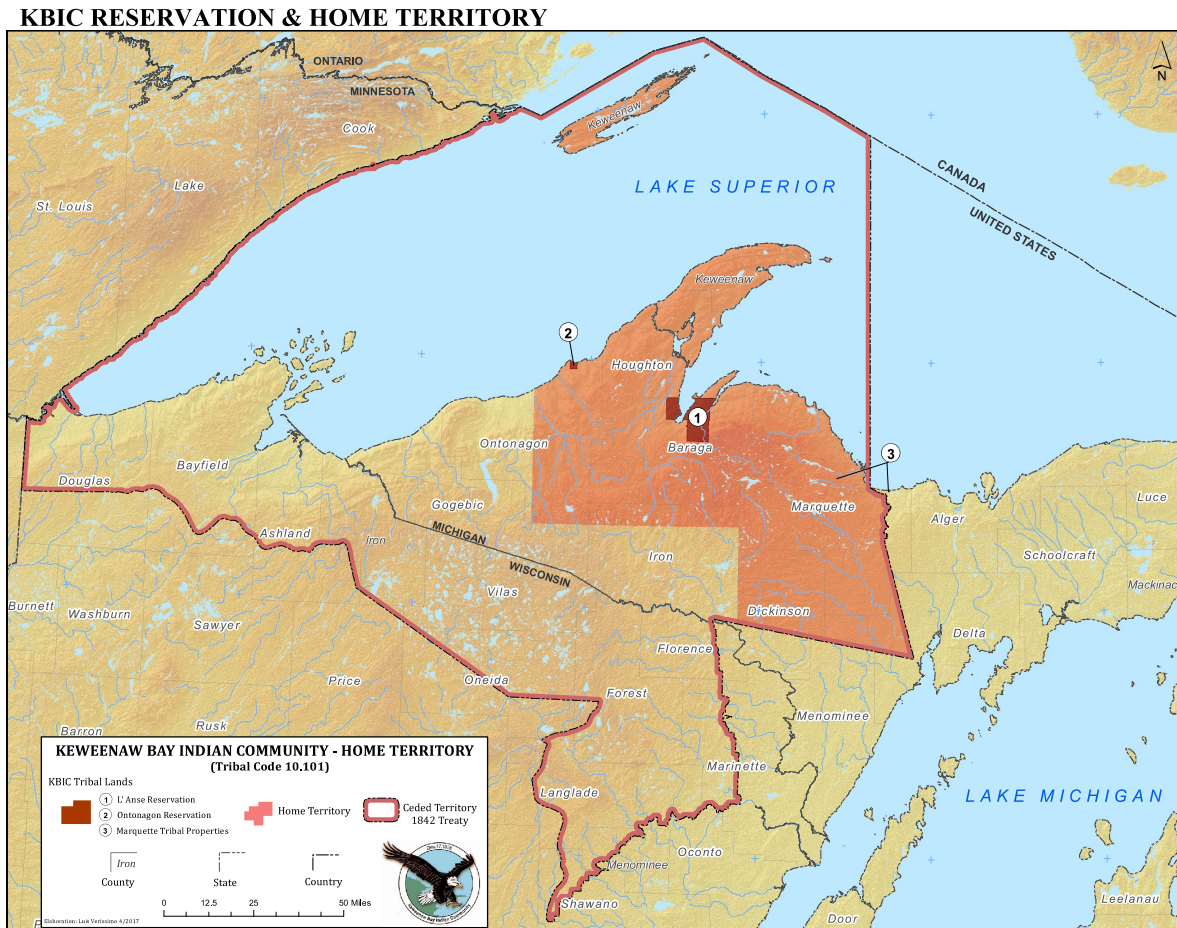
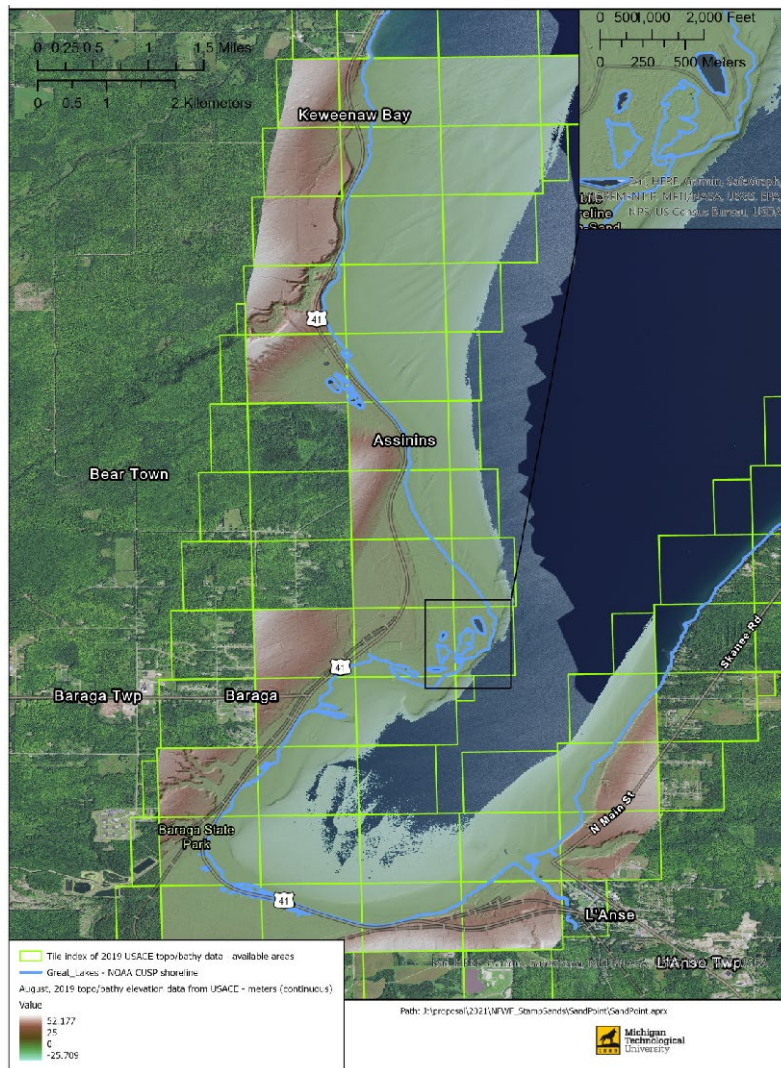


# Coastal Environments: Mine Discharges And Infringements On Indigenous Peoples' Rights

W. Charles Kerfoot, Gary Swain, Luis M. Verissimo, Erin Johnston, Carol A. MacLennan, Daniel Schneider and Noel R. Urban



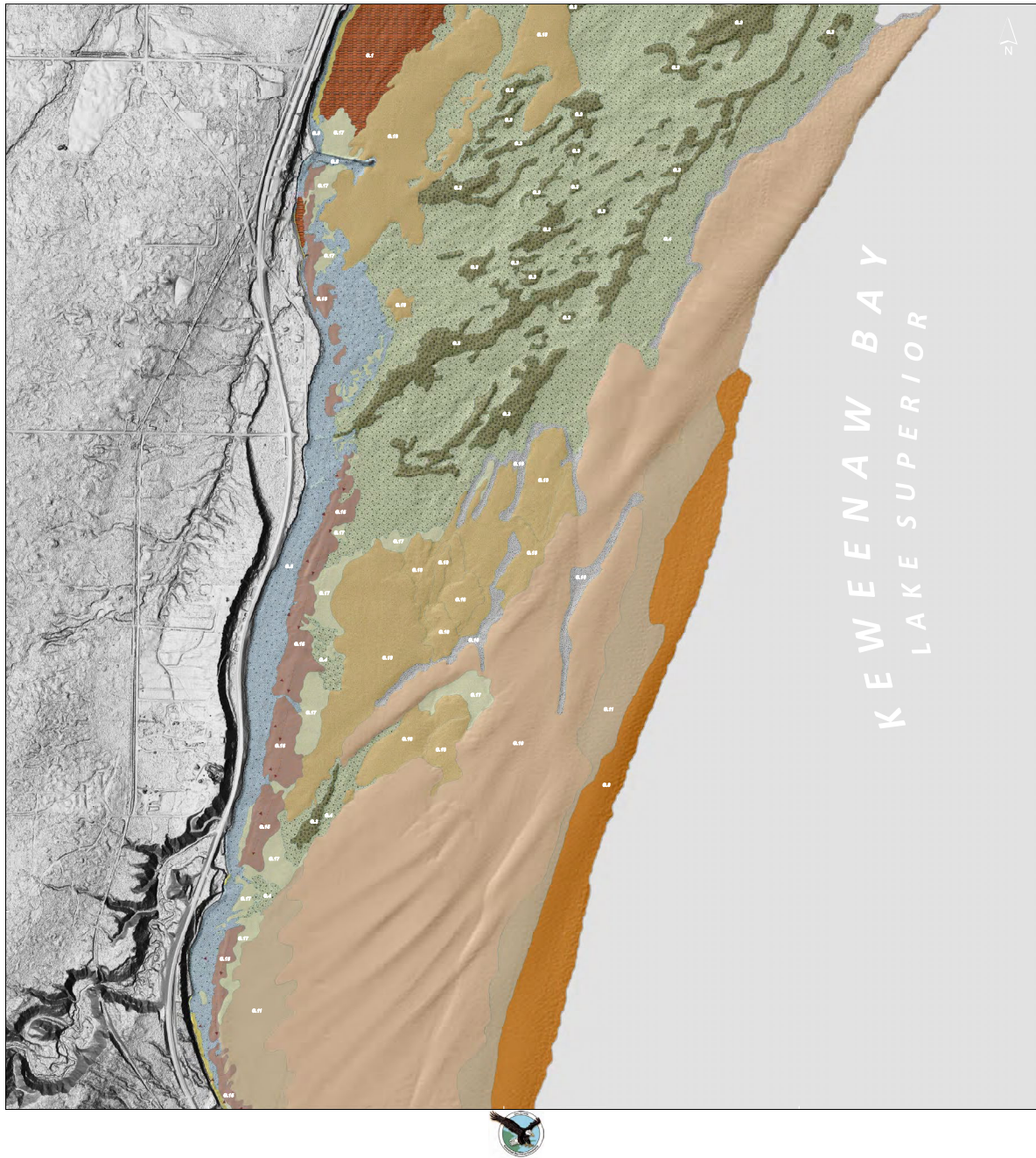
**Figure S1.** Keweenaw Bay Indian Community (KBIC): Ceded Territory of 1842 Treaty, Home Territory, and Reservation Lands.



**Figure S2.** Boundaries of LiDAR topographic and bathymetric depth data for Keweenaw Bay to Sand Point, showing shoreline and coastal shelf details.

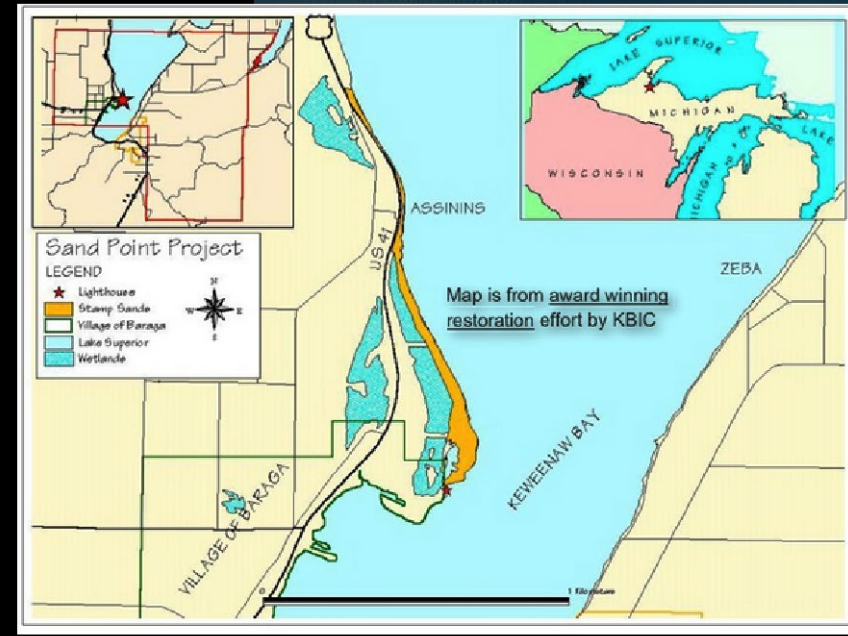


SHORE COASTAL MORPHOLOGY OF NORTH SHEET



**Figure S3.** Keweenaw Bay Shoreline and Coastal Shelf Geomorphology Map, with list of bottom formations (bedrock formations, boulder/cobble beds, sand fields).

At Sand Point (between points C and D on the map), part of the Keweenaw Bay Indian Community lands, Stampsands from the Mass Mill have accumulated. The area has been restored from a contaminated barren state to a native plant community by KBIC. The map of restored KBIC stampsands is shown below. See report by Pamela Nankervis.



**Figure S4.** Sand Point Remediation Project showing photo (above) of stamp sands distribution before soil cap. Wetland, trails, grass, shrub, and flower planting regions are in green, remaining stamp sand beach is in orange.

**Table S1.** Percentage stamp sands in beach samples from Mass Mill to Sand Point. Location, date, station numbers and percentages are listed below. Percentages feature means, 3-4 subcounts, Standard Deviation (SD) and Coefficient of Variation (CV) for sub-counts. Values arranged by latitude.

Latitude North	Longitude West	Date Collected	Station	%Mean Stamp Sand	Individual% Stamp Sand Counts				SD	CV%
					1st	2nd	3rd	4th		
46°52.910	88°28.563	7/11/19	KC06	4.6	15.8	4.4	3.6		1.11	24.21%
46°52.876	88°28.546	7/11/19	KCOS	5.4	4.6	7	4.5		1.42	26.21%
46°52.835	88°28.533	7/11/19	KC04	4.6	5	4.8	4.1		0.47	10.27%
46°52.802	88°28.515	7/11/19	KC03	7.6	15.9	8.7	8.3		1.51	19.93%
46°52.787	88°28.504	7/11/19	KC02	4.6	4.5	3.3	6		1.35	29.41%
46°52.778	88°28.498	7/11/19	KC01	4.5	4.2	4.9	5.5		0.65	13.28%
46°51.817	88°28.734	5/30/19	#1A MM	78.3	87	71.4	76.4		7.97	10.17%
46°51.817	88°28.734	5/30/19	#1B MM	78.6	77.3	77.9	80.7		1.81	2.31%
46°51.817	88°28.734	5/30/19	#1C MM	77.6	75.9	77.3	79.6		1.87	2.41%
46°51.809	88°28.724	5/30/19	#2 MM	79.8	80.9	80	78.4		1.27	1.59%
46°51.788	88°28.712	5/30/19	#4 MM	46.9	47.5	46.7	46.4		0.57	1.21%
46°51.773	88°28.721	5/30/19	#3 MM	69.6	74.5	70.8	63.5		5.60	8.04%
46°51.533	88°28.735	6/17/19	Sun#13	39.8	41	35.1	43.2		4.19	10.52%
46°51.502	88°28.750	6/17/19	Sun#11	29	32.4	30.7	23.8		4.55	15.71%
46°51.462	88°28.735	6/17/19	Sun#12	30.3	32.6	27.3	31.1		2.73	9.02%
46°51.344	88°28.665	6/17/19	Jurnu#15	79.2	82.8	79.3	75.6		3.60	4.55%
46°51.224	88°28.702	6/17/19	Jurmu#14	61.2	61.2	60.1	63.1		1.52	2.48%
46°51.096	88°28.718	5/30/19	#5 MM	13.8	11.9	17.3	12.2		3.03	21.99%
46°50.658	88°28.884	6/17/19	RR#16	48.2	51.6	45.7	47.4		3.04	6.30%
46°50.380	88°28.867	6/27/19	LCT1002	42.7	44.7	41.9	41.5		1.74	4.08%
46°50.080	88°28.153	6/26/19	PC015	8.2	8.9	8.2	7.5		0.70	8.54%
46°50.064	88°28.963	6/17/19	SRR#18	38.35	39.9	33.3	42.2		4.62	12.05%
46°49.950	88°29.052	8/20/19	SLCRO1	32.5	32.6	33.6	31.2		1.21	3.71%
46°49.936	88°29.059	8/20/19	SLCRO2	30.2	29	30.5	31.1		1.08	3.58%
46°49.553	88°28.960	6/13/19	PM#9	22	20.7	24.2	21.1		1.92	8.71%
46°49.503	88°28.916	6/13/19	PM#8A	19.7	18.8	20.3	20.1		0.81	4.13%
46°49.502	88°28.929	6/13/19	PM#8B	50.2	52.3	44.3	53.9		5.14	10.25%
46°49.497	88°28.945	6/13/19	PM#8C	43.3	43.6	44	42.4		0.83	1.92%
46°49.491	88°28.945	7/5/18	AT-2	49.6	50.7	50	48.2		3.18	6.40%
46°49.491	88°28.898	7/5/18	AT-4	21.7	18.2	22.5	24.4		1.29	5.94%
46°49.490	88°28.924	7/5/18	AT-3	20.5	22.3	20.1	19.1		1.64	7.99%
46°49.481	88°28.902	7/5/18	AT-1	423	45.3	46.8	34.9		6.48	15.32%
46°49.428	88°28.885	6/13/19	PM#7	36.9	38.2	34	385		2.52	6.82%
46°49.419	88°28.904	7/5/18	AT-5	45.1	51.1	42.9	41.3		5.26	11.66%
46°49.348	88°28.879	6/13/19	HW41#6	53.3	58.4	54.1	35.5	65.3	12.75	23.92%
46°49.238	88°28.786	6/13/19	HW41#4	42.9	41	42.5	45.1		2.07	4.84%
46°49.238	88°28.787	6/13/19	HW41#5	43.6	41.7	48.4	40.7		4.19	9.60%
46°49.177	88°28.739	6/13/19	HW41#3	37.6	36.6	35.5	40.7		2.74	7.29%
46°49.096	88°28.667	6/13/19	HW41#2A	33	31.3	314	36.3		2.86	8.66%
46°49.096	88°28.667	6/13/19	HW41#2B	46.7	44.8	48.4	47.6		1.89	4.05%
46°49.062	88°28.634	6/13/19	HW41#1B	67.6	70.8	63.7	68.4		3.61	5.34%
46°49.062	88°28.634	6/13/19	HW41#1A	36	33.5	36.5	38.1		2.34	6.49%
46°48.566	88°28.422	7/5/18	AT-6	55.4	54.3	58.8	53.1		3.00	5.42%

46°48.562	88°28.417	7/5/18	AT-7	44.8	38.9	50.5	45.1	5.80	12.96%
46°48.560	88°28.423	7/5/18	AT-9	53.5	50.5	53.2	56.7	3.11	5.81%
46°48.552	88°28.424	7/5/18	AT-10	65.6	67.1	62.9	66.7	2.32	3.53%
46°48.495	88°28.451	7/5/18	AT-8	56.3	54.3	56.6	58.1	1.91	3.40%
46°48.440	88°28.430	7/5/18	AT-9A	73.9	75.6	75	71.1	2.44	3.31%
46°48.124	88°28.326	7/3/19	SP16	48	45.3	48.7	49.9	2.39	4.97%
46°48.119	88°28.330	7/3/19	SP17	52.3	52	55.2	49.7	2.76	5.28%
46°48.080	88°28.293	7/3/19	SP15	51.8	55.4	51.1	48.8	3.35	6.47%
46°48.056	88°28.294	7/3/19	SP18	57.2	54.5	57.5	59.6	2.56	4.48%
46°48.030	88°28.252	7/3/19	SP14	48.4	46.8	49.7	48.7	1.47	3.04%
46°48.017	88°28.431	7/10/18	Sand Point	58.7	59.8	55.9	60.5	2.48	4.22%
46°47.988	88°28.217	7/3/19	SP13	58.8	60.5	61.3	54.5	3.72	6.32%
46°47.938	88°28.180	7/3/19	SP12	53.5	56.4	50	54.1	3.24	6.06%
46°47.936	88°28.187	7/3/19	SP19	50.4	51.8	49	50.3	1.40	2.78%
46°47.899	88°28.136	7/3/19	SP11	46.9	46.4	49.2	45	2.14	4.56%
46°47.865	88°28.109	9/12/19	SPS#005	52	54.8	51	50.1	0.72	1.39%
46°47.795	88°28.051	9/12/19	SPS#006	52.3	52.5	51.5	52.9	0.72	1.38%
46°47.728	88°27.992	9/12/19	SPS#007	52.9	533	55.8	49.6	3.12	5.90%
46°47.677	88°27.931	9/12/19	SPS#008	50.3	462	51	53.8	3.84	7.64%
46°47.567	88°27.844	8/20/19	NLH16	51.8	49.5	54.8	51.2	2.71	5.22%
46°47.534	88°27.842	7/5/18	AT-18	55.1	56.9	49.5	58.8	4.91	8.92%
46°47.504	88°27.829	8/20/19	NLH15	57.6	57.5	59.2	56.1	1.55	2.70%
46°47.454	88°27.773	8/20/19	NLH14	40.8	39.6	39.6	43.2	2.08	5.09%
46°47.450	88°27.789	7/5/18	AT-11	59.9	59.1	61.5	59	1.42	2.36%
46°47.411	88°27.737	8/20/19	NLH13	53.7	52.4	54.3	54.3	1.10	2.04%
46°47.376	88°27.704	8/20/19	NLH12	47.5	45.1	51.1	46.3	3.17	6.68%
46°47.337	88°27.723	8/20/19	NLH11	52.1	52.3	50.8	53.1	1.17	2.24%
46°47.303	88°27.755	8/20/19	NLH10	40.4	41.3	35.9	43.6	3.95	9.78%
46°47.264	88°27.723	8/20/19	NLH09	56.2	54.5	57.9	56.2	1.70	3.02%
46°47.226	88°27.747	8/20/19	NLH08	43.9	43.3	45.5	43	1.37	3.11%
46°47.199	88°27.753	8/20/19	NLH07	46.1	48.1	42.3	47.9	3.29	7.14%
46°47.171	88°27.778	8/20/19	NLH06	95.9	93.5	96.6	97.5	2.10	2.19%
46°47.161	88°27.783	8/20/19	NLH05	22.1	20.1	23.4	22.9	1.78	8.05%
46°47.128	88°27.778	8/20/19	NLH04	23.1	24.4	23.7	21.1	1.74	7.53%
46°47.107	88°27.868	8/20/19	NLH03	15.1	17.1	14.6	13.6	1.80	11.94%
46°47.079	88°27.912	8/20/19	NLH02	14	15.7	13.4	13	1.46	10.41%
46°47.070	88°27.946	8/20/19	NLH01	15.8	15.5	15.8	16.1	0.30	1.90%
46°47.060	88°27.973	7/5/18	AT-12	19.9	21.6	18	20.1	1.81	9.09%
46°47.036	88°27.989	7/3/19	SP01	12.6	12.7	13	12.1	0.46	3.64%
46°47.033	88°27.995	7/3/19	SP02	10.8	8.2	11.4	12.9	2.40	22.23%
46°47.000	88°28.009	7/3/19	SP03	18.9	20.7	18.5	17.4	1.68	8.89%
46°46.996	88°28.009	7/5/18	AT-13	37.9	32.8	38.9	42.2	4.77	12.58%
46°46.988	88°28.010	7/3/19	SP04	16.9	18.4	15.8	16.5	1.35	7.96%
46°46.972	88°28.032	7/5/18	AT-14	5.4	4.5	6.5	5.2	1.01	18.79%
46°46.964	88°28.032	7/3/19	SP05	5.5	4.3	5	7.2	1.51	27.51%
46°46.962	88°28.050	7/3/19	SP06	8.2	5.3	8.9	10.3	2.58	31.46%
46°46.948	88°28.062	7/3/19	SP07	5.7	6.3	5.3	5.5	0.53	9.28%
46°46.945	88°28.076	7/3/19	SP08	5.3	6.1	6.6	3.3	1.78	33.56%
46°46.940	88°28.103	7/3/19	SP09	4.2	4.5	3.6	4.6	0.55	13.11%
46°46.931	88°28.121	9/12/19	CB#001	5.8	6.4	4.8	6.1	0.85	14.66%

46°46.921	88°28.133	9/12/19	CB#002	5.3	5.4	4.3	6.2	0.95	18.00%
46°46.903	88°28.156	9/12/19	CB#003	7	7.7	6.9	6.4	0.66	9.37%
46°46.832	88°28.204	9/12/19	CB#004	6.6	9	5	5.7	2.14	32.37%

**Table S2.** Underwater Ponar samples from Mass Mill to Sand Point. 3-4 sub-counts, with Standard Deviations (SD) and Coefficient of Variation (CV). Predicted Cu concentrations given from Mass Mill pile standard (100% = 3000 ug/g, ppm). Ponar samples arranged by latitude.

Latitude North	Longitude West	Date Collected	Station	Depth (m)	%Mean Stamp Sand	Individual% Stamp Sand Counts				SD	CV	Cu Conc. (100% 3000 µg/g, ppm)
						1st	2nd	3rd	4th			
46°52.665	88°28.117	6/25/19	PC001	7.5	7	7.3	9.2	4.5		2.36	33.78%	210
46°52.333	88°28.110	6/25/19	PC003	8.6	17.2	8.8	5.7	7.1		1.55	21.56%	216
46°52.027	88°28.157	6/25/19	PC004	9.0	7.5	7	7.9					225
46°51.899	88°28.360	6/25/19	PC005	6.5	7.2	6	8.3	7.4		1.16	16.10%	216
46°51.705	88°28.366	6/25/19	PC006	7.0	8.5	10	8.1	7.5		1.31	15.35%	255
46°51.639	88°28.681	6/25/19	PCX001	13.5	8.2	7.7	8.1	8.7		0.50	6.14%	246
46°51.5171	88°28.6381	6/11/18	Mass 003	6.0	7.1	8.2	5.2	7.9		1.65	23.27%	213
46°51.469	88°28.301	6/25/19	PC008	11.0	7.8	6	9	8.4		1.59	20.35%	234
46°50.714	88°28.394	6/26/19	PC017	7.0	10.1	7.9	11.4	11		1.92	18.97%	303
46°50.6673	88°28.6136	6/11/18	Mass 004	7.0	7.8	8	6.4	8.5		1.10	14.06%	234
46°50.528	88°28.323	6/26/19	PC016	7.8	10.7	7.6	11	11.7		2.19	20.50%	321
46°50.5241	88°28.6712	6/27/19	LCT1010	3.9	12.4	12.1	12.1	13		0.52	4.19%	372
46°50.4964	88°28.7175	6/27/19	LCT1009	3.1	12.2	11.2	12.7	12.6		0.84	6.87%	366
46°50.4519	88°28.7651	6/27/19	LCT1008	2.3	13.1	14.4	13.7	11.1		1.74	13.27%	393
46°50.4365	88°28.7934	6/27/19	LCT1007	1.8	13.6	12.6	14.6	13.5		1.00	7.37%	408
46°50.4149	88°28.8130	6/27/19	LCT1006	1.8	16.8	15.7	17.5	17.1		0.95	5.63%	504
46°50.3944	88°28.8521	6/27/19	LCT1003	1.5	15.2	13.8	15.7	16.1		1.23	8.08%	456
46°50.3796	88°28.8670	6/27/19	LCT1002	1.3	42.7	44.7	41.9	41.5		1.74	4.08%	1281
46°50.080	88°28.153	6/26/19	PC015	8.7	8.2	8.9	8.2	7.5		0.70	8.54%	246
46°49.8173	88°28.8004	6/27/19	MLT1010	3.8	18.7	15.9	18	22.1		3.15	16.86%	561
46°49.7806	88°28.8484	6/27/19	MLT1009	3.4	25	30.8	23	20.7	25.6	4.34	17.36%	750
46°49.7509	88°28.8900	6/27/19	MLT1008	3.0	16.2	13.4	17.5	17.8		2.46	15.17%	486
46°49.7341	88°28.9080	6/27/19	MLT1007	2.8	22	23.3	22.9	19.8		1.92	8.71%	660
46°49.7147	88°28.9382	6/27/19	MLT1006	2.4	17.8	21.1	19	12.1	18.9	3.92	22.01%	534
46°49.7028	88°28.9494	6/27/19	MLT1005	2.1	18.9	17.5	20.6	18.6		1.57	8.32%	567
46°49.6975	88°28.9601	6/27/19	MLT1004	1.8	14.7	17.5	12.7	14.7		2.41	16.40%	441
46°49.6848	88°28.9746	6/27/19	MLT1003	1.7	11	9.5	12.5	11		1.50	13.64%	330
46°49.6715	88°28.9875	6/27/19	MLT1002	1.6	16.4	19.2	13.4	15.3		2.96	18.03%	492
46°49.6670	88°28.9998	6/27/19	MLT1001	1.4	16.5	18.6	15.2	15.8		1.81	11.00%	495
46°49.5441	88°28.6792	6/11/18	Mass 005	6.5	7.5	5.9	7.7	8.8		1.46	19.52%	225
46°49.5280	88°28.7631	6/11/18	Mass 006	5.5	16.8	13.4	25.1	12.8	16	5.69	33.86%	504
46°49.4988	88°28.8429	6/11/18	Mass 007	4.5	27.5	26.3	26.9	29.4		1.64	5.98%	825
46°49.4517	88°28.6567	6/27/19	MLT2009	3.7	14.2	11.2	13.8	17.6		3.22	22.67%	426
46°49.4017	88°28.7283	6/27/19	MLT2007	2.6	20.2	21.2	21.3	18.1		1.82	9.01%	606
46°49.3770	88°28.7627	6/27/19	MLT2005	1.8	18.5	14.9	19.4	21.2		3.24	17.54%	555
46°49.3567	88°28.7883	6/27/19	MLT2003	1.6	20.7	20.7	19.1	22.3		1.60	7.73%	621
46°49.3367	88°28.8167	6/27/19	MLT2001	2.0	24.8	23.7	26.6	24.1		1.57	6.34%	744
46°49.1567	88°28.4417	6/27/19	MLT3009	5.4	6.9	6.3	6.3	8.1			15.06%	207
46°49.1083	88°28.4850	6/27/19	MLT3007	3.9	11.3	12.6	10.7	10.6		1.13	9.97%	339
46°49.0816	88°28.5200	6/27/19	MLT3005	2.8	20.5	20.8	18.9	21.7		1.43	6.97%	615
46°49.0617	88°28.5467	6/27/19	MLT3003	2.1	17	17.6	16.7	16.8		0.49	2.90%	510
46°49.0417	88°28.5750	6/27/19	MLT3001	3.0	12.4	10.7	14	12.5		1.65	13.32%	372



46°48.995	88°28.263	8/29/19	AST1010	5.2	11.1	11.8	12	9.6	1.33	12.00%	333
46°48.964	88°28.187	8/29/19	AST1009	4.8	10	9.3	10	10.6	0.65	6.51%	300
46°48.936	88°28.314	8/29/19	AST1007	4.5	8.9	10.1	9.3	7.4	1.39	15.58%	267
46°48.909	88°28.332	8/29/19	AST1006	3.9	12.6	13.9	10.6	13.4	1.78	14.12%	378
46°48.893	88°28.348	8/29/19	AST1005	3.4	15	17.5	13.9	13.4	2.24	14.91%	450
46°48.876	88°28.361	8/29/19	AST1003	2.7	14.6	15.1	15.4	13.4	1.08	7.39%	438
46°48.865	88°28.370	8/29/19	AST1002	2.3	17.3	17.7	15.5	18.7	1.64	940%	519
46°48.853	88°28.377	8/29/19	AST1001	2.1	16.6	15.8	15.1	19	2.08	12.53%	498
46°48.772	88°28.081	8/29/19	AST2010	7.5	8.5	7.6	0	0	0.81	9.51%	255
46°48.738	88°28.107	8/29/19	AST2009	6.4	7.2	7.2	8.3	6.1	1.10	15.28%	216
46°48.704	88°28.164	8/29/19	AST2007	5.2	11.1	12.3	11.5	9.6	1.39	12.49%	333
46°48.675	88°28.195	8/29/19	AST2006	4.9	13	15.2	11.6	12.2	1.93	14.84%	390
46°48.637	88°28.240	8/29/19	AST2005	4.6	11.9	10.3	12.3	13	1.40	11.77%	357
46°48.606	88°28.288	8/29/19	AST2003	2.2	13.8	12.7	15.1	13.6	1.21	8.79%	414
46°48.591	88°28.309	8/29/19	AST2002	2.7	14	14.8	15.9	11.2	2.46	17.56%	420
46°48.572	88°28.341	8/20/10	AST2001	3.6	10.1	12.8	7.4	10.1	2.70	26.73%	303
46°48.4636	88°28.2560	6/27/19	SPT1009	3.0	8.3	8.3	8.7	7.9	0.40	4.82%	249
46°48.4141	88°28.3167	6/27/19	SPT1007	3.1	25.1	23.4	28.8	23	3.24	12.91%	753
46°48.387	88°28.350	6/27/19	SPT1005	2.7	10.1	7.4	10.8	12.2	2.47	24.44%	303
46°48.367	88°28.378	6/27/19	SPT1003	1.7	24	20.2	24.1	27.6	3.70	15.42%	720
46°48.347	88°28.405	6/27/19	SPT1001	0.6	40.8	40.3	45.5	36.5	4.52	11.07%	1224
46°48.314	88°28.189	6/27/19	SPT6010	3.5	18.9	20.3	18.1	18.3	1.22	6.44%	567
46°48.284	88°28.254	8/14/19	SPT6008	2.3	16.8	16.7	17.6	16	0.80	4.77%	504
46°48.276	88°28.282	8/14/19	SPT6007	2.4	23.2	26.8	23.1	19.8	3.50	15.09%	696
46°48.244	88°28.302	8/14/19	SPT6003	2.2	27.9	28.8	28	26.9	0.95	3.42%	837
46°48.244	88°28.286	8/14/19	SPT6006	2.3	25.9	27.9	27.2	22.7	2.82	10.90%	777
46°48.2356	88°28.1480	6/27/19	SPT2009	3.9	11	11.4	12.7	0	1.88	17.06%	330
46°48.233	88°28.307	8/14/19	SPT6002	1.7	27.5	26.5	24.8	31.3	3.37	12.26%	825
46°48.197	88°28.332	8/14/19	SPT6001	0.9	43.8	42.1	44.8	44.4	1.46	3.33%	1314
46°48.1865	88°28.2228	6/27/19	SPT2007	2.2	18.4	16.6	18.6	19.9	1.66	9.03%	552
46°48.1599	88°28.2519	6/27/19	SPT2005	2.9	26.9	23.8	24.8	28.7	2.72	10.11%	807
46°48.1477	88°27.8071	6/11/18	Mass 008	15.5	7.7	7.1	7.1	8.8	0.98	12.75%	231
46°48.1439	88°28.2719	6/27/19	SPT2003	1.5	22.1	24.2	19.7	22.3	2.26	10.22%	663
46°48.1218	88°28.2790	6/27/19	SPT2001	1.2	31.1	29.6	32.1	31.5	1.31	4.20%	933
46°48.1083	88°27.9366	6/11/18	Mass 009	7.5	11.6	11.3	12.4	11	0.74	6.35%	348
46°48.079	88°27.914	8/14/19	SPT7010	4.9	8.7	9.8	8.8	7.4	1.21	13.86%	261
46°48.034	88°27.984	8/14/19	SPT7009	4.0	10.4	10.7	10.1	10.4	0.30	2.88%	312
46°48.0292	88°28.1889	6/11/18	Mass 010	4.5	25.6	23.3	28.2	25.4	2.46	9.60%	768
46°47.974	88°28.046	8/14/19	SPT7007	2.9	15.6	15.9	14.1	16.7	1.33	8.54%	468
46°47.962	88°28.082	8/14/19	SPT7005	2.1	21.2	21.4	21.4	20.9	0.29	1.36%	636
46°47.961	88°28.052	8/14/19	SPT7006	1.7	17.6	20.1	15.1	17.7	2.50	14.21%	528
46°47.936	88°28.098	8/14/19	SPT7003	1.7	25.2	28.8	22.7	24	3.21	12.75%	756
46°47.932	88°28.122	8/14/19	SPT7002	0.9	33	30.4	36.8	31.7	3.38	10.25%	990
46°47.913	88°28.120	8/14/19	SPT7001	0.8	38.9	40.4	37.5	38.9	1.45	3.73%	1167
46°47.918	88°27.795	8/14/19	SPT8010	5.1	13.1	13.2	13.2	13	0.12	0.88%	393
46°47.880	88°27.843	8/14/19	SPT8009	4.3	13	13.1	12.4	13.6	0.60	4.64%	390
46°47.853	88°27.840	8/14/19	SPT8008	3.2	19.7	18.7	23.6	16.8	3.51	17.81%	591
46°47.834	88°27.893	8/14/19	SPT8007	2.8	8.1	82	8.2	7.8	0.23	2.85%	243
46°47.804	88°27.957	8/14/19	SPT8006	2.7	24.4	24.8	27.3	21.2	3.07	12.57%	732
46°47.7914	88°27.7760	6/11/18	Mass 011	7.0	14.2	14.2	14.5	14	0.25	1.77%	426
46°47.785	88°27.955	8/14/19	SPT8005	2.4	22.6	21.7	20.7	25.3	2.42	10.71%	678

46°47.783	88°27.946	8/14/19	SPT8004	2.2	27	27.6	25.1	28.3	1.68	6.23%	810
46°47.779	88°27.953	8/14/19	SPT8003	2.1	24.1	22.6	24.2	25.5	1.45	6.03%	723
46°47.758	88°27.955	8/14/19	SPT8002	1.5	26	24.5	29.5	24.1	3.01	11.57%	780
46°47.751	88°27.957	8/14/19	SPT8001	1.2	28.2	26	33.4	25.1	4.55	16.15%	846
46°47.7391	88°27.7183	6/27/19	SPT4009	4.3	9.3	8.5	6.2	13.3	3.62	38.95%	279
46°47.6918	88°27.7851	6/27/19	SPT4007	2.7	13	14.6	9.9	14.4	2.66	20.44%	390
46°47.6702	88°27.8160	6/27/19	SPT4005	1.9	17.3	17.1	17.1	17	0.06	0.33%	519
46°47.6507	88°27.8482	6/27/19	SPT4003	3.0	23.7	25.3	21.8	24	1.77	7.46%	711
46°47.6487	88°27.7888	6/11/18	Mass 012	4.0	19.4	20	18.1	20.1	1.13	5.81%	582
46°47.6284	88°27.8510	6/27/19	SPT4001	1.7	24.7	27.5	28.8	17.9	5.95	24.10%	741
46°47.5400	88°27.6898	6/27/19	SPT5007	3.6	17.7	16.8	21.5	14.8	3.44	19.43%	531
46°47.5233	88°27.7134	6/27/19	SPT5006	2.4	19.4	17.3	21.2	19.6	1.96	10.11%	582
46°47.5102	88°27.7241	6/27/19	SPT5005	2.8	17	20.4	15.2	15.4	2.95	17.33%	510
46°47.5034	88°27.7349	6/27/19	SPT5004	3.3	16.7	17.4	14.6	18.1	1.85	11.09%	501
46°47.4940	88°27.7551	6/27/19	SPT5003	2.6	18.6	19.2	18.2	18.4	0.53	2.84%	558
46°47.4814	88°27.7649	6/27/19	SPT5002	2.0	26.1	26.1	26.1	26.1	0.00	0.00%	783
46°47.4728	88°27.7725	6/27/19	SPT5001	1.2	27.8	27.6	26.6	29.2	1.31	4.72%	834

**Table S3.** Sieved Pomar sediment samples .Table lists station names, position (latitude&longitude), depth (B=beach sample, depth in meters), mean particle size(um), and %mass in each sieved size class (screen size).

Latitude North	Longitude West	Date	Station	Depth (m)	Mean Particle Size (µm)	Percent Mass for Each Screen Size						
						5.3 mm	3 mm	1.25 mm	0.375 mm	0.1875 mm	0.094 mm	0.047 mm
46°52.910	88°28.563	7/11/19	KC06	B	668	4.01%	0.04%	35.58%	57.89%	2.47%	0.01%	0.00%
46°52.876	88°28.546	7/11/19	KC05	B	652	2.88%	0.33%	32.80%	60.10%	3.72%	0.18%	0.00%
46°52.835	88°28.533	7/11/19	KC04	B	580	9.75%	0.97%	25.19%	61.67%	2.42%	0.00%	0.00%
46°52.802	88°28.515	7/11/19	KC03	B	495	4.01%	0.14%	16.85%	70.39%	8.52%	0.09%	0.00%
46°52.787	88°28.504	7/11/19	KC02	B	625	13.37%	2.22%	28.00%	54.88%	1.50%	0.04%	0.00%
46°52.778	88°28.498	7/11/19	KC01	B	847	11.76%	6.84%	38.86%	40.84%	1.52%	0.18%	0.00%
46°52.665	88°28.117	6/25/19	PC001	7.5	241	0.00%	0.00%	0.24%	51.56%	0.02%	47.77%	0.41%
46°52.333	88°28.110	6/25/19	PC003	8.6	205	0.00%	0.00%	0.16%	39.09%	0.00%	60.09%	0.66%
46°52.027	88°28.157	6/25/19	PC004	9.0	764	0.00%	1.52%	43.18%	45.08%	0.00%	9.98%	0.24%
46°51.899	88°28.360	6/25/19	PC005	6.5	274	0.00%	0.00%	0.05%	64.09%	0.01%	34.73%	1.12%
46°51.817	88°28.734	5/30/19	#1A MM	B	1169	3.54%	19.31%	40.62%	12.82%	13.60%	7.04%	3.08%
46°51.817	88°28.734	5/30/19	#1B MM	B	1116	4.93%	16.79%	42.05%	14.48%	13.65%	5.87%	2.21%
46°51.817	88°28.734	5/30/19	#1C MM	B	1224	4.42%	20.81%	41.73%	12.53%	13.22%	5.40%	1.89%
46°51.809	88°28.724	5/30/19	#2 MM	B	1167	0.00%	1.90%	84.84%	12.98%	0.28%	0.00%	0.00%
46°51.788	88°28.712	5/30/19	#4 MM	B	1470	4.34%	24.64%	53.25%	17.12%	0.59%	0.06%	0.00%
46°51.773	88°28.721	5/30/19	#3 MM	B	583	0.00%	0.71%	25.85%	53.80%	19.53%	0.11%	0.00%
46°51.705	88°28.366	6/25/19	PC006	7.0	217	0.00%	0.02%	1.11%	39.30%	0.00%	57.08%	2.48%
46°51.639	88°28.681	6/25/19	PCX001	13.9	679	0.00%	1.28%	34.13%	49.78%	14.06%	0.65%	0.09%
46°51.533	88°28.735	6/17/19	Sun#13	B	433	0.15%	0.18%	9.02%	77.35%	13.16%	0.12%	0.01%
46°51.517	88°28.6381	6/11/18	Mass 003	6.0	128	0.00%	0.00%	0.35%	2.83%	24.38%	70.67%	1.77%
46°51.502	88°28.750	6/17/19	Sun#11	B	1076	1.41%	11.78%	46.08%	37.68%	3.06%	0.00%	0.00%
46°51.469	88°28.301	6/25/19	PC008	11.0	371	0.00%	0.08%	1.68%	91.07%	0.00%	6.81%	0.37%
46°51.462	88°28.735	6/17/19	Sun#12	B	376	0.94%	0.51%	0.66%	90.57%	6.38%	0.89%	0.04%
46°51.344	88°28.665	6/17/19	Jurmu#15	B	1571	4.04%	27.38%	56.32%	12.15%	0.11%	0.00%	0.00%
46°51.224	88°28.702	6/17/19	Jurmu#14	B	457	0.00%	0.07%	9.73%	87.58%	2.62%	0.00%	0.00%
46°51.096	88°28.718	5/30/19	#5 MM	B	649	6.34%	2.99%	31.03%	36.52%	15.26%	5.15%	2.70%
46°50.714	88°28.394	6/26/19	PC017	7.0	166	0.00%	0.00%	1.11%	4.10%	50.84%	43.45%	0.50%
46°50.667	88°28.6136	6/11/18	Mass 004	7.0	143	0.00%	0.00%	0.56%	2.22%	39.53%	57.00%	0.70%
46°50.658	88°28.884	6/17/19	RR#16	B	1212	0.19%	3.30%	85.84%	10.67%	0.01%	0.00%	0.00%
46°50.528	88°28.323	6/26/19	PC016	7.8	206	0.00%	0.00%	1.37%	17.56%	50.65%	30.23%	0.19%
46°50.524	88°28.6712	6/27/19	LCT1010	3.9	116	0.00%	0.04%	0.24%	0.57%	18.61%	78.86%	1.69%
46°50.496	88°28.7175	6/27/19	LCT1009	3.1	115	0.00%	0.00%	0.06%	0.23%	22.18%	75.73%	1.82%
46°50.451	88°28.7651	6/27/19	LCT1008	2.3	168	0.00%	0.00%	0.10%	1.53%	73.96%	24.13%	0.29%
46°50.436	88°28.7934	6/27/19	LCT1007	1.8	203	0.00%	0.00%	0.03%	9.24%	88.41%	2.30%	0.01%
46°50.414	88°28.8130	6/27/19	LCT1006	1.8	265	0.00%	0.00%	0.16%	40.61%	59.09%	0.14%	0.00%
46°50.394	88°28.8521	6/27/19	LCT1003	1.5	589	0.00%	0.00%	24.77%	73.96%	1.02%	0.23%	0.01%
46°50.379	88°28.8670	6/27/19	LCT1002	1.3	626	0.00%	0.16%	28.61%	69.42%	1.68%	0.13%	0.00%
46°50.105	88°28.959	6/17/19	SRR#17	B	1144	0.86%	16.03%	40.62%	40.60%	1.89%	0.01%	0.00%
46°50.091	88°28.969	6/17/19	SRR#19	B	1134	0.25%	1.68%	81.89%	16.08%	0.11%	0.00%	0.00%
46°50.080	88°28.153	6/26/19	PC015	8.7	118	0.00%	0.00%	0.15%	0.50%	22.75%	75.52%	1.07%
46°50.064	88°28.963	6/17/19	SRR#18	B	381	0.00%	0.00%	3.58%	83.10%	13.32%	0.00%	0.00%
46°49.950	88°29.052	8/20/19	5LCR01	B	993	0.22%	3.39%	60.77%	34.66%	0.97%	0.00%	0.00%

46°49.936 88°29.059	8/20/19	5LCR02	B	869	0.00%	0.05%	56.56%	42.16%	1.23%	0.00%	0.00%
46°49.817388°28.8004	6/27/19	MLT1010	3.8	143	0.00%	0.06%	1.01%	0.96%	35.95%	60.60%	1.42%
46°49.780688°28.8484	6/27/19	MLT1009	3.4	134	0.00%	0.00%	1.30%	2.00%	21.66%	72.81%	2.22%
46°49.750988°28.8900	6/27/19	MLT1008	3.0	122	0.00%	0.04%	0.37%	0.77%	22.65%	73.38%	2.79%
46°49.734188°28.9080	6/27/19	MLT1007	2.8	140	0.00%	0.11%	0.78%	1.58%	32.51%	63.05%	1.97%
46°49.714788°28.9382	6/27/19	MLT1006	2.4	140	0.00%	0.00%	0.51%	1.93%	37.84%	57.14%	2.57%
46°49.702888°28.9494	6/27/19	MLT1005	2.1	143	0.00%	0.03%	0.49%	1.96%	40.72%	54.99%	1.82%
46°49.697588°28.9601	6/27/19	MLT1004	1.8	163	0.00%	0.00%	0.07%	0.55%	71.51%	27.51%	0.36%
46°49.684888°28.9746	6/27/19	MLT1003	1.7	184	0.00%	0.00%	0.03%	0.82%	92.92%	6.13%	0.09%
46°49.671588°28.9875	6/27/19	MLT1002	1.6	224	0.00%	0.04%	0.22%	19.03%	78.49%	2.06%	0.17%
46°49.667088°28.9998	6/27/19	MLT1001	1.4	228	0.00%	0.00%	0.25%	23.01%	71.42%	5.03%	0.29%
46°49.544188°28.6782	6/11/18	Mass 005	6.5	137	0.00%	0.02%	0.55%	1.89%	33.44%	63.37%	0.72%
46°49.553 88°28.960	6/13/19	PMII9	B	376	0.00%	0.09%	3.46%	79.79%	16.62%	0.04%	0.00%
46°49.528088°28.7631	6/11/18	Mass 006	5.5	153	0.00%	0.00%	0.28%	0.92%	57.21%	40.28%	1.31%
46°49.503 88°28.916	6/13/19	PMIBA	B	431	0.00%	0.00%	8.85%	79.89%	11.26%	0.00%	0.00%
46°49.502 88°28.929	6/13/19	PM#88	B	547	0.00%	0.07%	22.05%	65.77%	11.95%	0.15%	0.00%
46°49.498888°28.8429	6/11/18	Mass 007	4.5	291	0.00%	0.21%	3.01%	38.02%	53.17%	5.45%	0.14%
46°49.497 88°28.945	6/13/19	PMIIBC	B	885	0.00%	8.25%	37.75%	34.65%	19.04%	0.18%	0.13%
46°49.491 88°28.945	7/5/18	AT-2	B	957	0.00%	4.50%	55.42%	29.28%	10.44%	0.27%	0.09%
46°49.491 88°28.898	7/5/18	AT-4	B	442	0.00%	1.32%	8.56%	67.75%	21.56%	0.76%	0.06%
46°49.490 88°28.924	7/5/18	AT-3	B	1111	0.00%	8.43%	60.71%	22.01%	8.77%	0.06%	0.02%
46°49.481 88°28.902	7/5/18	AT-1	B	749	0.00%	0.03%	44.50%	46.88%	8.32%	0.17%	0.10%
46°49.451788°28.6567	6/27/19	MLT2009	3.7	136	0.00%	0.00%	0.42%	0.54%	38.91%	59.15%	0.97%
46°49.428 88°28.885	6/13/19	PMW7	B	784	0.49%	3.25%	39.59%	45.34%	11.32%	0.02%	0.00%
46°49.419 88°28.904	7/5/18	AT-5	B	629	0.26%	2.77%	24.23%	57.20%	15.27%	0.28%	0.00%
46°49.401788°28.7283	6/27/19	MLT2007	2.6	149	0.00%	0.01%	0.41%	0.85%	51.72%	46.00%	1.02%
46°49.377088°28.7627	6/27/19	MLT2005	1.8	213	0.00%	0.00%	0.15%	14.45%	82.28%	3.04%	0.07%
46°49.356788°28.7883	6/27/19	MLT2003	1.6	227	0.00%	0.00%	0.60%	20.80%	72.65%	5.87%	0.08%
46°49.348 88°28.879	6/13/19	HW41#6	B	259	0.00%	0.00%	1.83%	28.44%	68.00%	1.73%	0.01%
46°49.336788°28.8167	6/27/19	MLT2001	2.0	241	0.00%	0.19%	0.86%	23.13%	71.05%	4.63%	0.14%
46°49.238 88°28.786	6/13/19	HW41#4	B	779	0.00%	0.19%	45.72%	53.79%	0.30%	0.00%	0.00%
46°49.238 88°28.787	6/13/19	HW41#5	B	278	0.00%	0.00%	0.63%	45.18%	53.75%	0.44%	0.00%
46°49.177 88°28.739	6/13/19	HW41#3	B	1245	0.21%	10.11%	70.07%	15.47%	4.15%	0.00%	0.00%
46°49.156788°28.4417	6/27/19	MLT3009	5.4	169	0.00%	0.01%	1.50%	4.72%	47.87%	45.36%	0.55%
46°49.108388°28.4850	6/27/19	MLT3007	3.9	145	0.00%	0.00%	0.39%	3.02%	40.90%	54.30%	1.38%
46°49.096 88°28.667	6/13/19	HW41#2A	B	1563	3.09%	42.58%	11.52%	32.50%	10.32%	0.00%	0.00%
46°49.096 88°28.667	6/13/19	HW41#2B	B	1868	1.45%	38.93%	54.79%	3.16%	1.67%	0.00%	0.00%
46°49.081688°28.5200	6/27/19	MLT3005	2.8	173	0.00%	0.08%	0.66%	2.61%	66.90%	28.91%	0.84%
46°49.062 88°28.634	6/13/19	HW41#1B	B	1565	0.42%	19.32%	78.33%	1.56%	0.37%	0.00%	0.00%
46°49.062 88°28.634	6/13/19	HW41#1A	B	1797	12.30%	53.74%	7.29%	23.15%	3.52%	0.00%	0.00%
46°49.061788°28.5467	6/27/19	MLT3003	2.1	189	0.00%	0.01%	0.45%	8.07%	71.65%	19.63%	0.19%
46°49.041788°28.5750	6/27/19	MLT3001	3.0	267	0.00%	0.08%	2.83%	33.22%	48.31%	13.95%	1.60%
46°48.995 88°28.263	8/29/19	AST1010	5.2	227	0.00%	0.75%	4.12%	3.23%	58.79%	32.76%	0.35%
46°48.964 88°28.187	8/29/19	AST1009	4.8	163	0.00%	0.07%	1.46%	2.37%	46.71%	48.89%	0.50%
46°48.936 88°28.314	8/29/19	AST1007	4.5	145	0.00%	0.04%	0.66%	2.04%	39.51%	56.82%	0.93%
46°48.909 88°28.332	8/29/19	AST1006	3.9	131	0.00%	0.05%	0.26%	0.58%	34.32%	63.24%	1.55%
46°48.893 88°28.348	8/29/19	AST1005	3.4	167	0.00%	0.13%	0.79%	2.96%	55.32%	40.04%	0.76%
46°48.876 88°28.361	8/29/19	AST1003	2.7	172	0.00%	0.00%	0.30%	1.72%	74.98%	22.61%	0.40%
46°48.865 88°28.370	8/29/19	AST1002	2.3	178	0.00%	0.00%	0.39%	3.06%	75.98%	20.38%	0.20%
46°48.853 88°28.377	8/29/19	AST1001	2.1	203	0.00%	0.00%	0.20%	9.95%	84.02%	5.78%	0.06%
46°48.772 88°28.081	8/29/19	AST2010	7.5	176	0.00%	0.54%	2.35%	2.86%	33.33%	60.43%	0.48%



46°48.738	88°28.107	8/29/19	AST2009	6.4	166	0.00%	0.20%	0.92%	1.72%	54.82%	41.73%	0.62%
46°48.704	88°28.164	8/29/19	AST2007	5.2	128	0.00%	0.06%	0.18%	0.69%	30.34%	67.48%	1.24%
46°48.675	88°28.195	8/29/19	AST2006	4.9	127	0.00%	0.03%	0.08%	0.21%	32.89%	65.64%	1.14%
46°48.637	88°28.240	8/29/19	AST2005	4.6	127	0.00%	0.05%	0.14%	0.18%	31.78%	66.36%	1.49%
46°48.606	88°28.288	8/29/19	AST2003	2.2	181	0.00%	0.02%	0.23%	3.43%	78.97%	17.13%	0.22%
46°48.591	88°28.309	8/29/19	AST2002	2.7	179	0.00%	0.00%	0.10%	1.96%	83.97%	13.78%	0.19%
46°48.572	88°28.341	8/29/19	AST2001	3.6	359	1.30%	2.00%	10.63%	13.73%	51.68%	15.89%	4.77%
46°48.566	88°28.422	7/5/18	AT-6	B	1166	0.00%	11.67%	57.09%	23.76%	6.65%	0.49%	0.35%
46°48.562	88°28.417	7/5/18	AT-7	B	1087	0.70%	5.99%	64.40%	25.39%	3.47%	0.02%	0.02%
46°48.560	88°28.423	7/5/18	AT-9	B	716	0.00%	1.02%	39.25%	44.40%	15.23%	0.07%	0.02%
46°48.552	88°28.424	7/5/18	AT-10	B	391	0.00%	0.04%	10.18%	50.41%	38.51%	0.84%	0.01%
46°48.495	88°28.451	7/5/18	AT-8	B	568	0.00%	0.81%	23.42%	58.25%	17.47%	0.05%	0.00%
46°48.463688°28.2560	6/27/19	SPT1009	3.0	145	0.00%	0.00%	0.09%	0.20%	53.68%	44.32%	1.71%	
46°48.440	88°28.430	7/5/18	AT-9A	B	1109	0.66%	16.65%	39.66%	18.07%	23.85%	1.02%	0.10%
46°48.414188°28.3167	6/27/19	SPT1007	3.1	648	0.00%	1.79%	31.52%	41.52%	22.85%	1.69%	0.63%	
46°48.387	88°28.350	6/27/19	SPT1005	2.7	259	0.00%	0.07%	2.87%	28.90%	53.30%	12.88%	1.97%
46°48.367	88°28.378	6/27/19	SPT1003	1.7	275	0.00%	0.49%	2.71%	26.22%	65.51%	4.92%	0.14%
46°48.347	88°28.405	6/27/19	SPT1001	0.6	694	0.00%	6.88%	20.72%	49.83%	22.37%	0.17%	0.03%
46°48.314	88°28.189	8/14/19	SPT6010	3.5	166	0.00%	0.14%	0.62%	0.73%	63.38%	33.55%	1.57%
46°48.284	88°28.254	8/14/19	SPT6008	2.3	519	0.00%	0.03%	18.87%	69.95%	9.93%	0.99%	0.22%
46°48.276	88°28.282	8/14/19	SPT6007	2.4	400	0.00%	0.02%	12.51%	43.10%	42.88%	1.27%	0.22%
46°48.244	88°28.302	8/14/19	SPT6003	2.2	238	0.00%	0.00%	1.51%	19.13%	77.81%	1.51%	0.03%
46°48.244	88°28.286	8/14/19	SPT6006	2.3	217	0.00%	0.02%	0.55%	13.90%	82.57%	2.79%	0.18%
46°48.235688°28.1480	6/27/19	SPT2009	3.9	120	0.00%	0.00%	0.08%	0.17%	27.85%	69.28%	2.63%	
46°48.233	88°28.307	8/14/19	SPT6002	1.7	212	0.00%	0.00%	0.70%	10.39%	86.37%	2.49%	0.05%
46°48.197	88°28.332	8/14/19	SPT6001	0.9	385	0.00%	0.50%	6.44%	61.47%	31.45%	0.14%	0.00%
46°48.186588~28.2228	6/27/19	SPT2007	2.2	191	0.00%	0.00%	0.39%	3.44%	88.41%	7.64%	0.12%	
46°48.159988°28.2519	6/27/19	SPT2005	2.9	605	0.00%	5.50%	19.38%	31.58%	40.95%	2.36%	0.23%	
46°48.147788°27.8071	6/11/18	Mass 008	15.5	110	0.00%	0.00%	0.16%	0.90%	15.20%	78.96%	4.78%	
46°48.143988°28.2719	6/27/19	SPT2003	1.5	246	0.00%	0.57%	6.43%	27.83%	61.61%	3.48%	0.08%	
46°48.124	88°28.326	7/3/19	SP16	B	493	0.00%	0.09%	13.83%	83.30%	2.77%	0.01%	0.00%
46°48.121888°28.2790	6/27/19	SPT2001	1.2	299	0.00%	0.22%	2.51%	42.29%	54.68%	0.30%	0.00%	
46°48.119	88°28.330	7/3/19	SP17	B	414	0.00%	0.03%	9.23%	67.95%	22.61%	0.18%	0.00%
46°48.108388°27.9366	6/11/18	Mass 009	7.5	124	0.00%	0.21%	0.10%	2.14%	18.83%	77.20%	1.52%	
46°48.080	88°28.293	7/3/19	SP15	B	393	0.00%	0.04%	7.58%	65.79%	26.57%	0.02%	0.00%
46°48.079	88°27.914	8/14/19	SPT7010	4.9	126	0.00%	0.00%	1.20%	1.78%	14.95%	80.99%	1.09%
46°48.056	88°28.294	7/3/19	SP18	B	1115	0.00%	7.07%	63.43%	29.29%	0.19%	0.03%	0.00%
46°48.034	88°27.984	8/14/19	SPT7009	4.0	122	0.00%	0.00%	0.13%	0.51%	27.67%	69.29%	2.41%
46°48.030	88°28.252	7/3/19	SP14	B	399	0.00%	0.04%	5.88%	78.79%	15.28%	0.00%	0.00%
46°48.029288°28.1889	6/11/18	Mass 010	4.5	279	0.26%	0.89%	3.05%	20.74%	69.98%	4.79%	0.28%	
46°48.017	88°28.431	7/10/18	Sand Point	B	424	0.00%	0.21%	9.32%	70.51%	19.53%	0.32%	0.10%
46°47.988	88°28.217	7/3/19	SP13	B	992	0.14%	1.65%	65.70%	32.19%	0.32%	0.00%	0.00%
46°47.974	88°28.046	8/14/19	SPT7007	2.9	246	0.00%	0.07%	0.91%	27.37%	67.17%	4.43%	0.05%
46°47.962	88°28.082	8/14/19	SPT7005	2.1	969	1.52%	10.64%	42.23%	20.91%	22.25%	1.43%	1.01%
46°47.961	88°28.052	8/14/19	SPT7006	1.7	246	0.00%	0.00%	0.47%	28.82%	69.73%	0.93%	0.06%
46°47.938	88°28.180	7/3/19	SP12	B	643	0.13%	2.07%	26.22%	63.27%	8.27%	0.04%	0.00%
46°47.936	88°28.187	7/3/19	SP19	B	541	0.00%	0.03%	23.15%	57.22%	19.49%	0.07%	0.04%
46°47.936	88°28.098	8/14/19	SPT7003	1.7	522	0.00%	0.73%	23.13%	36.83%	38.69%	0.59%	0.03%
46°47.932	88°28.122	8/14/19	SPT7002	0.9	319	0.00%	0.00%	1.68%	60.94%	37.13%	0.25%	0.00%
46°47.913	88°28.120	8/14/19	SPT7001	0.8	334	0.00%	0.45%	3.79%	49.99%	45.46%	0.31%	0.00%
46°47.918	88°27.795	8/14/19	SPT8010	5.1	113	0.00%	0.00%	0.07%	0.29%	19.59%	78.80%	1.24%

46°47.899	88°28.136	7/3/19	SP11	B	751	0.00%	0.67%	42.16%	51.44%	5.73%	0.00%	0.00%
46°47.880	88°27.843	8/14/19	SPT8009	4.3	138	0.00%	0.01%	0.23%	0.55%	43.50%	53.12%	2.59%
46°47.865	88°28.109	9/12/19	SPS#005	B	369	0.00%	0.01%	2.72%	81.06%	16.19%	0.02%	0.00%
46°47.853	88°27.840	8/14/19	SPT8008	3.2	188	0.00%	0.14%	1.98%	3.57%	61.23%	32.27%	0.80%
46°47.834	88°27.893	8/14/19	SPT8007	2.8	207	0.00%	0.00%	1.81%	6.14%	80.76%	10.84%	0.46%
46°47.804	88°27.957	8/14/19	SPT8006	2.7	289	0.00%	0.05%	2.94%	37.46%	57.75%	1.72%	0.08%
46°47.795	88°28.051	9/12/19	SPS#006	B	375	0.00%	0.03%	3.60%	78.95%	17.40%	0.02%	0.00%
46°47.791488°27.7760	6/11/18	Mass 011	7.0	157	0.00%	0.01%	0.21%	1.05%	62.18%	35.52%	1.03%	
46°47.785	88°27.955	8/14/19	SPT8005	2.4	397	0.00%	0.24%	11.62%	43.26%	43.57%	1.28%	0.04%
46°47.783	88°27.946	8/14/19	SPT8004	2.2	369	0.14%	0.38%	8.65%	42.75%	46.61%	1.41%	0.05%
46°47.779	88°27.953	8/14/19	SPT8003	2.1	320	0.00%	0.19%	5.42%	38.13%	53.99%	2.15%	0.12%
46°47.758	88°27.955	8/14/19	SPT8002	1.5	276	0.00%	0.00%	0.36%	45.40%	53.28%	0.95%	0.01%
46°47.751	88°27.957	8/14/19	SPT8001	1.2	273	0.00%	0.00%	0.49%	29.17%	69.18%	1.12%	0.04%
46°47.739188°27.7183	6/27/19	SPT4009	4.3	114	0.00%	0.00%	0.06%	0.41%	22.74%	69.88%	6.91%	
46°47.728	88°27.992	9/12/19	SPS#007	B	400	0.00%	0.17%	6.82%	72.13%	20.83%	0.04%	0.03%
46°47.691888°27.7851	6/27/19	SPT4007	2.7	215	0.00%	1.60%	0.90%	0.21%	68.37%	28.34%	0.59%	
46°47.677	88°27.931	9/12/19	SPS#008	B	351	0.00%	0.00%	2.38%	73.57%	23.98%	0.04%	0.03%
46°47.670288°27.8160	6/27/19	SPT4005	1.9	192	0.00%	0.00%	0.05%	4.08%	91.41%	4.37%	0.08%	
46°47.650788°27.8482	6/27/19	SPT4003	3.0	217	0.00%	0.00%	0.52%	16.54%	75.47%	6.83%	0.64%	
46°47.648788°27.7888	6/11/18	Mass 012	4.0	206	0.00%	0.00%	0.47%	9.30%	86.19%	3.97%	0.07%	
46°47.628488°27.8510	6/27/19	SPT4001	1.7	223	0.00%	0.00%	0.80%	15.17%	82.16%	1.83%	0.04%	
46°47.567	88°27.844	8/20/19	NLH16	B	947	0.00%	2.06%	59.57%	36.48%	1.89%	0.01%	0.00%
46°47.540088°27.6898	6/27/19	SPT5007	3.6	197	0.00%	0.07%	1.03%	5.03%	80.40%	12.46%	1.01%	
46°47.534	88°27.842	7/5/18	AT-18	B	755	0.00%	2.36%	38.36%	49.62%	9.63%	0.02%	0.00%
46°47.523388°27.7134	6/27/19	SPT5006	2.4	172	0.00%	0.05%	0.42%	1.41%	73.32%	23.94%	0.87%	
46°47.510288°27.7241	6/27/19	SPT5005	2.8	178	0.00%	0.00%	0.14%	1.77%	83.76%	13.14%	1.19%	
46°47.504	88°27.829	8/20/19	NLH15	B	990	0.00%	2.88%	61.71%	35.32%	0.09%	0.00%	0.00%
46°47.503488°27.7349	6/27/19	SPT5004	3.3	233	0.00%	0.05%	1.27%	19.03%	74.33%	4.67%	0.65%	
46°47.494088°27.7551	6/27/19	SPT5003	2.6	198	0.00%	0.00%	0.28%	7.57%	85.51%	6.47%	0.16%	
46°47.481488°27.7649	6/27/19	SPT5002	2.0	191	0.00%	0.00%	0.29%	3.67%	88.80%	7.13%	0.11%	
46°47.472888°27.7725	6/27/19	SPT5001	1.2	238	0.00%	0.17%	1.33%	17.78%	79.15%	1.56%	0.01%	
46°47.454	88°27.773	8/20/19	NLH14	B	709	0.00%	1.73%	34.02%	59.51%	4.74%	0.00%	0.00%
46°47.450	88°27.789	7/5/18	AT-11	B	2126	0.09%	60.74%	18.14%	20.16%	0.86%	0.01%	0.00%
46°47.411	88°27.737	8/20/19	NLH13	B	950	0.29%	4.96%	51.09%	43.10%	0.56%	0.00%	0.00%
46°47.376	88°27.704	8/20/19	NLH12	B	739	0.00%	0.63%	40.39%	55.99%	3.00%	0.00%	0.00%
46°47.337	88°27.723	8/20/19	NLH11	B	1097	0.24%	5.46%	66.55%	26.17%	1.48%	0.10%	0.00%
46°47.303	88°27.755	8/20/19	NLH10	B	884	0.30%	3.13%	52.52%	27.92%	15.31%	0.80%	0.01%
46°47.264	88°27.723	8/20/19	NLH09	B	910	0.18%	0.99%	58.54%	38.92%	1.34%	0.02%	0.00%
46°47.226	88°27.747	8/20/19	NLH08	B	726	0.10%	2.32%	35.57%	51.20%	10.69%	0.10%	0.02%
46°47.199	88°27.753	8/20/19	NLH07	B	1146	0.00%	3.90%	77.19%	15.50%	3.38%	0.02%	0.00%
46°47.171	88°27.778	8/20/19	NLH06	B	1886	1.29%	37.38%	61.11%	0.17%	0.04%	0.00%	0.00%
46°47.161	88°27.783	8/20/19	NLH05	B	726	0.28%	7.15%	23.99%	44.94%	22.69%	0.82%	0.13%
46°47.128	88°27.778	8/20/19	NLH04	B	748	0.48%	5.33%	31.11%	43.37%	19.67%	0.04%	0.00%
46°47.107	88°27.868	8/20/19	NLH03	B	491	1.14%	3.26%	10.97%	52.26%	32.33%	0.05%	0.00%
46°47.079	88°27.912	8/20/19	NLH02	B	879	0.12%	9.95%	37.32%	8.29%	44.25%	0.08%	0.00%
46°47.070	88°27.946	8/20/19	NLH01	B	321	0.00%	0.05%	1.59%	36.23%	61.55%	0.58%	0.00%
46°47.060	88°27.973	7/5/18	AT-12	B	316	0.00%	0.00%	1.61%	59.42%	38.43%	0.49%	0.03%
46°47.036	88°27.989	7/3/19	SP01	B	476	0.00%	0.17%	14.45%	69.75%	15.57%	0.07%	0.00%
46°47.033	88°27.995	7/3/19	SPO2	B	636	0.00%	1.43%	27.97%	59.16%	11.43%	0.02%	0.00%
46°47.000	88°28.009	7/3/19	5P03	B	436	0.57%	0.50%	10.01%	69.16%	19.71%	0.06%	0.00%
46°46.996	88°28.009	7/5/18	AT-13	B	315	0.00%	0.02%	1.78%	58.22%	38.77%	1.20%	0.00%

46°46.988	88°28.010	7/3/19	SP04	B	370	0.00%	0.02%	3.82%	75.64%	20.50%	0.02%	0.00%
46°46.972	88°28.032	7/5/18	AT-14	B	609	0.00%	0.00%	27.41%	69.69%	2.90%	0.01%	0.00%
46°46.964	88°28.032	7/3/19	SP05	B	390	0.00%	0.00%	4.58%	81.82%	13.60%	0.00%	0.00%
46°46.962	88°28.050	7/3/19	SP06	B	416	0.00%	0.00%	8.57%	73.45%	17.97%	0.01%	0.00%
46°46.948	88°28.062	7/3/19	SP07	B	450	0.00%	0.24%	9.93%	79.90%	9.91%	0.02%	0.00%
46°46.945	88°28.076	7/3/19	SP08	B	403	0.00%	0.00%	4.91%	87.02%	8.07%	0.00%	0.00%
46°46.940	88°28.103	7/3/19	SP09	B	420	0.00%	0.04%	6.12%	88.77%	5.05%	0.02%	0.00%
46°46.931	88°28.121	9/12/19	CB#001	B	331	0.00%	0.00%	0.10%	76.07%	23.58%	0.24%	0.00%
46°46.921	88°28.133	9/12/19	CB#002	B	330	0.00%	0.00%	0.05%	75.91%	24.02%	0.02%	0.00%
46°46.903	88°28.156	9/12/19	CB#003	B	346	0.00%	0.00%	2.00%	73.21%	24.42%	0.36%	0.02%
46°46.832	88°28.204	9/12/19	CB#004	B	293	0.00%	0.01%	0.48%	53.48%	45.78%	0.25%	0.00%

**Table S4.** Manganese adjustment for %SS and copper concentrations in beach & underwater samples. Mn given as % of SS, then converted into Cu adjustment. Top table is for Beach samples (5.7 % SS %mean adjustment; SD =1.0; 171.5 Cu conc correction); bottom is for underwater samples (3.1% SS %adjustment; SD = 0.8; 93.4 Cu conc correction).

Latitude North	Longitude West	Date	Station	Depth (m)	%SS	%SS Adjusted for Mn	Cu Conc.	Cu Conc. Adjusted for Mn	Cu Conc. error (Mn reduction)	%Mn Mean
46°51.817	88°28.734	5/30/19	#1A MM	Beach	64.1	63.3	1923	1898	25	0.8
46°51.817	88°28.734	5/30/19	#1C MM	Beach	65.2	65.2	1956	1956	0	0.0
46°51.809	88°28.724	5/30/19	#2 MM	Beach	70.9	70.9	2127	2127	0	0.0
46°51.502	88°28.750	6/17/19	Sun#11	Beach	30.9	30.7	927	922	5	0.2
46°51.344	88°28.665	6/17/19	Jurmu#15	Beach	79	79.0	2370	2370	0	0.0
46°50.105	88°28.959	6/17/19	SRR#17	Beach	30.4	30.3	912	910	2	0.1
46°49.950	88°29.052	8/20/19	SLCR01	Beach	33.5	33.0	1005	991	14	0.5
46°49.503	88°28.916	6/13/19	PM#8A	Beach	22.2	21.8	666	654	12	0.4
46°49.491	88°28.945	7/5/18	AT-2	Beach	44.2	42.6	1326	1279	47	1.6
46°49.428	88°28.885	6/13/19	PM#7	Beach	38.4	36.9	1152	1106	46	1.5
46°49.238	88°28.787	6/13/19	HW41#5	Beach	34.7	26.6	1041	797	244	8.1
46°49.177	88°28.739	6/13/19	HW41#3	Beach	37.8	37.7	1134	1131	3	0.1
46°49.062	88°28.634	6/13/19	HW41#1	Beach	68.7	68.7	2061	2061	0	0.0
46°49.062	88°28.634	6/13/19	HW41#1/	Beach	37.6	37.6	1128	1128	0	0.0
46°48.552	88°28.424	7/5/18	AT-10	Beach	65.5	26.9	1965	807	1158	38.6
46°48.440	88°28.430	7/5/18	AT-9A	Beach	69.6	21.3	2088	638	1450	48.3
46°48.119	88°28.330	7/3/19	SP17	Beach	50.9	46.2	1527	1386	141	4.7
46°48.056	88°28.294	7/3/19	SP18	Beach	59.4	54.0	1782	1620	162	5.4
46°47.988	88°28.217	7/3/19	SP13	Beach	54.4	54.1	1632	1623	9	0.3
46°47.938	88°28.180	7/3/19	SP12	Beach	48.5	47.3	1455	1418	37	1.2
46°47.936	88°28.187	7/3/19	SP19	Beach	44.5	43.6	1335	1307	28	0.9
46°47.865	88°28.109	9/12/19	SPS#005	Beach	50.2	49.2	1506	1476	30	1.0
46°47.795	88°28.051	9/12/19	SPS#006	Beach	48.9	46.7	1467	1400	67	2.2
46°47.534	88°27.842	7/5/18	AT-18	Beach	51.9	51.1	1557	1532	25	0.8
46°47.454	88°27.773	8/20/19	NLH14	Beach	41.1	39.7	1233	1192	41	1.4
46°47.450	88°27.789	7/5/18	AT-11	Beach	62.8	62.8	1884	1884	0	0.0
46°47.264	88°27.723	8/20/19	NLH09	Beach	55.7	55.4	1671	1661	10	0.3
46°47.226	88°27.747	8/20/19	NLH08	Beach	35.7	35.3	1071	1059	12	0.4
46°47.128	88°27.778	8/20/19	NLH04	Beach	26.2	26.1	786	783	3	0.1
46°47.060	88°27.973	7/5/18	AT-12	Beach	20.4	9.5	612	286	326	10.9
46°47.033	88°27.995	7/3/19	SPO2	Beach	14	11.1	420	334	86	2.9
46°46.996	88°28.009	7/5/18	AT-13	Beach	54.4	4.3	1632	128	1504	50.1
46°49.8173	88°28.8004	6/27/19	MLT1010	3.8	19	7.2	570	216	354	11.8
46°49.7806	88°28.8484	6/27/19	MLT1009	3.4	23.9	8.4	717	252	465	15.5
46°49.7147	88°28.9382	6/27/19	MLT1006	2.4	14.4	7.4	432	222	210	7.0
46°49.6975	88°28.9601	6/27/19	MLT1004	1.8	10.7	7.0	321	211	110	3.7
46°49.6848	88°28.9746	6/27/19	MLT1003	1.7	10.1	8.9	303	268	35	1.2
46°49.4988	88°28.8429	6/11/18	Mass 007	4.5	19.7	18.4	591	551	40	1.3
46°49.3567	88°28.7883	6/27/19	MLT2003	1.6	18	16.0	540	480	60	2.0
46°49.3367	88°28.8167	6/27/19	MLT2001	2.0	24.6	22.8	738	683	55	1.8
46°49.1083	88°28.4850	6/27/19	MLT3007	3.9	12.4	8.4	372	253	119	4.0
46°49.0617	88°28.5467	6/27/19	MLT3003	2.1	18.9	14.4	567	432	135	4.5



46°49.0417	88°28.5750	6/27/19	MLT3001	3.0	18.3	17.2	549	517	32	1.1
46°48.4141	88°28.3167	6/27/19	SPT1007	3.1	30.6	29.8	918	893	25	0.8
46°48.367	88°28.378	6/27/19	SPT1003	1.7	24.5	23.7	735	711	24	0.8
46°48.347	88°28.405	6/27/19	SPT1001	0.6	37.7	36.9	1131	1106	25	0.8
46°48.284	88°28.254	8/14/19	SPT6008	2.3	17.7	17.6	531	527	4	0.1
46°48.244	88°28.302	8/14/19	SPT6003	2.2	26.6	25.8	798	773	25	0.8
46°48.2356	88°28.1480	6/27/19	SPT2009	3.9	12.2	8.8	366	265	101	3.4
46°48.197	88°28.332	8/14/19	SPT6001	0.9	37.9	37.1	1137	1114	23	0.8
46°48.1083	88°27.9366	6/11/18	Mass 009	7.5	12.4	7.0	372	211	161	5.4
46°48.0292	88°28.1889	6/11/18	Mass 010	4.5	23.4	21.5	702	644	58	1.9
46°47.962	88°28.082	8/14/19	SPT7005	2.1	21.8	20.5	654	614	40	1.3
46°47.932	88°28.122	8/14/19	SPT7002	0.9	31.5	30.8	945	925	20	0.7
46°47.913	88°28.120	8/14/19	SPT7001	0.8	32.5	30.8	975	925	50	1.7
46°47.758	88°27.955	8/14/19	SPT8002	1.5	25.3	22.9	759	687	72	2.4
46°47.6702	88°27.8160	6/27/19	SPT4005	1.9	18.6	17.1	558	512	46	1.5
46°47.6507	88°27.8482	6/27/19	SPT4003	3.0	23.8	21.5	714	644	70	2.3
46°47.5233	88°27.7134	6/27/19	SPT5006	2.4	20	15.7	600	470	130	4.3
46°47.5102	88°27.7241	6/27/19	SPT5005	2.8	14.4	11.9	432	358	74	2.5
46°47.4814	88°27.7649	6/27/19	SPT5002	2.0	24.5	19.7	735	590	145	4.8
46°47.4728	88°27.7725	6/27/19	SPT5001	1.2	22.2	19.1	666	572	94	3.1