Appendix C: Longitudinal Water Quality Comparison of Median Concentrations from the Lower Delaware Monitoring Program, 2000-2003

Codes:

Trib vs River = Tributary BCP median concentrations statistically compared to upstream neighbor ICP
River vs River = Upstream ICP concentrations statistically compared to downstream neighbor ICP

BCP = Boundary Control Point (Tributary Sites near Delaware River confluence)
ICP = Interstate Control Point (Delaware River Sites)

BEL = Belvidere-Riverton Bridge ICP River Mile 197.84
BUL = Bulls Island Foot Bridge ICP; Lumberville-Raven Rock; River Mile 155.40
BUS = Bushkill Creek BCP; Northampton Co., PA; River Mile 184.10
CAL = Calhoun Street Bridge ICP, Trenton-Morrisville; River Mile 134.34
COO = Cooks Creek BCP; Bucks County, PA; River Mile 173.70
EAS = Northampton Street Bridge, Easton-Phillipsburg ICP; River Mile 183.82
LAM = Lambertville-New Hope Bridge ICP; River Mile 148.70
LEH = Lehigh River BCP; Northampton Co., PA; River Mile 183.66
LOC = Lockatong Creek BCP; Hunterdon Co., NJ; River Mile 154.00
MAR = Martins Creek BCP; Northampton Co., PA; River Mile 190.58
MIL = Milford-Upper Black Eddy Bridge ICP; River Mile 167.70
MUS = Musconetcong River BCP; Hunterdon/Warren Co., NJ; River Mile 174.60
NIS = Nishisakawick Creek BCP; Hunterdon Co., NJ; River Mile 164.10
PAN = Paunnacussing Creek BCP; Bucks Co., PA; River Mile 155.60
PAU = Paulins Kill River BCP, Warren Co., NJ; River Mile 207.0
PEQ = Pequest River BCP; Warren Co., NJ; River Mile 197.80
PID = Pidcock Creek BCP; Bucks Co., PA; River Mile 146.3
POH = Pohatcong Creek BCP; Warren Co., NJ; River Mile 177.40
POR = Columbia-Portland Footbridge ICP, River Mile 207.4
RIE = Riegelsville Bridge ICP; River Mile 174.80
TIN = Tinicum Creek BCP; Bucks Co., PA; River Mile 161.60
TOH = Tohickon Creek BCP; Bucks Co., PA; River Mile 157.00
WAX = Washington Crossing Bridge ICP; River Mile 141.8
WIC = Wickecheoke Creek BCP; Hunterdon Co., NJ; River Mile 152.50

No change or improves Delaware
Significantly higher than Delaware
Significant change in river

Longitudinal Water Quality Comparison of Sites in the Lower Delaware River
2000-2003 May to September Lower Delaware Monitoring Program Data

	TRIB VS. RIVER	RIVER VS. RIVER	TRIB VS. RIVER	TRIB VS. RIVER	RIVER VS. RIVER	TRIB VS. RIVER	TRIB VS. RIVER
	PAU vs POR	BEL vs POR	PEQ vs BEL	BUS vs BEL	EAS vs BEL	LEH vs EAS	POH vs EAS
Parameter	Difference Medians	Difference Medians	Difference Medians	Difference Medians	Difference Medians	Difference Medians	Difference Medians
PARAMETERS DESCRIBING DATA SET							
Discharge (cfs)	165.8	144.5	84.0	122.9	346.0	1,716.3	29.5
GENERAL WATER QUALITY PARAMETERS							
Discharge per Drainage Area (cfs/mi2)	-0.136	-0.019	-0.518	0.483	-0.002	0.210	-0.534
DO mg/l	-0.8	-0.3	1.56	1.71	-0.44	0.87	1.61
DO % Saturation	-9.3%	-3.3%	10.66%	9.1%	1.1%	2.7%	2.94%
Water Temperature F	-1.1	2.3	-7.8	-9.9	1.0	-4.0	-11.3
pH	0.30	0.00	0.69	0.50	0.09	0.07	0.31
TDS mg/l	189.0	12.0	230.0	307.0	20.0	70.0	100.0
TSS mg/l	4.5	0.5	3.0	2.0	1.0	0.0	1.0
Hardness mg/l	125.0	5.0	192.5	182.5	11.0	49.5	94.0
Alkalinity mg/l	102.0	6.0	161.0	113.5	8.00	21.5	75.5
Turbidity NTU	2.5	0.1	1.15	1.2	1.0	0.5	1.6
Chloride mg/l	27.0	1.5	22.0	11.5	1.5	5.0	5.0
NUTRIENTS AND PRIMARY PRODUCTION PARAMETERS							
Total Phosphorus mg/l	0.020	0.005	0.055	0.010	0.005	0.180	0.045
Orthophosphate mg/l	0.010	0.000	0.050	0.020	0.010	0.100	0.040
Nitrate NO3-N mg/l	0.080	-0.030	0.715	3.050	0.160	0.980	1.560
Total Kjeldahl Nitrogen mg/l	0.090	0.015	0.170	0.130	0.050	0.155	-0.010
Ammonia NH3-N mg/l	0.045	0.000	0.008	0.080	0.000	0.055	0.000
Total Nitrogen mg/l*	0.248	0.023	0.920	3.435	0.315	1.295	1.775
Chlorophyll A mg/m3	1.17	-0.23	0.24		-0.45	1.25	
Phytoplankton Biomass (mg/m3)**	78.39	-15.41	16.08		-30.15	83.75	
BACTERIA PARAMETERS							
Enterococcus col/100ml	68	24	194	354	106	-62	398
Fecal Coliform col/100ml	80	0	142	560	65	15	455
E. coli col/100ml	37	5	117	407	12	14	220

No change or improves Delaware
Significantly higher than Delaware
Significant change in river

Longitudinal Water Quality Comparison of Sites in the Lower Delaware River
2000-2003 May to September Lower Delaware Monitoring Program Data

	RIVER VS. RIVER	TRIB VS. RIVER	TRIB VS. RIVER	RIVER VS. RIVER	TRIB VS. RIVER	TRIB VS. RIVER	TRIB VS. RIVER	TRIB VS. RIVER
	RIE vs EAS	MUS vs RIE	COO vs RIE	MIL vs RIE	NIS vs MIL	TIN vs MIL	TOH vs MIL	PAN vs MIL
Parameter	Difference Medians	Difference Medians	Difference Medians	Difference Medians	Difference Medians	Difference Medians	Difference Medians	Difference Medians
PARAMETERS DESCRIBING DATA SET								
Discharge (cfs)	2,386.5	179.1	35.3	262.0	3	12	30	9
GENERAL WATER QUALITY PARAMETERS								
Discharge per Drainage Area (cfs/mi2)	0.110	-0.012	0.037	0.031	-0.950	-0.710	-0.923	-0.069
DO mg/l	0.70	0.60	1.30	0.00	0.85	1.00	0.30	0.62
DO % Saturation	2.68%	1.55%	6.19%	-1.59%	4.85%	7.46%	4.80%	2.34%
Water Temperature F	-0.87	-6.33	-8.6	-0.1	-5.1	-4.1	-0.5	-7.5
pH	0.03	0.28	0.38	-0.03	0.30	0.41	0.40	0.00
TDS mg/l	30.0	100.0	30.0	0.0	-20.0	30.0	19.0	-7.0
TSS mg/l	0.5	2.0	-2.0	0.5	-3.5	-3.0	-3.0	-4.0
Hardness mg/l	20.5	78.5	53.5	2.0	-8.5	22.0	-3.5	11.5
Alkalinity mg/l	10.5	55.5	51.5	0.0	0.0	16.0	1.0	2.0
Turbidity NTU	0.0	0.5	-1.1	0.4	-1.6	-1.8	-1.9	-2.1
Chloride mg/l	1.0	26.0	-7.1	0.0	-2.0	-3.0	11.0	8.0
NUTRIENTS AND PRIMARY PRODUCTION PARAMETERS								
Total Phosphorus mg/l	0.060	-0.040	-0.070	0.000	-0.050	-0.070	-0.070	-0.040
Orthophosphate mg/l	0.040	-0.040	-0.050	0.000	-0.020	-0.050	-0.045	-0.010
Nitrate NO3-N mg/l	0.355	0.875	0.610	0.035	0.370	-0.460	-0.560	1.330
Total Kjeldahl Nitrogen mg/l	-0.050	0.190	-0.085	0.035	0.010	-0.035	0.020	-0.040
Ammonia NH3-N mg/l	0.015	0.020	-0.015	-0.013	-0.003	-0.003	-0.003	-0.003
Total Nitrogen mg/l*	0.190	1.185	0.615	0.145	0.488	-0.465	-0.583	1.350
Chlorophyll A mg/m3	0.97	0.78		-0.62			0.34	
Phytoplankton Biomass (mg/m3)**	64.99	52.26		-41.54			22.78	
BACTERIA PARAMETERS								
Enterococcus col/100ml	-83	141	281	-19	180	140	530	260
Fecal Coliform col/100ml	-9	174	74	-26	35	105	28	30
E. coli col/100ml	6	69	62	-12	24	56	12	4

No change or improves Delaware
Significantly higher than Delaware
Significant change in river

Longitudinal Water Quality Comparison of Sites in the Lower Delaware River 2000-2003 May to September Lower Delaware Monitoring Program Data

	RIVER VS. RIVER	TRIB VS. RIVER	TRIB VS. RIVER	RIVER VS. RIVER	TRIB VS. RIVER	RIVER VS. RIVER	RIVER VS. RIVER
	BUL vs MIL	LOC vs BUL	WIC vs BUL	LAM vs BUL	PID vs LAM	WAX vs LAM	CAL vs WAX
Parameter	Difference Medians	Difference Medians	Difference Medians	Difference Medians	Difference Medians	Difference Medians	Difference Medians
PARAMETERS DESCRIBING DATA SET							
Discharge (cfs)	377	6	3	53.5	5	52	-326
GENERAL WATER QUALITY PARAMETERS							
Discharge per Drainage Area (cfs/mi2)	0.018	-0.963	-1.092	-0.007	-0.820	-0.002	-0.056
DO mg/l	0.19	-0.30	0.46	-0.55	-1.00	0.25	0.09
DO % Saturation	2.36%	-4.30%	2.17%	-4.97%	-12.62%	4.11%	-0.75%
Water Temperature F	-1.3	-3.3	-3.7	0.7	-3.9	-0.5	1.0
pH	0.00	-0.30	-0.07	-0.06	-0.15	0.16	0.10
TDS mg/l	0.0	-10.0	-20.0	-10.0	45.0	10.0	-10.0
TSS mg/l	-0.2	-3.8	-3.8	0.2	-2.0	1.0	0.0
Hardness mg/l	1.0	-9.5	-12.0	0.0	38.0	-2.5	3.5
Alkalinity mg/l	0.0	-2.5	-5.0	1.0	31.0	-1.0	0.0
Turbidity NTU	1.0	-2.8	-2.7	-1.9	1.7	1.8	-1.0
Chloride mg/l	0.0	-4.0	-1.0	3.7	-1.2	-2.7	0.0
NUTRIENTS AND PRIMARY PRODUCTION PARAMETERS							
Total Phosphorus mg/l	0.000	-0.060	-0.055	0.000	-0.015	-0.010	0.010
Orthophosphate mg/l	0.000	-0.030	-0.0300	-0.020	0.030	0.010	0.000
Nitrate NO3-N mg/l	-0.050	-0.070	0.630	0.000	-0.210	-0.030	0.030
Total Kjeldahl Nitrogen mg/l	-0.020	0.070	0.1200	0.160	0.025	-0.110	0.130
Ammonia NH3-N mg/l	-0.003	0.000	0.0000	0.010	0.015	-0.010	0.003
Total Nitrogen mg/l*	-0.083	0.033	0.598	0.203	-0.095	-0.070	0.020
Chlorophyll A mg/m3	0.90			0.25		-0.65	0.40
Phytoplankton Biomass (mg/m3)**	60.30			164.15		-43.55	26.80
BACTERIA PARAMETERS							
Enterococcus col/100ml	-16	216	126	8	433	-2	-6
Fecal Coliform col/100ml	10	-28	32	-8	143	8	28
E. coli col/100ml	18	-10	10	-18	67	9	9