

Supplementary Materials

Biophysical controls on seasonal changes in the structure, growth, and grazing of the size-fractionated phytoplankton community in the northern South China Sea

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This document contains additional materials in supporting of the main manuscript:
Table S1 for the results of correlation analyses between different variables, Table S2 for
the estimations of growth and grazing rates of each phytoplankton size-class for all the
20 dilution experiments, Figure S1 for comparison of the typical vertical hydrology for the
estuary-to-sea transect between the winter and the summer, and Figure S2 for typical
results of size-specific dilution experiments during June and July 2018.

Table S1 Pearson correlation analyses between environmental variables and biological rates for surface waters at the Wanshan station. TChl is total Chla [$\mu\text{g/L}$]; μ_n : nutrient-amended phytoplankton growth rate [d^{-1}]; m : microzooplankton grazing rate [d^{-1}]; μ_0 : natural phytoplankton growth rate [d^{-1}].

	<i>T</i>	<i>S</i>	<i>Flow</i>	<i>Light</i>	<i>SiO₄</i>	<i>NO₃</i>	<i>PO₄</i>	<i>TChl</i>	μ_n	<i>m</i>	μ_0
<i>T</i>	1.00										
<i>S</i>	-0.50	1.00									
<i>Flow</i>	0.53	-0.82**	1.00								
<i>Light</i>	0.76**	-0.48	0.53	1.00							
<i>SiO₄</i>	0.39	-0.85**	0.66*	0.50	1.00						
<i>NO₃</i>	0.43	-0.93**	0.82**	0.49	0.94**	1.00					
<i>PO₄</i>	0.30	-0.39	0.27	0.37	0.73**	0.64*	1.00				
<i>TChl</i>	0.43	-0.55	0.14	0.10	0.24	0.28	-0.05	1.00			
μ_n	0.84**	-0.77**	0.80**	0.71**	0.71**	0.78**	0.50	0.33	1.00		
<i>m</i>	0.62*	-0.73**	0.48	0.25	0.45	0.56	0.27	0.82**	0.69*	1.00	
μ_0	0.80**	-0.68*	0.53	0.68*	0.70*	0.67*	0.55	0.37	0.90**	0.63*	1.00

Note: (*) for $p < 0.05$ and (**) for $p < 0.01$

Table S2 Estimations of growth and grazing rates of each phytoplankton size-class for all the dilution experiments conducted during one-year survey at the Wanshan station. Parameters of regression analysis between apparent growth rate and dilution factors by least-square method are the determination coefficient (R) and the significant level (p).

Date	Total				Micro				Nano				Pico			
	μ	m	R ²	p	μ	m	R ²	p	μ	m	R ²	p	μ	m	R ²	p
2018/06/14	2.18	1.51	0.99	<0.01	2.69	1.93	0.99	<0.01	2.14	1.85	0.99	<0.01	2.38	1.00	0.94	<0.01
2018/07/19	1.16	0.24	0.92	<0.01	0.53	*0.00	0.50	<0.05	1.32	0.29	0.85	<0.05	0.76	0.19	0.93	<0.01
2018/08/20	1.74	2.09	0.95	<0.01	2.21	2.82	0.90	<0.01	1.97	2.42	0.93	<0.01	1.90	1.74	0.87	<0.01
2018/09/20	2.96	1.12	0.97	<0.01	4.87	0.63	0.94	<0.01	2.51	1.08	0.92	<0.01	3.61	2.05	0.95	<0.01
2018/10/16	1.20	*0.00	0.63	<0.01	1.50	0.10	0.82	<0.01	0.92	*0.00	0.69	<0.01	1.86	*0.00	0.55	<0.05
2018/11/19	0.88	0.19	0.86	<0.01	1.23	0.99	0.91	<0.01	0.80	0.30	0.82	<0.01	1.22	*0.00	0.62	<0.01
2018/12/18	0.31	*0.00	0.72	<0.01	0.96	0.03	0.95	<0.01	0.31	0.15	0.94	<0.01	0.47	0.18	0.90	<0.01
2019/01/14	0.10	0.26	0.87	<0.01	0.14	0.13	0.90	<0.01	-0.03	0.39	0.99	<0.01	0.65	0.29	0.77	<0.01
2019/02/25	-0.34	0.15	0.92	<0.01	-0.32	0.74	0.94	<0.01	0.18	1.49	0.96	<0.01	0.19	0.19	0.88	<0.01
2019/04/17	0.19	0.51	0.93	<0.01	2.84	0.46	0.98	<0.01	-1.46	0.26	0.97	<0.01	0.81	0.75	0.95	<0.01
2019/05/27	0.94	1.04	0.95	<0.01	1.26	1.02	0.91	<0.01	-0.49	0.57	0.95	<0.01	1.08	0.76	0.99	<0.01
2019/06/10	1.76	0.70	0.92	<0.01	1.25	0.17	0.87	<0.01	2.00	0.80	0.94	<0.01	2.18	1.70	0.98	<0.01

Note: * Denotes that saturated grazing was detected.

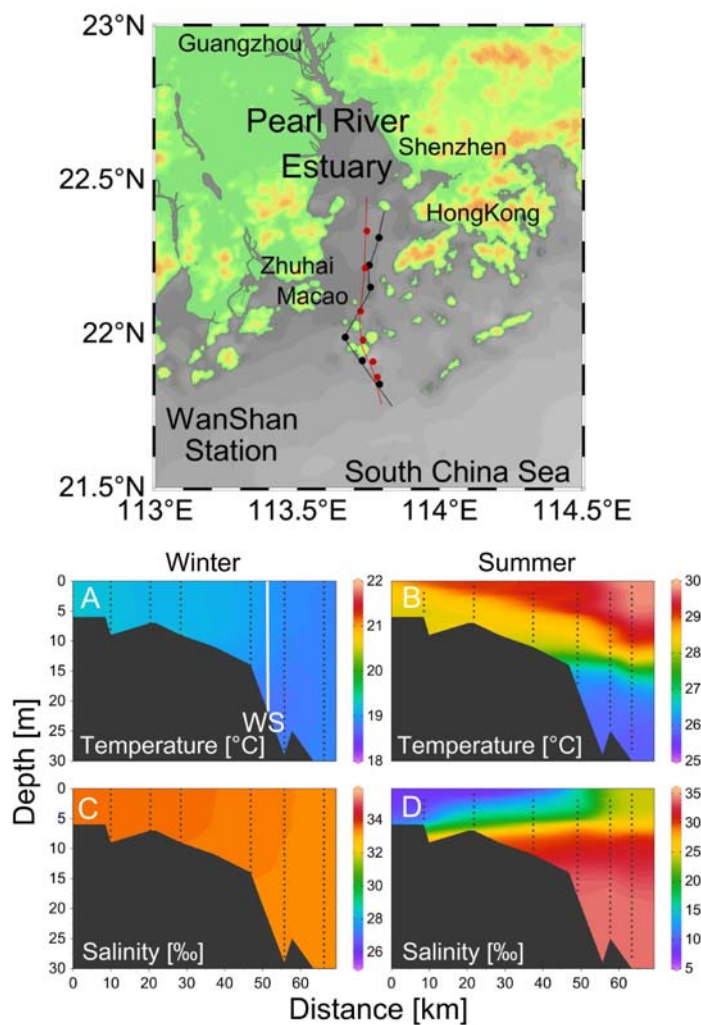


Figure S1 Comparisons of the vertical distributions of temperature and salinity between the winter (December 2006, A and C) and the summer (June 2019, B and D) for the estuary-to-sea transect in the north South China Sea. The white line in panel A shows the location of the WanShan station (WS). Station locations are shown in the map on the top with red for 2019 and black for 2006, respectively.

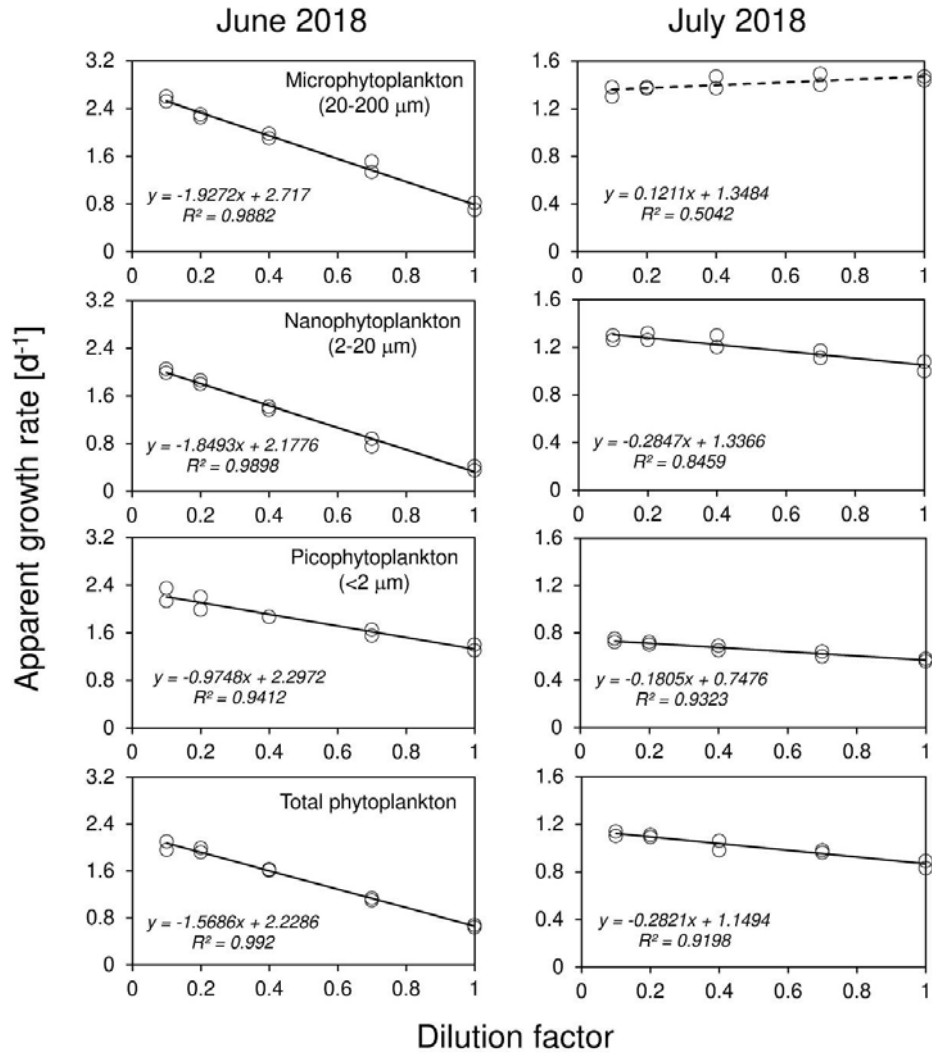


Figure S2 Typical results of dilution experiments at the Wanshan station: examples of a normal linear case in June 2018 (left) and an unusual case of positive slopes in July 2018 (right). A zero grazing rate was assumed for microphytoplankton with a positive slope

50 according to Calbet and Saiz (2013); see text for details.