Table S1. Details of studies that have applied deoxygenation defaunation treatments to assess macroinvertebrate-related effects on ecosystem function, including the present study.

Study	N_2 purge duration	Capping duration	Number of treatments	Defaunation efficacy	Unremoved taxa	Statistical adjustment
Andersen & Kristensen 1988	20 minutes	24 hours	1	Biomass and abundance of unremoved taxa measured	*Peloscolex* sp., *Pygospio* spp., Nereididae (juveniles), Hydrobiidae (juveniles)	Not completed
Andersen & Kristensen 1992	Not stated	4 days	1	N/A	Some invertebrates potentially remained (as gauged from alkalinity measures), however no individuals were present at the end of the experiment.	N/A
Hansen & Kristensen 1997	1 hour	24 hours	1	Density of unremoved taxa measured	*Hediste diversicolor*, *Nereis virens*, *Hydrobia* spp., small polychaetes	Not completed
Tang & Kristensen 2007	Not stated	Not stated	1	Not completed	Not completed	Not completed
Camillini et al. 2019	Not stated	7 days	1	Not completed	Not completed	Not completed
Present study	2 hours	12-20 hours	3	Biomass and abundance of unremoved taxa measured	Polychaetes (e.g. *Capitella capitata*, *Desdemona ornata*, *Simplisetia aequisetis*), chironomids, and bivalves (*Arthritica semen*, *Mysella* sp. 1)	Untransformed biomass added as covariate

Table S2. Abundance (A) and biomass (B, mg) of taxa remaining in defaunated cores from the lower and upper regions of the Peel-Harvey Estuary, with the top five ranking taxa according to both measures highlighted grey. Phyla (Ph) are also listed; Annelida (An), Arthropoda (Ar), Mollusca (M) and Nematoda (N).

		Lower estuary			Upper estuary		
Taxa	Ph	A	B	Rank (A/B)	A	B	Rank (A/B)
Desdemona ornata	An	91	11.7	1/6	2	<0.1	7/-
Mysella sp. 1	M	82	48.9	1/3			
Capitella capitata	An	55	70.1	3/2	10	5.8	3/4
Heteromastus filiformis	An	47	98.8	4/1			
Prionospio cirrifera	An	28	17.5	5/5			
Dipolydora socialis	An	13	8.7	6/7			
Scoloplos normalis	An	11	45.9	7/4			
Carazziella victoriensis	An	10	2.6	8/5			
Galathowenia sp. 1	An	8	<0.1	8/-			
Nematoda spp.	N	6	<0.1	9/-			
Chironominae spp.	Ar	4	<0.1	12/-	14	60.9	1/1
Corophium minor	Ar	4	1.8	12/12			
Simplisetia aequisetis	An	4	0.9	12/13	3	38	4/2
Ephemeroptera spp.	Ar	1	0	20/-			
Grandidierella propodentata	Ar	1	<0.1	20/-			
Sphaeromatidae spp.	Ar	1	<0.1	20/-			
Tanais dulongii	Ar	1	<0.1	20/-			
Arthritica semen	M	1	5.3	20/8	11	15.7	2/3
Assiminea spp.	M	1	2.3	20/11			
Bivalvia spp.	M	1	3.6	20/9			
Brania sp. 1	An	1	<0.1	20/-			
Xenostrobus securis	M				2	1.8	7/6
Boccardiella limnicola	An				2	2.1	7/5
Synopiidae aff. sp. 1	Ar				1	1.7	8/7
Total A		371			45		
Total B		318			126		

Table S3. Results for two-way sediment condition × community PERMANOVA tests of differing order-of-fits on solute fluxes of benthic metabolism (a-i), nutrient exchange (j-u) and denitrification (v-x) in the upper and lower estuary, which includes the mean squares (MS), pseudo-*F* ratio, significance level (*P*), components of variation (COV) and degrees of freedom (d.f.), and the added covariate (i.e. unremoved biomass) for each test. Significant effects ($P \leq 0.05$) are emboldened while tests that became insignificant depending on the order-of-fit are highlighted grey. Chemical symbols and fluxes: oxygen (O_2), dissolved inorganic carbon (DIC), phosphate (PO_4^{3-}), ammonium (NH_4^+), dissolved organic nitrogen (DON), nitrate and nitrite (NO_x), and dinitrogen (N_2).

	Lower estuary					Upper estuary				
	d.f.	MS	Pseudo-*F*	*P*	COV	d.f.	MS	Pseudo-*F*	*P*	COV
a. Dark O_2 flux										
Order-of-fit 1										
Covariate	1	20500	1.198	0.329	14.55	1	32560	0.078	0.785	-155.34
Sediment condition	1	111330	6.505	**0.04**	124.71	1	919620	2.197	0.164	301.46
Community	1	33715	1.970	0.199	58.94	1	205710	0.491	0.497	-218.27
Condition × Community	1	80	0.005	0.949	-95.88	1	113380	0.271	0.62	-479.1
Residual	11	17114			130.82	11	418660			647.04
Order-of-fit 2										
Covariate	1	20500	1.198	0.3	14.55	1	32560	0.078	0.785	-155.34
Community	1	87234	5.097	0.056	112.3	1	658340	1.573	0.239	210.57
Sediment condition	1	57812	3.378	0.076	88.42	1	466990	1.115	0.313	102.97
Condition × Community	1	80	0.005	0.959	-95.88	1	113380	0.271	0.64	-479.1
Residual	11	17114			130.82	11	418660			647.04
b. Light O_2 flux										
Order-of-fit 1										
Covariate	1	214530	1.363	0.258	59.77	1	159890	0.757	0.402	-56.64
Sediment condition	1	384020	2.440	0.138	193.43	1	307700	1.457	0.258	132.30
Community	1	64756	0.411	0.584	-139.23	1	26135	0.124	0.702	-203.49
Condition × Community	1	40489	0.257	0.6	-251.15	1	430	0.002	0.971	-398.11
Residual	11	157370			396.70	11	211220			459.59
Order-of-fit 2										
Covariate	1	214530	1.363	0.279	59.77	1	159890	0.757	0.4	-56.64
Community	1	219320	1.394	0.265	105.55	1	7015	0.033	0.855	-194.36
Sediment condition	1	229460	1.458	0.277	117.68	1	326820	1.547	0.243	159.25
Condition × Community	1	40489	0.257	0.594	-251.15	1	430	0.002	0.962	-398.11
Residual	11	157370			396.7	11	211220			459.59
c. Net O_2 flux										
Order-of-fit 1										
Covariate	1	4223	0.686	0.43	-10.99	1	18934	0.503	0.479	-34.23
Sediment condition	1	890	0.144	0.744	-29.49	1	94292	2.503	0.135	101.34
Community	1	713	0.116	0.769	-33.75	1	3246	0.086	0.761	-87.77
Condition × Community	1	603	0.098	0.763	-54.74	1	3777	0.100	0.766	-159.66
Residual	11	6156			78.46	11	37679			194.11
Order-of-fit 2										
Covariate	1	4223	0.686	0.407	-10.99	1	18934	0.503	0.471	-34.23
Community	1	1292	0.210	0.68	-29.58	1	32240	0.856	0.382	-31.72
Sediment condition	1	311	0.050	0.849	-33.51	1	65298	1.733	0.195	77.84
Condition × Community	1	603	0.098	0.773	-54.74	1	3777	0.100	0.783	-159.66
Residual	11	6156			78.46	11	37679			194.11

	Lower estuary					Upper estuary				
	d.f.	MS	Pseudo-*F*	*P*	COV	d.f.	MS	Pseudo-*F*	*P*	COV
d. Dark DIC flux										
Order-of-fit 1										
Covariate	1	618610	4.915	0.073	221.98	1	13387	0.053	0.848	-163.57
Sediment condition	1	200040	1.589	0.261	143.23	1	499550	1.965	0.255	243.33
Community	1	43229	0.343	0.584	-216.77	1	1315900	5.177	0.081	853.07
Condition × Community	1	517100	4.108	0.077	654.05	1	48114	0.189	0.701	-457.86
Residual	5	125870			354.78	4	254180			504.16
Order-of-fit 2										
Covariate	1	618610	4.915	0.074	221.98	1	13387	0.053	0.832	-163.57
Community	1	2307	0.018	0.897	-250.10	1	130630	0.514	0.532	-213.5
Sediment condition	1	240960	1.914	0.208	189.10	1	1684800	6.629	0.059	800.79
Condition × Community	1	517100	4.108	0.071	654.05	1	48114	0.189	0.695	-457.86
Residual	5	125870			354.78	4	254180			504.16
e. Light DIC flux										
Order-of-fit 1										
Covariate	1	71848	1.18	0.328	32.91	1	408240	0.848	0.435	-90.34
Sediment condition	1	276	0.00	0.961	-129.62	1	611540	1.270	0.305	177.01
Community	1	233410	3.83	0.101	313.08	1	2731000	5.670	0.059	1241.6
Condition × Community	1	77952	1.28	0.293	136.06	1	260690	0.541	0.542	-474.16
Residual	5	61021			247.02	4	481690			694.04
Order-of-fit 2										
Covariate	1	71848	1.177	0.3	32.91	1	408240	0.848	0.419	-90.341
Community	1	202810	3.324	0.14	267.91	1	463990	0.963	0.383	-80.821
Sediment condition	1	30874	0.506	0.525	-96.78	1	2878500	5.976	0.069	1036.5
Condition × Community	1	77952	1.278	0.284	136.06	1	260690	0.541	0.532	-474.16
Residual	5	61021			247.02	4	481690			694.04
f. Net DIC flux										
Order-of-fit 1										
Covariate	1	10537	2.969	0.146	26.44	1	15647	0.311	0.621	-62.12
Sediment condition	1	10654	3.002	0.129	44.33	1	94760	1.881	0.274	103.49
Community	1	1980	0.558	0.517	-29.87	1	336530	6.680	**0.05**	442.87
Condition × Community	1	9313	2.624	0.164	79.39	1	2066	0.041	0.863	-221.7
Residual	5	3549			59.57	4	50378			224.45
Order-of-fit 2										
Covariate	1	10537	2.969	0.145	26.44	1	15647	0.311	0.617	-62.12
Community	1	5802	1.635	0.272	33.77	1	46864	0.930	0.383	-36.01
Sediment condition	1	6831	1.925	0.217	31.94	1	384430	7.631	0.061	386.95
Condition × Community	1	9313	2.624	0.151	79.39	1	2066	0.041	0.854	-221.70
Residual	5	3549			59.57	4	50378			224.45
g. Dark alkalinity flux										
Order-of-fit 1										
Covariate	1	205070	1.135	0.311	39.00	1	159710	0.189	0.689	-207.26
Sediment condition	1	1205000	6.667	**0.03**	411.19	1	1424300	1.682	0.221	323.63
Community	1	575220	3.183	0.097	287.34	1	89576	0.106	0.75	-411.63
Condition × Community	1	522760	2.892	0.122	429.62	1	1738400	2.053	0.189	818.7
Residual	11	180740			425.13	11	846980			920.32
Order-of-fit 2										
Covariate	1	205070	1.135	0.291	38.999	1	159710	0.189	0.694	-207.26
Community	1	84892	0.470	0.534	-131.29	1	50322	0.059	0.795	-383.9
Sediment condition	1	1695400	9.380	**0.015**	539.39	1	1463600	1.728	0.208	367.79
Condition × Community	1	522760	2.892	0.108	429.62	1	1738400	2.053	0.166	818.7
Residual	11	180740			425.13	11	846980			920.32

	Lower estuary					Upper estuary				
	d.f.	MS	Pseudo-*F*	*P*	COV	d.f.	MS	Pseudo-*F*	*P*	COV
h. Light alkalinity flux										
Order-of-fit 1										
Covariate	1	1593500	7.133	**0.027**	292.63	1	485390	1.030	0.359	29.85
Sediment condition	1	988540	4.425	**0.049**	355.39	1	65657	0.139	0.699	-271.22
Community	1	359620	1.610	0.24	168.85	1	9848.8	0.021	0.891	-321.24
Condition × Community	1	7326	0.033	0.853	-341.48	1	119600	0.254	0.639	-514.11
Residual	11	223410			472.66	11	471140			686.39
Order-of-fit 2										
Covariate	1	1593500	7.133	**0.034**	292.63	1	485390	1.030	0.338	29.85
Community	1	33494	0.150	0.706	-184.81	1	267	0.001	0.981	-295.14
Sediment condition	1	1314700	5.885	**0.033**	457.85	1	75238	0.160	0.693	-294.71
Condition × Community	1	7326	0.033	0.856	-341.48	1	119600	0.254	0.64	-514.11
Residual	11	223410			472.66	11	471140			686.39
i. Net alkalinity flux										
Order-of-fit 1										
Covariate	1	113530	6.037	**0.036**	76.94	1	6650.3	0.142	0.716	-50.19
Sediment condition	1	401	0.021	0.903	-55.12	1	30169	0.643	0.429	-55.17
Community	1	250	0.013	0.916	-62.32	1	1029	0.022	0.869	-101.35
Condition × Community	1	23819	1.267	0.276	52.01	1	117120	2.495	0.13	229.7
Residual	11	18807			137.14	11	46948			216.67
Order-of-fit 2										
Covariate	1	113530	6.037	**0.034**	76.94	1	6650	0.142	0.713	-50.19
Community	1	51	0.003	0.951	-58.08	1	1856	0.040	0.84	-91.33
Sediment condition	1	601	0.032	0.876	-59.14	1	29342	0.625	0.467	-62.15
Condition × Community	1	23819	1.267	0.279	52.01	1	117120	2.495	0.155	229.70
Residual	11	18807			137.14	11	46948			216.67
j. Dark PO_4^{3-} flux										
Order-of-fit 1										
Covariate	1	2.66	0.138	0.728	-1.02	1	6.44	2.357	0.157	0.48
Sediment condition	1	17.52	0.908	0.388	-0.54	1	7.03	2.570	0.132	0.88
Community	1	1.09	0.056	0.838	-1.95	1	22.96	8.400	**0.023**	2.13
Condition × Community	1	0.02	0.001	0.977	-3.23	1	8.35	3.054	0.103	2.05
Residual	11	19.30			4.39	11	2.73			1.65
Order-of-fit 2										
Covariate	1	2.66	0.138	0.728	-1.02	1	6.44	2.357	0.172	0.48
Community	1	6.44	0.333	0.578	-1.52	1	10.59	3.875	0.071	1.21
Sediment condition	1	12.17	0.631	0.435	-1.17	1	19.39	7.095	**0.026**	1.91
Condition × Community	1	0.02	0.001	0.979	-3.23	1	8.35	3.054	0.109	2.05
Residual	11	19.30			4.39	11	2.73			1.65
k. Light PO_4^{3-} flux										
Order-of-fit 1										
Covariate	1	0.69	0.165	0.66	-0.47	1	1.67	0.802	0.426	-0.17
Sediment condition	1	0.31	0.074	0.793	-0.80	1	3.05	1.463	0.255	0.44
Community	1	0.12	0.028	0.848	-0.92	1	0.35	0.166	0.677	-0.63
Condition × Community	1	7.21	1.718	0.234	1.28	1	0.41	0.195	0.672	-1.44
Residual	11	4.20			2.05	10	2.09			1.44
Order-of-fit 2										
Covariate	1	0.69	0.165	0.667	-0.47	1	1.67	0.802	0.372	-0.17
Community	1	0.01	0.003	0.961	-0.87	1	0.01	0.006	0.939	-0.63
Sediment condition	1	0.42	0.099	0.73	-0.85	1	3.39	1.623	0.244	0.56
Condition × Community	1	7.21	1.718	0.215	1.28	1	0.41	0.195	0.696	-1.44
Residual	11	4.20			2.05	10	2.09			1.44

	Lower estuary					Upper estuary				
	d.f.	MS	Pseudo-*F*	*P*	COV	d.f.	MS	Pseudo-*F*	*P*	COV
l. Net PO_4^{3-} flux										
Order-of-fit 1										
Covariate	1	0.01	0.020	0.88	-0.18	1	0.70	5.809	**0.027**	0.20
Sediment condition	1	0.69	1.264	0.28	0.15	1	0.61	5.073	**0.033**	0.32
Community	1	0.02	0.034	0.878	-0.33	1	1.26	10.48	**0.006**	0.51
Condition × Community	1	0.33	0.615	0.475	-0.34	1	0.47	3.865	0.116	0.65
Residual	11	0.54			0.74	10	0.12			0.35
Order-of-fit 2										
Covariate	1	0.01	0.020	0.904	-0.18	1	0.70	5.809	**0.035**	0.20
Community	1	0.19	0.351	0.605	-0.25	1	0.56	4.624	**0.031**	0.29
Sediment condition	1	0.52	0.947	0.352	-0.07	1	1.32	10.928	**0.009**	0.53
Condition × Community	1	0.33	0.615	0.449	-0.34	1	0.47	3.865	0.113	0.65
Residual	11	0.54			0.74	10	0.12			0.35
m. Dark NH_4^+ flux										
Order-of-fit 1										
Covariate	1	1751	0.098	0.648	-31.80	1	479	0.022	0.89	-36.50
Sediment condition	1	5958	0.332	0.597	-44.46	1	11939	0.548	0.46	-42.27
Community	1	359	0.020	0.902	-60.65	1	13053	0.599	0.428	-44.21
Condition × Community	1	2780	0.155	0.656	-90.43	1	0	0.000	0.996	-127.99
Residual	11	17934			133.92	11	21789			147.61
Order-of-fit 2										
Covariate	1	1751	0.098	0.603	-31.80	1	478.86	0.022	0.894	-36.50
Community	1	129	0.007	0.926	-56.59	1	22305	1.024	0.347	9.77
Sediment condition	1	6188	0.345	0.605	-47.50	1	2686.9	0.123	0.726	-64.74
Condition × Community	1	2780	0.155	0.678	-90.43	1	0	0.000	0.999	-127.99
Residual	11	17934			133.92	11	21789			147.61
n. Light NH_4^+ flux										
Order-of-fit 1										
Covariate	1	10480	2.931	0.116	20.77	1	5178	0.415	0.534	-21.34
Sediment condition	1	9772	2.733	0.135	31.98	1	35685	2.863	0.134	64.90
Community	1	1278	0.357	0.555	-21.93	1	1891	0.152	0.703	-48.64
Condition × Community	1	428	0.120	0.733	-41.21	1	3788	0.304	0.57	-80.77
Residual	11	3576			59.80	11	12465			111.65
Order-of-fit 2										
Covariate	1	10480	2.931	0.118	20.77	1	5178	0.415	0.517	-21.34
Community	1	15	0.004	0.949	-25.30	1	13954	1.119	0.331	16.59
Sediment condition	1	11035	3.086	0.125	37.85	1	23622	1.895	0.191	49.47
Condition × Community	1	428	0.120	0.744	-41.21	1	3788	0.304	0.589	-80.77
Residual	11	3576			59.80	11	12465			111.65
o. Net NH_4^+ flux										
Order-of-fit 1										
Covariate	1	180	0.243	0.583	-5.91	1	124	0.143	0.693	-6.81
Sediment condition	1	6	0.008	0.926	-11.00	1	3922	4.525	0.058	23.54
Community	1	28	0.037	0.875	-12.20	1	853	0.985	0.366	-1.72
Condition × Community	1	24	0.033	0.857	-19.64	1	169	0.195	0.667	-22.91
Residual	11	739			27.19	11	867			29.44
Order-of-fit 2										
Covariate	1	180	0.243	0.599	-5.91	1	124	0.143	0.7	-6.81
Community	1	16	0.021	0.904	-11.41	1	2769	3.195	0.102	18.76
Sediment condition	1	18	0.024	0.884	-11.77	1	2007	2.315	0.153	15.81
Condition × Community	1	24	0.033	0.877	-19.64	1	169	0.195	0.662	-22.91
Residual	11	739			27.19	11	867			29.44

	Lower estuary					Upper estuary				
	d.f.	MS	Pseudo-*F*	*P*	COV	d.f.	MS	Pseudo-*F*	*P*	COV
p. Dark NO_x flux										
Order-of-fit 1										
Covariate	1	0.06	0.046	0.860	-0.27	1	6.240	0.251	0.487	-1.08
Sediment condition	1	1.02	0.822	0.382	-0.19	1	4.577	0.184	0.641	-1.92
Community	1	0.07	0.056	0.818	-0.49	1	1.259	0.051	0.837	-2.30
Condition × Community	1	0.09	0.070	0.814	-0.79	1	2.257	0.091	0.709	-4.13
Residual	11	1.24			1.11	11	24.91			4.99
Order-of-fit 2										
Covariate	1	0.06	0.046	0.858	-0.27	1	6.240	0.251	0.510	-1.08
Community	1	0.39	0.313	0.553	-0.39	1	0.017	0.001	0.976	-2.15
Sediment condition	1	0.70	0.565	0.489	-0.32	1	5.818	0.234	0.670	-2.05
Condition × Community	1	0.09	0.070	0.793	-0.79	1	2.257	0.091	0.699	-4.13
Residual	11	1.24			1.11	11	24.907			4.99
q. Light NO_x flux										
Order-of-fit 1										
Covariate	1	866	0.904	0.341	-2.47	1	1481	0.196	0.673	-19.50
Sediment condition	1	164	0.171	0.674	-11.64	1	4409	0.583	0.466	-23.92
Community	1	2	0.002	0.972	-15.20	1	32488	4.296	0.057	74.67
Condition × Community	1	44	0.046	0.844	-27.79	1	176	0.023	0.882	-74.53
Residual	10	958			30.95	11	7563			86.97
Order-of-fit 2										
Covariate	1	866	0.904	0.337	-2.47	1	1481	0.196	0.679	-19.50
Community	1	21	0.022	0.874	-13.47	1	36685	4.850	**0.048**	73.40
Sediment condition	1	144	0.150	0.711	-13.17	1	213	0.028	0.867	-40.16
Condition × Community	1	44	0.046	0.832	-27.79	1	176	0.023	0.883	-74.53
Residual	10	958			30.95	11	7563			86.97
r. Net NO_x flux										
Order-of-fit 1										
Covariate	1	0.00	0.013	0.868	-0.12	1	0.11	0.044	0.82	-0.38
Sediment condition	1	0.10	0.486	0.521	-0.13	1	0.17	0.067	0.80	-0.65
Community	1	0.01	0.060	0.826	-0.21	1	27.58	11.170	**0.007**	2.37
Condition × Community	1	0.04	0.198	0.624	-0.37	1	1.07	0.432	0.53	-1.03
Residual	10	0.20			0.45	11	2.47			1.57
Order-of-fit 2										
Covariate	1	0.00	0.013	0.896	-0.12	1	0.11	0.044	0.842	-0.38
Community	1	0.00	0.009	0.93	-0.20	1	24.45	9.903	**0.007**	2.02
Sediment condition	1	0.11	0.537	0.502	-0.14	1	3.29	1.334	0.291	0.43
Condition × Community	1	0.04	0.198	0.649	-0.37	1	1.07	0.432	0.54	-1.03
Residual	10	0.20			0.45	11	2.47			1.57
s. Dark DON flux										
Order-of-fit 1										
Covariate	1	62266	0.118	0.717	-170.53	1	483350	0.245	0.618	-305.03
Sediment condition	1	7380	0.014	0.916	-293.03	1	6866300	3.482	0.094	942.27
Community	1	23493	0.045	0.857	-324.8	1	4532400	2.298	0.146	756.81
Condition × Community	1	116840	0.221	0.636	-470.8	1	2491100	1.263	0.258	624.66
Residual	11	527570			726.34	11	1972100			1404.3
Order-of-fit 2										
Covariate	1	62266	0.118	0.736	-170.53	1	483350	0.245	0.58	-305.03
Community	1	30382	0.058	0.815	-299.03	1	9157100	4.643	**0.045**	1152.9
Sediment condition	1	491	0.001	0.978	-318.19	1	2241600	1.137	0.318	243.15
Condition × Community	1	116840	0.221	0.641	-470.8	1	2491100	1.263	0.258	624.66
Residual	11	527570			726.34	11	1972100			1404.3

	Lower estuary					Upper estuary				
	d.f.	MS	Pseudo-*F*	*P*	COV	d.f.	MS	Pseudo-*F*	*P*	COV
t. Light DON flux										
Order-of-fit 1										
Covariate	1	4323	0.041	0.859	-79.89	1	38032	0.077	0.791	-168.98
Sediment condition	1	127410	1.197	0.298	58.85	1	4235100	8.557	**0.016**	823.72
Community	1	207210	1.947	0.19	145.23	1	33037	0.067	0.792	-321.44
Condition × Community	1	382940	3.598	0.085	386.29	1	297810	0.602	0.445	-384.97
Residual	11	106430			326.24	11	494910			703.50
Order-of-fit 2										
Covariate	1	4323	0.041	0.878	-79.89	1	38032	0.077	0.813	-168.98
Community	1	83002	0.780	0.421	-64.92	1	1043300	2.108	0.184	318.50
Sediment condition	1	251620	2.364	0.146	167.00	1	3224800	6.516	**0.026**	773.88
Condition × Community	1	382940	3.598	0.07	386.29	1	297810	0.602	0.46	-384.97
Residual	11	106430			326.24	11	494910			703.50
u. Net DON flux										
Order-of-fit 1										
Covariate	1	1621	0.083	0.77	-33.46	1	35840	0.381	0.528	-60.34
Sediment condition	1	10567	0.541	0.445	-38.48	1	9187	0.098	0.761	-124.11
Community	1	3314	0.170	0.681	-58.27	1	154660	1.644	0.242	116.40
Condition × Community	1	4423	0.226	0.632	-90.31	1	41450	0.441	0.488	-198.95
Residual	11	19538			139.78	11	94090			306.74
Order-of-fit 2										
Covariate	1	1621	0.083	0.749	-33.46	1	35840	0.381	0.553	-60.34
Community	1	219	0.011	0.914	-58.94	1	158000	1.679	0.237	108.73
Sediment condition	1	13662	0.699	0.42	-33.60	1	5843	0.062	0.816	-139.14
Condition × Community	1	4423	0.226	0.664	-90.31	1	41450	0.441	0.458	-198.95
Residual	11	19538			139.78	11	94090			306.74
v. Dark N_2 flux										
Order-of-fit 1										
Covariate	1	701	0.147	0.68	-21.28	1	6529	1.693	0.21	14.92
Sediment condition	1	16	0.003	0.955	-39.47	1	10662	2.765	0.134	41.58
Community	1	31154	6.524	0.058	112.88	1	3175	0.823	0.425	-15.20
Condition × Community	1	656	0.137	0.749	-64.48	1	992	0.257	0.612	-48.14
Residual	4	4775			69.10	7	3857			62.10
Order-of-fit 2										
Covariate	1	701	0.147	0.697	-21.28	1	6529	1.693	0.225	14.92
Community	1	30700	6.429	**0.048**	111.34	1	7813	2.026	0.19	34.41
Sediment condition	1	470	0.099	0.77	-37.73	1	6024	1.562	0.254	24.99
Condition × Community	1	656	0.137	0.734	-64.48	1	992	0.257	0.636	-48.14
Residual	4	4775			69.10	7	3857			62.10
w. Light N_2 flux										
Order-of-fit 1										
Covariate	1	0.31	0.156	0.693	-0.46	1	0.00	0.007	0.934	-0.20
Sediment condition	1	0.33	0.168	0.669	-0.88	1	3.65	6.728	**0.026**	0.86
Community	1	0.00	0.002	0.961	-1.00	1	0.05	0.096	0.778	-0.35
Condition × Community	1	0.08	0.039	0.858	-1.47	1	0.38	0.708	0.437	-0.36
Residual	3	1.98			1.41	9	0.54			0.74
Order-of-fit 2										
Covariate	1	0.31	0.156	0.685	-0.46	1	0.00	0.007	0.956	-0.20
Community	1	0.01	0.003	0.948	-1.00	1	0.98	1.801	0.211	0.30
Sediment condition	1	0.33	0.167	0.657	-0.88	1	2.73	5.023	0.053	0.79
Condition × Community	1	0.08	0.039	0.858	-1.47	1	0.38	0.708	0.393	-0.36
Residual	3	1.98			1.41	9	0.54			0.74

	Lower estuary					Upper estuary				
	d.f.	MS	Pseudo-*F*	*P*	COV	d.f.	MS	Pseudo-*F*	*P*	COV
x. Net N_2 flux										
Order-of-fit 1										
Covariate	1	0.13	0.967	0.394	-0.02	1	0.23	0.525	0.5	-0.13
Sediment condition	1	0.20	1.549	0.324	0.18	1	3.30	7.678	**0.026**	0.84
Community	1	1.04	8.05	**0.039**	0.68	1	0.00	0.006	0.939	-0.34
Condition × Community	1	0.02	0.142	0.742	-0.36	1	0.67	1.565	0.271	0.44
Residual	3	0.13			0.36	8	0.43			0.66
Order-of-fit 2										
Covariate	1	0.13	0.967	0.391	-0.02	1	0.23	0.525	0.515	-0.13
Community	1	1.07	8.244	**0.045**	0.69	1	0.54	1.247	0.32	0.16
Sediment condition	1	0.18	1.355	0.351	0.15	1	2.76	6.437	**0.028**	0.82
Condition × Community	1	0.02	0.142	0.718	-0.36	1	0.67	1.565	0.251	0.44
Residual	3	0.13			0.36	8	0.43			0.66

Figure S1. Linear regression relationships between the covariate (i.e. unremoved biomass, mg) and light (Fig. S1a) and net (Fig. S1b) alkalinity fluxes in the lower estuary, and net phosphate (PO_4^{3-}; Fig. S1c) fluxes in the upper estuary.

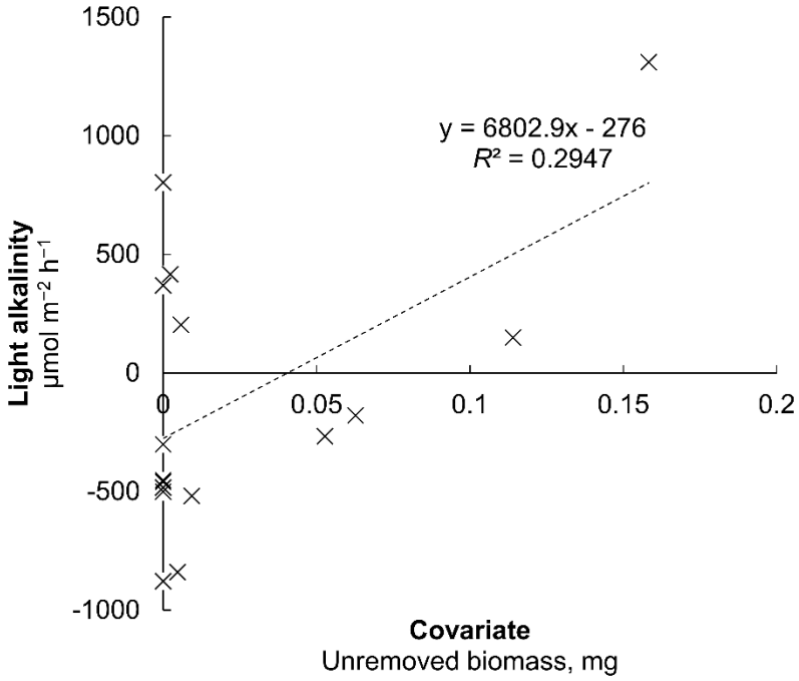

Figure S1a. Light alkalinity fluxes (µmol m^{-2} h^{-1}) *vs*. the covariate (unremoved biomass, mg) for samples incubated from the lower estuary. The equation of the dashed line is y = −276 + 6802.9x (ANOVA, F = 5.85, P = 0.029, d.f. = 15). The R^2 value is 0.29; n = 16.

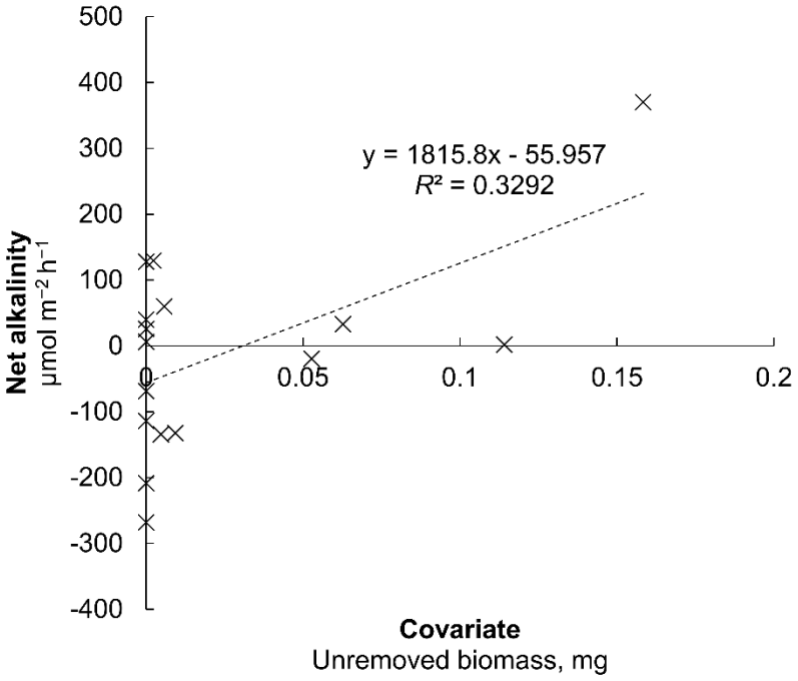

Figure S1b. Net alkalinity fluxes (µmol m^{-2} h^{-1}) *vs*. the covariate (unremoved biomass, mg) for samples incubated from the lower estuary. The equation of the dashed line is y = −56 + 1815.8x (ANOVA, F = 6.87, P = 0.02, d.f. = 15). The R^2 value is 0.33; n = 16.

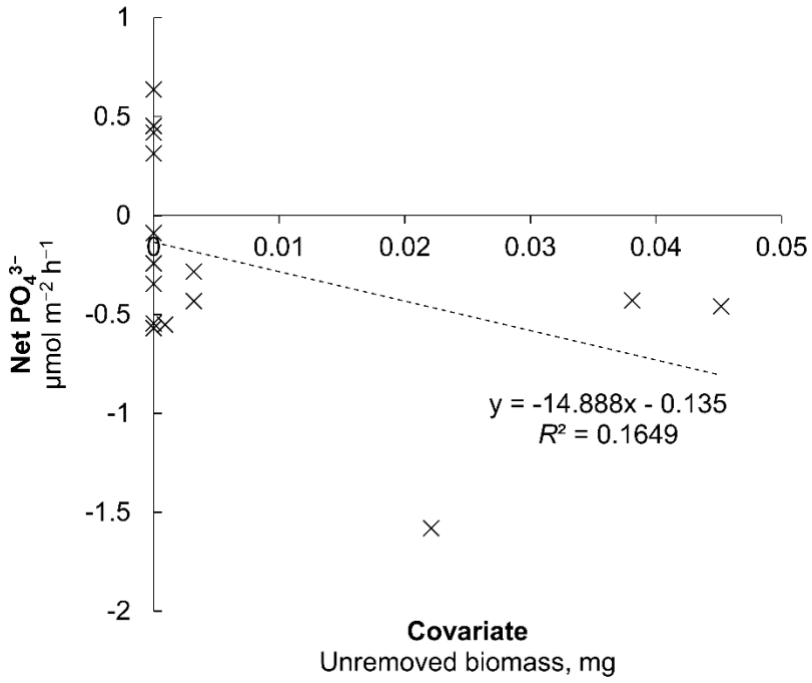

Figure S1c. Net phosphate (PO_4^{3-}) fluxes (µmol m^{-2} h^{-1}) *vs*. the covariate (unremoved biomass, mg) for samples incubated from the upper estuary. The equation of the dashed line is y = −0.14 – 14.889x (ANOVA, F = 2.57, P = 0.13, d.f. = 14). The R^2 value is 0.16; n = 15.

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