



*Supplement of*

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

**Yuan Dong et al.**

*Correspondence to:* Qian P. Li (qianli@scsio.ac.cn)

The copyright of individual parts of the supplement might differ from the article licence.

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 dilution experiments, Figure S1 for comparison of the typical vertical hydrology for the estuary-to-sea transect between the winter and the summer, Figure S2 for typical results of size-specific dilution experiments during June and July 2018, and Figure S3 for temporal change in size-selective grazing impacts through the entire year.

10 **Table S1** Pearson correlation analyses between environmental variables and biological rates for surface waters at the Wanshan station. TChl is total Chla [ $\mu\text{g/L}$ ];  $\mu_n$ : nutrient-amended phytoplankton growth rate [ $\text{d}^{-1}$ ];  $m$ : microzooplankton grazing rate [ $\text{d}^{-1}$ ];  $\mu_0$ : natural phytoplankton growth rate [ $\text{d}^{-1}$ ].

	<i>T</i>	<i>S</i>	<i>Flow</i>	<i>Light</i>	<i>SiO<sub>4</sub></i>	<i>NO<sub>3</sub></i>	<i>PO<sub>4</sub></i>	<i>TChl</i>	$\mu_n$	<i>m</i>	$\mu_0$
<i>T</i>	1.00										
<i>S</i>	-0.50	1.00									
<i>Flow</i>	0.53	<b>-0.82**</b>	1.00								
<i>Light</i>	<b>0.76**</b>	-0.48	0.53	1.00							
<i>SiO<sub>4</sub></i>	0.39	<b>-0.85**</b>	<b>0.66*</b>	0.50	1.00						
<i>NO<sub>3</sub></i>	0.43	<b>-0.93**</b>	<b>0.82**</b>	0.49	<b>0.94**</b>	1.00					
<i>PO<sub>4</sub></i>	0.30	-0.39	0.27	0.37	<b>0.73**</b>	<b>0.64*</b>	1.00				
<i>TChl</i>	0.43	-0.55	0.14	0.10	0.24	0.28	-0.05	1.00			
$\mu_n$	<b>0.84**</b>	<b>-0.77**</b>	<b>0.80**</b>	<b>0.71**</b>	<b>0.71**</b>	<b>0.78**</b>	0.50	0.33	1.00		
<i>m</i>	<b>0.62*</b>	<b>-0.73**</b>	0.48	0.25	0.45	0.56	0.27	<b>0.82**</b>	<b>0.69*</b>	1.00	
$\mu_0$	<b>0.80**</b>	<b>-0.68*</b>	0.53	<b>0.68*</b>	<b>0.70*</b>	<b>0.67*</b>	0.55	0.37	<b>0.90**</b>	<b>0.63*</b>	1.00

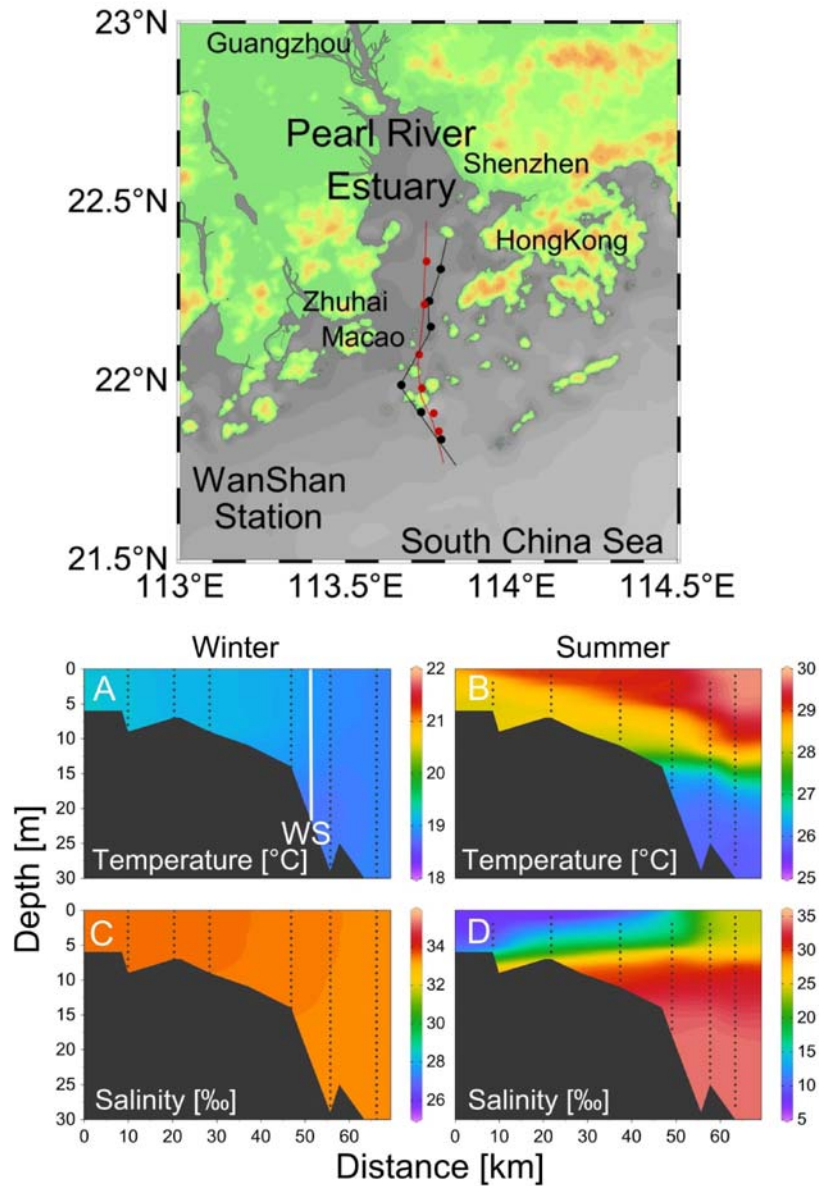
Note: (\*) for  $p < 0.05$  and (\*\*) for  $p < 0.01$

**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 ( $p$ ).

20

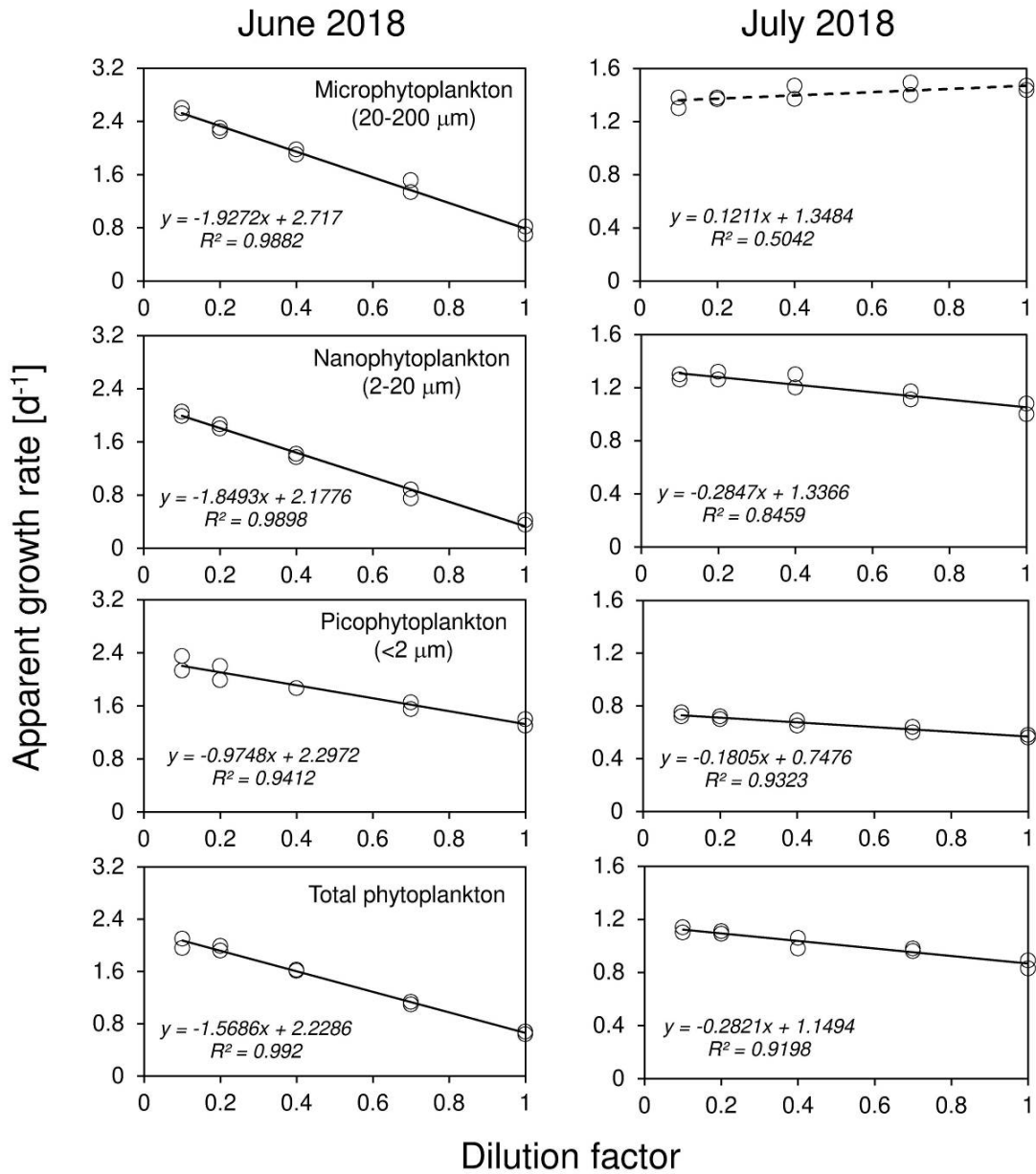
Date	Total				Micro				Nano				Pico			
	$\mu$	m	R <sup>2</sup>	$p$	$\mu$	m	R <sup>2</sup>	$p$	$\mu$	m	R <sup>2</sup>	$p$	$\mu$	m	R <sup>2</sup>	$p$
2018/06/14	2.18	1.51	0.99	<0.01	2.69	1.93	0.99	<0.01	2.14	1.85	0.99	<0.01	2.38	1.00	0.94	<0.01
2018/07/19	1.16	0.24	0.92	<0.01	0.53	*0.00	0.50	<0.05	1.32	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.



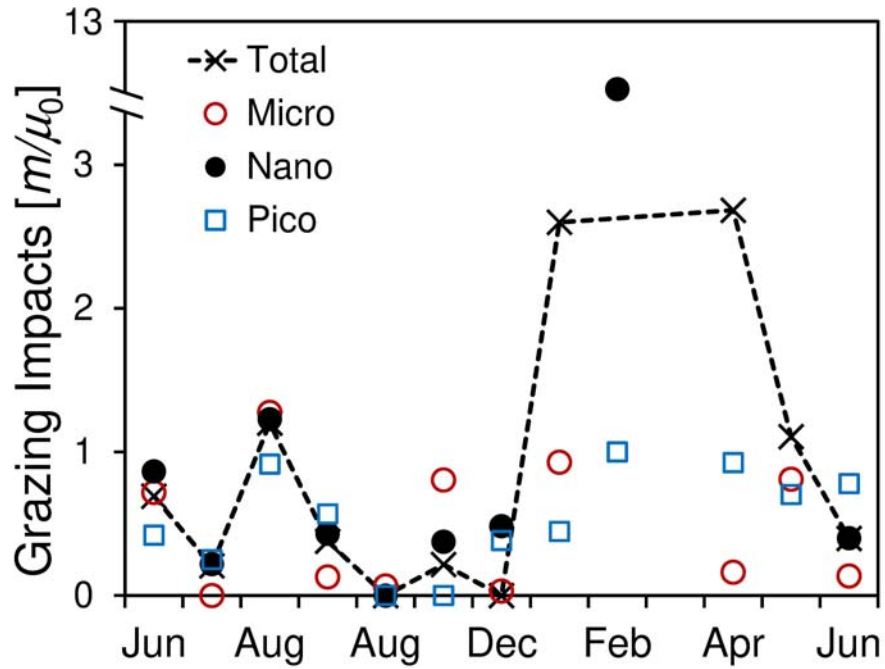
25 **Figure S1** Comparisons of the vertical distributions of temperature and salinity between the winter (December 2006, A and C) and the summer (June 2019, B and D) for the estuary-to-sea transect in the north South China Sea. The white line in panel A shows the location of the WanShan station (WS).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

30



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

35



**Figure S3** Temporal variations of microzooplankton grazing impacts on various

40 phytoplankton size-classes in the surface water at the Wanshan station from June 2018 to  
June 2019.