APPENDIX A

BENCHMARK CHARACTERISTIC ANALYSIS OF DATA FROM FIXED STATIONS IN THE UPPER WABASH WATERSHED

Station WB-402

	Valid N	Mean	Confid. -95.000%	Confid. +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Range	Quartile Range	Variance	Std Dev.	Standard Error	Skewness	Std Err. Kurtosis	Std Err. Kurtosis
Alkalinity (mg/l)	78	174.7692	164.7133	184.8252	180.5	13632	16	282	145	200	246	55	1989.245	44.60095	5.050063	-0.50365	0.272211	0.829153	0.538176
Ammonia (mgN as N)	77	0.138312	0.108804	0.167819	0.1	10.65	0.05	0.8	0.05	0.2	0.75	0.15	0.016901	0.130004	0.014815	2.610896	0.273908	9.457698	0.54146
BOD (mg/l)	38	3.113158	2.562028	3.664287	2.6	118.3	0.5	7.2	1.8	4.2	6.7	2.4	2.811444	1.676736	0.272003	0.809603	0.382818	-0.23543	0.7497
COD (mg/l)	77	24.85584	23.01113	26.70056	24	1913.9	6	47	19.8	29.5	41	9.7	66.05546	8.127512	0.926216	0.525733	0.273908	0.357928	0.54146
Cyanide (mg/l)	74	0.006149	0.005593	0.006704	0.005	0.455	0.005	0.016	0.005	0.006	0.011	0.001	5.7E-06	0.002397	0.000279	2.371988	0.279197	5.403514	0.551684
Nitrate (mgN as N)	77	4.045455	3.404965	4.685944	3.3	311.5	0.8	14	2	5.4	13.2	3.4	7.963038	2.821886	0.321584	1.279758	0.273908	1.41958	0.54146
Total Phosphorus (mgP as P)	77	0.277273	0.247719	0.306826	0.24	21.35	0.05	0.57	0.17	0.39	0.52	0.22	0.016954	0.130209	0.014839	0.374564	0.273908	-0.99379	0.54146
Total Solids (mg/l)	78	484.3462	464.3749	504.3174	476	37779	275	790	442	538	515	96	7846.047	88.57792	10.02947	0.469543	0.272211	2.004391	0.538176
Suspended Solids (mg/l)	78	60.05128	43.67857	76.42399	36.5	4684	5	383	16	66	378	50	5273.296	72.61746	8.222309	2.390455	0.272211	5.978426	0.538176
Dissolved Solids (mg/l)	0																		
Sulfate (mg/l)	0																		
TKN (mgN as N)	0																		
E. coli (CFU/100ml)	73	1782.466	679.1659	2885.766	260	130120	5	34000	100	810	33995	770	2.2E+07	4728.754	553.4588	5.101593	0.281029	31.06524	0.555223
TOC (mg/l)	0																		
Hardness (mg/l)	78	275.2692	260.7953	289.7431	276.5	21471	136	414	218	327	278	109	4121.082	64.19566	7.268727	-0.09142	0.272211	-0.68679	0.538176
Chloride (mg/l)	0																		
Dissolved Oxygen (mg/l)	59	10.38441	9.864991	10.90382	10.5	612.68	6	15.15	9.1	11.75	9.15	2.65	3.972611	1.993141	0.259485	0.145387	0.311176	0.10896	0.613257
pH	60	7.829333	7.849488	8.009179	7.905	475.76	7.2	8.57	7.745	8.15	1.37	0.405	0.095535	0.309088	0.039903	-0.26829	0.308694	-0.21569	0.608492
Copper (ug/l)	76	6.860526	4.288427	9.432625	5	521.4	2	100	4	7	98	3	126.6968	11.25597	1.291148	7.758596	0.275537	64.61598	0.544804
Iron (ug/l)	9	1413.333	-105.574	2932.241	770	12720	140	6500	370	1400	6360	1030	3904675	1976.025	658.675	2.626617	0.717137	7.296361	1.399708
Zinc (ug/l)	11	13.66818	6.160609	21.17575	8.3	150.35	2.25	39	7	23	36.75	16	124.8841	11.17516	3.369437	1.457685	0.660687	1.431779	1.279416

Station WB-370

	Valid N	Mean	Confid. -95.000%	Confid. +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Range	Quartile Range	Variance	Std.Dev.	Standard Error	Skewness	Std.Err. Skewness	Kurtosis	Std.Err. Kurtosis
Alkalinity (mg/l)	78	184.4744	174.6642	194.2845	181	14389	90	280	158	214	190	56	1893.188	43.51078	4.926825	0.201995	0.272211	-0.32182	0.538176
Ammonia (mgN as N)	78	0.103205	0.083608	0.122802	0.05	8.05	0.05	0.4	0.05	0.1	0.35	0.05	0.007555	0.086917	0.009841	1.863045	0.272211	2.825067	0.538176
BOD (mg/l)	35	2.408571	1.993562	2.823581	2.3	84.3	0.5	6.2	1.7	2.9	5.7	1.2	1.487866	1.219781	0.206181	1.699535	0.397694	1.666078	0.777794
COD (mg/l)	0																		
Cyanide (mg/l)	0																		
Nitrate (mgN as N)	78	3.639744	3.213308	4.066179	3.4	283.9	0.1	8.2	2.3	4.9	8.1	2.6	3.577231	1.891157	0.214154	0.572267	0.272211	-0.17526	0.538176
Total Phosphorus (mgP as P)	78	0.190769	0.166804	0.214734	0.18	14.88	0.05	0.67	0.13	0.24	0.62	0.11	0.011298	0.106293	0.012035	1.874906	0.272211	6.095177	0.538176
Total Solids (mg/l)	78	425.5128	409.2055	441.8201	422.5	33190	221	692	381	465	471	84	5231.24	72.32731	8.189455	0.837191	0.272211	3.22003	0.538176
Suspended Solids (mg/l)	78	47.39744	36.03959	58.75979	33	3697	4	252	19	54	248	35	2539.671	50.39915	5.706127	2.630048	0.272211	7.255159	0.538176
Dissolved Solids (mg/l)	0																		
Sulfate (mg/l)	1	0.05			0.05	0.05	0.05	0.05											
TKN (mgN as N)	74	1022.635	348.9745	1696.296	180	75675	5	22000	80	600	21995	520	8454749	2907.705	338.0139	5.691764	0.279197	38.13446	0.551684
E. coli (CFU/100ml)	0																		
TOC (mg/l)	78	261.1795	248.5938	273.7652	257	20372	116	374	226	298	258	72	3115.993	55.82108	6.320493	-0.02639	0.272211	-0.28407	0.538176
Hardness (mg/l)	0																		
Chloride (mg/l)	60	10.5805	10.04457	11.11643	10.11	634.83	7.18	16.32	8.93	11.71	9.14	2.78	4.303971	2.074601	0.26783	0.783339	0.308694	0.000302	0.608492
Dissolved Oxygen (mg/l)	60	8.071167	7.990457	8.151876	8.12	484.27	6.93	8.66	7.92	8.255	1.73	0.335	0.097614	0.312432	0.040335	-1.32004	0.308694	3.081537	0.608492
pH	74	4.832432	4.124433	5.540432	4.3	357.6	2	16	2	6	14	4	9.139866	3.055922	0.355244	1.680183	0.279197	3.396685	0.551684
Copper (ug/l)	13	1319.692	577.9949	2121.39	920	17156	96	4900	330	2000	4804	1670	1760048	1326.668	367.9515	1.820452	0.616336	1.799791	1.190874
Iron (ug/l)	12	10.12917	6.164466	14.09387	10.2	121.55	2.25	25	5.35	13.5	22.75	8.15	38.93748	6.23999	1.80133	1.108734	0.637302	1.758235	1.232246
Zinc (ug/l)																			

Station: WB-420

	Valid N	Mean	Confid -95.000%	Confid +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Quartile Range	Range	Variance	Std Dev.	Standard Error	Skewness	Std Err. Skewness	Kurtosis	Std Err. Kurtosis
Alkalinity (mg/l)	74	196.4595	185.4866	207.4323	192.5	14538	100	310	167	227	60	210	2243.156	47.36197	5.505717	0.290569	0.279197	-0.26732	0.551684
Ammonia (mg/l as N)	75	0.148667	0.121989	0.175344	0.1	11.15	0.05	0.5	0.05	0.2	0.15	0.45	0.013444	0.115949	0.013389	1.095318	0.2774	0.685888	0.548211
BOD (mg/l)	35	4.294286	3.265268	5.323303	3.4	150.3	0.5	14	2.2	5.7	3.5	13.5	8.973496	2.995579	0.506345	1.41185	0.397694	2.348133	0.777794
COD (mg/l)	75	30.12	27.61247	32.62753	29.7	2259	9.1	73	22	35.6	13.6	63.9	118.7789	10.89857	1.258459	1.018151	0.2774	2.673096	0.548211
Cyanide (mg/l)	0																		
Nitrate (mg/l as N)	75	3.534	2.820704	4.247296	3	265.05	0.05	12	1	4.8	3.8	11.95	9.611362	3.10022	0.357983	1.0588	0.2774	0.436274	0.548211
Total Phosphorus (mg/l as P)	75	0.28112	0.252309	0.309931	0.26	21.084	0.08	0.83	0.19	0.33	0.14	0.75	0.015681	0.125224	0.01446	1.716281	0.2774	4.848079	0.548211
Total Solids (mg/l)	74	555.527	527.6459	583.4081	530.5	41109	370	825	469	623	154	455	14482.33	120.3426	13.98954	0.7012	0.278197	-0.21692	0.551684
Suspended Solids (mg/l)	74	65.2027	52.81382	77.59159	56	4825	5	396	32	92	60	391	2859.451	53.47384	6.216208	3.423178	0.279197	19.34844	0.551684
Dissolved Solids (mg/l)	1	437				437	437	437											
Sulfate (mg/l)	1	75				75	75	75											
TKN (mg/l as N)	1	2.5				2.5	2.5	2.5											
E. coli (CFU/100ml)	73	427.3973	235.7591	619.0354	170	31200	5	6100	40	500	460	6095	674636.9	821.3628	96.13325	5.022709	0.281029	31.94059	0.555223
TOC (mg/l)	0																		
Hardness (mg/l)	74	299.7162	285.3856	314.0469	303	22179	154	405	262	348	86	251	3826.042	61.85501	7.190498	-0.4084	0.279197	-0.64303	0.551684
Chloride (mg/l)	0																		
Dissolved Oxygen (mg/l)	54	10.1437	9.559628	10.72778	9.905	547.76	6.16	14.86	8.45	11.32	2.87	8.7	4.579095	2.139882	0.291201	0.411136	0.324556	-0.39163	0.638893
pH	56	7.993464	7.895203	8.103726	8.075	447.97	6.64	8.88	7.805	8.205	2.24*	17	0.151572	0.389323	0.052025	-0.76716	0.319	2.312126	0.628256
Copper (ug/l)	73	5.512329	4.815278	6.209379	5	402.4	2	19	4	7	3	17	8.92554	2.987564	0.349668	1.512602	0.281029	4.814901	0.555223
Iron (ug/l)	10	1533	785.97	2280.03	1430	15330	410	2900	510	2500	1990	2490	1090512	1044.276	330.229	0.149551	0.687043	-2.09034	1.33249
Zinc (ug/l)	10	9.875	7.009241	12.74076	10.5	98.75	2.25	17	8.2	11	2.8	14.75	16.04847	4.006054	1.266826	-0.29222	0.687043	1.111176	1.33249

Station: WB-409

	Valid N	Mean	Confid -95.000%	Confid +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Quartile Range	Range	Variance	Std Dev.	Standard Error	Skewness	Std Err. Skewness	Kurtosis	Std Err. Kurtosis
Alkalinity (mg/l)	80	164.875	156.7274	173.0226	163.5	13190	91	262	141.5	190	48.5	171	1340.44	36.61202	4.093348	0.260766	0.268909	-0.03409	0.531786
Ammonia (mg/l as N)	79	0.162025	0.13332	0.190731	0.1	12.8	0.05	0.8	0.05	0.2	0.15	0.75	0.016424	0.128156	0.014419	2.096727	0.270545	7.279122	0.534952
BOD (mg/l)	38	2.836842	2.379064	3.29462	2.3	107.8	1.2	7.1	1.8	3.4	1.6	5.9	1.939687	1.392726	0.22593	1.498144	0.382818	2.004888	0.7497
COD (mg/l)	79	25.53165	23.84958	27.21371	25	2017	8	52	21	30	9	44	56.39424	7.50961	0.844897	0.730782	0.270545	1.885488	0.534952
Cyanide (mg/l)	2	0.005			0.005	0.01	0.005	0.005			0	0	0	0	0				
Nitrate (mg/l as N)	79	4.665823	3.915831	5.415814	3.7	368.6	0.4	17	2.1	6.8	4.7	15.6	11.21151	3.348359	0.37672	0.9885	0.270545	1.000634	0.534952
Total Phosphorus (mg/l as P)	79	0.227215	0.199919	0.254512	0.19	17.95	0.05	0.7	0.13	0.29	0.16	0.65	0.014851	0.121865	0.013711	1.265625	0.270545	1.774662	0.534952
Total Solids (mg/l)	80	448.4	430.4254	466.3746	446.5	35872	264	667	402.5	487.5	85	403	6523.863	80.77044	9.030409	0.225418	0.268909	0.432948	0.531786
Suspended Solids (mg/l)	80	48.075	39.53987	56.61013	36	3846	8	214	23	61	38	206	1470.982	38.35338	4.288038	2.378648	0.268909	7.367788	0.531786
Dissolved Solids (mg/l)	0																		
Sulfate (mg/l)	0																		
TKN (mg/l as N)	76	535.1316	163.8646	906.3986	60	40670	5	12000	20	325	305	11995	2639751	1624.731	186.3694	5.509829	0.275637	34.79123	0.544804
E. coli (CFU/100ml)	0																		
TOC (mg/l)	80	260.5125	245.799	275.226	255.5	20841	133	545	221	301.5	412	80.5	4371.392	66.11651	7.39205	0.98493	0.268909	3.358889	0.531786
Hardness (mg/l)	0																		
Chloride (mg/l)	60	10.24033	9.676305	10.80436	10.25	614.42	5.2	14.92	8.69	11.88	9.72	3.19	4.767176	2.183386	0.281874	0.110205	0.308694	-0.39681	0.608492
Dissolved Oxygen (mg/l)	61	7.895082	7.807664	7.98825	7.92	481.6	6.99	8.64	7.72	8.12	1.65	0.4	0.116505	0.341329	0.043703	-0.28735	0.30627	0.273679	0.603837
pH	77	5.202597	4.622783	5.782412	5	400.6	2	13	4	6	2	11	6.525783	2.554561	0.291119	0.923292	0.273908	0.835332	0.54146
Copper (ug/l)	10	1033	625.8529	1440.147	980	10330	320	2300	730	1300	570	1980	323934.4	569.1524	179.9818	1.045378	0.687043	2.078142	1.334249
Iron (ug/l)	11	6.959091	3.409108	10.50907	6	76.55	2.25	20	7.2	17.75	4.95	27.92291	5.284213	1.59325	1.75352	0.660687	3.296829	1.279416	
Zinc (ug/l)																			

Station WB-452

	Valid N	Mean	Confid -95.000%	Confid +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Range	Quartile Range	Variance	Std Dev.	Standard Error	Skewness	Std Err Skewness	Kurtosis	Std Err Kurtosis
Alkalinity (mg/l)	72	202.0278	189.6306	214.425	200.5	14546	102	341	164	238	239	74	2783.267	52.75668	6.217434	0.183693	0.282898	-0.32132	0.558831
Ammonia (mg/l as N)	72	0.329861	0.268234	0.391489	0.3	23.75	0.05	1.2	0.1	0.5	1.15	0.4	0.068779	0.262257	0.030907	1.231418	0.282898	1.50265	0.558831
BOD (mg/l)	6	6.076471	5.070479	7.082462	5.85	206.6	1.3	12	3.8	8	10.7	4.2	8.312763	2.883186	0.494462	0.332518	0.403053	-0.56816	0.787899
COD (mg/l)	34	35.10278	31.86167	38.34388	34	2527.4	2.5	110	27.75	42.35	107.5	14.6	190.236	13.79261	1.625474	2.11052	0.282898	11.39538	0.558831
Cyanide (mg/l)	72	0.006125	0.005067	0.007183	0.005	0.441	0.005	0.04	0.005	0.005	0.035	0	2E-05	0.004503	0.000531	6.586644	0.282898	47.33045	0.558831
Nitrate (mg/l as N)	72	3.535417	2.612376	4.458458	2.3	254.55	0.05	24	0.8	4.8	23.95	4	15.4294	3.928027	0.462922	2.612231	0.282898	9.863828	0.558831
Total Phosphorus (mg/l as P)	72	0.432778	0.337078	0.528477	0.355	31.16	0.11	3.4	0.275	0.47	3.29	0.195	0.165854	0.407252	0.047985	5.75688	0.282898	40.49999	0.558831
Total Solids (mg/l)	72	681.9583	635.1223	728.5943	649	49101	398	1200	498	804	802	306	39386.69	198.4608	23.38883	0.630151	0.282898	-0.28064	0.558831
Suspended Solids (mg/l)	72	97.25	83.62017	110.8798	93	7002	8	254	49	139.5	246	90.5	3364.246	58.00212	6.835616	0.376116	0.282898	-0.25597	0.558831
Dissolved Solids (mg/l)	0																		
Sulfate (mg/l)	0																		
TKN (mg/l as N)	69	1343.986	856.0947	1831.876	450	92735	5	9300	260	1300	9295	1040	4124815	2030.964	244.4993	2.5414	0.288737	6.381676	0.570095
E. coli (CFU/100ml)	0																		
TOC (mg/l)	72	330.1806	310.554	349.8071	334.5	23773	112	519	272	386.5	407	114.5	6975.84	83.5215	9.843103	-0.1069	0.282898	-0.20787	0.558831
Hardness (mg/l)	0																		
Chloride (mg/l)	51	9.684118	9.076467	10.29177	9.44	493.89	5.32	16.2	7.98	11.65	10.88	3.67	4.667769	2.160502	0.302531	0.436965	0.333464	0.148854	0.65592
Dissolved Oxygen (mg/l)	54	7.977222	7.898792	8.055653	8.005	430.77	6.99	8.47	7.8	8.13	1.48	0.33	0.082568	0.287346	0.039103	-0.74356	0.324556	1.461918	0.638893
pH	54	7.33662	6.318353	8.354887	6.8	520.9	2	30	5	9	28	4	18.50721	4.302001	0.510554	2.265646	0.284805	9.958849	0.562511
Copper (ug/l)	71	3673.944	2810.212	4537.676	3400	260850	290	29000	1500	4600	28710	3100	1.3E+07	3649.117	433.0705	4.900716	0.284805	33.23755	0.562511
Iron (ug/l)	71	20.15211	16.74854	23.55568	20	1430.8	6.9	110	10	20	103.1	10	206.7697	14.37949	1.706531	3.884503	0.284805	21.76936	0.562511
Zinc (ug/l)	71																		