	286	8.4	240	**
47° 12.1854	88° 12.3077	9/20/16	8.5	station B	67	1918	65.4	1872	**
47°12.180	88°11.620	5/29/13	7.5		50	1432	48.4	1386	**
47°12.180	88°11.250	5/29/13	8.6		25	716	23.4	670	**
47° 12.177	88° 11.676	9/20/16	9.3	station J	35.6	1019	34	973	***
47°12.170	88°11.000	5/29/13	13.4		25	716	23.4	670	**
47° 12.170	88° 11.000	6/22/13	13.2		30	859	28.4	813	**
47°12.170	88°10.170	5/29/13	20.0		10	286	8.4	240	**
47° 12.170	88° 09.170	6/22/13	39.7	USB002	10.4	298	8.8	252	***
47° 12.167	88° 11.500	6/11/18	13	T-4	27.5	787	25.9	742	***
47° 12.1667	88° 12.500	9/9/16	7.8	station E	19.9	570	18.3	524	***
47° 12.1667	88°12.1667	9/9/16	9.7	station H	39.3	1125	37.7	1079	***
47° 12.126	88° 11.834	8/22/16	10.5	BRB-10	38.5	1102	36.9	1056	**
47°12.122	88°12.808	8/15/12	3.4	Sta 3	63.5	1818	61.9	1772	**
47° 12.114	88° 4.173	8/22/16	75.0	Gay-75	3.8	109	2.2	63	**
47°12.081	88°12.248	8/15/12	8.8	Gay 4	20.5	587	18.9	541	**
47°12.081	88°12.245	8/15/12	8.5	Sta 4	17.4	498	15.8	452	**
47°12.080	88°12.250	5/29/13	8.6		40	1145	38.4	1099	**
47° 12.080	88° 12.420	8/23/13	7.4		10	286	8.4	240	**
47° 12.046	88° 9.882	9/23/17	24.3	BRB-25	5	143	3.4	97	**
47° 12.00	88° 12.333	9/9/16	10.7	station C	27.6	790	26	744	***
47° 12.00	88° 12.1667	9/9/16	9.2	station F	19.8	567	18.2	521	***
47° 12.000	88° 09.670	7/11/13	28.8		0	0	0	0	*
47°11.944	88°11.147	8/15/12	4.1	Sta 10	73.1	2093	71.5	2047	**
47° 11.910	88° 8.367	9/23/17	48.7	BRB-50	6.7	192	5.1	146	**
47°11.880	88°12.520	5/29/13	7.0		30	859	28.4	813	**
47°11.870	88°13.017	8/15/12	3.7	Sta 2	64.3	1841	62.7	1795	**

47°11.836	88°12.525	8/15/12	9.8	Sta 5	54.4	1557	52.8	1512	**
47° 11.820	88° 13.400	8/23/13	5.2	T07W01	29.2	836	27.6	790	**
47° 11.667	88° 13.031	8/22/16	11.0	BR2-10	11.8	338	10.2	292	**
47°11.660	88°10.000	5/29/13	22.0		10	286	8.4	240	**
47 11.650	88°13.170	5/29/13	7.5		30	859	28.4	813	**
47° 11.630	88° 13.300	8/23/13	3.6		75	2147	73.4	2101	**
47° 11.630	88° 13.270	8/23/13	8.6		60	1718	58.4	1672	**
47° 11.630	88° 13.190	8/23/13	3.7		70	2004	68.4	1958	**
47°11.611	88°13.214	8/15/12	8.9	Gay 1	51.4	1472	49.8	1426	**
47°11.611	88°13.214	8/15/12	8.9	Sta 1	51.5	1474	49.9	1429	**
47°11.598	88°12.774	8/15/12	11.5	Gay 6	19.6	561	18	515	***
47°11.598	88°12.774	8/15/12	13.4	Sta 6	10.1	289	8.5	243	**
47°11.598	88°12.261	8/15/12	6	Sta 7	74.3	2127	72.7	2081	**
47°11.500	88°13.510	5/29/13	8.8		50	1432	48.4	1386	**
47° 11.500	88° 13.190	8/23/13	10.1		40	1145	38.4	1099	**
47° 11.500	88° 13.160	8/23/13	10.3		45	1288	43.4	1243	**
47°11.500	88°12.920	5/29/13	8.5		30	859	28.4	813	**
47° 11.500	88° 12.833	5/26/17	9.1	S12	9.4	269	7.8	223	**
47° 11.500	88° 12.833	5/26/17	9.1	S13	7.3	209	5.7	163	**
47° 11.500	88° 12.500	5/26/17	9.1	S14	12.1	346	10.5	301	**
47° 11.500	88° 11.500	5/26/17	11.2	S18	9	258	7.4	212	**
47° 11.500	88° 11.000	6/22/13	22.0		5	143	3.4	97	**
47° 11.480	88° 12.790	8/23/13	12.7		20	573	18.4	527	**
47°11.390	88°13.900	5/29/13	4.7		65	1861	63.4	1815	**
47° 11.386	88° 13.203	8/22/16	11.0	station 5	23	658	21.4	613	***
47° 11.340	88° 13.170	6/22/13	11.8		10	286	8.4	240	**
47° 11.340	88° 13.000	6/22/13	12.5		10	286	8.4	240	**
47° 11.340	88° 12.670	6/22/13	13.8		10	286	8.4	240	**
47° 11.340	88° 11.340	6/22/13	20.0		10	286	8.4	240	**
47° 11.333	88° 13.00	5/26/17	10.9	S1	15	429	13.4	384	**
47° 11.333	88° 12.833	5/26/17	10.9	S2	6	172	4.4	126	**
47° 11.333	88° 12.666	5/26/17	10.3	S3	7.1	203	5.5	157	**
47° 11.333	88° 12.166	5/26/17	11.2	S6	10.2	292	8.6	246	***
47° 11.296	88° 14.149	7/31/17	2.0	OP 8	26.4	756	24.8	710	**
47° 11.27	88° 14.106	7/31/17	4.2	OP 7	31.9	913	30.3	867	**
47° 11.253	88° 13.958	7/31/17	6.5	OP 3	44.9	1285	43.3	1240	**

47°11.250	88°13.960	5/29/13	4.7		50	1432	48.4	1386	**
47° 11.250	88° 13.919	7/31/17	7.4	OP 2	49.2	1409	47.6	1363	**
47° 11.248	88° 14.002	7/31/17	5.8	OP 4	37.5	1074	35.9	1028	**
47° 11.247	88° 14.053	7/31/17	5.1	OP 5	21	601	19.4	555	**
47° 11.241	88° 14.086	7/31/17	5.0	OP 6	34.1	976	32.5	930	**
47° 11.23	88° 14.244	7/31/17	2.1	OP 9	23.4	670	21.8	624	**
47° 11.230	88° 13.020	8/23/13	12.3		20	573	18.4	527	**
47° 11.199	88° 14.148	7/31/17	4.5	OP 19	12	344	10.4	298	**
47° 11.1975	88° 13.3958	6/11/18	13.0	C1	11.6	332	10	286	***
47° 11.166	88° 13.166	5/26/17	10.3	S16	8.1	232	6.5	186	**
47° 11.166	88° 13.00	5/26/17	10.3	S17	7.9	226	6.3	180	**
47° 11.166	88° 12.833	5/26/17	10.3	S9	8.9	255	7.3	209	***
47° 11.165	88° 13.972	7/31/17	7.8	OP 18	18.8	538	17.2	492	**
47° 11.15	88° 14.141	7/31/17	5.1	OP 10	17.2	492	15.6	447	**
47° 11.137	88° 13.885	7/31/17	9.2	OP 17	29.8	853	28.2	807	**
47° 11.097	88° 14.303	7/31/17	2.1	OP 11	9.7	278	8.1	232	**
47° 11.0971	88° 14.0010	6/11/18	7.5	A2	43.2	1237	41.6	1191	***
47° 11.047	88° 13.008	8/22/16	11.0	station 4	36.6	1048	35	1002	***
47° 11.022	88° 9.470	8/22/16	51.0	BR2-50	3.7	106	2.1	60	**
47° 11.000	88° 14.170	6/22/13	4.5		10	286	8.4	240	**
47°11.000	88°14.090	5/29/13	5.6		10	286	8.4	240	**
47° 11.000	88° 14.000	6/22/13	7.9		5	143	3.4	97	**
47°11.000	88°12.330	5/29/13	18.0		25	716	23.4	670	**
47° 11.000	88° 11.670	7/11/13	25.5		0	0	0	0	*
47°10.9970	88°13.9272	6/11/18	10.5	A3	42.9	1228	41.3	1182	***
47° 10.991	88° 11.908	8/22/16	24.5	BR-2-25	7.9	226	6.3	180	**
47°10.9822	88°13.4975	6/11/18	14.0	B3	15.6	447	14	401	**
47° 10.986	88° 5.861	8/22/16	101.0	BR2-100	2.4	69	0.8	23	**
47° 10.9759	88° 13.5337	9/20/16	10.8	station N	11.3	324	9.7	278	**
47° 10.968	88° 14.213	7/31/17	4.5	OP 12	18.6	533	17	487	**
47°10.834	88°13.842	9/24/19	10.7	ES.T01	34.5	988	32.9	942	***
47° 10.830	88° 13.000	7/11/13	15.5		0	0	0	0	*
47° 10.830	88° 12.000	7/11/13	26.4		0	0	0	0	*
47°10.800	88°11.300	7/29/10	28.0	GA0018	25	716	23.4	670	**
47° 10.799	88° 14.376	7/31/17	1.9	OP 14	14.3	409	12.7	364	**
47° 10.794	88° 14.257	7/31/17	4.8	OP 13	24.9	713	23.3	667	**

47°10.717	88° 12.428	6/18/13	22.7		0	0	0	0	*
47° 10.688	88° 13.130	6/18/13	22.5		10	286	8.4	240	**
47° 10.670	88° 14.170	6/22/13	6.9		0	0	0	0	*
47°10.665	88°13.811	9/24/19	11.3	ES.T03	32.2	922	30.6	876	***
47°10.656	88°14.000	9/24/19	10.3	ES.T02	37.6	1076	36	1031	***
47° 10.590	88° 14.019	9/20/16	9.1	station O	15.9	455	14.3	409	***
47°10.5153	88°13.224	8/15/12	11.0	BGT 2	46.5	1331	44.9	1285	**
47° 10.510	88° 13.968	6/11/18	13.5	A-4	6.6	189	5	143	**
47°10.506	88°13.826	9/24/19	11.5	ES.T06	8.1	232	6.5	186	**
47° 10.50	88° 13.380	6/11/18	10.8	C-4	24.1	690	22.5	644	***
47° 10.500	88° 13.500	7/11/13	11.9	WSB010	0	0	0	0	*
47°10.497	88°13.976	9/24/19	11.4	ES.T05	11.9	341	10.3	295	***
47°10.478	88°13.043	8/15/12	15.0	BGT 1	14.2	407	12.6	361	***
47° 10.440	88° 13.822	8/22/16	10.6	station 7	18.2	521	16.6	475	***
47°10.311	88°14.163	9/24/19	9.5	ES.T04	10.5	301	8.9	255	***
47° 10.308	88° 13.203	6/18/13	14.6		5	143	3.4	97	**
47°10.300	88°09.700	7/29/10	35.0		10	286	8.4	240	**
47° 10.170	88° 13.670	6/22/13	12.8		5	143	3.4	97	**
47° 10.000	88° 13.330	7/11/13	15.6		5	143	3.4	97	**
47° 10.000	88° 12.670	7/11/13	29.3		15	429	13.4	384	**
47°09.897	88° 14.330	6/18/13	6.1		5	143	3.4	97	**
47° 9.833	88° 12.66	8/22/16	29.1	station 8	16.8	481	15.2	435	***
47°09.800	88°12.200	7/29/10	20.0		25	716	23.4	670	**
47°09.800	88°10.400	7/29/10	35.0		0	0	0	0	*
47° 09.670	88° 14.170	6/22/13	9.4		15	429	13.4	384	**
47° 09.670	88° 13.670	6/22/13	12.1		0	0	0	0	*
47° 09.670	88° 13.170	6/22/13	19.6		5	143	3.4	97	**
47° 09.670	88° 12.670	7/11/13	31.1		5	143	3.4	97	**
47° 09.670	88° 12.670	6/22/13	20.0		0	0	0	0	*
47° 09.670	88° 12.330	7/11/13	35.6		5	143	3.4	97	**
47° 9.582	88° 14.402	8/22/16	6.3	CSI-5	17.2	492	15.6	447	**
47° 09.547	88° 14.300	6/18/13	9.4		10	286	8.4	240	**
47° 9.351	88° 12.913	10/17/17	24.7	CSI-25	7.3	209	5.7	163	**
47° 9.192	88° 11.945	10/17/17	55.9	CSI-50	6.1	175	4.5	129	**
47° 9.259	88° 14.298	7/31/17	4.9	OP 15	14.5	415	12.9	369	**
47° 9.244	88° 14.379	7/31/17	2.0	OP 16	7.9	226	6.3	180	**

47°09.200	88°11.300	7/29/10	25.0		0	0	0	0	*
47° 9.146	88° 11.689	10/17/17	72.2	CSI-75	6.2	178	4.6	132	**
47° 7.695	88° 16.823	10/10/17	9.0	LTB 010	7.1	203	5.5	157	**

*No correction, 0 value; **Mean Mn subtracted (1.6%) and SS% corrected; ***Mn determined and %SS corrected

Supplemental Table 3. Macroinvertebrate density and diversity. Variables include lat-long, date collected, depth, % stamp sand (rounded to the nearest 5%), and taxa tallies (n/m²), total density, taxa richness, and Shannon Wiener Index H.

Latitude North	Longitude West	Depth(m)	% Stamp sand										Total biota	Taxonomic	
			Diporeia	Oligochaeta	Nematodae	Chironomidae	Sphaeriidae	Mysis	Gastropoda	Trichoptera	richness	Diversity H			
47° 11.820	88° 13.400'	5.2	0	0	0	0	96	192	0	0	0	287	2	0.635	
47° 10.670	88° 14.170	6.9	0	345	364	268	57	77	57	77	57	1303	8	1.778	
47° 12.830	88° 08.670	10.2	0	843	498	326	0	0	19	0	0	1686	4	1.075	
47° 13.000	88° 09.000	10.4	0	38	287	19	172	211	96	19	38	881	4	1.705	
47° 10.500	88° 13.500	11.9	0	96	96	19	192	19	0	0	38	460	6	1.488	
47° 09.670	88° 13.670	12.1	0	19	0	0	211	230	0	77	0	537	4	1.127	
47° 10.830	88° 13.000	15.5	0	38	0	38	115	115	38	0	19	364	6	1.59	
47° 09.670	88° 12.670	20	0	0	0	230	38	134	0	0	0	402	3	0.909	
47° 10.717	88° 12.428	22.7	0	671	96	0	192	57	0	0	0	1015	4	0.973	
47° 09.200	88° 11.300	25	0	57	77	77	153	134	0	19	0	517	6	1.642	
47° 11.000	88° 11.670	25.5	0	38	19	19	249	77	0	0	0	402	5	1.125	
47° 10.830	88° 12.000	26.4	0	556	134	19	38	211	0	0	19	977	6	1.204	
47° 12.000	88° 09.670	28.8	0	632	0	115	0	1111	0	0	0	1859	3	0.848	
47° 09.800	88° 10.400	35	0	249	57	38	38	57	19	0	57	517	7	1.586	
47° 09.897'	88° 14.330	6.1	5	307	402	77	920	249	0	0	0	1954	5	1.361	
47° 11.000	88° 14.000	7.9	5	0	0	0	172	77	0	0	0	249	2	0.619	
47° 10.170	88° 13.670	12.8	5	613	153	57	498	115	0	0	77	1514	6	1.434	
47° 10.308	88° 13.203	14.6	5	134	0	58	19	38	0	96	77	422	6	1.641	
47° 10.000	88° 13.330	15.6	5	0	0	115	19	57	0	0	0	192	3	0.896	
47° 09.670	88° 13.170	19.6	5	19	19	0	77	38	0	96	0	249	5	1.41	
47° 11.500	88° 11.000	22	5	766	172	0	0	0	57	0	0	996	3	0.669	
47° 09.670	88° 12.670	31.1	5	57	77	172	0	0	0	38	0	345	4	1.222	
47° 09.670	88° 12.330	35.6	5	345	77	134	172	517	96	96	77	1514	8	1.818	
47° 11.000	88° 14.170	4.5	10	38	0	19	57	0	0	0	0	115	3	1.011	
47° 11.000	88° 14.090	5.6	10	96	77	230	19	19	0	0	96	536	6	1.495	
47° 12.080	88° 12.420	7.4	10	0	57	0	422	134	0	0	19	632	4	0.921	
47° 09.547	88° 14.300	9.4	10	172	38	575	38	0	57	0	0	881	5	1.046	
47° 11.340	88° 13.170	11.8	10	0	0	0	211	172	0	0	0	383	2	0.688	
47° 11.340	88° 13.000	12.5	10	0	0	0	57	0	0	0	0	57	1	0	
47° 12.190	88° 11.040	12.9	10	134	57	153	0	0	0	0	0	345	3	1.024	
47° 11.340	88° 12.670	13.8	10	19	115	134	0	0	0	19	19	307	5	1.246	
47° 12.170	88° 10.170	20	10	0	19	0	134	0	0	19	0	172	3	0.681	
47° 11.340	88° 11.340	20	10	153	96	134	0	0	0	0	0	383	3	1.081	
47° 11.660	88° 10.000	22	10	0	0	0	0	0	77	0	0	77	1	0	
47° 10.688	88° 13.130	22.5	10	0	0	0	115	19	0	57	0	192	3	0.897	
47° 10.300	88° 09.700	35	10	96	0	0	0	0	192	115	38	441	4	1.255	
47° 09.670	88° 14.170	9.4	15	38	19	19	115	249	0	0	38	479	6	1.341	
47° 10.000	88° 12.670	29.3	15	38	96	0	96	57	0	364	57	709	6	1.446	

[illegible]