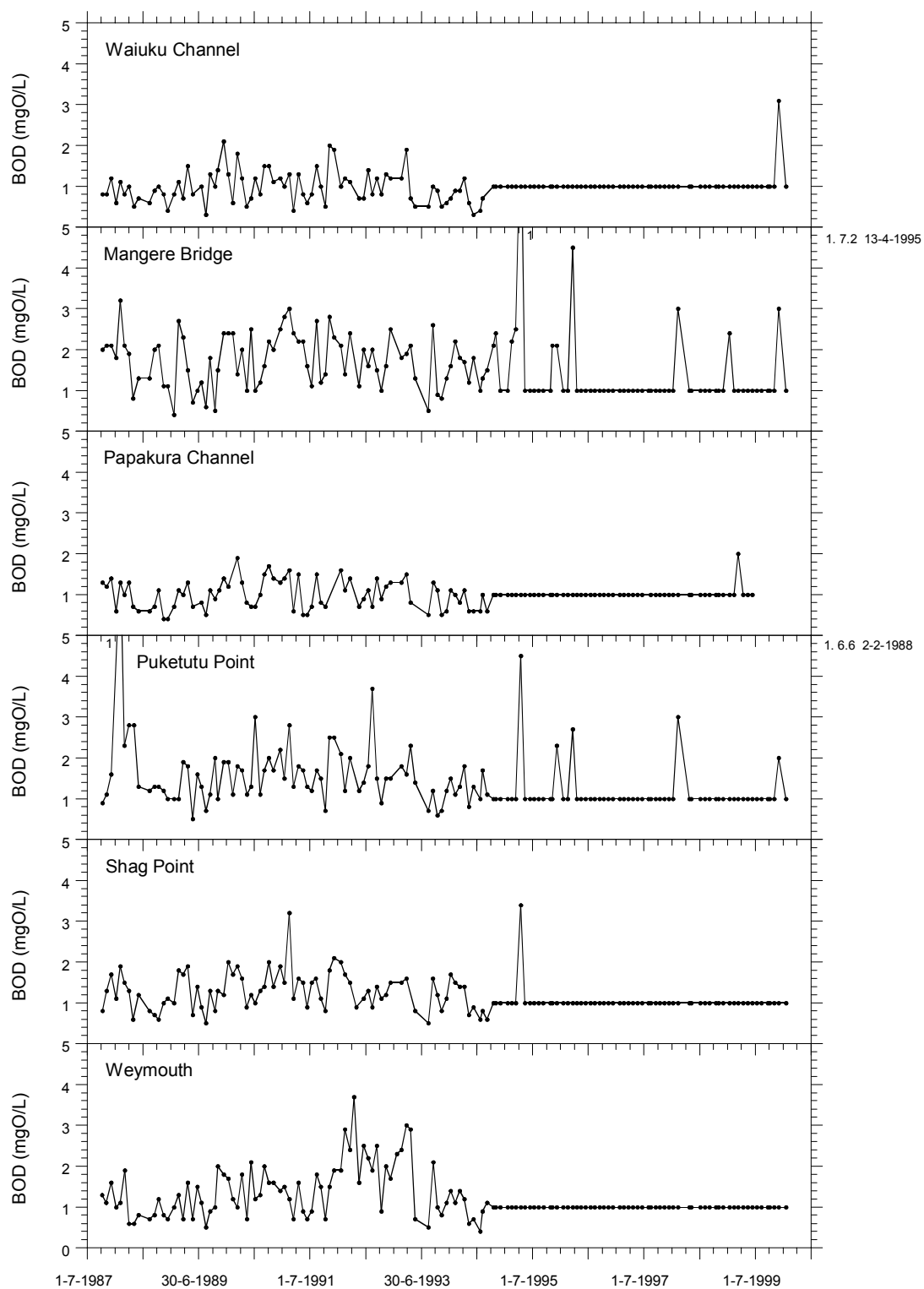




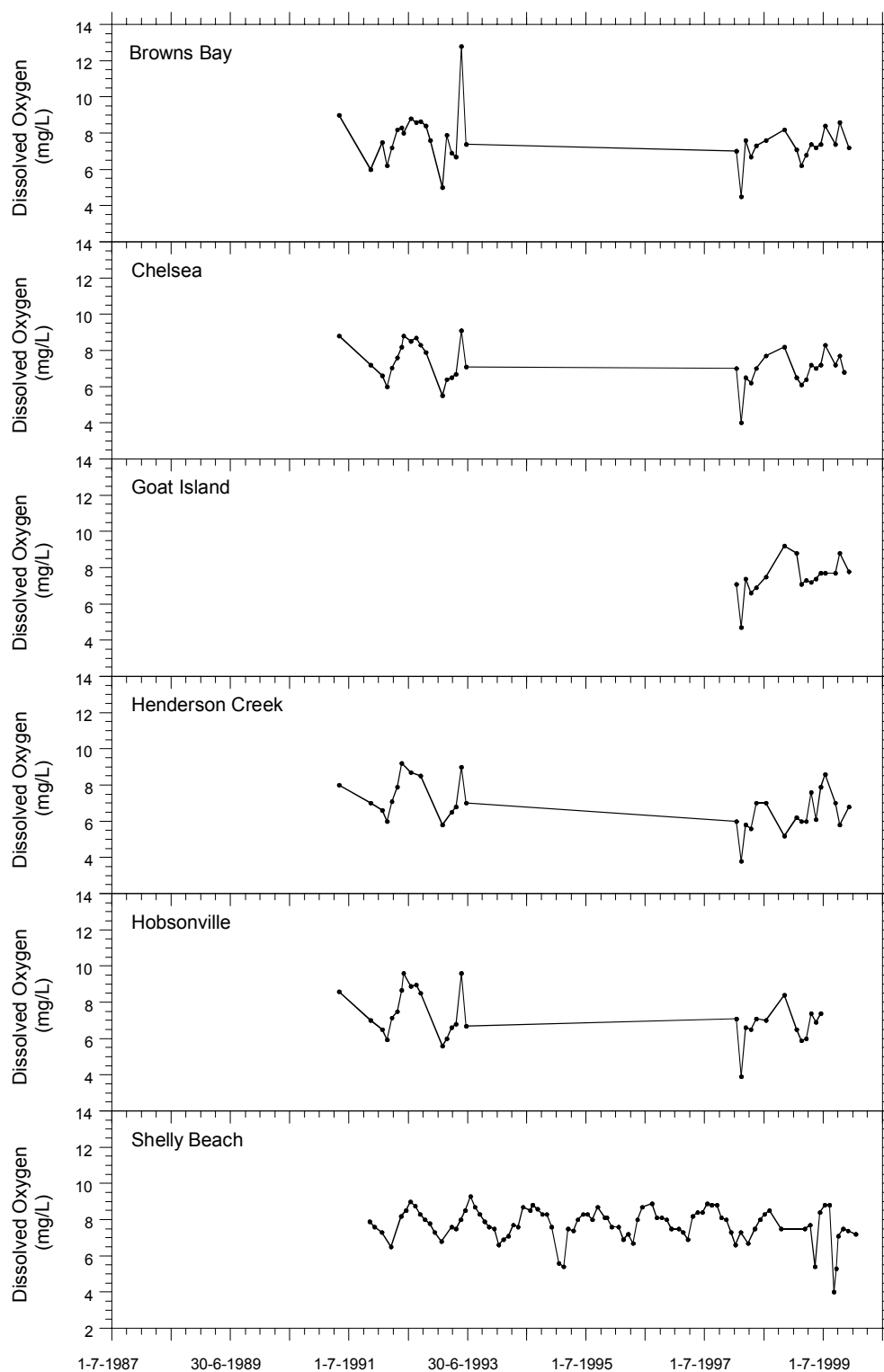
APPENDIX 28: DISSOLVED OXYGEN – SALINE**a) Dissolved oxygen (mg/L) during January 1999 - December 1999**

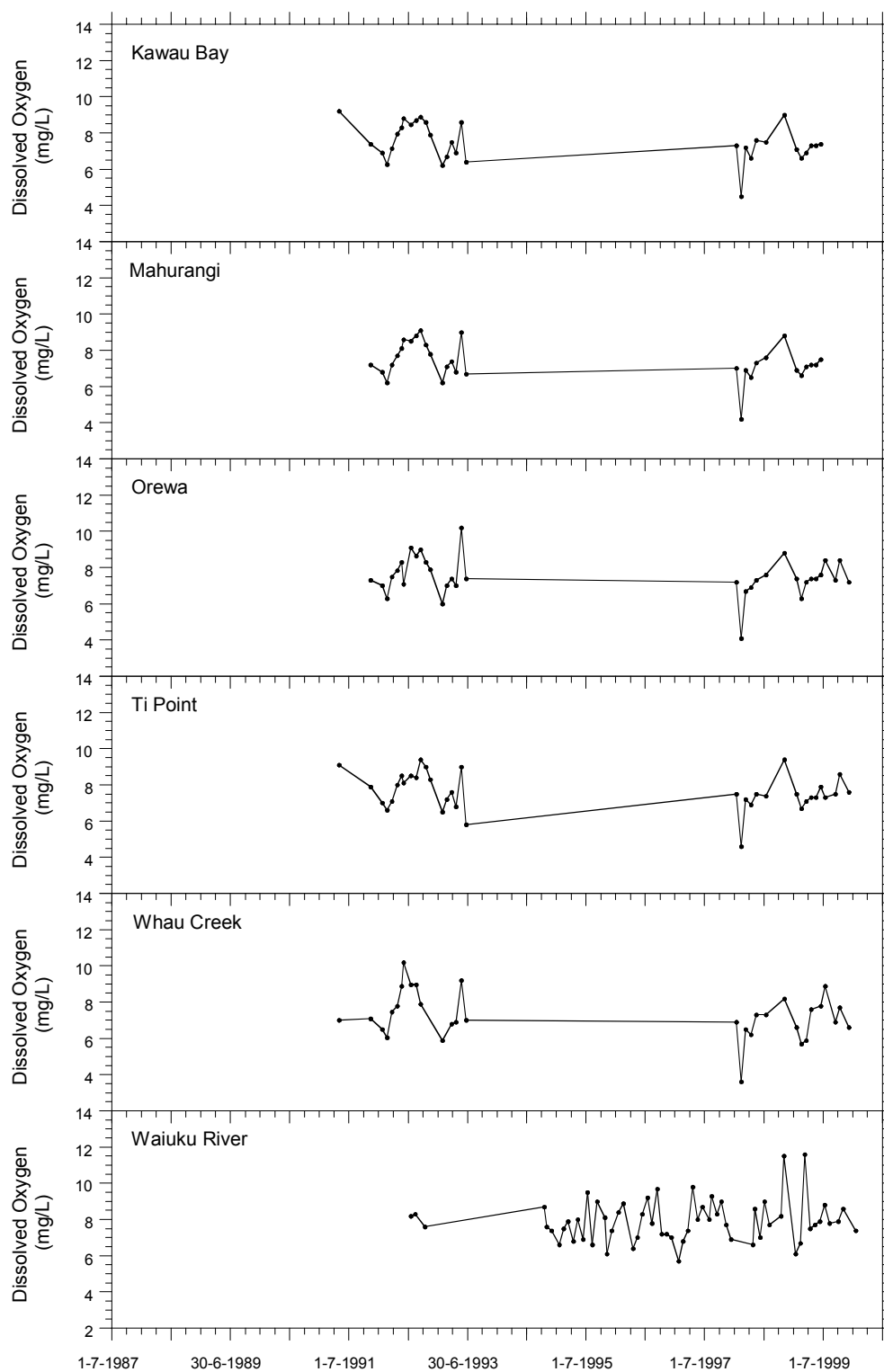
Date	Browns Bay	Chelsea Bay	Goat Island	Henderson	Hobsonville	Shelly Beach	Kawau Bay	Mahurangi	Orewa	Ti Point	Whau	Waiuku River	Waiuku Channel	Mangere Bridge	Papakura Channel	Puketutu Point	Shag Point	Weymouth
Jan-99	7.1	6.5	8.8	6.2	6.5		7.1	6.9	7.4	7.5	6.6	6.1	6.3	6.5	6.8	6.8	7.3	6.2
Feb-99	6.2	6.1	7.1	6	5.9		6.6	6.6	6.3	6.7	5.7	6.7	6.9	7.1	7	7	7	4.7
Mar-99	6.8	6.4	7.3	6	6	7.5	6.9	7.1	7.2	7.1	5.9	11.6	12.2	10.5	12.8	11.8	12.6	11.6
Apr-99	7.4	7.2	7.2	7.6	7.4	7.7	7.3	7.2	7.4	7.3	7.6	7.5	7.5	5.5	7.4	6.3	7.3	7.3
May-99	7.2	7	7.4	6.1	6.9	5.4	7.3	7.2	7.4	7.3		7.7	8.2	6.8	6.8	6.9	7.4	8.4
Jun-99	7.4	7.2	7.7	7.9	7.4	8.4	7.4	7.5	7.6	7.9	7.8	7.9	7.8	7.4	8.3	7.8	8.3	8.2
Jul-99	8.4	8.3	7.7	8.6		8.8			8.4	7.3	8.9	8.8	8.7	7.9		8.9	9.1	9.3
Aug-99						8.8						7.8	7.6	5.9		6.8	7.2	7.3
Sep-99	7.4	7.2	7.7	7		4			7.3	7.5	6.9							
Oct-99	8.6	7.7	8.8	5.8		5.3			8.4	8.6	7.7	7.9	8.3	5.7		8.4	8	8.3
Nov-99		6.8				7.1						8.6	9.3	7.8		8.6	10.1	9.6
Dec-99	7.2		7.8	6.8		7.5			7.2	7.6	6.6							
median	7.3	7.1	7.7	6.5	6.7	7.5	7.2	7.2	7.4	7.4	6.9	7.9	8.0	7.0	7.2	7.4	7.7	8.2
IQR/median (%)	4	9	6	22	18	24	5	3	3	4	16	11	13	24	17	23	21	22

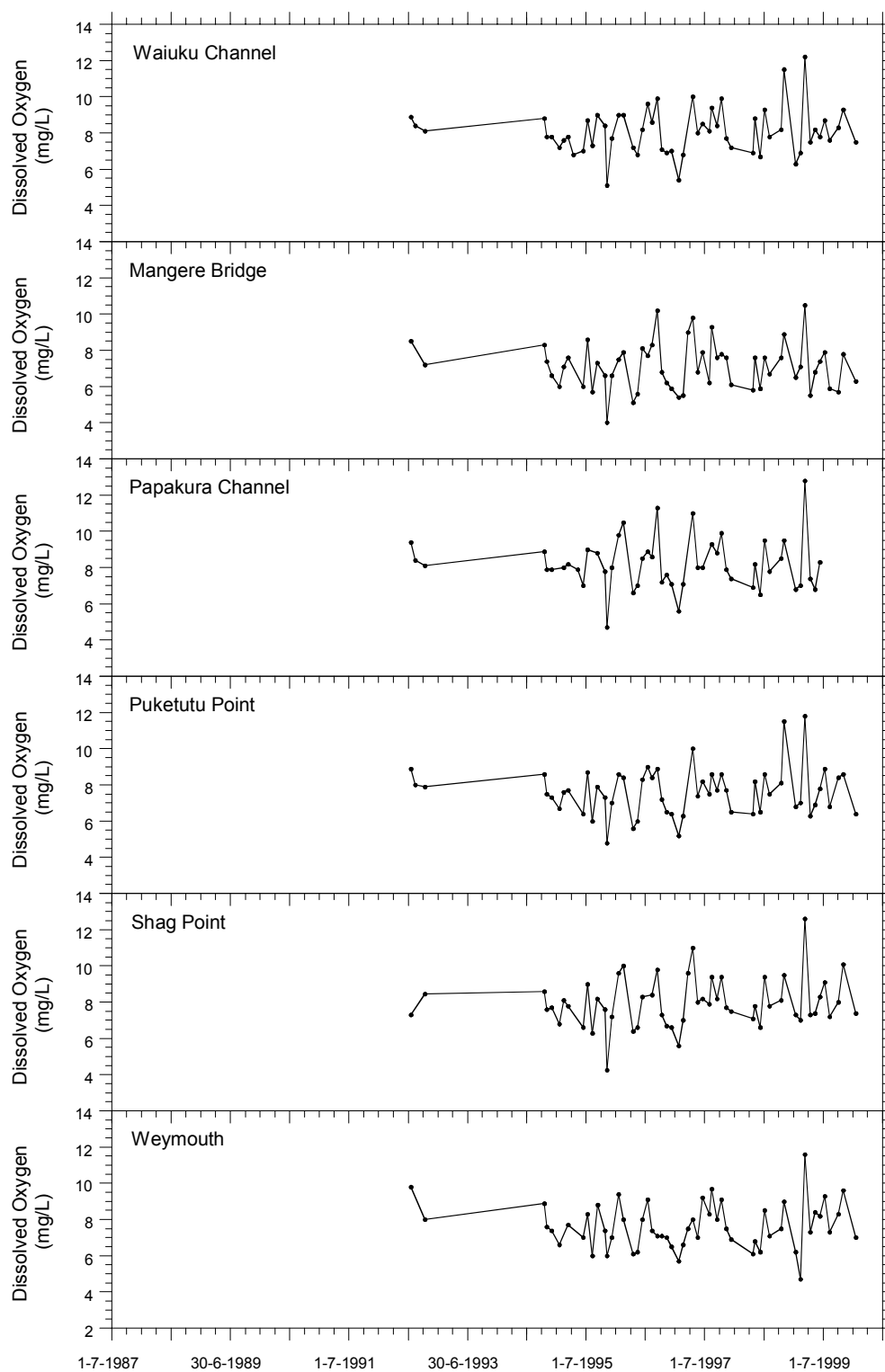
b) Statistical summary for all data to January 2000: Dissolved oxygen (mg/L)

Date	Browns Bay	Chelsea Bay	Goat Island	Henderson	Hobsonville	Shelly Beach	Kawau Bay	Mahurangi	Orewa	Ti Point	Whau	Waiuku River	Waiuku Channel	Mangere Bridge	Papakura Channel	Puketutu Point	Shag Point	Weymouth
N	36	35	17	31	30	90	32	31	35	36	32	59	57	56	49	56	55	55
Median	7.4	7.1	7.4	6.8	7.0	7.9	7.4	7.2	7.4	7.5	7.1	7.8	8.0	7.2	8.0	7.7	7.8	7.5
Normality	N	Y	N	Y	Y	N	Y	Y	Y	Y	Y	N	N	Y	Y	N	N	Y
Seasonality	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	N	Y
Trend	80%	95%	99%	90%	NS	95%	80%	NS	NS	NS	80%	NS	NS	NS	NS	NS	NS	NS
Slope	-0.08	-0.10	0.67	-0.14	—	-0.05	-0.11	—	—	—	-0.11	—	—	—	—	—	—	—

c) The graphs on the following page show all DO measurements up to January 2000 (where data are available)







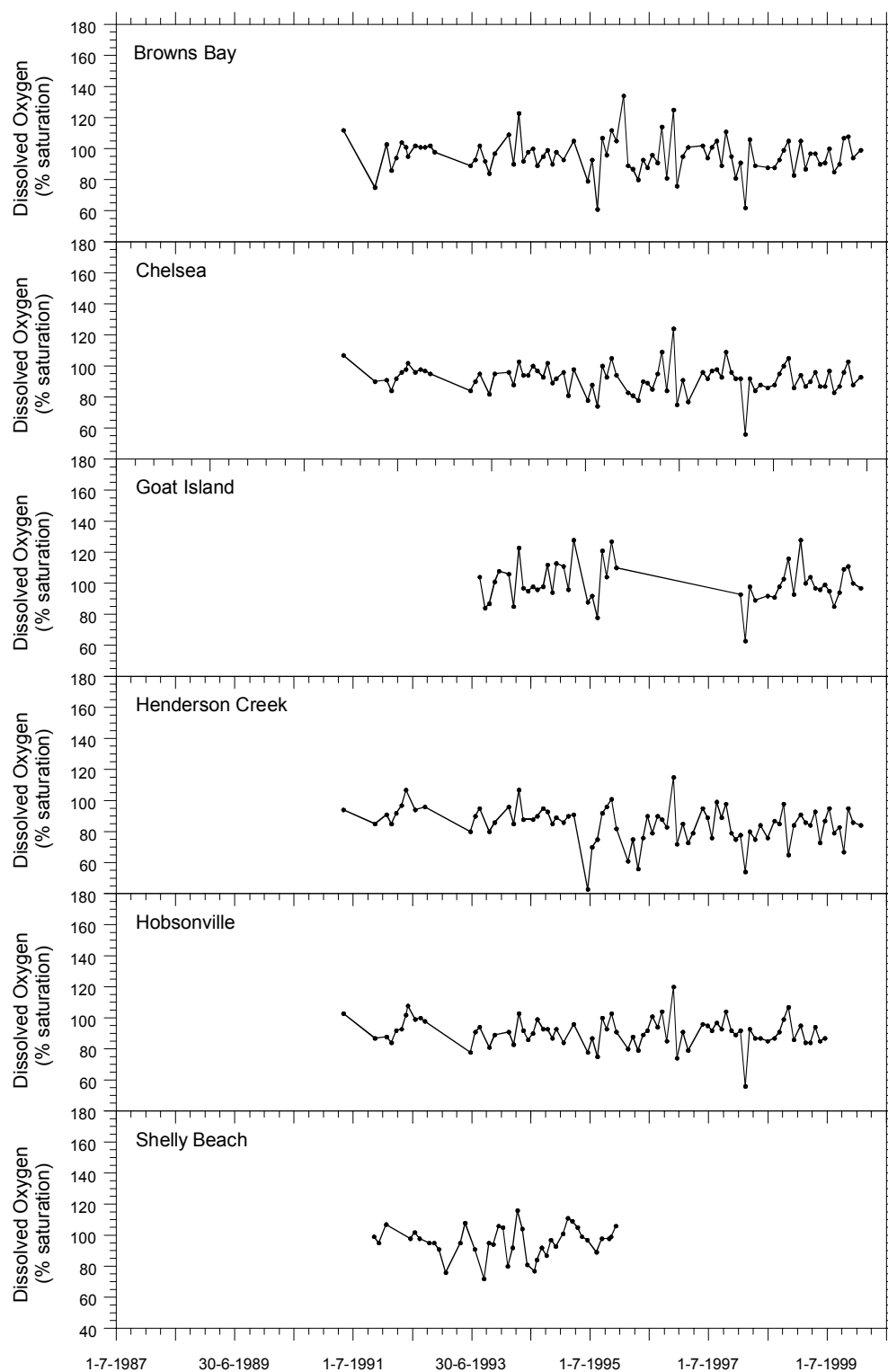
APPENDIX 29: DISSOLVED OXYGEN %SATURATION – SALINE**a) Dissolved oxygen (% saturation) during January 1999 - December 1999**

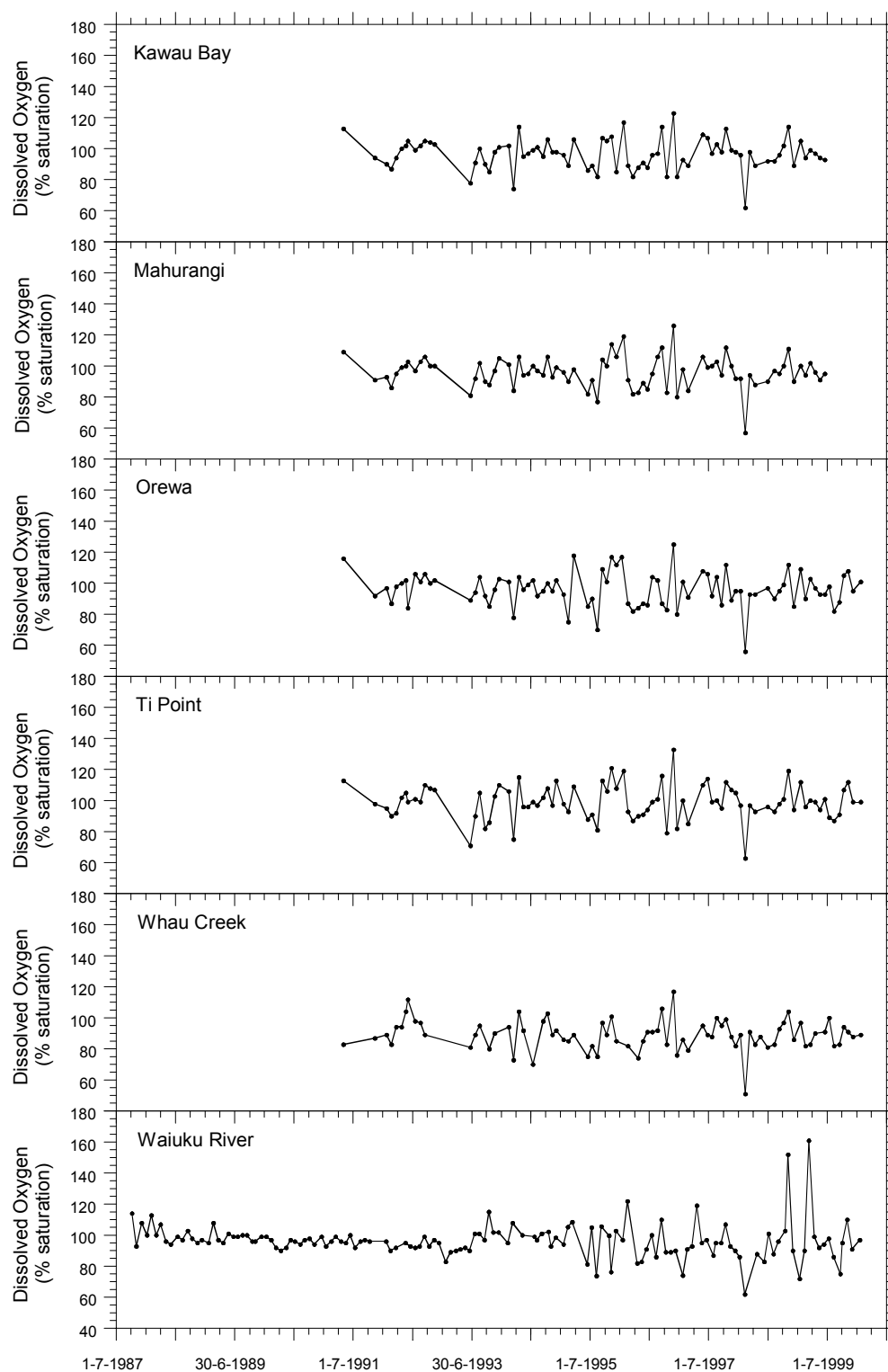
Date	Browns Bay	Chelsea Bay	Goat Island	Henderson	Hobsonville	Shelly Beach	Kawau Bay	Mahurangi	Orewa	Ti Point	Whau	Waiuku River	Waiuku Channel	Mangere Bridge	Papakura Channel	Puketutu Point	Shag Point	Weymouth
Jan-99	105	94	128	91	95		105	100	109	112	97	72	74	77	80	80	86	73
Feb-99	87	87	100	86	84		94	94	90	96	82	90	93	94	95	95	93	63
Mar-99	97	90	104	84	84		99	102	103	100	83	161	169	146	178	164	175	161
Apr-99	97	96	97	93	94		97	96	97	99	90	99	100	70	98	83	97	94
May-99	90	87	96	73	85		94	91	93	94		92	100	81	82	83	90	98
Jun-99	91	87	99	87	87		93	95	93	101	91	94	95	84	98	92	97	94
Jul-99	100	97	95	95					98	89	100	98	101	88		101	103	104
Aug-99	85	83	85	79					82	87	82	86	86	65		75	80	80
Sep-99	90	87	94	83					88	91	83	75	100	79		87	82	77
Oct-99	107	96	109	67					105	107	94	95	100	69		101	98	101
Nov-99	108	103	111	95					108	112	91	110	118	101		110	131	123
Dec-99	94	88	100	86					95	99	88	91	96	102		93	100	91
median	96	89	100	86	86	–	96	96	96	99	90	93	100	83	97	93	97	94
IQR/median (%)	11	10	10	11	9	–	5	5	12	9	11	10	6	25	13	9	12	24

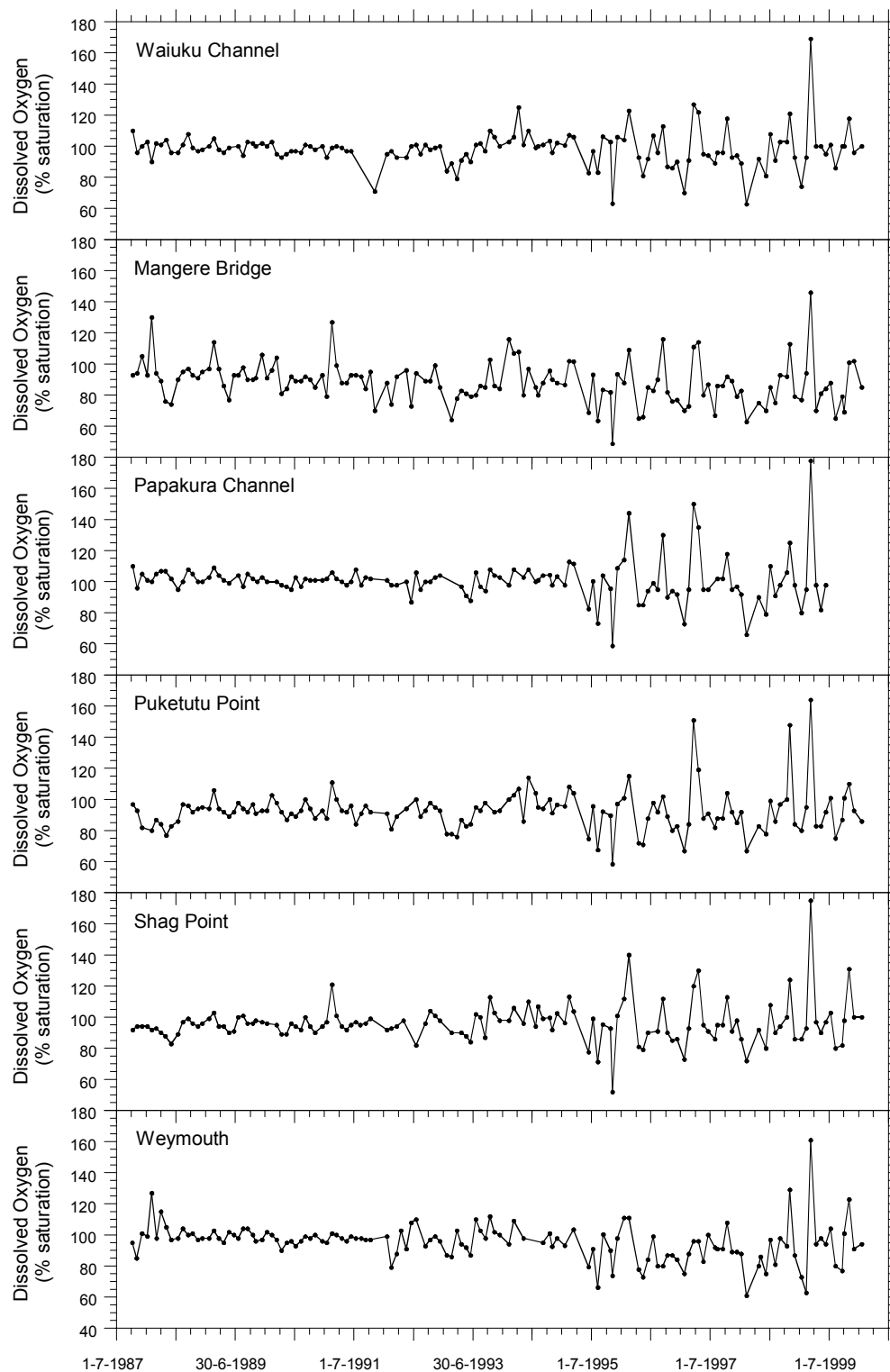
b) Statistical summary for all data to January 2000: Dissolved oxygen (% sat.)

Date	Browns Bay	Chelsea Bay	Goat Island	Henderson	Hobsonville	Shelly Beach	Kawau Bay	Mahurangi	Orewa	Ti Point	Whau	Waiuku River	Waiuku Channel	Mangere Bridge	Papakura Channel	Puketutu Point	Shag Point	Weymouth
N	84	83	49	80	74	40	79	79	86	86	78	137	135	138	125	136	132	135
Median	95.0	93.0	98.0	86.0	91.5	97.0	97.0	96.0	96.0	99.0	89.0	96.0	99.0	88.5	100.0	92.0	95.0	89.0
Normality	N	N	Y	N	N	Y	N	N	N	N	N	N	N	Y	N	N	N	N
Seasonality	N	Y	Y	N	Y	Y	Y	N	N	Y	Y	N	N	N	N	N	N	N
Trend	NS	NS	NS	95%	NS	NS	NS	NS	NS	NS	NS	99%	NS	99%	99%	NS	NS	NS
Slope	–	–	–	-1.1	–	–	–	–	–	–	–	-0.5	–	-1.0	-0.5	–	–	–

c) The graphs on the following page show all DO % sat. measurements up to January 2000 (where data are available)







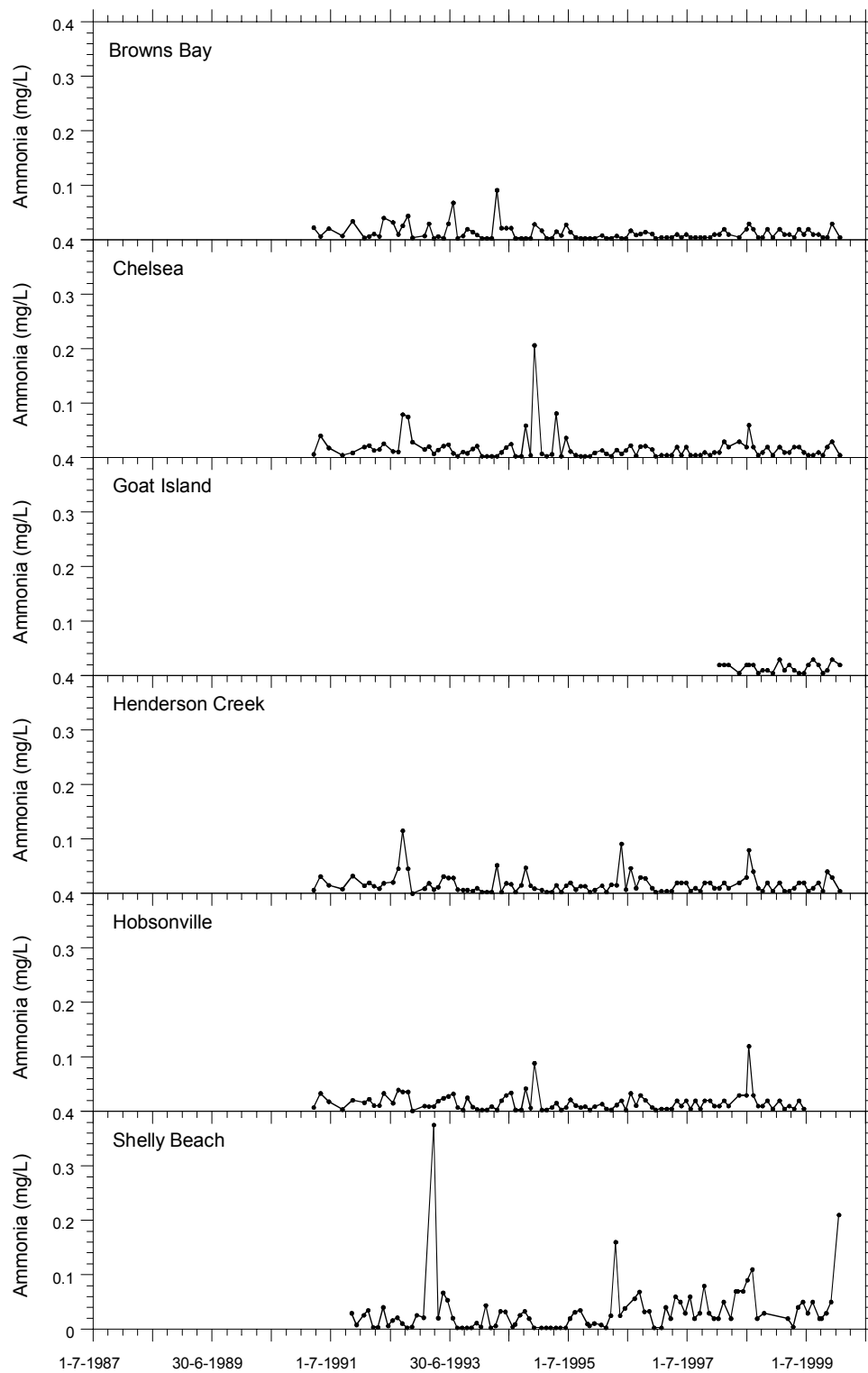
APPENDIX 30: AMMONIA NITROGEN – SALINE**a) Ammonia nitrogen (mg/L) during January 1999 - December 1999**

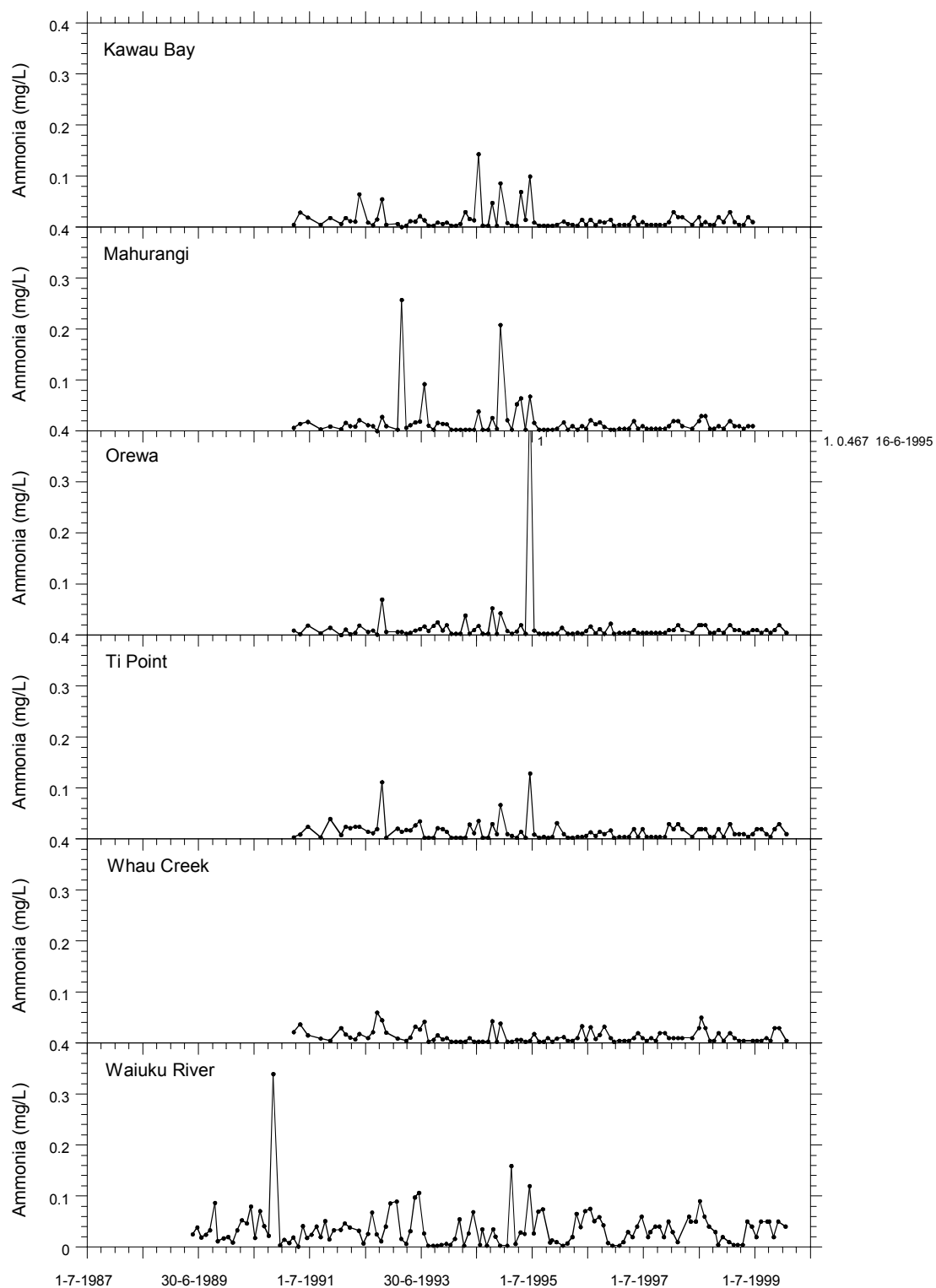
Date	Browns Bay	Chelsea Island	Goat Island	Henderson	Hobsonville	Shelly Beach	Kawau Bay	Mahurangi	Orewa	Ti Point	Whau	Waiuku River	Waiuku Channel	Mangere Bridge	Papakura Channel	Puketutu Point	Shag Point	Weymouth
Jan-99	0.02	0.02	0.03	0.02	0.02		0.03	0.02	0.02	0.03	0.02	0.01	0.01	0.02	0.01	0.08	0.01	0.02
Feb-99	0.01	0.01	0.01	0.005	0.005		0.01	0.01	0.01	0.01	0.01	0.005	0.01	0.05	0.02	0.23	0.1	0.02
Mar-99	0.01	0.01	0.02	0.005	0.01	0.02	0.005	0.01	0.01	0.01	0.005	0.005	0.005	0.62	0.005	0.72	0.08	0.02
Apr-99	0.005	0.02	0.01	0.01	0.005	0.005	0.005	0.005	0.005	0.01	0.005	0.005	0.005	1.1	0.03	0.94	0.46	0.005
May-99	0.02	0.02	0.005	0.02	0.02	0.04	0.02	0.01	0.005	0.005		0.05	0.05	1.1	0.1	0.94	0.53	0.06
Jun-99	0.01	0.01	0.005	0.02	0.005	0.05	0.01	0.01	0.01	0.01	0.005	0.04	0.05	0.19	0.08	0.18	0.47	0.07
Jul-99	0.02	0.005	0.02	0.005		0.03			0.01	0.02	0.005	0.02	0.03	1.1		0.97	0.41	0.04
Aug-99	0.01	0.005	0.03	0.01		0.05			0.005	0.02	0.005	0.05	0.07	1.37		1.3	0.78	0.08
Sep-99	0.01	0.01	0.02	0.02		0.02			0.01	0.01	0.01	0.05	0.04	1.2		1.2	0.39	0.08
Oct-99	0.005	0.005	0.005	0.005		0.02			0.005	0.005	0.005	0.05	0.03	0.9		0.79	0.34	0.05
Nov-99	0.005	0.02	0.01	0.04		0.03			0.01	0.02	0.03	0.02	0.02	0.56		0.5	0.05	0.03
Dec-99	0.03	0.03	0.03	0.03		0.05			0.02	0.03	0.03	0.05	0.03	0.43		0.77	0.34	0.04
median	0.01	0.01	0.015	0.015	0.0075	0.03	0.01	0.01	0.01	0.01	0.005	0.03	0.03	0.76	0.025	0.78	0.37	0.04
IQR/median (%)	113	113	92	100	167	92	113	0	50	100	200	138	108	96	220	66	100	106

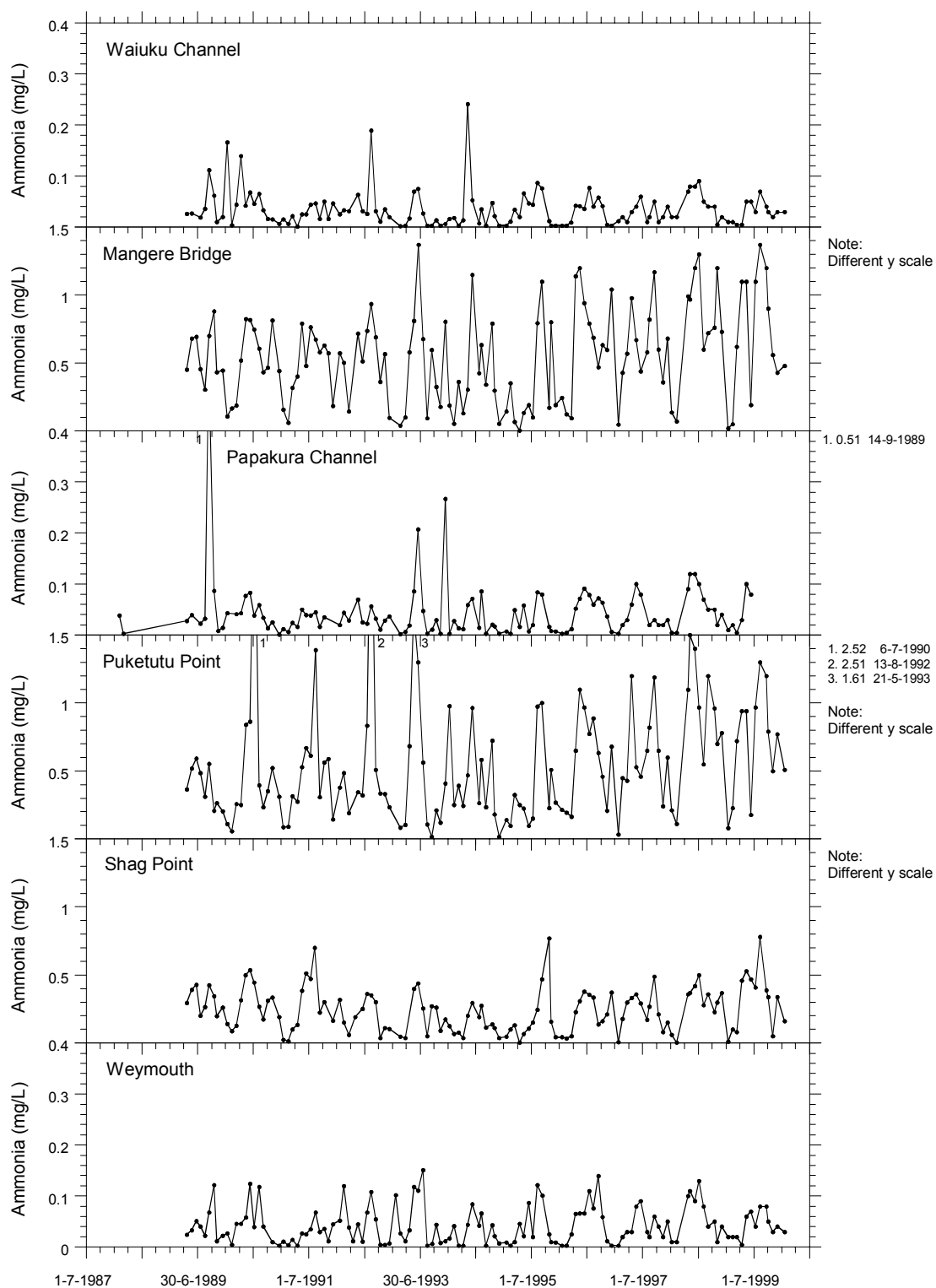
b) Statistical summary for all data to January 2000: Ammonia nitrogen (mg/L)

Date	Browns Bay	Chelsea Island	Goat Island	Henderson	Hobsonville	Shelly Beach	Kawau Bay	Mahurangi	Orewa	Ti Point	Whau	Waiuku River	Waiuku Channel	Mangere Bridge	Papakura Channel	Puketutu Point	Shag Point	Weymouth
N	99	99	24	99	92	93	92	92	99	99	97	127	126	127	117	127	125	97
Median	0.008	0.010	0.020	0.013	0.010	0.022	0.008	0.010	0.006	0.010	0.010	0.027	0.026	0.57	0.03	0.46	0.227	0.034
Normality	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N
Seasonality	N	N	N	Y	Y	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y
Trend	NS	NS	NS	NS	NS	99%	NS	NS	NS	NS	NS	NS	NS	95%	90%	95%	NS	80%
Slope	–	–	–	–	–	0.003	–	–	–	–	–	–	–	0.020	0.001	0.029	–	0.001

c) The graphs on the following page show all ammonia nitrogen measurements up to January 2000 (where data are available)







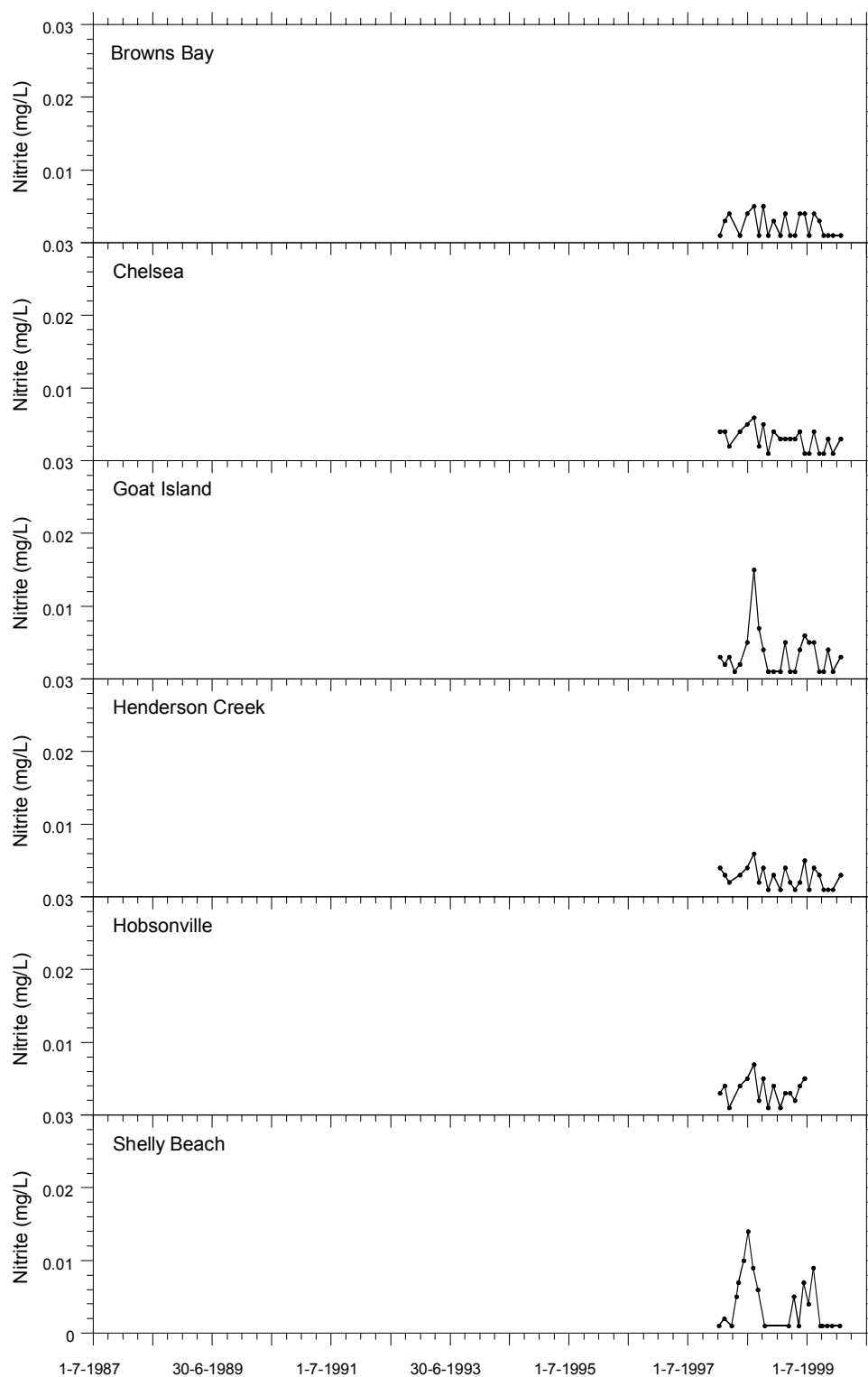
APPENDIX 31: NITRITE NITROGEN – SALINE**a) Nitrite nitrogen (mg/L) during January 1999 - December 1999**

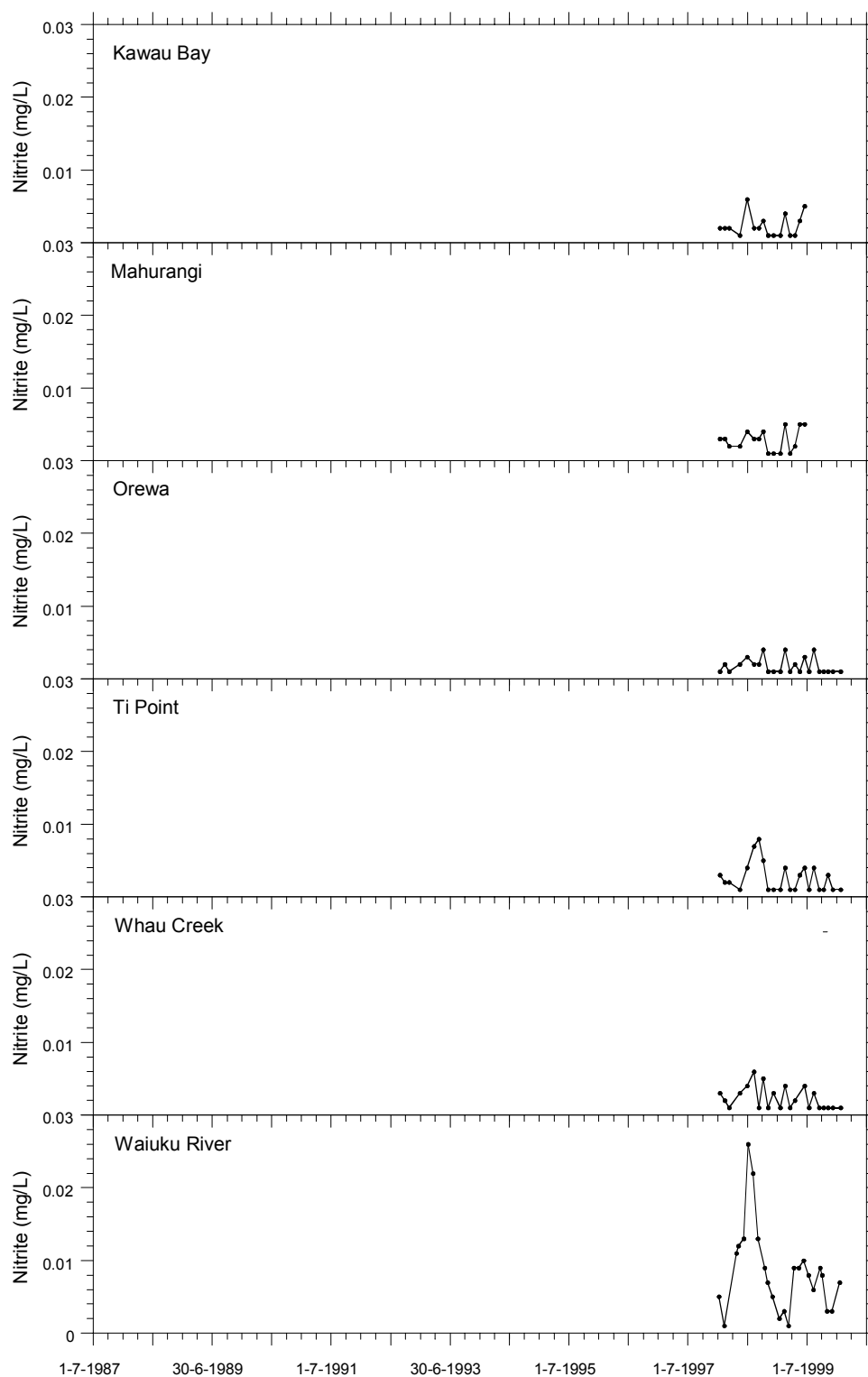
Date	Browns Bay	Chelsea Bay	Goat Island	Henderson	Hobsonville	Shelly Beach	Kawau Bay	Mahurangi	Orewa	Ti Point	Whau	Waiuku River	Waiuku Channel	Mangere Bridge	Papakura Channel	Puketutu Point	Shag Point	Weymouth
Jan-99	0.001	0.003	0.001	0.001	0.001		0.001	0.001	0.001	0.001	0.001	0.002	0.003	0.036	0.002	0.009	0.002	0.001
Feb-99	0.004	0.003	0.005	0.004	0.003		0.004	0.005	0.004	0.004	0.004	0.003	0.001	0.041	0.003	0.02	0.013	0.003
Mar-99	0.001	0.003	0.001	0.002	0.003	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.13	0.001	0.079	0.033	0.007
Apr-99	0.001	0.003	0.001	0.001	0.002	0.005	0.001	0.002	0.002	0.001	0.002	0.009	0.008	0.173	0.009	0.087	0.041	0.008
May-99	0.004	0.004	0.004	0.002	0.004	0.001	0.003	0.005	0.001	0.003		0.009	0.011	0.19	0.013	0.097	0.06	0.01
Jun-99	0.004	0.001	0.006	0.005	0.005	0.007	0.005	0.005	0.003	0.004	0.004	0.01	0.013	0.185	0.015	0.093	0.053	0.012
Jul-99	0.001	0.001	0.005	0.001		0.004			0.001	0.001	0.001	0.008	0.011	0.14		0.061	0.048	0.01
Aug-99	0.004	0.004	0.005	0.004		0.009			0.004	0.004	0.003	0.006	0.007	0.134		0.069	0.05	0.01
Sep-99	0.003	0.001	0.001	0.003		0.001			0.001	0.001	0.001	0.009	0.007	0.163		0.079	0.04	0.012
Oct-99	0.001	0.001	0.001	0.001		0.001			0.001	0.001	0.001	0.008	0.007	0.165		0.081	0.041	0.008
Nov-99	0.001	0.003	0.004	0.001		0.001			0.001	0.003	0.001	0.003	0.001	0.109		0.053	0.015	0.001
Dec-99	0.001	0.001	0.001	0.001		0.001			0.001	0.001	0.001	0.003	0.001	0.11		0.048	0.002	0.005
median	0.001	0.003	0.003	0.003	0.003	0.001	0.002	0.004	0.001	0.001	0.001	0.007	0.007	0.137	0.006	0.074	0.041	0.008
IQR/median (%)	300	67	160	75	50	375	138	107	125	225	150	86	110	42	163	42	65	69

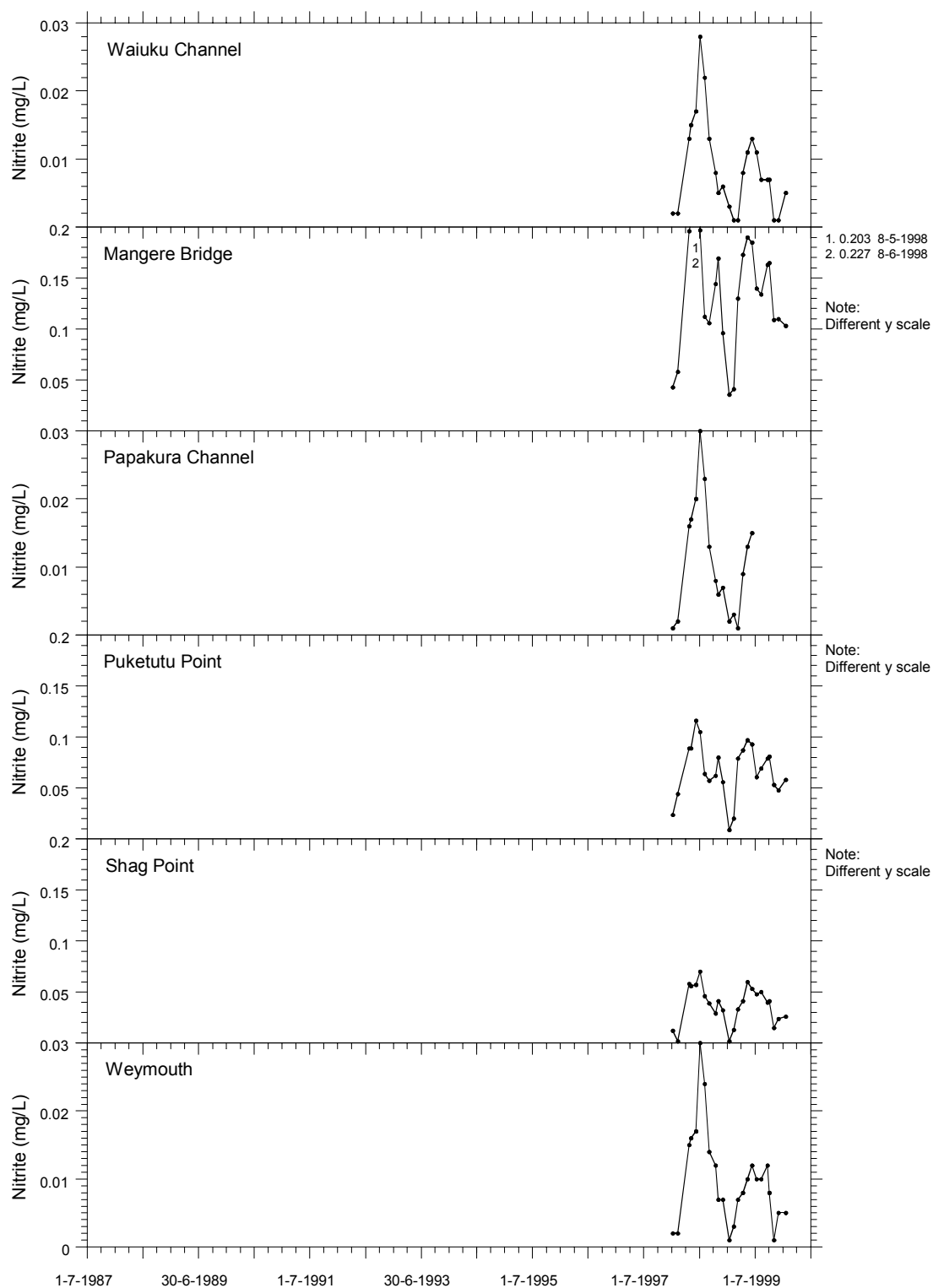
b) Statistical summary for all data to January 2000: Nitrite nitrogen (mg/L)

Date	Browns Bay	Chelsea Bay	Goat Island	Henderson	Hobsonville	Shelly Beach	Kawau Bay	Mahurangi	Orewa	Ti Point	Whau	Waiuku River	Waiuku Channel	Mangere Bridge	Papakura Channel	Puketutu Point	Shag Point	Weymouth
N	23	23	24	23	16	21	16	16	23	23	22	24	24	24	17	24	24	24
Median	0.001	0.003	0.003	0.003	0.004	0.002	0.002	0.003	0.001	0.002	0.002	0.008	0.007	0.137	0.009	0.067	0.041	0.002
Normality	N	N	N	N	Y	N	N	Y	N	N	N	N	N	Y	Y	Y	Y	N
Seasonality	N	N	Y	N	N	Y	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y
Trend	NS	95%	NS	80%	NS	95%	NS	NS	NS	80%	90%	80%	95%	NS	NS	NS	NS	90%
Slope	-	-0.001	-	-0.001	-	-0.002	-	-	-	0	0	-0.005	-0.003	-0.007	-	-	-	-0.005

c) The graphs on the following page show all nitrite nitrogen measurements up to January 2000 (where data are available)







APPENDIX 32: NITRATE NITROGEN – SALINE**a) Nitrate nitrogen (mg/L) during January 1999 - December 1999**

Date	Browns Bay	Chelsea Bay	Goat Island	Henderson	Hobsonville	Shelly Beach	Kawau Bay	Mahurangi	Orewa	Ti Point	Whau	Waiuku River	Waiuku Channel	Mangere Bridge	Papakura Channel	Puketutu Point	Shag Point	Weymouth
Jan-99	0.002	0.011	0.008	0.001	0.005		0.007	0.002	0.003	0.003	0.005	0.02	0.011	0.079	0.011	0.041	0.018	0.006
Feb-99	0.006	0.002	0.001	0.002	0.006		0.001	0.002	0.001	0.005	0.003	0.012	0.008	0.111	0.004	0.045	0.032	0.022
Mar-99	0.006	0.013	0.003	0.013	0.011	0.024	0.002	0.008	0.008	0.002	0.009	0.035	0.028	0.254	0.022	0.138	0.083	0.155
Apr-99	0.007	0.03	0.007	0.05	0.041	0.018	0.005	0.007	0.002	0.003	0.031	0.03	0.018	0.338	0.023	0.139	0.091	0.064
May-99	0.012	0.019	0	0.025	0.018	0.047	0.001	0	0.001	0.001		0.071	0.06	1.47	0.072	0.222	0.004	0.153
Jun-99	0.005	0	0.006	0.144	0.018	0.023	0.007	0.008	0.002	0.006	0	0.059	0.054	0.516	0.066	0.237	0.175	0.167
Jul-99	0	0	0.007	0.001		0.085			0.001	0.002	0	0.047	0.049	0.39		0.178	0.156	0.167
Aug-99	0.009	0.007	0.001	0.055		0.009			0.004	0.004	0.008	0.165	0.085	0.585		0.279	0.235	0.455
Sep-99	0.008	0.013	0.01	0.028		0.005			0.001	0.008	0.006	0.075	0.042	0.397		0.189	0.119	0.298
Oct-99	0.01	0.016	0.01	0.023		0.011			0.001	0.016	0.022	0.075	0.051	0.327		0.196	0.115	0.145
Nov-99	0.003	0.028	0.005	0.071		0.026			0.006	0.005	0.06	0.015	0.003	0.277		0.141	0.041	0
Dec-99	0.001	0.001	0	0.001		0.017			0.002	0.002	0.001	0.034	0.01	0.325		0.114	0.073	0.183
median	0.006	0.012	0.006	0.024	0.015	0.021	0.004	0.005	0.002	0.004	0.006	0.041	0.035	0.333	0.023	0.160	0.087	0.154
IQR/median (%)	92	125	114	206	74	62	150	128	113	93	225	109	117	47	184	44	103	77

b) Statistical summary for all data to January 2000: Nitrate nitrogen (mg/L)

Date	Browns Bay	Chelsea Bay	Goat Island	Henderson	Hobsonville	Shelly Beach	Kawau Bay	Mahurangi	Orewa	Ti Point	Whau	Waiuku River	Waiuku Channel	Mangere Bridge	Papakura Channel	Puketutu Point	Shag Point	Weymouth
N	97	97	76	98	91	92	91	90	98	98	95	126	126	127	114	127	125	129
Median	0.007	0.013	0.005	0.019	0.018	0.020	0.005	0.006	0.004	0.007	0.010	0.050	0.032	0.301	0.038	0.139	0.11	0.097
Normality	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	Y	N	N
Seasonality	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Trend	95%	NS	NS	NS	80%	80%	95%	95%	99%	95%	80%	NS	NS	95%	95%	95%	NS	95%
Slope	-0.001	–	–	–	0	0.002	-0.001	0	0	0	0	–	–	0.008	0.002	0.007	–	0.005

c) The graphs on the following page show all nitrate nitrogen measurements up to January 2000 (where data are available)

