Appendix H:
Detailed Results

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APPENDIX H1 – DETAILED DATA SUMMARY

This section presents a detailed summary of the data used to prepare the report. Presented first are tables of summary statistics (i.e., minimum, maximum, mean, and median) for each parameter and sampling location (i.e., bioretention planter boxes (BPBs), the Filterra® (FLT), and detention tank system (DTS). Figures summarizing results for each parameter are presented below these tables.

Table H1-1. Summary of validated results for conventional parameters and bacteria* for each site.

		BPB1 In	BPB1 Out	BPB2 In	BPB2 Out	BPB3 In	BPB3 Out	BPB4 In	BPB4 Out	FLT In	FLT Out	DTS In	DTS Out
TSS (mg/L)	FOD	8 of 8	8 of 8	7 of 7	7 of 7	7 of 7	7 of 7	2 of 2	2 of 2	5 of 5	5 of 5	5 of 5	5 of 5
	Min	39.6	5.10	40.3	0.50 J	31.1	0.70 J	17.3	10.9	31.6	8.32	18.4	15.4
	Max	223	23.4	165	3.9	273	7.68	99.2	26.3	264	37.9	36.4	37.8
	Mean	106	15.0	82.7	1.58 J	120	2.81 J	NC	NC	95.5	18.8	26.5	23.3
	Median	76.1	15.7	56.9	1.3 J	73.2	2.0 J	NC	NC	60.7	16.9	24.7	22.9
TOC (mg/L)	FOD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 of 5
	Min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8.33
	Max	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	19.6
	Mean	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10.9
	Median	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9.03
DOC (mg/L)	FOD	4 of 4	4 of 4	3 of 3	3 of 3	3 of 3	3 of 3	1 of 1	1 of 1	1 of 1	1 of 1	NA	5 of 5
	Min	1.09	2.04	1.58	2.36	0.66 J	3.97	NC	NC	NC	NC	NA	3.48
	Max	2.89	4.65	2.08	4.80	3.42	9.18	1.03	5.58	5.52	8.72	NA	16.5
	Mean	2.35	3.19	1.79	3.71	2.06 J	6.36	NC	NC	NC	NC	NA	6.92
	Median	2.70	3.03	1.70	3.97	2.09	5.92	NC	NC	NC	NC	NA	4.68
Bact (CFU)*	FOD	8 of 8	8 of 8	7 of 7	7 of 7	7 of 7	7 of 7	2 of 2	2 of 2	5 of 5	5 of 5	4 of 4	4 of 4
	Min	14 J	4 J	10 J	13 J	19 J	16 J	16 J	30 J	44 J	5 J	90 J	200 J
	Max	290 J	150 J	150 J	290 J	690 J	190 J	180 J	160 J	540 J	420 J	1,400 J	910 J
	Mean	136 J	69 J	83 J	96 J	214 J	110 J	98 J	95 J	213 J	130 J	678 J	595 J
	Median	123 J	64 J	110 J	43 J	150 J	97 J	98 J	95 J	150 J	73 J	610 J	635 J

* The bacteria summary includes both fecal coliform and *Escherichia coli* estimated results (See Appendix G for details) units are colony forming units (CFU) per 100-mL.
TSS – total suspended solids; TOC – total organic carbon; DOC – dissolved organic carbon; FOD – frequency of detection;
NA – not analyzed, with the exception of TOC where one sample was analyzed at each site; NC – not calculated due to low sample number; J – estimated value

Table H1-2. Summary of validated results for nutrients for each site.

		BPB1 In	BPB1 Out	BPB2 In	BPB2 Out	BPB3 In	BPB3 Out	BPB4 In	BPB4 Out	FLT In	FLT Out	DTS In	DTS Out
TP (mg/L)	FOD	8 of 8	8 of 8	7 of 7	7 of 7	7 of 7	7 of 7	2 of 2	2 of 2	5 of 5	5 of 5	5 of 5	5 of 5
	Min	0.0700	0.132	0.0656	0.357	0.0603	0.124	0.0381	0.0753	0.0680	0.0409	0.129	0.115
	Max	0.242	0.287	0.184	0.487	0.299	0.689	0.107	0.143	0.342	0.0933	0.281	0.259
	Mean	0.126	0.201	0.102	0.402	0.137	0.330	NC	NC	0.141	0.0586	0.175	0.170
	Median	0.103	0.186	0.0750	0.387	0.0960	0.204	NC	NC	0.101	0.0464	0.153	0.157
TN (mg/L)	FOD	8 of 8	8 of 8	7 of 7	7 of 7	7 of 7	7 of 7	2 of 2	2 of 2	5 of 5	5 of 5	5 of 5	5 of 5
	Min	0.324	0.302	0.484	0.313	0.446	0.472	0.356	0.260	0.432	0.211	0.754	0.804
	Max	1.31	1.20	1.14	1.11	1.67	2.05	0.630	0.499	2.31	1.35	2.30	2.28
	Mean	0.763	0.577	0.848	0.736	0.818	0.903	NC	NC	0.934	0.499	1.20	1.17
	Median	0.680	0.495	0.813	0.794	0.698	0.702	NC	NC	0.713	0.308	0.928	0.825
OP (µg/L)	FOD	8 of 8	8 of 8	7 of 7	7 of 7	7 of 7	7 of 7	2 of 2	2 of 2	5 of 5	5 of 5	5 of 5	5 of 5
	Min	2.18 J	97.0 J	2.0 J	298 J	2.0 J	96.1 J	4.73 J	43.1 J	3.24 J	8.8 J	52.7 J	49.6 J
	Max	16.5 J	218 J	10.6 J	415 J	14.2 J	639 J	5.02 J	83.1 J	27.9 J	27.9 J	109 J	114 J
	Mean	8.02 J	148 J	6.54 J	345 J	5.99 J	281 J	NC	NC	17.3 J	16 J	74.1 J	74.7 J
	Median	5.54 J	135 J	5.7 J	343 J	3.63 J	175 J	NC	NC	22.4 J	15 J	66.4 J	67.5 J
NH3 (mg/L)	FOD	8 of 8	8 of 8	7 of 7	7 of 7	7 of 7	7 of 7	2 of 2	2 of 2	5 of 5	4 of 5	5 of 5	5 of 5
	Min	0.0651	0.0054 J	0.193	0.0023 J	0.0537	0.0034 J	0.145	0.0175	0.0146	0.0020 U	0.0522	0.0373
	Max	0.324	0.116	0.455	0.0195	0.385	0.0174	0.188	0.0226	0.435	0.0599	0.403	0.456
	Mean	0.147	0.0252 J	0.346	0.0070 J	0.134	0.0068 J	NC	NC	0.117	0.0143 J	0.183	0.204
	Median	0.116	0.0140 J	0.381	0.0038 J	0.0867	0.0051 J	NC	NC	0.0422	0.0030 J	0.155	0.187
NO32 (mg/L)	FOD	8 of 8	8 of 8	7 of 7	7 of 7	7 of 7	7 of 7	2 of 2	2 of 2	5 of 5	5 of 5	5 of 5	5 of 5
	Min	0.031 J	0.0884	0.0478	0.115	0.018 J	0.238	0.024 J	0.025 J	0.036 J	0.039 J	0.108	0.104
	Max	0.124	0.508	0.0882	0.600	0.139	1.26	0.029 J	0.0578	0.186	0.553	0.429	0.487
	Mean	0.0693 J	0.216	0.0728	0.369	0.0752 J	0.426	NC	NC	0.0907 J	0.159 J	0.259	0.239
	Median	0.0691	0.182	0.0758	0.396	0.0702	0.301	NC	NC	0.0676	0.0540	0.182	0.165

TP – total phosphorus; TN – total nitrogen; OP – orthophosphate phosphorus; NH3 – ammonia nitrogen; NO32 – nitrate/nitrite nitrogen;
FOD – frequency of detection; NC – not calculated due to low sample number; J – estimated value

Table H1-3. Summary of validated results for hardness and total metals for each site.

		BPB1 In	BPB1 Out	BPB2 In	BPB2 Out	BPB3 In	BPB3 Out	BPB4 In	BPB4 Out	FLT In	FLT Out	DTS In	DTS Out
Hard (mg CaCO3/L)	FOD	8 of 8	8 of 8	7 of 7	7 of 7	7 of 7	7 of 7	2 of 2	2 of 2	5 of 5	5 of 5	5 of 5	5 of 5
	Min	8.99	10.1	11.2	5.08	10.2	7.27	7.36	19.6	13.9	9.14	11.5	11.9
	Max	27.9	31.0	26.8	25.3	30.5	116	16.4	38.2	38.6	18.2	25.3	26.9
	Mean	18.5	15.3	17.3	17.4	19.2	28.2	NC	NC	22.1	13.2	18.1	17.1
	Median	18.3	13.7	18.0	19.3	15.4	16.1	NC	NC	19.5	11.6	14.4	15.3
Tot Cd (µg/L)	FOD	8 of 8	8 of 8	7 of 7	0 of 7	6 of 7	1 of 7	1 of 2	0 of 2	5 5	0 of 5	5 of 5	4 of 5
	Min	0.055 J	0.050 U	0.053 J	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.053 J	0.050 U	0.054 J	0.050 U
	Max	0.19 J	0.10 J	0.15 J	0.050 U	0.23 J	0.070 J	0.091 J	0.050 U	0.25 J	0.050 U	0.10 J	0.094 J
	Mean	0.11 J	0.069 J	0.086 J	NC	0.12 J	NC	NC	NC	0.11 J	NC	0.066 J	0.066 J
	Median	0.11 J	0.067 J	0.064 J	NC	0.10 J	NC	NC	NC	0.078 J	NC	0.059 J	0.056 J
Tot Cu (µg/L)	FOD	8 of 8	8 of 8	7 of 7	7 of 7	7 of 7	7 of 7	2 of 2	2 of 2	5 of 5	5 of 5	5 of 5	5 of 5
	Min	16.7	3.39	15.2	2.24	15.2	3.26	7.69	5.17	15.8	6.28	9.75	9.72
	Max	60.1	9.99	39.2	5.73	68.9	10.2	22.4	7.84	72.0	19.8	27.1	24.3
	Mean	33.3	5.77	24.2	3.91	34.7	5.99	NC	NC	29.7	10.1	14.6	14.1
	Median	31.5	5.28	19.0	4.12	29.7	5.70	NC	NC	17.2	7.60	11.2	12.9
Tot Pb (µg/L)	FOD	8 of 8	8 of 8	7 of 7	7 of 7	7 of 7	7 of 7	2 of 2	2 of 2	5 of 5	5 of 5	5 of 5	5 of 5
	Min	3.84	1.30	3.84	0.21 J	2.93	0.30 J	1.48	1.73	3.77	1.21	1.97	1.72
	Max	19.1	4.66	13.0	0.579	22.5	0.985	6.49	2.25	29.5	3.49	3.25	3.64
	Mean	9.91	3.00	6.63	0.35 J	10.3	0.689 J	NC	NC	11.6	2.14	2.56	2.43
	Median	8.00	2.89	4.61	0.26 J	6.90	0.719	NC	NC	7.25	1.75	2.57	2.20
Tot Zn (µg/L)	FOD	8 of 8	8 of 8	7 of 7	7 of 7	7 of 7	7 of 7	2 of 2	2 of 2	5 of 5	5 of 5	5 of 5	5 of 5
	Min	56.4	10.3	66.2	3.33	54.7	4.56	29.4	11.3	67.2	20.4	69.5	62.8
	Max	268	30.7	186	7.78	328	13.9	106	18.2	395	52.3	137	123
	Mean	133	16.7	101	5.69	143	8.80	NC	NC	149	33.3	90.4	84.6
	Median	120	15.7	80.0	5.91	112	8.07	NC	NC	93.5	30.0	75.0	75.4

Hard – hardness; Tot Cd – total cadmium; Tot Cu – total copper; Tot Pb – total lead; Tot Zn – total zinc;
FOD – frequency of detection; NC – not calculated due to low sample number or FOD; J – estimated value; U – non-detect value

Table H1-4. Summary of validated results for dissolved metals for each site.

		BPB1 In	BPB1 Out	BPB2 In	BPB2 Out	BPB3 In	BPB3 Out	BPB4 In	BPB4 Out	FLT In	FLT Out	DTS In	DTS Out
Dis Cd (µg/L)	FOD	0 of 8	1 of 8	0 of 7	0 of 7	0 of 7	0 of 7	0 of 2	0 of 2	0 of 5	0 of 5	0 of 5	0 of 5
	Min	NC	0.050 U	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Max	0.050 U	0.22 J	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
	Mean	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Median	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Dis Cu (µg/L)	FOD	8 of 8	8 of 8	7 of 7	7 of 7	7 of 7	7 of 7	2 of 2	2 of 2	5 of 5	5 of 5	5 of 5	5 of 5
	Min	2.16	1.7 J	1.7 J	1.6 J	1.1 J	2.68	2.0 J	3.11	1.8 J	3.82	4.00 J	4.23 J
	Max	6.47	4.82	5.85	4.77	7.93	6.20	2.03	5.94	12.9	16.3	14.9 J	13.6 J
	Mean	4.04	2.81 J	3.40 J	3.13 J	4.32 J	4.39	NC	NC	5.57 J	6.39	7.24 J	7.10 J
	Median	4.35	2.52	3.12	3.08	4.04	4.66	NC	NC	4.41	3.97	5.84 J	5.82 J
Dis Pb (µg/L)	FOD	5 of 8	6 of 8	3 of 7	1 of 7	3 of 7	6 of 7	0 of 2	2 of 2	3 of 5	3 of 5	5 of 5	5 of 5
	Min	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.17 J	0.22 J
	Max	0.15 J	0.21 J	0.12 J	0.10 U	0.24 J	0.28 J	0.10 U	0.31 J	0.17 J	0.33 J	0.31 J	0.34 J
	Mean	0.12 J	0.14 J	0.11 J	0.10 U	0.13 J	0.14 J	NC	NC	0.13 J	0.16 J	0.24 J	0.28 J
	Median	0.11 J	0.12 J	0.10 U	0.10 U	0.10 U	0.13 J	NC	NC	0.10 U	0.12 J	0.25 J	0.28 J
Dis Zn (µg/L)	FOD	8 of 8	8 of 8	7 of 7	7 of 7	7 of 7	7 of 7	2 of 2	2 of 2	5 of 5	5 of 5	5 of 5	5 of 5
	Min	7.83	2.3 J	9.98	1.3 J	5.58	2.1 J	7.62	4.30	5.87	8.12	25.8 J	24.9 J
	Max	19.8	6.81	14.1	3.07	25.2	5.36	9.47	10.5	23.6	28.8	68.0 J	67.6 J
	Mean	13.6	4.60 J	11.9	2.4 J	12.9	3.35 J	NC	NC	11.3	15.0	47.1 J	47.1 J
	Median	14.0	4.52	11.8	2.55	11.6	2.80	NC	NC	7.08	11.9	40.9 J	42.6 J

Dis Cd – dissolved cadmium; Dis Cu – dissolved copper; Dis Pb – dissolved lead; Dis Zn – dissolved zinc;
FOD – frequency of detection; NC – not calculated due to low sample number or FOD; J – estimated value; U – non-detect value

Table H1-5. Summary of validated results for organic contaminants for each site.

		BPB1 In		BPB1 Out		BPB2 In		BPB2 Out		BPB3 In		BPB3 Out		BPB4 In		BPB4 Out		FLT In		FLT Out		DTS In		DTS Out	
Dx-D (mg/L)	FOD	3 of	7	7 of	7	2 of	5	0 of	5	3 of	6	0 of	6	0 of	1	0 of	1	1 of	4	0 of	4	0 of	4	0 of	4
	Min	0.189	U	NC		0.189		NC		0.189	U	0.189		NC		NC		0.189	U	NC		NC		NC	
	Max	0.532		0.189	U	0.454		0.189	U	0.369		0.190		0.189	U	0.190	U	0.344		0.189	U	0.194	U	0.192	U
	Mean	0.279	J	NC		0.272		NC		0.264	J	0.189		NC		NC		NC		NC		NC		NC	
	Median	0.189	U	NC		0.189		NC		0.239	J	0.189		NC		NC		NC		NC		NC		NC	
Dx-LO (mg/L)	FOD	7 of	7	3 of	7	5 of	5	1 of	5	6 of	6	1 of	6	1 of	1	0 of	1	4 of	4	2 of	4	4 of	4	4 of	4
	Min	0.550		0.19	U	0.862		0.19	U	0.637		0.19	U	1.48		NC		0.529		0.19	U	0.352		0.352	
	Max	4.50		0.405		2.62		0.203		3.45		0.249		1.48		0.19	U	2.96		0.397		0.903		1.14	
	Mean	2.01		0.231	J	1.52		NC		2.07		NC		NC		NC		1.30		NC		0.589		0.692	
	Median	1.15		0.19	U	0.905		NC		2.14		NC		NC		NC		0.850		NC		0.551		0.638	
PAHs (µg/L)	FOD	8 of	8	6 of	8	6 of	6	0 of	6	7 of	7	1 of	7	2 of	2	2 of	2	5 of	5	4 of	5	5 of	5	5 of	5
	Min	0.544	J	0.0094	U	0.523	J	NC		0.446	J	0.0094	U	0.289	J	0.0048	J	0.337	J	0.0094	U	0.0750	J	0.0718	J
	Max	2.33	J	0.106	J	1.52	J	0.0094	U	2.28	J	0.0256	J	1.16	J	0.0064	J	2.05	J	0.134	J	0.287	J	0.301	J
	Mean	1.08	J	0.0311	J	0.918	J	NC		1.16	J	NC		NC		NC		0.987	J	0.0563	J	0.172	J	0.156	J
	Median	0.894	J	0.0218	J	0.710	J	NC		0.959	J	NC		NC		NC		0.733	J	0.0422	J	0.168	J	0.124	J
PCBs (ng/L)	FOD	4 of	4	4 of	4	4 of	4	4 of	4	4 of	4	4 of	4	4 of	4	4 of	4	4 of	4	4 of	4	4 of	4	4 of	4
	Min	0.945	J	0.100	J	1.10	J	0.00590	J	1.26	J	0.0124	J	1.52	J	0.149	J	0.957	J	0.0693	J	1.20	J	1.23	J
	Max	5.27	J	0.745	J	4.14	J	0.129	J	2.89	J	1.32	J	3.93	J	0.527	J	13.5	J	1.03	J	2.90	J	2.12	J
	Mean	2.49	J	0.307	J	2.83	J	0.0455	J	1.91	J	0.400	J	NC		NC		4.53	J	0.568	J	1.75	J	1.64	J
	Median	1.88	J	0.191	J	3.03	J	0.0234	J	1.75	J	0.133	J	NC		NC		1.85	J	0.587	J	1.45	J	1.62	J

Dx-D – diesel-range hydrocarbons; Dx-LO – lube oil-range hydrocarbons; PAHs – total polycyclic aromatic hydrocarbons; PCBs – total polychlorinated biphenyls; FOD – frequency of detection; NC – not calculated due to low sample number or FOD; J – estimated value; U – non-detect value

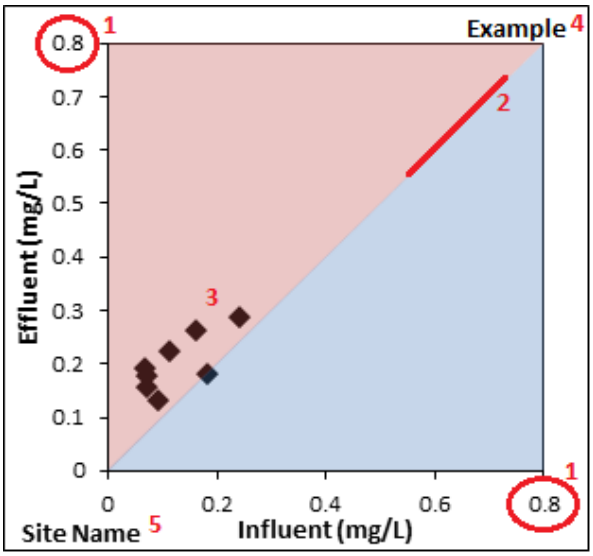
Table H1-6. Summary of validated results for organic contaminants for each site.

		BPB1 In	BPB1 Out	BPB2 In	BPB2 Out	BPB3 In	BPB3 Out	BPB4 In	BPB4 Out	FLT In	FLT Out	DTS In	DTS Out
Cond (umhos/cm)	FOD	8 of 8	8 of 8	7 of 7	7 of 7	7 of 7	7 of 7	2 of 2	2 of 2	4 of 4	5 of 5	4 of 4	4 of 4
	Min	15.0 J	25.1 J	23.3 J	29.2 J	25.5 J	34.2 J	15.1 J	40.8 J	28.4 J	30.0 J	33.3 J	31.7 J
	Max	119 J	273 J	102 J	287 J	170 J	949 J	360 J	355 J	122 J	470 J	122 J	132 J
	Mean	53.9 J	82.4 J	52.8 J	106 J	65.8 J	203 J	NC	NC	55.0 J	127 J	74.4 J	70.4 J
	Median	35.9 J	42.0 J	38.1 J	64.9 J	43.7 J	56.6 J	NC	NC	34.7 J	45.0 J	71.1 J	58.9 J
Temp (°C)	FOD	8 of 8	8 of 8	7 of 7	7 of 7	7 of 7	7 of 7	2 of 2	2 of 2	4 of 4	5 of 5	4 of 4	4 of 4
	Min	5.3 J	4.0 J	5.6 J	3.8 J	5.3 J	4.8 J	6.5 J	5.6 J	5.3 J	5.2 J	11.7 J	11.7
	Max	11.3 J	11.3	12.6 J	12.1	12.5 J	13.0 J	11.2	11.4	13.0 J	12.9 J	17.1 J	17.4 J
	Mean	8.8 J	8.1 J	9.2 J	8.2 J	9.0 J	8.7 J	NC	NC	9.7 J	9.8 J	13.4 J	13.5 J
	Median	9.0 J	8.1 J	9.0	8.3 J	9.2 J	8.4 J	NC	NC	10.3 J	9.8 J	12.4 J	12.4 J
pH (pH units)	FOD	8 of 8	8 of 8	7 of 7	7 of 7	7 of 7	7 of 7	2 of 2	2 of 2	4 of 4	5 of 5	4 of 4	4 of 4
	Min	7.02 J	6.86 J	7.38 J	6.56	6.89 J	6.18 J	5.95 J	6.07 J	7.44 J	7.08 J	7.16 J	7.08 J
	Max	7.61	7.35 J	7.60 J	7.47 J	7.57 J	7.03	7.40	7.22	7.76 J	7.63 J	7.24	7.29
	Mean	7.37 J	7.12 J	7.46 J	6.90 J	7.30 J	6.54 J	NC	NC	7.63 J	7.29 J	7.21 J	7.19 J
	Median	7.38 J	7.19 J	7.46	6.86 J	7.34 J	6.44 J	NC	NC	7.66 J	7.24	7.22 J	7.19 J
DO (mg/L)	FOD	8 of 8	8 of 8	7 of 7	7 of 7	7 of 7	7 of 7	2 of 2	2 of 2	4 of 4	5 of 5	4 of 4	4 of 4
	Min	10.0 J	10.3	10.2 J	10.0 J	10.2 J	7.5 J	10.6	10.0	10.2 J	9.2 J	8.9 J	8.2 J
	Max	12.0 J	12.1 J	12.1 J	12.8 J	12.0 J	11.1 J	11.5 J	11.9 J	12.3 J	11.5 J	10.6 J	10.6 J
	Mean	11.0 J	11.1 J	11.1 J	11.0 J	11.0 J	10.0 J	NC	NC	11.1 J	10.3 J	10.0 J	9.9 J
	Median	11.1 J	11.1 J	11.2 J	10.8 J	10.8 J	10.4 J	NC	NC	10.9 J	10.3 J	10.3 J	10.4 J
Turb (NTU)	FOD	8 of 8	8 of 8	7 of 7	7 of 7	7 of 7	7 of 7	2 of 2	2 of 2	4 of 4	5 of 5	4 of 4	4 of 4
	Min	21.1	11.2 J	37.4 J	4.8 J	27.8 J	4.4 J	21.1	46.2	24.4 J	18.0	12.7 J	12.2 J
	Max	225 J	49.6 J	125 J	11.7 J	222 J	13.9 J	71.8 J	48.3 J	144 J	75.0 J	30.8 J	43.3 J
	Mean	107 J	25.4 J	66.1 J	7.2 J	103 J	9.5 J	NC	NC	61.9 J	37.1 J	18.8 J	23.0 J
	Median	87.8 J	22.6 J	45.7 J	6.7 J	92.1 J	10.0	NC	NC	39.6 J	30.1 J	15.8 J	18.3 J

Cond – conductivity; Temp – temperature; DO – dissolved oxygen; Turb - turbidity;
FOD – frequency of detection; NC – not calculated due to low sample number; J – estimated value

The following pages include figures summarizing results for the BPBs and Filterra for each parameter, including field measurements. Each page includes five figures that summarize results for a single parameter, including four scatter plots of influent and effluent concentrations (one for each site) and a box plot displaying the distribution of results for each site. The example figures below provide explanations for the two figure types.

Scatter Plot Explanation:



These figures plot effluent versus influent concentrations for each sampling event at a given site.

1 – The x and y scales are the same for all scatter plots of the same parameter, unless the axis labels are in red. Red labels indicate abnormally low or high concentrations compared to the other sites.

2 – The middle line between the red and blue shading represents no change between influent and effluent concentrations, or a 1 to 1 ratio.

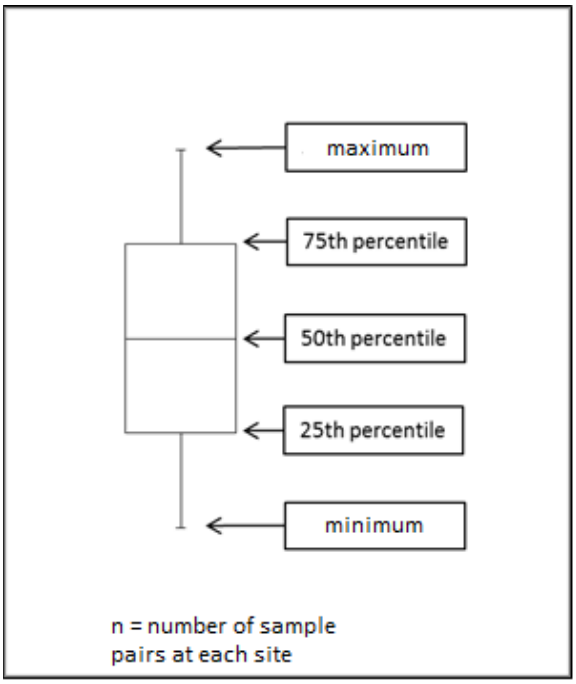
3 – Data points in the red shading illustrate sampling events where concentrations were higher in the effluent than the influent (> 1 to 1 ratio). Data points in the blue shading illustrate sampling events where concentrations were lower in the effluent than the influent (< 1 to 1 ratio).

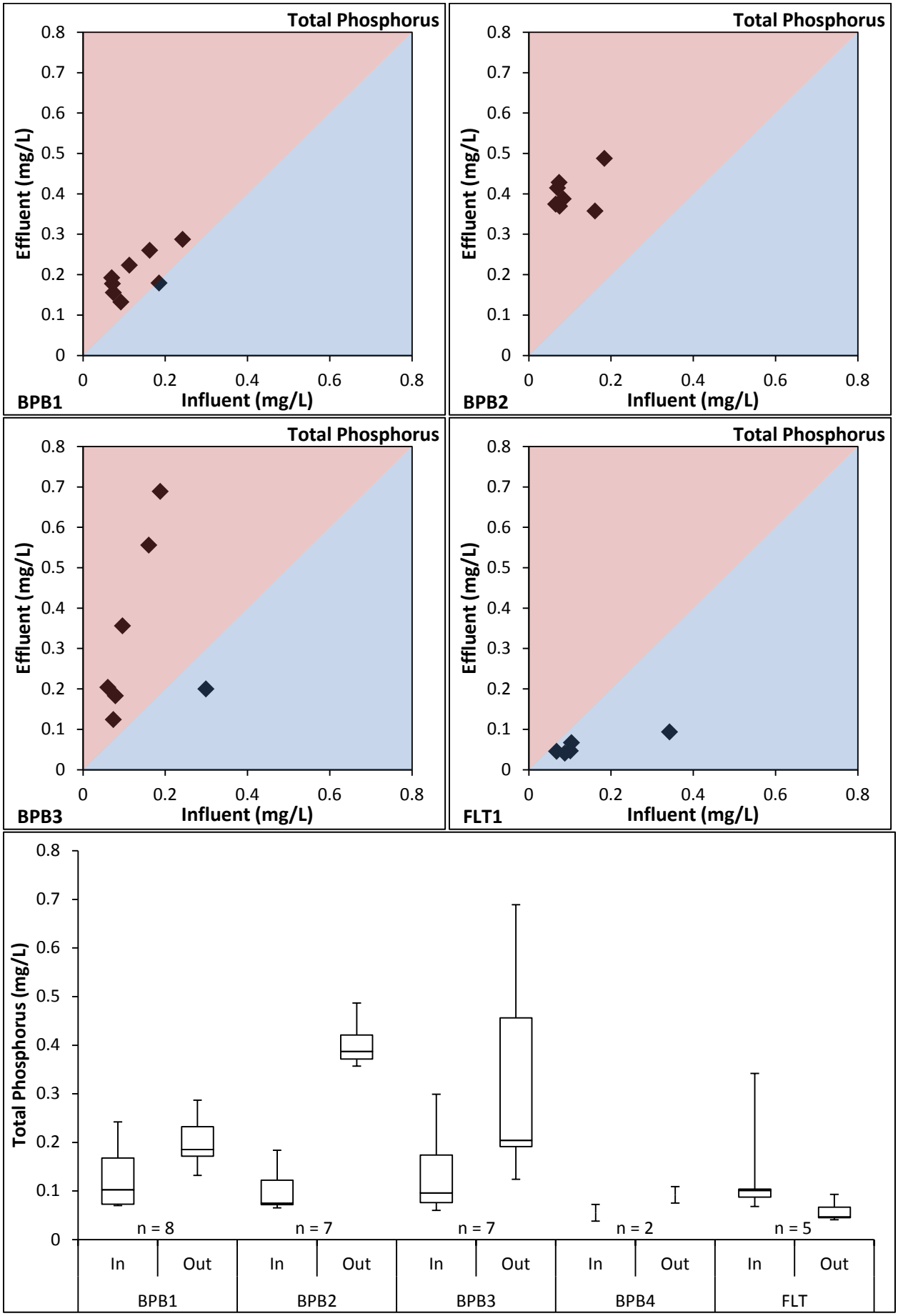
4 – Name of parameter

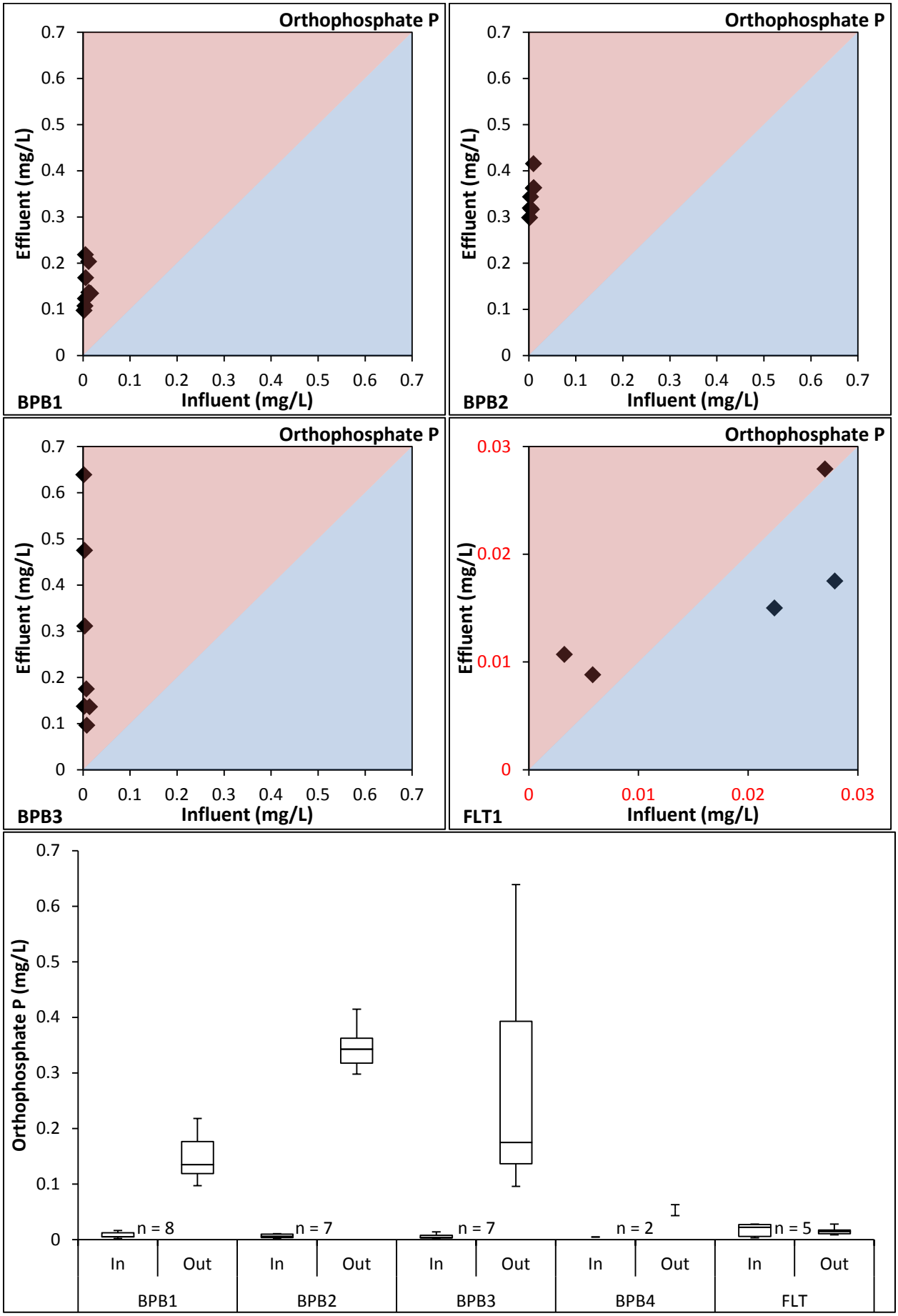
5 – Site name

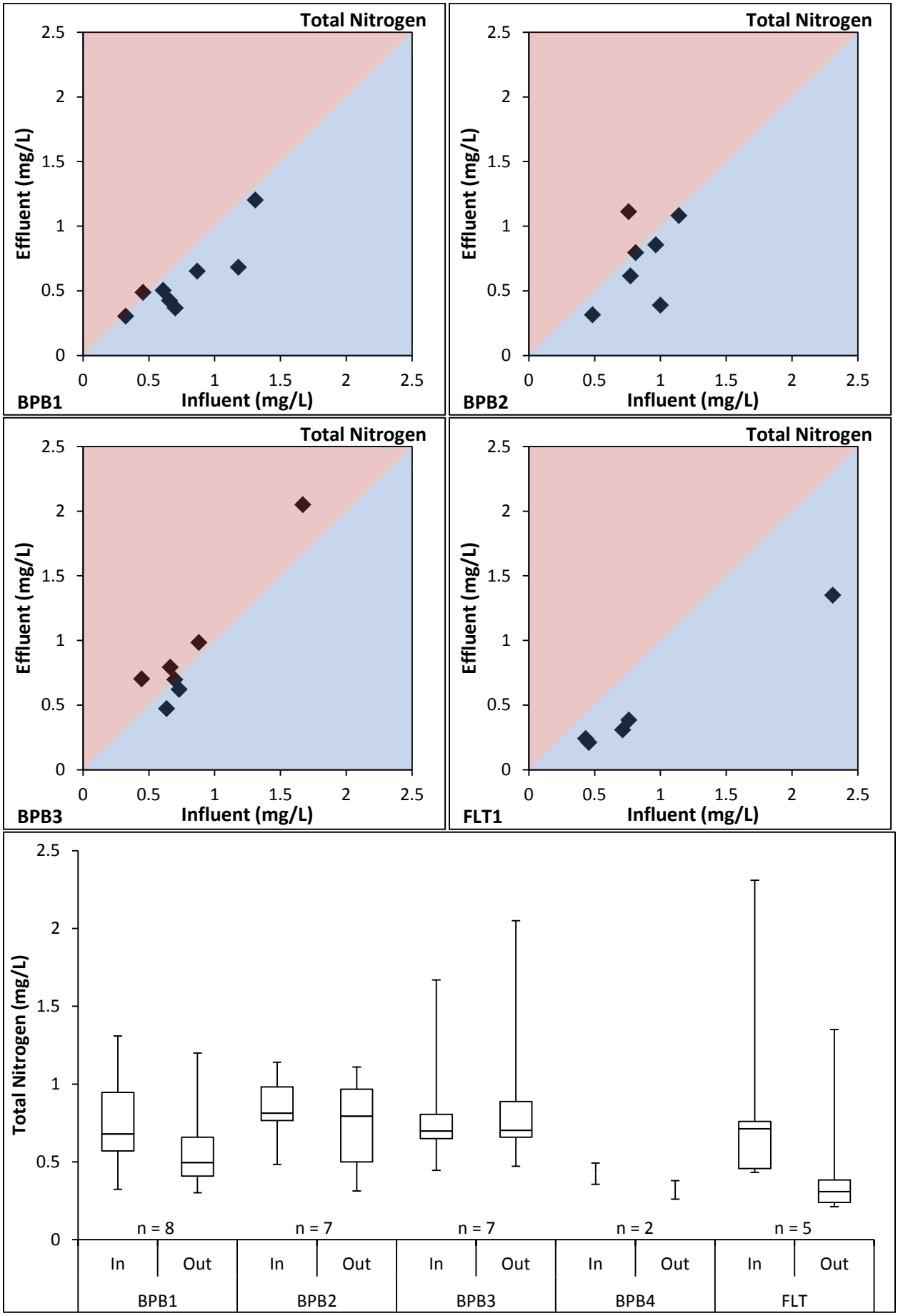
** Figures with several non-detect results include red lines indicating the method detection limit.*

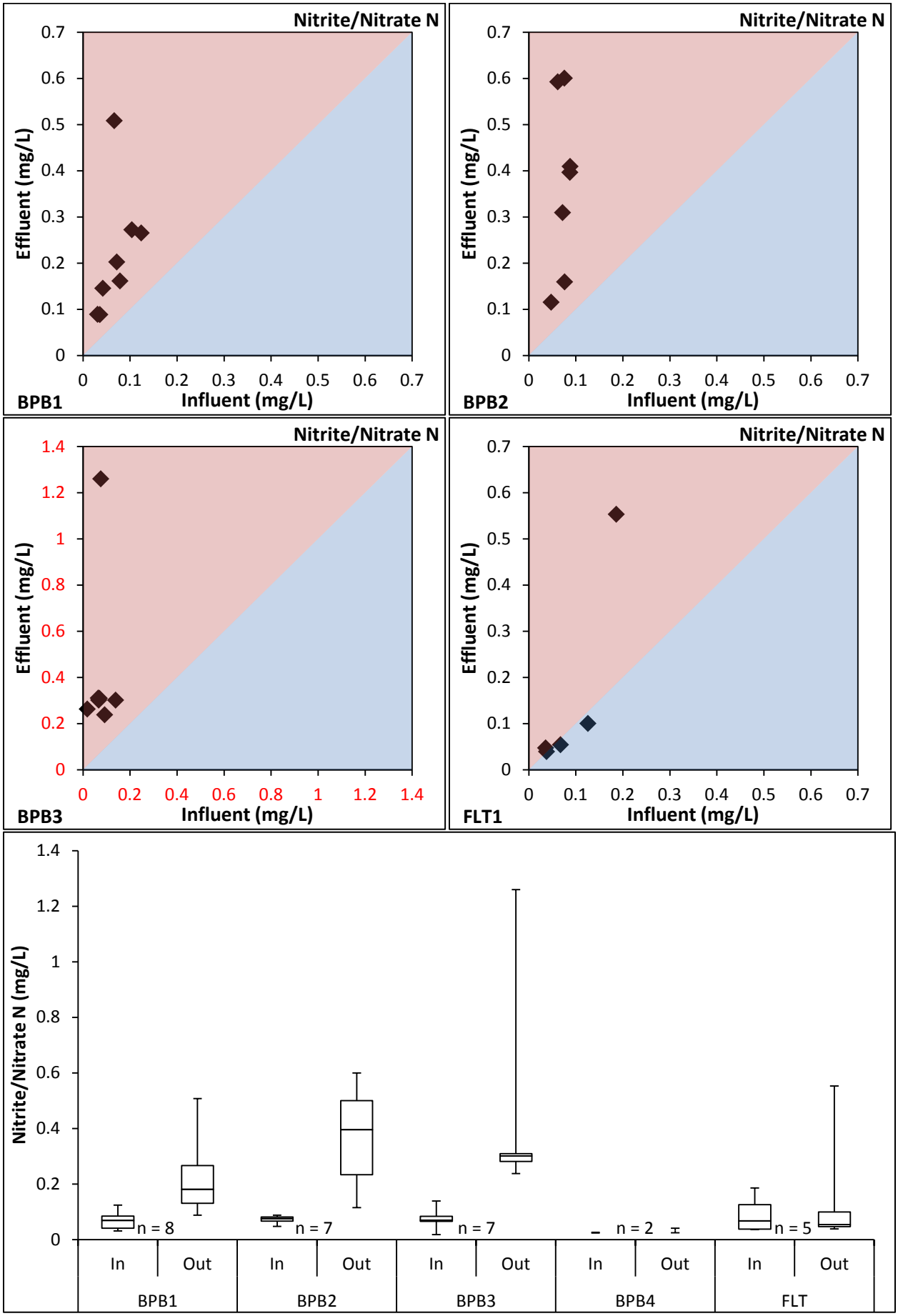
Box Plot Explanation:

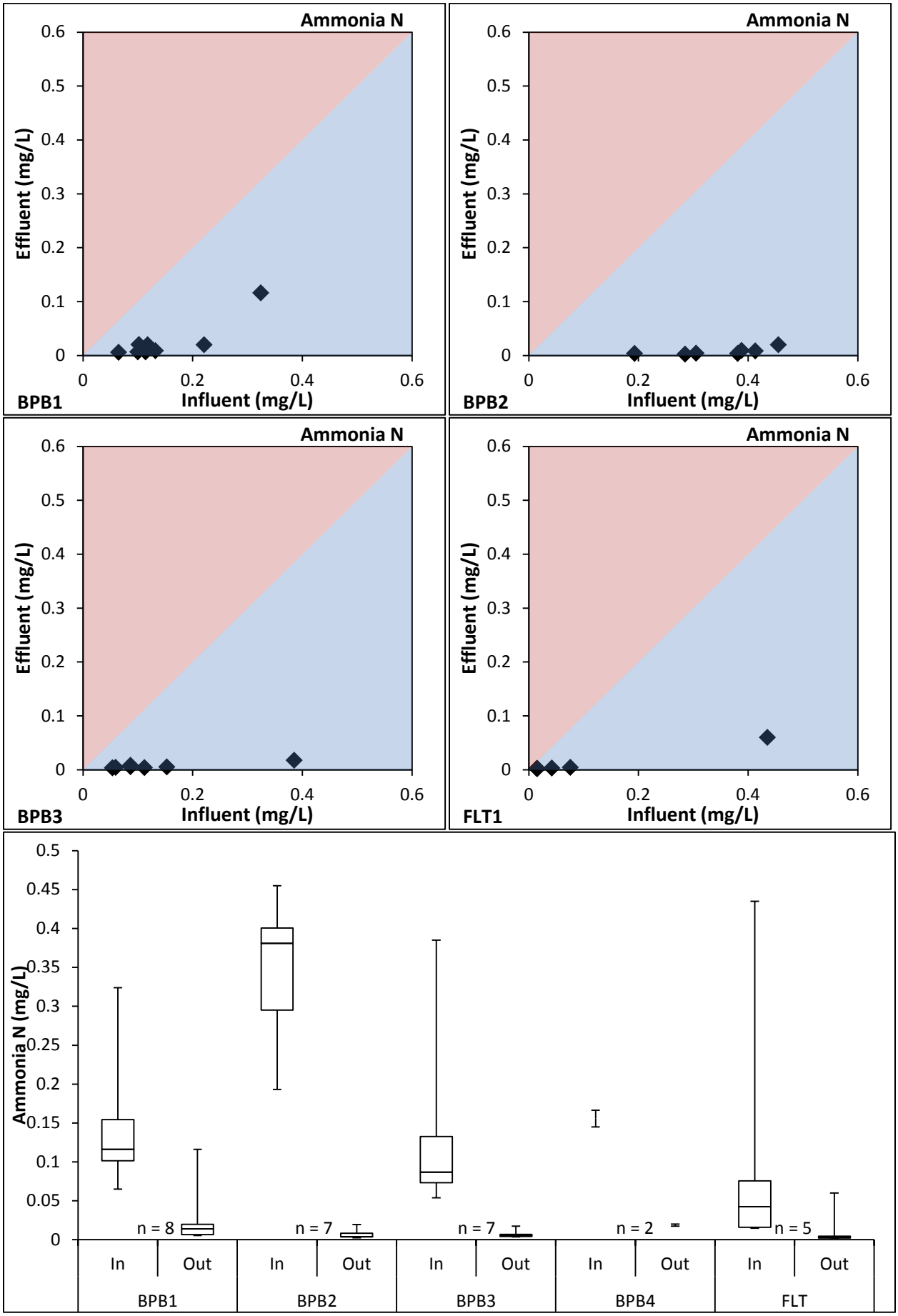


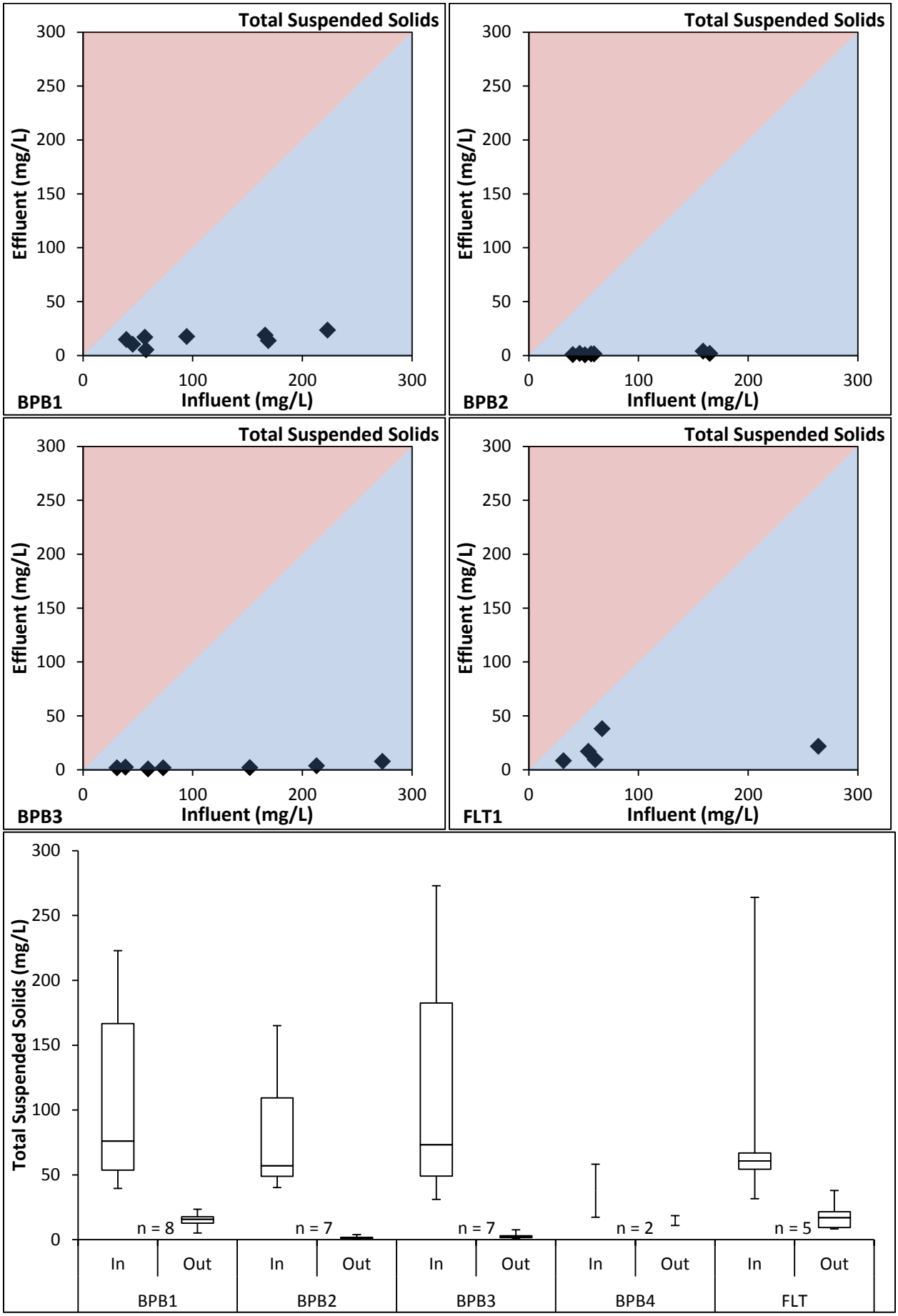

Total Phosphorus
Effluent (mg/L)
Influent (mg/L)
BPB1
BPB2
BPB3
FLT1
Total Phosphorus (mg/L)
n = 8
n = 7
n = 7
n = 2
n = 5
In
Out
BPB1
BPB2
BPB3
BPB4
FLT

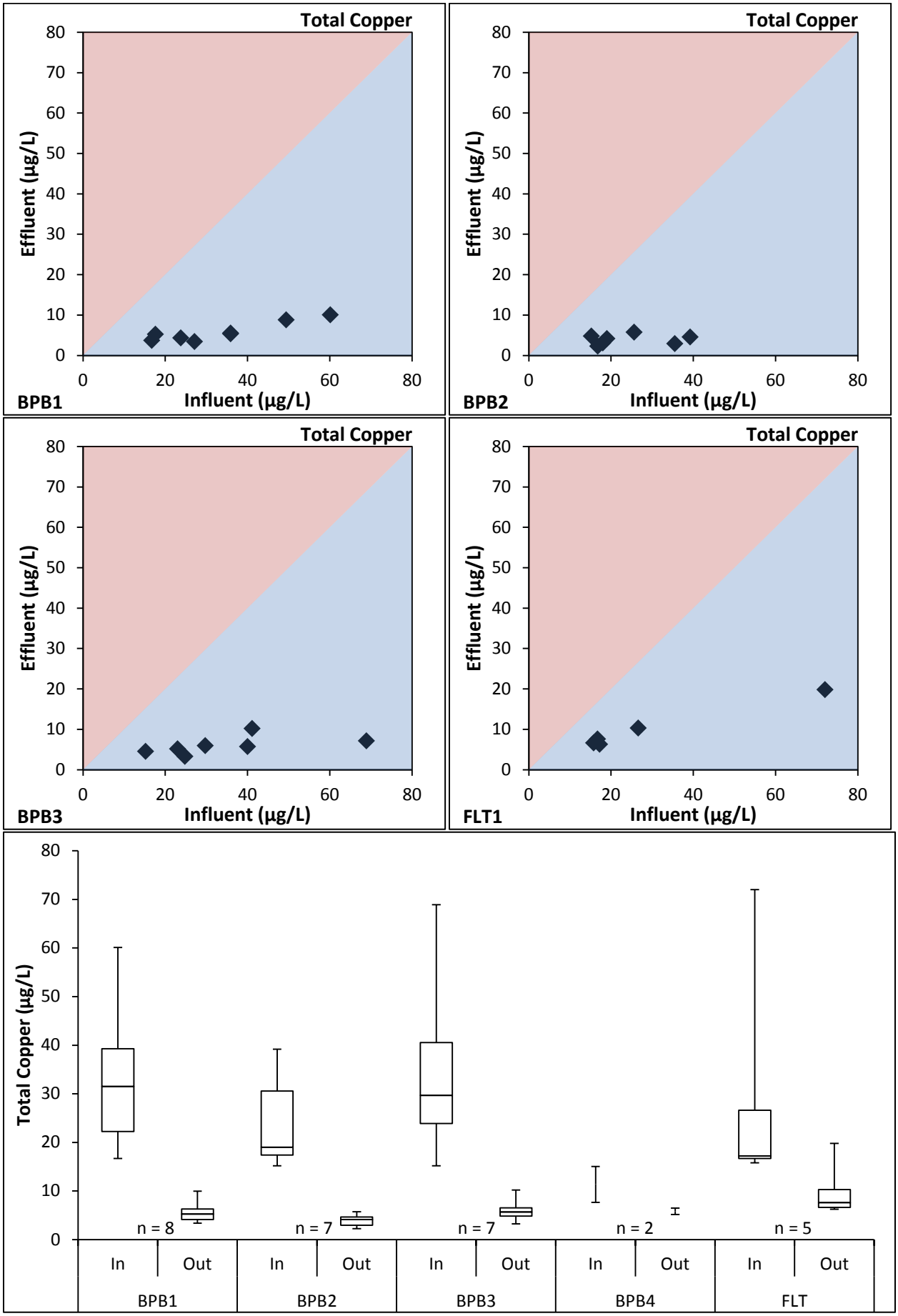

Orthophosphate P
Effluent (mg/L)
Influent (mg/L)
BPB1
BPB2
BPB3
FLT1
Orthophosphate P (mg/L)
n = 8
n = 7
n = 7
n = 2
n = 5
In
Out
BPB1
BPB2
BPB3
BPB4
FLT

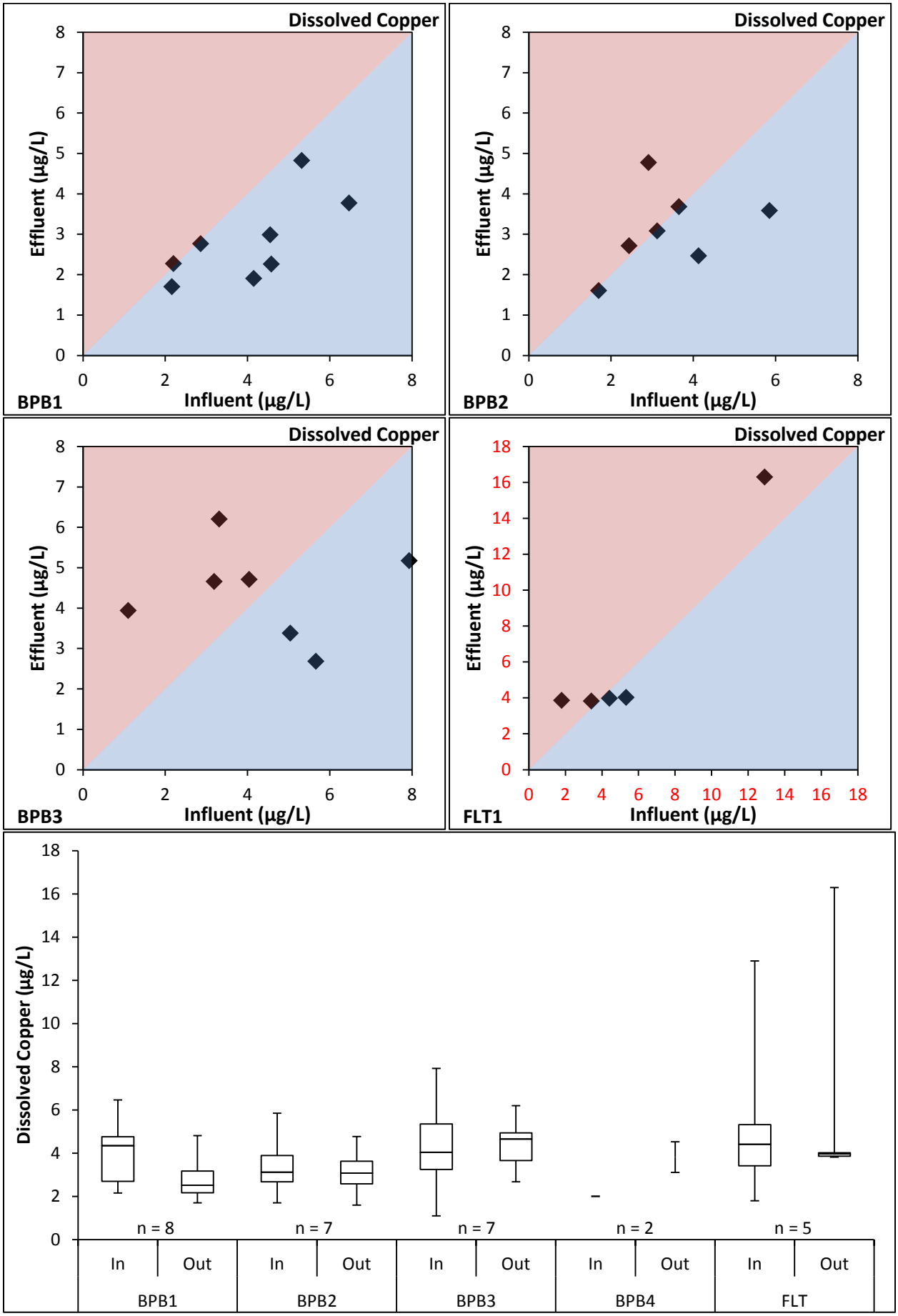

Total Nitrogen
Effluent (mg/L)
Influent (mg/L)
BPB1
BPB2
BPB3
FLT1
Total Nitrogen (mg/L)
n = 8
n = 7
n = 7
n = 2
n = 5
In
Out
BPB1
BPB2
BPB3
BPB4
FLT

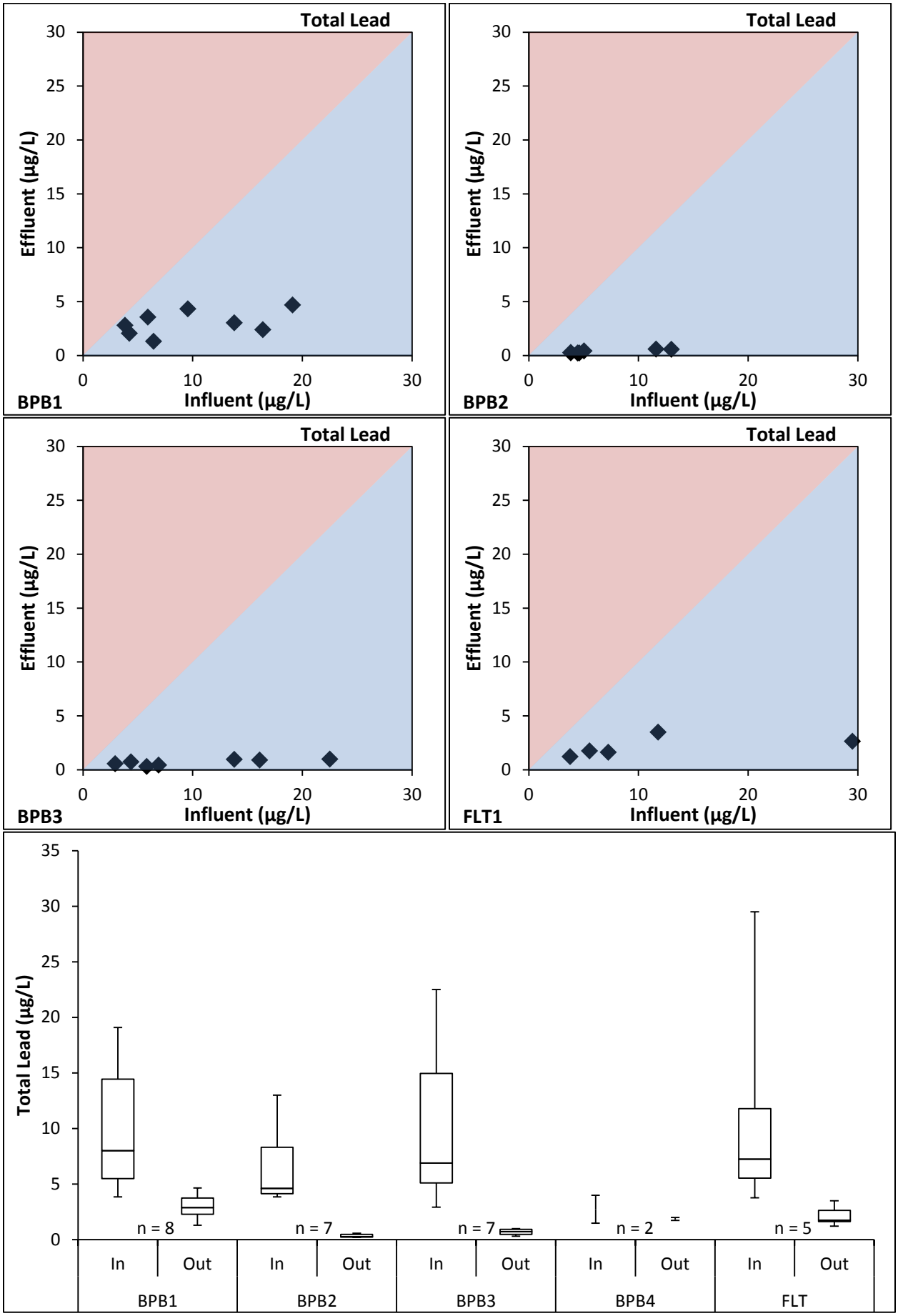

Nitrite/Nitrate N
Effluent (mg/L)
Influent (mg/L)
BPB1
BPB2
BPB3
FLT1
Nitrite/Nitrate N (mg/L)
n = 8
n = 7
n = 7
n = 2
n = 5
In
Out
BPB1
BPB2
BPB3
BPB4
FLT

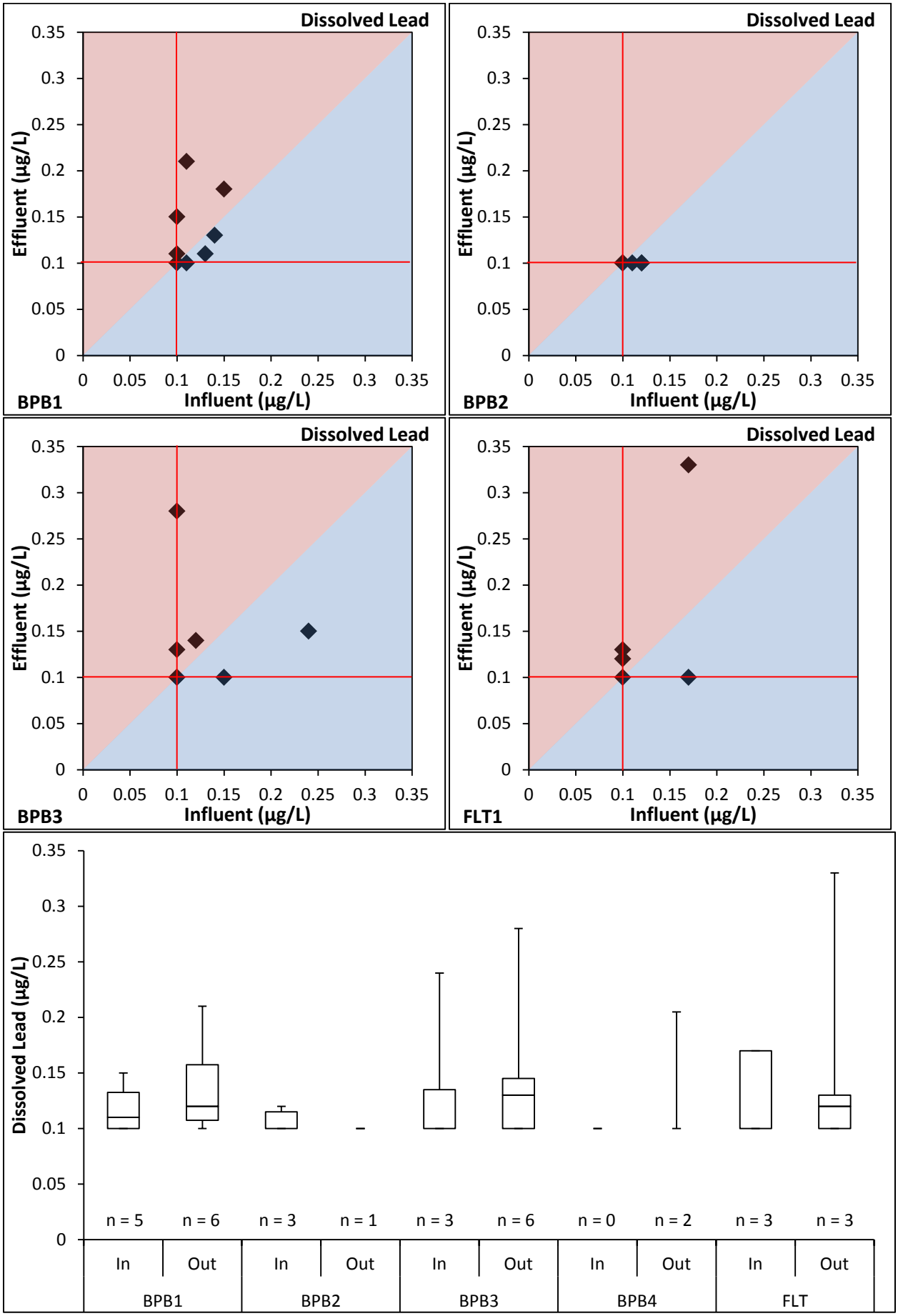

Ammonia N
Effluent (mg/L)
Influent (mg/L)
BPB1
BPB2
BPB3
FLT1
Ammonia N (mg/L)
n = 8
n = 7
n = 7
n = 2
n = 5
In
Out
BPB1
BPB2
BPB3
BPB4
FLT

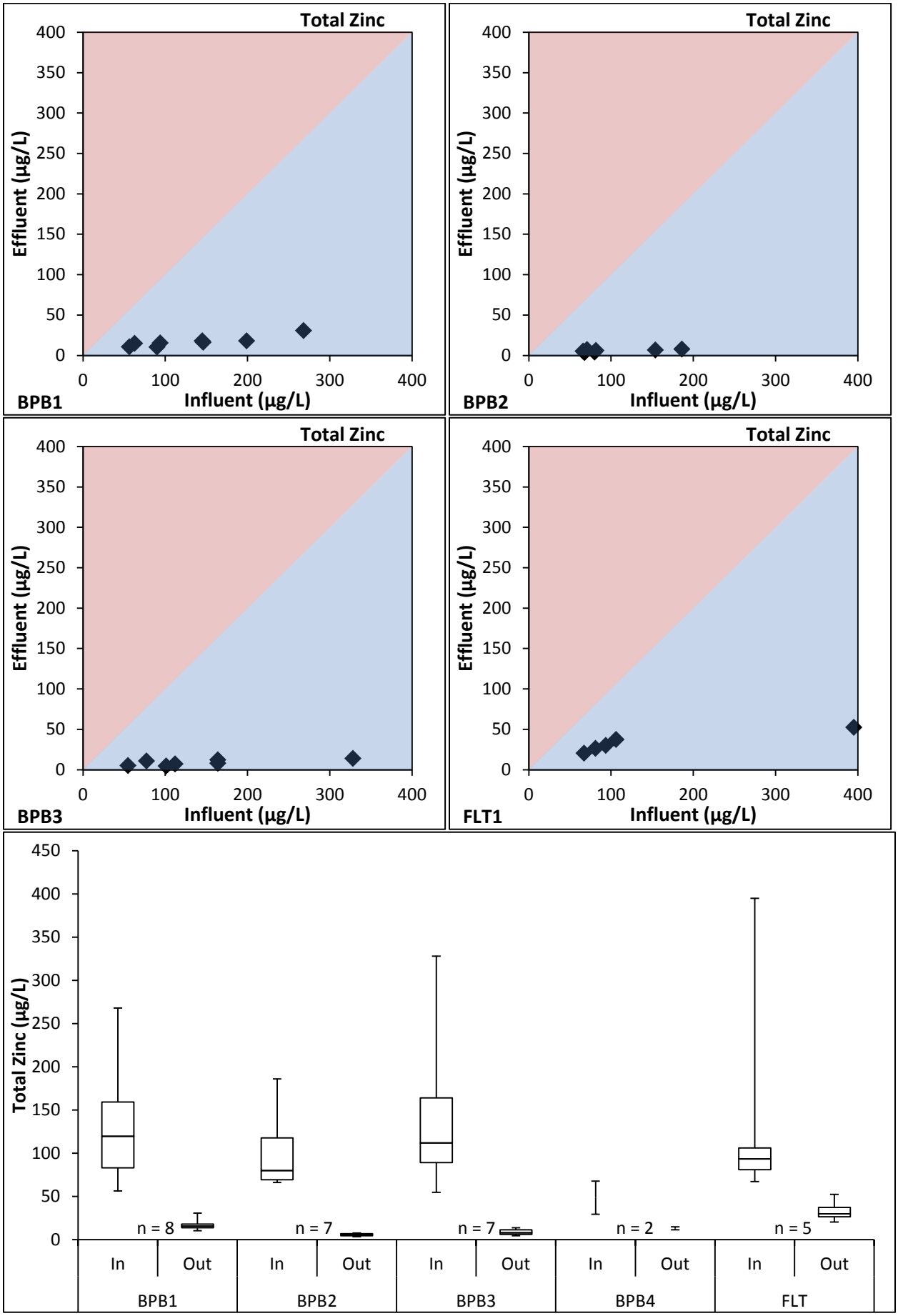

Total Suspended Solids
Effluent (mg/L)
Influent (mg/L)
BPB1
BPB2
BPB3
FLT1
Total Suspended Solids (mg/L)
n = 8
n = 7
n = 7
n = 2
n = 5
In
Out
BPB1
BPB2
BPB3
BPB4
FLT

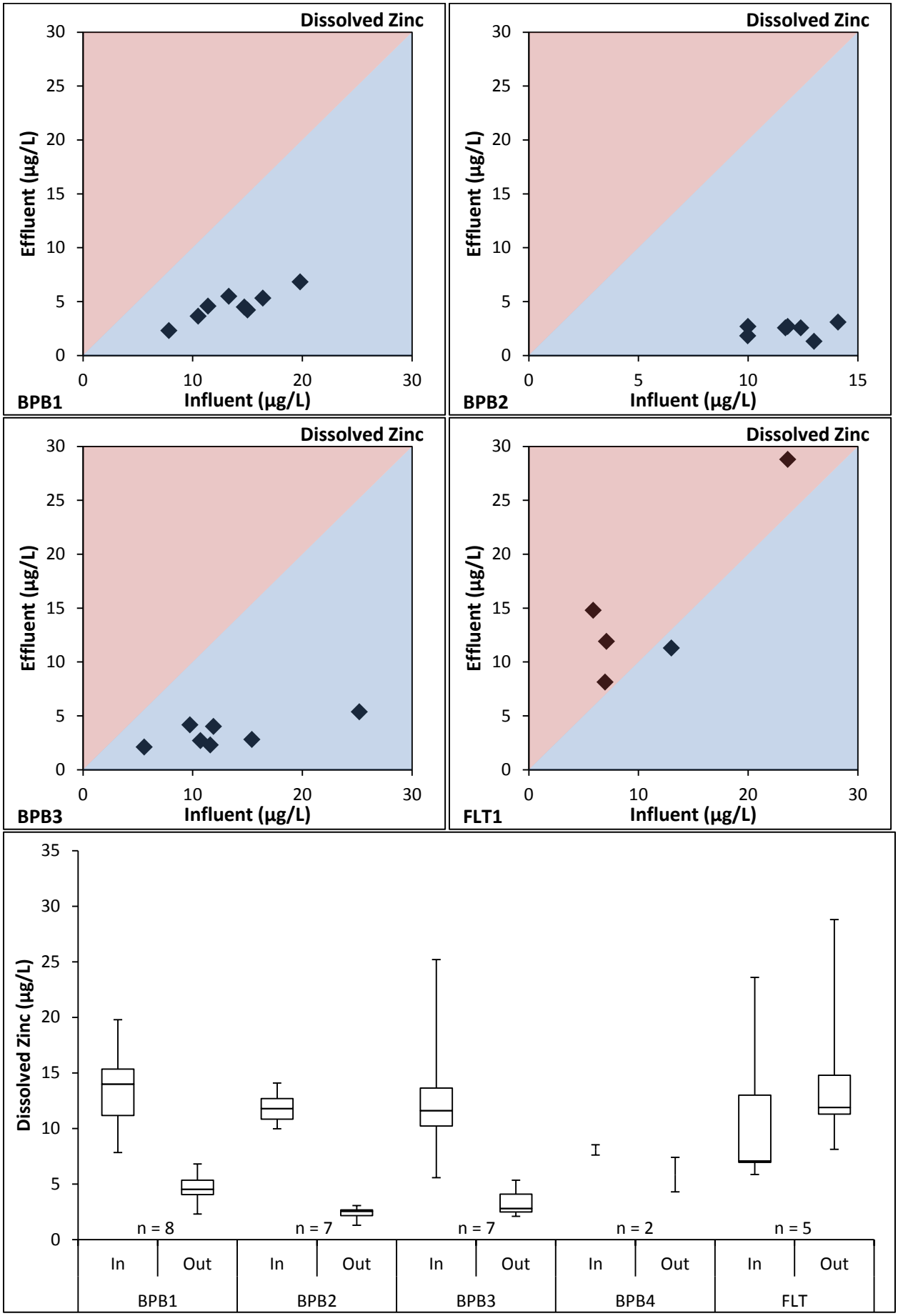

Total Copper
Effluent (µg/L)
Influent (µg/L)
BPB1
BPB2
BPB3
FLT1
Total Copper (µg/L)
n = 8
n = 7
n = 7
n = 2
n = 5
In
Out
BPB1
BPB2
BPB3
BPB4
FLT

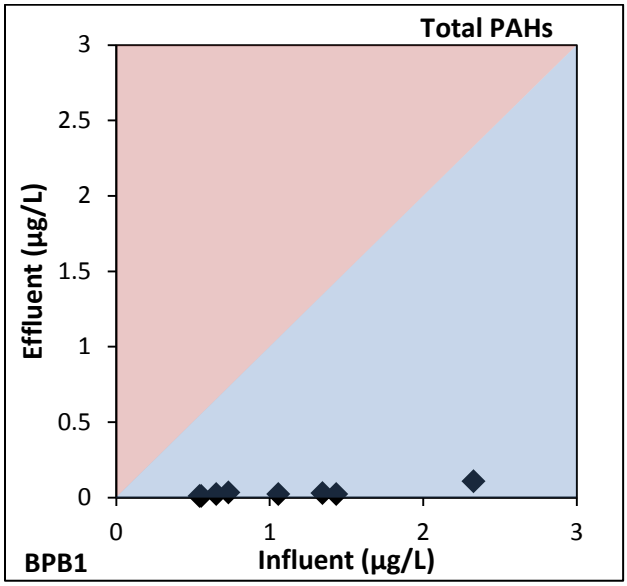

Dissolved Copper
Effluent (µg/L)
Influent (µg/L)
BPB1
BPB2
BPB3
FLT1
Dissolved Copper (µg/L)
n = 8
n = 7
n = 7
n = 2
n = 5
In
Out
BPB1
BPB2
BPB3
BPB4
FLT

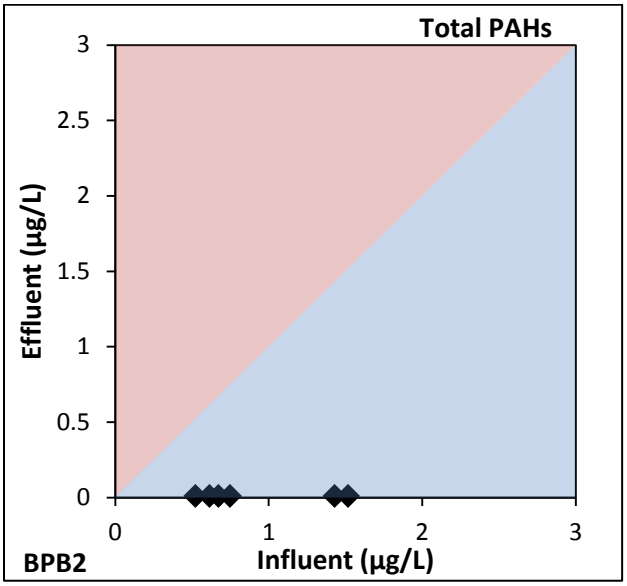

Total Lead
Effluent (µg/L)
Influent (µg/L)
BPB1
BPB2
BPB3
FLT1
Total Lead (µg/L)
n = 8
n = 7
n = 7
n = 2
n = 5
In
Out
BPB1
BPB2
BPB3
BPB4
FLT

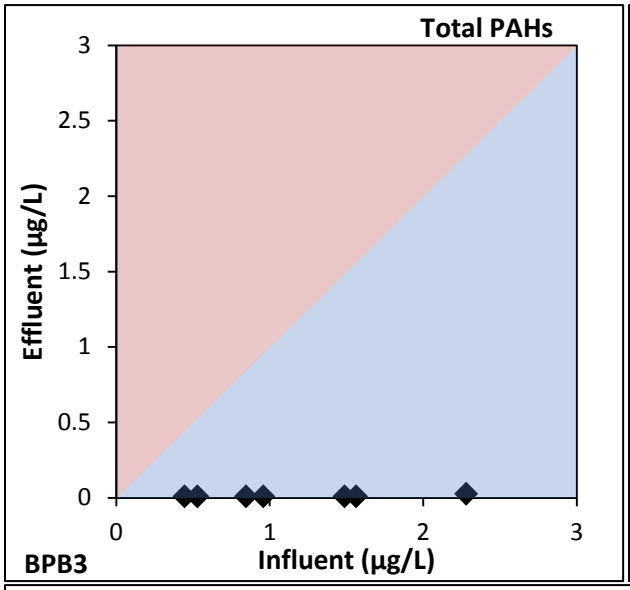

Dissolved Lead
Effluent (µg/L)
Influent (µg/L)
BPB1
BPB2
BPB3
FLT1
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
Dissolved Lead (µg/L)
n = 5
n = 6
n = 3
n = 1
n = 3
n = 6
n = 0
n = 2
n = 3
n = 3
In
Out
BPB1
BPB2
BPB3
BPB4
FLT

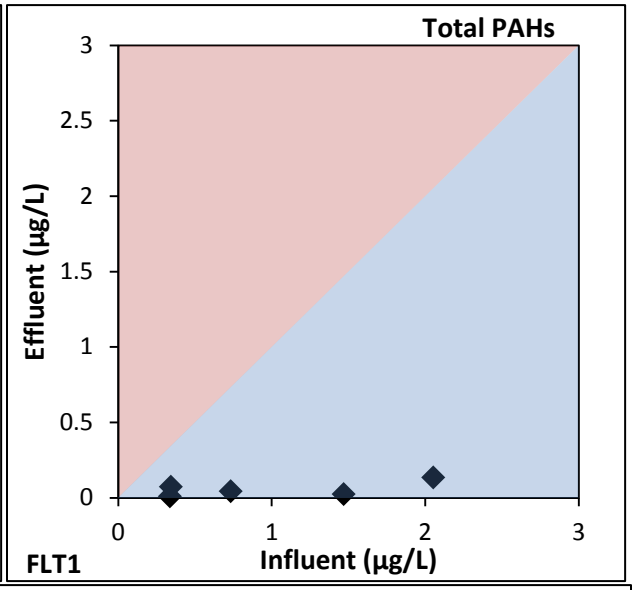

Total Zinc
Effluent (µg/L)
Influent (µg/L)
BPB1
BPB2
BPB3
FLT1
Total Zinc (µg/L)
n = 8
n = 7
n = 7
n = 2
n = 5
In
Out
BPB1
BPB2
BPB3
BPB4
FLT

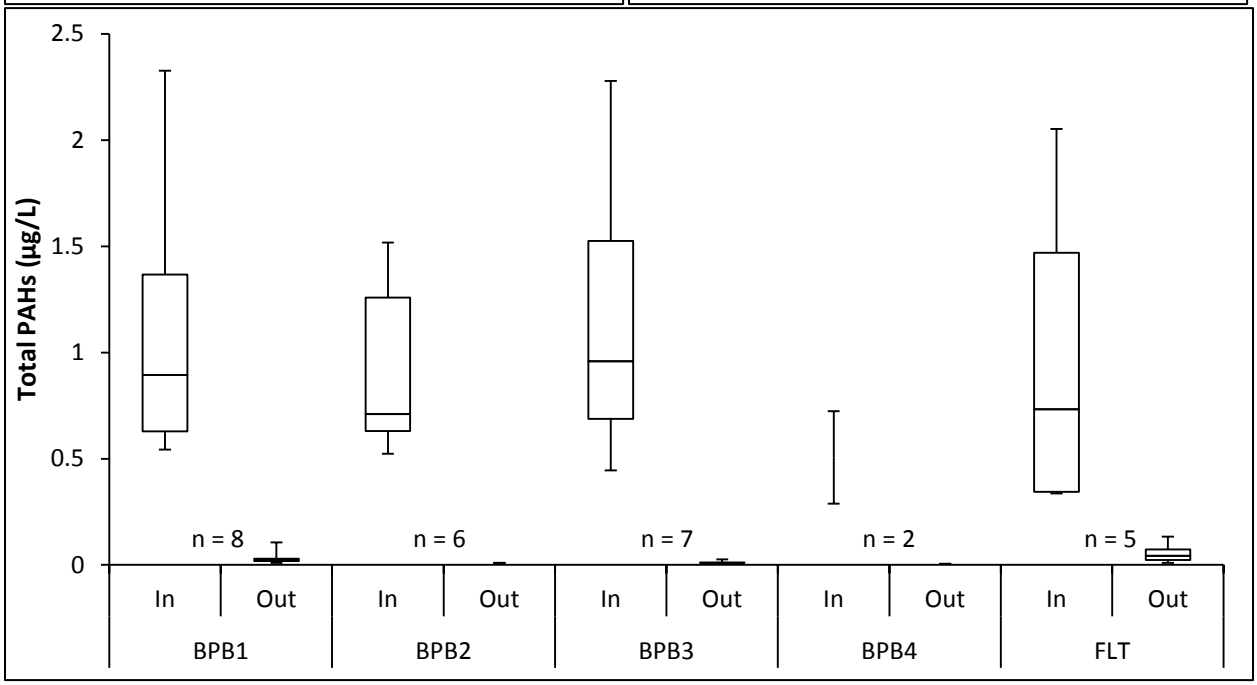

Dissolved Zinc
Effluent (µg/L)
Influent (µg/L)
BPB1
BPB2
BPB3
FLT1
Dissolved Zinc (µg/L)
n = 8
n = 7
n = 7
n = 2
n = 5
In
Out
BPB1
BPB2
BPB3
BPB4
FLT

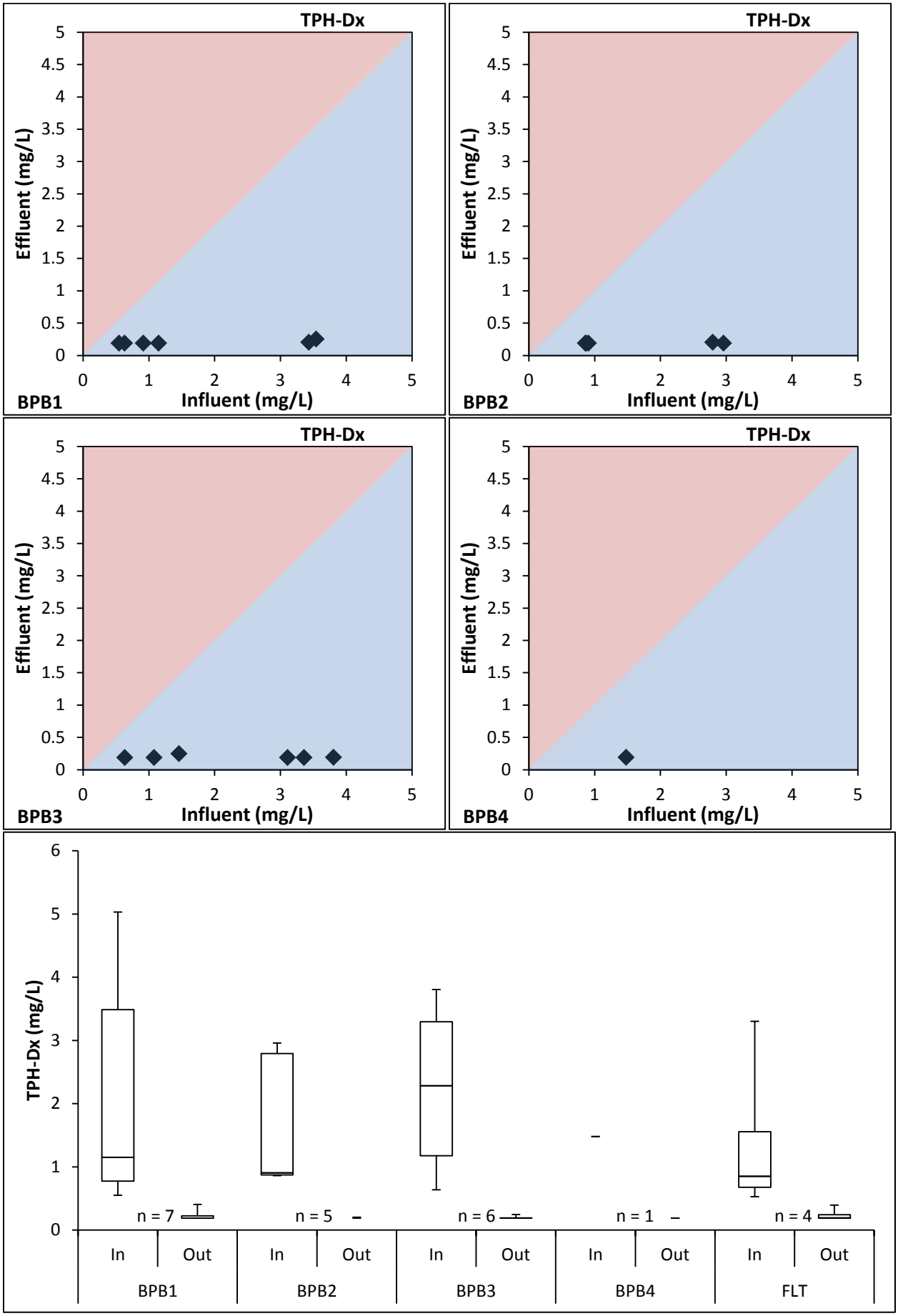

Total PAHs
Effluent (µg/L)
Influent (µg/L)
BPB1

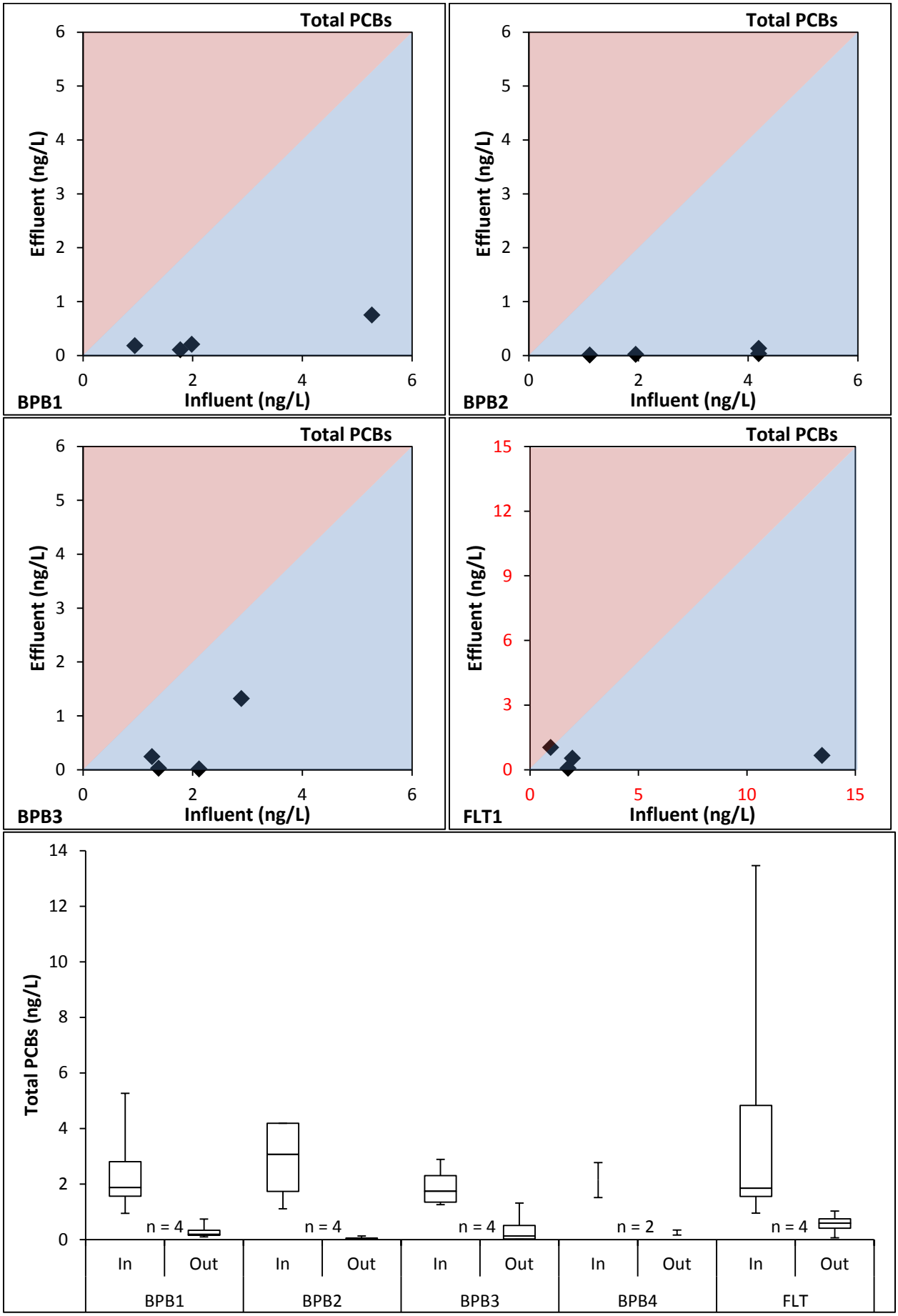

Total PAHs
Effluent (µg/L)
Influent (µg/L)
BPB2

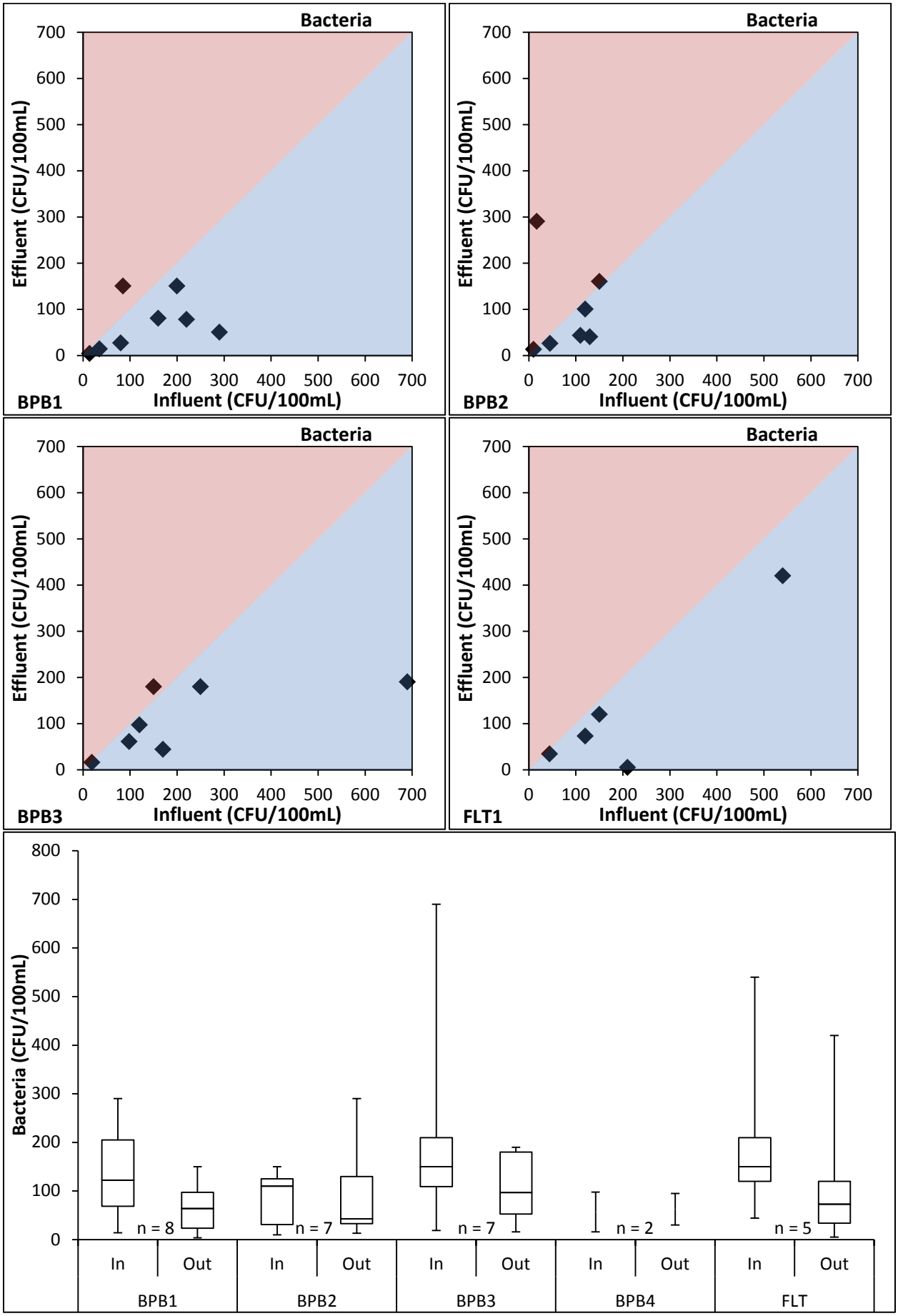

Total PAHs
Effluent (µg/L)
Influent (µg/L)
BPB3

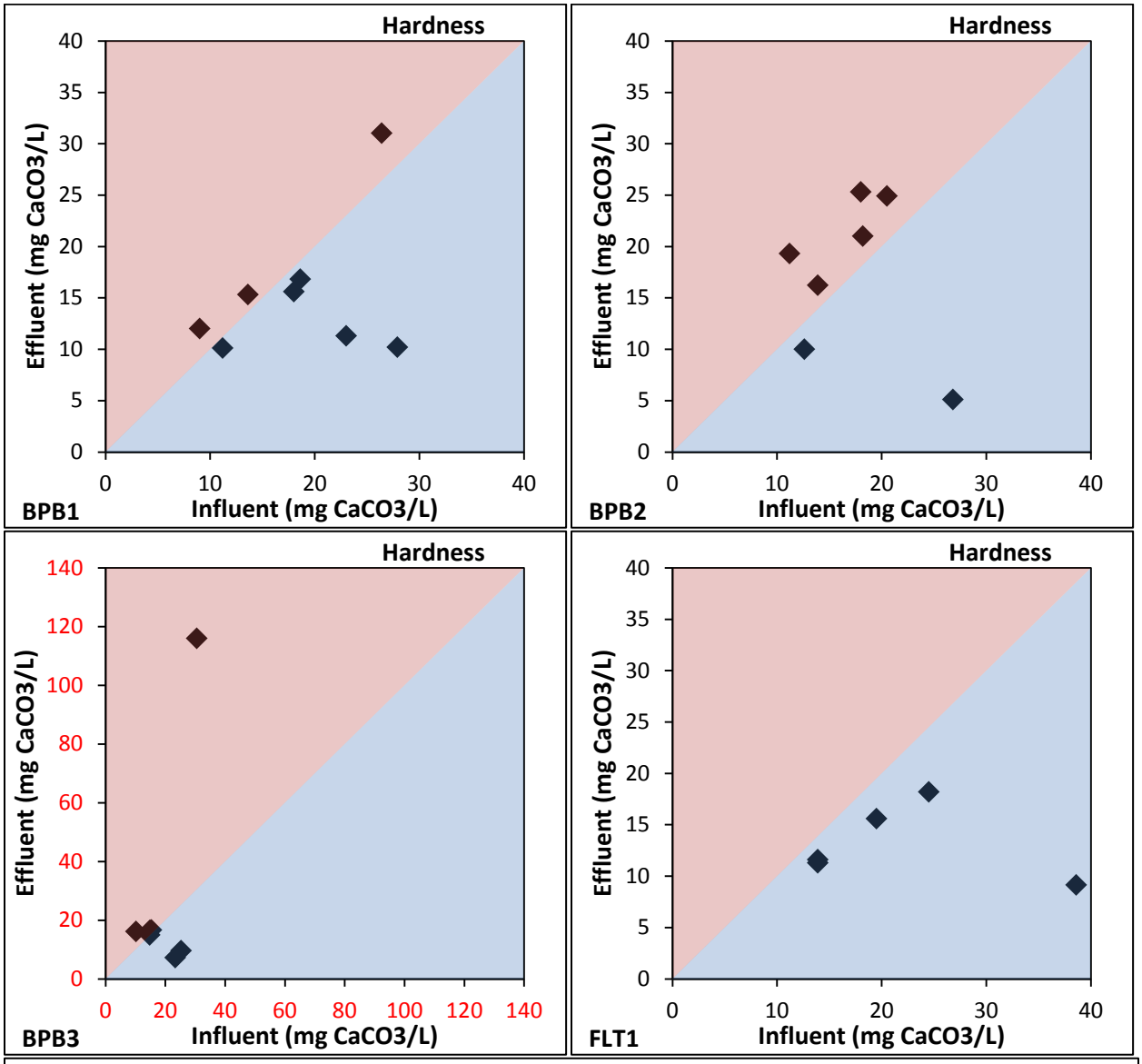

Total PAHs
Effluent (µg/L)
Influent (µg/L)
FLT1

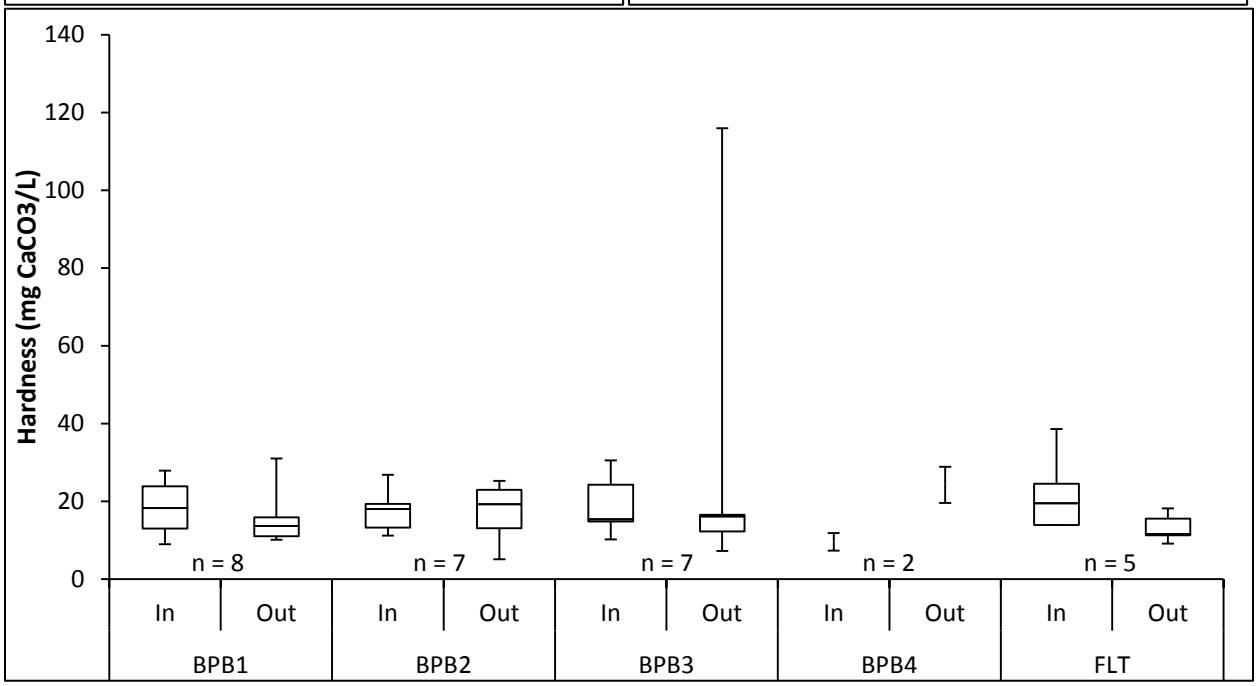

Total PAHs (µg/L)
n = 8
n = 6
n = 7
n = 2
n = 5
In
Out
BPB1
BPB2
BPB3
BPB4
FLT

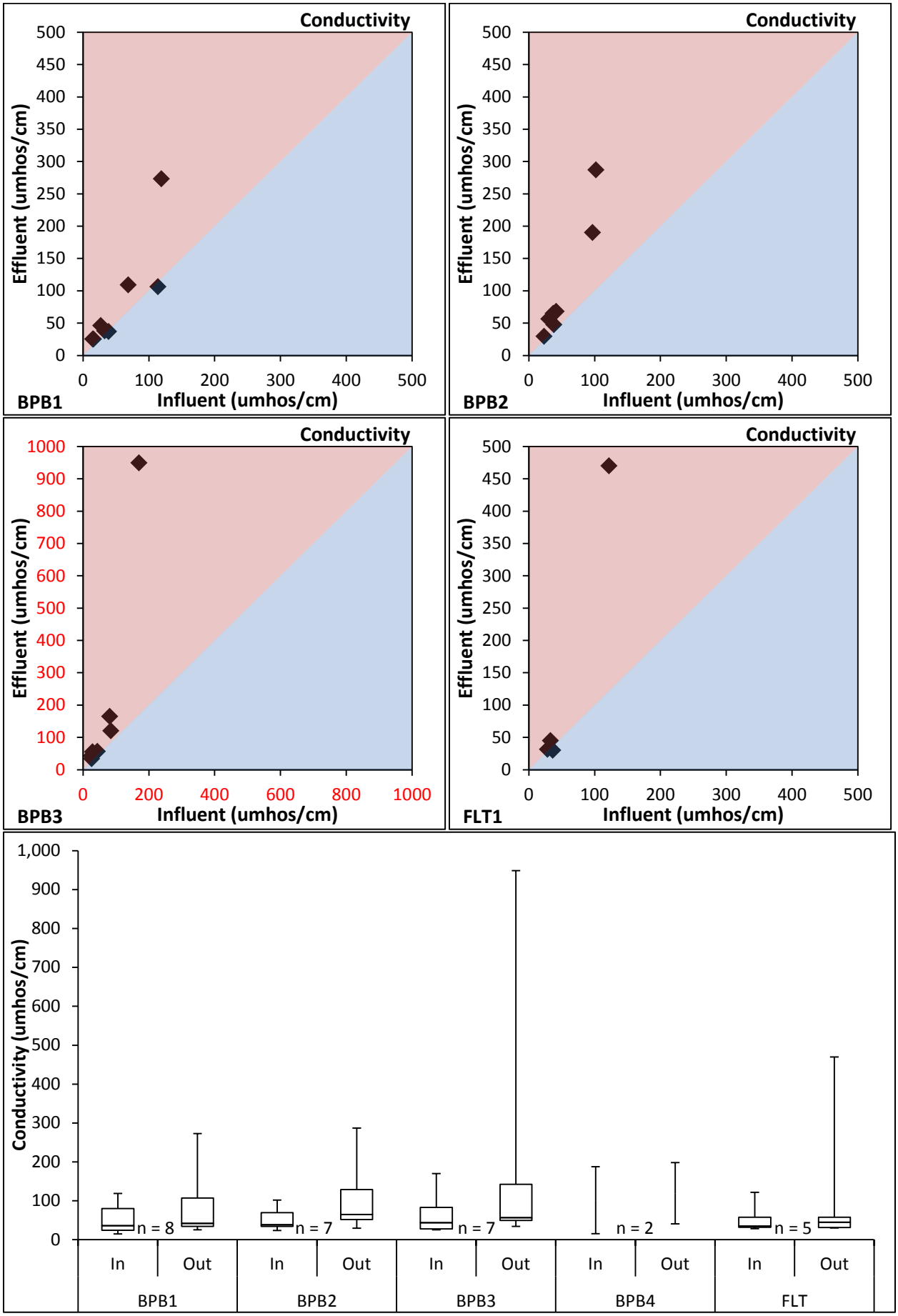

TPH-Dx
Effluent (mg/L)
Influent (mg/L)
BPB1
BPB2
BPB3
BPB4
TPH-Dx (mg/L)
n = 7
n = 5
n = 6
n = 1
n = 4
In
Out
BPB1
BPB2
BPB3
BPB4
FLT

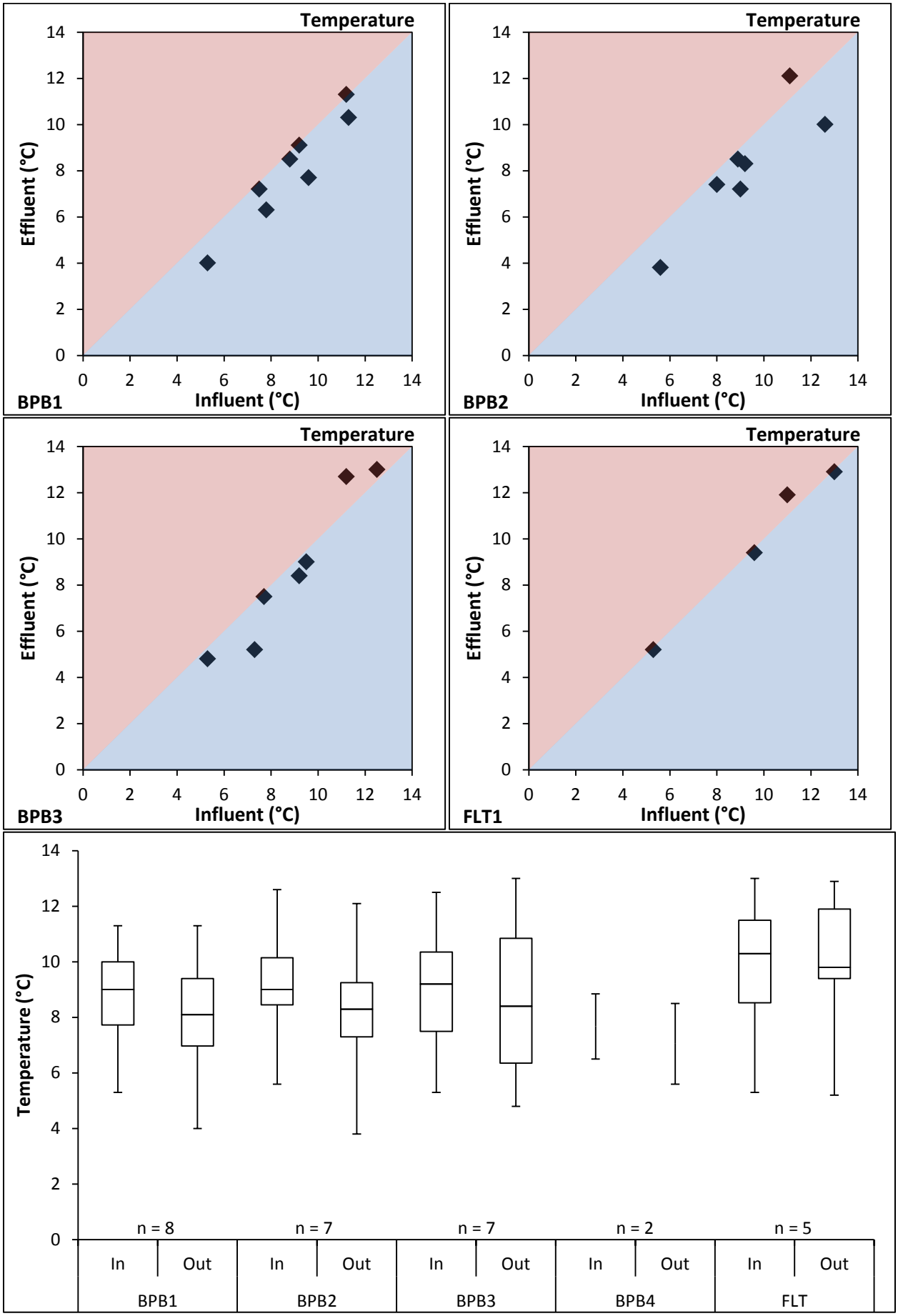

Total PCBs
Effluent (ng/L)
Influent (ng/L)
BPB1
BPB2
BPB3
FLT1
Total PCBs (ng/L)
n = 4
n = 4
n = 4
n = 2
n = 4
In
Out
BPB1
BPB2
BPB3
BPB4
FLT

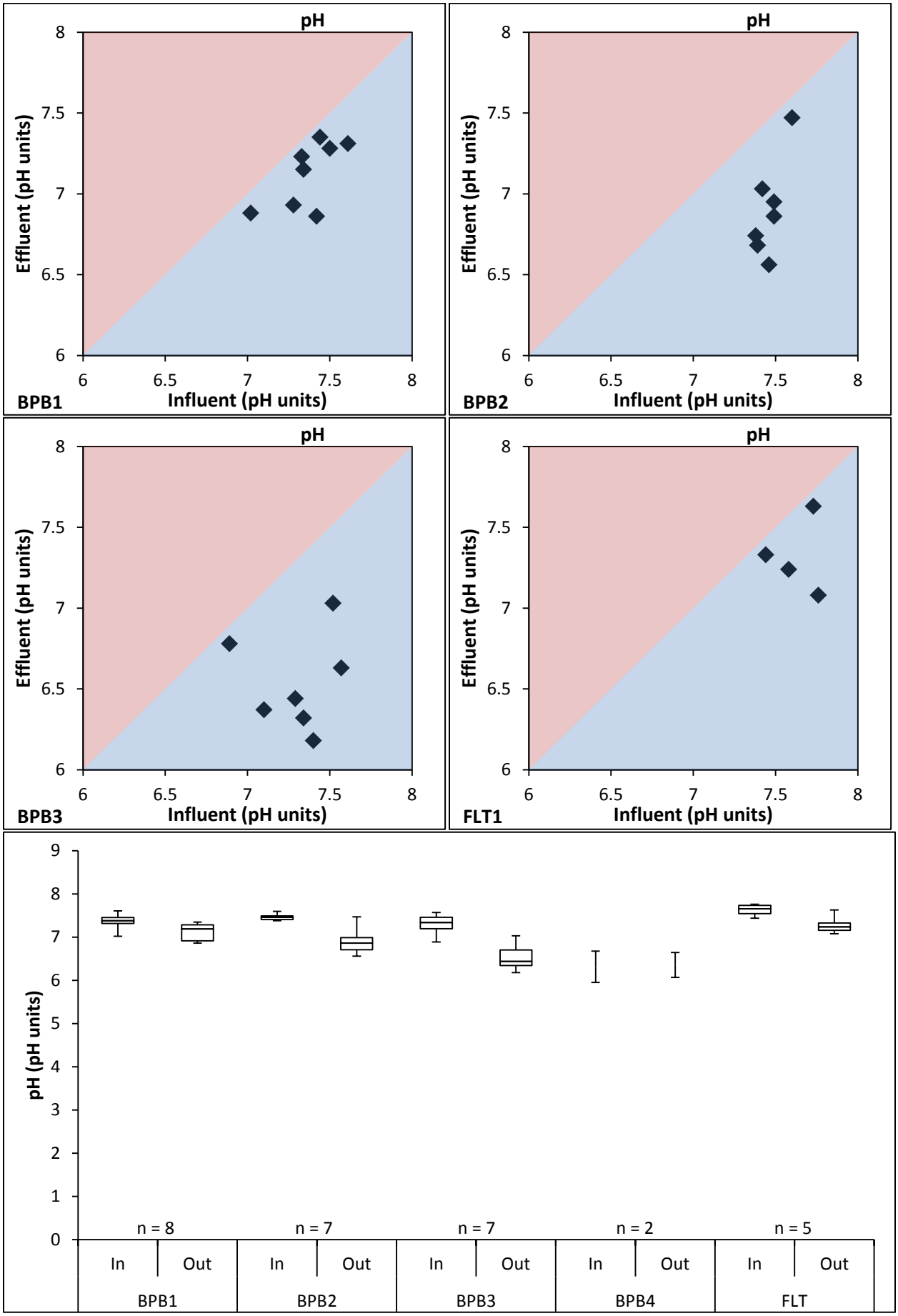

Bacteria
Effluent (CFU/100mL)
Influent (CFU/100mL)
BPB1
BPB2
BPB3
FLT1
Bacteria (CFU/100mL)
n = 8
n = 7
n = 7
n = 2
n = 5
In
Out
BPB1
BPB2
BPB3
BPB4
FLT


Hardness
Effluent (mg CaCO3/L)
Influent (mg CaCO3/L)
BPB1
BPB2
BPB3
FLT1


Hardness (mg CaCO3/L)
n = 8
n = 7
n = 7
n = 2
n = 5
In
Out
BPB1
BPB2
BPB3
BPB4
FLT


Conductivity
Effluent (umhos/cm)
Influent (umhos/cm)
BPB1
BPB2
BPB3
FLT1
Conductivity (umhos/cm)
n = 8
n = 7
n = 7
n = 2
n = 5
In
Out
BPB1
BPB2
BPB3
BPB4
FLT


Temperature
Effluent (°C)
Influent (°C)
BPB1
BPB2
BPB3
FLT1
Temperature (°C)
n = 8
n = 7
n = 7
n = 2
n = 5
In
Out
BPB1
BPB2
BPB3
BPB4
FLT


pH
Effluent (pH units)
Influent (pH units)
BPB1
BPB2
BPB3
FLT1
pH (pH units)
n = 8
n = 7
n = 7
n = 2
n = 5
In
Out
BPB1
BPB2
BPB3
BPB4
FLT

APPENDIX H2 – TOXICITY TEST RESULTS

Toxicity tests using *Daphnia pulex* (48-hour acute test) and *Ceriodaphnia dubia* (7-day chronic test) were conducted on samples from four storm events at BPB1. No acute toxicity was observed in the *D. pulex* tests. Three of the four influent samples were toxic to *C. dubia*, with greatest toxicity observed for the sample with highest contaminant concentrations (1/17/17). Dilution series were run for two events, but these exposures did not result in toxicity. Appendix F3 includes full toxicity reports. Table H2-1 summarizes the toxicity results and notable water quality parameters.

Table H2-1. Summary of toxicity test results and water quality parameters.

Storm Event	Sample Type	*Daphnia pulex*	*Ceriodaphnia dubia*		Hardness	Alkalinity	TSS	Dissolved Copper	Dissolved Zinc	Total PAHs
		Mean % Survival	Mean % Survival	Mean Reproduction	(mg $CaCO_3$/L)	(mg $CaCO_3$/L)	(mg/L)	(µg/L)	(µg/L)	(µg/L)
1/21/16	Standard Control	100	90	34.2	104	80.4	--	--	--	--
	Influent	95	50*	23.8*	11.2	7.93	45.4	2.16	10.5	0.555 J
	Effluent	95	80	30.6	10.1	10.3	10.2	1.7 J	3.63	0.0094 U
3/9/16	Standard Control	100	100	17.4	36.9	36.1	--	--	--	--
	Influent	85	100	19.2	10.9	8.09	56.4	4.58	13.3	0.732 J
	Effluent	100	90	21.4	10.5	10.5	16.8	2.26	5.48	0.0319 J
10/26/16	Standard Control	100	100	32.8	41.9	37.9	--	--	--	--
	Low Hard. Control	100	100	33.9	10.8	9.87	--	--	--	--
	Influent	100	60*†	19.5*†	8.99	--	39.6	2.86	11.4	0.653 J
	Effluent	100	100	33.2	12.0	--	14.6	2.76	4.56	0.0210 J
1/17/17	Standard Control	95	100	35.4	36.2	100	--	--	--	--
	Low Hard. Control	--	100	31.0	9.49	9.1	--	--	--	--
	Influent	100	0*†	0*†	26.4	--	223	5.32	19.8	2.33 J
	Effluent	100	90	37.9	31.0	--	23.4	4.82	6.81	0.106 J

* Statistically significant reduction in survival or reproduction compared to control response ($p < 0.05$; Appendix E describes statistical methods).
† Statistically significant reduction in survival or reproduction in the inlet response compared to outlet response ($p<0.05$; Appendix E).
-- – not analyzed; J – estimated value; U – non-detect value;
Low hardness controls were utilized, because the low hardness in project samples was not adjusted and could potentially impact survival.

APPENDIX H3 – RELATIONSHIPS BETWEEN PARAMETERS

Understanding the relationships between parameters can provide better insight into how the BMPs are affecting water quality and the conditions under which they will be most effective. For example, conventional parameters like organic carbon and suspended solids can affect removal efficiencies for some pollutants. This section explores the relationships between parameters using linear regressions and visual observations for the data collected at the BPBs installed in 2012 (i.e., BPB1, BPB2, and BPB3). When patterns were similar across these three sites, the results are summarized as a combined dataset. Data from BPB4, the Filterra and the DTS are not included in this section due to limited sample size.

Metals

Metals can be present in stormwater in a variety of forms, which can affect how well they are removed by bioretention and their toxicity. Dissolved metals includes freely dissolved metal ions and metals associated with particulates less than 0.45µm, including dissolved organic carbon (DOC). Total metals includes all dissolved metals and metals as particulates greater 0.45µm. Bioretention provides an effective physical filter for particulate metals; however, removal efficiency of dissolved metals depends more on chemical interactions, such as the metal's affinity for the media compared to the metal's affinity for DOC in the stormwater. This can vary with different metals and under different conditions including pH and amount of time stormwater is retained in the BMP.

Copper

The BPBs effectively reduced total copper (Section 2.1 of main report). The evidence suggests removal was achieved primarily through physical filtration of particulates. There was a strong relationship between total copper and TSS in the influent, but not in effluent where the majority of copper was present in the dissolved form (Figures H3-1 and H3-2).

Dissolved copper influent concentrations were not significantly reduced in the effluent. Dissolved copper was strongly related to DOC in the influent and moderately related to DOC in the effluent (Figure H3-3). Dissolved copper has a particularly high affinity to DOC compared to other stormwater metals, such as zinc (Kaschl et al. 2002, Li and Davis 2008, McBride et al. 1997, Silvertooth 2014,). Previous research has shown this strong relationship between dissolved copper and DOC in stormwater can prevent dissolved copper from binding with bioretention media, thus affecting treatment effectiveness (King County 2014, Li and Davis 2008, Silvertooth 2014, Zhou and Wong 2001). The relationships discussed in this section corroborate these findings.

Zinc

In contrast to copper, the BPBs efficiently reduced both total and dissolved zinc (Section 2.1 of the main report). There was a strong relationship between total zinc and TSS in the influent and the effluent (Figures H3-4), and the majority of total zinc was present in the particulate fraction in both influent and effluent (H3-5). Dissolved zinc was strongly related to DOC in the influent, but not related to DOC in the effluent (Figure H3-6). These data suggest that while dissolved zinc may have been associated with DOC in the influent, the association was not strong enough to prevent dissolved zinc from binding with the BPB media.

Cadmium and Lead

Data for cadmium and lead were limited due to infrequent detections, particularly in the effluent. Total cadmium and lead were strongly related to TSS in the influent, as was total lead in the effluent (Figures H3-7 and H3-8).

DOC

Concentrations of DOC tended to be higher in effluent compared to influent (e.g., average influent 2.09 mg/L, average effluent 4.29 mg/L). However, no statistical tests were conducted with DOC results, because this analyte was added partway through the study, resulting in a lower sample size at each individual site. Due to the lack of flow data, it was not possible to determine whether the observed concentration increase was due to an increase in DOC mass, or a decrease in stormwater volume (volume changes discussed in Section 2.1 of the main report). An increase of DOC mass is possible if the media is introducing DOC to the treated stormwater (Li and Davis 2009). If this is the case, the media could also release any OC-bound contaminants from the media, such as copper and hydrophobic organic contaminants; however, results of this study do not suggest this occurred at the BPBs or Filterra.

Nutrients

Total phosphorus and nitrogen were strongly related to TSS in the influent, but were not related to TSS in the effluent (Figures H3-9 and H3-10). This is likely due to export of dissolved nutrients from the media, particularly for phosphorus. For example, phosphorus concentrations were higher in effluent than the influent. Orthophosphate phosphorus comprised an average of 7% of the influent total phosphorus, but an average of 80% of the effluent total phosphorus (Figure H3-11).

Organic Contaminants

The organic contaminants analyzed in this study were lube-oil-/diesel-range petroleum hydrocarbons (TPH-Dx), polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs). These compounds are fairly hydrophobic indicating they have low solubility in water and are generally associated with suspended solids and organic matter. There was a moderate to strong relationship between influent concentrations of organic contaminants and TSS (Figures H3-12 through H3-14). Relationships between effluent concentrations could only be assessed for total PCBs due to low frequency of detection of the other organic contaminants, but no relationship was observed (Figure H3-14). Total organic carbon (TOC) was not analyzed in most samples; therefore, the relationship between organic contaminants and TOC could not be assessed.

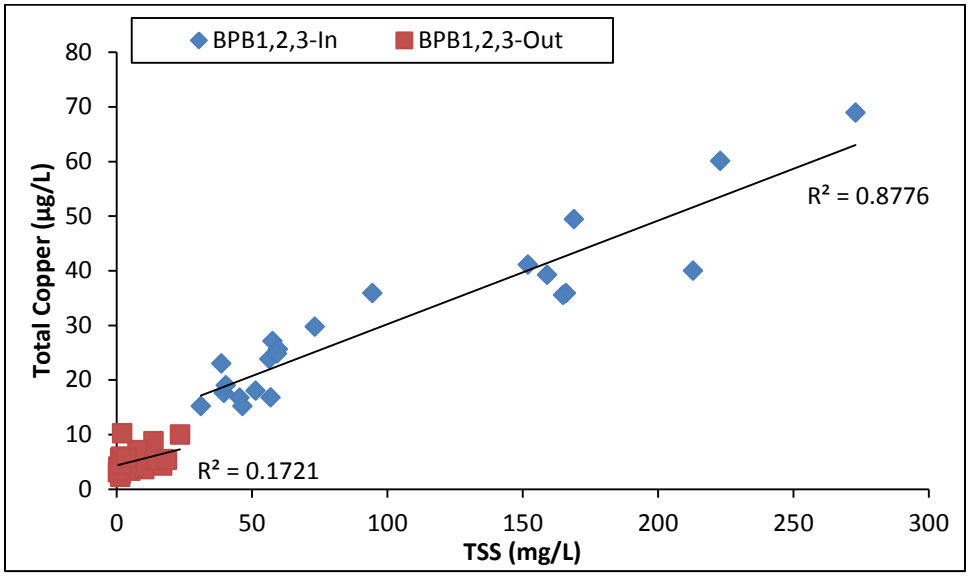


Figure H3-1. Total Copper Versus TSS for the 2012 BPBs Influent and Effluent

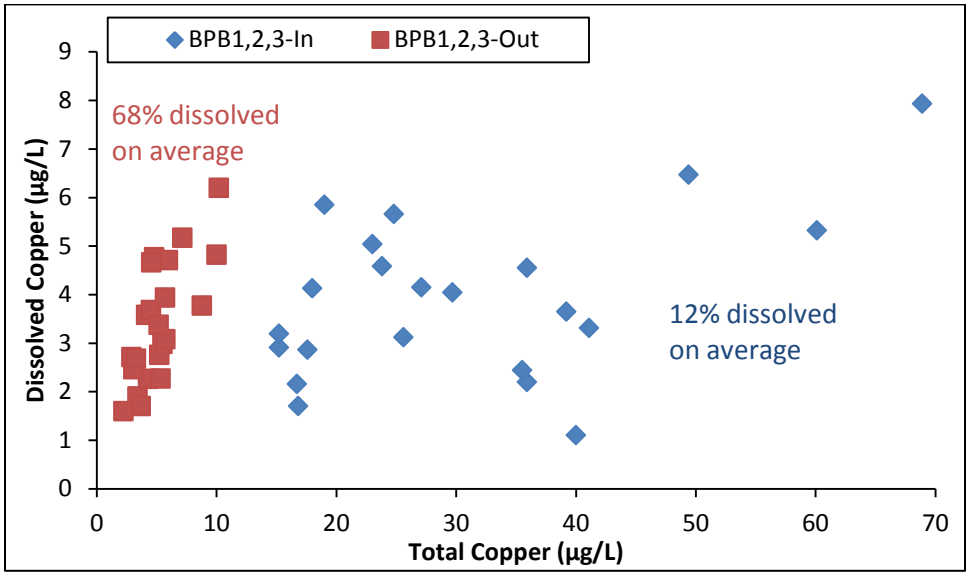


Figure H3-2. Dissolved Versus Total Copper for the 2012 BPBs Influent and Effluent

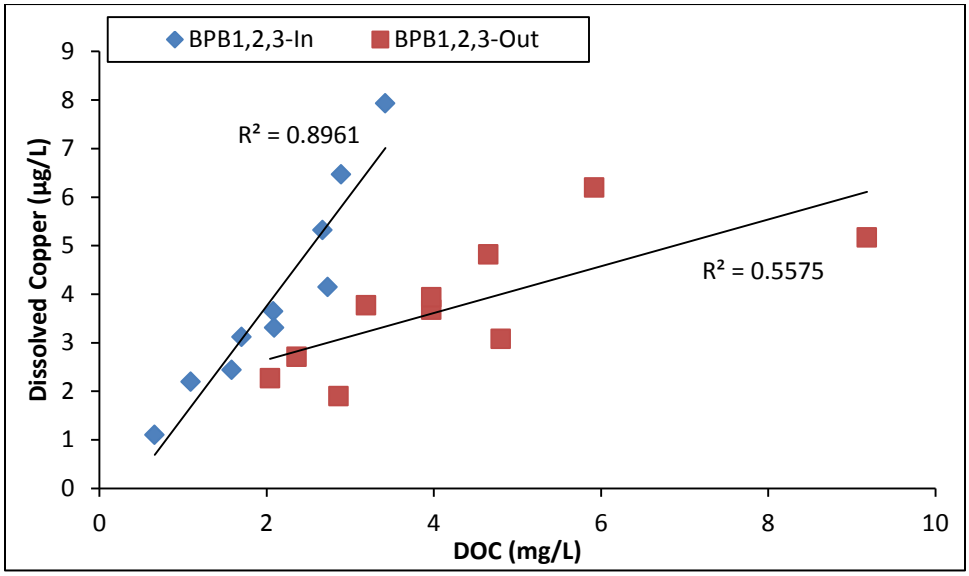


Figure H3-3. Dissolved Copper Versus DOC for the 2012 BPBs Influent and Effluent

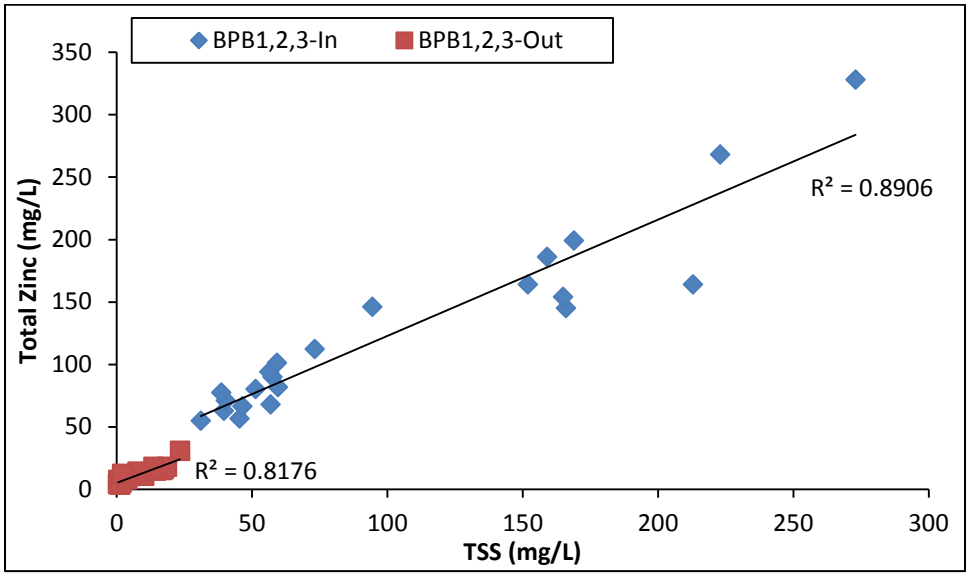


Figure H3-4. Total Zinc Versus TSS for the 2012 BPBs Influent and Effluent

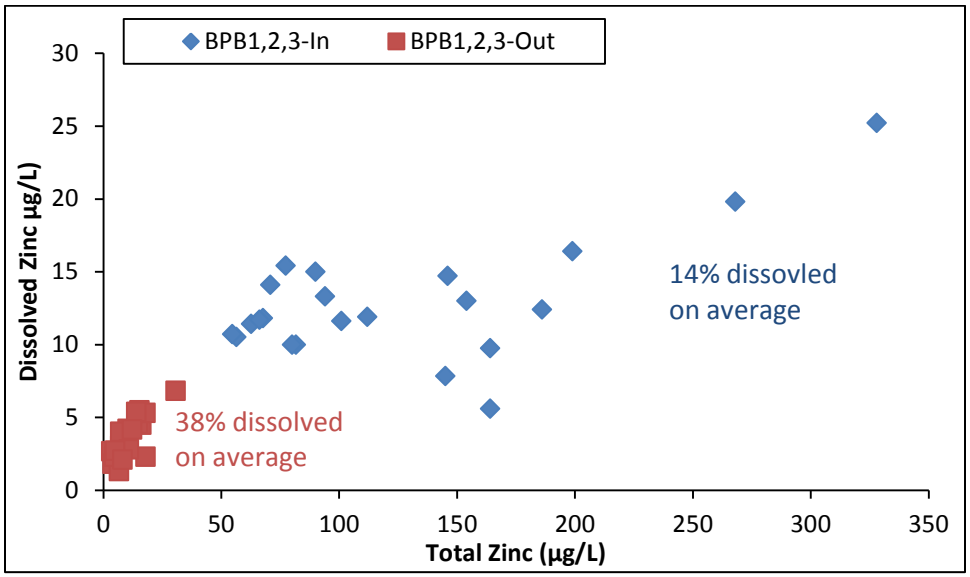


Figure H3-5. Dissolved Versus Total Zinc for the 2012 BPBs Influent and Effluent

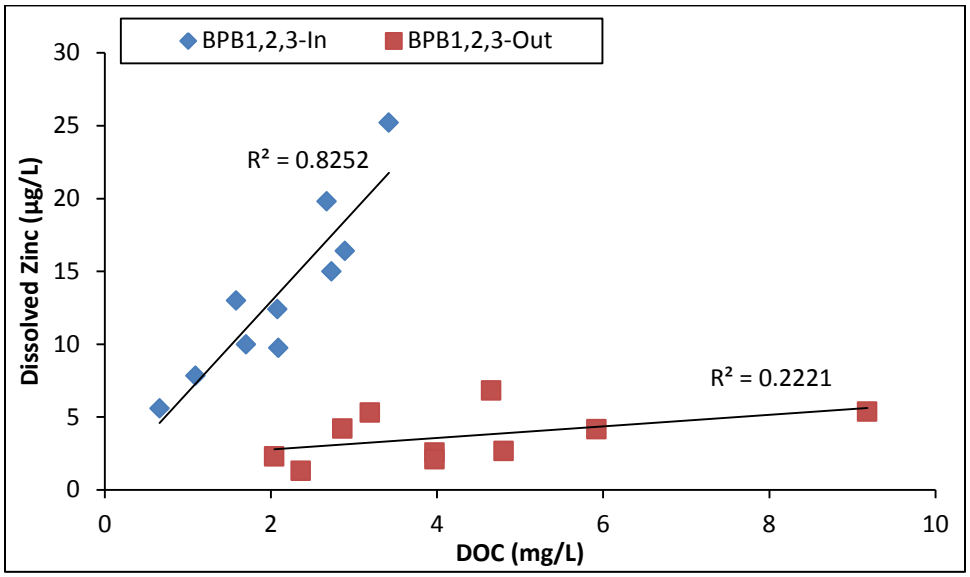


Figure H3-6. Dissolved Zinc Versus DOC for the 2012 BPBs Influent and Effluent

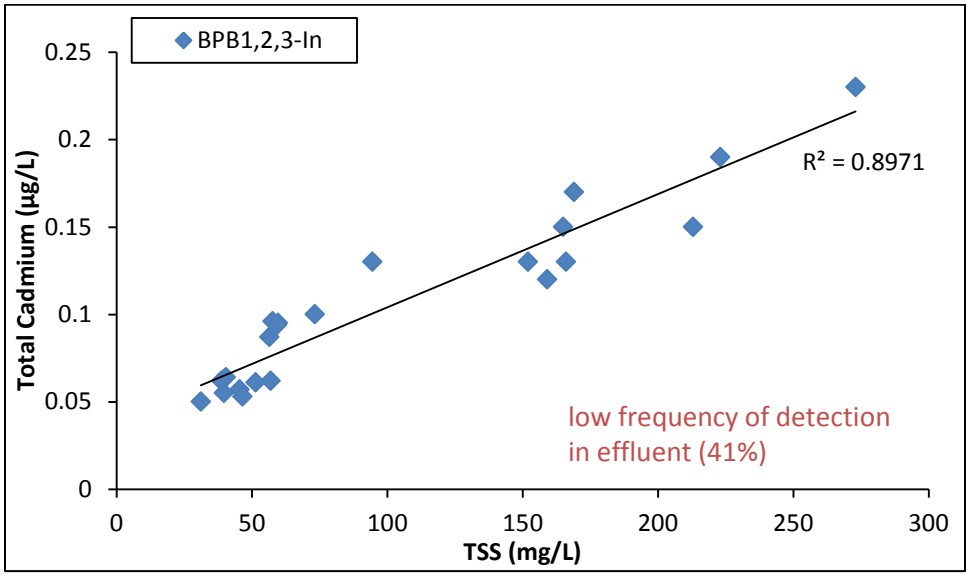


Figure H3-7. Total Cadmium Versus TSS for the 2012 BPBs Influent

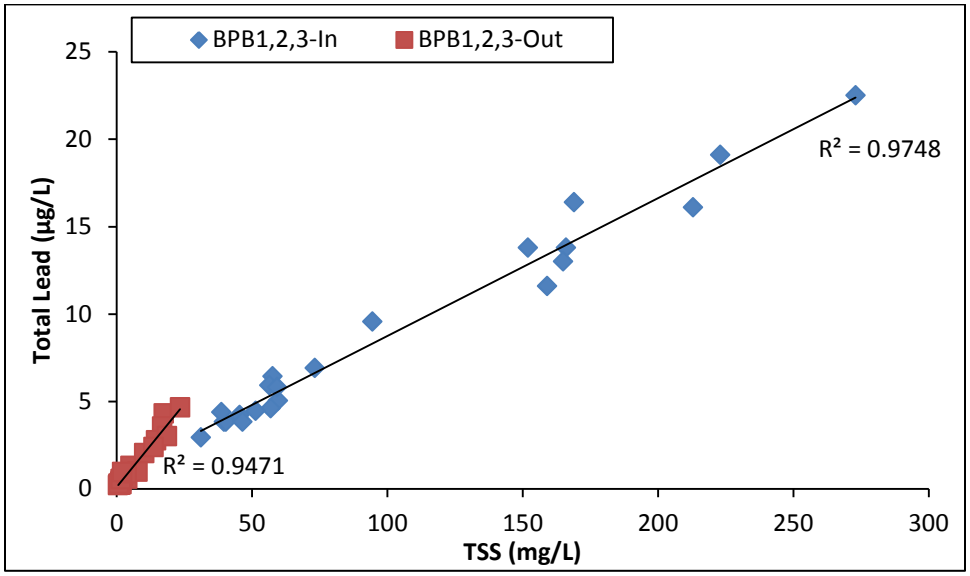


Figure H3-8. Total Lead Versus TSS for the 2012 BPBs Influent and Effluent

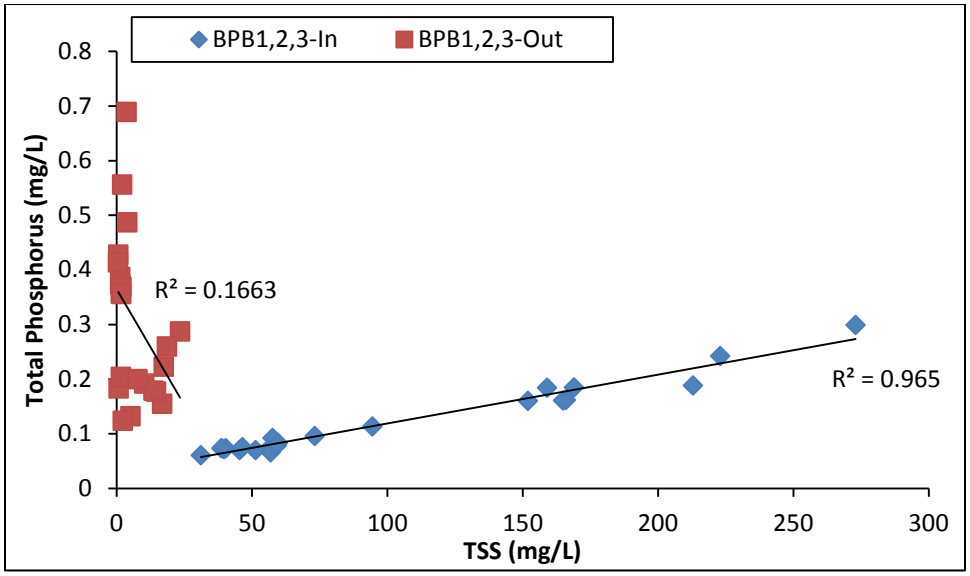


Figure H3-9. Total Phosphorus Versus TSS for the 2012 BPBs Influent and Effluent

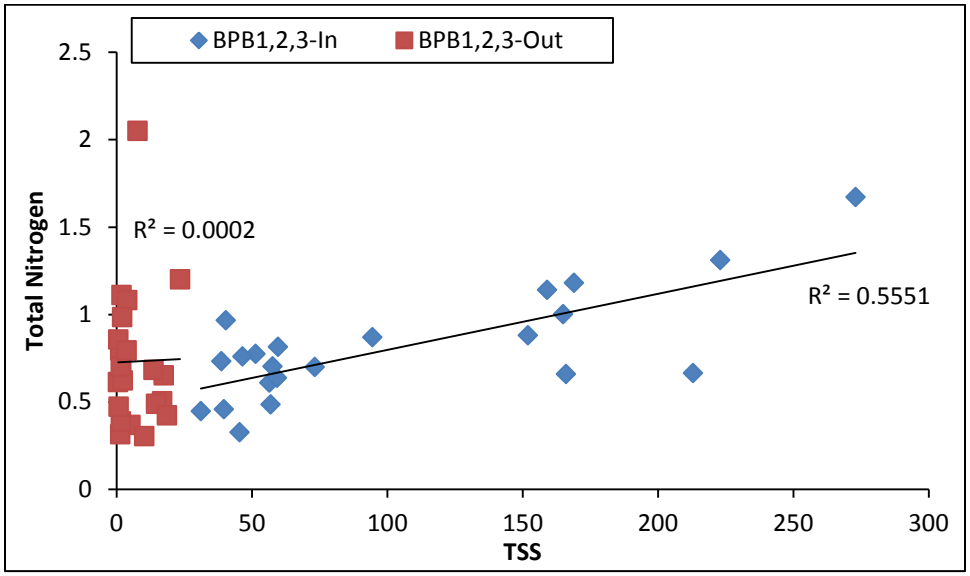


Figure H3-10. Total Nitrogen Versus TSS for the 2012 BPBs Influent and Effluent

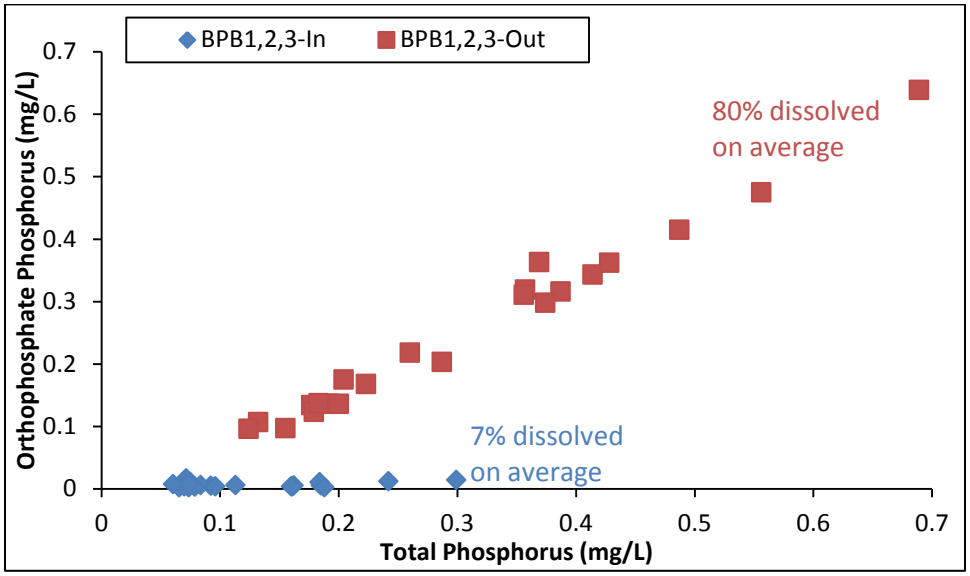


Figure H3-11. Dissolved Versus Total Phosphorus for the 2012 BPBs Influent and Effluent

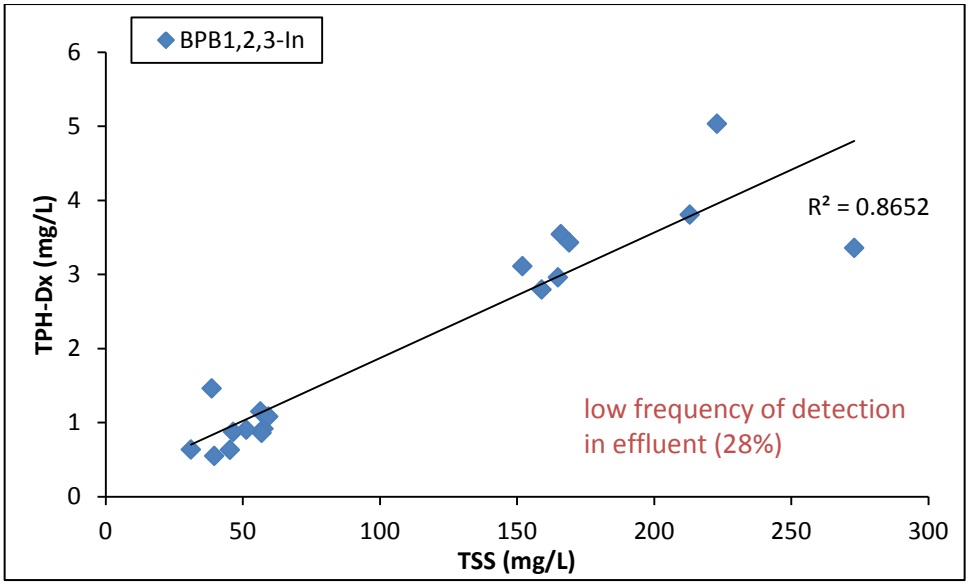


Figure H3-12. Petroleum Hydrocarbons Versus TSS for the 2012 BPBs Influent

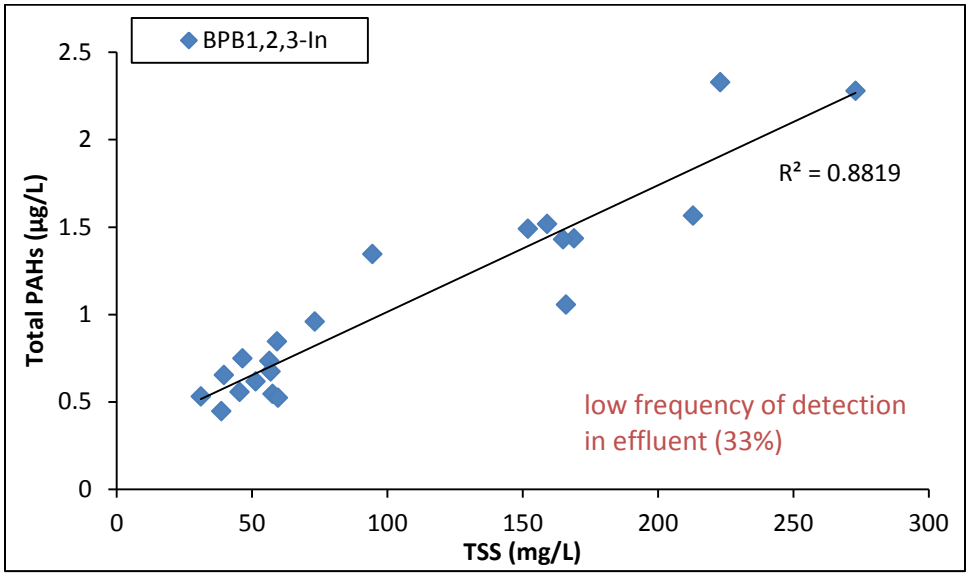


Figure H3-13. Total PAHs Versus TSS for the 2012 BPBs Influent

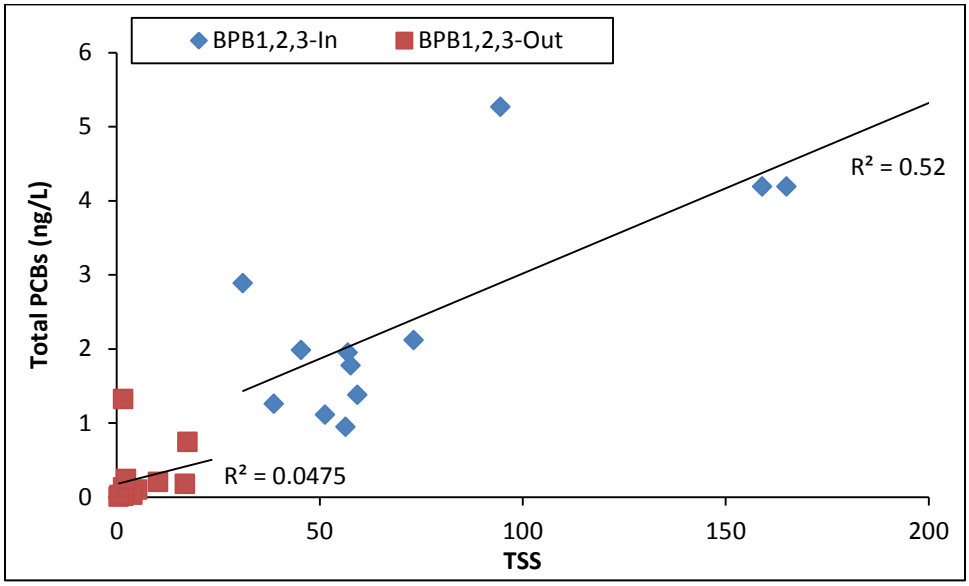
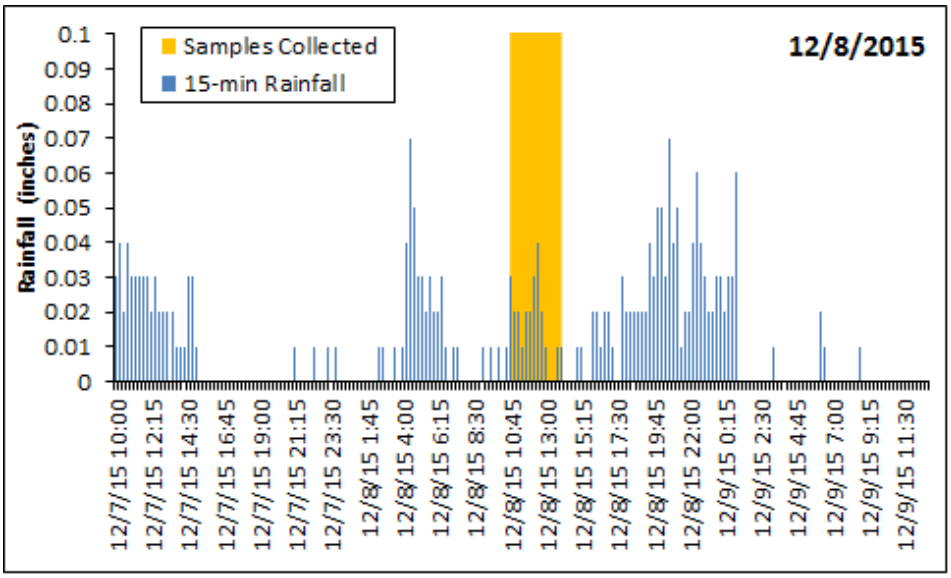


Figure H3-14. Total PCBs Versus TSS for the 2012 BPBs Influent and Effluent

APPENDIX H4 – STORM CONDITIONS

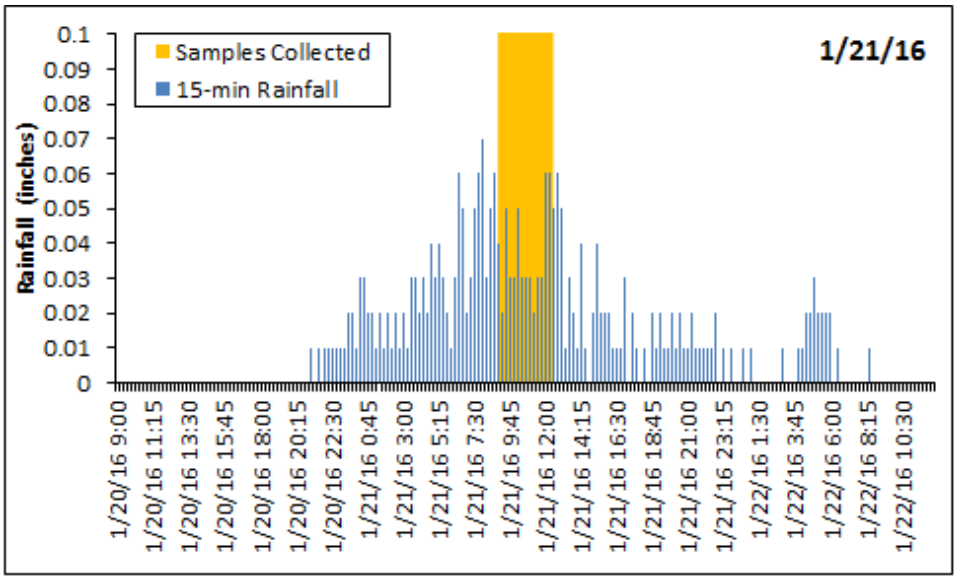
Samples could only be collected from the BPBs during relatively intense rainfall (i.e., generally >0.03 inches/15-minutes). Due to storm intensity requirements, along with daylight constraints for field safety, sampling timespans were often shorter than specified in the Quality Assurance Project Plan (QAPP; King County 2015a) resulting in sample collection from a fairly narrow range of storm conditions. The following figures present rainfall for each sampling event, as well conditions about 24 hours before and after the sampling event. The yellow bar highlights when BPB and Filterra samples were collected. Storm conditions on January 17, 2017 were notably different and are discussed below.



Notes:

- BPB1 and BPB2 sampled. Not ready for sampling at other sites.
- ~0.24 inches total rain during sampling

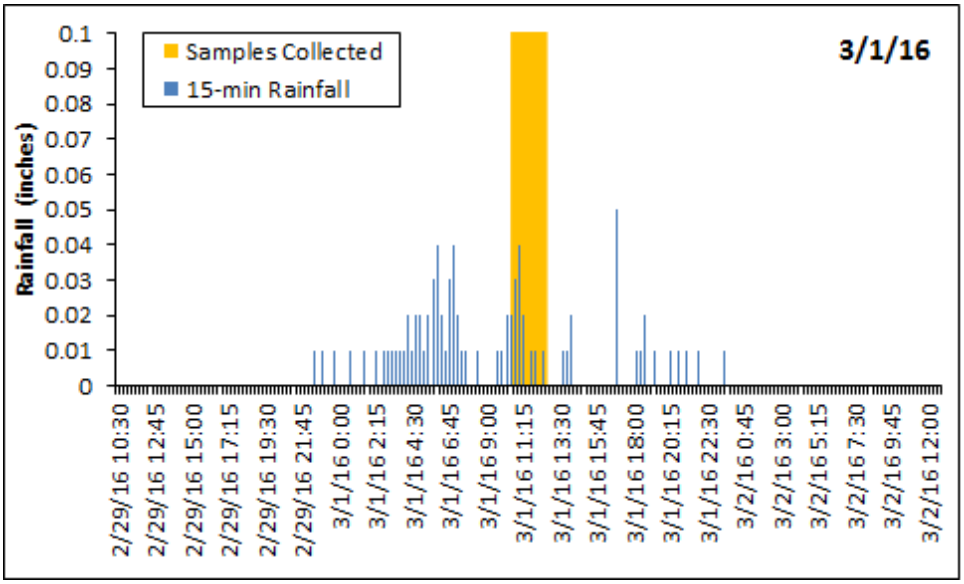
Table H4-1. Rainfall around the 12/8/15 sampling event.



Notes:

- BPB1 and BPB2 sampled. Not ready for sampling at other sites.
- ~0.56 inches total rain during sampling

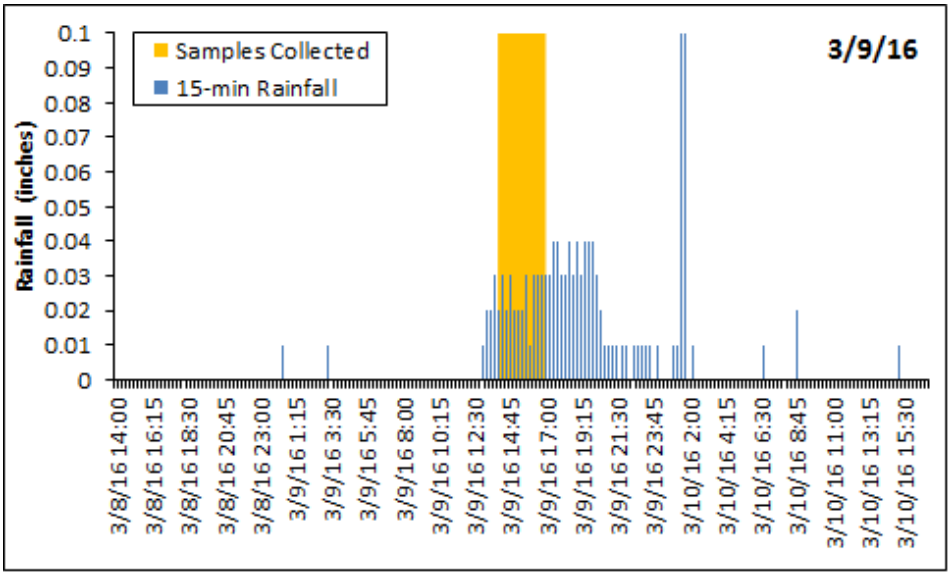
Table H4-2. Rainfall around the 1/21/16 sampling event.



Notes:

- BPB1, BPB2, BPB3, and Filterra sampled.
- ~0.14 inches total rain during sampling

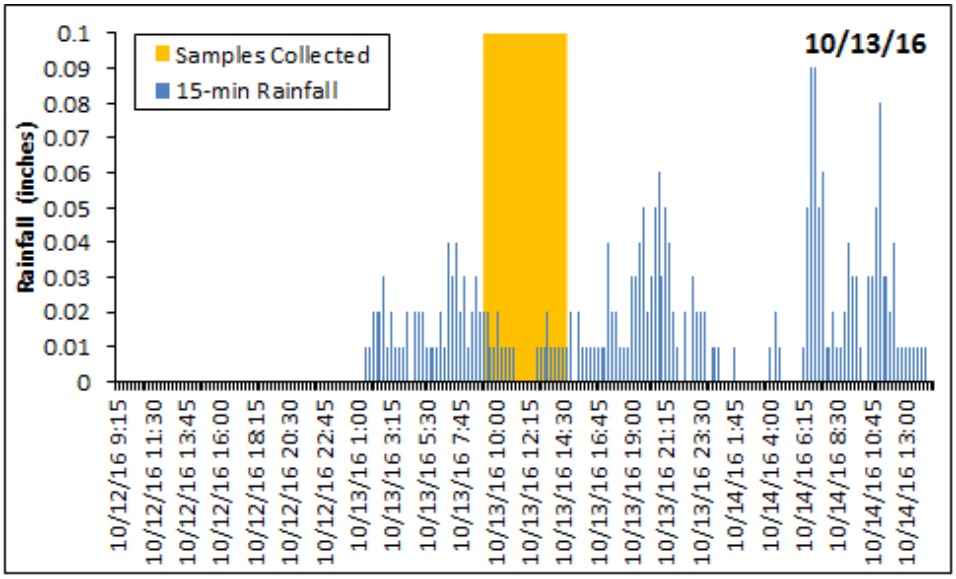
Table H4-3. Rainfall around the 3/1/16 sampling event.



Notes:

- BPB1, BPB2, BPB3, and Filterra sampled.
- ~0.32 inches total rain during sampling

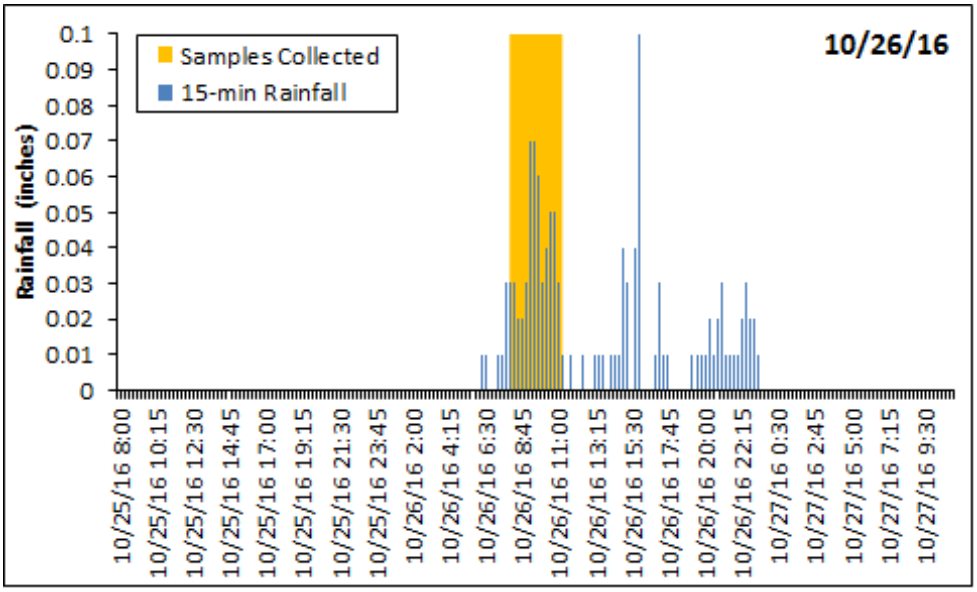
Table H4-4. Rainfall around the 3/9/16 sampling event.



Notes:

- Only BPB3 and Filterra could be sampled due to low rain intensity.
- ~0.22 inches total rain during sampling

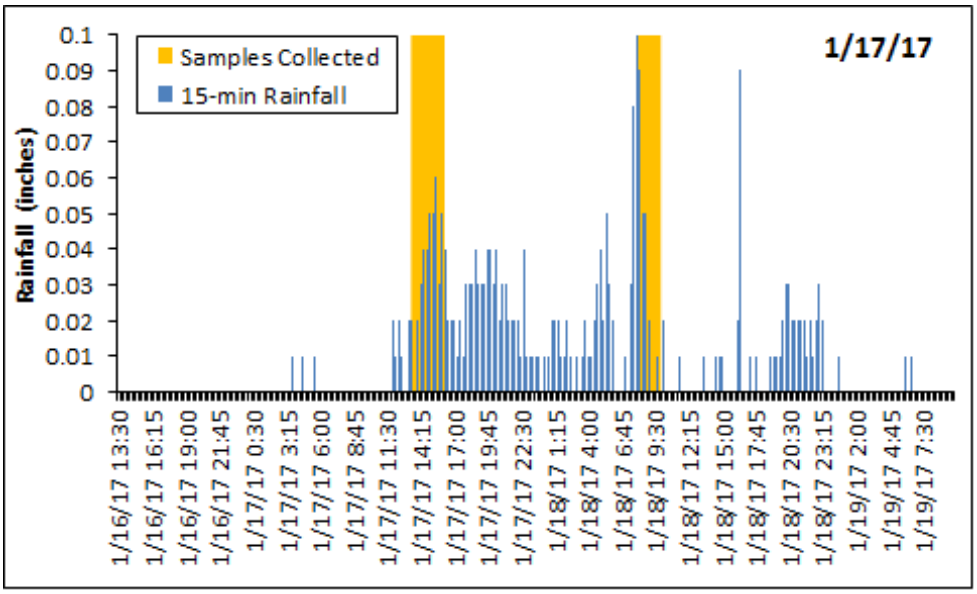
Table H4-5. Rainfall around the 10/13/16 sampling event.



Notes:

- BPB1, BPB2, BPB3, BPB4, and Filterra sampled.
- ~0.54 inches total rain during sampling

Table H4-6. Rainfall around the 10/26/16 sampling event.



Notes:

First attempt:

- BPB1, BPB2, BPB3, and Filterra sampled. No effluent flow at BPB4.
- ~0.36 inches total rain

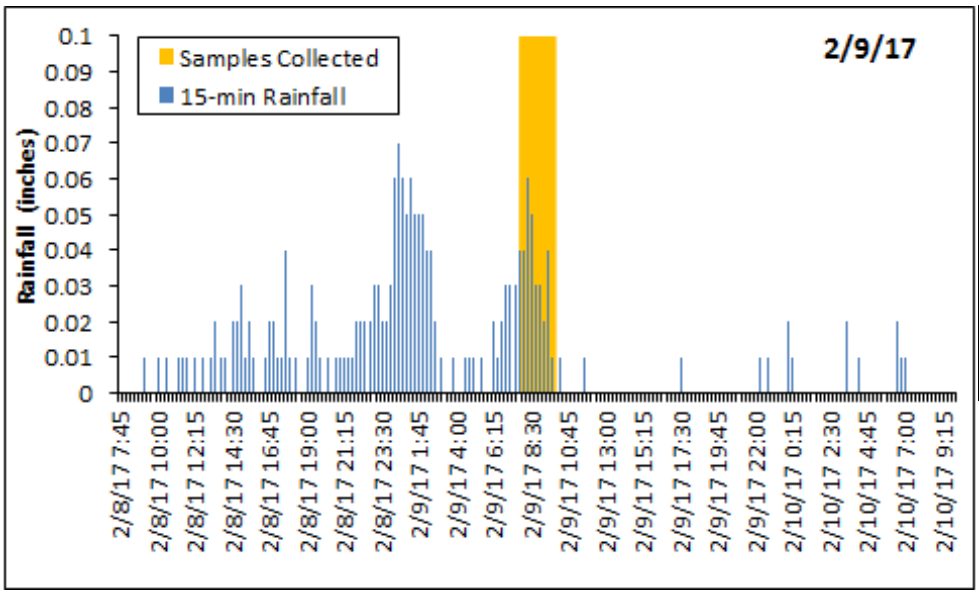
Second attempt:

- BPB4 sampled.
- ~0.32 inches total rain

Table H4-7. Rainfall around the 1/17/17 sampling event.

Notable sampling event – January 17, 2017:

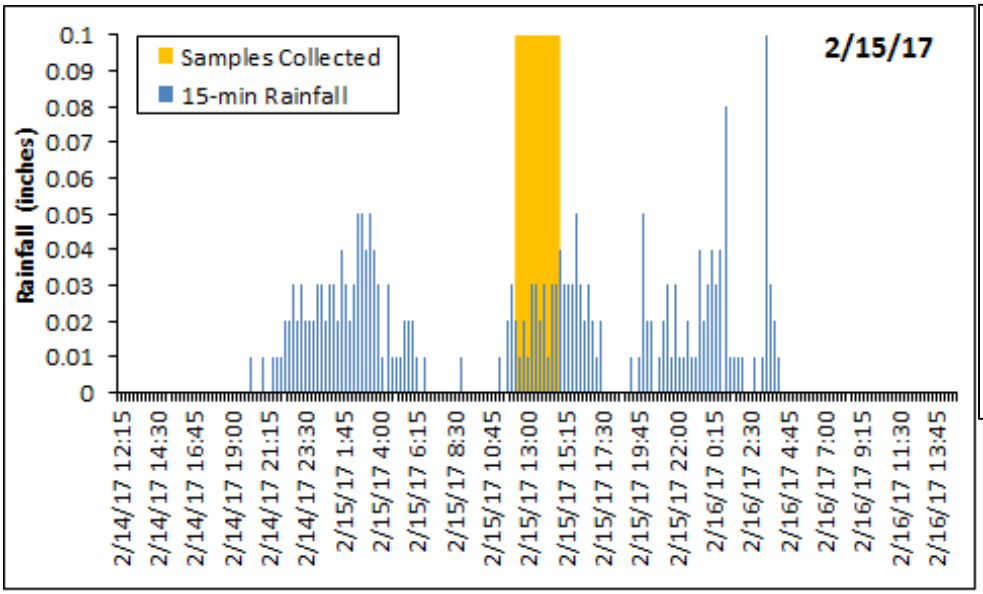
This sampling event occurred during a rain event that followed over two weeks of almost no rain and freezing temperatures. The City of Shoreline had applied salt and Calcium Chloride with Boost to the icy streets. It is likely that the samples contained these de-icing agents. Conductivity was particularly high during this event with influent measurements between 102 and 360 umhos/cm and effluent measurements between 273 and 949 umhos/cm. Some of the highest influent and effluent contaminant concentrations were also observed during this event. However, treatment effectiveness remained comparable to other events based on percent reduction of contaminant concentrations.



Notes:

- BPB1, BPB2, and BPB3 sampled. Filterra flooded, no effluent at BPB4.
- ~0.32 inches total rain during sampling

Table H4-8. Rainfall around the 2/9/17 sampling event.



Notes:

- BPB1 and BPB3 sampled. Filterra flooded, no effluent at BPB2 and BPB4.
- ~0.28 inches total rain during sampling

Table H4-9. Rainfall around the 2/15/17 sampling event.

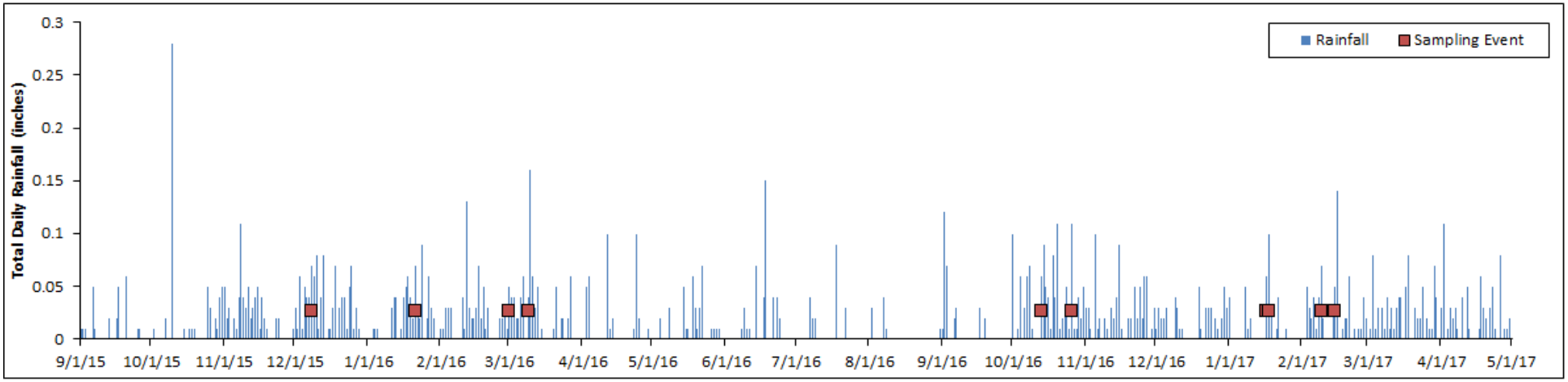


Table H4-10. Rainfall and BPB/Filterra sampling events over the entire project.

APPENDIX H5 – PCB PATTERNS FOR INDIVIDUAL BMPS

There was a dramatic decrease in PCB concentrations between influent and effluent at the individual BMPs. On average, homolog patterns were fairly similar between sites. The penta-PCBs were the most prevalent homolog, representing about one third of the total, followed by hexa-PCBs, at about one quarter of the total (Figure H5-1). Congeners 110 (penta-PCB), 138 (hexa-PCB), and 180 (hepta-PCB) were most frequently detected at greater than 10% of the total PCB concentration in influent samples. PCB-11 was a notable influence for some influent samples collected on 3/9/2016 and 1/17/2017.

Homolog patterns in the effluent were more variable between sites, but this was likely due to lower overall concentrations (i.e., relatively small differences in concentration will represent relatively large differences in percentages).

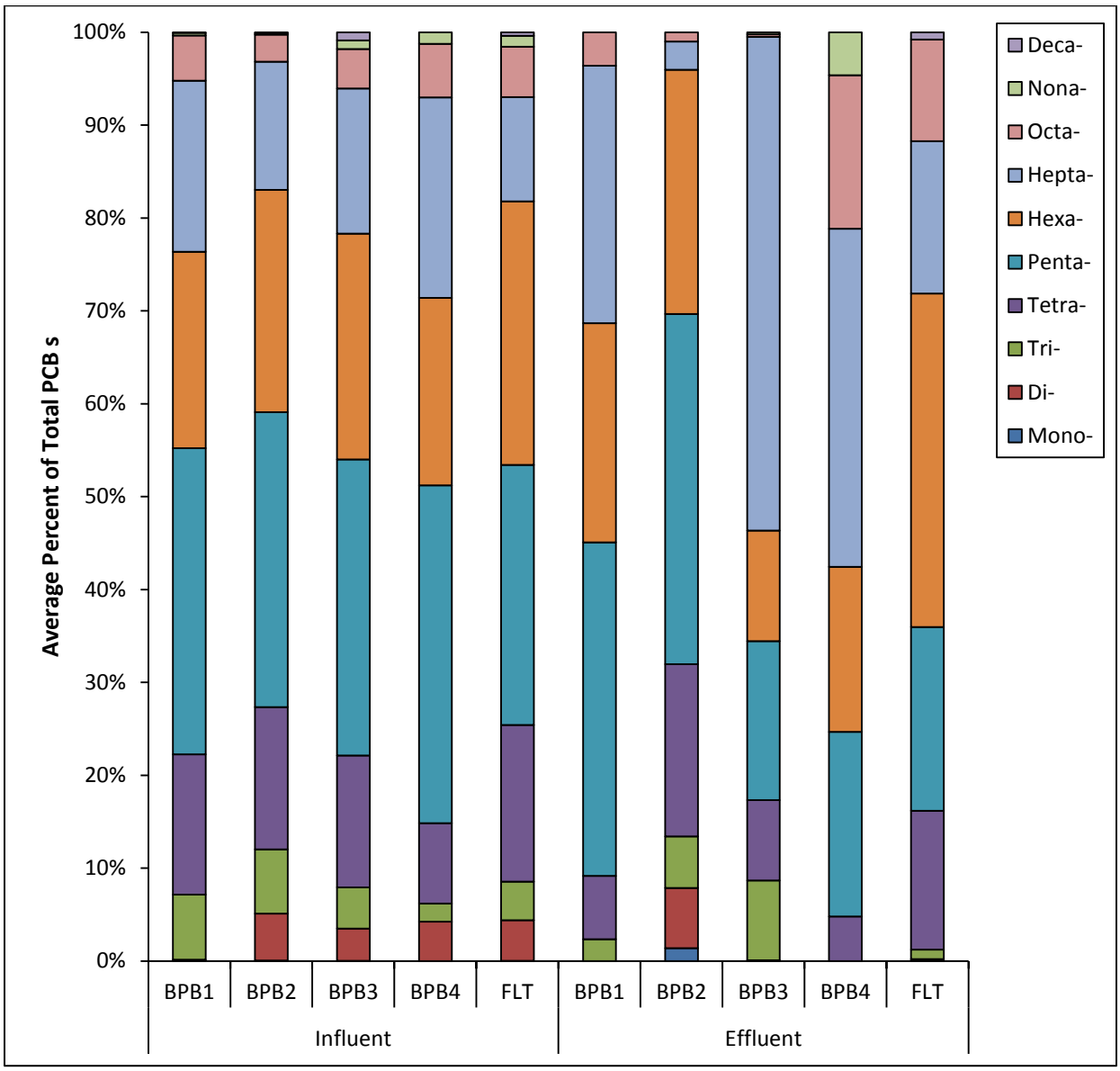


Figure H5-1. Homolog Patterns – Average Percent of Total PCB Concentrations

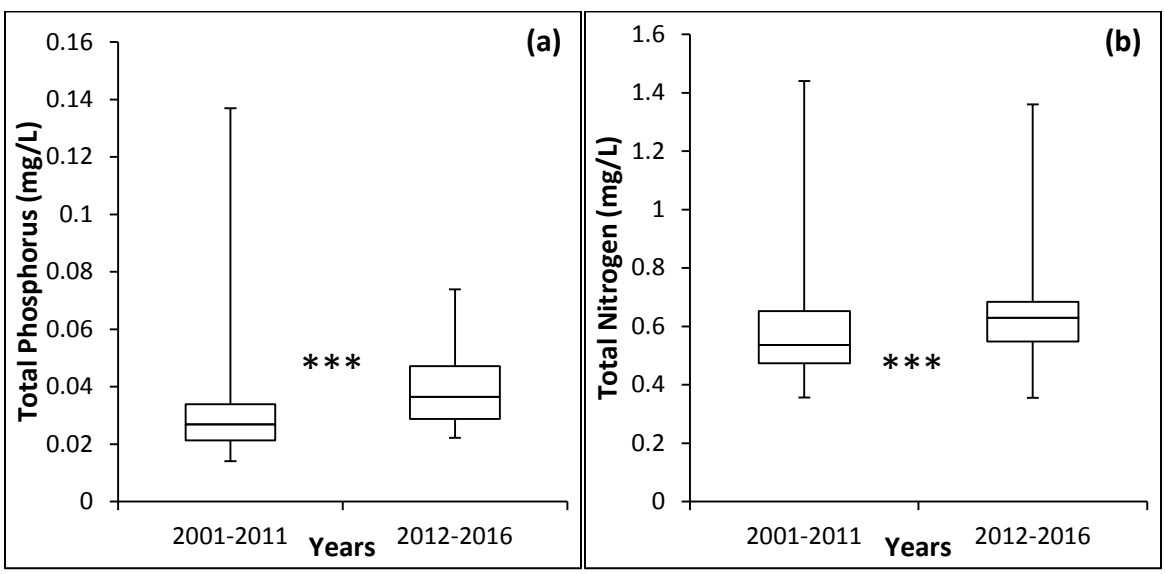
APPENDIX H6 – ECHO LAKE MONITORING SUMMARY

The City of Shoreline and King County's Small Lakes Monitoring Program have been monitoring Echo Lake water quality since 2001[1]. Bi-weekly water quality samples are collected from May through October at a mid-lake sampling station (one-meter depth). In addition, water samples at this location are collected twice a year from multiple depths to assess conditions in the full water column profile.

As part of King County's Swimming Beach Monitoring Program, water samples are also collected at one location near Echo Lake Park. Since 2004[2] weekly samples have been collected from May through September and analyzed for fecal coliform by the King County Environmental Laboratory.

Details about sampling and analytical methods are available in a technical memorandum produced as part of this project (King County 2015b). The memorandum summarized water quality data gathered at Echo Lake prior to construction of stormwater retrofits in the basin (2001-2011). This section builds on that summary to compare pre- and post-retrofit water quality in the lake and briefly explores potential causal factors for observed conditions.

Median surface concentrations of total phosphorus and nitrogen (one-meter depth) were compared between pre- and post-retrofit years to determine if nutrient levels in the lake had noticeably shifted since the retrofit. This exercise does not assume the retrofit caused any observed shift, instead it provides a starting point for the exploration. Mann-Whitney Rank Sum Tests showed statistically significant differences between median concentrations from 2001-2011 and 2012-2016 ($p<0.001$). However, as shown in Figures H6-1a and b, concentration ranges overlapped between the two timeframes.



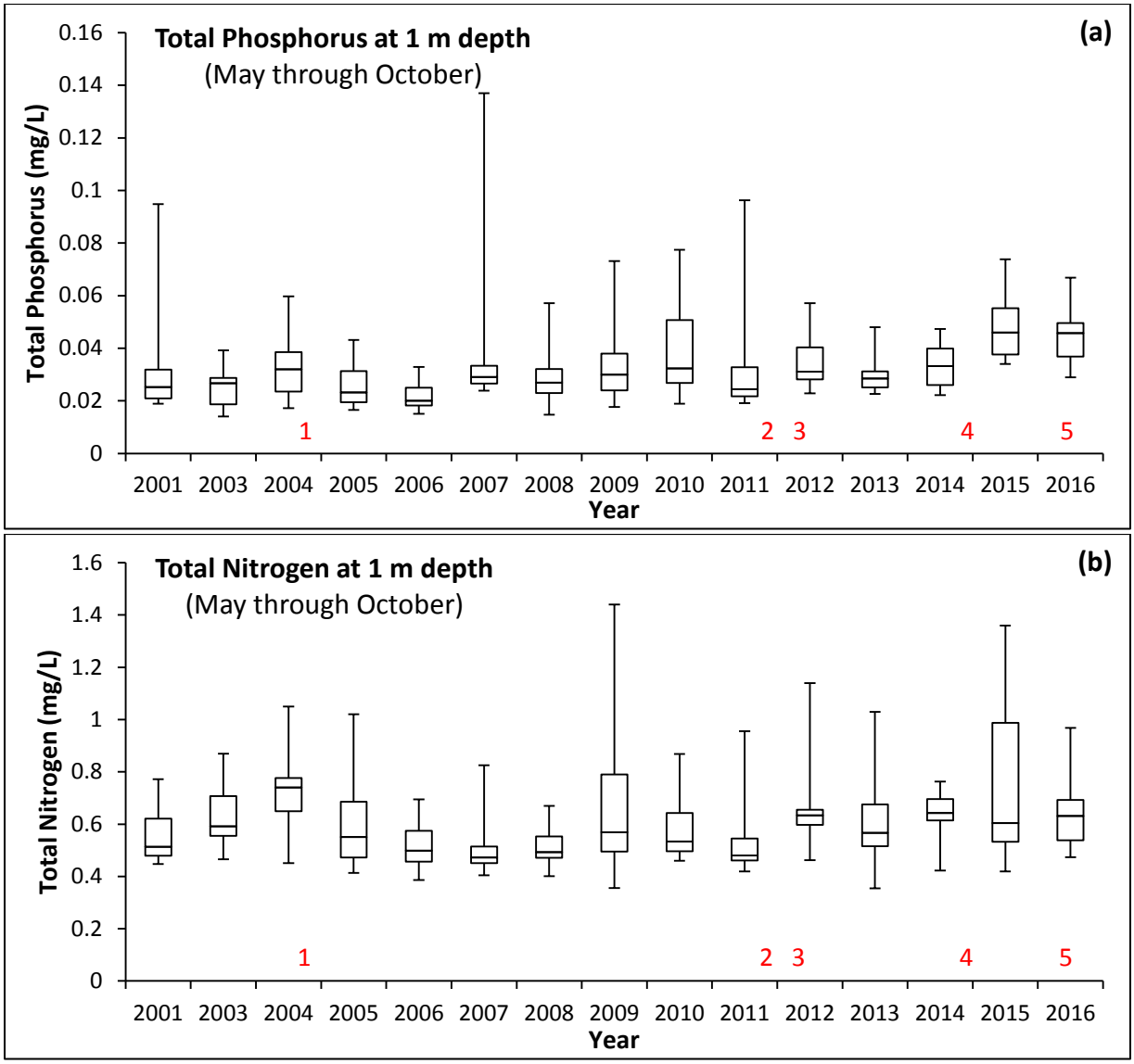
*** = Statistically significant differences between medians ($p<0.001$).

Figure H6-1. Distribution of Surface Water Quality Results from May through October for 2001-2011 and 2012-2016: (a) Total Phosphorus, (b) Total Nitrogen

[1] No water quality results are available from 2002.

[2] Bacteria sampling in 2014 was conducted only in May and June. Data from 2014 are not included in the comparisons, so that the full range of months are represented evenly across the years included in this analysis.

Figures H6-2a and b present the distribution of results for each year, which illustrates the intra-year variability and trends over time. These figures also include a timeline of known stormwater system activities in the basin. This timeline does not suggest major water quality changes corresponding with retrofit activities, although the highest minimum and median values for total phosphorus were observed in 2015 and 2016, respectively. These higher than average levels in 2015/2016 may be driving the statistical differences described above.



Stormwater System Activities:	
1) 2004-2005	source of nutrients and copper identified in basin, worked with business to mitigate
2) End of 2011:	detention tank system online for southern half of basin
3) June 2012:	treatment online in southern half of basin
4) End of 2014:	detention tank system online for northern half of basin
5) Mid-2016:	treatment online for northern half of basin

Figure H6-2. Distribution of Surface Water Quality Results from May through October for each Year, with a Timeline of Stormwater System Activities: (a) Total Phosphorus, (b) Total Nitrogen

The summers of 2015 and 2016 were unusually warm and dry, and small lakes around King County were highly impacted by algal blooms, which could contribute to higher surface phosphorus levels through retention of nutrients in algal biomass. The regional spike in algal blooms during these summers may indicate larger climatic differences in 2015 and 2016, rather than shifts due to unique landuse or stormwater system changes in the Echo Lake basin. Temperature may be an indirect, but influential, factor for abnormal phosphorus levels, but it is probably not the main driver influencing long-term phosphorus trends. Parsing out climatic influences versus local land use changes is outside the scope of this project and would require additional information (e.g., phytoplankton community assemblage, analysis of lakes throughout the region).

Lake sediment is likely an important source of phosphorus to the lake's water column. Echo Lake is stratified in the summer (i.e., a strong density gradient preventing mixing between surface and deep waters). Due to depleted dissolved oxygen at depth, the reducing conditions can cause phosphorus release from the sediment, which is seen through increasing phosphorus concentrations at depth in the summer (Figure H6-3). Insufficient data are available to accurately characterize the loading of phosphorus from stormwater or internal cycling. To do so, lake inflow and outflow data and a greater temporal resolution of total phosphorus in the lake's deep waters would be necessary.

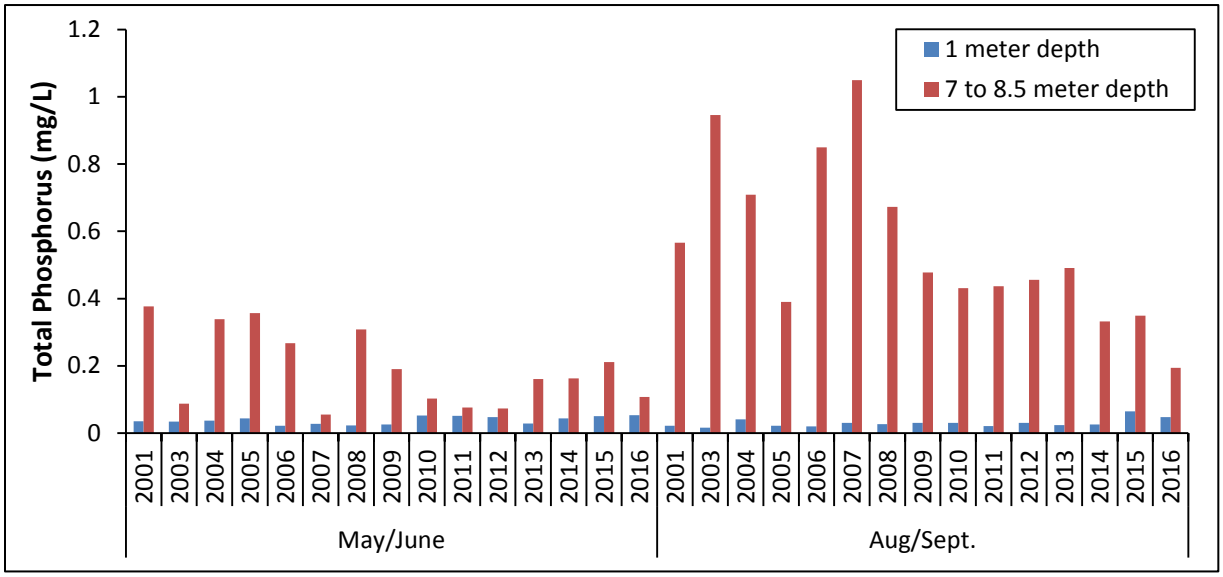
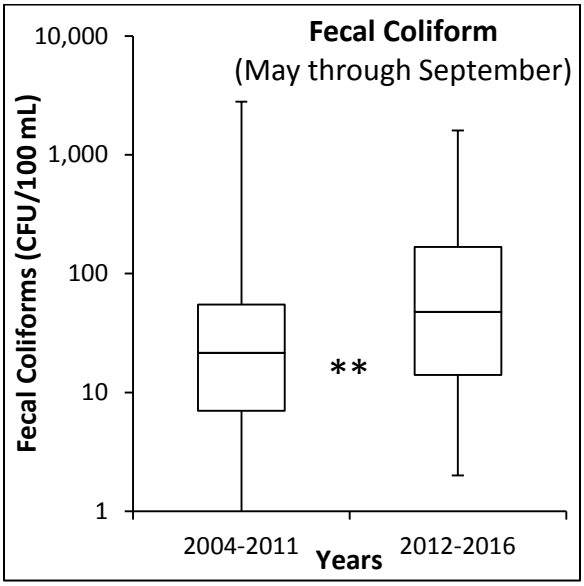


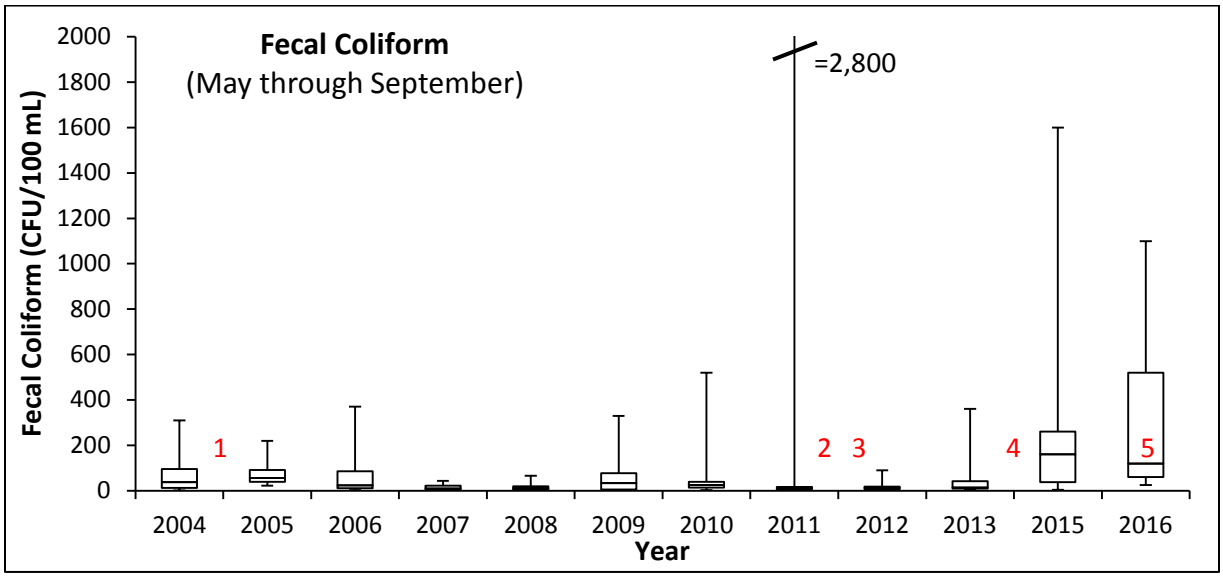
Figure H6-3. Comparison of Total Phosphorus Concentrations at Surface and at Depth for Early and Late Summer Sampling Events

Fecal coliform results were also statistically compared between pre- and post-retrofit years. The median colony forming units (CFU) in May through September were higher for 2012-2016 compared to 2004-2011 based on a Mann-Whitney Rank Sum Test (Figure H6-4). In comparing distribution of data for each year, it is clear that 2015 and 2016 stand out as years with higher fecal coliform CFUs (Figure H6-5). In fact, the Echo Lake swimming beach was closed for six weeks in August and September 2015 (no closures occurred in 2016). Warmer than usual summer temperatures may have contributed to more swimmers with less "flushing" of the swimming beach areas due to dry weather. As with regional algal bloom patterns, this may be due to a regional cause, such as unusually hot and dry weather, rather than a landuse or stormwater system change that would be unique to the Echo Lake basin.



** = Statistically significant differences between medians (p=0.003).

Figure H6-4. Distribution of Fecal Coliform Results from May through September for 2004-2011 and 2012-2016



Stormwater System Activities:	
1) 2004-2005	source of nutrients and copper identified in basin, worked with business to mitigate
2) End of 2011:	detention tank system online for southern half of basin
3) June 2012:	treatment online in southern half of basin
4) End of 2014:	detention tank system online for northern half of basin
5) Mid-2016:	treatment online for northern half of basin

Figure H6-5. Distribution of Fecal Coliform Results from May through September for each Year, with a Timeline of Stormwater System Activities

Overall, Echo Lake water quality does not appear to be dramatically affected by stormwater retrofits in the basin. Phosphorus levels appear to be increasing slightly over time, with 2015 and 2016 experiencing abnormally high phosphorus and fecal coliform levels. These do not appear to be correlated to specific stormwater system changes in the basin.

Appendix H References

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