

Interactive effects of nutrients and salinity on phytoplankton in subtropical plateau lakes of contrasting water depth

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Table S1 Results of GAM model parameters for TN, TP, and Cond relative to phytoplankton variables in the studied lakes.

	Response variables	Explanatory variables	Species	edf	F	P	dev,expl (%)	R ²	k
Figure 2	Species Number (SN)	TN	total	1.659	101.10		38.70	0.383	3
			Cyna	1.973	199.60	< 0.001	58.20	0.580	
			Chlo	1.561	95.27		36.20	0.359	
			Baci	1.872	4.11	0.023	2.94	0.023	
		TP	total	1.785	84.82		35.50	0.351	
			Cyna	1.933	69.71	< 0.001	32.00	0.315	
			Chlo	1.181	135.1		37.70	0.374	
			Baci	1.000	0.075	0.784	0.03	0.003	
		Cond	total	1.988	58.91		29.20	0.287	
			Cyna	1.992	106.6	< 0.001	42.60	0.422	
			Chlo	1.979	53.67		27.50	0.270	
			Baci	1.918	25.7		14.80	0.143	

Figure S3	Density	TN	total	1.835	298.10	< 0.001	66.50	0.663	3
			Cyna	1.000	579.80		66.60	0.665	
			Chlo	1.915	126.80		46.10	0.458	
			Baci	1.847	96.10		39.90	0.395	
		TP	total	1.982	171.90		54.10	0.538	
			Cyna	1.982	154.50		51.40	0.511	
			Chlo	1.925	159.90		52.00	0.517	
			Baci	1.904	60.12		29.60	0.291	
		Cond	total	1.997	257.80		64.10	0.638	
			Cyna	1.998	288.10		66.60	0.664	
			Chlo	1.992	89.92		38.60	0.382	
			Baci	1.992	66.95		32.80	0.323	
Figure 3	Biomass	TN	total	1.934	168.40		53.30	0.530	
			Cyna	1.429	336.20		66.50	0.664	
			Chlo	1.883	34.80		18.70	0.182	
			Baci	1.626	125.90		44.90	0.445	
		TP	total	1.983	167.70		53.50	0.532	
			Cyna	1.983	166.50		53.30	0.530	
			Chlo	1.891	77.25		34.10	0.336	
			Baci	1.899	71.65		33.40	0.329	
		Cond	total	1.996	161.90		52.90	0.526	
			Cyna	1.998	295.80		67.20	0.669	
			Chlo	1.973	26.23		15.80	0.153	
			Baci	1.993	72.48		34.60	0.341	

Figure 4	Percentage shares of density (%)	TN	Cyna	2.650	114.10	< 0.001	53.40	0.530	4
			Chlo	2.535	79.28		44.30	0.438	
		TP	Cyna	2.567	28.35		23.70	0.230	5
			Chlo	2.760	15.74		15.70	0.149	
		Cond	Cyna	1.992	122.80		46.10	0.457	3
			Chlo	1.988	68.72		32.50	0.320	
	Percentage shares of biomass (%)	TN	Cyna	2.966	61.67	< 0.001	42.90	0.423	5
			Chlo	2.113	52.88		32.70	0.322	
		TP	Cyna	3.743	27.82		27.70	0.268	
			Chlo	3.798	10.21		12.90	0.117	
		Cond	Cyna	1.992	86.41		37.60	0.372	
			Chlo	1.986	44.50		23.80	0.233	
Figure S4	TN:TP	TP		1.343	47.72	0.116	19.70	0.193	3
		Z _M	/	1.775	1.91		1.80	0.012	
		Cond		1.855	11.03		6.73	0.061	

Table S2 Results of summer GAM model parameters for TN, TP and Cond relative to phytoplankton variables in the studied lakes.

	Response variables	Explanatory variables	Species	edf	F	P	dev,expl (%)	R ²	k
Figure S5	Species number (SN)	TN	total	1.000	70.60		49.50	0.488	3
			Cyna	1.000	71.34	< 0.001	49.80	0.491	
			Chlo	1.386	50.75		52.20	0.513	
			Baci	1.872	3.42	0.034	10.40	0.080	
		TP	total	1.000	190.80		72.60	0.722	
			Cyna	1.588	55.13	< 0.001	60.30	0.594	
			Chlo	1.393	80.31		65.90	0.652	
			Baci	1.445	0.64	0.614	2.10	0.001	
		Cond	total	1.980	24.39		41.20	0.395	
			Cyna	1.980	26.42	< 0.001	43.30	0.417	
			Chlo	1.972	17.80		34.20	0.323	
			Baci	1.000	5.48	0.022	7.26	0.059	
Figure S6	Density	TN	total	1.800	43.10		56.00	0.549	3
			Cyna	1.521	49.39		56.90	0.559	
			Chlo	1.257	34.68		42.80	0.418	
			Baci	1.863	16.03		34.10	0.323	
		TP	total	1.000	116.60		61.80	0.613	
			Cyna	1.000	107.10	< 0.001	59.80	0.592	
			Chlo	1.483	98.43		71.50	0.709	
			Baci	1.000	58.22		45.80	0.450	
		Cond	total	1.990	51.45		59.40	0.583	
			Cyna	1.991	59.02		62.70	0.616	
			Chlo	1.977	21.82		38.50	0.368	
			Baci	1.911	5.66	0.006	14.90	0.125	

Figure S7	Biomass	TN	total	1.805	24.42	< 0.001	42.50	0.411	3
			Cyna	1.227	58.11		54.30	0.535	
			Chlo	1.557	6.32	0.003	16.80	0.150	
			Baci	1.828	18.25		37.00	0.353	
		TP	total	1.775	75.06	< 0.001	66.40	0.655	
			Cyna	1.000	117.30		62.00	0.614	
			Chlo	1.000	65.62		47.70	0.470	
			Baci	1.558	32.62		48.60	0.474	
		Cond	total	1.987	41.23	0.059	53.90	0.526	
			Cyna	1.992	61.65		63.70	0.627	
			Chlo	1.958	17.36		32.80	0.310	
			Baci	1.855	3.02		9.10	0.066	
Figure S8	Percentage shares of density (%)	TN	Cyna	2.306	16.67	< 0.001	39.80	0.379	4
			Chlo	1.000	23.37		24.50	0.235	
		TP	Cyna	1.000	15.83	0.007	18.00	0.169	
			Chlo	1.000	7.77		9.74	0.085	
		Cond	Cyna	1.979	46.95	< 0.001	57.60	0.564	3
			Chlo	1.931	15.54		32.10	0.302	
		TN	Cyna	2.876	21.52	0.007	48.00	0.459	
			Chlo	1.000	24.86		25.70	0.246	
		TP	Cyna	1.000	20.96	< 0.001	22.50	0.215	3
			Chlo	1.000	7.79		9.76	0.085	
		Cond	Cyna	1.979	31.54		47.80	0.463	
			Chlo	1.932	13.73		29.50	0.276	

Table S3 Results of GAM model parameters for TN, TP and Cond relative to phytoplankton variables based on lake-specific data of four seasons in the studied lakes.

	Response variables	Explanatory variables	Species	edf	F	P	dev,expl (%)	R ²	k
Figure S9	Species number (SN)	TN	total	1.000	25.93		46.40	0.446	3
			Cyna	1.119	40.17	< 0.001	63.00	0.616	
			Chlo	1.000	26.26		46.70	0.449	
			Baci	1.833	2.56	0.101	16.80	0.115	
		TP	total	1.000	26.75		47.10	0.454	
			Cyna	1.000	16.16	< 0.001	35.00	0.328	
			Chlo	1.000	30.95		50.80	0.491	
			Baci	1.000	0.13	0.722	0.43	0.029	
		Cond	total	1.890	5.99	0.005	32.30	0.279	
			Cyna	1.954	17.51	< 0.001	56.10	0.532	
			Chlo	1.794	5.38	0.007	31.00	0.268	
			Baci	1.396	5.77	0.025	21.40	0.188	
Figure S10	Density	TN	total	1.000	85.58		74.00	0.732	3
			Cyna	1.000	83.54		73.60	0.727	
			Chlo	1.160	37.64		61.20	0.597	
			Baci	1.748	12.90	< 0.001	44.30	0.410	
		TP	total	1.822	16.22		50.90	0.478	
			Cyna	1.794	14.49		47.80	0.445	
			Chlo	1.793	38.16		70.90	0.691	
			Baci	1.342	10.89	0.002	34.60	0.316	
		Cond	total	1.976	26.74		65.60	0.632	
			Cyna	1.977	29.17	< 0.001	67..5	0.652	
			Chlo	1.928	9.81		42.60	0.388	
			Baci	1.880	3.60	0.039	22.10	0.170	

Figure S11	Biomass	TN	total	1.424	31.48	< 0.001	62.50	0.607	3
			Cyna	1.000	86.70		74.30	0.734	
			Chlo	1.251	7.99	0.008	26.40	0.233	
			Baci	1.827	13.85		47.00	0.437	
		TP	total	1.926	27.33	< 0.001	64.70	0.623	
			Cyna	1.793	15.93		50.10	0.470	
			Chlo	1.854	22.37		59.20	0.566	
			Baci	1.185	12.78		35.10	0.325	
		Cond	total	1.966	16.76	0.129	54.70	0.517	
			Cyna	1.980	31.89		69.30	0.672	
			Chlo	1.723	1.85		15.40	0.104	
			Baci	1.870	3.30		20.60	0.155	
Figure S12	Percentage shares of density (%)	TN	Cyna	2.316	21.88	< 0.001	68.50	0.659	4
			Chlo	2.259	14.07		58.30	0.551	
		TP	Cyna	1.000	4.24	0.048	12.40	0.095	
			Chlo	1.000	2.64		8.09	0.050	
		Cond	Cyna	2.592	15.96	< 0.001	61.30	0.578	3
			Chlo	2.695	11.82		54.30	0.499	
		TN	Cyna	1.000	31.31	0.015	51.10	0.494	4
			Chlo	1.273	13.03		37.80	0.352	
		TP	Cyna	1.000	6.68	0.217	18.20	0.155	
			Chlo	1.000	1.59		5.02	0.019	
		Cond	Cyna	1.946	11.11	0.002	45.20	0.415	3
			Chlo	1.925	7.23		35.50	0.313	

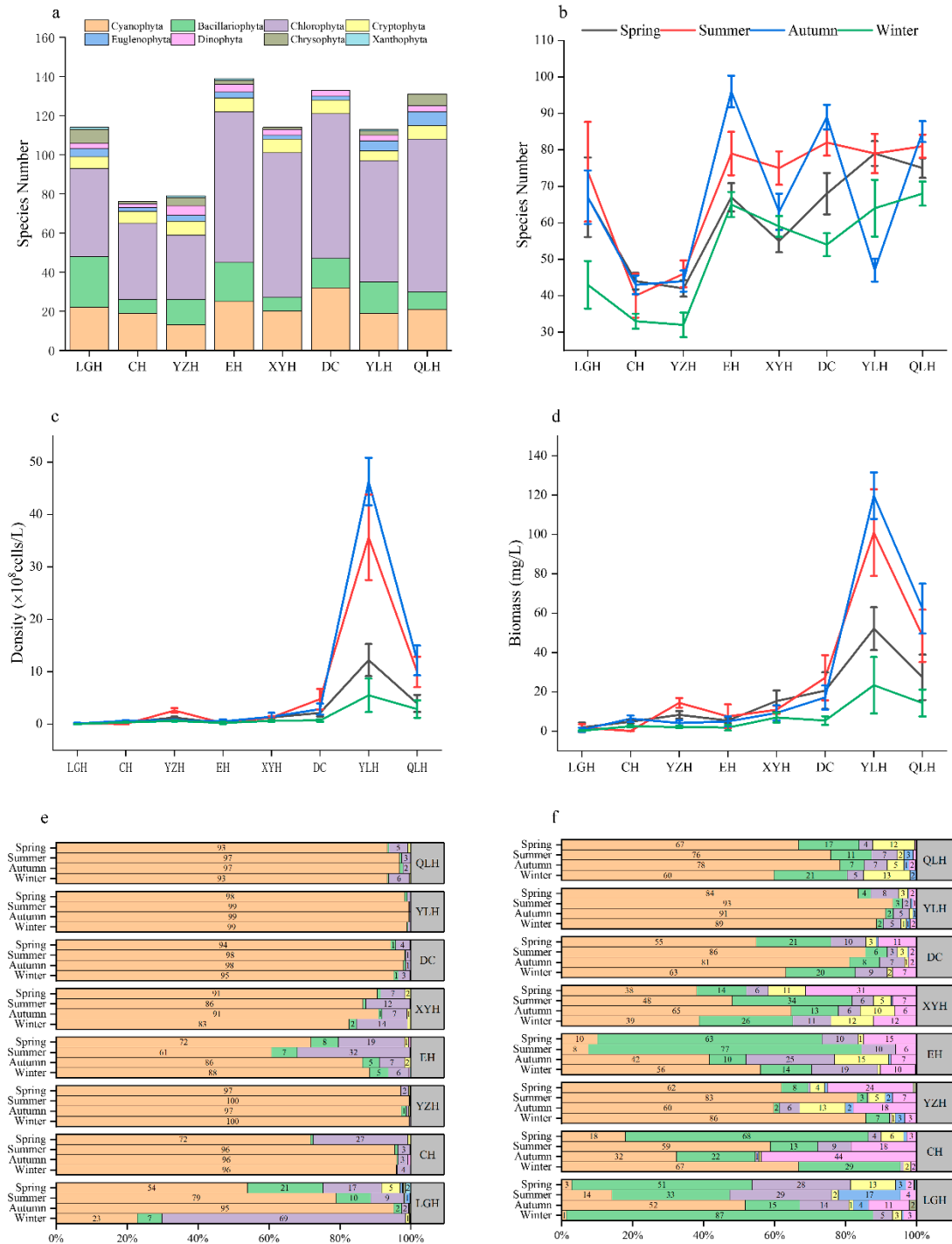


Figure S1 Phytoplankton assemblage structure in the eight studied lakes. Species number of the eight major taxa (a) and species number in the four seasons (b). Density (c) and biomass (d) of the main phytoplankton groups, and percentage shares of density (e) and biomass (f) of phytoplankton in the studied lakes in the four seasons. Explanation of lake name abbreviations are given in Figure 1. The lakes are sorted from left to right by nutrient status from lowest to highest.

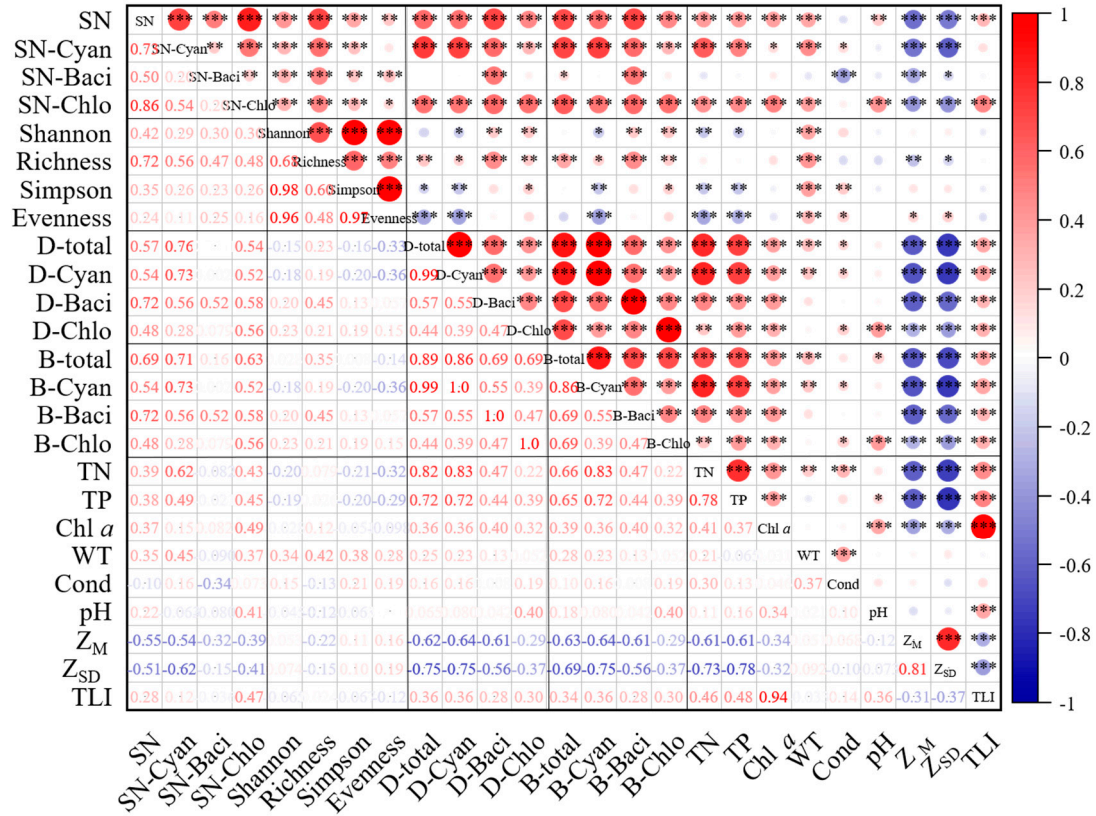


Figure S2 Spearman correlation analysis of the relationship between phytoplankton and environmental factors (* $P \leq 0.05$, ** $P \leq 0.01$, * $P \leq 0.001$).**

SN, species number; Cyanophyta, Cyan; Chlorophyta, Chlo; Bacillariophyta, Baci; D, density; B, biomass; TN, total nitrogen; TP, total phosphorus; Chl *a*, phytoplankton chlorophyll *a*; WT, water temperature; Cond, conductivity; Z_M, mean depth; Z_{SD}, Secchi depth.

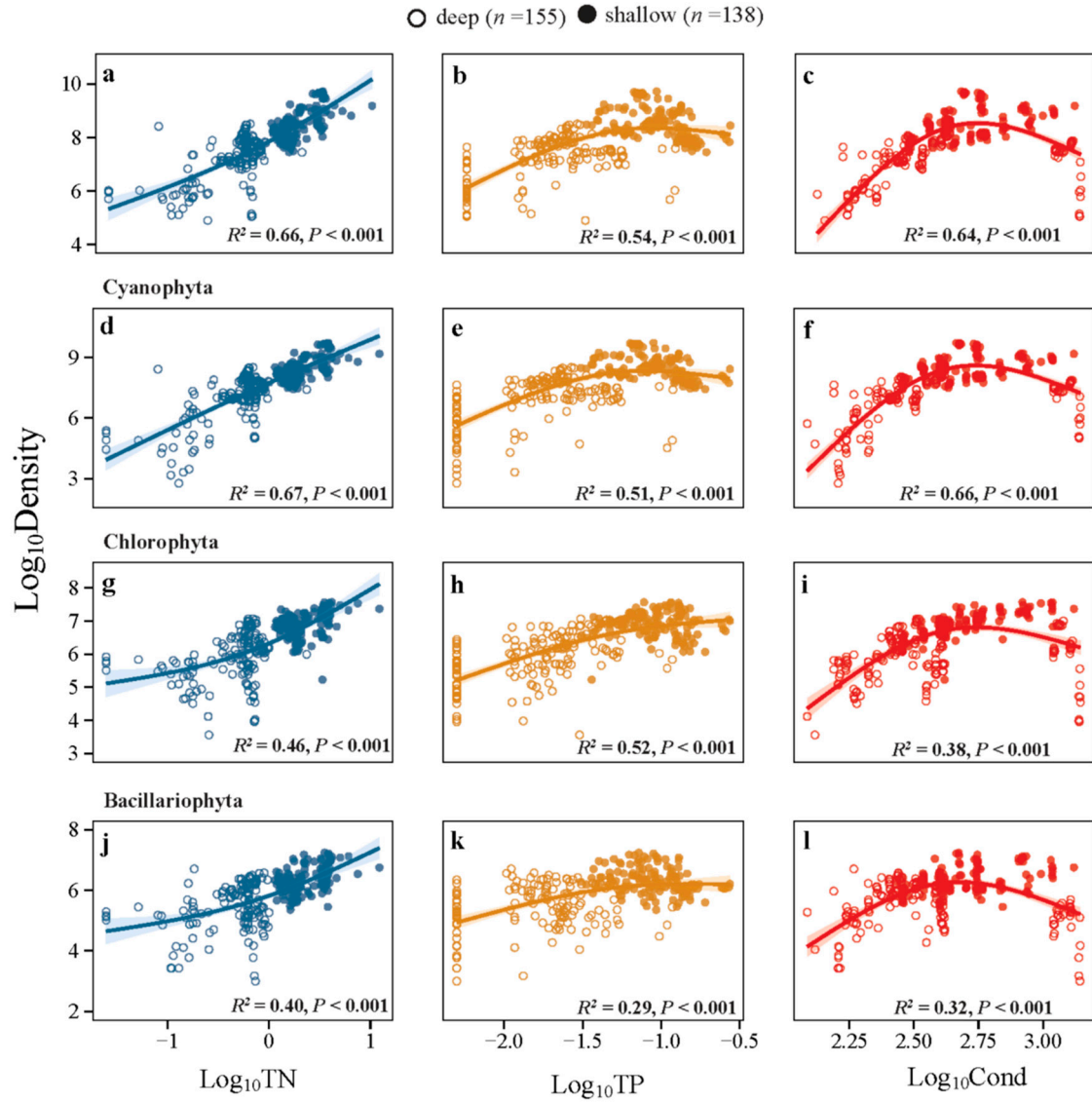


Figure S3 Generalized additive model results showing the relationships of TN, TP, and Cond with Density (a-c), total (a-c), Cyanophyta (d-f), Chlorophyta (g-i), and Bacillariophyta (j-l) in the studied lakes See Figure 3 and Table S2 for model parameters used in the classification of deep and shallow lakes.

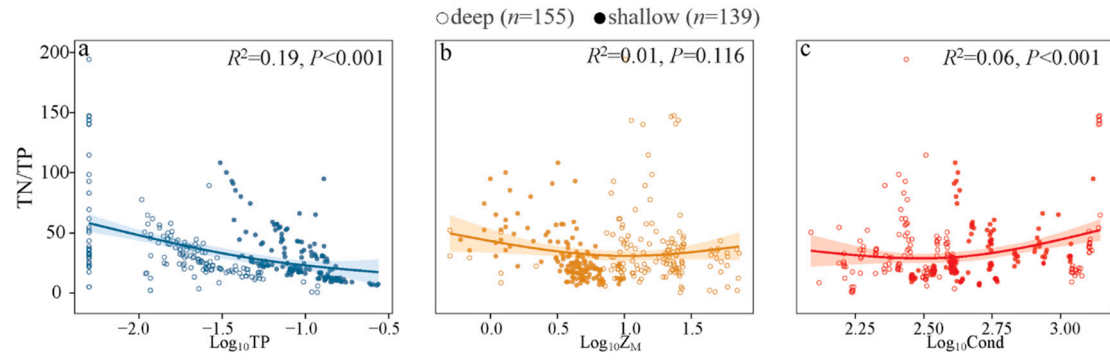


Figure S4 Generalized additive model results showing the relationships of TP, Z_M , and Cond with TN/TP in the studied lakes. See Figure 3 and Table S2 for model parameters used in the classification of deep and shallow lakes.

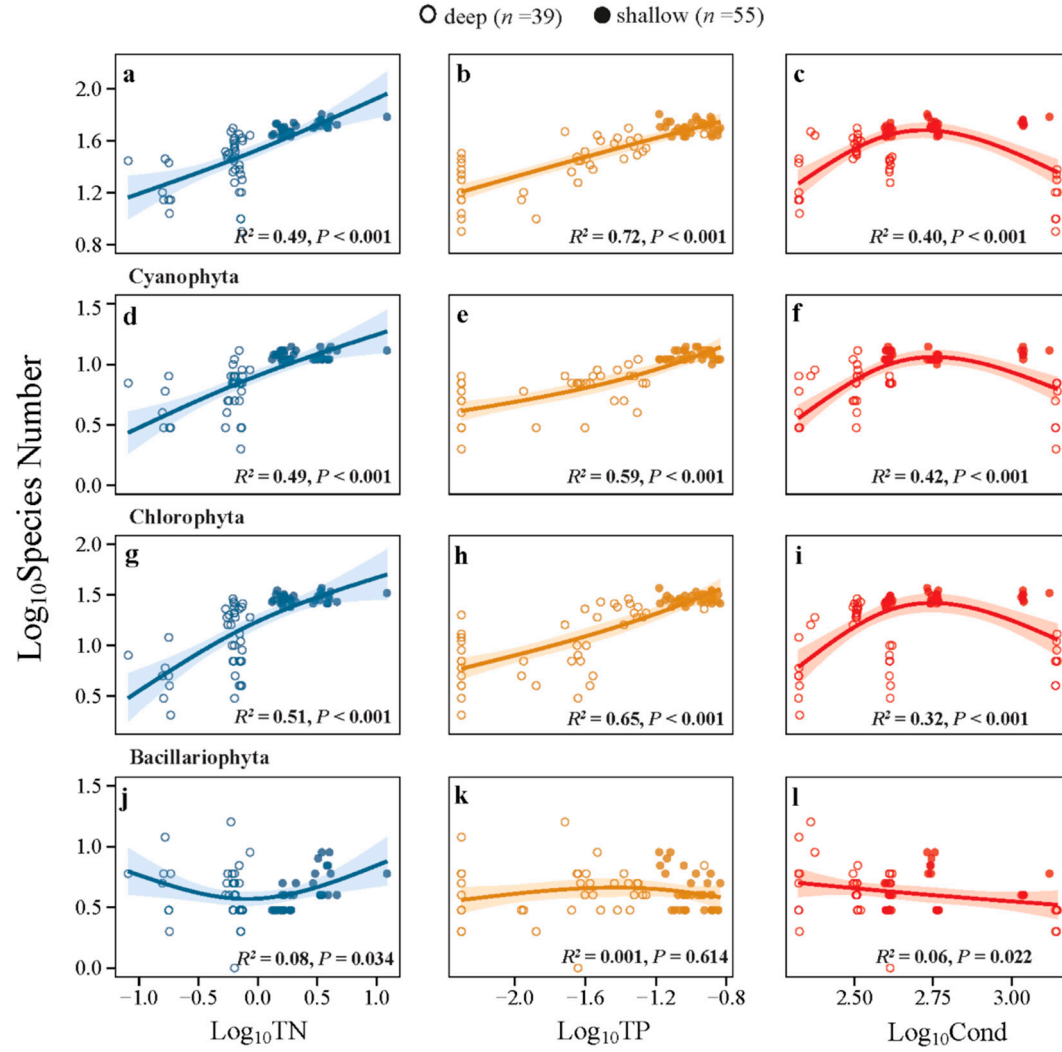


Figure S5 Generalized additive model showing the summer relationships of TN, TP, and Cond with Species number: total (a-c), Cyanophyta (d-f), Chlorophyta (g-i), and Bacillariophyta (j-l) in the studied lakes. See Figure 3 and Table S2 for model parameters used in the classification of deep and shallow lakes.

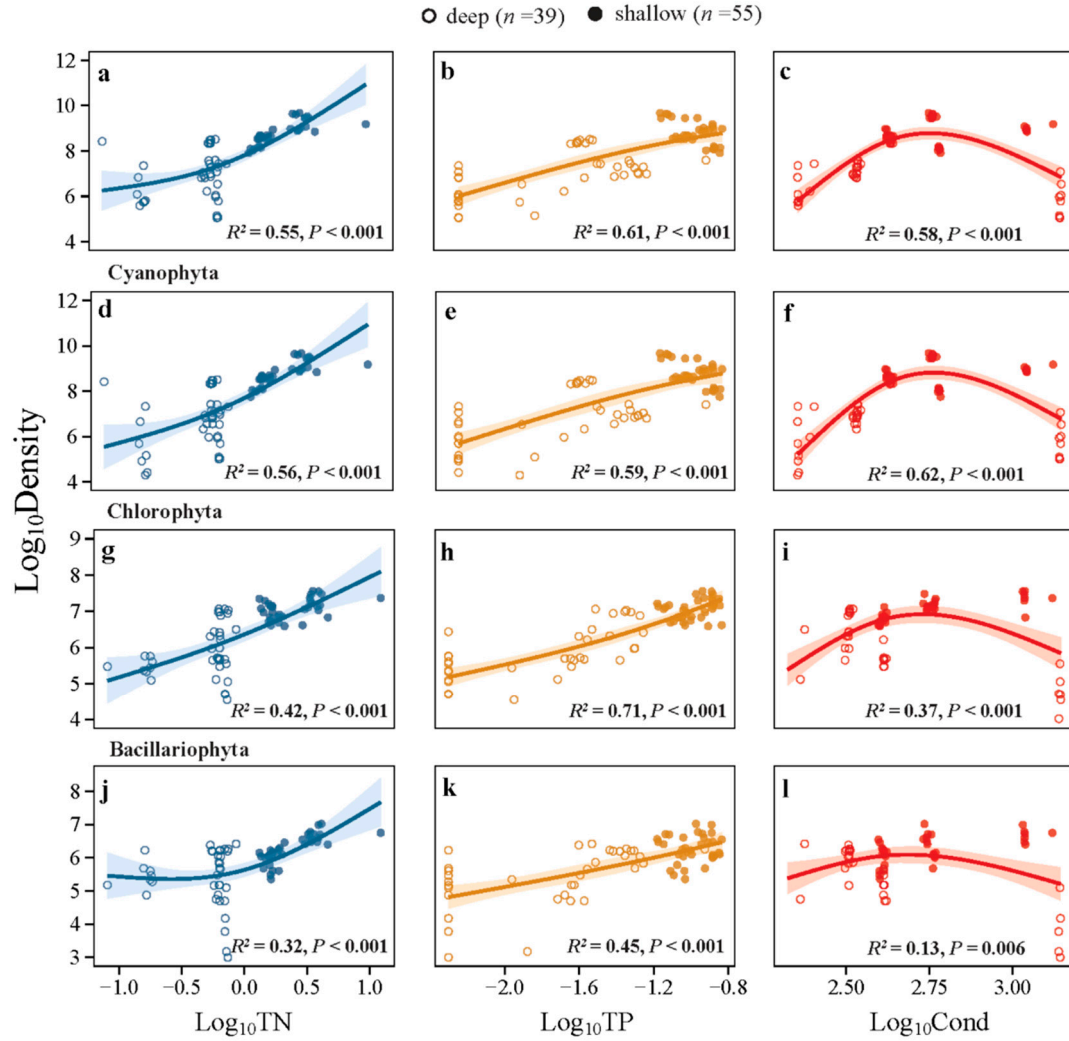


Figure S6 Generalized additive model showing the summer relationships of TN, TP, and Cond with Density: total (a-c), Cyanophyta (d-f), Chlorophyta (g-i), and Bacillariophyta (j-l) in the studied lakes. See Figure 3 and Table S2 for model parameters used in the classification of deep and shallow lakes.

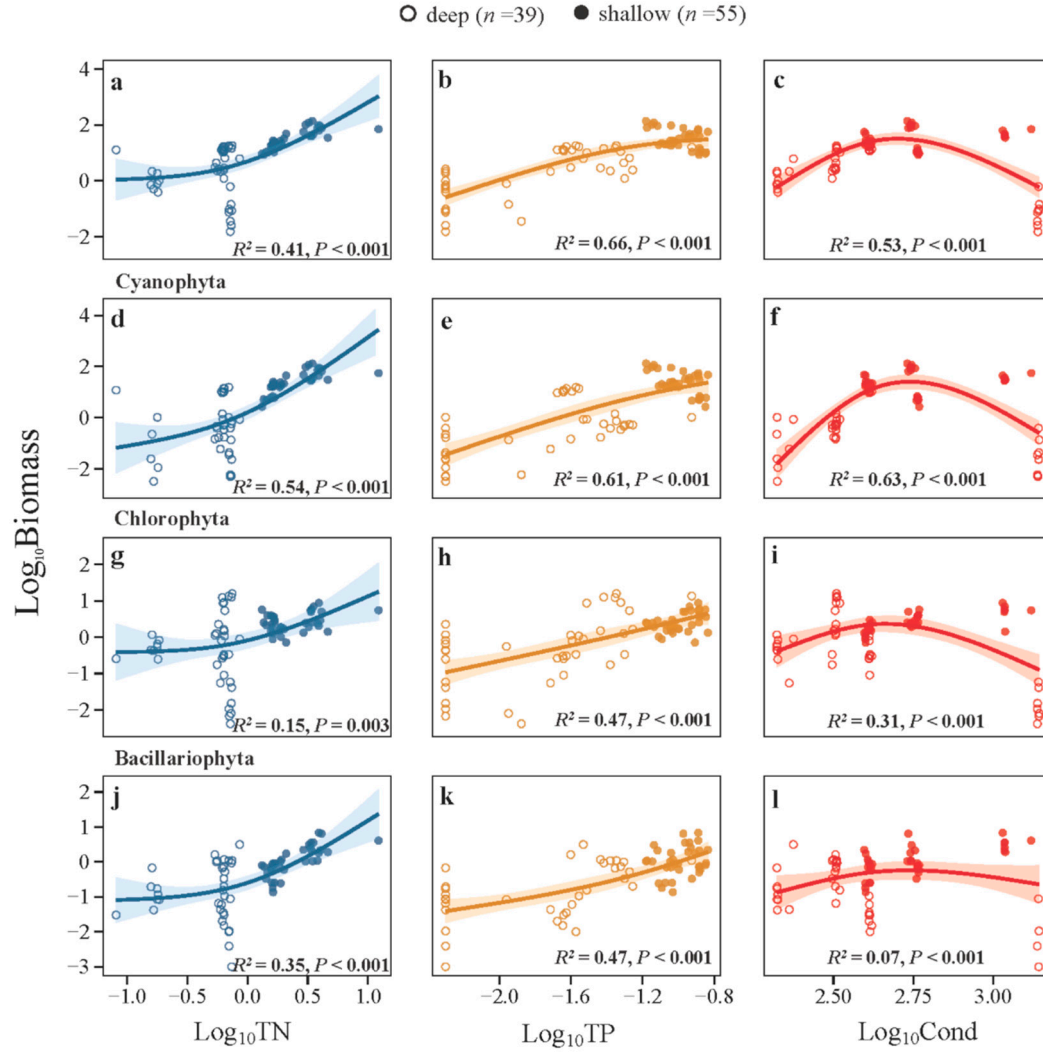


Figure S7 Generalized additive model showing the summer relationships of TN, TP, and Cond with Biomass: total (a-c), Cyanophyta (d-f), Chlorophyta (g-i), and Bacillariophyta (j-l) in the studied lakes. See Figure 3 and Table S2 for model parameters used in the classification of deep and shallow lakes.

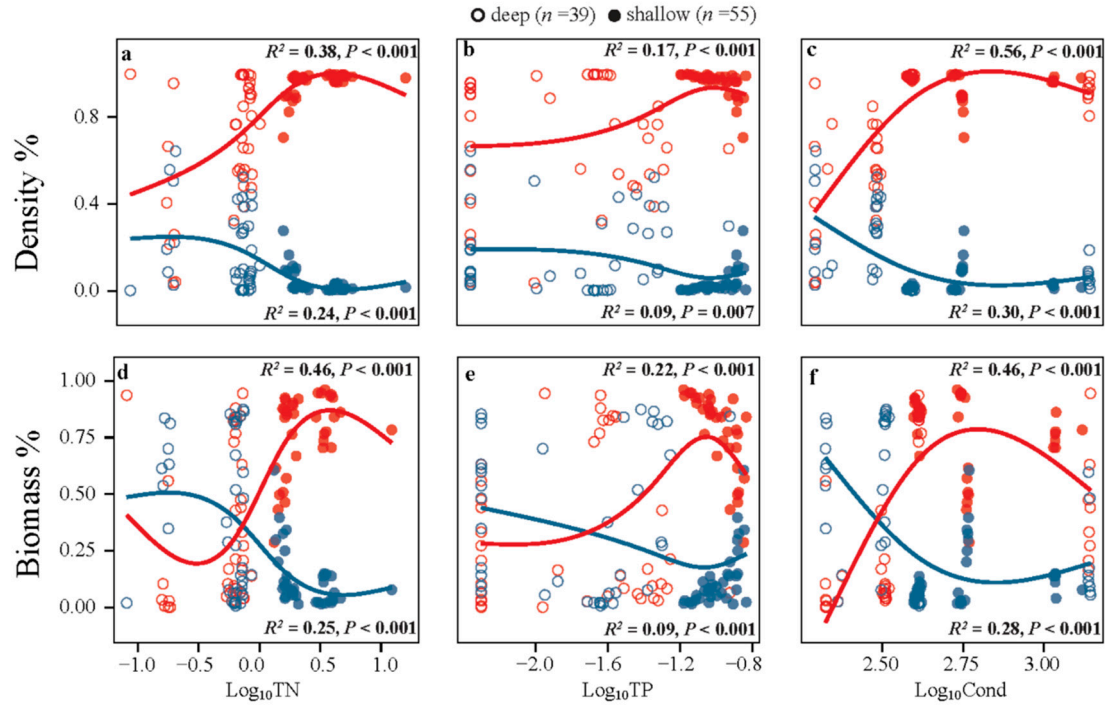


Figure S8 Generalized additive model measurements of the summer percentage share relationships of TN, TP, and Cond with Density (a-c) and Biomass (d-f) of Cyanophyta and Chlorophyta in the studied lakes. For the classification of deep and shallow lakes see Figure 3 and Table S2 for model parameters.

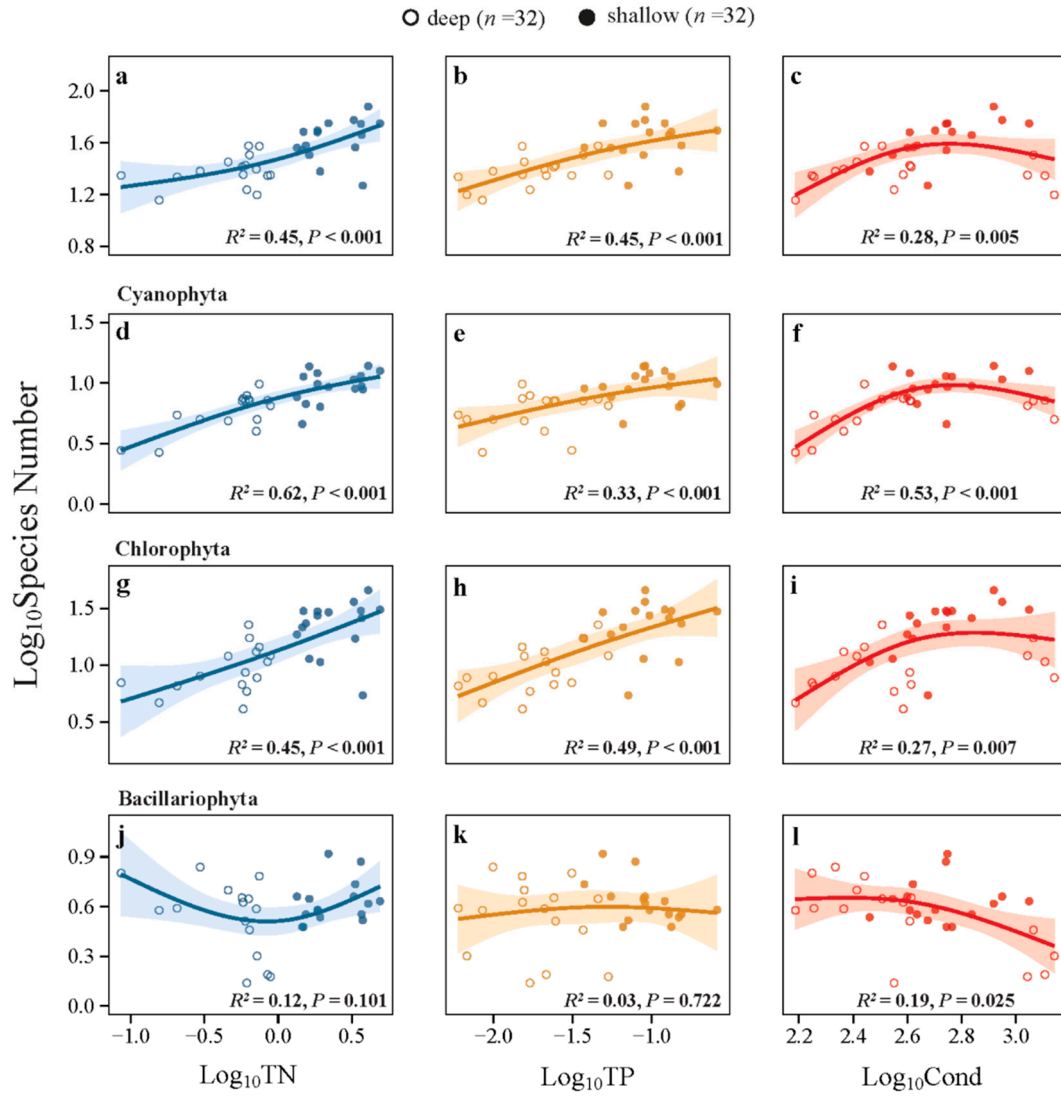


Figure S9 Generalized additive model of the relationships of TN, TP, and Cond with Species number of total phytoplankton (a-c), Cyanophyta (d-f), Chlorophyta (g-i), and Bacillariophyta (j-l) based on lake-specific data of four seasons in the studied lakes. For the classification of deep and shallow lakes see Figure 3 and Table S3 for model parameters.

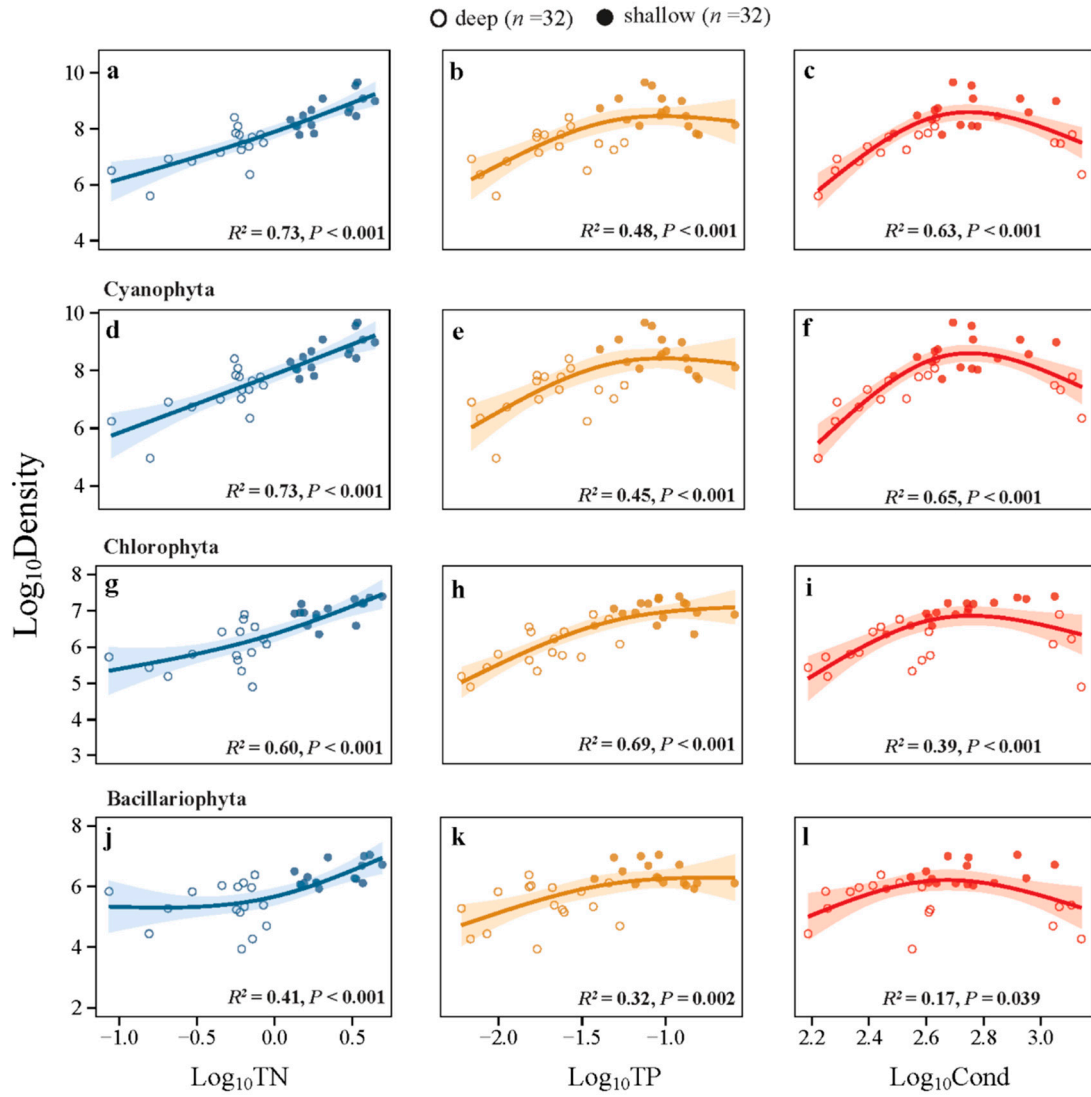


Figure S10 Generalized additive model of the relationships of TN, TP, and Cond with Density (a-c), total (a-c), Cyanophyta (d-f), Chlorophyta (g-i), and Bacillariophyta (j-l) based on lake-specific data of four seasons in the studied lakes. For the classification of deep and shallow lakes see Figure 3 and Table S3 for model parameters.

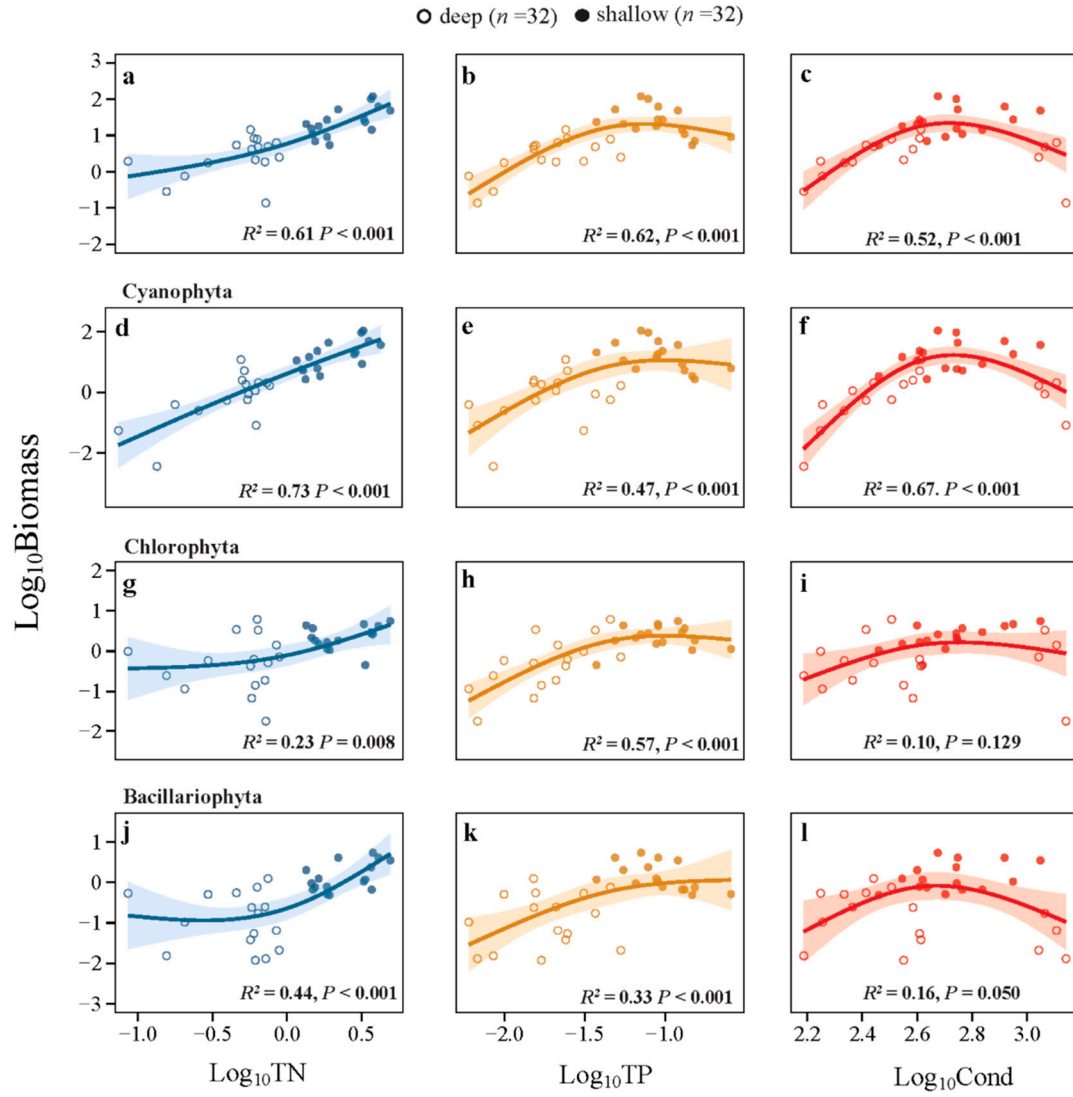


Figure S11 Generalized additive model of the relationships of TN, TP, and Cond with Biomass (a-c), total (a-c), Cyanophyta (d-f), Chlorophyta (g-i), and Bacillariophyta (j-l) based on lake-specific data of four seasons in the studied lakes. For the classification of deep and shallow lakes see Figure 3 and Table S3 for model parameters.

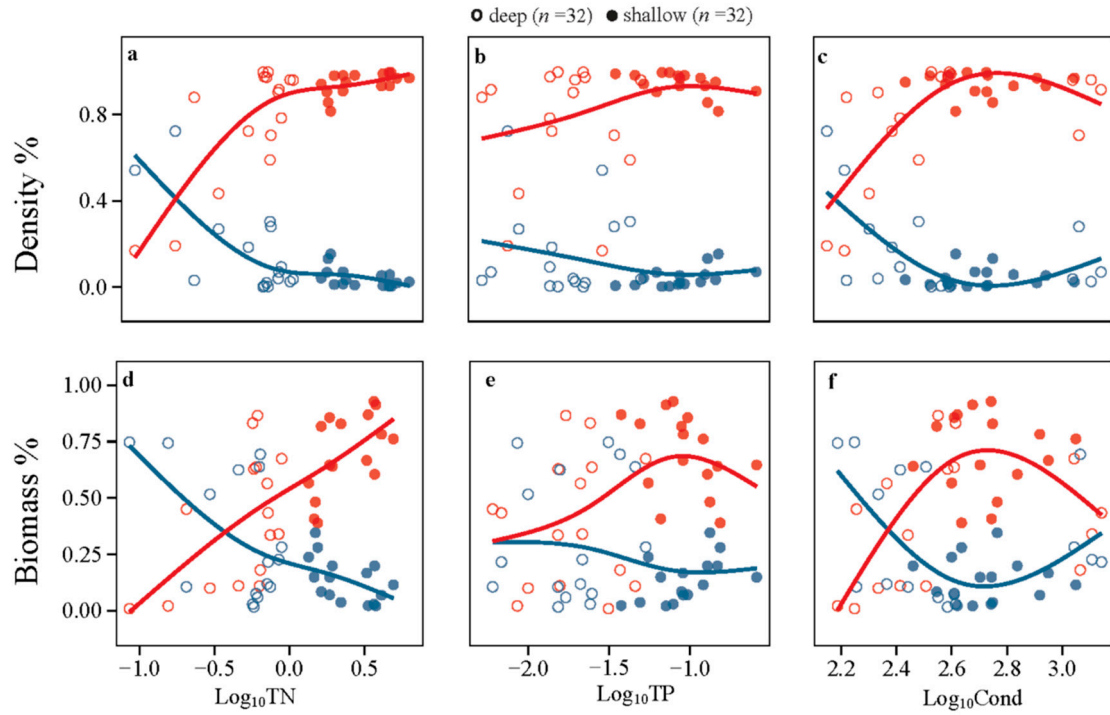


Figure S12 Generalized additive model measurements of the percentage share relationships of TN, TP, and Cond with Density (a-c) and Biomass (d-f) of Cyanophyta and Chlorophyta based on lake-specific data of four seasons in the studied lakes. For the classification of deep and shallow lakes see Figure 3 and Table S3 for model parameters.