Supplementary Materials:

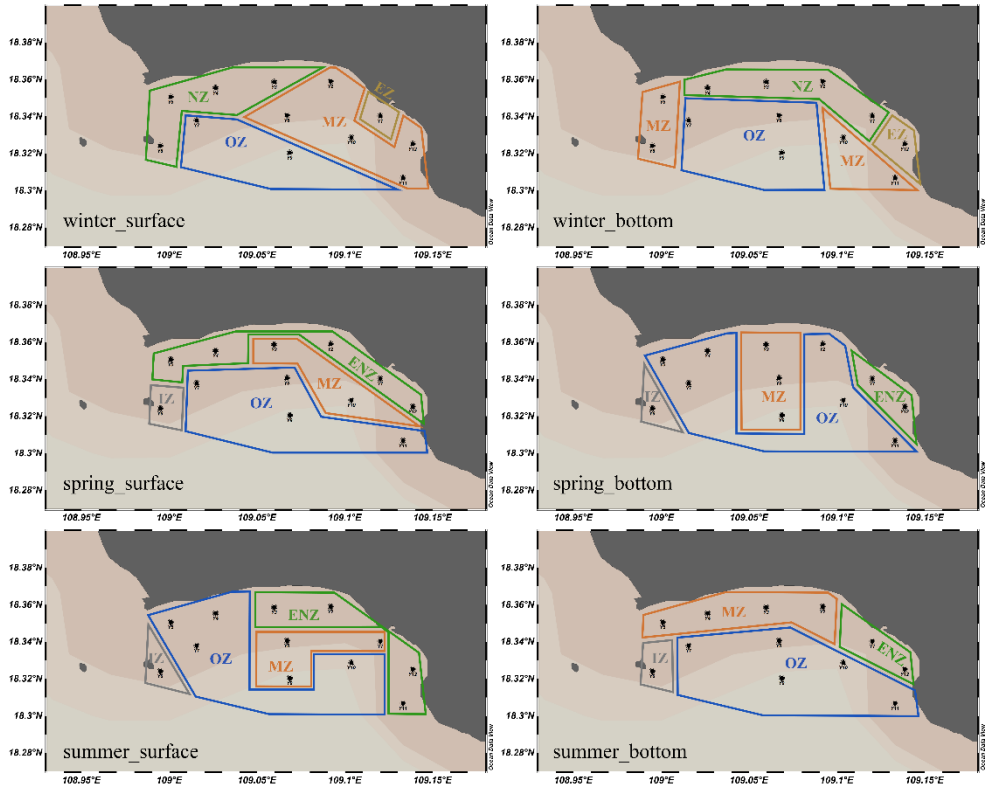

Figure S1. Phytoplankton subcommunity division in the surface and bottom water layers of Yazhou Bay.

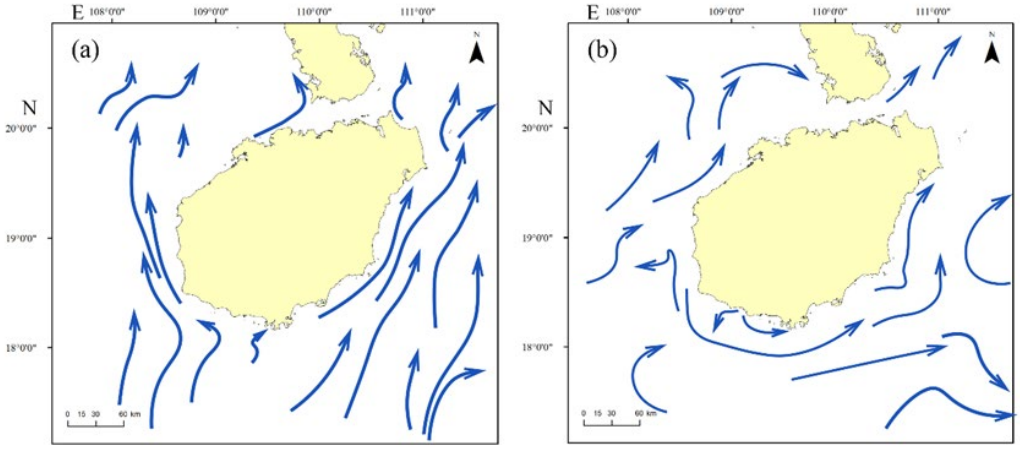

Figure S2. Schematic illustration of ocean currents in spring (**a**) and summer (**b**), adapted from real-time ocean current model results [60]. The blue arrows indicate the direction of the ocean currents.

Table S1. Abundance (10^4 cells·L^{-1}), Shannon–Wiener diversity index (H'), and Pielou evenness index (J) in the surface and bottom water layers of Yazhou Bay across three seasons.

Seasons		Surface	Range of Surface	Bottom	Range of Bottom	Average in Total	Range in Total
Winter	abundance	2.52 ± 0.46	1.01–6.50	3.30 ± 0.34	1.51–5.83	2.91 ± 0.28	1.01–6.50
	H'	4.13 ± 0.13	3.22–4.80	4.64 ± 0.08	4.09–5.05	4.38 ± 0.09	3.23–5.05
	J	0.82 ± 0.02	0.61–0.89	0.85 ± 0.01	0.75–0.88	0.83 ± 0.01	0.61–0.89
Spring	abundance	1.68 ± 1.04	0.09–12.96	0.96 ± 0.39	0.08–4.16	1.33 ± 0.53	0.08–12.96

	H′	3.00 ± 0.23	1.49–4.00	3.58 ± 0.22	2.00–4.32	3.29 ± 0.17	1.49–4.32
	J	0.76 ± 0.06	0.35–1	0.82 ± 0.05	0.46–0.96	0.79 ± 0.04	0.35–1
	abundance	1.59 ± 0.43	0.25–5.37	6.34 ± 1.19	1.45–14.30	3.96 ± 0.76	0.25–14.30
Summer	*H′*	4.00 ± 0.09	3.47–4.46	4.39 ± 0.10	3.51–4.74	4.20 ± 0.08	3.47–4.74
	J	0.87 ± 0.02	0.75–0.95	0.80 ± 0.02	0.69–0.90	0.83 ± 0.01	0.69–0.95

Table S2. Dominant species of subcommunities in the surface and bottom layers of Yazhou Bay.

Winter_Surface	**EZ**	**NZ**	**MZ**	**OZ**
	P. pungens	*P. pungens*	*P. pungens*	*T. thiebautii*
	L. danicus	*R. sinensis*	*R. sinensis*	*C. affinis*
	Thalassiosira sp.	*R. alata f.genuina*	*L. danicus*	*B. varians*
Winter_Bottom	EZ	NZ	MZ	OZ
	P. pungens	*P. pungens*	*R. sinensis*	*R. sinensis*
	R. sinensis	*R. sinensis*	*B. varians*	*C. affinis*
	L. danicus	*M. sulcata*	*C. affinis*	*C. socialis*
Spring_Surface	IZ	ENZ	MZ	OZ
	Nitzschia sp.	*S. costatum*	*M. sulcata*	*P. pungens*
	N. longissima	*P. pungens*	--	*N. longissima*
	N. closterium	*Nitzschia* sp.	--	*Gyrodinium spirals*
Spring_Bottom	IZ	ENZ	MZ	OZ
	Nitzschia sp.	*S. costatum*	*S. costatum*	*P. pungens*
	N. longissima	*P. pungens*	*P. pungens*	*Nitzschia* sp.
	P. pungens	*N. longissima*	*Nitzschia* sp.	*R. setigera*
Summer_Surface	IZ	ENZ	MZ	OZ
	B. comosum	*L. danicus*	*C. lorenzianus*	*C. affinis*
	Lauderia annuluta	*Pseudo-nitzschia* sp.	*C. pseudocurvisetus*	*P. pungens*
	C. affinis	*C. lorenzianus*	*C. affinis*	*L. annuluta*
Summer_Bottom	IZ	ENZ	MZ	OZ
	A. glacialis	*Pseudo-nitzschia* sp.	*C. curvisetus*	*P. pungens*
	Bellerochea horologicalis	*C. curvisetus*	*L. danicus*	*C. socialis*
	C. curvisetus	*L. danicus*	*C. affinis*	*C. curvisetus*

Table S3. Pearson correlation analysis between total abundance and environmental factors (*: $p < 0.05$).

Seasons	**Sal**	**Temp**	**NH_4^+**	**SiO_3^-**	**NO_3^-**	**DIN**	**PO_4^{3-}**	**N/P**	**N/Si**
winter	−0.4529	−0.5925	−0.4620	0.5110	−0.0321*	−0.2577	0.1911	−0.4009	−0.2541
spring	−0.7122	0.2004	0.1357	0.4807	−0.1197	0.0766	−0.1273	0.1659	−0.2453
summer	0.4494	−0.6771	−0.0825	−0.3438	−0.1637	−0.1279	−0.3207	0.2489	0.0930