

**GOOD NEWS AND BAD NEWS IN TWO HIGHLY INDUSTRIALIZED PUGET SOUND,
WASHINGTON (U.S.A.) EMBAYMENTS**

RUTH A. MARTIN* AND ELIZABETH A. NESBITT

APPENDIX 2. Supplementary Table. Statistical analyses of data from Commencement and Elliott Bays.
1A. Commencement Bay. 1B. Elliott Bay.

COMMENCEMENT BAY

ANOVA

Shannon Index

	<i>Df</i>	<i>Sum Sq</i>	<i>Mean Sq</i>	<i>F value</i>	<i>Pr(>F)</i>
Factor (Year)	3	2.233	0.7442	1.816	0.154
Residuals	60	24.594	0.4099		

Tukey multiple comparison of means

95% family-wise confidence level

	<i>diff</i>	<i>lwr</i>	<i>upr</i>	<i>P adj</i>
1999-1978	-0.45896104	-1.1931316	0.2752095	0.3579880
2008-1978	-0.43380952	-1.2082268	0.3406078	0.4556102
2014-1978	-0.10214286	-0.8451213	0.6408356	0.9834421
2008-1999	0.02515152	-0.5413515	0.5916545	0.9994158
2014-1999	0.35681818	-0.1658868	0.8795232	0.2816340
2014-2008	0.33166667	-0.2462054	0.9095388	0.4340825

Species Richness

	<i>Df</i>	<i>Sum Sq</i>	<i>Mean Sq</i>	<i>F value</i>	<i>Pr(>F)</i>
Factor (Year)	3	348.7	116.23	6.794	0.000477 **
Residuals	64	1094.8	17.11		

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Tukey

	<i>diff</i>	<i>lwr</i>	<i>upr</i>	<i>P adj</i>
1999-1978	-6.335404	-11.0449753	-1.625832	0.0039843
2008-1978	-7.412698	-12.2724990	-2.552989	0.0008685
2014-1978	-3.757143	-8.5484232	1.034137	0.1745221
2008-1999	-1.077295	-4.5107031	2.356114	0.8411432
2014-1999	2.578261	-0.7574548	5.913977	0.1847319
2014-2008	3.655556	0.1108982	7.200213	0.0407573

Density

	<i>Df</i>	<i>Sum Sq</i>	<i>Mean Sq</i>	<i>F value</i>	<i>Pr(>F)</i>
Factor (Year)	2	7966	3983	3.4	0.0403 *
Residuals	57	66784	1172		

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Tukey multiple comparison of means

95% family-wise confidence level

	<i>diff</i>	<i>lwr</i>	<i>upr</i>	<i>P adj</i>
2008-1999	-5.697323	-31.8762403	20.48159	0.8600846
2014-1999	21.381455	-4.0673614	46.83027	0.1161842
2014-2008	27.078778	0.3173166	53.84024	0.0467532

Martin and Nesbitt Supplementary Table 1

Agglutinates

	<i>Df</i>	<i>Sum Sq</i>	<i>Mean Sq</i>	<i>F value</i>	<i>Pr(>F)</i>
Factor (Year)	3	5141	1713.6	1.987	0.126
Residuals	60	51743	862.4		

Tukey multiple comparison of means

95% family-wise confidence level

	<i>diff</i>	<i>lwr</i>	<i>upr</i>	<i>P adj</i>
1999-1978	9.406299	-24.26881	43.081408	0.8813156
2008-1978	20.827238	-14.69392	56.348392	0.4150645
2014-1978	-2.511429	-36.59054	31.567681	0.9973542
2008-1999	11.420939	-14.56355	37.405433	0.6532127
2014-1999	-11.917727	-35.89328	12.057828	0.5580607
2014-2008	-23.338667	-49.84464	3.167307	0.1033344

Dissolution

	<i>Df</i>	<i>Sum Sq</i>	<i>Mean Sq</i>	<i>F value</i>	<i>Pr(>F)</i>
Factor (Year)	3	1136	378.8	1.41	0.249
Residuals	57	15308	268.6		

Tukey multiple comparison of means

95% family-wise confidence level

	<i>diff</i>	<i>lwr</i>	<i>upr</i>	<i>P adj</i>
1999-1978	6.284740	-12.535753	25.10523	0.8132711
2008-1978	14.662619	-5.964070	35.28931	0.2475040
2014-1978	10.331286	-8.714997	29.37757	0.4828623
2008-1999	8.377879	-7.1864321	23.94219	0.4895551
2014-1999	4.046545	-9.353018	17.44611	0.8544843
2014-2008	-4.331333	-20.167925	11.50526	0.8871858

REGRESSIONS

Species Richness

As

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-7.2075	-3.0830	-0.0822	3.0371	7.8539

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	7.27347	0.79644	9.133	6.87e-13 ***
As	-0.02588	0.07145	-0.362	0.718

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3.912 on 59 degrees of freedom

Multiple R-squared: 0.002219

Adjusted R-squared: -0.01469

F-statistic: 0.1312 on 1 and 59 DF

p-value: 0.7185

Cd

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-7.0426	-3.0179	-0.1659	2.9986	8.0150

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	6.9439	0.6494	10.693	1.97e-15 ***
Cd	0.4112	1.6129	0.255	0.8

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3.914 on 59 degrees of freedom

Multiple R-squared: 0.001101

Adjusted R-squared: -0.01583

F-statistic: 0.06501 on 1 and 59 DF

p-value: 0.7996

Hg

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-7.1349	-3.1022	-0.1022	3.0024	7.8781

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	7.1480	0.6554	10.907	9.01e-16 ***
Hg	-0.6539	2.7940	-0.234	0.816

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3.914 on 59 degrees of freedom

Multiple R-squared: 0.0009275

Adjusted R-squared: -0.01601

F-statistic: 0.05477 on 1 and 59 DF

p-value: 0.8158

Pb

Residuals:

Martin and Nesbitt Supplementary Table 1

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-7.1837	-3.1644	-0.0999	2.8596	7.8235

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	7.191305	0.600184	11.982	<2e-16 ***
Pb	-0.002261	0.012804	-0.177	0.86

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3.892 on 58 degrees of freedom

Multiple R-squared: 0.0005373

Adjusted R-squared: -0.01669

F-statistic: 0.03118 on 1 and 58 DF

p-value: 0.8605

Zn

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-7.1939	-3.1048	-0.0991	2.9245	7.8520

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	7.280321	0.754639	9.647	9.69e-14 ***
Zn	-0.003759	0.009182	-0.409	0.684

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3.911 on 59 degrees of freedom

Multiple R-squared: 0.002833

Adjusted R-squared: -0.01407

F-statistic: 0.1676 on 1 and 59 DF

p-value: 0.6837

Shannon Index

As

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-1.54621	-0.33186	0.03564	0.46204	1.02571

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	2.15939	0.13384	16.135	<2e-16 ***
As	-0.02887	0.01167	-2.474	0.0165 *

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.6279 on 55 degrees of freedom

Multiple R-squared: 0.1001

Adjusted R-squared: 0.08377

F-statistic: 6.12 on 1 and 55 DF

p-value: 0.01648

Cd

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-1.4934	-0.3697	0.1173	0.4555	0.9810

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
--	-----------------	-------------------	----------------	--------------------

Martin and Nesbitt Supplementary Table 1

(Intercept)	1.9728	0.1132	17.428	<2e-16 ***
Cd	-0.2737	0.2728	-1.003	0.32

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.656 on 55 degrees of freedom
 Multiple R-squared: 0.01798 Adjusted R-squared: 0.0001244
 F-statistic: 1.007 on 1 and 55 DF p-value: 0.32

Cu

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-1.4344	-0.3924	0.1120	0.4501	0.9946

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>	
(Intercept)	2.0633908	0.0992857	20.782	<2e-16 ***	
Cu	-0.0022672	0.0009421	-2.406	0.0196	*

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.6068 on 54 degrees of freedom
 Multiple R-squared: 0.09685 Adjusted R-squared: 0.08012
 F-statistic: 5.791 on 1 and 54 DF p-value: 0.01956

Hg

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-1.50840	-0.40039	0.07437	0.51437	0.97499

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	2.0146	0.1135	17.749	<2e-16 ***
Hg	-0.7231	0.4688	-1.543	0.129

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.6481 on 55 degrees of freedom
 Multiple R-squared: 0.04147 Adjusted R-squared: 0.02404
 F-statistic: 2.38 on 1 and 55 DF p-value: 0.1287

Pb

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-1.4574	-0.3615	0.1818	0.4842	1.0032

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	2.026526	0.099721	20.322	<2e-16 ***
Pb	-0.003742	0.002057	-1.819	0.0745 .

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.6198 on 54 degrees of freedom
 Multiple R-squared: 0.05772 Adjusted R-squared: 0.04027

Martin and Nesbitt Supplementary Table 1

F-statistic: 3.308 on 1 and 54 DF

p-value: 0.07451

Zn

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-1.5243	-0.3609	0.1545	0.4289	0.9810

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	2.133540	0.126478	16.869	<2e-16 ***
Zn	-0.003665	0.001494	-2.453	0.0174

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.6285 on 55 degrees of freedom

Multiple R-squared: 0.09858

Adjusted R-squared: 0.08219

F-statistic: 6.015 on 1 and 55 DF

p-value: 0.01738

BOXPLOTS

Dissolution

1978

<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.000	1.125	3.690	6.056	7.920	20.610	

1999

<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.00	0.00	5.93	12.34	24.63	50.00	1

2008

<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.00	0.00	19.48	20.72	25.67	76.67	6

2014

<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.3700	0.6400	0.7000	0.6875	0.7400	0.8900	

Density

1999

<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
1.090	4.385	12.320	22.190	24.590	137.100	1

2008

<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.000	1.033	4.795	14.040	22.580	64.940	

2014

<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.770	2.998	22.720	41.120	71.530	164.400	

Martin and Nesbitt Supplementary Table 1

Species Richness

1978						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
7.00	8.50	10.00	12.86	14.50	27.00	
1999						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.000	3.500	7.000	6.522	9.000	14.000	
2008						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.000	3.000	5.000	5.444	9.250	11.000	
2014						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
4.00	6.00	10.00	9.10	11.25	15.00	

Shannon Index

1978						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
1.500	1.760	2.210	2.227	2.670	3.020	
1999						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.400	1.368	1.720	1.768	2.262	2.910	1
2008						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.470	1.395	1.840	1.793	2.315	2.790	3
2014						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.730	1.952	2.290	2.125	2.418	2.790	

As

1999						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
6.530	7.375	9.360	11.790	11.850	57.400	1
2008						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
2.550	4.735	5.725	6.025	6.412	12.200	
2014						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
3.150	5.055	7.025	7.446	8.995	14.300	

Martin and Nesbitt Supplementary Table 1

Cd

1999

<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.1400	0.1850	0.2000	0.3291	0.2850	2.0000	1

2008

<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.0560	0.1025	0.1200	0.1871	0.1775	1.0900	NA's

2014

<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.0500	0.1042	0.1430	0.2311	0.2350	1.2900	NA's

Cu

1999

<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
19.00	32.75	35.60	70.89	73.75	418.00	1

2008

<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
16.30	23.80	28.20	59.65	41.10	524.00	1

2014

<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
10.30	24.95	29.60	41.91	53.08	159.00	NA's

Hg

1999

<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.0400	0.0717	0.0977	0.1985	0.3030	0.8130	1

2008

<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.0210	0.0430	0.0520	0.1221	0.1152	0.6230	NA's

2014

<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.00840	0.04128	0.05980	0.12100	0.14700	0.67100	NA's

Martin and Nesbitt Supplementary Table 1

Pb

1999						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
9.00	12.55	16.40	38.05	40.05	262.00	1
2008						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
3.40	6.30	9.90	16.37	14.30	109.00	1
2014						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
1.680	6.478	12.250	19.250	20.520	126.000	

Zn

1999						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
29.50	45.40	51.60	77.23	74.75	315.00	1
2008						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
23.00	32.17	38.65	47.36	46.55	173.00	
2014						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
21.30	35.95	50.20	56.12	54.60	231.00	

ELLIOTT BAY

ANOVA

Shannon Index

One Way ANOVA

	<i>Df</i>	<i>Sum Sq</i>	<i>Mean Sq</i>	<i>F value</i>	<i>Pr(>F)</i>
Factor (Year)	2	1.073	0.5365	2.235	0.123
Residuals	33	7.920	0.2400		

Tukey HSD Test

	<i>diff</i>	<i>lwr</i>	<i>upr</i>	<i>P adj</i>
2007-1998	-0.1128333	-0.57841851	0.3527518	0.8239256
2013-1998	0.3324444	-0.17442050	0.8393094	0.2559424
2013-2007	0.4452778	-0.08481427	0.9753698	0.1137139

Species Richness

	<i>Df</i>	<i>Sum Sq</i>	<i>Mean Sq</i>	<i>F value</i>	<i>Pr(>F)</i>
Factor (Year)	2	239.9	120	5.998	0.000576 **
Residuals	35	700.0	20		

Tukey HSD Test

Martin and Nesbitt Supplementary Table 1

	<i>diff</i>	<i>lwr</i>	<i>upr</i>	<i>P adj</i>
2007-1998	-0.4423077	-4.528912	3.644296	0.9621042
2013-1998	5.6944444	1.134244	10.254645	0.0116137
2013-2007	6.1367521	1.390906	10.882598	0.0087851

Density

	<i>Df</i>	<i>Sum Sq</i>	<i>Mean Sq</i>	<i>F value</i>	<i>Pr(>F)</i>
Factor (Year)	2	1667	833.7	0.339	0.715
Residuals	32	78606	2456.4		

Tukey multiple comparison of means

95% confidence level

	<i>diff</i>	<i>lwr</i>	<i>upr</i>	<i>P adj</i>
2007-1998	5.824943	-41.87853	53.52842	0.9516541
2013-1998	-12.95625	-65.67380	39.80255	0.8196349
2013-2007	-18.760568	-75.35321	37.83207	0.6968178

Agglutinates

	<i>Df</i>	<i>Sum Sq</i>	<i>Mean Sq</i>	<i>F value</i>	<i>Pr(>F)</i>
Factor (Year)	2	4169	2085	1.747	0.19
Residuals	33	39384	1194		

Tukey HSD Test

95% confidence level

	<i>diff</i>	<i>lwr</i>	<i>Upr</i>	<i>P adj</i>
2007-1998	-10.37333	-43.204715	22.45805	0.7205900
2013-1998	18.00333	-17.738948	53.74561	0.4409265
2013-2007	28.37667	-9.003506	65.75684	0.1655292

REGRESSIONS

Species Richness

As

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	8.324e+00	1.098e+00	7.584	5.71e-09 ***
PAH	-9.358e-05	1.795e-04	-0.521	0.605

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 5.09 on 36 degrees of freedom

Multiple R-squared: 0.007493

Adjusted R-squared: -0.02008

F-statistic: 0.2718 on 1 and 36 DF

p-value: 0.6053

Cd

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	10.679	1.391	7.678	4.32e-09 ***
Cd	-12.386	5.248	-2.360	0.0238 *

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 4.755 on 36 degrees of freedom

Martin and Nesbitt Supplementary Table 1

Multiple R-squared: 0.134
F-statistic: 5.571 on 1 and 36 DF

Adjusted R-squared: 0.11
p-value: 0.0238

Cu

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	8.87210	1.01319	8.757	1.9e-10***
Cu	-0.01664	0.01109	-1.500	0.142

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 4.957 on 36 degrees of freedom

Multiple R-squared: 0.05884
F-statistic: 2.251 on 1 and 36 DF

Adjusted R-squared: 0.0327
p-value: 0.1423

Hg

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	9.531	1.056	9.026	8.93e-11 ***
Hg	-6.038	2.724	-2.217	0.0331 *

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 4.793 on 36 degrees of freedom

Multiple R-squared: 0.1201
F-statistic: 4.913 on 1 and 36 DF

Adjusted R-squared: 0.09565
p-value: 0.03305

Pb

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	8.393268	0.951584	8.820	1.59e-10 ***
Pb	-0.009511	0.010325	-0.921	0.363

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 5.05 on 36 degrees of freedom

Multiple R-squared: 0.02303
F-statistic: 0.8487 on 1 and 36 DF

Adjusted R-squared: -0.004107
p-value: 0.3631

Zn

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	10.06919	1.30846	7.695	4.11e-09 ***
Zn	-0.02629	0.01297	-2.027	0.0501 .

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 4.841 on 36 degrees of freedom

Multiple R-squared: 0.1025
F-statistic: 4.11 on 1 and 36 DF

Adjusted R-squared: 0.07754
p-value: 0.05009

PAH

Residuals:

<i>Min</i>	<i>Min</i>	<i>Min</i>	<i>Min</i>	<i>Min</i>	<i>Min</i>
-8.1753	-8.1753	-8.1753	-8.1753	-8.1753	-8.1753

Martin and Nesbitt Supplementary Table 1

Coefficients:

(Intercept)	(Intercept)	(Intercept)	(Intercept)	(Intercept)	(Intercept)
PAH	PAH	PAH	PAH	PAH	PAH
Signif. Codes: 0	****	0.001	***	0.01	**
			0.05	.	0.1

Residual standard error: 4709 on 36 degrees of freedom
 Multiple R-squared: 0.007493, Adjusted R-squared: -0.02008
 F-statistic: 0.2718 on 1 and 36 DF, p-value: 0.6053

Dissolution

As

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-15.889	-15.280	-14.862	8.349	85.040

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	16.0853	4.5572	3.530	0.00125 **
As	-0.1093	0.1671	-0.654	0.51788
Signif. Codes: 0	****	0.001	***	0.01
			**	0.05
			.	0.1

Residual standard error: 23.72 on 33 degrees of freedom
 Multiple R-squared: 0.01278
 F-statistic: 0.4272 on 1 and 36 DF
 Adjusted R-squared: -0.01714
 p-value: 0.5179

Cd

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-24.680	-14.877	-8.685	10.828	82.544

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	3.526	6.687	0.527	0.6015
Cd	51.595	25.452	2.027	0.0508 .
Signif. Codes: 0	****	0.001	***	0.01
			**	0.05
			.	0.1

Residual standard error: 22.52 on 33 degrees of freedom
 Multiple R-squared: 0.1107
 F-statistic: 4.109 on 1 and 36 DF
 Adjusted R-squared: 0.08379
 p-value: 0.05079

Cu

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-16.513	-14.527	-14.367	9.563	85.392

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	14.296697	5.351120	2.672	0.0116 *

Martin and Nesbitt Supplementary Table 1

Cu 0.007694 0.072376 0.106 0.9160
 Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 23.87 on 33 degrees of freedom
 Multiple R-squared: 0.0003423 Adjusted R-squared: -0.02995
 F-statistic: 0.0113 on 1 and 36 DF p-value: 0.916

Hg

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-14.699	-14.683	-14.616	9.262	85.336

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	14.7022	5.4375	2.704	0.0108 *
Hg	-0.1192	13.6252	-0.009	0.9931

 Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 23.88 on 33 degrees of freedom
 Multiple R-squared: 2.319e-06 Adjusted R-squared: -0.0303
 F-statistic: 7.654e-05 on 1 and 36 DF p-value: 0.9931

Pb

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-15.629	-15.158	-13.953	8.554	85.090

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	15.68922	4.66087	3.366	0.00195 **
Pb	-0.02117	0.04884	-0.433	0.66752

 Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 23.81 on 33 degrees of freedom
 Multiple R-squared: 0.005661 Adjusted R-squared: -0.02447
 F-statistic: 0.1879 on 1 and 36 DF p-value: 0.6675

Zn

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-19.257	-14.780	-13.884	9.513	85.158

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	13.24105	6.83152	1.938	0.0612 .
Zn	0.01868	0.07209	0.259	0.7971

 Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 23.85 on 33 degrees of freedom
 Multiple R-squared: 0.002031 Adjusted R-squared: -0.02821
 F-statistic: 0.06717 on 1 and 36 DF p-value: 0.7971

Martin and Nesbitt Supplementary Table 1

PAH

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-15.529	-15.064	-14.146	8.719	84.679

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	15.6141542	5.3899114	2.897	0.00664 **
PAH	-0.0002454	0.0009302	-0.264	0.79353

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 23.85 on 33 degrees of freedom

Multiple R-squared: 0.002105

Adjusted R-squared: -0.02813

F-statistic: 0.06962 on 1 and 36 DF

p-value: 0.7935

Shannon Index

As

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-1.32663	-0.19020	-0.01158	0.33250	0.89548

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	1.330848	0.096857	13.740	1.94e-15 ***
<i>As</i>	-0.002344	0.003599	-0.651	0.519

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.5111 on 34 degrees of freedom

Multiple R-squared: 0.01232

Adjusted R-squared: -0.01673

F-statistic: 0.4241 on 1 and 36 DF

p-value: 0.5193

Cd

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-1.40664	-0.15374	0.04137	0.26876	0.82256

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	1.4987	0.1458	10.280	5.72e-12 ***
Cd	-0.9201	0.5590	-1.646	0.109

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.495 on 34 degrees of freedom

Multiple R-squared: 0.07379

Adjusted R-squared: 0.04655

F-statistic: 2.709 on 1 and 34 DF

p-value: 0.109

Cu

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-1.31738	-0.22486	-0.0556	0.33375	0.90334

Martin and Nesbitt Supplementary Table 1

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	1.3199601	0.1137328	11.606	2.26e-13 ***
Cu	-0.0003976	0.0015559	-0.256	0.8

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.5138 on 34 degrees of freedom

Multiple R-squared: 0.001917

Adjusted R-squared: -0.02744

F-statistic: 0.06531 on 1 and 34 DF

p-value: 0.7998

Hg

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-1.36772	-0.18908	0.01006	0.30691	0.85228

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	1.3763	0.1139	12.082	7.46e-14 ***
Hg	-0.2853	0.2888	-0.988	0.33

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.5071 on 34 degrees of freedom

Multiple R-squared: 0.02789

Adjusted R-squared: -0.000697

F-statistic: 0.9756 on 1 and 34 DF

p-value: 0.3303

Pb

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-1.34398	-0.15215	0.01229	0.31429	0.87282

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	1.354332	0.097618	13.874	1.46e-15 ***
Pb	-0.001125	0.001036	-1.086	0.285

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.5056 on 34 degrees of freedom

Multiple R-squared: 0.03351

Adjusted R-squared: 0.005083

F-statistic: 1.179 on 1 and 34 DF

p-value: 0.2852

Zn

Residuals:

<i>Min</i>	<i>1Q</i>	<i>Median</i>	<i>3Q</i>	<i>Max</i>
-1.41492	-0.17088	0.02843	0.30549	0.80854

Coefficients:

	<i>Estimate</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Pr(> t)</i>
(Intercept)	1.41492	0.143025	10.186	7.26e-12 ***
Zn	-0.002035	0.001514	-1.344	0.188

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Martin and Nesbitt Supplementary Table 1

Residual standard error: 0.5012 on 34 degrees of freedom

Multiple R-squared: 0.05043

Adjusted R-squared: 0.0225

F-statistic: 1.805 on 1 and 34 DF

p-value: 0.1879

BOXPLOTS

Dissolution

	<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
1998	0.00	0.00	0.00	18.81	32.75	61.54	1
2007	0.000	0.000	0.000	4.274	0.000	26.290	2
2013	0.00	0.00	14.55	20.47	22.45	100.00	NA's

Agglutinates

	<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
1998	0.000	9.795	32.260	37.030	51.360	100.000	1
2007	0.000	1.982	7.175	26.650	32.300	100.000	1
2013	1.35	30.99	62.02	55.03	79.56	97.50	NA's

Density

	<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
1998	0.000	4.195	11.670	27.810	16.140	260.000	NA's
2007	2.22	8.56	17.44	33.63	28.50	121.90	2
2013	4.180	5.888	12.060	14.870	23.820	29.580	1

Martin and Nesbitt Supplementary Table 1

Species Richness

1998						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.00	5.00	6.00	6.75	8.25	16.00	
2007						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.000	3.000	7.000	6.308	8.000	17.000	
2013						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
3.00	10.00	12.00	12.44	13.00	23.00	

Shannon Index

1998						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.000	1.115	1.220	1.255	1.485	2.220	1
2007						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.0800	0.8625	1.2350	1.1420	1.4380	1.9300	1
2013						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.640	1.290	1.710	1.588	1.830	2.100	

As

1998						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
1.80	5.63	7.55	13.22	10.18	102.00	
2007						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
1.740	6.500	7.740	8.525	9.290	23.000	
2013						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
2.75	6.11	7.27	18.73	7.91	117.00	

Cd

1998						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.0200	0.1250	0.2350	0.2537	0.2925	0.8200	
2007						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.1000	0.1000	0.1900	0.2254	0.3000	0.4100	

Martin and Nesbitt Supplementary Table 1

2013						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.0600	0.0900	0.1100	0.1544	0.1600	0.3900	
<i>Cu</i>						
1998						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
6.50	28.10	33.00	57.68	69.20	288.00	
2007						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
5.67	23.90	32.30	56.97	40.00	352.00	
2013						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
5.80	10.50	18.10	49.79	40.50	198.00	
<i>Hg</i>						
1998						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.0300	0.1150	0.2000	0.3162	0.3025	1.5000	
2007						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.0400	0.1200	0.1800	0.2869	0.3000	0.8500	
2013						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
0.0300	0.0600	0.1200	0.1311	0.1700	0.3200	
<i>Pb</i>						
1998						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
6.36	20.17	33.50	66.342	53.12		
2007						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
6.75	22.00	25.80	33.16	31.00	82.00	
2013						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
2.86	16.50	22.30	31.97	25.00	134.00	
<i>Zn</i>						
1998						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
20.60	49.62	66.30	84.71	92.85	322.00	

Martin and Nesbitt Supplementary Table 1

2007						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
27.0	54.5	82.4	93.0	98.4	250.0	
2013						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
23.90	39.00	43.00	55.83	84.10	98.80	
<i>PAH</i>						
1998						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
824.8	1734.0	4611.0	5826.0	5624.0	20830.0	
2007						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
345.4	1066.0	2372.0	3162.0	2709.0	15530.0	
2013						
<i>Min.</i>	<i>1st Qu.</i>	<i>Median</i>	<i>Mean</i>	<i>3rd Qu.</i>	<i>Max.</i>	<i>NA's</i>
299.4	1193.0	1354.0	2084.0	2147.0	7492.0	