

APPENDIX E - Adjacent sites with significant differences in phosphorus concentrations.

Values given are annual medians, with associated level of probability of significance for the difference between sites (using the non-parametric Mann-Whitney U-Test). Values in bold indicate significant differences at the 95% level of significance (p<0.05).

E1. Soluble Reactive Phosphorus data

REGION (River)	SITE	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	TOTAL
ANGLIAN												
Bure	Ingworth Bridge	-	0.08	0.07	0.10	0.08	0.06	-	-	-	-	0.08
	Horstead Mill	-	0.09	0.11	0.12	0.11	0.16	-	-	-	-	0.11
	Probability (p)	-	0.171	0.023	0.252	0.000	0.000	-	-	-	-	-
Wensum	Billingsford Bridge ²	-	0.30	0.34	0.25	0.36	0.40	0.38	0.28	0.38	-	0.34
	Hellesdon Mill ²	-	0.20	0.21	0.26	0.26	0.26	0.27	0.24	0.22	-	0.24
	Probability (p)	-	0.019	0.003	0.403	0.064	0.001	0.098	0.078	0.024	-	-
Wensum	Swanton Morley Bridge ²	-	0.28	0.29	0.34	0.34	0.37	0.43	0.32	0.25	-	0.33
	Hellesdon Mill ²	-	0.20	0.21	0.26	0.26	0.26	0.27	0.24	0.22	-	0.24
	Probability (p)	-	0.038	0.008	0.079	0.008	0.003	0.061	0.078	0.297	-	-
NORTHUMBRIAN												
Wansbeck	Mitford	0.010	0.025	0.035	0.020	0.030	0.020	0.035	0.010	0.025	0.015	0.020
	Sheepwash	0.230	0.300	0.300	0.410	0.380	0.235	0.190	0.180	0.250	0.420	0.270
	Probability (p)	0.001	0.000	0.000	*	*	*	*	0.060	*	*	*
NORTHWEST												
Derwent	Ouse Bridge ²	0.020	0.010	0.010	0.010	0.010	0.020	0.010	0.020	0.005	-	0.010
	Workington ²	0.030	0.020	0.035	0.030	0.040	0.020	0.030	0.025	0.015	-	0.025
	Probability (p)	0.060	0.001	0.004	0.000	0.002	0.068	0.037	0.020	0.009	-	-
Eden	u/s Kirkby Stephen ²	0.020	0.015	0.020	0.010	0.020	0.020	0.070	-	-	-	0.020
	Temple Sowerby ²	0.090	0.130	0.140	0.110	0.115	0.090	0.105	-	-	-	0.120
	Probability (p)	0.001	0.000	0.001	0.000	0.002	0.001	0.000	-	-	-	-

APPENDIX E continued

E.1 continued

REGION (River)	SITE	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	TOTAL
Teifi	Lampeter Road Bridge	0.020	0.030	0.030	-	-	-	-	-	-	-	0.030
	Llechryd Bridge	0.007	0.010	0.010	-	-	-	-	-	-	-	0.010
	Probability (p)	0.011	0.001	0.008	-	-	-	-	-	-	-	0.000
Wye	Builth Wells ³	0.060	0.030	0.040	0.030	-	-	-	-	-	-	0.040
	Hoarwithy Bridge ¹	0.120	0.090	0.080	0.110	-	-	-	-	-	-	0.100
	Probability (p)	0.001	0.000	0.000	0.000	-	-	-	-	-	-	0.000
Wye	Builth Wells ³	0.060	0.030	0.040	0.030	-	-	-	-	-	-	0.040
	Redbrook Railway Bridge ¹	0.140	0.090	0.110	0.100	-	-	-	-	-	-	0.120
	Probability (p)	0.000	0.000	0.000	0.000	-	-	-	-	-	-	0.000
Wye	Whitney Toll Bridge ³	0.040	0.030	0.040	0.030	-	-	-	-	-	-	0.030
	Hoarwithy Bridge ¹	0.120	0.090	0.080	0.110	-	-	-	-	-	-	0.100
	Probability (p)	0.000	0.000	0.000	0.000	-	-	-	-	-	-	0.000
Wye	Whitney Toll Bridge ³	0.040	0.030	0.040	0.030	-	-	-	-	-	-	0.030
	Redbrook Railway Bridge ¹	0.140	0.090	0.110	0.100	-	-	-	-	-	-	0.120
	Probability (p)	0.000	0.000	0.000	0.000	-	-	-	-	-	-	0.000
WESSEX												
Avon	East Harnham ²	-	-	-	-	-	0.240	0.210	-	-	-	0.225
	Causeway ³	-	-	-	-	-	0.440	0.270	-	-	-	0.345
	Probability (p)	-	-	-	-	-	0.000	0.000	-	-	-	0.000
Frome	u/s Louds Mill ³	-	-	-	-	-	-	0.150	0.130	0.140	-	0.140
	u/s Pallington Lakes ²	-	-	-	-	-	-	0.010	0.030	0.020	-	0.020
	Probability (p)	-	-	-	-	-	-	*	0.000	0.000	-	0.000
Frome	u/s Pallington Lakes ²	-	-	-	-	-	-	0.010	0.030	0.020	-	0.020
	Winfrith Heath ²	-	-	-	-	-	-	0.155	0.180	0.160	-	0.160
	Probability (p)	-	-	-	-	-	-	*	0.000	0.000	-	0.000

APPENDIX E continued

E.1 continued

REGION (River)	SITE	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	TOTAL
Frome	u/s Pallington Lakes ²	-	-	-	-	-	-	0.010	0.030	0.020	-	0.020
	Holme Bridge ²	-	-	-	-	-	-	0.155	0.170	0.130	-	0.150
	Probability (p)	-	-	-	-	-	-	*	0.000	0.000	-	0.000
Moors	u/s Palmersford STW ¹	-	-	-	-	-	0.030	0.055	0.075	0.020	-	0.040
	Fir Grove Farm ¹	-	-	-	-	-	0.260	0.430	0.305	1.260	-	0.430
	Probability (p)	-	-	-	-	-	0.001	0.000	0.000	0.000	-	0.000
Piddle	Puddletown	-	-	-	-	-	0.200	0.145	0.130	0.120	-	0.130
	West Mills	-	-	-	-	-	0.035	0.050	0.090	0.035	-	0.060
	Probability (p)	-	-	-	-	-	0.003	0.000	0.000	0.000	-	0.000
YORKSHIRE												
Dove	Kirkby Mills	0.020	0.040	0.050	0.050	0.040	0.050	0.051	0.080	0.040	0.015	0.040
	Sparrow Hall Salton	0.050	0.070	0.090	0.110	0.075	0.070	0.078	0.080	0.120	0.060	0.070
	Probability (p)	0.011	0.028	0.067	0.043	0.063	0.183	0.274	0.408	0.052	0.036	0.000
Rye	Nunnington Bridge	0.030	0.030	0.060	0.040	0.040	0.049	0.056	0.060	0.040	0.015	0.040
	Ryton Bridge	0.060	0.070	0.080	0.080	0.075	0.057	0.075	0.070	0.090	0.015	0.070
	Probability (p)	0.042	0.003	0.098	0.042	0.042	0.139	0.204	0.181	0.214	0.163	0.000
Swale	Hudswell	0.005	0.005	0.010	0.025	0.005	0.052	0.032	0.040	0.090	0.015	0.015
	Norton-on-Swale	0.030	0.050	0.060	0.090	0.100	0.120	0.090	0.130	0.090	0.070	0.080
	Probability (p)	0.000	0.000	0.001	0.007	0.000	0.006	0.003	0.016	0.377	0.001	0.000

APPENDIX E continued

E.2 Total Phosphorus data

REGION (River)	SITE	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	TOTAL
ANGLIAN												
Roman	Essex Water Co intake	-	-	-	-	-	1.20	1.10	0.98	1.20	-	1.1
	Bounstead Bridge	-	-	-	-	-	0.83	0.66	0.65	1.14	-	0.7
	Probability (p)	-	-	-	-	-	0.001	0.007	0.000	0.446	-	0.0
Nene	Wansford Old Bridge	1.06	1.32	-	-	1.18	1.90	1.94	0.71	1.50	-	1.2
	Dog in a Doublet Sluice	1.01	0.91	-	-	0.85	0.85	1.08	1.26	1.48	-	1.0
	Probability (p)	0.102	0.001	-	-	0.146	0.002	0.030	*	0.269	-	0.0

* Significance level is not quoted because the sample size is too small, with 4 or less observations at one or both sites.

¹ SSSI rivers

² pSSSI rivers

³ SSSI or pSSSI rivers where the site in question falls outside of the designated stretch.

APPENDIX F Water quality and macrophyte site pairings for adjacent water quality sites with significant differences in phosphorus concentration.

Sites in bold were rejected since they did not comply with the stated selection criteria (see Section 5.3).

Region (river)	Water quality site	NGR	Macrophyte site NGR	Survey date	Surveyor	Inter-site distance (km)	Comments on pairing
ANGLIAN							
Bure	Ingworth Bridge	TG 193 292	TG 197 275	SEP 78	Holmes	2.5	No confl, no obv disch
	Horstead Mill	TG 267 198	TG 266 197	SEP 78	Holmes	<0.1	No confl, no obv disch
Nene*	Wansford Old Bridge	TL 075 991	NONE				
	Dog in a Doublet Sluice	TL 275 994					
Roman*	Essex Water Co intake	TL 997 202	NONE				
	Bounstead Bridge	TL 985 205					
Wensum	Billingsford Bridge	TG 004 202	TF 990 228	JUN 81	Holmes	3.5	No confl, no obv disch
			TG 020 185	JUN 81	Holmes	3.5	Large trib between
	Swanton Morley Bridge	TG 021 185	TG 202 185	JUN 81	Holmes	<0.1	No confl, no obv disch
	Hellesdon Mill	TG 199 098	TG 160 137	JUN 81	Holmes	9.0	R Tud enters between
NORTHUMBRIAN							
Wansbeck	Mitford	NZ 175 858	NZ 181 859	JUN 89	Dale	0.5	No confl, no obv disch
	Sheepwash	NZ 257 857	NZ 256 858	JUN 89	Dale	<0.1	No confl, no obv disch
NORTHWEST							
Derwent	Ouse Bridge	NY 200 321	NY 168 329	JUN 79	Holmes	4.0	No confl, no obv disch
	Workington	NY 008 291	NY 007 291	JUN 79	Holmes	<0.1	No confl, no obv disch
Eden	u/s Kirkby Stephen	NY 773 075	NY 781 040	JUL 78	Holmes	4.0	No confl, no obv disch
	Appleby	NY 684 204	NY 684 204	JUL 78	Holmes	<0.1	No confl, no obv disch
	Temple Sowerby	NY 604 282	NY 613 255	JUL 78	Holmes	4.0	R Leith enters between
				JUN 82	Holmes		
	Warwick Bridge	NY 469 567	NY 469 567	JUL 78	Holmes	<0.1	No confl, no obv disch

APPENDIX F continued

Region (river)	Water quality site	NGR	Macrophyte site NGR	Survey date	Surveyor	Inter-site distance (km)	Comments on pairing
SOUTH WEST							
Fowey	Bodmin Road Bridge	SX 111 644	SX 129 651	JUL 79	Holmes	2.0	2 minor tribs between
	Restormel	SX 108 613	SX 105 602	JUL 79	Holmes	1.2	No confl, no obv disc
Meavy	Below Burrator Dam	SX 552 679	NONE				
	Gratton Ford Bridge	SX 529 670	NONE				
Walkham	Magpie Bridge	SX 504 704	NONE				
	Grenofen Bridge	SX 490 710	NONE				
THAMES							
Colne	Hampermill Oxney	TQ 098 939	TQ 057 861	JAN 84	Holmes	14.0	STW disch, R Chess co
	Confluence	TQ 033 716	TQ 031 728	JAN 84	Holmes	1.0	In built-up area
Kennet	Stichcombe Mill	SU 227 695	SU 215 697	JUN 81	Holmes	1.2	No confl, no obv disc
	100m above Thames	SU 731 738	TQ 572 667	JUN 81	Holmes	>15	
Windrush	New Bridge below Dikler	SP 178 177	SP 178 177	JUN 79	Holmes	<0.1	No confl, no obv disc
	Intake @ Worsham	SP 302 107	SP 273 117	JUN 79	Holmes	3.5	Minor trib, no obv di
	Newbridge G/S	SP 402 019	SP 403 013	JUN 79	Holmes	0.5	No confl, no obv disc
WELSH							
Teifi	u/s Pontrhydfendigaith STW	SN 728 667	NONE				
	Henllan Bridge	SN 356 401	NONE				
	Llechryd Bridge	SN 218 436	NONE				
	Lampeter Road Bridge	SN 581 476	NONE				

APPENDIX F continued

Region (river)	Water quality site	NGR	Macrophyte site NGR	Survey date	Surveyor	Inter-site distance (km)	Comments on pairing
Wye	Builth Wells	SO 042 512	NONE				
	Hoarwithy Bridge	SO 549 295	NONE				
	Redbrook Railway Bridge	SO 536 098	NONE				
	Whitney Toll Bridge	SO 259 475	NONE				
WESSEX							
Avon	East Harnham	SU 146 291	SU 141 309	AUG 78	Holmes	2.0	In Salisbury centre
			SU 157 288	SEP 88	Smith	1.0	No confl, no obv disch
	Causeway	SZ 160 931	SZ 155 940	AUG 78	Holmes	1.0	WQ site is tidal
Frome	u/s Louds Mill	SY 708 903	SY 721 905	MAY 82	Holmes	1.5	No confl, poss works dis
	u/s Pallington Lakes	SY 785 911	SY 769 909	MAY 82	Holmes	2.0	No confl, no obv disch
	Winfrith Heath	SY 818 877	SY 845 872	MAY 82	Holmes	3.0	Minor trib, no obv disch
	Holme Bridge	SY 890 867	SY 891 867	MAY 82	Holmes	<0.1	No confl, no obv disch
Moors	u/s Palmersford STW	SU 103 007	SU 096 012	JUN 80	Holmes	0.7	No confl, no obv disch
	Fir Grove Farm	SU 105 001	SU 103 060	JUN 80	Holmes	0.5	Location of STW disch?
			SZ 127 965	JUN 80	Holmes	5.0	1 minor trib enters
Piddle	Puddletown	SY 757 947	SY 743 952	JUN 80	Holmes	1.2	No confl, no obv disch
	West Mills	SY 917 877	SY 922 878	JUN 80	Holmes	0.5	No confl, no obv disch
YORKSHIRE							
Dove	Kirkby Mills	SE 704 860	SE 705 877	JUL 90	Southey	2.0	No confl, no obv disch
	Sparrow Hall Salton	SE 706 813	SE 712 802	JUL 90	Smith	1.5	No confl, no obv disch
Rye	Nunnington Bridge	SE 669 795	SE 665 794	JUN 79	Holmes	0.5	No confl, no obv disch
	Ryton Bridge	SE 796 754	SE 795 753	JUN 79	Holmes	<0.1	No confl, no obv disch
Swale	Hudswell	NZ 146 007	NONE				
	Norton-on-Swale	SE 319 918	NONE				

Asterisks indicate sites with Total Phosphorus data.

APPENDIX G continued

REGION (River)	SITE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	TOTAL
Moors	1. u/s Palmersford STW	+	+	-	-	-	-	-	0.030	0.055	0.075	0.020	-	0.040
	2. Fir Grove Farm	+	+	-	-	-	-	-	0.260	0.430	0.305	1.260	-	0.430
	Probability (p)			-	-	-	-	-	0.001	0.000	0.000	0.000	-	0.000
	1. Macrophyte survey													June
	2. Macrophyte survey													June
Piddle	1. Puddletown	+	+	-	-	-	-	-	0.200	0.145	0.130	0.120	-	0.130
	2. West Mills	+	+	-	-	-	-	-	0.035	0.050	0.090	0.035	-	0.060
	Probability (p)			-	-	-	-	-	0.003	0.000	0.000	0.000	-	0.000
	1. Macrophyte survey													June
	2. Macrophyte survey													June
YORKSHIRE														
Dove	1. Kirkby Mills	+	+	0.020	0.040	0.050	0.050	0.040	0.050	0.051	0.080	0.040	0.015	0.040
	2. Sparrow Hall Salton	+	+	0.050	0.070	0.090	0.110	0.075	0.070	0.078	0.080	0.120	0.060	0.070
	Probability (p)			0.011	0.028	0.067	0.043	0.063	0.183	0.274	0.408	0.052	0.036	0.000
	1. Macrophyte survey													July
	2. Macrophyte survey													July
Rye	1. Nunnington Bridge	+	+	0.030	0.030	0.060	0.040	0.040	0.049	0.056	0.060	0.040	0.015	0.040
	2. Ryton Bridge	+	+	0.060	0.070	0.080	0.080	0.075	0.057	0.075	0.070	0.090	0.015	0.070
	Probability (p)			0.042	0.003	0.098	0.042	0.042	0.139	0.204	0.181	0.214	0.163	0.000
	1. Macrophyte survey													June
	2. Macrophyte survey													June

+ Not within the timescale of the English Nature water quality database.

* Significance level is not quoted because the sample size is too small, with 4 or less observations at one or both sites.