

**Supplementary Material**

**Ineffective artificial mouth-breaching practices and altered hydrology confound eutrophic symptoms in a temporarily closed estuary**

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**Table S1.** Physico-chemical (salinity and dissolved oxygen [DO]) and inorganic nutrient (ammonium [NH<sub>4</sub><sup>+</sup>], total oxidised nitrogen [NO<sub>x</sub>], dissolved inorganic phosphorus [DIP], and dissolved silicate) characteristics of the point source sites (P1–P5) in the Great Brak Estuary.

<b>Mouth State</b>	<b>Point source</b>	<b>Flow</b>	<b>Salinity</b>	<b>DO (mg L<sup>-1</sup>)</b>	<b>NH<sub>4</sub><sup>+</sup> (mg L<sup>-1</sup>)</b>	<b>NO<sub>x</sub> (mg L<sup>-1</sup>)</b>	<b>DIP (mg L<sup>-1</sup>)</b>	<b>Silicate (mg L<sup>-1</sup>)</b>
Closed	P1	No	0.97	6.06	0.316	0.015	0.172	6.629
	P2	No	16.56	11.43	0.005	0.009	0.078	0.397
	P3	No	0.20	7.06	0	0.005	0.072	3.911
	P4	Yes	2.12	10.49	0	0.004	0.110	7.261
	P5	No	16.61	4.96	0.048	0.013	0.078	0.393
Open	P1	Yes	0.17	8.33	0.015	0.033	0.042	2.839
	P2	Yes	2.39	5.76	0.008	0.043	0.126	1.708
	P3	Yes	0.33	5.95	0.005	0.064	0	3.648
	P4	Yes	0.79	8.61	0.010	0.210	0.178	4.898
	P5	Yes	2.13	6.63	0.052	0.152	0.038	3.195
Semi-closed	P1	Dry	-	-	-	-	-	-
	P2	No	17.67	4.20	0.013	0.018	0.013	1.301
	P3	Dry	-	-	-	-	-	-
	P4	Yes	2.18	7.19	0.004	0.024	0.105	7.684
	P5	No	14.22	5.16	0.067	0.089	0.064	4.550

**Table S2.** Dominant phytoplankton classes and species (where applicable) observed during the comprehensive surveys, i.e., closed (31 July 2021), open (26 November 2021), and semi-closed (18 February 2022) mouth states.

<b>Mouth condition</b>	<b>Dominant group</b>	<b>Maximum density (cells mL<sup>-1</sup>)</b>	<b>Site-specific dominance (%)</b>	<b>Bloom conditions (&gt;20 µg Chl-<i>a</i> L<sup>-1</sup>)</b>	<b>Dominant species</b>	<b>Site</b>
Closed	Litostomatea	241	37	No	<i>Mesodinium cf. rubrum</i>	S1
	Cryptophyceae	543	49	No	-	S2
	Bacillariophyceae	1262	79	No	<i>Cyclotella atomus</i> var. <i>marina</i>	S3-S8
Open	Bacillariophyceae	89	76	No	-	S1-S3; S5
	Chlorophyceae	96	70	No	<i>Monoraphidium</i> sp.; <i>Cosmarium</i> sp.	S4; S6-S8
Semi-closed	Bacillariophyceae	19958	91	Yes	<i>C. atomus</i> var. <i>marina</i>	S1-S6
	Cryptophyceae	11829	81	No	<i>Cryptomonas</i> sp.	S7
	Euglenophyceae	62	33	No	-	S8

**Table S3.** Dominant phytoplankton classes, presence OR absence of bloom conditions (>20 µg Chl-*a* L<sup>-1</sup>), and notable species observed during the intensive sampling programme.

Mouth condition (sampling month)		Primary dominant group	Secondary dominant class	Maximum density (cells mL <sup>-1</sup> )	Site-specific dominance (%)	Bloom conditions	Notable species	Sites of dominant class
Closed	23/09/2021	Bacillariophyceae	Chlorodendrophyceae	2409	87	No	<i>Cyclotella atomus</i> var. <i>marina</i>	M2-M4
	04/10/2021	Chlorodendrophyceae	Cryptophyceae	1606	72	No	<i>Tetraselmis</i> sp.	M1-M3
	19/10/2021	Chlorodendrophyceae	Cryptophyceae	1376	59	No	<i>Tetraselmis</i> sp.;	M1-M3
	02/11/2021	Bacillariophyceae	Litostomatea	4719	73	No	<i>Heterocapsa rotundata</i> <i>Navicula</i> sp.; <i>Mesodinium</i> cf. <i>rubrum</i>	M2-M4
	<b>15/11/2021</b>	<b>Chlorodendrophyceae</b>	<b>Dinophyceae</b>	<b>9807</b>	<b>87</b>	<b>Yes</b>	<b><i>Tetraselmis</i> sp.;</b> <b><i>Prorocentrum cordatum</i></b>	<b>M1-M4</b>
Open	29/11/2021	Chlorophyceae	Bacillariophyceae	145	73	No	-	M2-M4
	14/12/2021	Bacillariophyceae	Chlorophyceae	96	66	No	-	M1-M4
	03/01/2022	Bacillariophyceae	Cryptophyceae	551	71	No	<i>Nitzschia reversa</i> ;	M1-M3
	17/01/2022	Chlorophyceae	Bacillariophyceae	1950	66	No	<i>Peridinium quadridentatum</i> <i>Chlamydomonas</i> sp.	M2-M4
Closed	31/01/2022	Chlorophyceae	Cryptophyceae	6194	63	No	<i>Chlamydomonas</i> sp.;	M1-M4
						<i>P. quadridentatum</i>		
Semi-closed	<b>18/02/2022</b>	<b>Bacillariophyceae</b>	-	<b>18719</b>	<b>87</b>	<b>Yes</b>	<b><i>C. atomus</i> var. <i>marina</i></b>	<b>M1-M4</b>
Closed	28/02/2022	Bacillariophyceae	-	5506	92	No	<i>C. atomus</i> var. <i>marina</i>	M1-M4
	<b>14/03/2022</b>	<b>Cryptophyceae</b>	<b>Dinophyceae</b>	<b>2447</b>	<b>59</b>	<b>Yes</b>	<b><i>Teleaulax</i> cf. <i>amphioxeia</i>;</b> <b><i>C. atomus</i> var. <i>marina</i>;</b> <b><i>Peridinium</i> sp.</b>	<b>M2-M3</b>
	28/03/2022	Cryptophyceae	Bacillariophyceae	2684	68	No	<i>T. cf. amphioxeia</i> ;	M2-M4
	11/04/2022	Cryptophyceae	Chlorodendrophyceae	654	49	No	<i>C. atomus</i> var. <i>marina</i> ;	M2-M4
	26/04/2022	Cryptophyceae	Chlorodendrophyceae	1858	81	No	<i>H. rotundata</i>	M1-M4

Sampling intervals with phytoplankton bloom conditions highlighted in bold.