Supplementary Materials

Generalised linear models for Prediction of Dissolved Oxygen in a Waste Stabilisation Pond

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Supplementary Material S1: Overview of model development

Table S1. Overview of model development for prediction of dissolved oxygen in the waste stabilisation pond

STRATEGIES	DATA PARTITION	MODEL CONSTRUCTION	MODEL TRAINING	MODEL VALIDATION	NUMBER OF MODEL
1	A complete dataset	All ponds	2/3 mixed and randomised dataset of all ponds	1/3 mixed and randomised dataset of all ponds	3
2	Campaign-specific datasets	All ponds	2-sampling-time dataset of all ponds	1-sampling-time dataset of all ponds	3
3	Depth-specific datasets	• Model including depth variable	• Similar to Hypothesis 1.1 but depth was included in the dataset	• Similar to Hypothesis 1.1 but depth was included in the dataset	3
		• Model for the surface of all ponds	• 2-sampling-time dataset of the surface of all ponds	• 1-sampling-time dataset of the surface of all ponds	3
		• Model for the bottom of all ponds	• 2-sampling-time dataset of the bottom of all ponds	• 1-sampling-time dataset of the bottom of all ponds	3
4	Depth-and-pond-type-specific datasets	Models were developed separately for surface and bottom of FPs and for surface and bottom of MPs	• 2-sampling-time dataset of FPs_Surface	• 1-sampling-time dataset of FPs_Surface	3
			• 2-sampling-time dataset of FPs_Bottom	• 1-sampling-time dataset of FPs_Bottom	3
			• 2-sampling-time dataset of MPs_Surface	• 1-sampling-time dataset of MPs_Surface	3
			• 2-sampling-time dataset of MPs_Bottom	• 1-sampling-time dataset of MPs_ Bottom	3
5	Depth-and-pond-line-specific datasets	Different models were built for separate ponds and depths and were subsequently validated with data from the other pond	• 3-sampling-time dataset of FP1_Surface	• 3-sampling-time dataset of FP2_Surface	2
			• 3-sampling-time dataset of FP1_Bottom	• 3-sampling-time dataset of FP2_Bottom	2
			• 3-sampling-time dataset of MP1_Surface	• 3-sampling-time dataset of MP2_Surface	2
			• 3-sampling-time dataset of MP1_Bottom	• 3-sampling-time dataset of MP2_Bottom	2

6	Depth-and-pond-specific datasets	Different models were built for separate ponds and depths	• 2-sampling-time dataset of FP1_Surface	• 1-sampling-time dataset of FP1_Surface	3
			• 2-sampling-time dataset of FP1_Bottom	• 1-sampling-time dataset of FP1_Bottom	3
			• 2-sampling-time dataset of MP1_Surface	• 1-sampling-time dataset of MP1_Surface	3
			• 2-sampling-time dataset of MP1_Bottom	• 1-sampling-time dataset of MP1_Bottom	3
			• 2-sampling-time dataset of FP2_Surface	• 1-sampling-time dataset of FP2_Surface	3
			• 2-sampling-time dataset of FP2_Bottom	• 1-sampling-time dataset of FP2_Bottom	3
			• 2-sampling-time dataset of MP2_Surface	• 1-sampling-time dataset of MP2_Surface	3
			• 2-sampling-time dataset of MP2_Bottom	• 1-sampling-time dataset of MP2_Bottom	3
7	Depth-and-pond-specific datasets with Timing variable	Models similar to strategy No.6 but included timing variable	Similar to strategy No.6 but included timing variable	Similar to strategy No.6 but included timing variable	24

DO = Dissolved oxygen; T = Sampling time; FP = Facultative pond; MP = Maturation pond

Supplementary Material S2: Variability of physicochemical and biological parameters and climatic conditions

Table S2. Variability of physicochemical and biological parameters and climatic conditions in the ponds (mean ± standard deviation)

Pond	Sampling time	Chlorophyll *a* ($\mu g.L^{-1}$)	BOD ($mg.L^{-1}$)	Water temperature (^oC)	Solar radiation ($W.m^{-2}$)	Wind speed ($m.s^{-1}$)	Air temperature (^oC)
FP1 Surface	T1 (Afternoon)	471 ± 15.04	42.00 ± 2.29	19.61 ± 0.32	580.56 ± 98.13	4.42 ± 0.95	18.35 ± 0.58
	T2 (Afternoon)	500 ± 0.00	37.67 ± 6.50	19.48 ± 0.63	208.58 ± 53.07	2.57 ± 0.38	18.26 ± 1.15
	T3 (Morning)	360.44 ± 119.75	45.67 ± 7.00	18.34 ± 0.56	495.26 ± 152.67	1.43 ± 0.35	15.47 ± 1.89
	Mean	443.98 ± 90.81	41.78 ± 6.39	19.14 ± 0.77	428.13 ± 193.10	2.81 ± 1.39	17.36 ± 1.86
FP1 Bottom	T1 (Afternoon)	321.53 ± 169.95	43.14 ± 1.77	19.30 ± 0.48	574.43 ± 105.34	4.71 ± 0.78	18.47 ± 0.52
	T2 (Afternoon)	432.61 ± 101.19	37.86 ± 10.01	19.26 ± 0.77	217.44 ± 54.64	2.53 ± 0.39	18.44 ± 1.15
	T3 (Morning)	275.26 ± 165.81	28.00 ± 2.83	17.16 ± 0.20	487.25 ± 154.39	1.41 ± 0.36	15.36 ± 1.94
	Mean	343.13 ± 156.73	36.33 ± 8.64	18.57 ± 1.14	426.37 ± 188.74	2.88 ± 1.50	17.42 ± 1.96
MP1 Surface	T1 (Morning)	166.40 ± 1.32	18.67 ± 1.32	17.94 ± 0.19	247.37 ± 98.22	0.78 ± 0.11	9.86 ± 2.14
	T2 (Morning)	325.06 ± 95.19	22.33 ± 1.32	19.65 ± 0.23	210.34 ± 145.04	0.83 ± 0.41	14.96 ± 1.95
	T3 (Afternoon)	110.74 ± 31.65	18.00 ± 1.50	19.13 ± 0.23	381.59 ± 75.99	2.88 ± 0.11	19.24 ± 0.19
	Mean	200.73 ± 110.58	19.67 ± 2.35	18.90 ± 0.76	279.77 ± 129.76	1.50 ± 1.02	14.69 ± 4.23
MP1 Bottom	T1 (Morning)	175.26 ± 130.08	18.67 ± 1.00	17.75 ± 0.08	260.13 ± 94.67	0.79 ± 0.13	10.12 ± 2.16
	T2 (Morning)	111.64 ± 166.01	24.33 ± 5.22	19.42 ± 0.06	219.52 ± 143.83	0.86 ± 0.40	15.08 ± 1.97
	T3 (Afternoon)	200.04 ± 158.10	19.67 ± 3.28	18.44 ± 0.39	372.28 ± 73.86	2.86 ± 0.11	19.21 ± 0.21
	Mean	162.31 ± 151.05	20.89 ± 4.28	18.54 ± 0.73	283.98 ± 123.03	1.50 ± 1.01	14.80 ± 4.12
FP2 Surface	T1 (Morning)	312.57 ± 121.56	32.00 ± 4.33	18.54 ± 0.33	857.67 ± 617.32	1.76 ± 1.14	16.20 ± 2.32
	T2 (Morning)	481.70 ± 36.47	30.00 ± 6.54	18.22 ± 0.67	304.29 ± 92.61	0.92 ± 0.21	14.96 ± 1.30
	T3 (Morning)	374.91 ± 135.57	31.33 ± 9.01	17.89 ± 0.76	492.46 ± 132.95	1.39 ± 0.51	15.56 ± 1.85
	Mean	389.73 ± 125.21	31.11 ± 6.68	18.22 ± 0.65	551.48 ± 424.43	1.36 ± 0.79	15.57 ± 1.87
FP2 Bottom	T1 (Morning)	259.77 ± 121.94	27.00 ± 2.83	17.68 ± 0.51	701.20 ± 586.85	1.37 ± 0.84	15.72 ± 2.02
	T2 (Morning)	388.51 ± 144.85	24.86 ± 1.07	17.36 ± 0.19	345.95 ± 61.02	1.02 ± 0.22	15.55 ± 1.04
	T3 (Morning)	81.61 ± 159.45	24.86 ± 2.27	16.81 ± 0.36	568.64 ± 92.27	1.62 ± 0.48	16.51 ± 1.31
	Mean	243.30 ± 187.10	25.57 ± 2.31	17.28 ± 0.51	538.60 ± 359.93	1.34 ± 0.60	15.93 ± 1.50
	T1 (Afternoon)	275.21 ± 45.26	22.67 ± 3.50	19.41 ± 0.21	648.48 ± 248.54	4.68 ± 0.42	18.85 ± 0.53

MP2 Surface	T2 (Afternoon)	210.63 ± 65.07	15.00 ± 0.00	19.23 ± 0.21	488.66 ± 56.69	2.77 ± 0.38	18.93 ± 0.40
	T3 (Afternoon)	169.98 ± 42.36	17.00 ± 2.29	19.58 ± 0.21	744.56 ± 95.85	4.09 ± 0.22	20.11 ± 0.10
	Mean	218.61 ± 66.59	18.22 ± 4.04	19.41 ± 0.25	627.23 ± 185.44	3.85 ± 0.88	19.30 ± 0.69
MP2 Bottom	T1 (Afternoon)	63.03 ± 42.27	17.00 ± 3.77	18.86 ± 0.42	628.98 ± 251.39	4.68 ± 0.43	18.80 ± 0.57
	T2 (Afternoon)	71.06 ± 24.75	17.67 ± 0.50	18.49 ± 0.83	487.91 ± 52.52	2.79 ± 0.31	19.00 ± 0.39
	T3 (Afternoon)	59.09 ± 104.09	14.33 ± 1.32	18.47 ± 0.74	737.44 ± 106.43	4.08 ± 0.22	20.10 ± 0.10
	Mean	64.39 ± 64.02	16.33 ± 2.67	18.60 ± 0.68	618.11 ± 186.06	3.85 ± 0.86	19.30 ± 0.70

Supplementary Material S3: Results of model development

Strategy 1: A complete dataset

Table S3.1. Data of all ponds were randomised and split into three parts in which two parts were used to train and one part was used to validate models

TRAINING SET	CONSTANT	CHLOROPHYLL	BOD	WATER TEMPERATURE	SOLAR RADIATION	WIND SPEED	AIR TEMPERATURE	R^2
First 2/3 of mix	-38.332	0.010	0.179	1.848		0.597		0.732
Second 2/3 of mix	-34.695	0.012	0.164	1.607		0.809		0.692
Third 2/3 of mix	-32.664	0.012	0.159	1.524		0.705		0.660

Table S3.2. Predictive accuracy of models of a complete dataset

DATA SET	TIMING	POND	VALUE	DO_OBSERVED	DO_PREDICTED OPTIMAL MODEL	MAE OPTIMAL MODEL	(1-SMAPE)*100 OPTIMAL MODEL
Training_1st 2/3	Morning and Afternoon	All ponds	Min	0.10	-2.65	0.02	0.00
			Max	19.37	14.11	7.01	99.54
			Mean	4.57	4.56	1.91	61.61
			Sd	4.71	4.03	1.50	35.25
Validation_1st 1/3	Morning and Afternoon	All ponds	Min	0.09	-2.12	0.00	0.00
			Max	18.85	13.44	7.63	99.94
			Mean	4.80	5.05	2.41	61.90
			Sd	4.87	3.70	1.82	31.38
Training_2nd 2/3	Morning and Afternoon	All ponds	Min	0.09	-2.33	0.00	0.00
			Max	19.21	14.38	7.93	99.98
			Mean	4.81	4.73	2.13	61.81
			Sd	4.88	4.03	1.67	33.33
Validation_2nd 1/3	Morning and Afternoon	All ponds	Min	0.13	-2.94	0.10	0.00
			Max	19.37	13.81	7.17	99.33
			Mean	4.32	4.06	1.94	57.37
			Sd	4.50	4.05	1.57	36.89

Training_3rd 2/3	Morning and Afternoon	All ponds	Min	0.09	-2.58	0.01	0.00
			Max	19.37	13.47	8.02	99.95
			Mean	4.56	4.55	2.11	61.02
			Sd	4.68	3.80	1.72	33.49
Validation_3rd 1/3	Morning and Afternoon	All ponds	Min	0.10	-1.84	0.11	0.00
			Max	19.21	14.03	7.25	98.76
			Mean	4.82	4.74	1.95	62.40
			Sd	4.93	4.13	1.47	33.86

Strategy 2: Campaign-specific datasets

Table S3.3 Models were trained with 2T data of all ponds and validated by 1T data of all ponds

TRAINING SET	CONSTANT	CHLOROPHYLL	BOD	WATER TEMPERATURE	SOLAR RADIATION	WIND SPEED	AIR TEMPERATURE	R^2
T1T2_All Ponds	-39.571	0.013	0.137	1.917		0.773		0.702
T1T3_All Ponds	-29.819	0.007	0.193	1.499		0.912	-0.185	0.797
T2T3_All Ponds	-41.035	0.013	0.202	1.397			0.641	0.643

Table S3.4. Predictive accuracy of models of campaign-specific datasets

DATA SET	TIMING	POND	VALUE	DO_OBSERVED	DO_PREDICTED OPTIMAL MODEL	MAE OPTIMAL MODEL	(1-SMAPE)*100 OPTIMAL MODEL
Training_T1T2	Morning^{++++} and Afternoon^{++++}	All ponds	Min	0.09	-2.43	0.10	0.00
			Max	19.37	14.72	8.03	99.22
			Mean	5.52	5.54	2.35	62.08
			Sd	5.25	4.41	1.63	33.20
Validation_T3	Morning^{++} and Afternoon^{++}	All ponds	Min	0.13	-3.45	0.05	0.00
			Max	15.11	11.33	5.93	99.38

			Mean	2.91	3.53	1.78	58.97
			Sd	2.87	3.15	1.35	35.35
Training_T1T3	Morning^{++++} and Afternoon^{++++}	All ponds	Min	0.13	-2.14	0.03	0.00
			Max	17.47	13.01	5.73	99.50
			Mean	3.96	3.86	1.46	63.58
			Sd	4.13	3.64	1.16	32.55
Validation_T2	Morning^{++} and Afternoon^{++}	All ponds	Min	0.09	-2.14	0.01	0.00
			Max	19.37	12.06	8.99	99.96
			Mean	6.01	4.22	3.30	57.37
			Sd	5.58	3.16	2.53	28.38
Training_T2T3	Morning^{++++} and Afternoon^{++++}	All ponds	Min	0.09	-2.62	0.02	0.00
			Max	19.37	14.73	8.08	99.45
			Mean	4.46	4.55	2.14	64.57
			Sd	4.69	3.81	1.80	31.49
Validation_T1	Morning^{++} and Afternoon^{++}	All ponds	Min	0.13	-6.31	0.06	0.00
			Max	17.47	14.00	7.19	99.77
			Mean	5.02	3.88	2.53	56.27
			Sd	4.89	6.03	1.99	40.55

Strategy 3: Depth-specific datasets

Table S3.5. Models were constructed similar to Strategy 2 but included Depth as a variable

TRAINING SET	CONSTANT	CHLOROPHYLL	BOD	WATER TEMPERATURE	SOLAR RADIATION	WIND SPEED	AIR TEMPERATURE	DEPTH	R^2
T1T2_All Ponds	-24.558	0.008	0.152	1.090	-0.003	0.787	0.278	-0.023	0.747
T1T3_All Ponds	-19.838	0.007	0.177	1.018		1.161	-0.205	-0.011	0.812
T2T3_All Ponds	-32.961	0.011	0.185	1.056			0.683	-0.018	0.683

Table S3.6. Predictive accuracy of models of depth-specific datasets taking into depth variable

DATA SET	TIMING	POND	VALUE	DO_OBSERVED	DO_PREDICTED OPTIMAL MODEL	MAE OPTIMAL MODEL	(1-SMAPE)*100 OPTIMAL MODEL
Training_T1T2	Morning^{++++} and Afternoon^{++++}	All ponds	Min	0.09	-2.73	0.02	0.00
			Max	19.37	13.81	8.43	99.81
			Mean	5.52	5.41	2.09	64.97
			Sd	5.25	4.58	1.61	32.56
Validation_T3	Morning^{++} and Afternoon^{++}	All ponds	Min	0.13	-1.93	0.12	0.00
			Max	15.11	11.34	5.50	99.23
			Mean	2.91	4.27	2.13	54.49
			Sd	2.87	3.15	1.20	30.79
Training_T1T3	Morning^{++++} and Afternoon^{++++}	All ponds	Min	0.13	-1.92	0.00	0.00
			Max	17.47	13.02	5.49	99.94
			Mean	3.96	3.99	1.35	66.62
			Sd	4.13	3.73	1.17	33.34
Validation_T2	Morning^{++} and Afternoon^{++}	All ponds	Min	0.09	-1.79	0.10	0.00
			Max	19.37	11.14	9.12	98.97
			Mean	6.01	3.90	3.15	55.00
			Sd	5.58	3.29	2.56	28.93
Training_T2T3	Morning^{++++} and Afternoon^{++++}	All ponds	Min	0.09	-2.05	0.02	0.00
			Max	19.37	13.89	7.55	98.06
			Mean	4.46	4.60	2.18	58.86
			Sd	4.69	3.91	1.50	33.26
Validation_T1	Morning^{++} and Afternoon^{++}	All ponds	Min	0.13	-6.94	0.06	0.00
			Max	17.47	13.50	7.11	99.76
			Mean	5.02	3.83	2.64	50.92
			Sd	4.89	6.08	1.90	41.84

Table S3.7. Models were constructed similar to strategy 2 but separately for Surface and Bottom

TRAINING SET	CONSTANT	CHLOROPHYLL	BOD	WATER TEMPERATURE	SOLAR RADIATION	WIND SPEED	AIR TEMPERATURE	R^2
All Ponds_T1T2_Surface	-12.475	0.014	0.140		-0.003		0.778	0.724
All Ponds_T1T2_Bottom	-5.873		0.276		-0.003	1.427		0.725
All Ponds_T1T3_Surface	-42.838	0.013	0.132	2.263		0.578	-0.181	0.846
All Ponds_T1T3_Bottom	-3.478	0.003	0.270		-0.002	1.669	-0.284	0.783
All Ponds_T2T3_Surface	-42.163	0.023	0.153	0.905	-0.006		1.326	0.800
All Ponds_T2T3_Bottom	-23.732	0.003	0.287	0.458			0.580	0.620

Table S3.8. Predictive accuracy of models of depth-specific datasets separating Surface and Bottom

DATA SET	TIMING	POND	VALUE	DO_OBSERVED	DO_PREDICTED OPTIMAL MODEL	MAE OPTIMAL MODEL	1-SMAPE OPTIMAL MODEL
Training_T1T2_Surface	Morning^{++++} and Afternoon^{++++}	All ponds Surface	Min	0.85	-2.85	0.06	0.00
			Max	19.37	14.50	6.02	99.54
			Mean	7.66	7.53	2.16	76.90
			Sd	5.05	4.30	1.54	27.37
Validation_T3_Surface	Morning^{++} and Afternoon^{++}	All ponds Surface	Min	1.73	4.65	0.06	47.21
			Max	15.11	13.19	5.06	99.43
			Mean	4.58	7.11	2.65	73.97
			Sd	2.81	2.14	1.42	15.50
Training_T1T2_Bottom			Min	0.09	-0.78	0.03	0.00

	Morning^{++++} and Afternoon^{++++}	All ponds Bottom	Max	18.56	12.00	7.68	98.43
			Mean	3.11	3.21	1.61	53.60
			Sd	4.38	3.74	1.62	34.43
Validation_T3_Bottom	Morning^{++} and Afternoon^{++}	All ponds Bottom	Min	0.13	0.99	0.28	8.83
			Max	6.71	4.33	4.45	85.13
			Mean	1.02	2.06	1.54	45.23
			Sd	1.40	0.80	0.92	25.13
Training_T1T3_Surface	Morning^{++++} and Afternoon^{++++}	All ponds Surface	Min	0.85	0.30	0.02	40.94
			Max	15.11	13.11	4.19	99.76
			Mean	5.57	5.64	1.12	86.44
			Sd	3.84	3.56	1.00	13.33
Validation_T2_Surface	Morning^{++} and Afternoon^{++}	All ponds Surface	Min	1.44	2.52	0.51	45.30
			Max	19.37	12.63	7.27	94.54
			Mean	8.76	6.87	3.71	72.95
			Sd	5.42	2.94	1.70	13.46
Training_T1T3_Bottom	Morning^{++++} and Afternoon^{++++}	All ponds Bottom	Min	0.13	-1.21	0.01	0.00
			Max	17.47	12.06	5.72	97.96
			Mean	2.16	2.04	1.19	51.50
			Sd	3.70	3.27	1.24	34.04
Validation_T2_Bottom	Morning^{++} and Afternoon^{++}	All ponds Bottom	Min	0.09	-1.77	0.04	0.00
			Max	18.56	10.37	8.37	99.81
			Mean	2.92	1.64	2.19	29.83
			Sd	3.96	3.25	1.80	32.26
Training_T2T3_Surface	Morning^{++++} and Afternoon^{++++}	All ponds Surface	Min	1.44	0.08	0.04	6.44
			Max	19.37	17.44	6.16	99.52
			Mean	6.67	6.71	1.68	83.58
			Sd	4.77	4.31	1.30	15.43
Validation_T1_Surface	Morning^{++} and Afternoon^{++}	All ponds Surface	Min	0.85	-11.55	0.22	0.00
			Max	14.99	14.42	12.43	99.23
			Mean	6.56	3.85	3.94	58.63

			Sd	4.47	8.05	3.56	40.15
Training_T2T3_Bottom	Morning^{++++} and Afternoon^{++++}	All ponds Bottom	Min	0.09	-0.11	0.11	0.00
			Max	18.56	11.47	7.40	97.86
			Mean	1.97	2.06	1.37	52.04
			Sd	3.09	2.48	1.32	26.49
Validation_T1_Bottom	Morning^{++} and Afternoon^{++}	All ponds Bottom	Min	0.13	-4.98	0.01	0.00
			Max	17.47	10.49	7.48	99.77
			Mean	3.29	1.61	2.75	35.67
			Sd	4.82	4.84	2.09	38.86

Strategy 4: Depth-and-pond-type-specific datasets

Table S3.9. Models were trained with T1T2 and validated by T3

TRAINING SET	CONSTANT	CHLOROPHYLL	BOD	WATER TEMPERATURE	SOLAR RADIATION	WIND SPEED	AIR TEMPERATURE	R^2
FPs_Surface	-87.472	0.024	0.298	3.304		-1.910	1.122	0.848
FPs_Bottom	-53.398		0.277	2.686				0.755
MPs_Surface	18.802	0.011	-0.104	-1.268		0.481	0.527	0.902
MPs_Bottom	-1.452				0.003		0.112	0.579

Table S3.10. Predictive accuracy of models of depth-and-pond-type-specific datasets trained with T1T2 and validated by T3

DATA SET	TIMING	POND	VALUE	DO_OBSERVED	DO_PREDICTED OPTIMAL MODEL	MAE OPTIMAL MODEL	(1-SMAPE)*100 OPTIMAL MODEL
Training T1T2_FPs_Surface	Afternoon^{++} and Morning^{++}	FPs_Surface	Min	1.31	2.27	0.02	63.69
			Max	19.37	18.26	4.59	99.90
			Mean	10.65	10.73	1.61	89.71
			Sd	5.10	4.71	1.13	9.49
Validation T3_FPs_Surface	Morning^{++}	FPs_Surface	Min	2.14	-0.69	0.14	0.00
			Max	15.11	17.91	7.73	99.20
			Mean	5.76	7.38	2.64	70.66
			Sd	3.48	5.16	2.07	27.20

Training T1T2_FPs_Bottom	Afternoon^{++} and Morning^{++}	FPs_Bottom	Min	0.18	-0.82	0.19	0.00
			Max	18.56	13.27	7.09	98.02
			Mean	5.22	5.22	2.09	57.61
			Sd	5.85	5.08	1.96	36.11
Validation T3_FPs_Bottom	Morning^{++}	FPs_Bottom	Min	0.18	-2.73	0.25	0.00
			Max	6.71	3.08	7.04	92.93
			Mean	1.46	-0.45	2.32	11.45
			Sd	1.94	1.60	1.78	24.37
Training T1T2_MPs_Surface	Morning^{++} and Afternoon^{++}	MPs_Surface	Min	0.85	-0.16	0.02	0.00
			Max	9.53	7.88	2.05	99.77
			Mean	4.66	4.62	0.66	85.21
			Sd	2.71	2.57	0.53	23.88
Validation T3_MPs_Surface	Afternoon^{++}	MPs_Surface	Min	1.73	4.86	1.12	48.17
			Max	4.91	7.78	3.72	89.77
			Mean	3.41	6.02	2.61	70.54
			Sd	1.13	0.83	0.73	12.38
Training T1T2_MPs_Bottom	Morning^{++} and Afternoon^{++}	MPs_Bottom	Min	0.09	-0.29	0.01	0.00
			Max	4.62	3.52	2.25	99.35
			Mean	1.46	1.51	0.64	67.30
			Sd	1.32	1.04	0.56	30.33
Validation T3_MPs_Bottom	Afternoon^{++}	MPs_Bottom	Min	0.13	1.44	0.34	12.46
			Max	2.21	3.45	2.75	91.68
			Mean	0.67	2.41	1.78	39.02
			Sd	0.62	0.67	0.81	26.66

Table S3.11. Models were trained with T1T3 and validated by T2

TRAINING SET	CONSTANT	CHLOROPHYLL	BOD	WATER TEMPERATURE	SOLAR RADIATION	WIND SPEED	AIR TEMPERATURE	R^2
FPs_Surface	-45.046	0.018	0.188	1.590			0.545	0.830

FPs_Bottom	-2.264	0.007				-0.004	2.802	0.810
MPs_Surface	-24.016	0.016		1.329		0.715	-0.149	0.935
MPs_Bottom	-14.096		0.146	0.720		0.594	-0.144	0.550

Table S3.12. Predictive accuracy of models of depth-and-pond-type-specific datasets trained with T1T3 and validated by T2

DATA SET	TIMING	POND	VALUE	DO_OBSERVED	DO_PREDICTED OPIMAL MODEL	MAE OPTIMAL MODEL	(1-SMAPE)*100 OPTIMAL MODEL
Training T1T3_FPs_Surface	Afternoon^{+} and Morning^{+++}	FPs_Surface	Min	1.31	1.21	0.10	57.52
			Max	15.11	13.28	3.99	99.50
			Mean	7.28	7.39	1.50	85.86
			Sd	4.34	3.97	0.95	11.72
Validation T2_FPs_Surface	Afternoon^{+} and Morning^{+}	FPs_Surface	Min	3.59	4.67	0.29	66.09
			Max	19.37	13.52	7.31	96.76
			Mean	12.50	9.18	3.64	83.72
			Sd	4.96	3.08	2.08	7.97
Training T1T3_FPs_Bottom	Afternoon^{+} and Morning^{+++}	FPs_Bottom	Min	0.18	-1.68	0.03	0.00
			Max	17.47	12.91	5.31	99.14
			Mean	3.57	3.43	1.70	53.69
			Sd	5.16	4.66	1.44	30.52
Validation T2_FPs_Bottom	Afternoon^{+} and Morning^{+}	FPs_Bottom	Min	0.22	0.21	0.18	9.62
			Max	18.56	8.52	10.08	97.66
			Mean	4.77	4.46	2.53	59.83
			Sd	5.35	3.03	2.87	35.71
Training T1T3_MPs_Surface	Morning^{+} and Afternoon^{+++}	MPs_Surface	Min	0.85	0.50	0.02	54.81
			Max	9.53	8.33	1.40	99.52
			Mean	3.86	3.77	0.51	90.34
			Sd	2.26	2.14	0.35	10.49
Validation T2_MPs_Surface	Morning^{+} and Afternoon^{+}	MPs_Surface	Min	1.44	2.30	0.22	59.69
			Max	8.41	7.12	4.30	97.16

			Mean	5.01	4.01	1.94	77.54
			Sd	2.47	1.48	1.10	10.27
Training T1T3_MPs_Bottom	Morning^{+} and Afternoon^{+++}	MPs_Bottom	Min	0.13	0.01	0.00	3.33
			Max	4.62	3.44	1.81	99.99
			Mean	1.05	1.07	0.59	64.39
			Sd	1.13	0.84	0.46	25.21
Validation T2_MPs_Bottom	Morning^{+} and Afternoon^{+}	MPs_Bottom	Min	0.09	-0.70	0.18	0.00
			Max	3.41	2.65	2.84	86.66
			Mean	1.48	1.25	1.75	36.65
			Sd	1.30	0.86	0.71	22.28

Table S3.13. Models were trained with T2T3 and validated by T1

TRAINING SET	CONSTANT	CHLOROPHYLL	BOD	WATER TEMPERATURE	SOLAR RADIATION	WIND SPEED	AIR TEMPERATURE	R^2
FPs_Surface	-58.317	0.020	0.144	2.354	-0.008		0.807	0.841
FPs_Bottom	-35.699		0.263	1.768				0.698
MPs_Surface	15.178	0.010	-0.113	-1.131	0.001		0.646	0.992
MPs_Bottom	-1.568						0.144	0.085

Table S3.14. Predictive accuracy of models of depth-and-pond-type-specific datasets trained with T1T3 and validated by T2

DATA SET	TIMING	POND	VALUE	DO_OBSERVED	DO_PREDICTED OPIMAL MODEL	MAE OPTIMAL MODEL	(1-SMAPE)*100 OPTIMAL MODEL
Training T2T3_FPs_Surface	Afternoon^{+} and Morning^{+++}	FPs_Surface	Min	2.14	0.32	0.04	22.99
			Max	19.37	17.69	4.99	99.82
			Mean	9.13	8.94	1.73	84.88
			Sd	5.43	4.99	1.29	17.79
Validation T1_FPs_Surface	Afternoon^{+} and Morning^{+}	FPs_Surface	Min	1.31	-2.08	0.25	0.00
			Max	14.99	14.35	8.95	99.12

			Mean	8.81	7.95	3.04	66.19
			Sd	4.66	6.24	2.50	37.56
Training T2T3_FPs_Bottom	Afternoon^{+} and Morning^{+++}	FPs_Bottom	Min	0.18	-0.41	0.02	0.00
			Max	18.56	12.06	6.75	98.48
			Mean	3.11	3.10	1.60	54.27
			Sd	4.29	3.58	1.70	33.06
Validation T1_FPs_Bottom	Afternoon^{+} and Morning^{+}	FPs_Bottom	Min	0.18	1.23	0.17	12.58
			Max	17.47	11.04	6.92	99.16
			Mean	5.68	6.21	2.64	58.25
			Sd	6.47	3.91	2.27	32.64
Training T2T3_MPs_Surface	Morning^{+} and Afternoon^{+++}	MPs_Surface	Min	1.44	1.60	0.01	48.25
			Max	8.41	7.88	3.71	99.88
			Mean	4.21	5.52	1.60	81.74
			Sd	2.06	1.61	1.17	14.66
Validation T1_MPs_Surface	Morning^{+} and Afternoon^{+}	MPs_Surface	Min	0.85	-1.07	0.02	0.00
			Max	9.53	7.29	2.33	99.57
			Mean	4.32	3.65	0.94	74.23
			Sd	2.97	2.93	0.65	35.74
Training T2T3_MPs_Bottom	Morning^{+} and Afternoon^{+++}	MPs_Bottom	Min	0.09	0.32	0.01	19.39
			Max	3.41	1.35	2.31	99.26
			Mean	1.08	1.07	0.86	56.19
			Sd	1.08	0.31	0.56	22.88
Validation T1_MPs_Bottom	Morning^{+} and Afternoon^{+}	MPs_Bottom	Min	0.13	-0.51	0.08	0.00
			Max	4.62	1.23	3.42	95.93
			Mean	1.43	0.51	1.06	37.27
			Sd	1.39	0.68	0.87	31.18

Strategy 5: Depth-and-pond-line-datasets

Table S3.15. Models were constructed for the ponds of WSP line 1

TRAINING SET	CONSTANT	CHLOROPHYLL	BOD	WATER TEMPERATURE	SOLAR RADIATION	WIND SPEED	AIR TEMPERATURE	R^2
FP1_Surface	-68.013	0.024	0.351	2.050	-0.012		1.190	0.909
FP1_Bottom	-45.696		0.283	2.287				0.649
MP1_Surface	-1.917	0.012			0.004	0.468		0.807
MP1_Bottom	0.489							0.000

Table S3.16. Predictive accuracy of models were constructed for the ponds of WSP line 1

DATA SET	TIMING	POND	VALUE	DO_OBSERVED	DO_PREDICTED OPTIMAL MODEL	MAE OPTIMAL MODEL	(1-SMAPE)*100 OPTIMAL MODEL
Training_FP1_Surface	Afternoon^{++} and Morning^{+}	FP1_Surface	Min	3.41	2.26	0.07	77.72
			Max	19.37	19.09	3.64	99.82
			Mean	11.79	12.07	1.17	93.28
			Sd	4.95	4.74	0.94	7.03
Validation_FP2_Surface	Morning^{+++}	FP1_Surface	Min	1.31	-7.69	0.02	0.00
			Max	14.43	6.90	15.13	99.20
			Mean	6.25	1.52	5.07	46.61
			Sd	3.67	4.69	4.00	39.69
Training_FP1_Bottom	Afternoon^{++} and Morning^{+}	FP1_Bottom	Min	0.20	0.81	0.16	9.54
			Max	18.56	13.33	7.52	97.61
			Mean	7.05	7.06	2.59	69.70
			Sd	5.87	4.73	2.25	30.31
Validation_FP2_Bottom	Morning^{+++}	FP1_Bottom	Min	0.18	-1.42	0.10	0.00
			Max	3.48	6.07	4.99	95.57
			Mean	0.89	1.06	1.45	32.72
			Sd	0.87	1.67	1.07	28.87
Training_MP1_Surface		MP1_Surface	Min	0.85	0.25	0.07	44.26
			Max	8.41	6.22	2.19	98.49

	Morning^{++} and Afternoon^{+}		Mean	2.44	2.31	0.54	85.30
			Sd	1.56	1.37	0.44	13.95
Validation_MP2_Surface	Afternoon^{+++}	MP1_Surface	Min	4.04	2.73	0.08	59.76
			Max	9.53	8.50	4.57	99.07
			Mean	6.05	5.01	1.52	85.68
			Sd	1.51	1.45	1.18	11.60
Training_MP1_Bottom	Morning^{++} and Afternoon^{+}	MP1_Bottom	Min	0.09	0.49	0.01	31.09
			Max	2.21	0.49	1.72	98.89
			Mean	0.49	0.49	0.38	60.60
			Sd	0.50	0.00	0.33	18.99
Validation_MP2_Bottom	Afternoon^{+++}	MP1_Bottom	Min	0.21	0.49	0.01	19.14
			Max	4.62	0.49	4.13	99.07
			Mean	1.90	0.49	1.49	49.73
			Sd	1.27	0.00	1.18	25.52

Table S3.17. Models were constructed for the ponds of WSP line 2

TRAINING SET	CONSTANT	CHLOROPHYLL	BOD	WATER TEMPERATURE	SOLAR RADIATION	WIND SPEED	AIR TEMPERATURE	R^2
FP2_Surface	-53.550	0.013		2.999				0.590
FP2_Bottom	0.887							0.000
MP2_Surface	-22.004	0.018		2.676	0.002	-0.862	-1.330	0.870
MP2_Bottom	-11.623	0.004	0.401	0.438	-0.002			0.772

Table S3.18. Predictive accuracy of models were constructed for the ponds of WSP line 2

DATA SET	TIMING	POND	VALUE	DO_OBSERVED OPTIMAL MODEL	DO_PREDICTED OPTIMAL MODEL	MAE OPTIMAL MODEL	(1-SMAPE)*100 OPTIMAL MODEL
Training_FP2_Surface	Morning^{+++}	FP2_Surface	Min	1.31	0.78	0.05	35.69
			Max	14.43	11.16	5.25	98.89
			Mean	6.25	6.15	1.74	82.79

			Sd	3.67	2.80	1.55	18.47
Validation_FP1_Surface	Afternoon^{++} and Morning^{+}	FP2_Surface	Min	3.41	2.93	0.07	52.09
			Max	19.37	12.75	7.22	99.11
			Mean	11.79	9.63	3.08	84.58
			Sd	4.95	2.97	2.17	11.18
Training_FP2_Bottom	Morning^{+++}	FP2_Bottom	Min	0.18	0.89	0.09	33.74
			Max	3.48	0.89	2.59	94.84
			Mean	0.89	0.89	0.66	61.85
			Sd	0.87	0.00	0.55	20.14
Validation_FP1_Bottom	Afternoon^{++} and Morning^{+}	FP2_Bottom	Min	0.20	0.89	0.01	9.12
			Max	18.56	0.89	17.67	99.60
			Mean	7.05	0.89	6.38	33.28
			Sd	5.87	0.00	5.62	24.25
Training_MP2_Surface	Afternoon^{+++}	MP2_Surface	Min	4.04	3.46	0.04	88.37
			Max	9.53	9.37	1.20	99.70
			Mean	6.05	6.14	0.42	96.26
			Sd	1.51	1.43	0.34	3.12
Validation_MP1_Surface	Morning^{++} and Afternoon^{+}	MP2_Surface	Min	0.85	2.73	1.00	9.19
			Max	8.41	17.78	16.80	84.38
			Mean	2.44	11.94	9.49	42.80
			Sd	1.56	6.00	6.22	27.96
Training_MP2_Bottom	Afternoon^{+++}	MP2_Bottom	Min	0.21	0.41	0.00	35.06
			Max	4.62	4.02	1.37	99.99
			Mean	1.90	2.10	0.49	81.99
			Sd	1.27	1.11	0.40	17.42
Validation_MP1_Bottom	Morning^{++} and Afternoon^{+}	MP2_Bottom	Min	0.09	2.62	1.49	2.29
			Max	2.21	8.81	8.63	65.53
			Mean	0.49	4.95	4.47	18.44
			Sd	0.50	1.93	1.99	17.12

Strategy 6: Depth-and-pond-specific datasets

Table S3.19. Models were constructed with T1T2 and validated by T3

TRAINING SET	CONSTANT	CHLOROPHYLL	BOD	WATER TEMPERATURE	SOLAR RADIATION	WIND SPEED	AIR TEMPERATURE	R^2
FP1_Surface	-61.865		0.372	2.304	-0.009	-1.119	1.306	0.828
FP1_Bottom	-81.983		0.406		-0.027	4.448	3.773	0.770
MP1_Surface	-2.024	0.012			0.007			0.854
MP1_Bottom	4.353		0.078	-0.345	0.003			0.407
FP2_Surface	-80.233	0.018		4.351				0.595
FP2_Bottom	1.005							0.000
MP2_Surface	-15.016	0.016		1.952	0.004	-0.947	-0.969	0.885
MP2_Bottom	-5.773	0.018	0.407					0.624

Table S3.20. Predictive accuracy of models were constructed with T1T2 and validated by T3

DATA SET	TIMING	POND	VALUE	DO_OBSERVED	DO_PREDICTED OPTIMAL MODEL	MAE OPTIMAL MODEL	(1-SMAPE)*100 OPTIMAL MODEL
Training_T1T2	Afternoon^{++}	FP1_Surface	Min	9.36	10.90	0.08	90.19
			Max	19.37	18.94	2.95	99.72
			Mean	14.45	14.43	0.76	97.23
			Sd	2.70	2.46	0.80	3.01
Validation_T3	Morning^{+}	FP1_Surface	Min	3.41	6.29	0.55	44.02
			Max	15.11	15.66	10.76	98.23
			Mean	6.47	11.52	5.06	69.09
			Sd	4.06	3.77	3.58	18.41
Training_T1T2	Afternoon^{++}	FP1_Bottom	Min	0.40	0.66	0.53	30.93
			Max	18.56	15.14	5.24	97.39
			Mean	9.44	9.49	2.08	83.85
			Sd	5.63	4.94	1.62	17.80
Validation_T3	Morning^{+}	FP1_Bottom	Min	0.20	-25.81	9.31	0.00

			Max	6.71	-9.11	27.26	0.00
			Mean	2.27	-19.54	21.81	0.00
			Sd	2.50	5.86	6.17	0.00
Training_T1T2	Morning^{++}	MP1_Surface	Min	0.85	0.07	0.02	14.96
			Max	8.41	6.71	1.70	99.60
			Mean	2.46	2.53	0.54	82.50
			Sd	1.89	1.77	0.46	21.64
Validation_T3	Afternoon^{+}	MP1_Surface	Min	1.73	0.86	0.03	64.94
			Max	3.47	3.69	1.42	99.31
			Mean	2.41	1.98	0.74	82.36
			Sd	0.58	0.82	0.43	10.07
Training_T1T2	Morning^{++}	MP1_Bottom	Min	0.09	0.02	0.03	29.32
			Max	1.42	0.78	0.79	94.79
			Mean	0.40	0.34	0.21	68.98
			Sd	0.37	0.22	0.19	21.83
Validation_T3	Afternoon^{+}	MP1_Bottom	Min	0.13	0.08	0.01	26.67
			Max	2.21	0.97	1.34	99.49
			Mean	0.66	0.64	0.54	53.53
			Sd	0.70	0.35	0.42	26.50
Training_T1T2	Morning^{++}	FP2_Surface	Min	1.31	2.38	0.09	36.32
			Max	14.43	11.09	4.59	99.47
			Mean	6.85	6.90	1.93	83.19
			Sd	3.96	3.06	1.55	16.96
Validation_T3	Morning^{+}	FP2_Surface	Min	2.14	-1.55	0.49	0.00
			Max	10.01	13.22	5.13	97.27
			Mean	5.05	4.34	2.42	59.85
			Sd	2.85	5.17	1.57	38.76
Training_T1T2	Morning^{++}	FP2_Bottom	Min	0.18	1.01	0.08	30.38
			Max	3.48	1.01	2.48	96.40

			Mean	1.01	1.01	0.74	61.39
			Sd	0.98	0.00	0.61	21.91
Validation_T3	Morning^{+}	FP2_Bottom	Min	0.18	1.01	0.21	30.38
			Max	1.93	1.01	0.93	88.64
			Mean	0.65	1.01	0.62	58.73
			Sd	0.61	0.00	0.27	22.54
Training_T1T2	Afternoon^{++}	MP2_Surface	Min	5.14	5.52	0.02	92.62
			Max	9.53	9.69	1.09	99.86
			Mean	6.87	7.02	0.32	97.65
			Sd	1.14	1.11	0.27	2.00
Validation_T3	Afternoon^{+}	MP2_Surface	Min	4.04	4.18	0.07	78.92
			Max	4.91	7.09	2.36	99.18
			Mean	4.41	5.56	1.14	89.12
			Sd	0.32	0.96	0.77	6.42
Training_T1T2	Afternoon^{++}	MP2_Bottom	Min	0.32	0.99	0.04	41.09
			Max	4.62	3.71	0.94	99.31
			Mean	2.51	2.49	0.55	86.49
			Sd	1.05	0.84	0.32	12.82
Validation_T3	Afternoon^{+}	MP2_Bottom	Min	0.21	-0.47	0.15	0.00
			Max	1.96	5.08	3.90	91.58
			Mean	0.69	1.12	1.30	28.38
			Sd	0.58	2.12	1.35	33.56

Table S3.21. Models were constructed with T1T3 and validated by T2

TRAINING SET	CONSTANT	CHLOROPHYLL	BOD	WATER TEMPERATURE	SOLAR RADIATION	WIND SPEED	AIR TEMPERATURE	R^2
FP1_Surface	-80.911	0.026	0.372	3.335				0.861
FP1_Bottom	-41.642	0.015			-0.032		3.601	0.777
MP1_Surface	-18.692	0.006		1.070				0.632
MP1_Bottom	-24.251			1.410	0.004		-0.134	0.450
FP2_Surface	-40.463	0.014	0.201	1.448		-0.592		0.752
FP2_Bottom	-5.658	-0.003	0.296			-0.592		0.635
MP2_Surface	-30.089	0.014	0.080	2.610	0.003		-1.114	0.969
MP2_Bottom	-24.462	0.005	0.695		-0.008		1.040	0.769

Table S3.22. Predictive accuracy of models were constructed with T1T3 and validated by T2

DATA SET	TIMING	POND	VALUE	DO_OBSERVED	DO_PREDICTED OPTIMAL MODEL	MAE OPTIMAL MODEL	(1-SMAPE)*100 OPTIMAL MODEL
Training_T1T3	Afternoon$^+$ and Morning$^+$	FP1_Surface	Min	3.41	2.08	0.13	73.09
			Max	15.11	14.24	3.53	98.29
			Mean	9.64	9.49	1.41	90.30
			Sd	4.50	4.15	0.87	8.47
Validation_T2	Afternoon$^+$	FP1_Surface	Min	13.56	7.68	1.01	70.73
			Max	19.37	14.08	6.35	96.11
			Mean	16.09	11.07	5.02	81.01
			Sd	2.35	2.42	1.74	7.83
Training_T1T3	Afternoon$^+$ and Morning$^+$	FP1_Bottom	Min	0.20	-0.16	0.16	0.00
			Max	17.47	15.80	7.21	99.00
			Mean	6.54	6.76	2.14	61.15
			Sd	6.00	5.32	1.87	35.69
Validation_T2	Afternoon$^+$	FP1_Bottom	Min	0.40	19.96	6.84	3.93
			Max	18.56	26.84	20.14	84.45
			Mean	8.06	24.30	16.24	44.65

			Sd	5.93	2.51	4.88	26.18
Training_T1T3	Morning^{+} and Afternoon^{+}	MP1_Surface	Min	0.85	0.96	0.04	68.36
			Max	3.47	3.10	0.91	98.63
			Mean	2.02	1.97	0.38	90.25
			Sd	0.78	0.62	0.27	7.62
Validation_T2	Morning^{+}	MP1_Surface	Min	1.44	3.55	0.14	57.66
			Max	8.41	5.69	2.72	98.72
			Mean	3.29	4.28	1.59	75.18
			Sd	2.32	0.78	0.90	15.88
Training_T1T3	Morning^{+} and Afternoon^{+}	MP1_Bottom	Min	0.13	-0.01	0.07	0.00
			Max	2.21	1.43	0.84	89.16
			Mean	0.60	0.57	0.36	61.13
			Sd	0.58	0.38	0.21	22.92
Validation_T2	Morning^{+}	MP1_Bottom	Min	0.09	1.57	1.18	9.11
			Max	0.57	2.43	2.27	43.91
			Mean	0.26	1.99	1.73	22.54
			Sd	0.19	0.36	0.37	14.08
Training_T1T3	Morning^{++}	FP2_Surface	Min	1.31	1.69	0.09	62.69
			Max	10.01	8.91	2.57	98.28
			Mean	4.92	4.97	1.07	87.34
			Sd	2.58	2.25	0.67	9.47
Validation_T2	Morning^{+}	FP2_Surface	Min	3.59	4.93	0.55	63.47
			Max	14.43	7.22	7.72	94.12
			Mean	8.91	6.12	3.54	79.09
			Sd	4.22	0.78	2.62	10.35
Training_T1T3	Morning^{++}	FP2_Bottom	Min	0.18	0.07	0.00	41.36
			Max	1.93	1.45	0.59	98.72
			Mean	0.60	0.62	0.24	76.93
			Sd	0.49	0.41	0.17	17.74
Validation_T2	Morning^{+}	FP2_Bottom	Min	0.22	-0.65	0.38	0.00

			Max	3.48	0.39	4.13	46.80
			Mean	1.47	-0.07	1.54	10.76
			Sd	1.19	0.36	1.34	19.12
Training_T1T3	Afternoon^{++}	MP2_Surface	Min	4.04	3.66	0.03	93.66
			Max	9.53	9.83	0.61	99.77
			Mean	5.71	5.89	0.27	97.36
			Sd	1.63	1.63	0.20	2.14
Validation_T2	Afternoon^{+}	MP2_Surface	Min	5.14	3.30	1.18	72.93
			Max	7.96	5.85	3.39	89.56
			Mean	6.73	4.61	2.12	81.23
			Sd	0.97	0.77	0.68	5.47
Training_T1T3	Afternoon^{++}	MP2_Bottom	Min	0.21	-0.09	0.15	0.00
			Max	4.62	3.80	0.98	98.03
			Mean	1.51	1.50	0.56	68.29
			Sd	1.36	1.19	0.32	29.30
Validation_T2	Afternoon^{+}	MP2_Bottom	Min	2.14	3.31	0.31	61.45
			Max	3.41	4.82	2.68	95.20
			Mean	2.70	4.02	1.32	80.27
			Sd	0.44	0.50	0.70	10.10

Table S3.23. Models were constructed with T2T3 and validated by T1

TRAINING SET	CONSTANT	CHLOROPHYLL	BOD	WATER TEMPERATURE	SOLAR RADIATION	WIND SPEED	AIR TEMPERATURE	R^2
FP1_Surface	-40.085	0.027	0.301		-0.011		1.860	0.949
FP1_Bottom	-9.550		0.447					0.540
MP1_Surface	-3.504	0.017				1.407		0.841
MP1_Bottom	-23.980	0.001	0.092	1.087		0.907		0.863
FP2_Surface	-84.479			5.295	-0.010			0.838
FP2_Bottom	10.237						-0.572	0.500
MP2_Surface	5.267	0.014		1.862			-1.971	0.915
MP2_Bottom	-10.804	0.003	0.395	0.407	-0.002			0.906

Table S3.24. Predictive accuracy of models were constructed with T2T3 and validated by T1

DATA SET	TIMING	POND	VALUE	DO_OBSERVED	DO_PREDICTED OPTIMAL MODEL	MAE OPTIMAL MODEL	(1-SMAPE)*100 OPTIMAL MODEL
Training_T2T3	Afternoon+ and Morning+	FP1_Surface	Min	3.41	1.53	0.07	61.91
			Max	19.37	18.93	2.85	99.27
			Mean	11.28	11.57	1.12	92.34
			Sd	5.90	5.76	0.74	9.36
Validation_T1	Afternoon+	FP1_Surface	Min	9.36	12.25	0.31	79.89
			Max	14.99	14.07	4.71	98.73
			Mean	12.82	13.04	1.92	92.46
			Sd	1.98	0.64	1.24	5.31
Training_T2T3	Afternoon+ and Morning+	FP1_Bottom	Min	0.20	2.07	0.38	6.84
			Max	18.56	11.91	6.65	97.70
			Mean	5.17	5.17	2.75	61.30
			Sd	5.31	3.90	2.20	31.49
Validation_T1	Afternoon+	FP1_Bottom	Min	1.47	8.78	0.70	28.69
			Max	17.47	10.57	7.31	96.36
			Mean	10.82	9.73	3.52	79.92
			Sd	5.39	0.79	3.00	24.08
Training_T2T3	Morning+ and Afternoon+	MP1_Surface	Min	1.44	1.20	0.02	80.47
			Max	8.41	6.67	1.70	99.41
			Mean	2.85	2.81	0.48	92.33
			Sd	1.70	1.54	0.47	4.96
Validation_T1	Morning+	MP1_Surface	Min	0.85	-0.66	0.08	0.00
			Max	2.74	1.22	1.84	96.75
			Mean	1.63	0.42	1.28	38.52

			Sd	0.78	0.80	0.63	38.99
Training_T123	Morning^{+} and Afternoon^{+}	MP1_Bottom	Min	0.09	-0.07	0.03	0.00
			Max	2.21	1.68	0.53	97.93
			Mean	0.46	0.46	0.14	69.76
			Sd	0.54	0.50	0.13	29.63
Validation_T1	Morning^{+}	MP1_Bottom	Min	0.13	-2.25	2.13	0.00
			Max	1.42	-1.96	3.59	0.00
			Mean	0.54	-2.07	2.61	0.00
			Sd	0.46	0.11	0.49	0.00
Training_T2T3	Morning^{++}	FP2_Surface	Min	2.14	1.35	0.03	73.82
			Max	14.43	12.65	2.72	99.79
			Mean	6.98	7.14	1.28	88.99
			Sd	4.02	3.67	0.95	8.96
Validation_T1	Morning^{+}	FP2_Surface	Min	1.31	-0.37	3.03	0.00
			Max	8.47	11.28	9.97	61.99
			Mean	4.80	5.13	6.13	34.53
			Sd	2.45	4.88	2.02	21.11

Strategy 7: Depth-and-pond-specific datasets and including Timing

Table S3.25. Models were constructed with T1T2 and validated by T3

TRAINING SET	CONSTANT	CHLOROPHYLL	BOD	WATER TEMPERATURE	SOLAR RADIATION	WIND SPEED	AIR TEMPERATURE	TIMING	R^2
FP1_Surface	-47.434		0.325	2.007	-0.013		1.293	-0.615	0.846
FP1_Bottom	-136.555			6.186				1.827	0.757
MP1_Surface	-13.595	0.010	0.299				-0.266	1.224	0.902
MP1_Bottom	18.581			-1.135	-0.004		0.299		0.529
FP2_Surface	-175.676	0.017	0.579	6.488	-0.008	-3.787	3.088		0.810
FP2_Bottom	1.005								0.000
MP2_Surface	1.208	0.016		1.077			-0.574	-0.564	0.879
MP2_Bottom	-5.773	0.018	0.407						0.624

Table S3.26. Predictive accuracy of models were constructed with T1T2 and validated by T3

DATA SET	TIMING	POND	VALUE	DO_OBSERVED	DO_PREDICTED OPTIMAL MODEL	MAE OPTIMAL MODEL	(1-SMAPE)*100 OPTIMAL MODEL
Training_T1T2	Afternoon++	FP1_Surface	Min	9.36	10.80	0.13	90.99
			Max	19.37	18.85	2.69	99.57
			Mean	14.45	14.43	0.76	97.22
			Sd	2.70	2.50	0.72	2.72
Validation_T3	Morning+	FP1_Surface	Min	3.41	7.84	0.66	46.48
			Max	15.11	14.45	9.74	97.78

			Mean	6.47	11.56	5.24	67.11
			Sd	4.06	2.71	3.00	18.00
Training_T1T2	Afternoon^{++}	FP1_Bottom	Min	0.40	0.65	0.09	32.38
			Max	18.56	16.62	7.49	99.46
			Mean	9.44	9.45	1.90	82.63
			Sd	5.63	4.90	1.95	22.38
Validation_T3	Morning^{+}	FP1_Bottom	Min	0.20	-13.93	8.28	0.00
			Max	6.71	-8.08	20.64	0.00
			Mean	2.27	-12.11	14.37	0.00
			Sd	2.50	2.11	3.73	0.00
Training_T1T2	Morning^{++}	MP1_Surface	Min	0.85	0.81	0.06	77.55
			Max	8.41	7.09	1.32	97.72
			Mean	2.46	2.57	0.48	89.80
			Sd	1.89	1.83	0.35	5.63
Validation_T3	Afternoon^{+}	MP1_Surface	Min	1.73	3.98	1.63	47.16
			Max	3.47	6.07	3.88	79.07
			Mean	2.41	5.05	2.64	64.52
			Sd	0.58	0.74	0.91	11.85
Training_T1T2	Morning^{++}	MP1_Bottom	Min	0.09	0.02	0.03	29.32
			Max	1.42	0.78	0.79	94.79
			Mean	0.40	0.34	0.21	68.98
			Sd	0.37	0.22	0.19	21.83
Validation_T3	Afternoon^{+}	MP1_Bottom	Min	0.13	0.08	0.01	26.67
			Max	2.21	0.97	1.34	99.49
			Mean	0.66	0.64	0.54	53.53
			Sd	0.70	0.35	0.42	26.50
Training_T1T2	Morning^{++}	FP2_Surface	Min	1.31	1.16	0.15	64.38
			Max	14.43	12.64	3.91	99.09
			Mean	6.85	6.69	1.33	88.35
			Sd	3.96	3.55	1.06	8.72
Validation_T3	Morning^{+}	FP2_Surface	Min	2.14	-3.40	0.07	0.00

	Max	10.01	15.79	5.78	99.58
	Mean	5.05	3.72	2.84	55.21
	Sd	2.85	5.97	2.10	41.62

Table S3.27. Models were constructed with T1T3 and validated by T2

TRAINING SET	CONSTANT	CHLOROPHYLL	BOD	WATER TEMPERATURE	SOLAR RADIATION	WIND SPEED	AIR TEMPERATURE	TIMING	R^2
FP1_Surface	-80.911	0.026	0.372	3.335					0.861
FP1_Bottom	-16.998	0.009						1.637	0.829
MP1_Surface	-46.215			2.655		-1.915	0.174		0.847
MP1_Bottom	-4.543		0.177			-1.219	0.271		0.622
FP2_Surface	-40.463	0.014	0.201	1.448			0.496		0.752
FP2_Bottom	-8.678	-0.003	0.336			-1.160	0.398	-0.340	0.783
MP2_Surface	-30.089	0.014	0.080	2.610	0.003		-1.114		0.969
MP2_Bottom	-24.462	0.005	0.695		-0.008		1.040		0.769

Table S3.28. Predictive accuracy of models were constructed with T1T3 and validated by T2

DATA SET	TIMING	POND	VALUE	DO_OBSERVED	DO_PREDICTED OPTIMAL MODEL	MAE OPTIMAL MODEL	(1-SMAPE)*100 OPTIMAL MODEL
Training_T1T3	Afternoon+ and Morning+	FP1_Surface	Min	3.41	2.08	0.13	73.09
			Max	15.11	14.24	3.53	98.29
			Mean	9.64	9.49	1.41	90.30
			Sd	4.50	4.15	0.87	8.47
Validation_T2	Afternoon+	FP1_Surface	Min	13.56	7.68	1.01	70.73
			Max	19.37	14.08	6.35	96.11
			Mean	16.09	11.07	5.02	81.01
			Sd	2.35	2.42	1.74	7.83
Training_T1T3	Afternoon+ and Morning+	FP1_Bottom	Min	0.20	-0.02	0.38	0.00
			Max	17.47	14.57	4.04	91.19
			Mean	6.54	6.50	2.18	61.81

			Sd	6.00	5.45	1.04	32.33
Validation_T2	Afternoon^{+}	FP1_Bottom	Min	0.40	6.53	0.52	6.42
			Max	18.56	12.06	11.66	97.44
			Mean	8.06	9.58	4.11	72.90
			Sd	5.93	1.81	4.18	31.39
Training_T1T3	Morning^{+} and Afternoon^{+}	MP1_Surface	Min	0.85	0.57	0.01	78.28
			Max	3.47	3.22	0.54	99.44
			Mean	2.02	2.02	0.25	93.19
			Sd	0.78	0.72	0.17	5.80
Validation_T2	Morning^{+}	MP1_Surface	Min	1.44	6.71	0.90	34.57
			Max	8.41	7.51	5.53	94.33
			Mean	3.29	6.96	3.87	57.72
			Sd	2.32	0.25	1.70	22.57
Training_T1T3	Morning^{+} and Afternoon^{+}	MP1_Bottom	Min	0.13	0.09	0.09	0.00
			Max	2.21	1.43	1.43	0.00
			Mean	0.60	0.60	0.60	0.00
			Sd	0.58	0.45	0.45	0.00
Validation_T2	Morning^{+}	MP1_Bottom	Min	0.09	1.47	1.30	5.21
			Max	0.57	3.82	3.66	46.72
			Mean	0.26	2.81	2.54	18.42
			Sd	0.19	0.90	0.94	13.50
Training_T1T3	Morning^{++}	FP2_Surface	Min	1.31	1.69	0.09	62.69
			Max	10.01	8.91	2.57	98.28
			Mean	4.92	4.97	1.07	87.34
			Sd	2.58	2.25	0.67	9.47
Validation_T2	Morning^{+}	FP2_Surface	Min	3.59	4.93	0.55	63.47
			Max	14.43	7.22	7.72	94.12
			Mean	8.91	6.12	3.54	79.09
			Sd	4.22	0.78	2.62	10.35

Table S3.29. Models were constructed with T1T3 and validated by T2

TRAINING SET	CONSTANT	CHLOROPHYLL	BOD	WATER TEMPERATURE	SOLAR RADIATION	WIND SPEED	AIR TEMPERATURE	TIMING	R^2
FP1_Surface	-40.284	0.025	0.394		-0.021		2.572	-0.971	0.962
FP1_Bottom	-9.550		0.447						0.540
MP1_Surface	-3.504	0.017				1.407			0.841
MP1_Bottom	-23.980	0.001	0.092	1.087		0.907			0.863
FP2_Surface	-93.611			5.712			-2.768	3.993	0.868
FP2_Bottom	10.370							-0.905	0.428
MP2_Surface	5.267	0.014		1.862			-1.971		0.915
MP2_Bottom	-10.804	0.003	0.395	0.407	-0.002				0.906

Table S3.30. Predictive accuracy of models were constructed with T1T3 and validated by T2

DATA SET	TIMING	POND	VALUE	DO_OBSERVED	DO_PREDICTED OPTIMAL MODEL	MAE OPTIMAL MODEL	(1-SMAPE)*100 OPTIMAL MODEL
Training_T2T3	Afternoon⁺ and Morning⁺	FP1_Surface	Min	3.41	1.62	0.15	64.36
			Max	19.37	19.37	2.20	99.58
			Mean	11.28	11.12	0.98	92.98
			Sd	5.90	5.80	0.58	8.37
Validation_T1	Afternoon⁺	FP1_Surface	Min	9.36	6.69	0.89	69.48
			Max	14.99	11.51	6.18	95.00
			Mean	12.82	8.82	3.99	81.35
			Sd	1.98	1.79	1.65	8.27
Training_T2T3	Afternoon⁺ and Morning⁺	FP1_Bottom	Min	0.20	2.07	0.38	6.84
			Max	18.56	11.91	6.65	97.70
			Mean	5.17	5.17	2.75	61.30
			Sd	5.31	3.90	2.20	31.49
Validation_T1	Afternoon⁺	FP1_Bottom	Min	1.47	8.78	0.70	28.69
			Max	17.47	10.57	7.31	96.36

			Mean	10.82	9.73	3.52	79.92
			Sd	5.39	0.79	3.00	24.08
Training_T2T3	Morning^{+} and Afternoon^{+}	MP1_Surface	Min	1.44	1.28	0.03	80.47
			Max	8.41	7.15	1.26	99.41
			Mean	2.85	2.84	0.33	92.33
			Sd	1.70	1.63	0.30	4.96
Validation_T1	Morning^{+}	MP1_Surface	Min	0.85	-5.10	4.24	0.00
			Max	2.74	-1.83	6.08	96.75
			Mean	1.63	-3.58	5.20	38.52
			Sd	0.78	1.20	0.68	38.99
Training_T123	Morning^{+} and Afternoon^{+}	MP1_Bottom	Min	0.09	-0.07	0.03	0.00
			Max	2.21	1.68	0.53	97.93
			Mean	0.46	0.46	0.14	69.76
			Sd	0.54	0.50	0.13	29.63
Validation_T1	Morning^{+}	MP1_Bottom	Min	0.13	-2.25	2.13	0.00
			Max	1.42	-1.96	3.59	0.00
			Mean	0.54	-2.07	2.61	0.00
			Sd	0.46	0.11	0.49	0.00
Training_T2T3	Morning^{++}	FP2_Surface	Min	2.14	1.17	0.01	68.26
			Max	14.43	13.28	4.15	99.97
			Mean	6.98	6.99	1.02	91.27
			Sd	4.02	3.74	1.01	9.24
Validation_T1	Morning^{+}	FP2_Surface	Min	1.31	8.82	3.69	20.83
			Max	8.47	15.31	9.96	80.15
			Mean	4.80	11.82	7.02	54.99
			Sd	2.45	2.19	2.12	19.32