

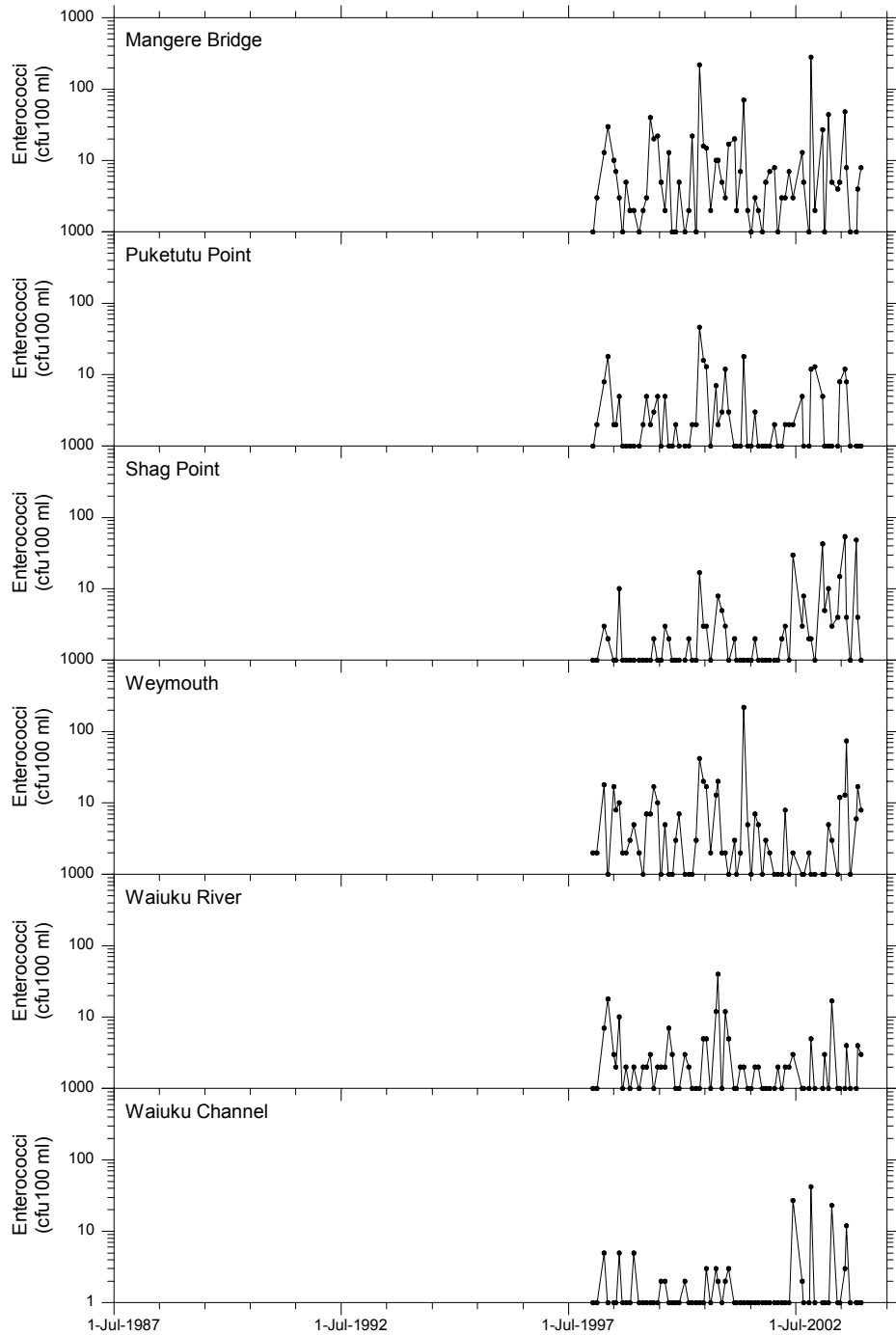
APPENDIX 40: SALINE – ENTEROCOCCI

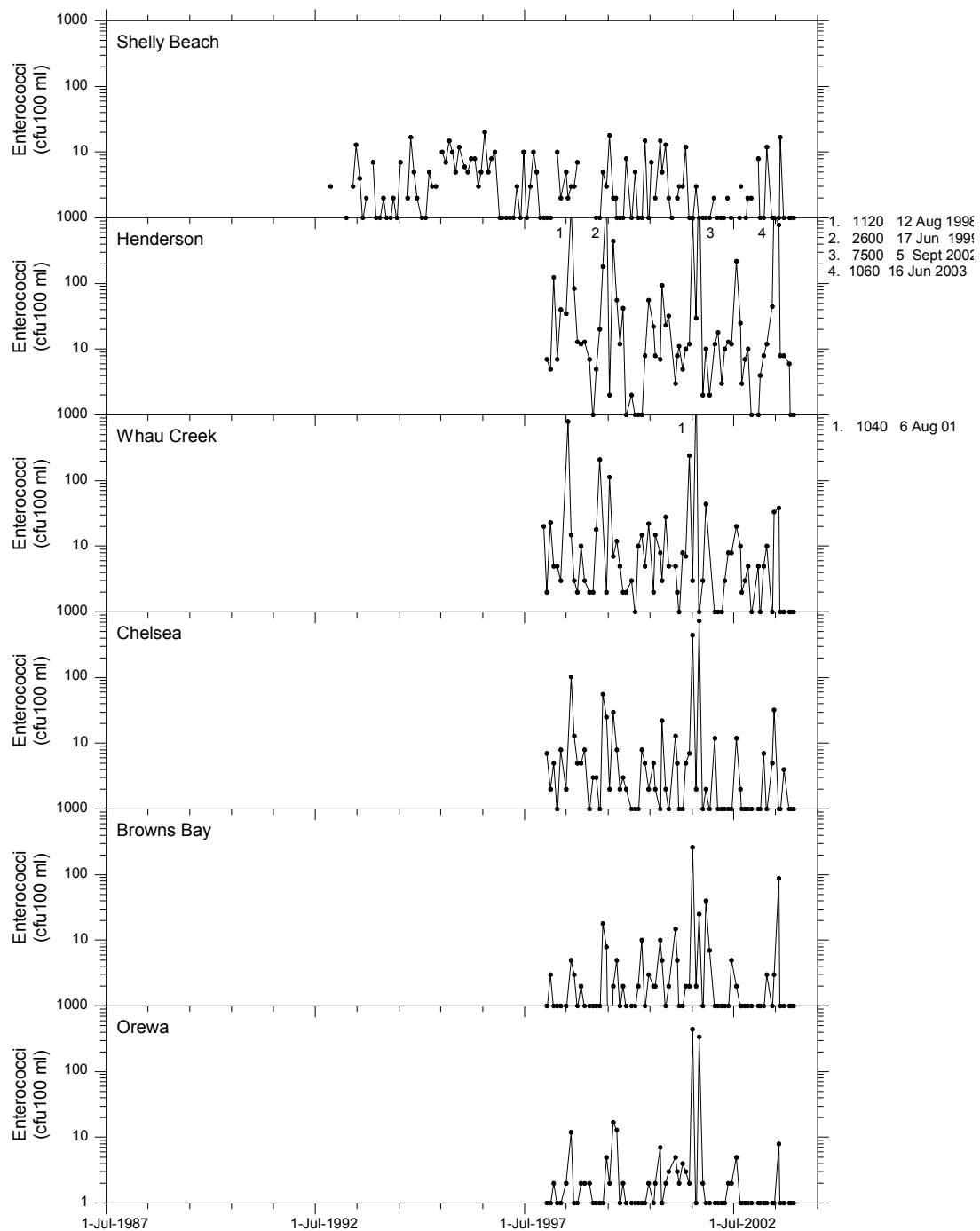
Enterococci (cfu/100mL) for the period January 2003 - December 2003														
Date	Browns	Chelsea	Goat Isl	Henderson	Mangere	Orewa	Puketutu	Shag Point	Shelly	TiPoint	Waiuku Ch	Waiuku Rvr	Weymouth	Whau
3-Feb-03	<2	<2	<2	<2	27	<2	5	8	43	3	<2	<2	<2	5
17-Feb-03	<2	<2	<2	4	<2	<2	<2	<2	5	<2	<2	3	<2	<2
19-Mar-03	<2	7	<2	8	44	<2	<2	<2	10	<2	<2	<2	5	5
17-Apr-03	3	<2	<2	12	5	<2	<2	12	3	<2	23	17	3	10
3-Jun-03	<2	5	<2	45	4	<2	<2	<2	4	<2	<2	<2	<2	<2
16-Jun-03	3	32	4	1060	5	<2	8	<2	15	3	<2	<2	12	33
30-Jul-03	88	<2	<2	780	48	8	12	<2	54	56	3	<2	13	38
14-Aug-03	<2	<2	<2	8	8	<2	8	17	4	<2	12	4	74	<2
12-Sep-03	<2	4	<2	8	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
29-Oct-03	<2	<2	<2	6	<2	<2	<2	<2	48	<2	<2	<2	6	<2
10-Nov-03	<2	<2	<2	<2	4	<2	<2	<2	4	<2	<2	4	17	<2
8-Dec-03	<2	<2	<2	<2	8	<2	<2	<2	<2	<2	<2	3	8	<2
Median	1	1	1	8	5	1	1	1	5	1	1	1	6	1
IQR/Median %	50	325	0	213	190	0	475	175	406	50	50	225	205	525

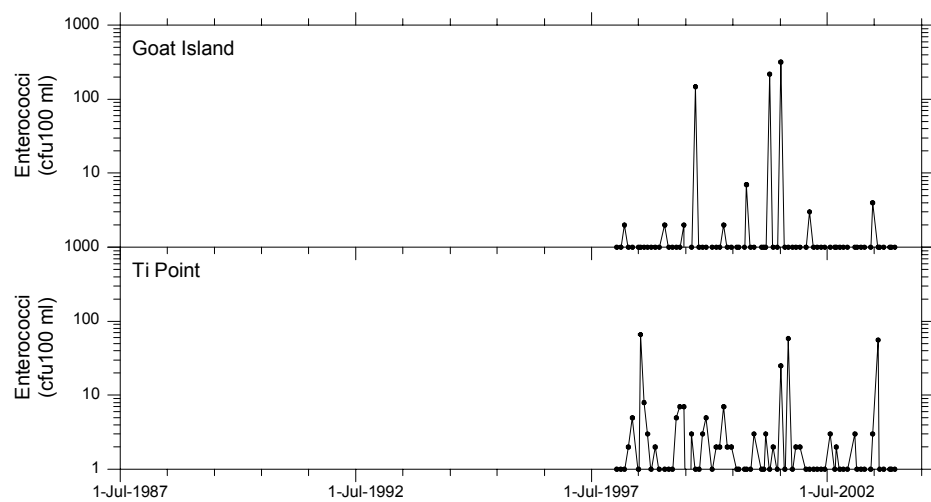
The dates given are for the East Coast and Waitemata Harbour sites. The Manukau and Kaipara Harbour sites were visited on 13-Jan, 11-Feb, 14-Mar, 14-Apr, 13-May, 13-Jun, 9-Jul, 8-Aug, 8-Sep, 6-Oct, 3-Nov and 2-Dec.

Method detection limit is 2 cfu/100 mL. For summary statistics, a result of "<2" is taken to have the value 1.

The graphs on the following pages show enterococci results for the period August 1987 to December 2003 (where data available).







APPENDIX 41: LAKE KERETA

Annual mean and median chemical and bacteriological quality of Lake Kereta

Date	Depth	BOD	Chl a	Chloride	EC	Faecal Coliforms	Presumptive Coliforms	NH ₄ -N	NNN ¹	DRP	TP	pH	SS	TKN	Turb	Secchi ² Depth
	(m)	(mg/L)	(mg/L)	(mg/L)	(mS/m)	(MPN/100mL)	(MPN/100mL)	(mg/L)	(mg/L)	(mg/L)	(mg/L)		(mg/L)	(mg/L)	(NTU)	(m)
06-Mar-03	0	<2	0.002	45.4	24.7	210	5000	<0.01	0.004	<0.01	0.03	9.0	3.8	0.2	4.1	
08-May-03	0	<2	0.0023	45.0	25.5	27	2400	<0.01	0.004	<0.01	0.02	8.4	4.1	2.6	2.4	
11-Sep-03	0	<2	0.002	30.6	22.0	23	23	<0.01	0.002	<0.01	0.02	8.3	2.0	0.3	1.9	
18-Nov-03	0	4.1	0.0073	39.3	23.8	3000	3000	0.05	0.003	0.07	0.13	9.6	14	0.5	5.1	
Mean		1.8	0.0034	40.1	24.0	815	2606	0.02	0.003	0.02	0.05	8.8	6.0	0.9	3.4	
Median		1	0.0022	42.1	24.3	119	2700	0.005	0.004	0.005	0.025	8.7	4.0	0.4	3.3	

N.B. mg/L = g/m³ = g m⁻³

¹ NNN represents nitrate + nitrite nitrogen.

² Secchi depth not measured at this site.

APPENDIX 42: LAKE KUWAKATAI

Annual mean and median chemical and bacteriological quality of Lake Kuwakatai

Date	Depth	BOD	Chl a	Chloride	EC	Faecal Coliforms	Presumptive Coliforms	NH ₄ -N	NNN	DRP	TP	pH	SS	TKN	Turb	Secchi Depth
	(m)	(mg/L)	(mg/L)	(mg/L)	(mS/m)	(MPN/100mL)	(MPN/100mL)	(mg/L)	(mg/L)	(mg/L)	(mg/L)		(mg/L)	(mg/L)	(NTU)	(m)
06-Mar-03	0	<2	0.0223	38.9	21.5	23	50	<0.01	0.003	<0.01	0.04	8.4	3.8	0.2	4.7	1.7
08-May-03	0	<2	0.0417	38.3	22.0	8	13	<0.01	0.005	<0.01	0.06	7.7	5.2	1.0	4.3	1.3
11-Sep-03	0	8.6	0.1459	23.6	21.2	22	50	<0.01	0.004	<0.01	0.16	7.6	13.2	1.3	8.3	1.8
20-Nov-03	0	5.7	0.068	38.0	21.8	7.5	65	<0.01	0.0045	<0.01	0.045	8.3	6.6	0.6	4.1	0.8
Mean		4.1	0.0695	34.7	21.6	15	45	0.005	0.004	0.005	0.08	8.0	7.2	0.8	5.3	1.4
Median		3.35	0.0549	38.1	21.7	15	50	0.005	0.004	0.005	0.053	8.0	5.9	0.8	4.5	1.5
06-Mar-03	5	<2	0.0215	39.00	21.7	13	22	<0.01	<0.002	<0.01	0.03	8.0	5.4	0.4	6.1	
08-May-03	5	3.1	0.0367	38.50	22.1	4	27	<0.01	0.008	<0.01	0.07	7.7	3.1	0.9	3.7	
11-Sep-03	5	<2	0.0075	37.00	21.4	13	13	<0.01	0.017	<0.01	0.03	7.6	1.7	0.4	1.7	
20-Nov-03	5	2.9	0.0152	37.3	21.9	7	80	<0.01	0.006	<0.01	0.03	7.8	1.7	0.5	1.7	
Mean		2.0	0.0202	38.0	21.8	9	36	0.005	0.008	0.005	0.04	7.8	3.0	0.6	3.3	
Median		2.0	0.0184	37.9	21.8	10	25	0.005	0.007	0.005	0.03	7.8	2.4	0.5	2.7	

N.B. $\text{mg/L} = \text{g/m}^3 = \text{g m}^{-3}$
 NNN represents nitrate + nitrite nitrogen.

APPENDIX 43: LAKE OTOTOA

Annual mean and median chemical and bacteriological quality of Lake Ototoa

Date	Depth	BOD	Chl a	Chloride	EC	Faecal Coliforms	Presumptive Coliforms	NH4-N	NNN	DRP	TP	pH	SS	TKN	Turb	Secchi Depth
	(m)	(mg/L)	(mg/L)	(mg/L)	(mS/m)	(MPN/100mL)	(MPN/100mL)	(mg/L)	(mg/L)	(mg/L)	(mg/L)		(mg/L)	(mg/L)	(NTU)	(m)
07-Mar-03	0	<2	0.0022	41.30	22.0	<2	4	<0.01	0.003	<0.01	0.02	7.79	0.7	0.2	0.50	5.6
08-May-03	0	<2	0.0042	40.00	20.9	13	50	<0.01	0.003	<0.01	0.02	7.66	1.1	0.5	0.79	3
11-Sep-03	0	<2	0.0052	31.00	20.9	<2	8	<0.01	0.020	<0.01	0.02	7.71	1.0	0.2	0.79	5.7
18-Nov-03	0	<2	0.0027	39.14	21.4	<2	71	0.02	0.007	<0.01	0.02	7.76	0.7	0.2	0.94	5.2
Mean		1.0	0.0036	37.9	21.3	4	33	0.01	0.008	0.005	0.02	7.7	0.9	0.3	0.8	4.9
Median		1.0	0.0034	39.6	21.2	1	29	0.01	0.005	0.005	0.02	7.7	0.9	0.2	0.8	5.4
07-Mar-03	10	<2	0.0023	40.4	22.1	11	17	0.38	0.003	<0.01	0.03	7.79	0.7	0.9	0.7	
08-May-03	10	<2	0.0062	40.5	21.1	4	80	0.02	0.005	<0.01	0.02	7.67	0.6	0.8	1.0	
11-Sep-03	10	<2	0.0031	38.7	20.6	4	13	0.02	0.019	<0.01	<0.01	7.71	0.8	0.2	0.8	
18-Nov-03	10	<2	0.0036	39.5	21.4	<2	13	0.03	0.005	<0.01	0.02	7.91	0.82	0.2	0.8	
Mean		1.0	0.0038	39.8	21.3	5	31	0.11	0.008	0.005	0.02	7.8	0.7	0.5	0.8	
Median		1.0	0.0034	39.9	21.3	4	15	0.03	0.005	0.005	0.02	7.8	0.8	0.5	0.8	
07-Mar-03	20	<2	0.0022	40.5	22.7	<2	<2	<0.01	0.004	<0.01	0.03	7.13	7.3	0.2	5.0	
08-May-03	20	<2	0.0024	40.2	21.2	4	230	<0.01	0.006	<0.01	0.02	7.68	0.6	0.9	0.8	
11-Sep-03	20	<2	0.0028	35.0	20.8	4	7	0.02	0.017	<0.01	<0.01	7.69	0.8	0.2	0.8	
18-Nov-03	20	<2	0.0023	39.0	21.7	<2	170	0.02	0.011	<0.01	0.02	7.52	0.8	0.2	1.3	
Mean		1.0	0.0024	38.7	21.6	3	102	0.01	0.010	0.005	0.02	7.5	2.4	0.4	2.0	
Median		1.0	0.0024	39.6	21.5	3	89	0.01	0.009	0.005	0.02	7.6	0.8	0.2	1.1	

N.B. $\text{mg/L} = \text{g/m}^3 = \text{g m}^{-3}$
 NNN represents nitrate + nitrite nitrogen.

APPENDIX 44: LAKE PUPUKE

Annual mean and median chemical and bacteriological quality of Lake Pupuke

Date	Depth	BOD	Chl a	Chloride	EC	Faecal Coliforms	Presumptive Coliforms	NH ₄ -N	NNN	DRP	TP	pH	SS	TKN	Turb	Secchi Depth
	(m)	(mg/L)	(mg/L)	(mg/L)	(mS/m)	(MPN/100mL)	(MPN/100mL)	(mg/L)	(mg/L)	(mg/L)	(mg/L)		(mg/L)	(mg/L)	(NTU)	(m)
17-Mar-03	5	<2	0.0055	36.8	26	13	13	0.13	0.01	<0.01	0.03	8.73	1.8	1.1	1.2	3.6 ^a
14-May-03	5	<2	0.0011	38.5	27.4	4	50	<0.01	<0.01	<0.01	<0.01	8.10	<0.1	3.1	0.65	5.1 ^a
07-Oct-03	5	<2	0.0061	36.33	28.6	3	10	<0.01	0.055	<0.01	0.023	7.94	2.8	1.4	1.39	4.6 ^a
14-Nov-03	5	2.1	0.0050	36.92	28.1	3	6	0.033	0.059	<0.01	<0.01	8.13	1.2	0.4	0.61	3.4 ^a
Mean		1.0	0.0044	37.1	27.5	6	20	0.043	0.032	0.005	0.02	8.2	1.5	1.5	1.0	
Median		1.0	0.0052	36.9	27.7	4	12	0.019	0.032	0.005	0.01	8.1	1.5	1.3	0.9	
17-Mar-03	25	<2	0.0013	35.6	26.2	<2	130	0.06	0.036	<0.01	0.02	7.55	0.5	1.0	0.48	
14-May-03	25	<2	0.0006	36.2	26.5	<2	170	<0.01	0.054	<0.01	0.02	7.50	0.5	1.3	0.25	
07-Oct-03	25	<2	0.0059	36.0	28.6	<2	4	<0.01	0.038	<0.01	0.02	7.80	0.1	0.4	0.49	
14-Nov-03	25	2.2	0.0038	36.8	28.0	<2	<2	0.02	0.050	<0.01	0.005	7.80	0.5	0.3	0.49	
Mean		1.3	0.0029	36.2	27.3	1	76	0.023	0.045	0.005	0.02	7.7	0.4	0.8	0.4	
Median		1.0	0.0026	36.1	27.3	1	67	0.013	0.044	0.005	0.02	7.7	0.5	0.7	0.5	
17-Mar-03	50	2.2	0.0008	35.5	27.1	<2	13	0.28	<0.01	<0.01	0.06	7.35	3.6	0.8	4.4	
14-May-03	50	2.7	0.0007	36.3	27.1	4	23	0.26	<0.01	<0.01	0.05	7.20	3.0	6.0	3.0	
07-Oct-03	50	<2	0.0033	36.5	28.6	<2	13	0.01	0.117	<0.01	0.02	7.70	7.2	3.1	3.3	
14-Nov-03	50	<2	0.0033	36.7	28.2	<2	<2	0.03	0.123	<0.01	<0.01	7.70	0.7	0.2	0.25	
Mean		1.7	0.0020	36.3	27.8	2	13	0.145	0.065	0.005	0.035	7.5	3.6	2.5	2.7	
Median		1.6	0.0021	36.4	27.7	1	13	0.145	0.064	0.005	0.035	7.5	3.3	2.0	3.1	

N.B. mg/L = g/m³ = g m⁻³

NNN represents nitrate + nitrite nitrogen

^a Surface measurement

APPENDIX 45: LAKE SPECTACLE

Annual mean and median chemical and bacteriological quality of Lake Spectacle

Date	Depth	BOD	Chl a	Chloride	EC	Faecal Coliforms	Presumptive Coliforms	NH ₄ -N	NNN	DRP	TP	pH	SS	TKN	Turb	Secchi Depth
	(m)	(mg/L)	(mg/L)	(mg/L)	(mS/m)	(MPN/100mL)	(MPN/100mL)	(mg/L)	(mg/L)	(mg/L)	(mg/L)		(mg/L)	(mg/L)	(NTU)	(m)
06-Mar-03	0	4.7	0.0914	42.8	22.5	11	90	<0.01	0.004	<0.01	0.08	9.21	32.9	1.6	24.2	0.3
08-May-03	0	<2	0.0758	40.8	26.3	27	80	<0.01	0.007	<0.01	0.10	7.52	22.0	1.4	19.5	0.4
11-Sep-03	0	<2	0.0422	19.9	23.5	800	1300	0.22	0.151	0.02	0.10	7.57	14.4	1.7	21.2	0.25
18-Nov-03	0	<2	0.045	36.0	25.7	8	110	0.81	0.092	0.03	0.15	7.25	17.4	1.8	25.0	0.25
Mean		1.9	0.0636	34.9	25	212	395	0.26	0.064	0.015	0.11	7.9	21.7	1.63	22.5	0.3
Median		1	0.0604	38.4	24.6	19	100	0.11	0.050	0.013	0.10	7.5	19.7	1.65	22.7	0.3
06-Mar-03	5	4.3	0.0909	43.8	22.4	4	30	<0.01	0.004	<0.01	0.10	8.77	29.4	1.4	28.8	
08-May-03	5	<2	0.0932	41.5	26.4	8	70	<0.01	0.006	<0.01	0.10	7.49	20.8	1.4	19.8	
11-Sep-03	5	<2	0.0418	33.4	23.8	800	1300	0.28	0.155	0.02	0.14	7.52	25.0	1.2	31.6	
18-Nov-03	5	3.6	0.0477	36.3	26.1	17	170	0.91	0.089	0.06	0.22	7.3	30.2	2.6	36.4	
Mean		2.5	0.0684	38.7525	24.7	207	393	0.30	0.064	0.023	0.14	7.8	26.4	1.7	29.2	
Median		2.3	0.0693	38.905	25.0	13	120	0.14	0.048	0.013	0.12	7.5	27.2	1.4	30.2	

N.B. $\text{mg/L} = \text{g/m}^3 = \text{g m}^{-3}$
 NNN represents nitrate + nitrite nitrogen

APPENDIX 46: LAKE TOMARATA

Annual mean and median chemical and bacteriological quality of Lake Tomarata

Date	Depth	BOD	Chl a	Chloride	EC	Faecal Coliforms	Presumptive Coliforms	NH ₄ -N	NNN	DRP	TP	pH	SS	TKN	Turb	Secchi Depth
	(m)	(mg/L)	(mg/L)	(mg/L)	(mS/m)	(MPN/100mL)	(MPN/100mL)	(mg/L)	(mg/L)	(mg/L)	(mg/L)		(mg/L)	(mg/L)	(NTU)	(m)
06-Mar-03	0	<2	0.0073	38.20	14.9	1	30	<0.01	0.006	<0.01	0.03	7.43	2.0	0.2	1.8	1.8
08-May-03	0	<2	0.0095	37.70	17.7	11	30	<0.01	0.006	<0.01	0.05	7.63	2.0	0.5	1.4	1.8
11-Sep-03	0	<2	0.0085	18.00	18.7	13	23	<0.01	0.001	<0.01	0.02	7.64	1.1	0.4	1.7	1.5
18-Nov-03	0	<2	0.0040	37	17.8	11	30	<0.01	0.004	<0.01	0.02	7.32	3.0	0.2	1.4	1.2
Mean		1	0.0073	32.7	17.3	9	28	0.005	0.004	0.01	0.03	7.5	2.0	0.3	1.6	1.6
Median		1	0.0079	37.4	17.8	11	30	0.005	0.005	0.005	0.03	7.5	2.0	0.3	1.5	1.6
06-Mar-03	5	<2	0.0072	38.0	14.8	<2	50	<0.01	0.006	<0.01	0.02	7.45	3.1	0.6	1.8	
08-May-03	5	<2	0.0098	38.4	17.7	7	800	<0.01	0.007	<0.01	0.03	7.56	1.1	0.5	1.3	
11-Sep-03	5	<2	0.0082	19.9	17.0	17	30	0.02	0.003	<0.01	0.02	7.84	1.2	0.9	1.9	
18-Nov-03	5	<2	0.0062	37.2	17.8	4	13	<0.01	0.005	<0.01	0.02	7.35	0.1	0.2	1.3	
Mean		1	0.0079	33.4	16.8	7	223	0.009	0.005	0.01	0.02	7.6	1.4	0.6	1.6	
Median		1	0.0077	37.6	17.4	6	40	0.005	0.006	0.005	0.02	7.5	1.2	0.6	1.6	

N.B. $\text{mg/L} = \text{g/m}^3 = \text{g m}^{-3}$
 NNN represents nitrate + nitrite nitrogen.

APPENDIX 47: LAKE WAINAMU

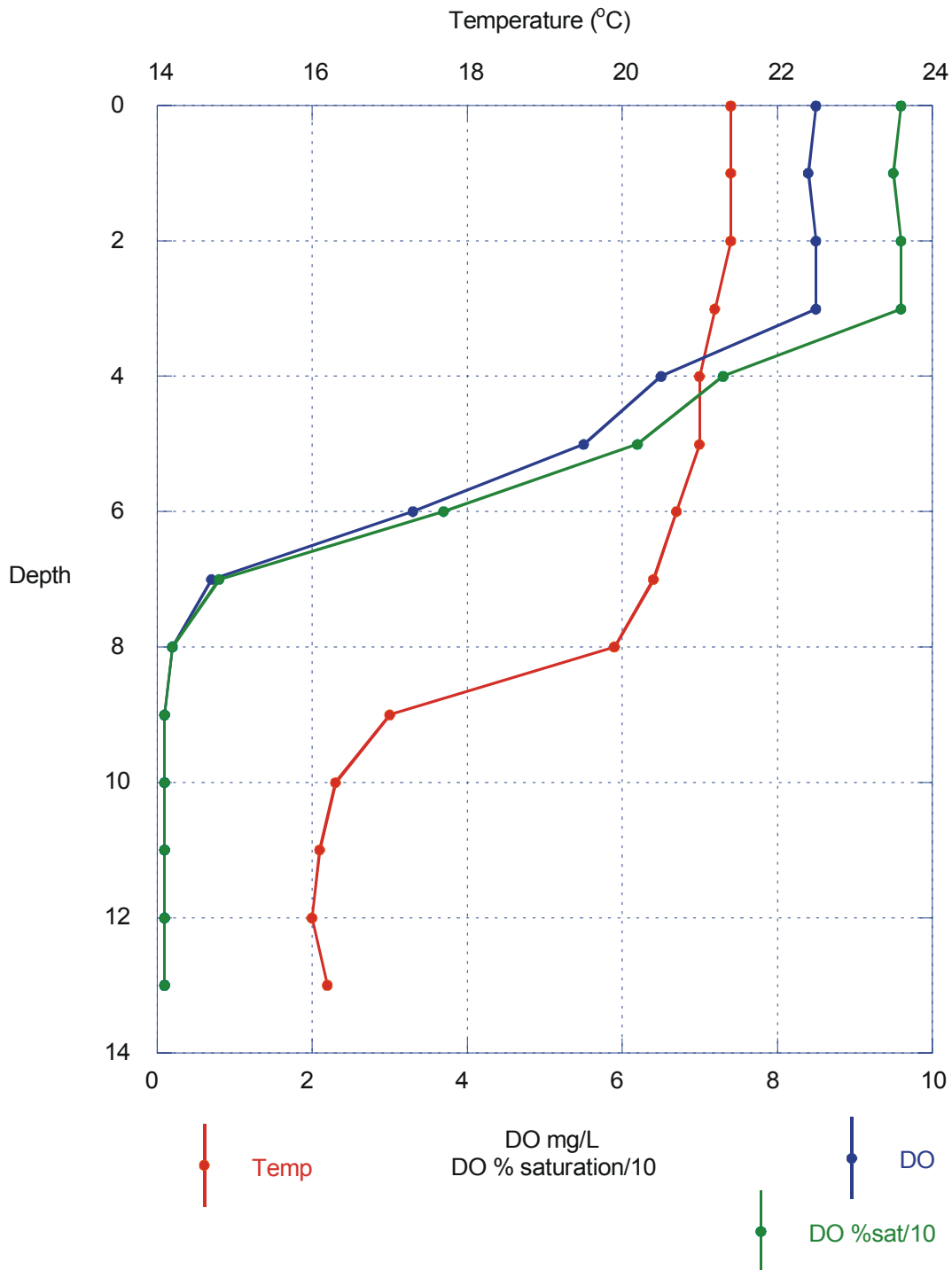
Annual mean and median chemical and bacteriological quality of Lake Wainamu

Date	Depth	BOD	Chl a	Chloride	EC	Faecal Coliforms	Presumptive Coliforms	NH ₄ -N	NNN	DRP	TP	pH	SS	TKN	Turb	Secchi Depth
	(m)	(mg/L)	(mg/L)	(mg/L)	(mS/m)	(MPN/100mL)	(MPN/100mL)	(mg/L)	(mg/L)	(mg/L)	(mg/L)		(mg/L)	(mg/L)	(NTU)	(m)
06-Mar-03	0	<2	0.0072	41.2	20.5	13	30	<0.01	0.004	<0.01	0.03	7.9	4.5	0.20	5.4	1.0
08-May-03	0	<2	0.0039	42.2	21.1	30	280	<0.01	0.009	<0.01	0.02	7.6	2.3	0.70	3.9	1.2
20-Nov-03	0	<2	0.0113	42.5	21.0	12	37	<0.01	0.006	0.02	0.03	7.6	2.7	0.45	12.0	0.6
Mean		1.0	0.0075	42.0	20.9	18	116	0.005	0.006	0.010	0.027	7.7	3.2	0.5	7.1	0.9
Median		1.0	0.0072	42.2	21.0	13	37	0.005	0.006	0.005	0.03	7.6	2.7	0.5	5.4	1.0
06-Mar-03	5	<2	0.0033	42.2	20.6	30	30	<0.01	0.005	<0.01	0.03	7.7	2.5	0.20	5.8	
08-May-03	5	<2	0.0054	42.0	21.1	8	50	<0.01	0.005	<0.01	0.02	7.5	1.9	1.10	3.8	
20-Nov-03	5	<2	0.0127	42.45	21	21	50	<0.01	0.006	0.02	0.04	7.51	2.4	0.7	12.30	
Mean		1.0	0.0071	42.2	20.9	20	43	0.005	0.005	0.01	0.03	7.6	2.3	0.7	7.3	
Median		1.0	0.0054	42.2	21.0	21	50	0.005	0.005	0.005	0.03	7.5	2.4	0.7	5.8	

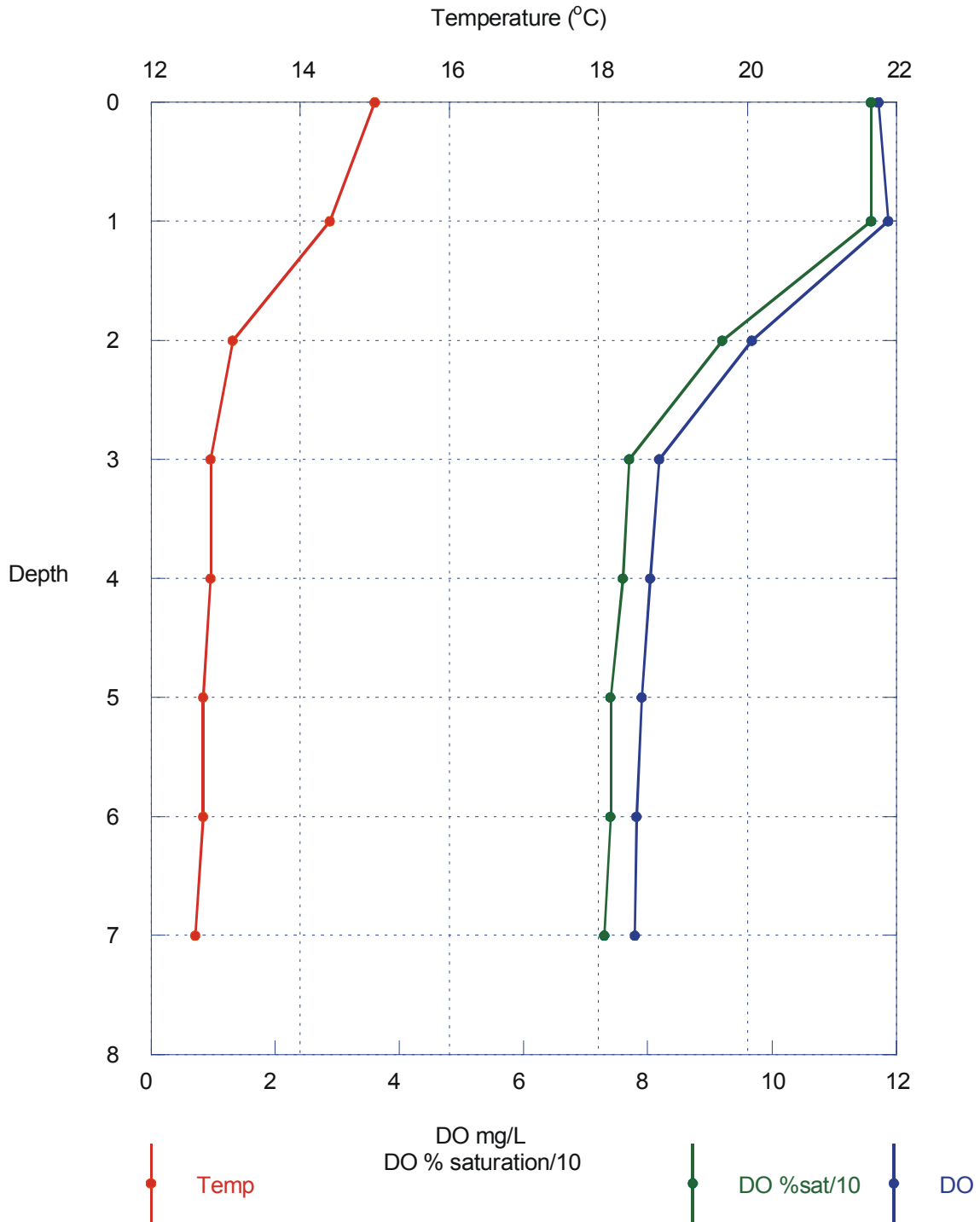
N.B. $\text{mg/L} = \text{g/m}^3 = \text{g m}^{-3}$
 NNN represents nitrate + nitrite nitrogen.

APPENDIX 48: LAKE DEPTH PROFILES FOR TEMPERATURE AND DISSOLVED OXYGEN, 2003.

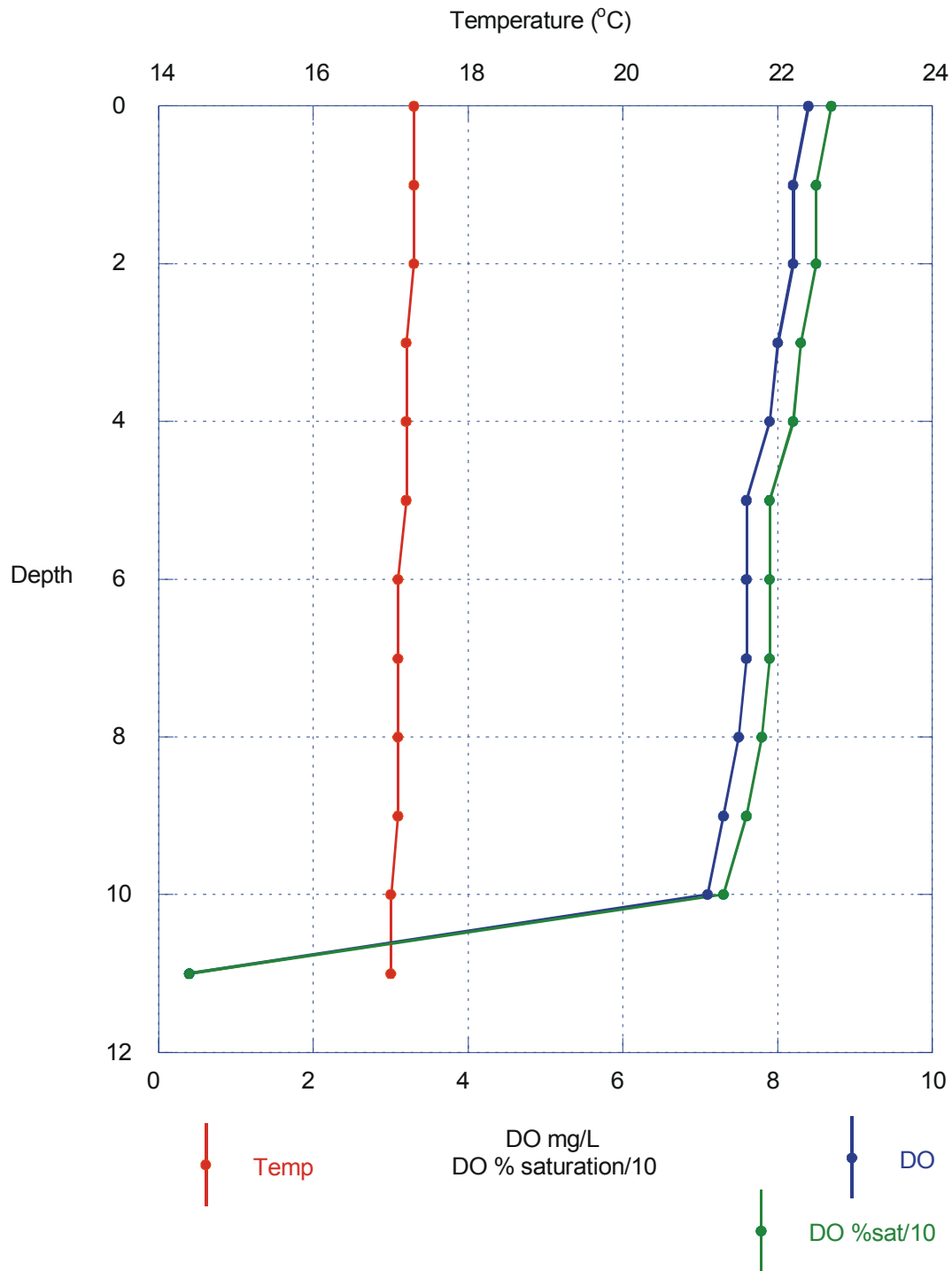
Lake Kuwakatai 6 March 2003



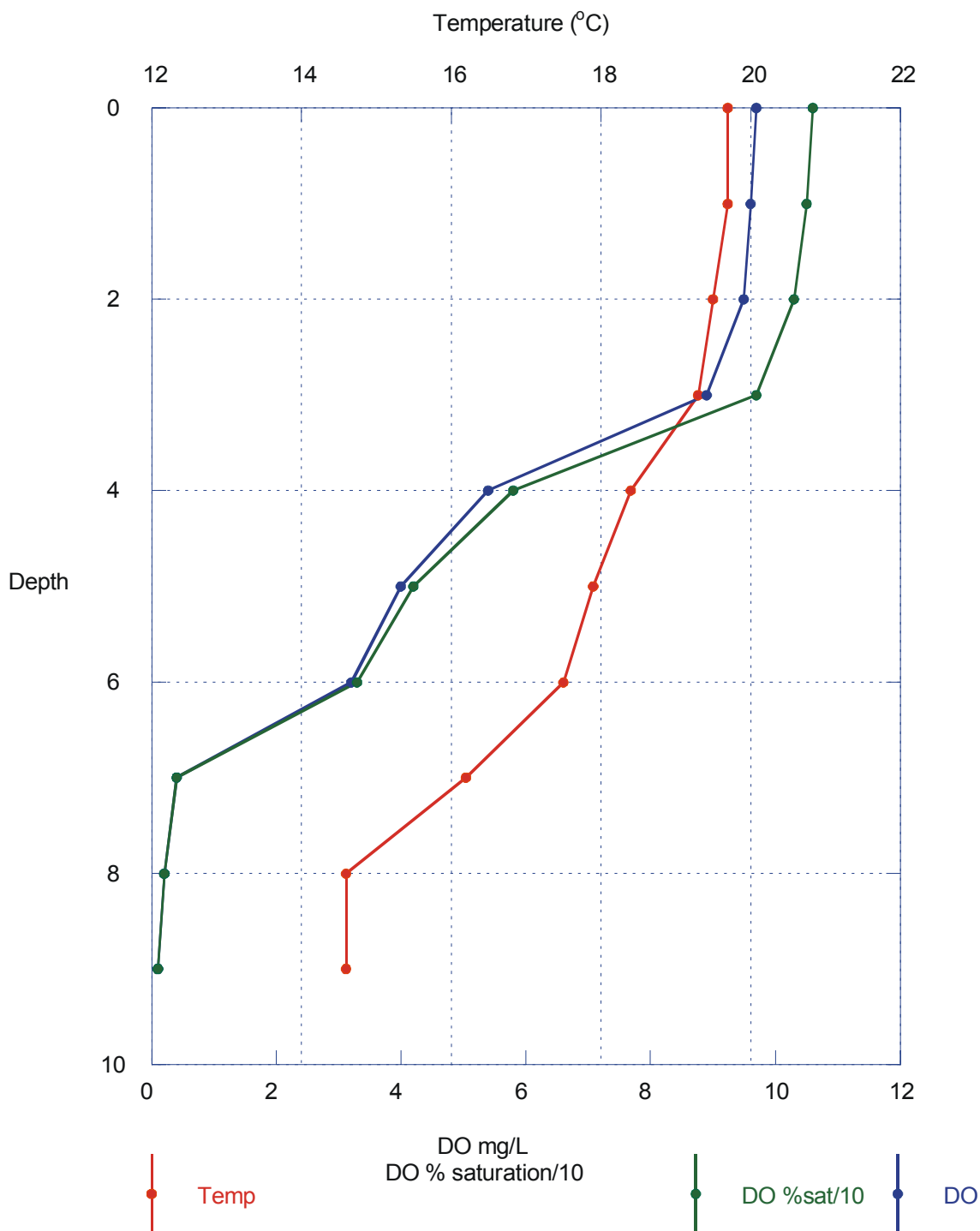
Lake Kuwakatai 11 September 2003



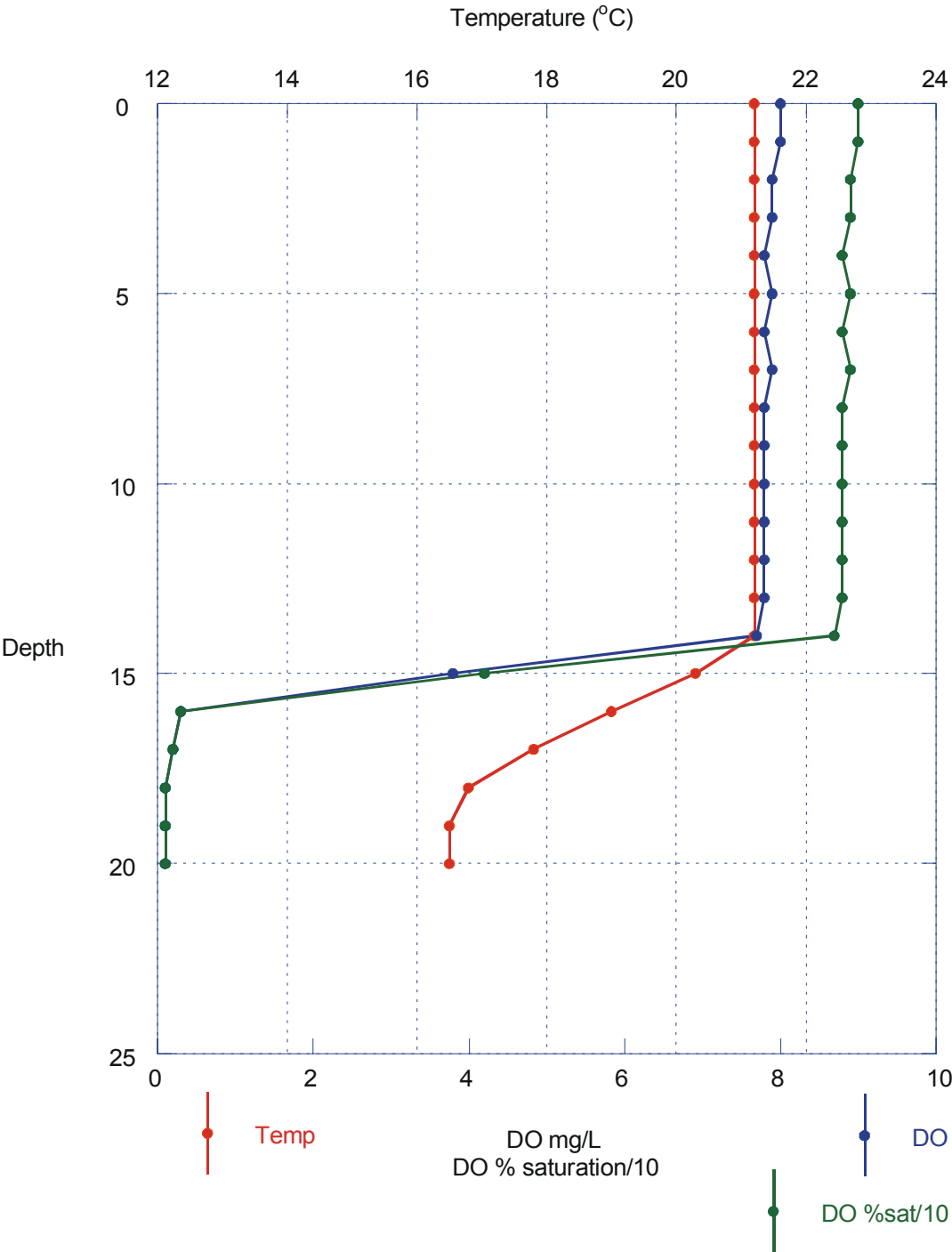
Lake Kuwakatai 8 May 2003



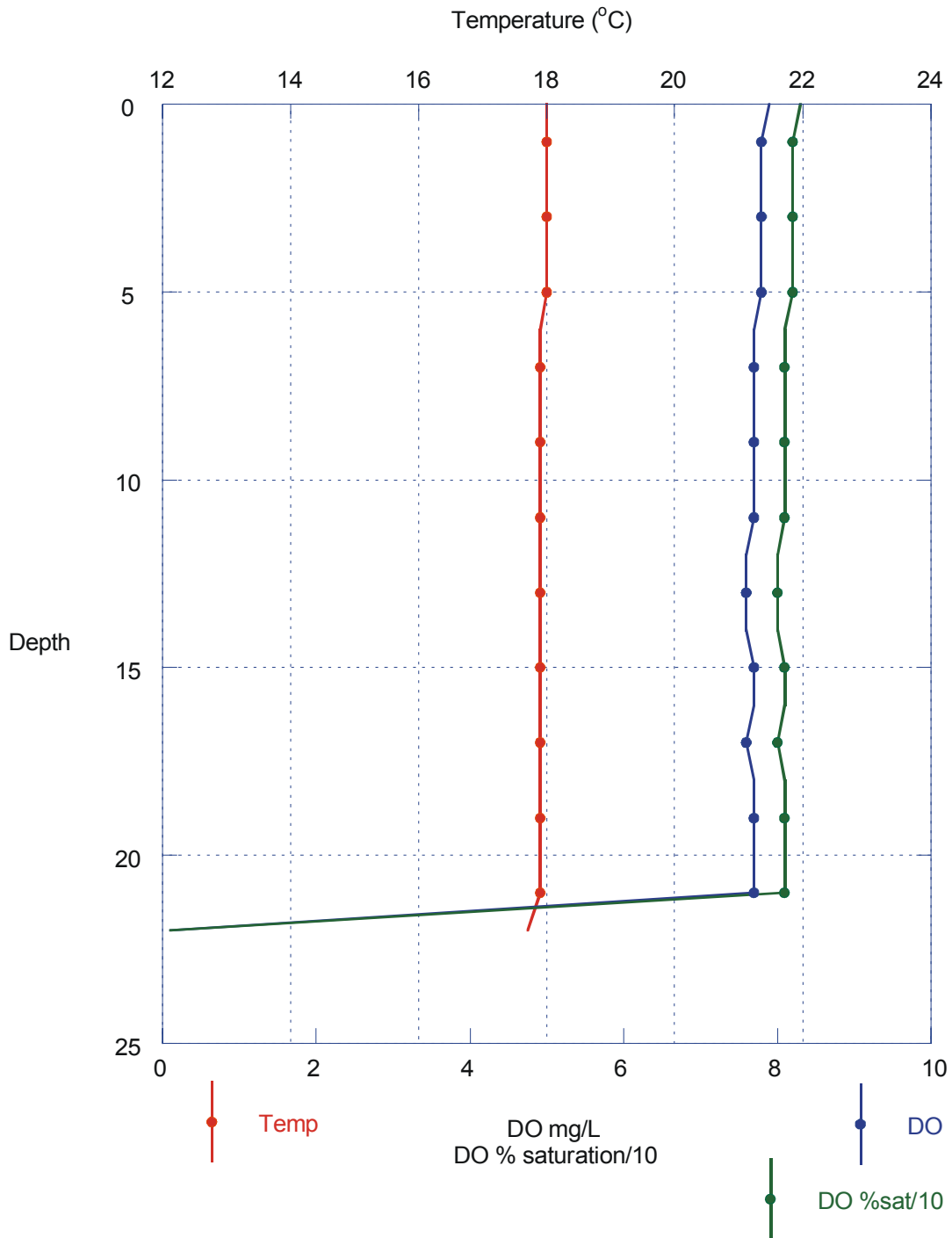
Lake Kuwakatai 20 November 2003



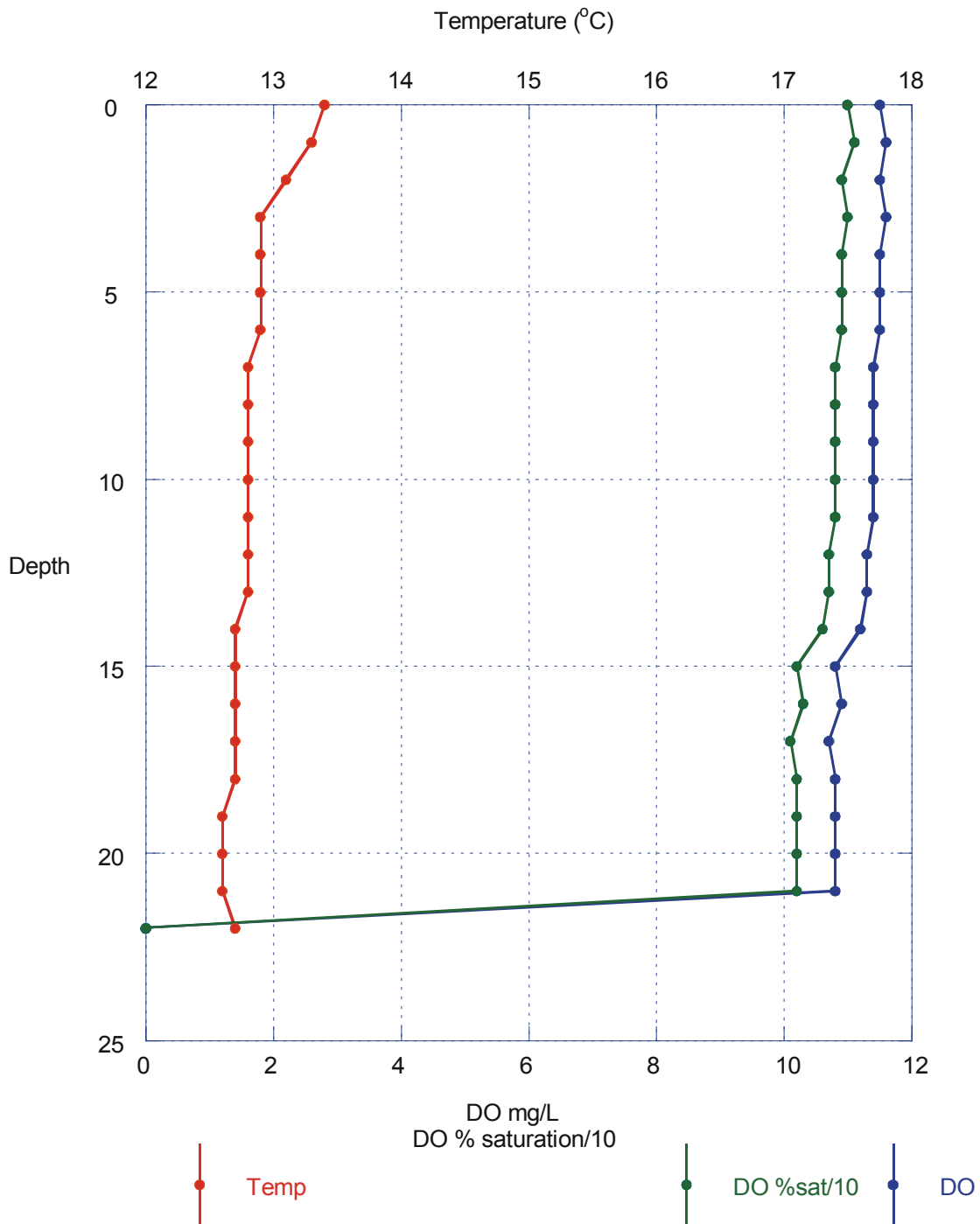
Lake Ototoa 7 March 2003



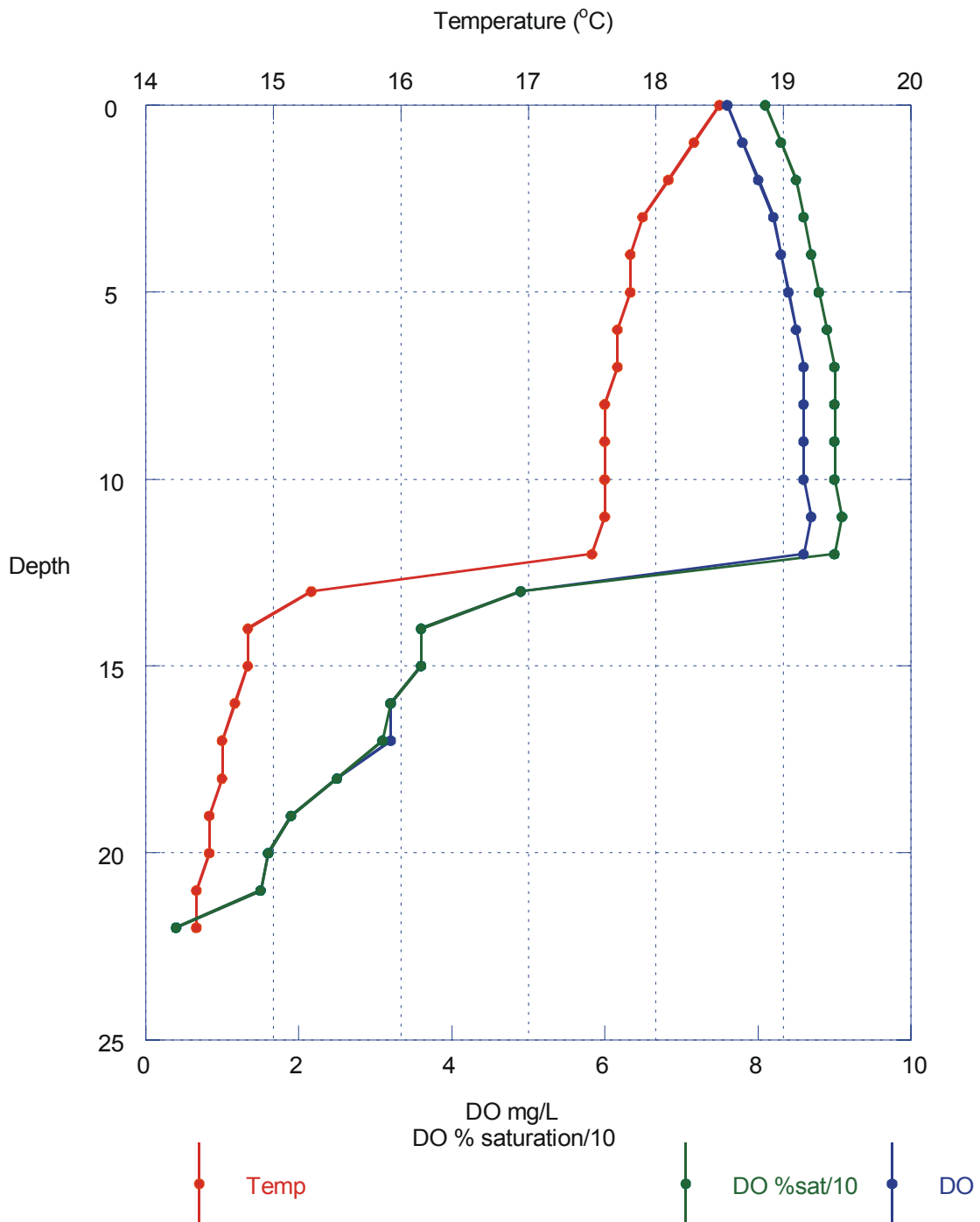
Lake Ototoa 8 May 2003



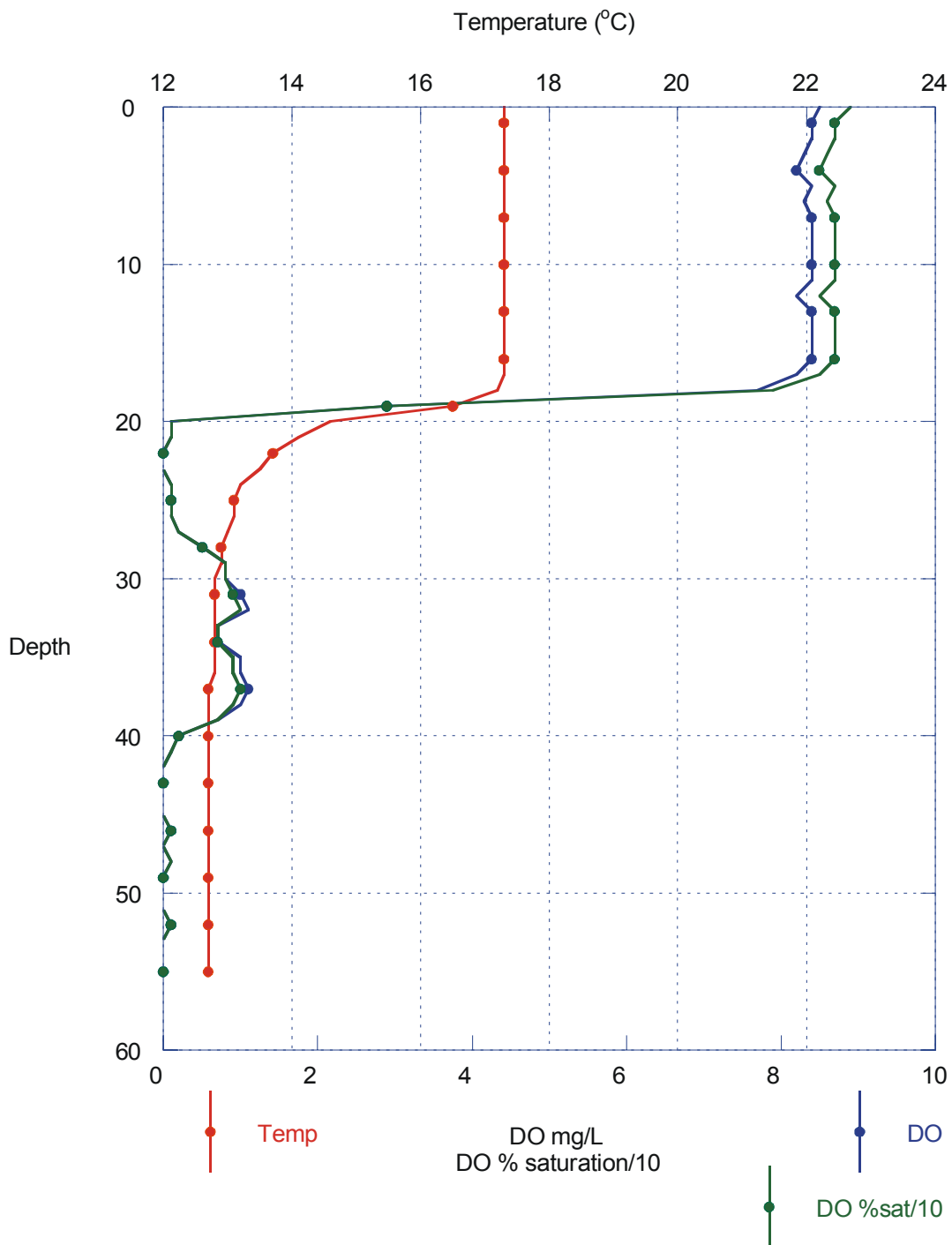
Lake Ototoa 11 September 2003



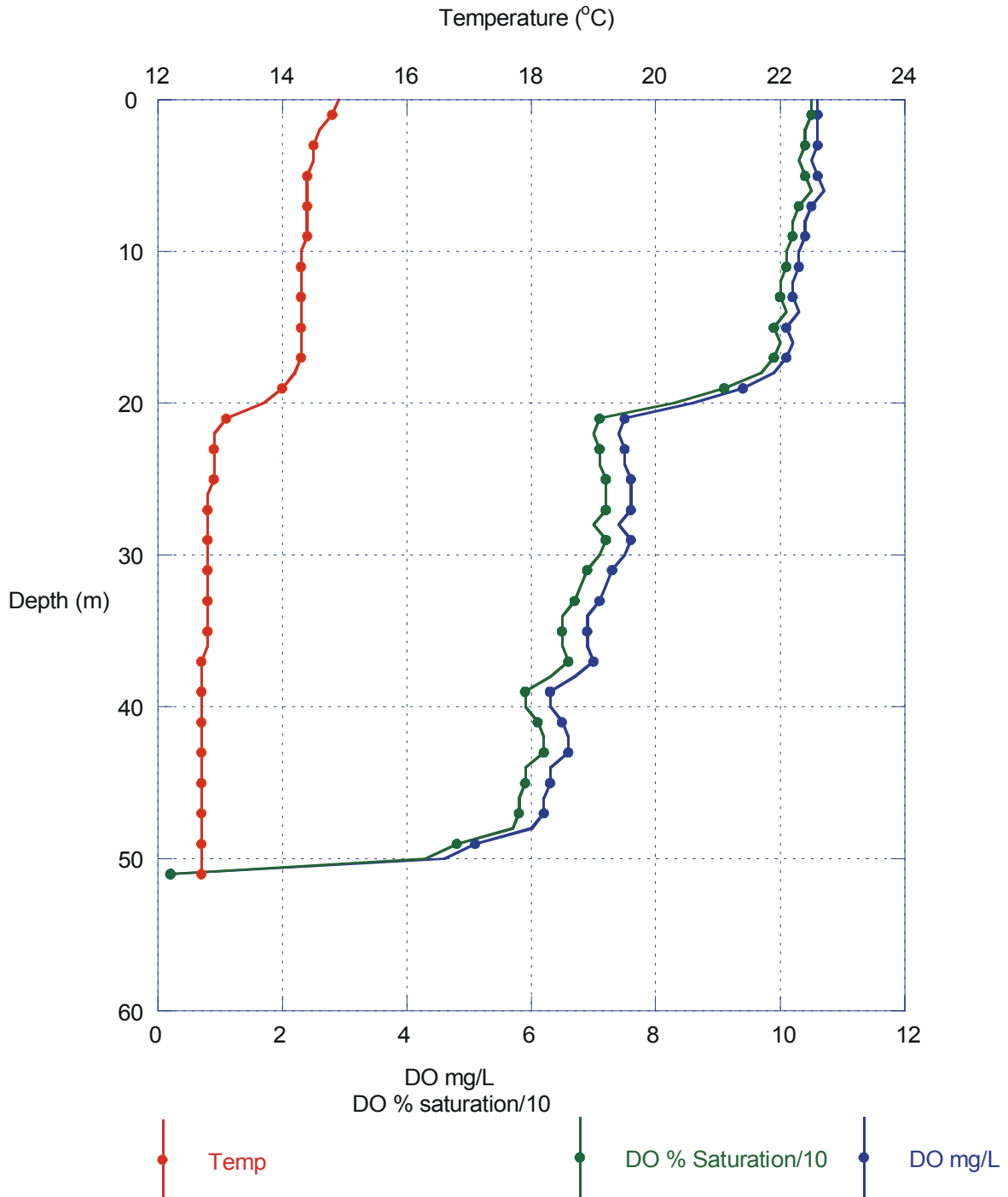
Lake Ototoa 18 November 2003



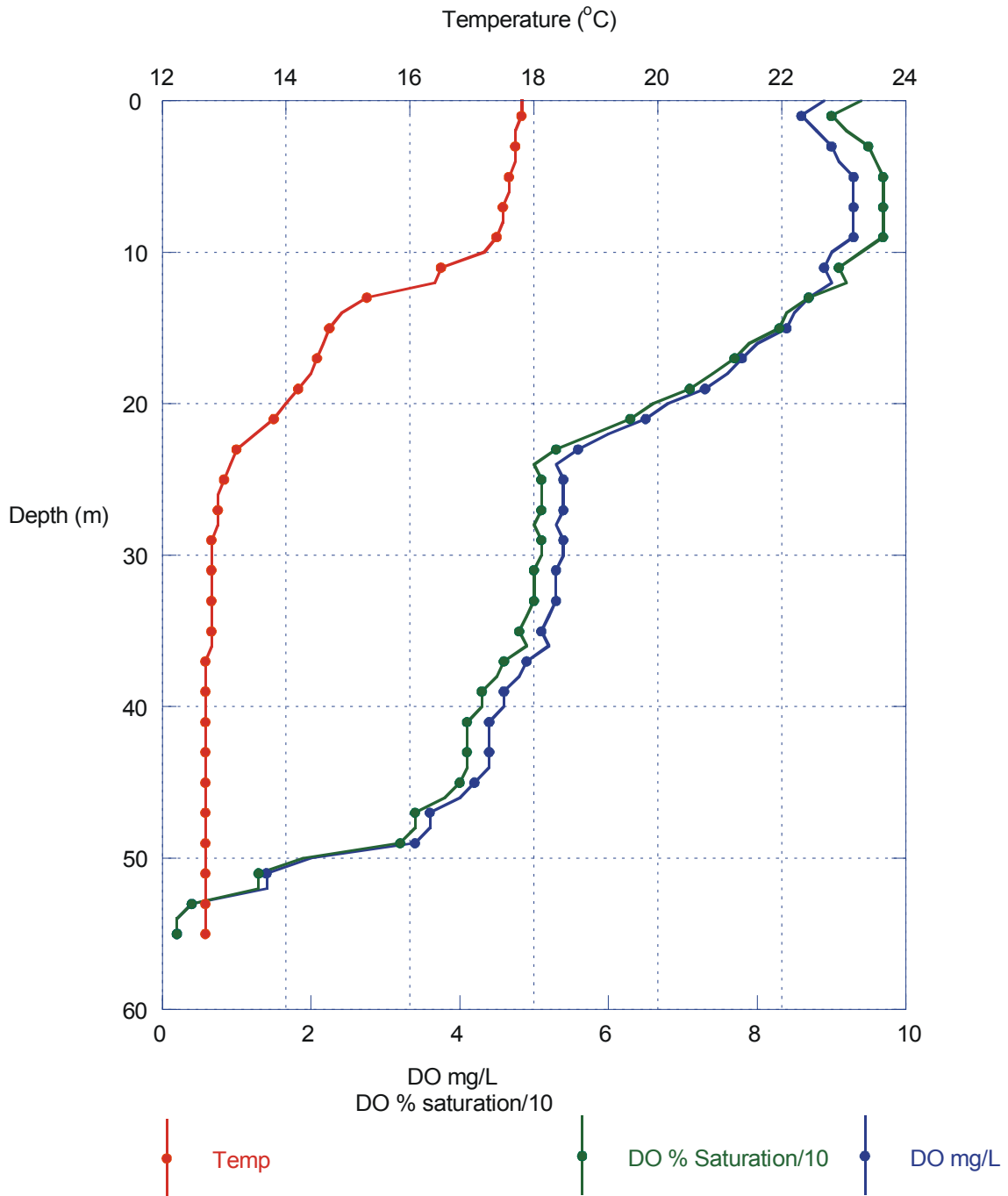
Lake Pupuke 14 May 2003



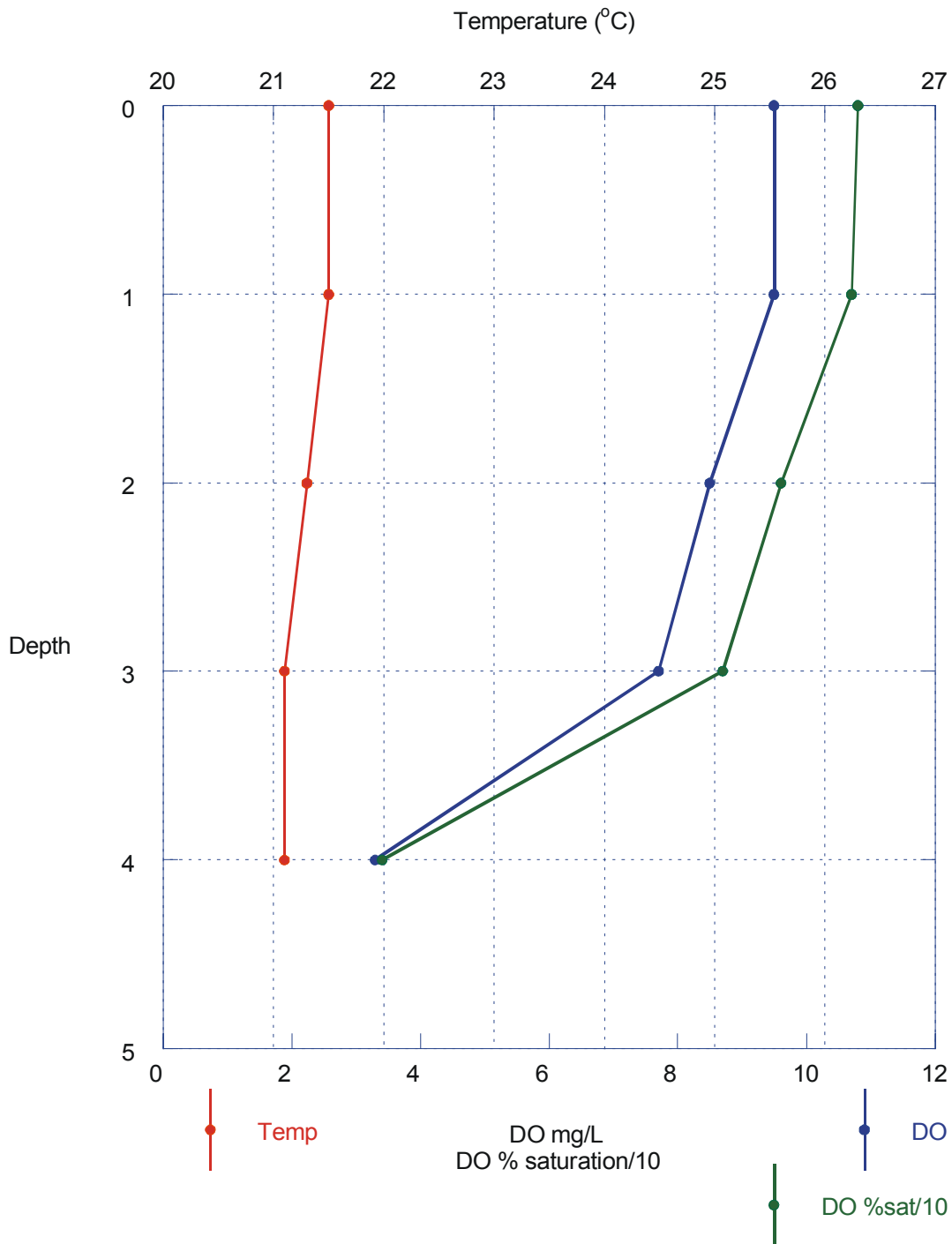
Lake Pupuke 7 October 2003



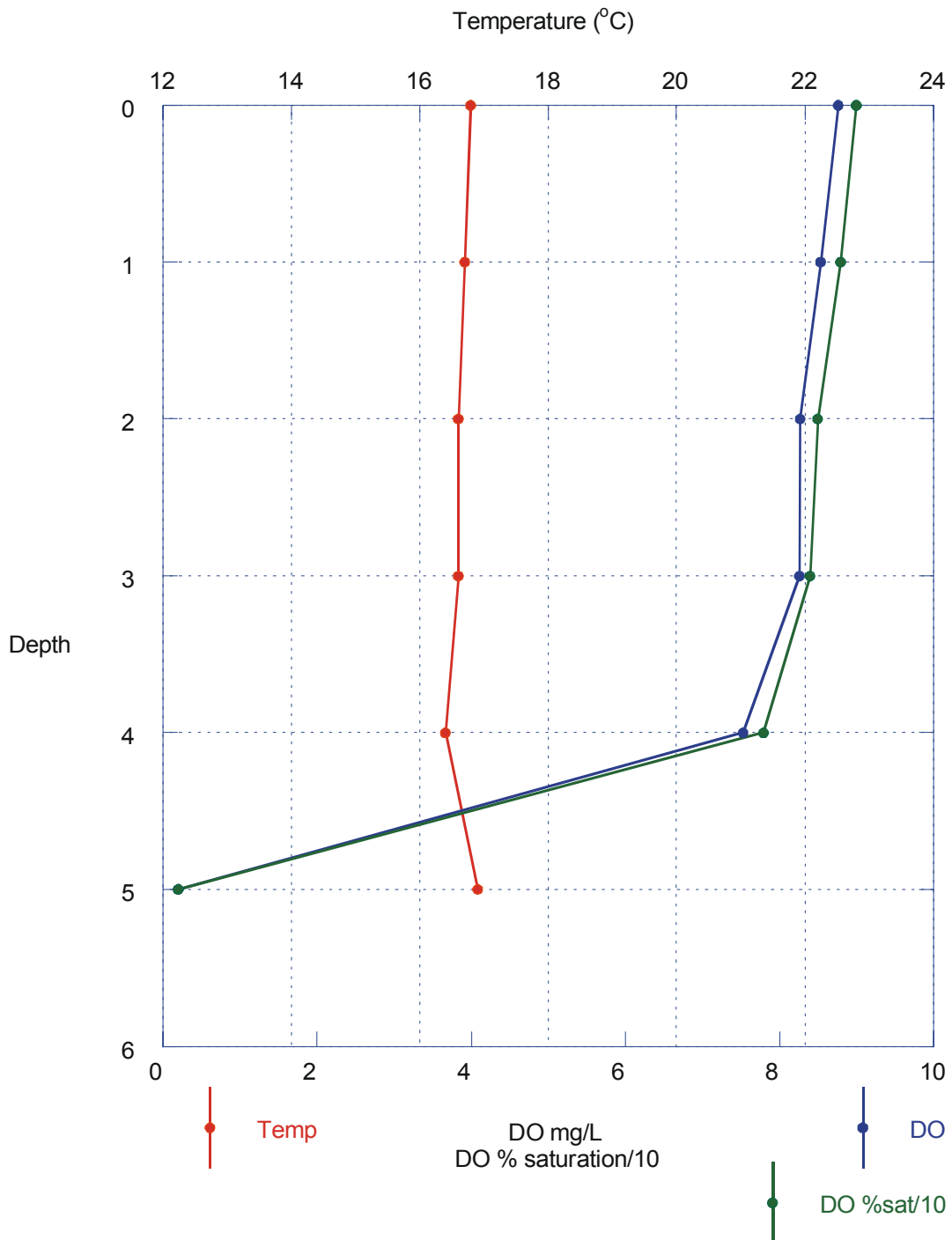
Lake Pupuke 14 November 2003



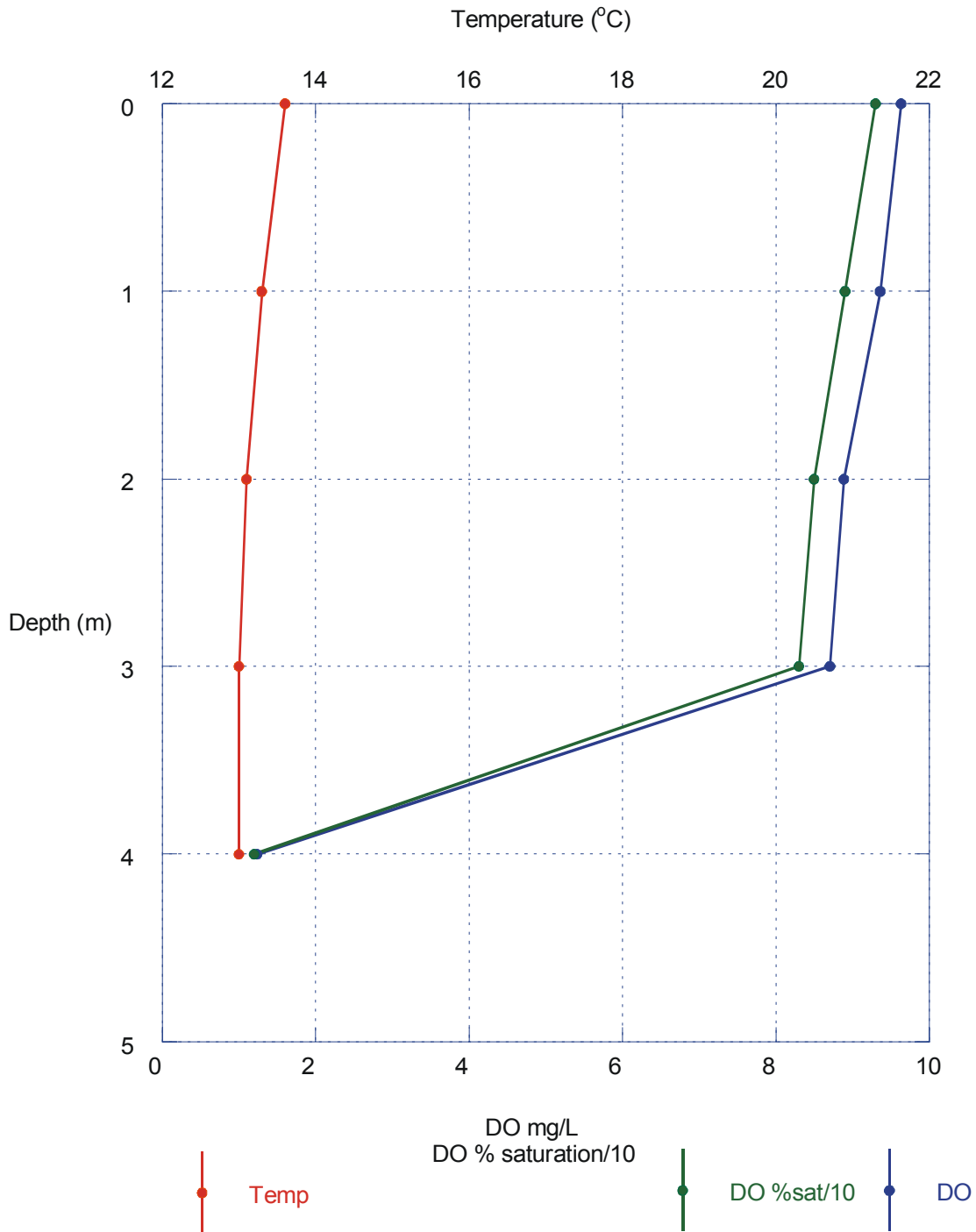
Lake Spectacle 6 May 2003



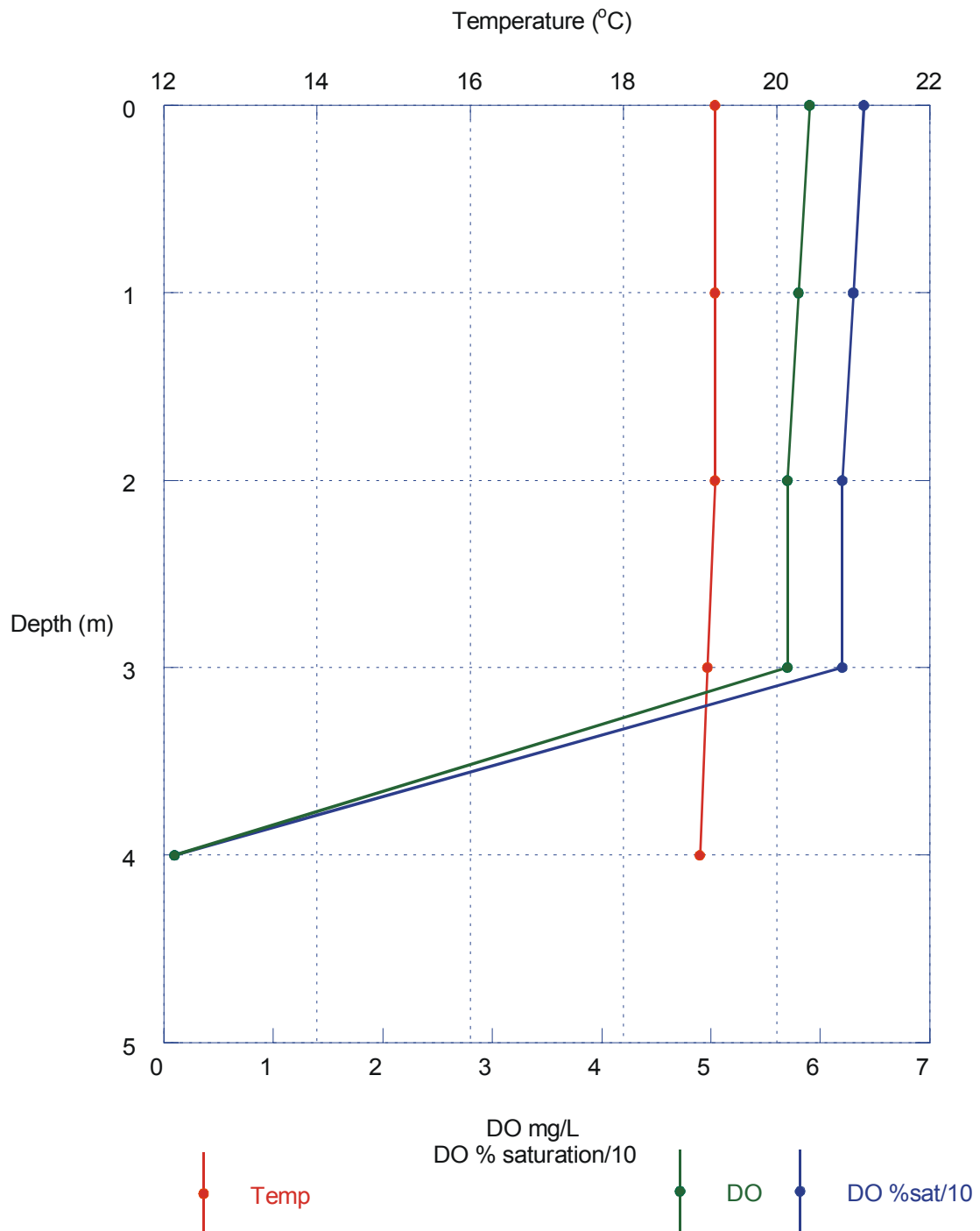
Lake Spectacle 8 May 2003



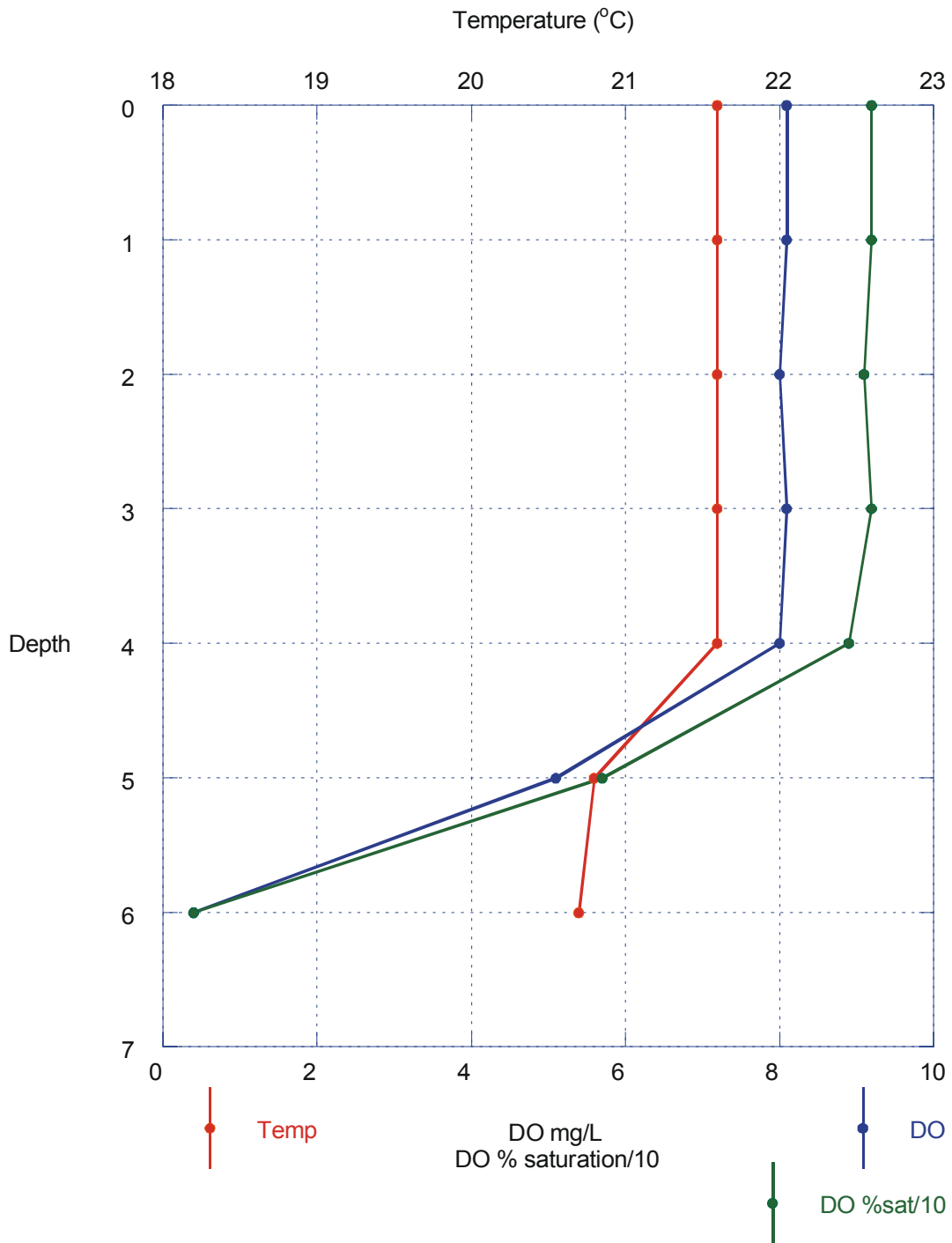
Lake Spectacle 11 September 2003



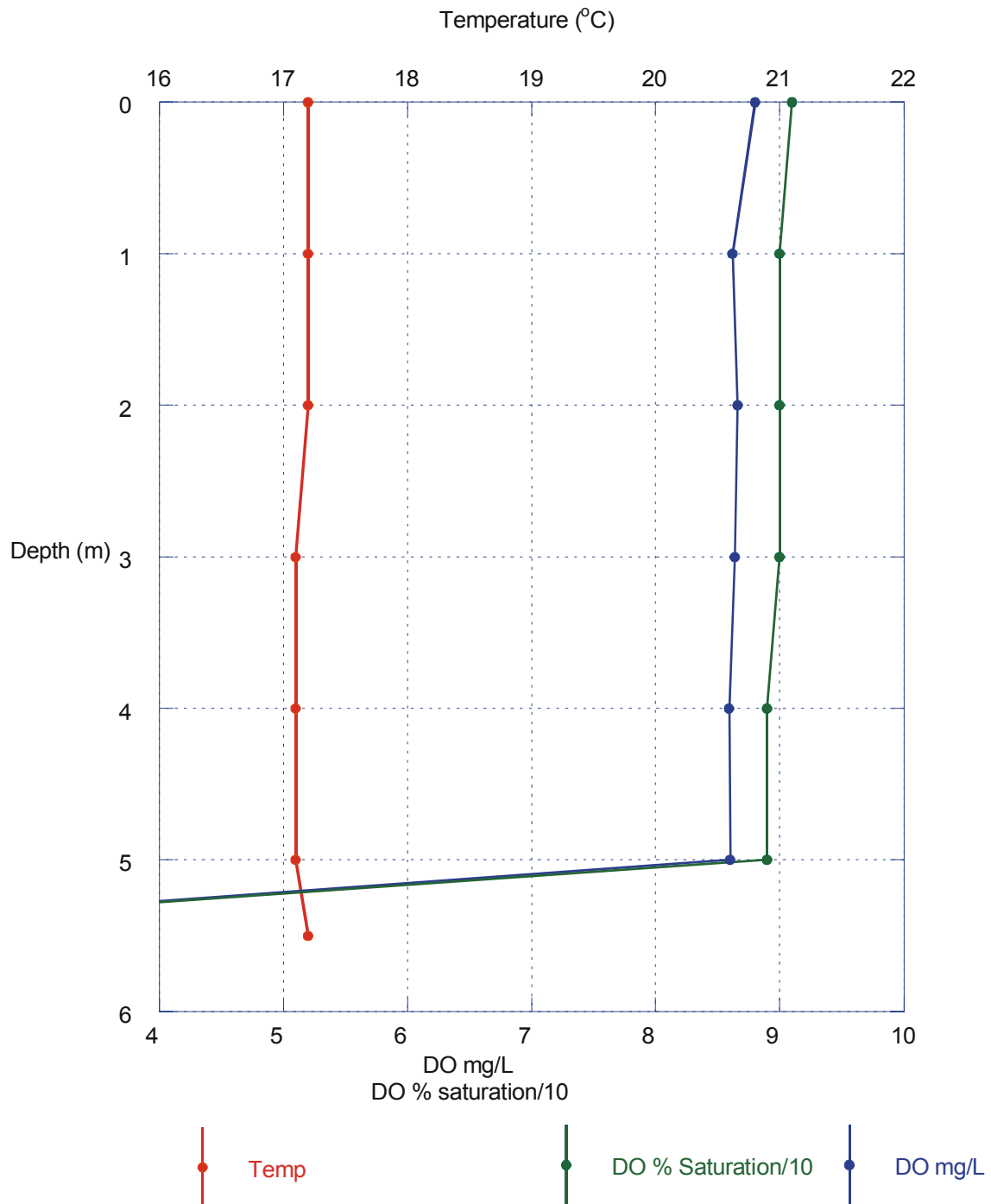
Lake Spectacle 18 November 2003



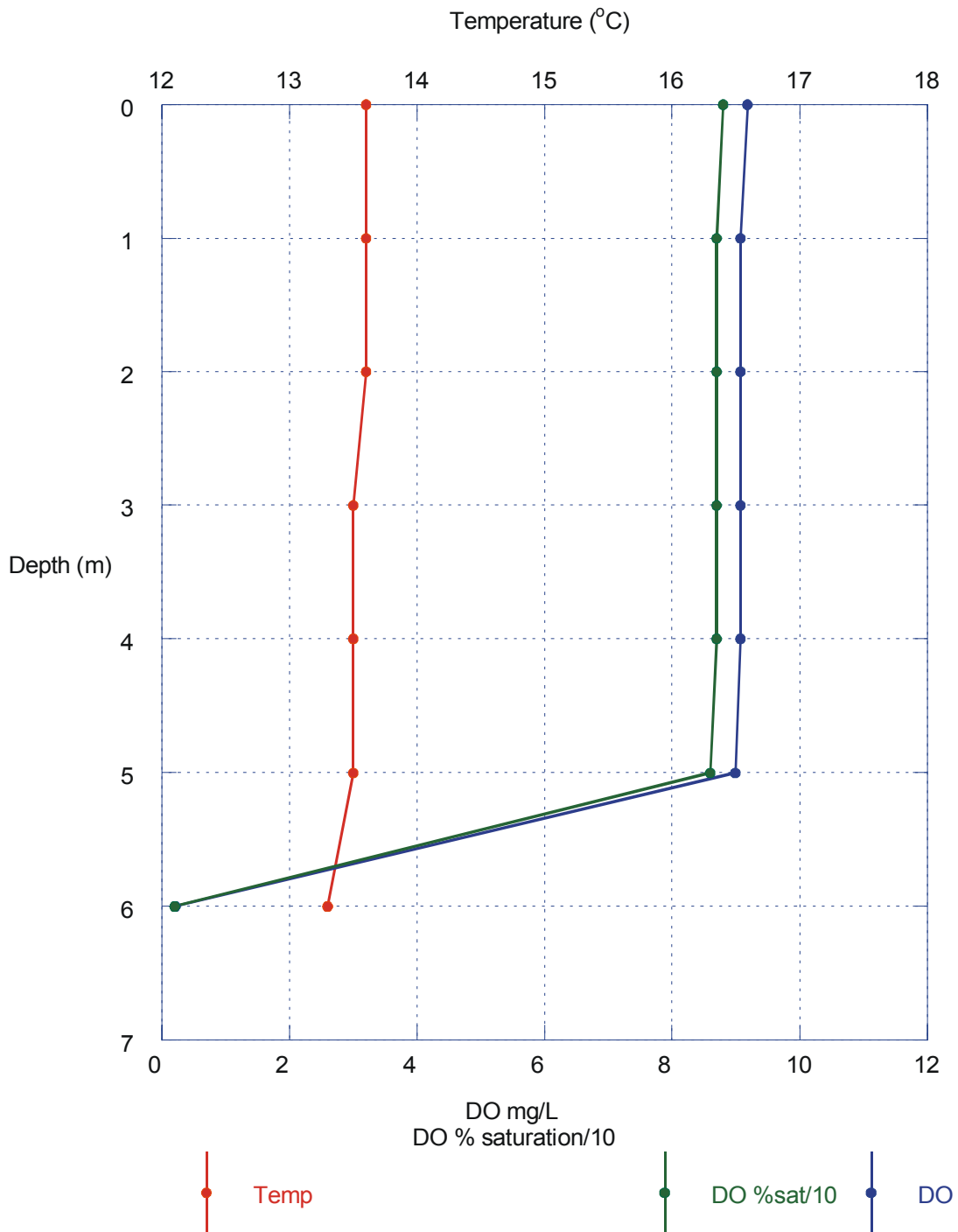
Lake Tomarata 6 Mar 2003



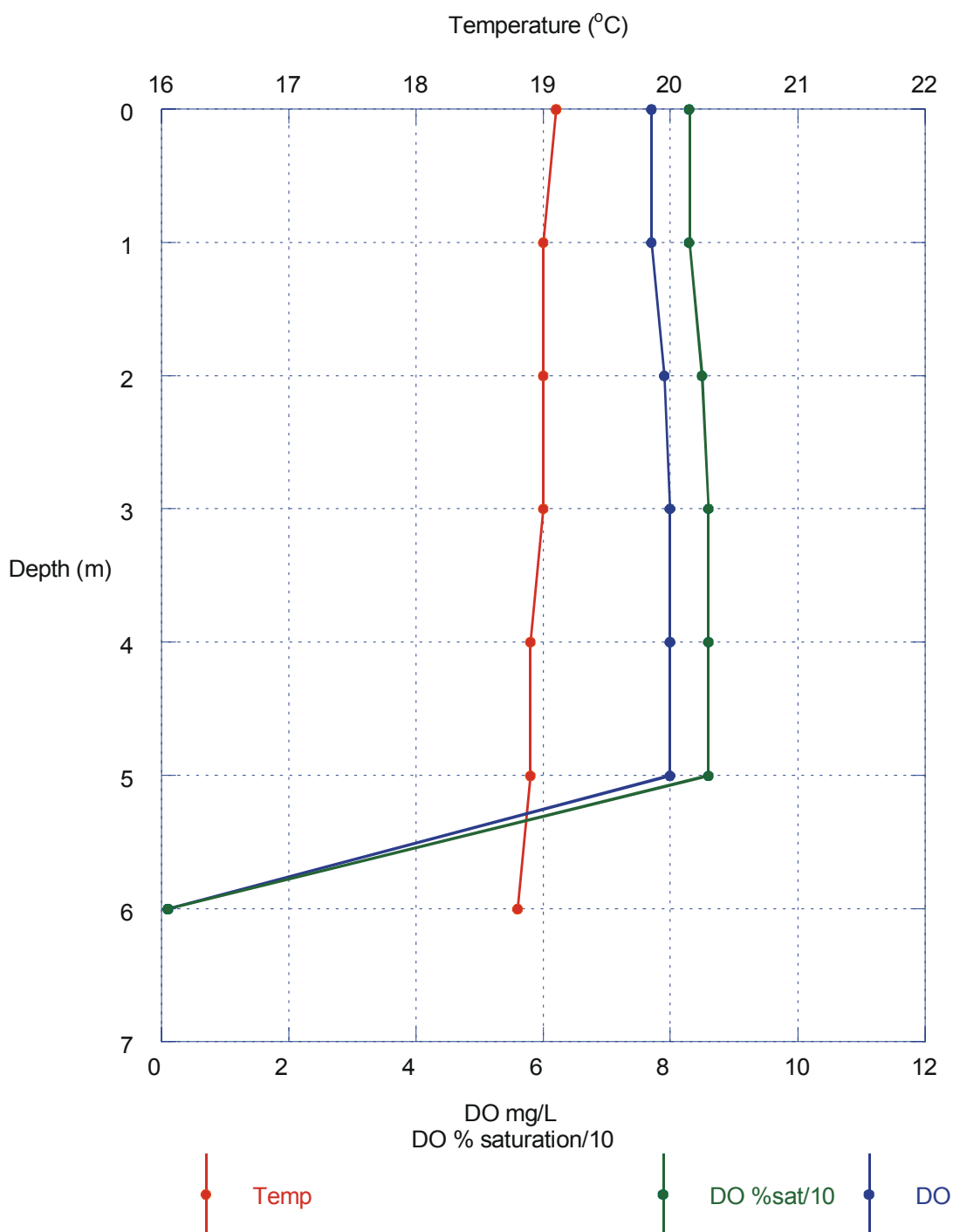
Lake Tomarata 8 May 2003



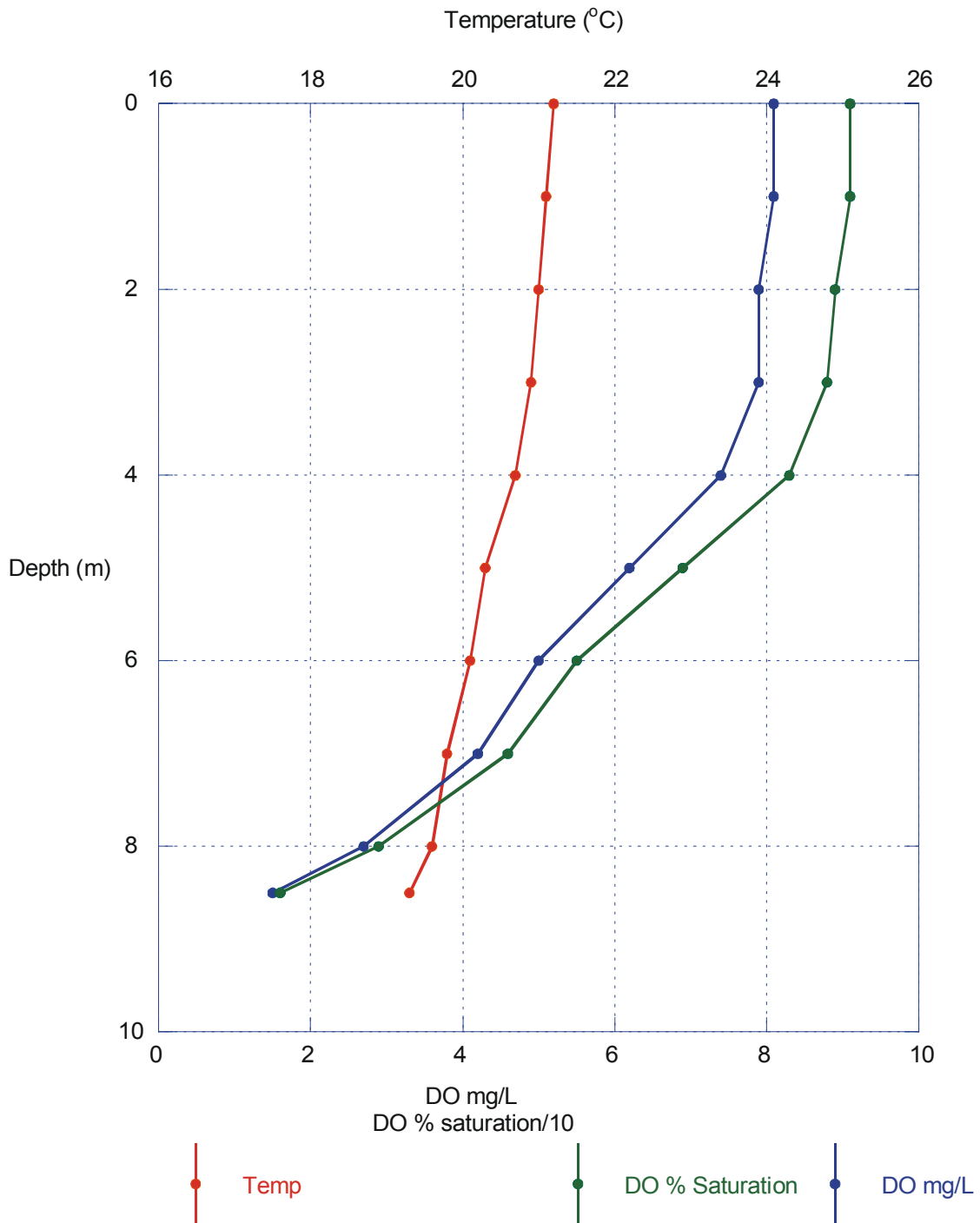
Lake Tomarata 11 September 2003



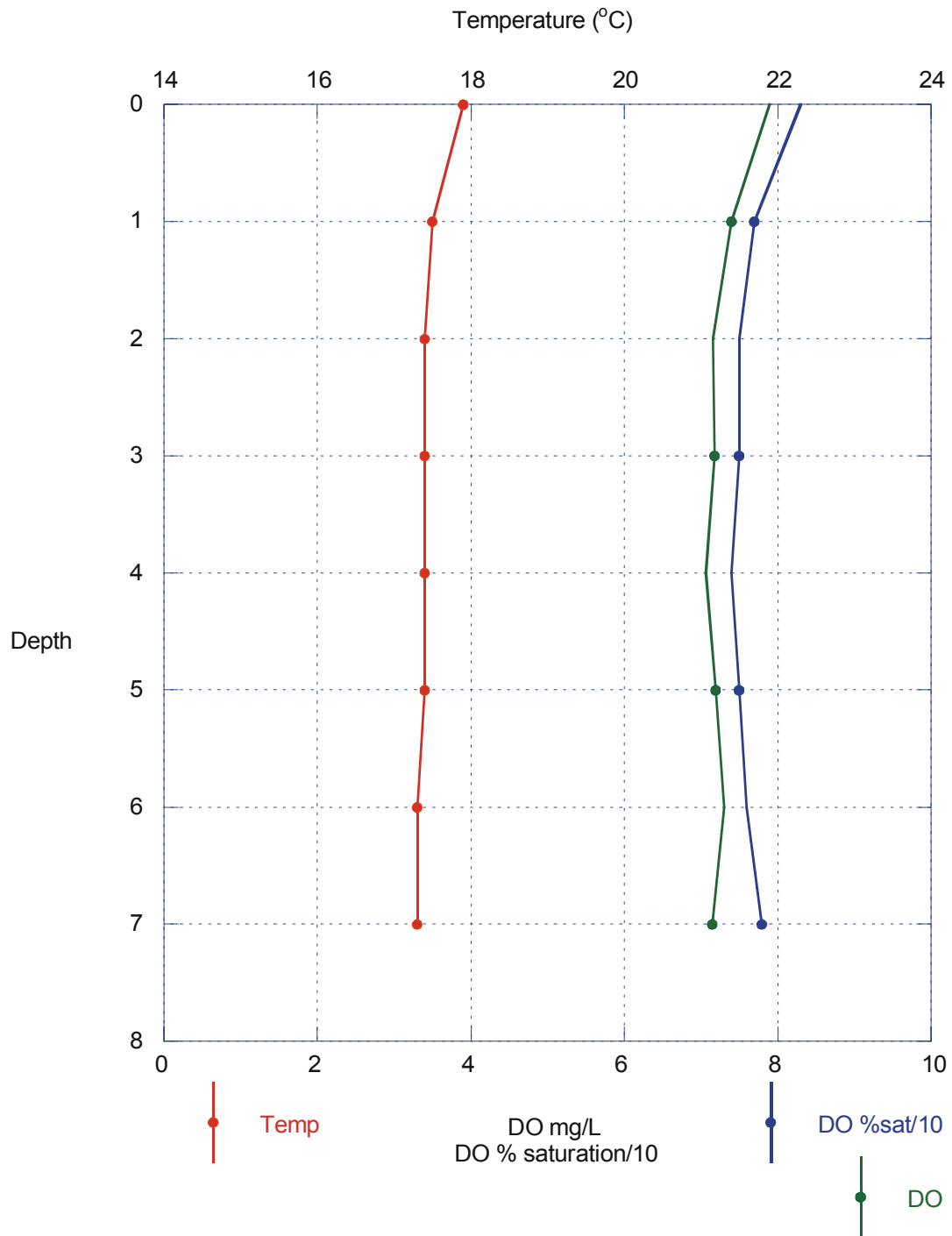
Lake Tomarata 18 November 2003



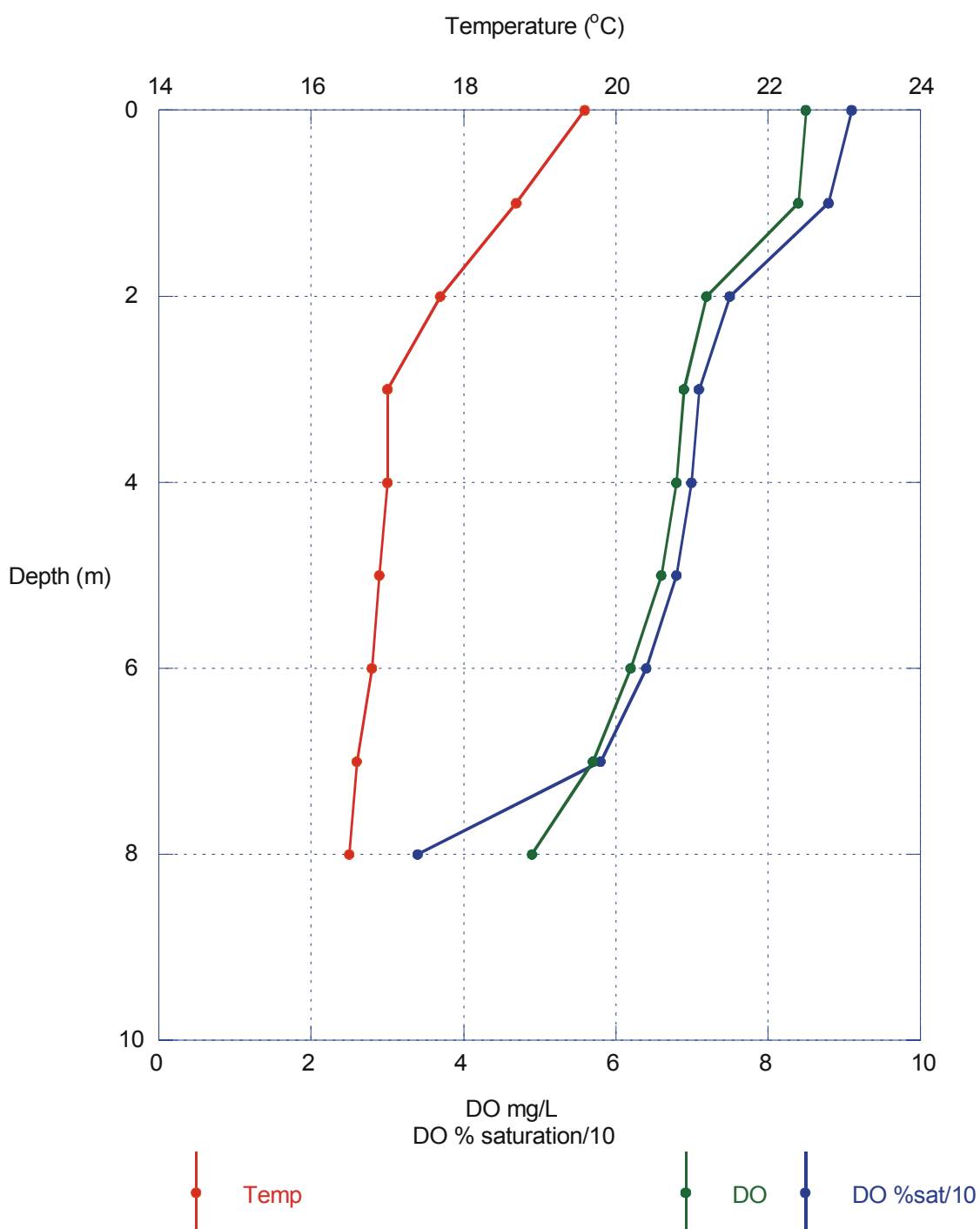
Lake Wainamu 6 March 2003



Lake Wainamu 8 May 2003



Lake Wainamu 20 November 2003



APPENDIX 49: LAKES : TIME-SERIES PLOTS

