10.0 Introduction

In order to determine the chemical condition of Baltimore County waters three chemical monitoring programs have been implemented. The chemical monitoring program is intended to provide information on ambient chemical conditions and, over time, to assess trends in both chemical concentrations and chemical loads. The information will be used to better target restoration activities, to provide data for the calibration of pollutant load models, and to provide local data to assess the results of the Chesapeake Bay Program modeling efforts and TMDL modeling. The data will be used to assess water quality improvements that are the result of restoration efforts. It will also be used to determine progress in meeting the pollutant load reductions required by the Chesapeake Bay restoration efforts and as determined by the development of Total Maximum Daily Loads (TMDLs). These programs will partially fulfill the restoration effectiveness monitoring required under NPDES Permit section F.2.

The three current, chemically oriented programs, the Baseflow Monitoring Program, the Chemical Trend Monitoring Program, and the Tidal Waters Monitoring Program are described in Sections 10.1, 10.2 and 10.3 respectively.

10.1 Baseflow Monitoring Program

10.1.1 Baseflow Monitoring Program Description

A baseflow monitoring program was initiated in 1999. The initial effort was targeted at watersheds that were undergoing or about to undergo the preparation of a Water Quality Management plan. The targeted watersheds included the Lower Gunpowder, the Little Gunpowder, the Middle River and the Baltimore Harbor watersheds. The limited data was used in the calibration of the SWMM pollutant load models that were included in the Water Quality Management plans. In the fall of 2000, the baseflow monitoring was shifted to the Back River, Jones Falls and Gwynns Falls watersheds. The shift was intended to address the lack of chemical monitoring information available for these watersheds. These watersheds were monitored until the spring of 2001. The data collected was presented in the NPDES – 2001 Annual Report. Staffing levels curtailed the continuance of the baseflow monitoring program until the spring of 2003.

The baseflow monitoring program, which resumed in 2003 was also redesigned. Baseflows are monitored in the Patapsco/Back River Basin in odd-numbered years, while the Gunpowder Basin/Deer Creek are monitored in the even-numbered years. A total of fifty-three (53) sites in the Patapsco Back River Basin, and fifty-six (56) sites in the Gunpowder Basin/Deer Creek have been selected for monitoring. The points were chosen to maximize the number of subwatersheds monitored. The monitoring points within the Patapsco/Back River Basin are displayed in Figure 10-1, while the Gunpowder Basin/Deer Creek monitoring points are displayed in Figure 10-2. Appendix 10-1, at the end of this section, displays the watersheds and subwatersheds associated with each monitoring point.

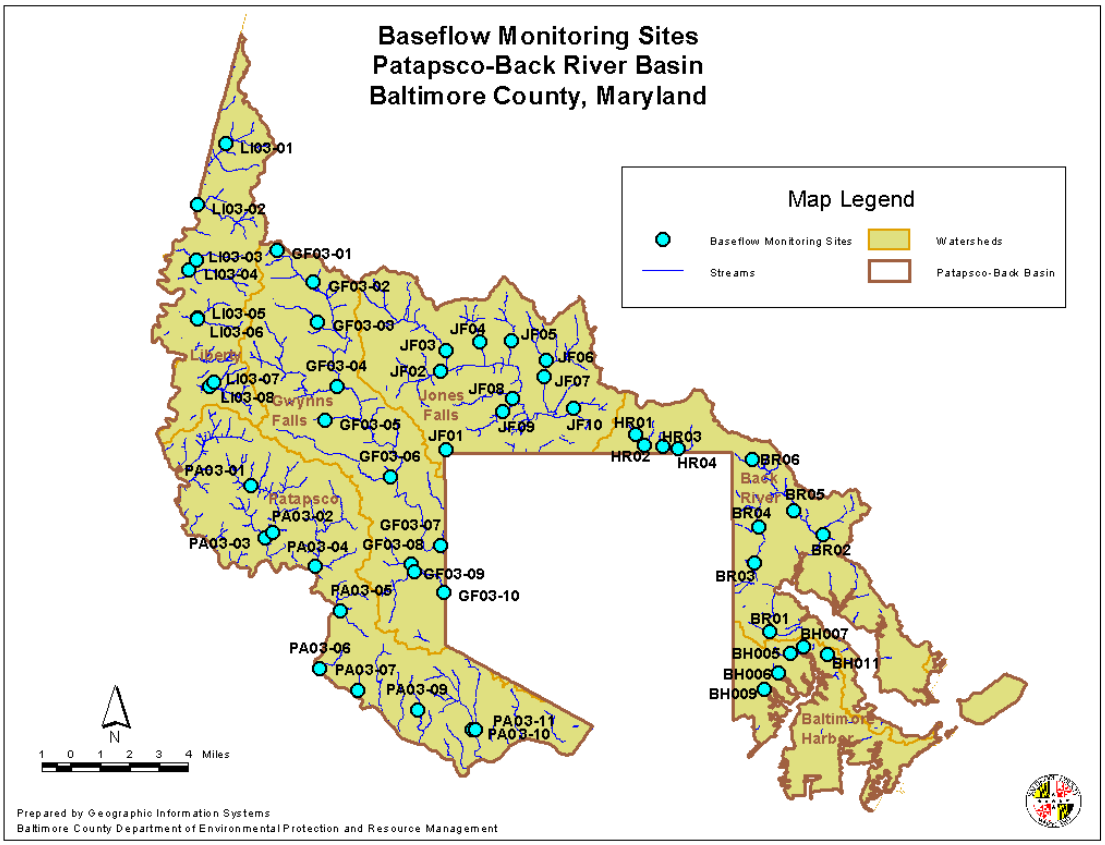

Figure 10-1: Patapsco/Back River Basin – Baseflow Monitoring Sites

The target number of baseflow samples is six to eight samples per year at each site. The actual number sampled will vary depending on weather conditions, staffing and other duties. The standard set of monitored pollutants includes (TSS, TS, TKN, Nitrate/Nitrite, Total Phosphorus, Ortho-phosphorus, Cadmium, Copper, Lead, Zinc, BOD, COD, and Chlorides) as well as temperature and pH determined in *situ*. Discharge measurements are made during each sample collection. A minimum of three days of dry weather is required prior to monitoring any baseflow site.

The design will allow determination of ambient water quality for major portions of each watershed. The two-year sampling cycle will allow an analysis of baseflow water quality trends for the pollutant parameters analyzed.

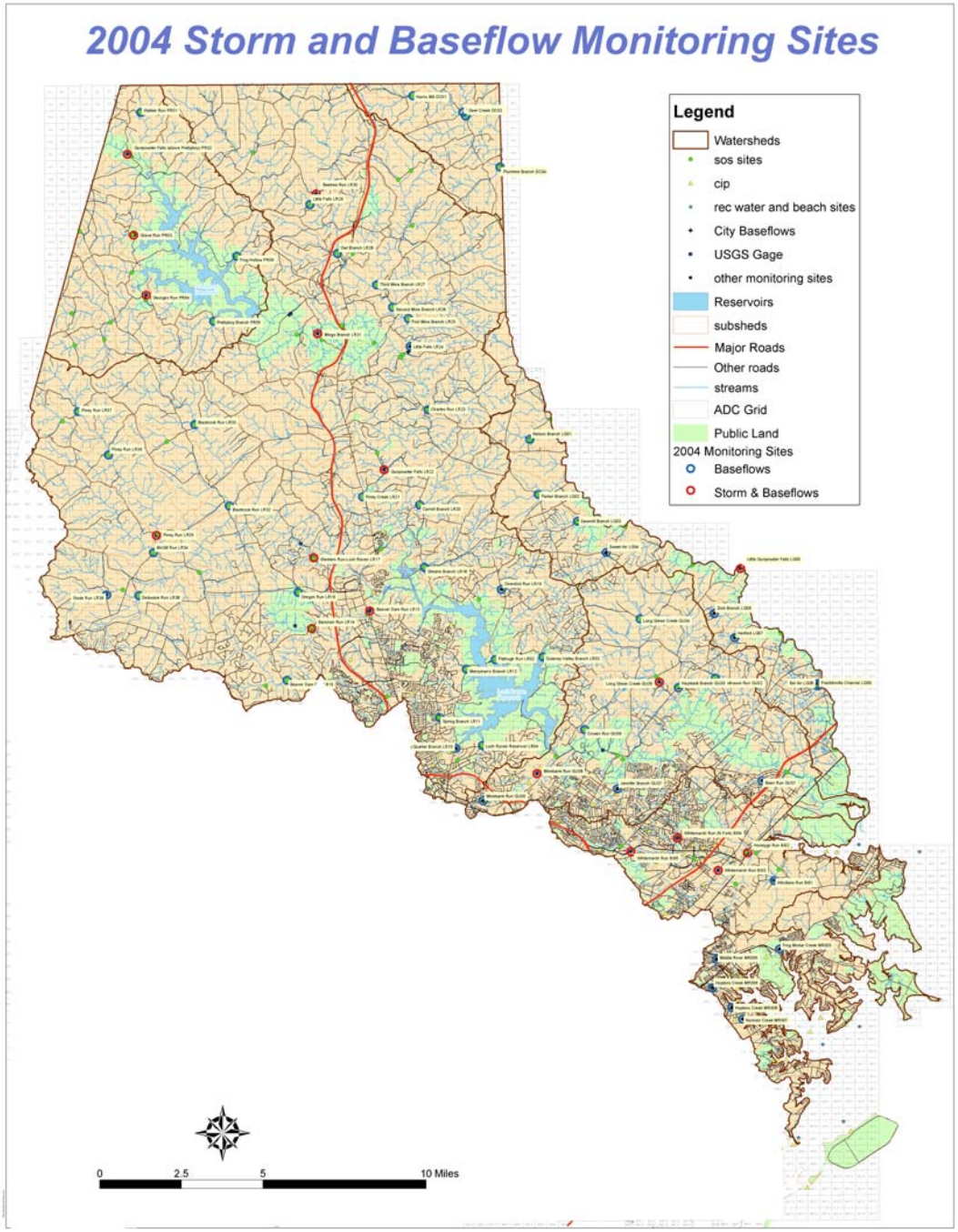

Figure 10-2: Gunpowder Basin/Deer Creek – Baseflow Monitoring Sites

10.1.2 Baseflow Monitoring Program Results

A total of three hundred and nine (309) baseflow samples were collected in the Gunpowder River Basin/Deer Creek in 2004. The number of samples per site varied from one to seven, with the majority of the sites falling in the range of five to six samples

per site. In addition to the baseflow samples, 46 field blanks and 48 duplicate samples were collected.

The mean, number of samples and the standard deviation for each site are presented at the end of this section in Appendix 10-2 for each parameter analyzed. The sample results were analyzed for distribution frequencies. The results for both the 2003 samples in the Patapsco/Back River Basin and the 2004 samples in the Gunpowder River Basin/Deer Creek are presented graphically in Figure 10-3 for select parameters.

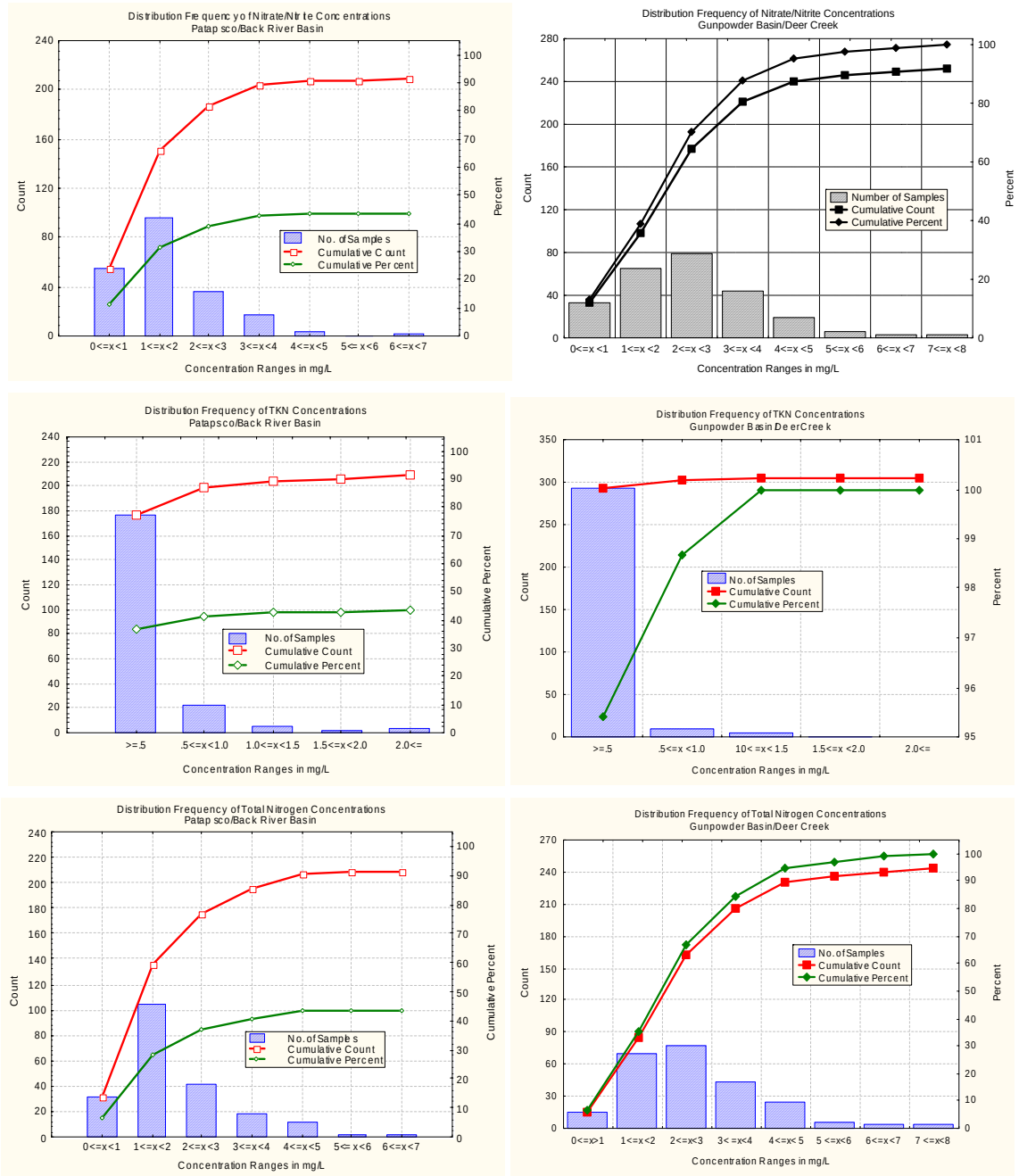

Figure 10-3: Frequency distributions by concentration for Nitrate, TKN, Total Nitrogen and Dissolved Copper for both the Patapsco/Back River Basin (2003) and the Gunpowder Basin/Deer Creek (2004).

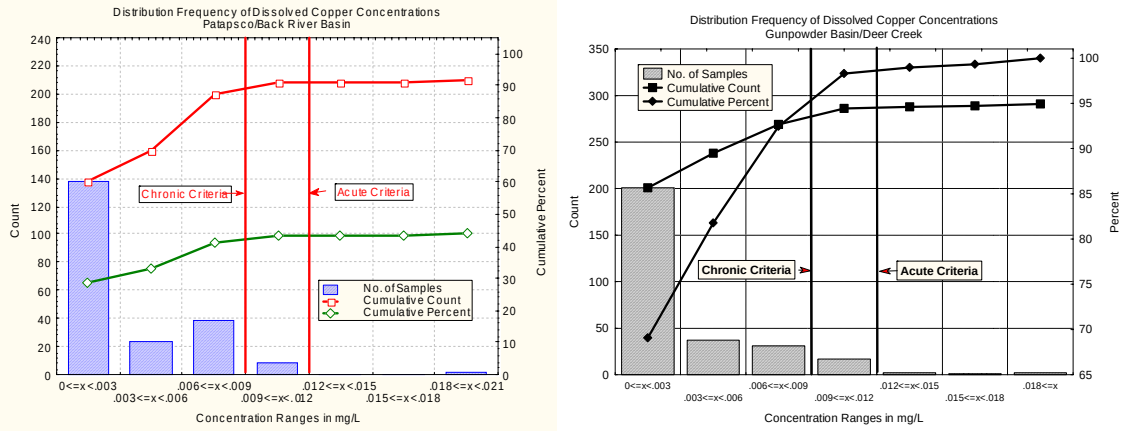

Figure 10-3: Frequency distributions by concentration for Nitrate, TKN, Total Nitrogen and Dissolved Copper for both the Patapsco/Back River Basin (2003) and the Gunpowder Basin/Deer Creek (2004) (continued).

As can be seen from Figure 10-3 approximately 70% of the nitrate/nitrite concentrations were below 2 mg/L for the Patapsco/Back River Basin, while only ~40% of the nitrate/nitrite concentrations were below 2mg/L for the Gunpowder River Basin/Deer Creek. Conversely, ~80% of the TKN samples were below 0.5 mg/L for the Patapsco/Back River Basin, while ~95% of the TKN samples were below 0.5mg/L for the Gunpowder River Basin/Deer Creek. Approximately 65% of the Total Nitrogen concentrations were below 2 mg/L in the Patapsco/Back River Basin, while 65% of the samples in the Gunpowder River Basin/Deer Creek exceeded 2mg/L. The difference in the concentration of Total Nitrogen between the two basins may be due to the higher percentage of agricultural lands in the Gunpowder River Basin/Deer Creek, although climatic differences between years cannot be ruled out.

Ninety-five (95) percent and 92.5% of the dissolved copper concentrations were below the freshwater aquatic life chronic criteria of .009 mg/L for the Patapsco/Back River Basin and the Gunpowder River Basin/Deer Creek, respectively. Less than 1% of the samples (2) exceeded the freshwater aquatic life acute criteria of .012 mg/L in the Patapsco/Back River Basin and less that 2% of the samples (5) in the Gunpowder River Basin/Deer Creek exceed the acute criteria.

Figures 10-4 and 10-5 display, the site mean concentration for nitrate and total phosphorus for the sampling sites in the Gunpowder River Basin/Deer Creek. The map includes information from both Baltimore City and Baltimore County monitoring programs. This map was presented in a report that was distributed to ~175 attendees at the Second Annual State of Our Watersheds conference held in November 2004. The map displays show the variability between sites.

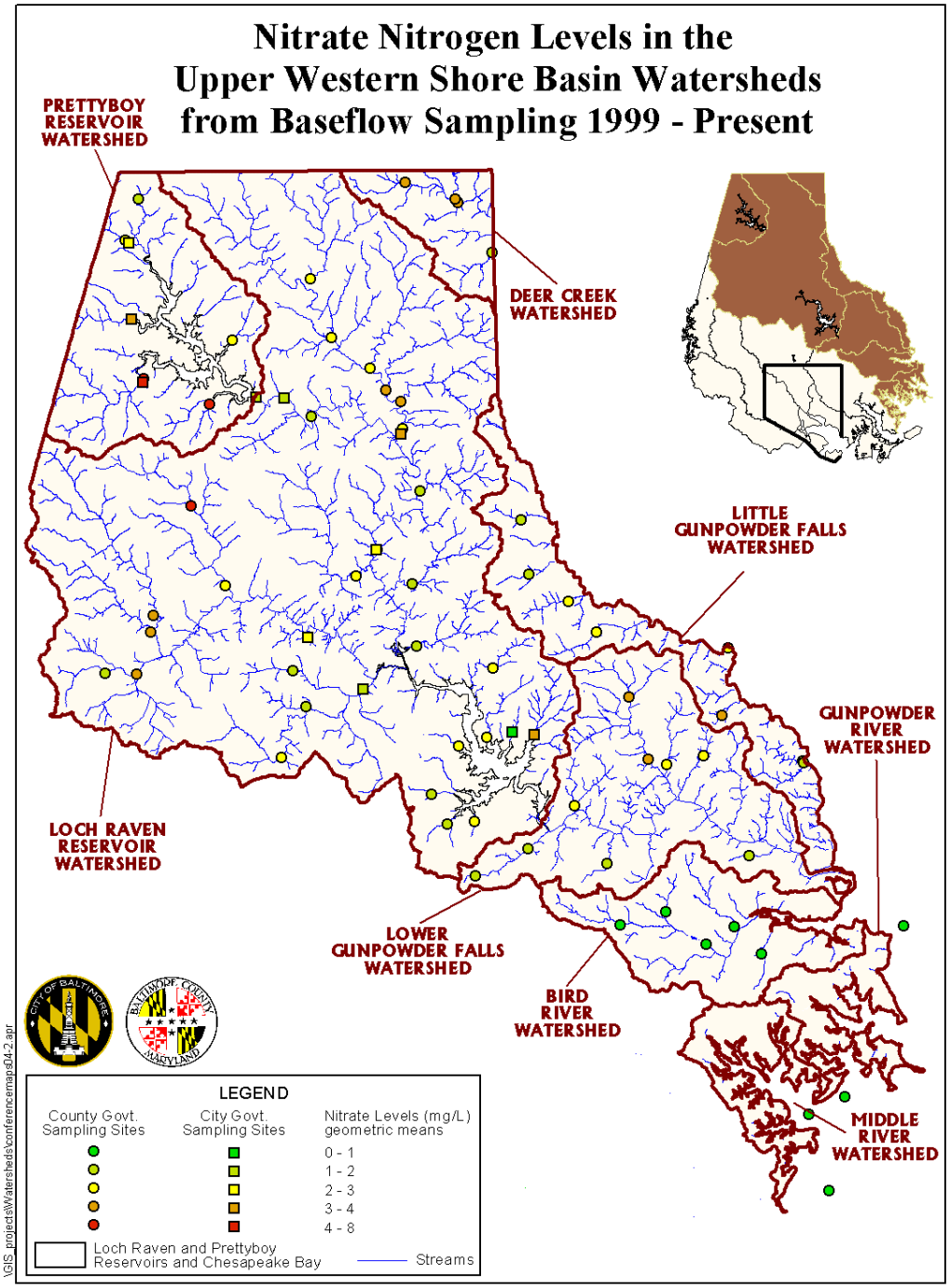

Figure 10-4: Mean Nitrate Concentrations for Each Site.

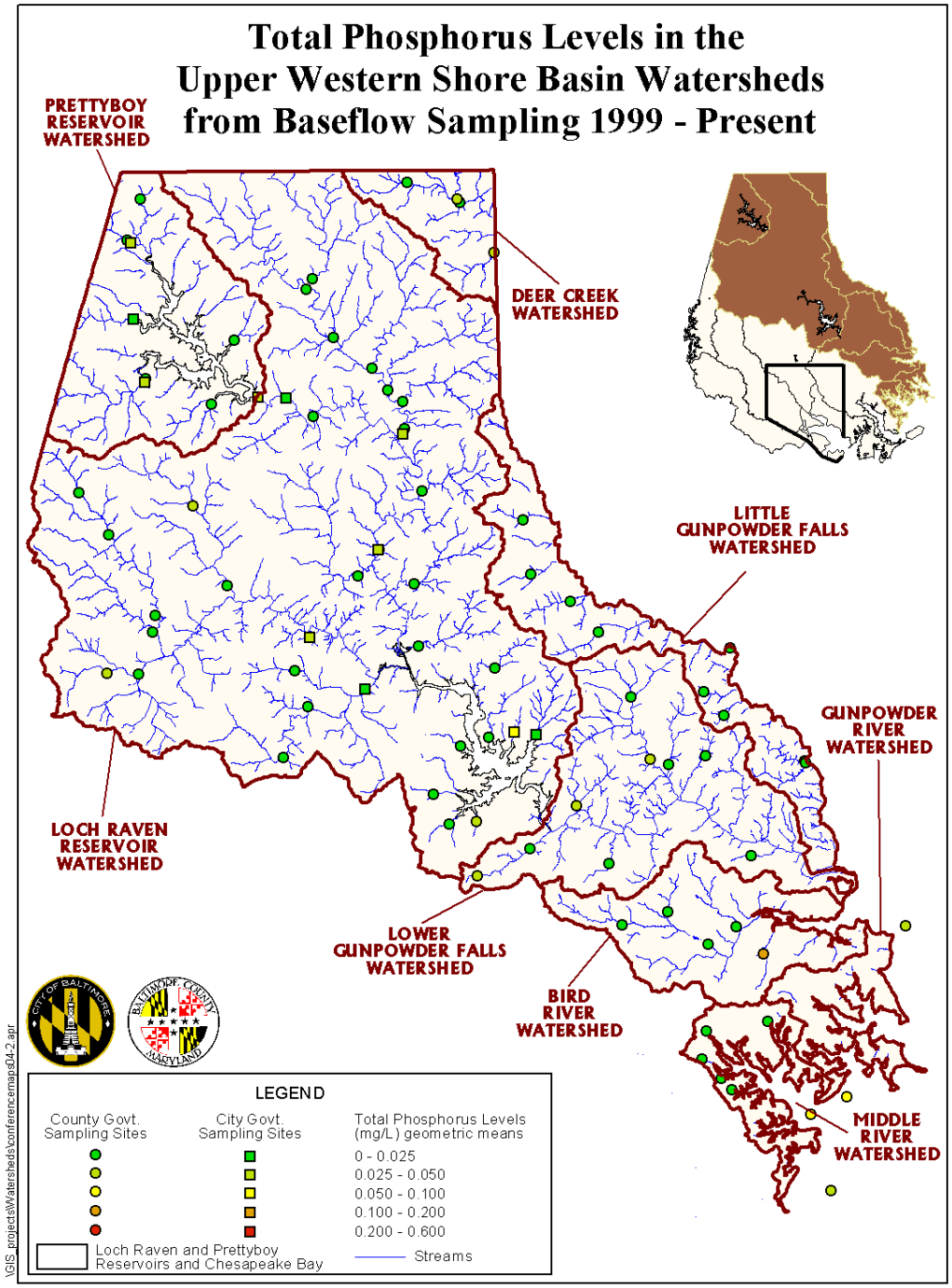

Figure 10-5: Mean Total Phosphorus Concentrations for Each Site.

Figure 10-4 shows that the mean nitrate/nitrite concentrations were higher in the northern and western portion of the Gunpowder Basin (Prettyboy Reservoir and Loch Raven Reservoir watersheds) and in Deer Creek with concentrations generally ranging in the 3-5 mg/L range. The southern and eastern portion of the Gunpowder Basin generally had

concentrations less than 3mg/L. The higher concentrations were found to be related to the presence of agricultural operations.

As indicated in Figure 10-5, baseflow total phosphorus concentrations were low throughout the Gunpowder Basin. Previous work has indicated that only about 5% of the phosphorus load is associated with baseflow, with majority of the total phosphorus load being delivered during storm events. Therefore the low mean total phosphorus concentrations were not unexpected.

The relationship between the percent impervious area coverage and the baseflow concentrations was explored through a Pearson's correlation analysis of all the baseflow monitoring sites from both the Patapsco/Back River Basin and the Gunpowder River Basin/Deer Creek. A significant relationship was found between the percent impervious cover and seven water quality parameters (Total Solids, Chloride, TKN (Patapsco Basin only) nitrate/nitrite nitrogen (Gunpowder Basin), Total Copper, Total Zinc, Dissolved Zinc and Hardness). Select relationships are displayed in Figure 10-6, showing the Patapsco/Back River Basin separate from the Gunpowder River Basin.

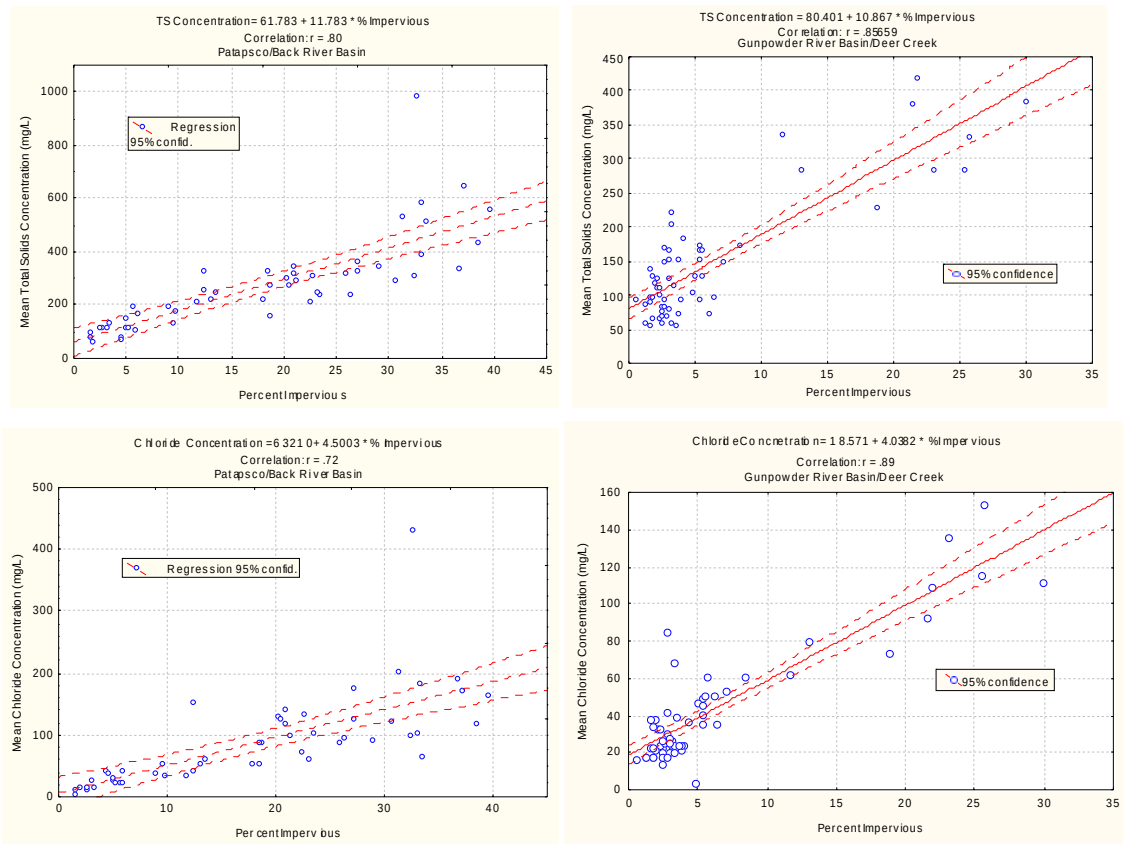

Figure 10-6: Significant Correlations Between Percent Impervious Cover and TS, Chloride, TKN, Total Zinc, and Dissolved Zinc.

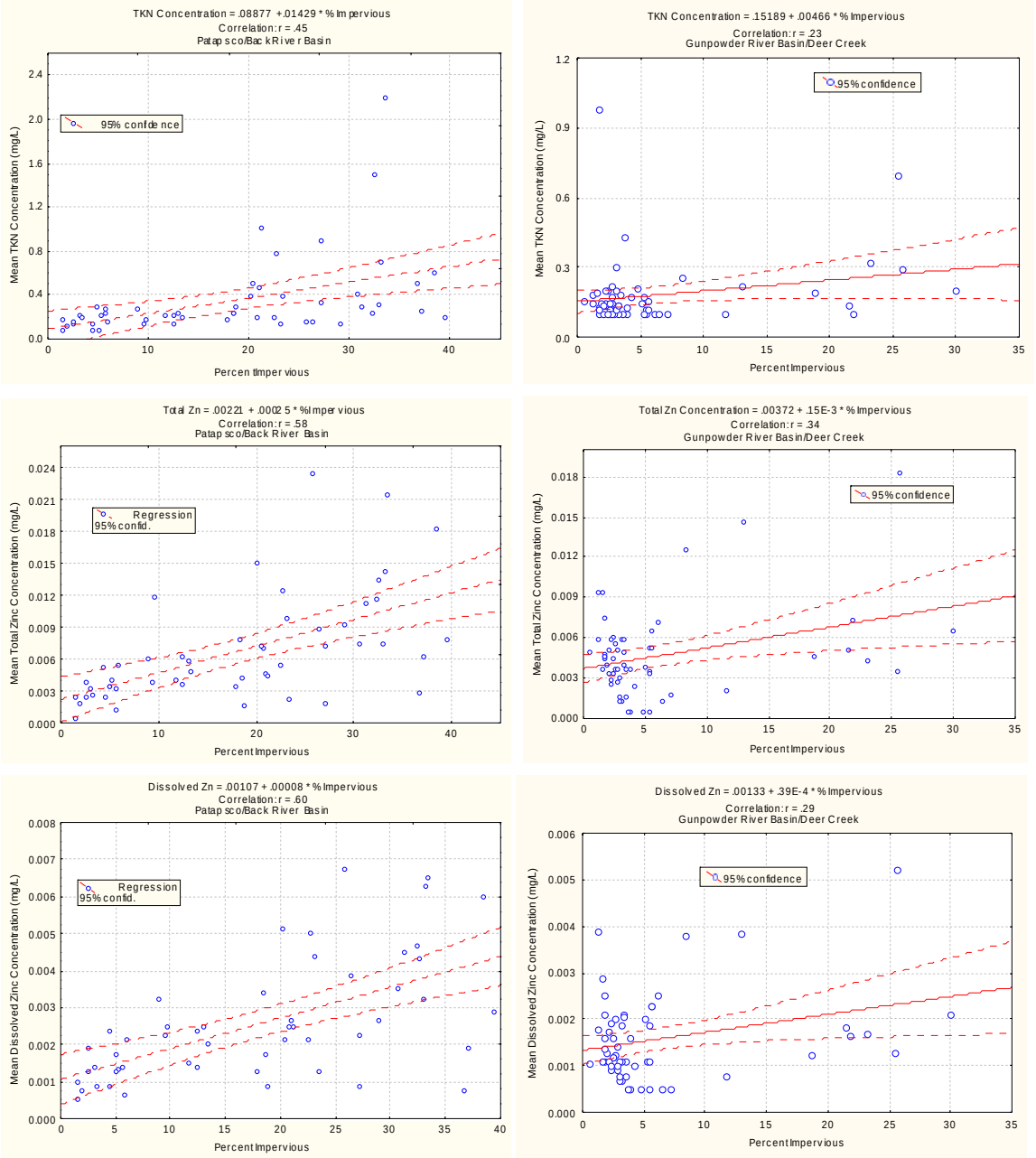

Figure 10-6: Significant Correlations Between Percent Impervious Cover and TS, Chloride, TKN, Total Zinc, and Dissolved Zinc (continued).

As can be seen from Figure 10-6, there is a great deal of scatter in the data points, particularly at higher percent impervious cover sites. The relationships are all positive (i.e. pollutant concentrations increase as impervious cover increases) with the exception of nitrate/nitrite nitrogen (not displayed). Nitrate/nitrite nitrogen, total nitrogen and chlorides were analyzed on the basis of percentage of generalized land cover (urban, agriculture, or forest cover). The results are displayed in Figure 10-7.

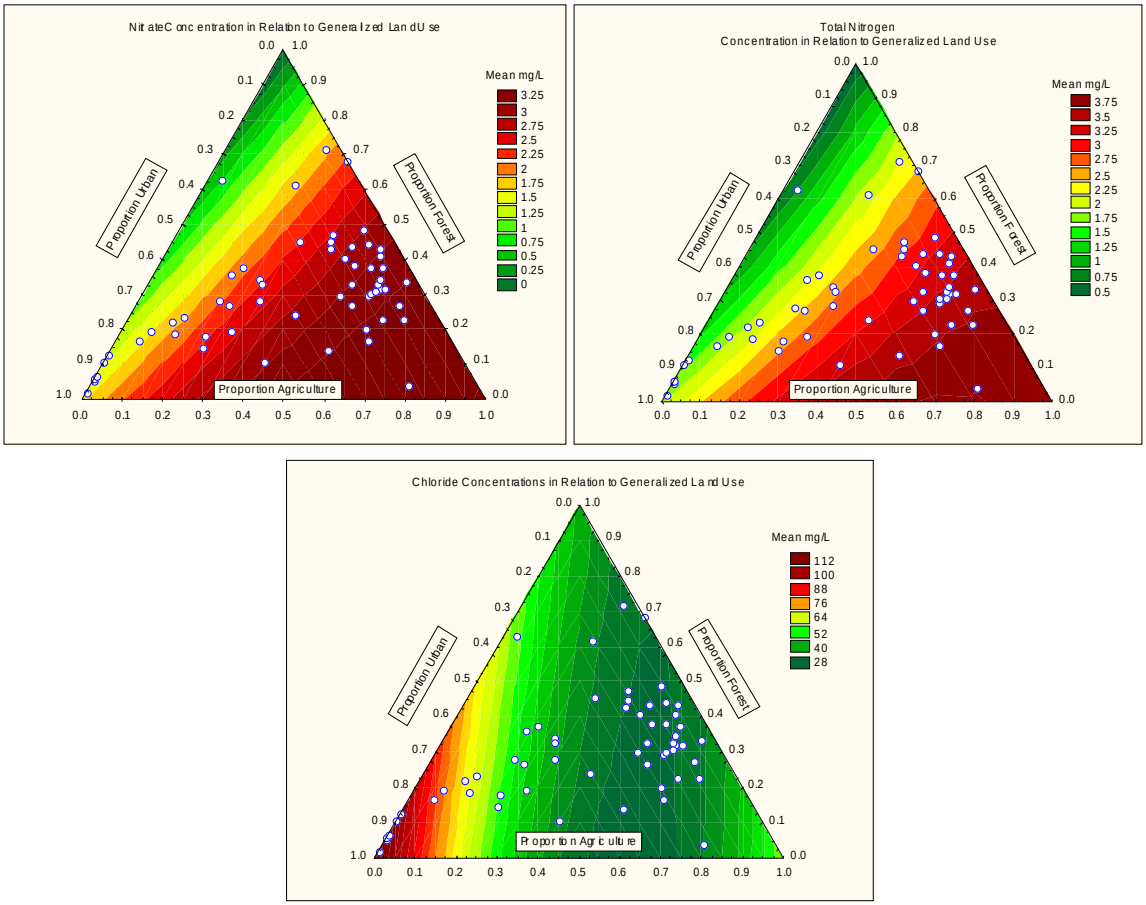

Figure 10-7: Relationship between generalized land cover and nitrate/nitrite nitrogen, total nitrogen and chloride concentrations.

These graphs display proportion of generalized land use for each monitoring point (open blue circles). The lower left point would represent 100% agriculture, the lower right point would represent 100% urban, and the top point would represent 100% forest cover. In practically, any monitoring point has a mix of land uses in its drainage area. Using the mean concentration data generated for each point a regression analysis with the generalized land use data as predictor variables produced the graphs displayed in Figure 10-7. For nitrate/nitrite nitrogen and total nitrogen, agricultural land use is predicted to have the highest concentrations. As little as 20% agricultural land use results in concentrations higher than 1 mg/L. Sites with a high proportion of urban land use, for these two parameters, result in elevated concentrations in relation to forest cover.

The baseflow data collected in the Gunpowder River Basin/Deer Creek in 2004 were analyzed for differences in concentration for each pollutant between the six watersheds sampled. An ANOVA was used for the analysis, with an *post hoc* Duncan's Multiple Range Test applied to parameters found to be significantly different, to determine which watersheds differ. The results are displayed in Table 10-1. The results of the Duncan's Multiple Range Test are displayed with the watersheds having the highest concentrations to the left and progressing in order to the lowest concentrations on the right. The watersheds joined by the same line are not significantly different.

Table 10-1: Baseflow Pollutant ANOVA and Duncan' Multiple Range Test Results

Pollutant Parameter	df Effect	Df Error	F	P
TSS	5	292	0.37	NS
TS	5	292	8.55	<.001
TKN	5	292	32.01	<.001
Nitrate/Nitrite	5	241	18.78	<.001
TP	5	292	3.74	<.01
Cadmium	5	277	0.00	NS
Copper	5	277	5.96	<.001
Lead	5	277	3.99	<.01
Zinc	5	277	3.56	<.01
BOD	5	277	1.05	NS
COD	5	285	26.78	<.001
Chloride	5	274	24.51	<.001
Hardness	5	264	14.06	<.001

Duncan's Multiple Range Test

Total Solids (TS)	BI GU LR PR LG DC
Total Kjedahl Nitrogen (TKN)	BI GU DC PR LG LR
Nitrate/Nitrite Nitrogen	DC PR LG LR GU BI ----------
Total Nitrogen	DC PR LG LR GU BI ---------
Total Phosphorus (TP)	DC BI GU LR PR LG
Total Copper	BI DC LG PR LR GU
Total Lead	BI PR LG LR DC GU
Total Zinc	BI DC PR LG LR GU
Chemical Oxygen Demand (COD)	BI GU LR LG DC PR
Chloride	BI GU LR LG DC PR ----------
Hardness	GU BI LR LG DC PR

The concentrations of ten parameters were found to differ significantly between watersheds. The Bird River watershed had the highest concentration for metal, COD, chlorides, total solids and TKN. For the metals, COD, and TKN there was no difference between the other watersheds. Bird River and Lower Gunpowder watersheds were not significantly different for total solids. Chlorides showed a decreasing concentration trend from the most highly urbanized to the least urbanized. Nutrient parameters (nitrate/nitrite nitrogen, total nitrogen and total phosphorus) for the most part displayed the highest concentrations in those watersheds dominated by agricultural land uses.

10.2 Chemical Trend Monitoring Program

10.2.1 Chemical Trend Monitoring Program Description

The Chemical Trend Monitoring Program was initiated in 2003 as a pilot program. The monitoring was conducted at the US Geological Survey (USGS) gage sites throughout Baltimore County. Grab water quality samples were collected during both baseflow and storm events to represent the range of flow experienced at the gages. The target number of grab samples was 20 to thirty at each gage during the course of each calendar year. During the pilot program it was discovered that it is not be possible to collect this number of samples for each gage. Consequently, the program became more targeted in 2004 with sampling at the gages in the Gunpowder Basin only. This has also been found to be beyond the staffing capability of the Watershed Management and Monitoring Section. In order to gain data that will allow an estimate of pollutant loads and trends in pollutant loads, the program will be further modified. A three year rotating schedule will be set up to monitor storms and baseflows at USGS gages located on major tributaries. The monitoring will focus on three gages each year. The schedule is presented in Table 10-2.

Table 10-2: Schedule of Storm Event Monitoring at USGS Gages

Watershed	Initial Year	Site 1	Site 2	Site 3
Prettyboy Reservoir	2005	Gunpowder Falls mainstem	Grave Run	Georges Run
Loch Raven Reservoir	2006	Gunpowder Falls - Glencoe	Western Run	Beaver Dam Run
Patapsco/Back River Basin	2007	Gwynns Falls – Villa Nova	Jones Falls – Sorrento	Whitemarsh Run-White Marsh

10.2.2 Chemical Trend Monitoring Results

Insufficient numbers of samples were collected at each gage to provide a meaningful analysis. By targeting a fewer number of gages, it is anticipated that we will be able to provide an analysis in next years report.

10.3 Tidal Waters Monitoring Program

10.3.1 Tidal Waters Monitoring Program Description

Baltimore County has had a tidal recreational water monitoring program since 1990. The program is administered by the Department of Environmental Protection and Resource Management – Environmental Health Section. The program has historically focused on fecal coliform concentrations and recently switched to Enterococci as the bacteriological indicator. The beach swimming standard of 35 MPN is used for comparison purposes to assess the general bacteriological water quality. Fecal coliform and E. coli may be measured in the event of a sewage spill/release to provide as much information as possible to characterize the potential public health threat. Starting in 2002 surface water quality samples were obtained at seven tidal water sites representing the various major tidal basins in Baltimore County. This sampling continued in 2004. Figure 10-8 shows approximately where the water quality samples were taken. Table 10-3 provides the site codes and the tidal water body they represent.

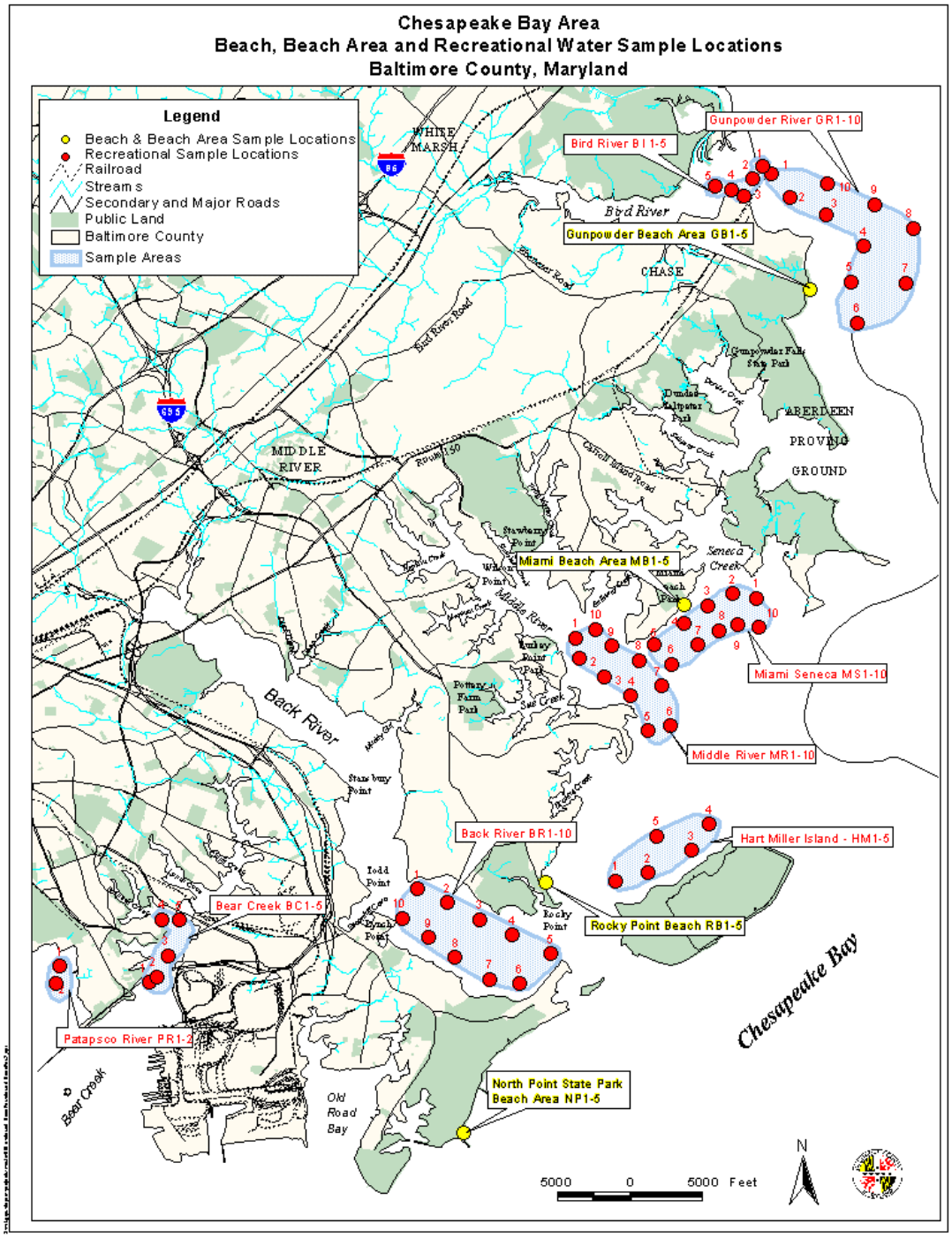

Figure 10-8: Tidal Waters Monitoring Site Locations.

Table 10-3: Site Codes and the Associated Tidal Water body

Code	Water Body
BC	Bear Creek
PR	Patapsco River
GR	Gunpowder River
MS	Miami Beach/Seneca Creek
MR	Middle River
BR	Back River
HM	Hart Miller Island

10.3.2 Tidal Waters Monitoring Program Results

All seven stations were monitored fifteen times during the time period of May 2004 through November 2004. The same standard set of pollutant parameters detailed in Section 10.1, were monitored in the tidal waters. The data are summarized by site in Appendix 10-3, which presents the means, number of samples and the standard deviation for each pollutant parameter presented.

An analysis of variance (ANOVA) was used for each pollutant to determine if there were significant differences between the seven sites. The results of the ANOVA are displayed in Table 10-4. If a significant difference was found a post hoc Duncan's Multiple Range Test was used to determine which sites were significantly different. The results of the Duncan's Multiple Range Test are presented at the end of Table 10-2. When interpreting the results of the Duncan's Multiple Range Test, the sites are arranged from highest concentration of the parameter to the lowest concentration. The sites that are significantly different are not joined by the same line. All statistical analyses were conducted using Statistica (Ver. 5.0).

Table 10-4: ANOVA and Duncan's Multiple Range Test Results

Pollutant Parameter	df Effect	Df Error	F	P
TSS	6	92	4.61	<.001
TS	6	90	54.10	<.001
TKN	6	86	11.47	<.001
Nitrate/Nitrite	6	75	3.08	<.01
TP	6	86	6.74	<.001
Cadmium	6	81	0.00	NS
Copper	6	81	5.98	<.001
Lead	6	81	1.38	NS
Zinc	6	81	2.62	<.05
BOD	6	89	3.71	<.01
COD	6	93	0.62	NS
Chloride	6	91	21.24	<.001

Duncan's Multiple Range Test

Total Suspended Solids (TSS)	BR PR BC MH MS GR MR
Total Solids (TS)	PR BC HM BR MR MS GR

Chloride	PR BC HM MR BR MS GR
Total Kjedahl Nitrogen (TKN)	BR BC PR GR HM MS MR
Total Phosphorus (TP)	BR BC PR GR HM MS MR
Total Copper	PR BC BR HM MR MS GR

Total Lead	PR BC HM BR GR MS MR
Total Zinc	BC BR PR GR HM MR MS

Biological Oxygen Demand (BOD)	BC PR BR MR GR HM MS

Sampling results for 2004 indicated that nine of the parameters (TSS, TS, chlorides, TKN, TP, Total Copper, Total Lead, Total Zinc and BOD had mean concentrations that differed among sites. For the 2002 monitoring season, five parameters (TS, chlorides, TKN, Lead and BOD) were found to have mean concentrations that differed among sites. The calendar year 2002 was an extreme drought year and 2003 ranked third for the amount of annual precipitation. The drought was broken at the end of 2002 after tidal waters monitoring had stopped. The four additional parameter in 2003 (TSS, TP, Total Copper and Total Zinc) may have exhibited differences due to the increase runoff occasioned by the increase in precipitation. Those same parameters were found to be significantly different in 2004. Precipitation (45.67 inches) was slightly above average for 2004 compared to 62.66 inches in 2003.

There were few changes in the relative ranking of the sites from highest to lowest between years for the five parameters that were found to have a significant difference among sites. Both the TS and chloride parameters Bear Creek (BC) and Patapsco River (PR) sites had the highest concentrations. This would indicate that these sites had the highest mean salinity. Back River (BR), again, had significantly higher TKN concentrations than the other six sites. This is probably due to the presence of the Back River WWTP. Bear Creek (BC) and Patapsco River (PR) also have relatively high TKN concentrations. This may also be related to the relatively poorer connection with open bay waters and the presence of algal populations, which would increase the organic nitrogen concentration. Total Phosphorus mean concentrations followed the same pattern as TKN mean concentrations. The presence of the Back River WWTP could account for the elevated concentrations of Total Phosphorus.

The Patapsco River (PR) site had a higher mean concentration of total lead and total copper than the other six sites. The shoreline adjacent to this monitoring is down stream from the Dundalk Marine Terminal, which with the associated industrial activity may have resulted in slightly elevated metal concentrations. Back River and Bear Creek also

had relatively higher concentrations of metals. This could be due in part to the more urban nature of these drainage areas, historical input from industrial activities, or current industrial activities.

Bear Creek followed by the Patapsco River (PR) and the Back River (BR) sites had significantly higher biological oxygen demand than the other four sites. All three of these sites had elevated TKN levels. This could indicate that all three sites had a greater algal population than the other sites. This would result in an increase in the biological oxygen demand.

The data would indicate that Back River, Bear Creek and the Patapsco River site are more impacted than the other four sites. This finding is consistent with the Chesapeake Bay program that lists Baltimore Harbor, which includes the Bear Creek and Patapsco River sites as a Region of Concern based on pollutant levels. The Chesapeake Bay Program lists Back River as an Area of Emphasis also based on levels of pollutants. These areas are currently undergoing an analysis for the purposes of determining a Total Maximum Daily Load (TMDL) for both toxics and nutrients.

A graphical comparison between years for each pollutant and site was conducted. The results are presented in Figure 10-9.

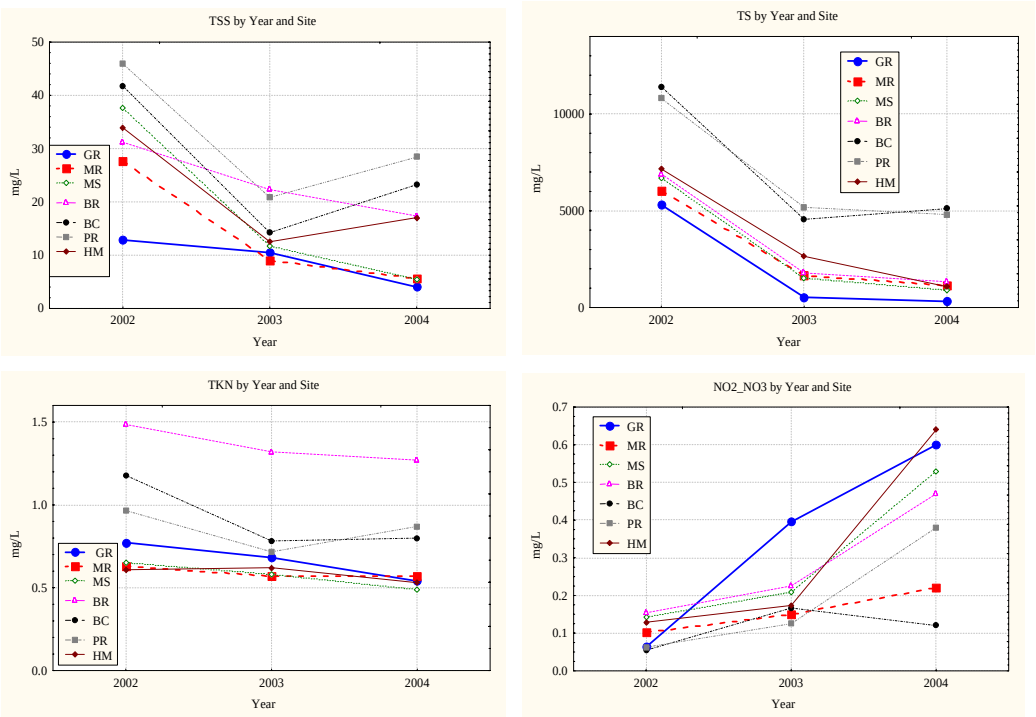

Figure 10-9: Pollutant Between Year Variation by Site.

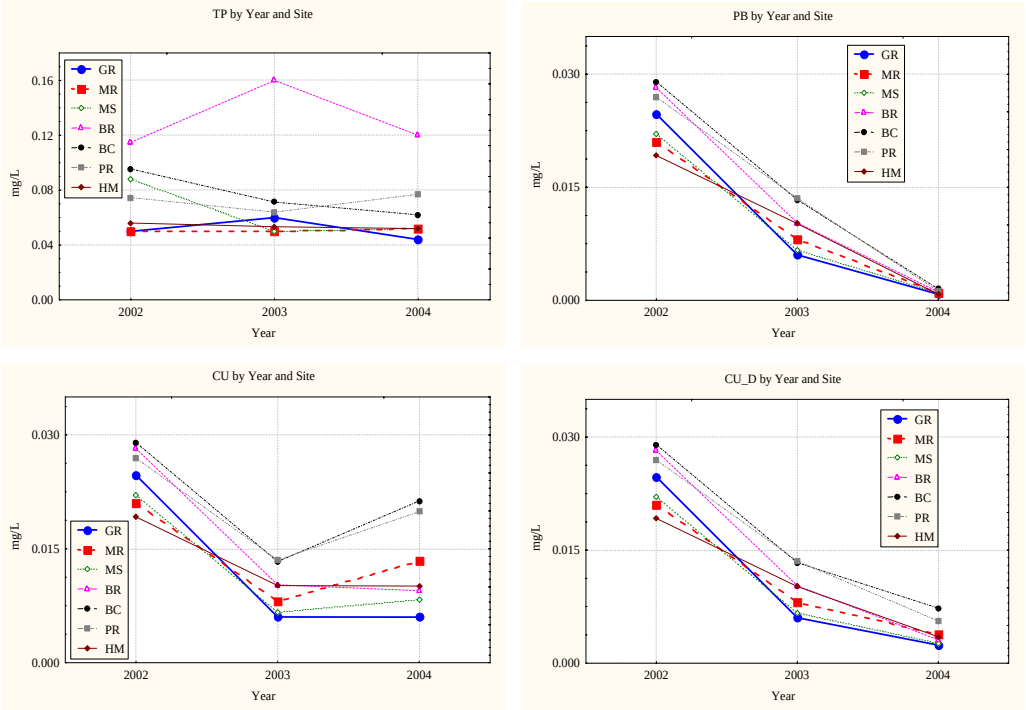

Figure 10-9: Pollutant Between Year Variation by Site (continued).

For Total Suspended Solids (TSS) and Total Solids (TS), as well as metals (represented by copper and lead) a noted decrease in concentrations for all sites can be noted between 2002 and 2003. In 2004 these Total Solids had approximately the same concentration as in 2003. While TSS and Total Copper had some sites with a slight increase in concentration and some with a slight decrease. Dissolved Copper and Total Lead continued to decrease in 2004. The TS reduction between 2002 and 2003 is undoubtedly related to the reduced salinity that resulted from the increased runoff.

Nitrate/nitrite concentrations in 2004 (with the exception of Bear Creek) continued the increase send in 2003 at all sites relative to 2002. TKN concentrations, on the other hand, showed very slight increases or decreases at each site relative to 2003. Total Phosphorus concentration changes in 2004 were mixed with increases at some sites and decreases at other sites relative to 2003 concentrations. The analysis of Total Phosphorus for 2002 and 2003 is hampered by the relatively high detection limit (0.1 mg/L) that was used during the time period. The Baltimore County Department of Public Works laboratory has improved the methodology and since December 2003 has lower the detection limit to 0.02 mg/L.

Appendix 10-1: Baseflow Monitoring Sites by Watershed

Site ID	Subwatershed	Site ID	Subwatershed
Liberty Reservoir – 8 Sites			
LI-01	Cliffs Branch	LI-05	Timber Run
LI-02	Glen Falls Run	LI-06	Cooks Branch
LI-03	Keysers Run	LI-07	Chimney Branch
LI-04	Norris Run	LI-08	Locust Run
Patapsco River – 10 Sites			
PA-01	Mardella Run	PA-06	Cooper Branch
PA-02	Brice Run	PA-07	Patapsco River
PA-03	Granite Branch	PA-09	Soapstone Branch
PA-04	Ben's Run	PA-10	West Branch Herbert Run
PA-05	Patapsco River	PA-11	East Branch Herbert Run
Gwynns Falls – 10 Sites			
GW-01	Gwynns Falls – Glyndon	GW-06	Scotts Level Branch
GW-02	Gwynns Falls – Unnamed Trib.	GW-07	Powder Mill ?
GW-03	Holly Branch	GW-08	Dead Run – North Branch
GW-04	Red Run	GW-09	Dead Run – South Branch
GW-05	Horsehead Branch	GW-10	Dead Run – Mainstem
Jones Falls – 10 Sites			
JF-01	Western Run	JF-06	Roland Run
JF-02	Jones Falls – Upper Mainstem	JF-07	Roland Run
JF-03	North Branch	JF-08	Shaughterhouse Run
JF-04	Dipping Pond Run	JF-09	Moores Run
JF-05	Deep Run	JF-10	Towson Run
Back River – 10 Sites			
HR-01	West Branch – Herring Run	BR-02	Brians Run
HR-02	West Branch – Herring Run	BR-03	Redhouse Run
HR-03	East Branch – Herring Run	BR-04	Redhouse Run
HR-04	East Branch – Herring Run	BR-05A	Stemmers Run
BR-01	Bread and Cheese Creek	BR-06	Stemmers Run
Baltimore Harbor – 5 Sites			
BH-005	Bear Creek – Headwaters	BH-009	Bullneck Run
BH-006	Lynch Cove	BH-011	Tabasco Cove
BH-007	Charlesmont Cove		
Deer Creek – 4 Sites			
DC-01	Harris Mill	DC-03	Deer Creek – mainstem
DC-02	Ebaughs Creek	DC-04	Plumtree Branch
Prettyboy Reservoir – 5 Sites			
PB-01	Walker Run	PB-04	Georges Run
PB-02	Gunpowder Falls – Mainstem	PB-06	Frog Hollow Run
PB-03	Grave Run		
Loch Raven Reservoir – 28 Sites			
LR-02	Fitzhugh Run	LR-22 (GF1)	Gunpowder Falls - Glencoe
LR-03	Dulaney Valley Branch	LR-23	Charles Run
LR-04	Loch Raven Res. Unnamed Trib.	LR-24	Little Falls
LR-10 (LQ3)	Long Quarter Branch	LR-25	First Mine Branch
LR-11 (SB-3)	Spring Branch	LR-26	Second Mine Branch
LR-13 (BR1)	Beaver Dam Run – York Road	LR-27	Third Mine Branch
LR-14	Baisman Run	LR-28	Owl Branch
LR-15	Beaver Dam Run – Rises Court	LR-30	Beetree Run
LR-16	Oregon Branch	LR-31	Mingo Branch
LR-17 (WR1)	Western Run	LR-32	Black Rock Run – Western Run
LR-18	Green Branch	LR-34	McGill Run

Loch Raven Reservoir – 28 Sites			
LR-19 (OR1)	Overshot Run	LR-35	Piney Run
LR-20	Carroll Branch	LR-38	Delaware Run
LR-21	Piney Creek	LR-39	Slade Run
Lower Gunpowder Falls – 7 Sites			
GU-01	Bean Run	GU-06	Cowen Run
GU-03	Haystack Branch	GU-07	Jennifer Branch
GU-04	Long Green Creek – Hydes Rd.	GU-08	Minebank Run
GU-05	Long Green Creek – Hartley Mill		
Little Gunpowder Falls – 7 Sites			
LG-01	Nelson Branch	LG-05	Little Gunpowder Falls
LG-02	Parker Branch	LG-07	Little Gunpowder Falls
LG-03	Sawmill Branch	LG-09	Frannklinville Channel.
LG-04	Little Gunpowder Falls		
Bird River – 5 Sites			
BI-01	Windlass Run	BI-04	North Fork
BI-02	Honeygo Run	BI-05	Whitemarsh Run – Mainstem
BI-03	Whitemarsh Run - Headwaters		

Appendix 10-2: Baseflow Water Quality Data by Site

Site	Pollutant Parameter					
	Ph			TS		
	Mean	N	Std.Dev	Mean	N	Std.Dev
Deer Creek						
DC-01	7.29	6	0.38	114.0	6	41.0
DC-02	7.47	6	0.44	86.6	6	47.4
DC-03	7.53	6	0.50	59.4	6	52.2
DC-04	7.18	6	0.42	93.8	6	23.9
Prettyboy Reservoir						
PR-01	7.34	7	0.46	81.5	7	65.5
PR-02	8.09	7	0.33	93.7	7	7.8
PR-03	7.66	7	0.28	67.4	7	33.1
PR-04	8.22	7	0.69	112.3	6	50.2
PR-06	7.34	7	0.42	221.1	7	430.8
Loch Raven Reservoir						
LR-02	7.11	5	0.46	57.7	5	44.0
LR-03	7.84	6	0.31	153.4	6	77.3
LR-04	8.30	5	0.29	336.0	5	49.1
LR-10	8.34	5	0.28	384.6	5	104.1
LR-11	8.07	4	0.36	380.7	3	48.4
LR-12	7.77	1	0.00	146.0	1	0.0
LR-13	8.01	5	0.43	284.0	6	66.8
LR-14	7.09	4	0.31	56.6	5	21.6
LR-15	7.41	5	0.49	127.6	5	65.8
LR-16	8.08	5	0.35	147.8	5	37.6
LR-17	7.92	5	0.50	126.0	6	34.6
LR-18	7.80	5	0.39	174.2	5	19.3
LR-19	7.26	5	0.32	129.6	5	19.6
LR-20	7.37	5	0.45	97.2	5	24.3
LR-21	8.15	5	0.41	203.8	4	35.2
LR-22	7.46	5	0.38	70.7	6	43.2
LR-23	7.41	5	0.33	84.8	5	27.0
LR-24	7.62	5	0.40	77.5	4	35.3

Site	Pollutant Parameter					
	Ph			TS		
	Mean	N	Std.Dev	Mean	N	Std.Dev
Loch Raven Reservoir						
LR-25	7.60	5	.034	58.3	4	32.0
LR-26	7.55	5	0.36	98.5	4	3.7
LR-27	7.76	5	0.35	57.1	4	49.3
LR-28	7.25	6	0.40	96.8	4	3.4
LR-30	7.50	6	0.48	69.3	6	31.9
LR-31	7.41	5	0.23	170.4	5	30.2
LR-32	7.50	4	0.60	111.4	5	11.8
LR-33	6.96	5	0.67	117.6	5	15.1
LR-34	7.46	5	0.61	126.6	5	18.9
LR-35	7.43	5	0.58	139.6	5	26.1
LR-38	7.88	5	0.53	167.8	5	46.0
LR-39	7.29	5	0.44	99.0	5	21.3
Lower Gunpowder Falls						
GU-01	7.70	3	0.15	123.5	4	43.6
GU-02	7.58	1	0.00	165.0	1	0.0
GU-03	8.37	3	0.27	153.0	4	40.5
GU-04	7.96	3	0.51	94.3	4	92.0
GU-05	8.08	3	0.30	152.8	4	27.9
GU-06	8.09	3	0.17	182.0	4	63.3
GU-07	8.26	4	0.16	227.4	5	31.8
GU-08	7.73	4	0.18	417.8	4	8.5
Little Gunpowder Falls						
LG-01	7.44	5	0.37	81.4	5	50.5
LG-02	7.29	5	0.44	67.3	5	40.7
LG-03	7.41	5	0.51	74.0	5	41.3
LG-04	7.44	5	0.51	92.0	5	22.9
LG-05	7.67	5	0.54	72.5	4	45.5
LG-07	7.64	5	0.42	165.3	4	49.3
LG-08	7.16	1	0.00	105.0	1	0.0
LG-09	7.85	5	0.62	149.0	5	49.3
Bird River						
BI-01	6.39	5	0.49	90.3	4	64.7
BI-02	7.05	5	0.34	174.2	5	27.0
BI-03	8.04	5	0.44	283.4	5	51.5
BI-04	7.87	5	0.51	285.0	5	30.2
BI-05	7.98	5	0.48	333.6	5	39.1

Site	Pollutant Parameter					
	TKN			NO2-NO3		
	Mean	N	Std.Dev	Mean	N	Std.Dev
Deer Creek						
DC-01	.187	6	.070	3.658	5	.466
DC-02	.183	6	.096	4.062	5	.912
DC-03	.200	6	.086	3.790	5	.432
DC-04	.175	6	.120	2.662	5	1.170
Prettyboy Reservoir						
PR-01	.224	7	.097	2.738	6	1.430
PR-02	.159	7	.075	2.618	6	.588
PR-03	.119	7	.049	3.144	6	.843
PR-04	.206	7	.079	4.530	5	1.224

Site	Pollutant Parameter					
	TKN			NO2-NO3		
	Mean	N	Std.Dev	Mean	N	Std.Dev
Prettyboy Reservoir						
PR-06	.141	7	.071	2.302	6	.539
Loch Raven Reservoir						
LR-02	.140	5	.055	2.038	4	.710
LR-03	.123	6	.057	1.978	4	.434
LR-04	.100	5	.000	1.958	4	.223
LR-10	.198	5	.059	.983	4	.132
LR-11	.133	3	.058	1.857	3	.283
LR-12	.100	1	.000	2.830	1	.000
LR-13	.223	6	.198	1.387	3	.179
LR-14	.100	5	.000	1.188	4	.448
LR-15	.150	5	.069	2.465	4	.244
LR-16	.144	5	.098	2.135	4	.574
LR-17	.145	6	.073	2.930	4	1.106
LR-18	.100	5	.000	1.830	4	.486
LR-19	.122	5	.049	2.212	4	.280
LR-20	.126	5	.058	2.190	4	.537
LR-21	.100	5	.000	2.755	4	1.060
LR-22	.120	6	.049	2.208	4	.470
LR-23	.148	5	.067	1.058	4	.068
LR-24	.100	5	.000	2.695	4	.253
LR-25	.150	5	.069	3.100	5	.651
LR-26	.146	5	.064	3.600	5	.766
LR-27	.100	6	.000	3.028	5	.629
LR-28	.100	6	.000	2.028	5	.486
LR-30	.100	6	.000	2.746	5	.271
LR-31	.100	5	.000	1.340	4	.280
LR-32	.100	5	.000	2.837	4	1.001
LR-33	.136	5	.080	4.745	4	1.280
LR-34	.122	5	.049	4.685	4	1.929
LR-35	.192	5	.094	4.565	4	1.827
LR-38	.120	5	.045	3.425	4	.917
LR-39	.100	5	.000	1.428	4	.436
Lower Gunpowder Falls						
GU-01	.200	4	.073	1.360	3	.114
GU-02	.100	1	.000	2.660	1	.000
GU-03	.130	4	.060	2.820	3	.193
GU-04	.100	4	.000	3.587	3	.259
GU-05	.433	4	.217	2.883	3	.658
GU-06	.170	4	.076	1.820	3	.238
GU-07	.190	5	.083	1.235	4	.128
GU-08	.100	4	.000	1.443	3	.467
Little Gunpowder Falls						
LG-01	.306	5	.244	1.680	4	.471
LG-02	.142	5	.058	2.148	4	.616
LG-03	.100	5	.000	3.117	4	1.022
LG-04	.178	5	.119	4.026	5	1.443
LG-05	.132	5	.072	2.912	5	1.066
LG-07	.160	5	.055	4.980	4	1.787
LG-08	.210	1	.000	2.310	1	.000

Site	Pollutant Parameter					
	TKN			NO2-NO3		
	Mean	N	Std.Dev	Mean	N	Std.Dev
Little Gunpowder Falls						
LG-09	.100	5	.000	2.660	4	1.064
Bird River						
BI-01	.980	4	.175	.620	4	.225
BI-02	.258	5	.126	.972	5	.134
BI-03	.320	5	.075	.566	5	.045
BI-04	.692	5	.415	.580	5	.095
BI-05	.290	5	.111	.660	5	.100
Site	**Pollutant Parameter**					
	TN			**TP**		
	Mean	**N**	**Std.Dev**	**Mean**	**N**	**Std.Dev**
Deer Creek						
DC-01	3.842	5	.406	.027	6	.016
DC-02	4.240	5	.911	.035	6	.016
DC-03	3.980	5	.367	.035	6	.026
DC-04	2.812	5	1.190	.150	6	.309
Prettyboy Reservoir						
PR-01	2.948	6	1.460	.030	7	.019
PR-02	2.766	5	.557	.017	7	.010
PR-03	3.244	5	.843	.017	7	.010
PR-04	4.736	5	1.225	.016	7	.008
PR-06	2.453	6	5.35	.019	7	.019
Loch Raven Reservoir						
LR-02	2.188	4	.678	.018	5	.011
LR-03	2.113	4	.472	.023	6	.008
LR-04	2.058	4	.223	.030	5	.010
LR-10	1.180	4	.187	.020	5	.007
LR-11	1.990	3	.339	.023	3	.006
LR-12	2.930	1	.000	.010	1	.000
LR-13	1.563	3	.172	.030	6	.039
LR-14	1.288	4	.448	.012	5	.004
LR-15	2.593	4	.292	.018	5	.008
LR-16	2.290	4	.508	.020	5	.007
LR-17	3.098	4	1.075	.025	6	.005
LR-18	1.930	4	.486	.018	5	.008
LR-19	2.313	4	.280	.022	5	.013
LR-20	2.323	4	.512	.024	5	.011
LR-21	2.855	4	1.060	.022	5	.008
LR-22	2.337	4	.443	.018	6	.004
LR-23	1.183	4	.035	.022	5	.008
LR-24	2.795	4	.253	.016	5	.009
LR-25	3.250	5	.688	.020	5	.007
LR-26	3.746	5	.722	.022	5	.013
LR-27	3.128	5	.629	.014	5	.005
LR-28	2.210	4	.520	.020	6	.011
LR-30	2.857	4	.312	.018	6	.008
LR-31	1.440	4	.280	.016	5	.005
LR-32	2.938	4	1.001	.014	5	.009
LR-33	4.890	4	1.325	.024	5	.009
LR-34	4.813	4	1.914	.022	5	.013

Site	Pollutant Parameter					
	TN			TP		
	Mean	N	Std.Dev	Mean	N	Std.Dev
Loch Raven Reservoir						
LR-35	4.780	4	1.833	.020	5	.007
LR-38	3.550	4	.952	.014	5	.005
LR-39	1.528	4	.436	.024	5	.015
Lower Gunpowder Falls						
GU-01	1.575	2	.049	.030	4	.018
GU-02	2.760	1	.000	.010	1	.000
GU-03	3.025	2	.092	.013	4	.005
GU-04	3.630	2	.339	.010	4	.000
GU-05	3.320	2	.735	.053	4	.032
GU-06	1.970	2	.311	.055	4	.010
GU-07	1.377	3	.125	.022	5	.013
GU-08	1.290	2	.226	.025	4	.010
Little Gunpowder Falls						
LG-01	2.038	4	.629	.016	5	.005
LG-02	2.275	4	.585	.018	5	.013
LG-03	3.217	4	1.022	.016	5	.005
LG-04	4.204	5	1.384	.020	5	.007
LG-05	3.044	5	1.038	.018	5	.008
LG-07	5.130	4	1.786	.020	5	.007
LG-08	2.520	1	.000	.020	1	.000
LG-09	2.760	4	1.064	.022	5	.008
Bird River						
BI-01	1.600	4	.366	.108	4	.017
BI-02	1.230	5	.182	.018	5	.008
BI-03	.886	5	.120	.014	5	.005
BI-04	1.272	5	.459	.020	5	.012
BI-05	.950	5	.191	.014	5	.005

Site	Pollutant Parameter					
	CU			CU_D		
	Mean	N	Std.Dev	Mean	N	Std.Dev
Deer Creek						
DC-01	.0127	5	.0188	.0044	5	.0053
DC-02	.0053	5	.0088	.0024	5	.0037
DC-03	.0058	5	.0056	.0018	5	.0016
DC-04	.0065	5	.0086	.0023	5	.0033
Prettyboy Reservoir						
PR-01	.0031	6	.0063	.0016	6	.0027
PR-02	.0031	7	.0070	.0011	7	.0017
PR-03	.0052	7	.0089	.0014	7	.0020
PR-04	.0079	7	.0111	.0024	7	.0028
PR-06	.0120	6	.0156	.0032	6	.0035
Loch Raven Reservoir						
LR-02	.0043	5	.0077	.0025	5	.0042
LR-03	.0062	6	.0062	.0018	6	.0017
LR-04	.0071	5	.0078	.0032	5	.0038
LR-10	.0033	5	.0040	.0011	5	.0008
LR-11	.0078	3	.0073	.0025	3	.0018
LR-12	.0005	1	.0000	.0005	1	.0000
LR-13	.0138	6	.0192	.0040	6	.0042

Site	Pollutant Parameter					
	CU			CU_D		
	Mean	N	Std.Dev	Mean	N	Std.Dev
Loch Raven Reservoir						
LR-14	.0059	5	.0118	.0023	5	.0038
LR-15	.0049	5	.0096	.0023	5	.0038
LR-16	.0005	5	.0000	.0005	5	.0000
LR-17	.0034	6	.0053	.0013	6	.0014
LR-18	.0095	5	.0087	.0025	5	.0026
LR-19	.0077	5	.0054	.0135	5	.0260
LR-20	.0090	5	.0129	.0102	5	.0170
LR-21	.0055	5	.0077	.0023	5	.0033
LR-22	.0038	6	.0056	.0018	6	.0018
LR-23	.0038	5	.0039	.0010	5	.0010
LR-24	.0034	5	.0059	.0011	5	.0011
LR-25	.0060	5	.0072	.0024	5	.0024
LR-26	.0064	5	.0057	.0018	5	.0018
LR-27	.0054	5	.0051	.0020	5	.0015
LR-28	.0088	5	.0089	.0036	5	.0029
LR-30	.0059	5	.0074	.0027	5	.0030
LR-31	.0033	5	.0040	.0013	5	.0012
LR-32	.0043	5	.0029	.0013	5	.0007
LR-33	.0024	5	.0025	.0010	5	.0006
LR-34	.0054	5	.0048	.0020	5	.0015
LR-35	.0079	5	.0047	.0027	5	.0015
LR-38	.0074	5	.0076	.0030	5	.0037
LR-39	.0054	5	.0076	.0021	5	.0028
Lower Gunpowder Falls						
GU-01	.0070	3	.0113	.0027	3	.0038
GU-02	.0005	1	.0000	.0005	1	.0000
GU-03	.0038	3	.0038	.0010	3	.0009
GU-04	.0007	3	.0003	.0007	3	.0003
GU-05	.0014	3	.0014	.0007	3	.0003
GU-06	.0125	3	.0105	.0048	3	.0039
GU-07	.0095	4	.0110	.0030	4	.0031
GU-08	.0083	3	.0136	.0030	3	.0043
Little Gunpowder Falls						
LG-01	.0043	5	.0050	.0019	5	.0019
LG-02	.0050	5	.0062	.0024	5	.0024
LG-03	.0055	5	.0084	.0033	5	.0033
LG-04	.0053	5	.0083	.0038	5	.0038
LG-05	.0083	5	.0081	.0033	5	.0034
LG-07	.0085	5	.0095	.0037	5	.0048
LG-08	.0080	1	.0000	.0020	1	.0000
LG-09	.0083	5	.0117	.0031	5	.0040
Bird River						
BI-01	.0109	4	.0096	.0039	4	.0037
BI-02	.0172	5	.0100	.0058	5	.0029
BI-03	.0168	5	.0135	.0049	5	.0039
BI-04	.0125	5	.0111	.0039	5	.0032
BI-05	.0222	5	.0188	.0064	5	.0056

Site	Pollutant Parameter					
	PB			PB_D		
	Mean	N	Std.Dev	Mean	N	Std.Dev
Deer Creek						
DC-01	.0009	5	.0007	.0005	5	.0000
DC-02	.0009	5	.0007	.0006	5	.0002
DC-03	.0007	5	.0003	.0005	5	.0000
DC-04	.0006	5	.0002	.0005	5	.0000
Prettyboy Reservoir						
PR-01	.0006	6	.0002	.0005	6	.0000
PR-02	.0007	7	.0003	.0005	7	.0000
PR-03	.0012	7	.0017	.0007	7	.0006
PR-04	.0013	7	.0017	.0006	7	.0002
PR-06	.0011	6	.0007	.0006	6	.0002
Loch Raven Reservoir						
LR-02	.0006	5	.0002	.0005	5	.0000
LR-03	.0007	5	.0003	.0005	6	.0000
LR-04	.0006	5	.0002	.0005	5	.0000
LR-10	.0005	5	.0000	.0005	5	.0000
LR-11	.0015	3	.0006	.0005	3	.0000
LR-12	.0005	1	.0000	.0005	1	.0000
LR-13	.0016	6	.0009	.0006	6	.0002
LR-14	.0015	5	.0015	.0007	5	.0003
LR-15	.0017	5	.0024	.0008	5	.0007
LR-16	.0006	5	.0002	.0005	5	.0000
LR-17	.0007	6	.0003	.0005	6	.0000
LR-18	.0007	5	.0003	.0005	5	.0000
LR-19	.0007	5	.0003	.0005	5	.0000
LR-20	.0007	5	.0003	.0005	5	.0000
LR-21	.0009	5	.0007	.0006	5	.0002
LR-22	.0018	6	.0025	.0006	6	.0002
LR-23	.0005	5	.0000	.0005	5	.0000
LR-24	.0006	5	.0002	.0005	5	.0000
LR-25	.0007	5	.0003	.0005	5	.0000
LR-26	.0008	5	.0003	.0005	5	.0000
LR-27	.0006	5	.0002	.0005	5	.0000
LR-28	.0012	5	.0008	.0006	5	.0002
LR-30	.0014	5	.0015	.0008	5	.0007
LR-31	.0006	5	.0002	.0005	5	.0000
LR-32	.0005	5	.0000	.0005	5	.0000
LR-33	.0006	5	.0002	.0005	5	.0000
LR-34	.0006	5	.0002	.0005	5	.0000
LR-35	.0007	5	.0003	.0005	5	.0000
LR-38	.0006	5	.0002	.0005	5	.0000
LR-39	.0006	5	.0002	.0005	5	.0000
Lower Gunpowder Falls						
GU-01	.0008	3	.0003	.0005	3	.0000
GU-02	.0005	1	.0000	.0005	1	.0000
GU-03	.0005	3	.0000	.0005	3	.0000
GU-04	.0007	3	.0003	.0005	3	.0000
GU-05	.0005	3	.0000	.0005	3	.0000
GU-06	.0007	3	.0003	.0005	3	.0000
GU-07	.0008	4	.0003	.0005	4	.0000

Site	Pollutant Parameter					
	PB			PB_D		
	Mean	N	Std.Dev	Mean	N	Std.Dev
Lower Gunpowder Falls						
GU-08	.0007	3	.0003	.0005	3	.0000
Little Gunpowder Falls						
LG-01	.0010	5	.0006	.0006	5	.0002
LG-02	.0011	5	.0011	.0006	5	.0002
LG-03	.0009	5	.0007	.0006	5	.0002
LG-04	.0007	5	.0003	.0005	5	.0000
LG-05	.0008	5	.0003	.0005	5	.0000
LG-07	.0011	5	.0011	.0006	5	.0002
LG-08	.0005	1	.0000	.0005	1	.0000
LG-09	.0009	5	.0007	.0006	5	.0002
Bird River						
BI-01	.0020	4	.0008	.0010	4	.0007
BI-02	.0011	5	.0005	.0006	5	.0002
BI-03	.0019	5	.0029	.0008	5	.0007
BI-04	.0011	5	.0008	.0006	5	.0002
BI-05	.0025	5	.0026	.0009	5	.0007

Site	Pollutant Parameter					
	ZN			ZN_D		
	Mean	N	Std.Dev	Mean	N	Std.Dev
Deer Creek						
DC-01	.0036	5	.0048	.0011	5	.0011
DC-02	.0093	5	.0059	.0039	5	.0033
DC-03	.0060	5	.0028	.0016	5	.0009
DC-04	.0055	5	.0052	.0020	5	.0023
Prettyboy Reservoir						
PR-01	.0037	6	.0049	.0010	6	.0008
PR-02	.0049	7	.0035	.0011	7	.0007
PR-03	.0046	7	.0043	.0014	7	.0008
PR-04	.0059	7	.0056	.0019	7	.0019
PR-06	.0059	6	.0080	.0021	6	.0030
Loch Raven Reservoir						
LR-02	.0039	5	.0030	.0011	5	.0005
LR-03	.0033	6	.0032	.0011	6	.0010
LR-04	.0020	5	.0034	.0008	5	.0007
LR-10	.0065	5	.0063	.0021	5	.0022
LR-11	.0052	3	.0048	.0018	3	.0019
LR-12	.0010	1	.0000	.0010	1	.0000
LR-13	.0147	6	.0167	.0038	6	.0045
LR-14	.0016	5	.0025	.0008	5	.0007
LR-15	.0038	5	.0074	.0020	5	.0034
LR-16	.0027	5	.0037	.0009	5	.0007
LR-17	.0051	6	.0052	.0018	6	.0015
LR-18	.0053	5	.0067	.0019	5	.0020
LR-19	.0053	5	.0073	.0023	5	.0038
LR-20	.0047	5	.0064	.0025	5	.0033
LR-21	.0049	5	.0090	.0021	5	.0033
LR-22	.0036	6	.0045	.0013	6	.0014
LR-23	.0034	5	.0028	.0012	5	.0008
LR-24	.0045	5	.0037	.0012	5	.0008

Site	Pollutant Parameter					
	ZN			ZN_D		
	Mean	N	Std.Dev	Mean	N	Std.Dev
Loch Raven Reservoir						
LR-25	.0059	5	.0056	.0018	5	.0014
LR-26	.0075	5	.0040	.0021	5	.0010
LR-27	.0045	5	.0031	.0011	5	.0005
LR-28	.0013	5	.0015	.0005	5	.0000
LR-30	.0030	5	.0035	.0011	5	.0011
LR-31	.0051	5	.0061	.0014	5	.0011
LR-32	.0033	5	.0039	.0011	5	.0008
LR-33	.0039	5	.0063	.0013	5	.0015
LR-34	.0046	5	.0059	.0016	5	.0015
LR-35	.0037	5	.0044	.0011	5	.0008
LR-38	.0016	5	.0015	.0008	5	.0003
LR-39	.0026	5	.0027	.0010	5	.0006
Lower Gunpowder Falls						
GU-01	.0013	3	.0014	.0007	3	.0003
GU-02	.0005	1	.0000	.0005	1	.0000
GU-03	.0013	3	.0014	.0007	3	.0003
GU-04	.0005	3	.0000	.0005	3	.0000
GU-05	.0005	3	.0000	.0005	3	.0000
GU-06	.0023	3	.0032	.0010	3	.0009
GU-07	.0046	4	.0040	.0013	4	.0009
GU-08	.0073	3	.0021	.0017	3	.0006
Little Gunpowder Falls						
LG-01	.0059	5	.0047	.0019	5	.0013
LG-02	.0029	5	.0051	.0009	5	.0007
LG-03	.0071	5	.0139	.0025	5	.0037
LG-04	.0035	5	.0059	.0011	5	.0011
LG-05	.0036	5	.0045	.0016	5	.0019
LG-07	.0065	5	.0064	.0023	5	.0022
LG-08	.0005	1	.0000	.0005	1	.0000
LG-09	.0017	5	.0020	.0005	5	.0000
Bird River						
BI-01	.0094	4	.0086	.0029	4	.0028
BI-02	.0126	5	.0098	.0038	5	.0030
BI-03	.0043	5	.0060	.0017	5	.0014
BI-04	.0035	5	.0054	.0013	5	.0015
BI-05	.0182	5	.0166	.0052	5	.0044

Site	Pollutant Parameter					
	Chloride			Hardness		
	Mean	N	Std.Dev	Mean	N	Std.Dev
Deer Creek						
DC-01	39.39	6	2.66	67.35	5	1.74
DC-02	17.24	6	1.84	71.54	5	10.91
DC-03	23.07	6	1.71	77.39	5	5.90
DC-04	30.24	6	3.02	66.60	5	18.25
Prettyboy Reservoir						
PR-01	17.74	6	9.66	54.95	6	12.80
PR-02	16.03	6	3.61	78.27	7	12.38
PR-03	17.82	6	4.44	55.78	7	5.26
PR-04	32.57	6	8.13	87.56	7	11.19

Site	Pollutant Parameter					
	Chloride			Hardness		
	Mean	N	Std.Dev	Mean	N	Std.Dev
Prettyboy Reservoir						
PR-06	20.18	6	3.97	42.01	6	9.36
Loch Raven Reservoir						
LR-02	23.88	4	2.60	54.46	5	8.97
LR-03	36.10	5	18.20	117.42	6	39.92
LR-04	61.75	4	5.63	350.76	5	41.54
LR-10	111.74	4	27.77	353.78	5	49.86
LR-11	92.86	3	7.49	344.52	3	22.56
LR-12	26.69	1	0.00	90.42	1	0.00
LR-13	80.19	5	3.81	237.20	6	19.55
LR-14	23.93	4	3.86	34.92	5	5.23
LR-15	47.57	4	9.44	81.64	5	20.15
LR-16	42.00	4	14.01	135.46	4	40.86
LR-17	24.55	6	8.39	123.24	5	4.34
LR-18	46.68	5	9.48	129.23	5	13.84
LR-19	50.74	5	8.42	92.92	5	15.29
LR-20	17.51	5	4.58	61.44	5	6.45
LR-21	68.95	4	15.49	156.93	5	32.50
LR-22	25.99	6	6.69	62.84	6	6.91
LR-23	17.54	5	1.21	53.88	5	3.47
LR-24	26.96	5	1.74	72.53	5	5.96
LR-25	18.13	5	3.64	63.63	5	13.79
LR-26	22.21	5	4.74	70.59	5	9.39
LR-27	22.59	5	5.09	68.09	5	5.54
LR-28	35.86	5	6.11	59.56	5	5.23
LR-30	28.10	6	1.89	59.84	5	11.65
LR-31	84.57	5	19.28	77.87	5	4.47
LR-32	32.55	5	11.99	97.24	4	1.37
LR-33	38.67	5	10.99	88.29	4	27.93
LR-34	34.12	5	16.66	92.43	4	4.34
LR-35	38.76	5	16.59	92.70	4	3.80
LR-38	25.17	5	7.70	203.44	4	20.91
LR-39	14.11	5	5.10	62.95	4	1.44
Lower Gunpowder Falls						
GU-01	24.40	4	2.83	150.36	3	25.19
GU-02	49.78	1	0.00	71.09	1	0.00
GU-03	20.90	4	0.06	144.58	3	30.18
GU-04	23.99	4	2.91	140.70	3	36.86
GU-05	22.00	4	0.79	160.45	3	25.07
GU-06	37.09	4	4.97	183.76	3	60.33
GU-07	74.03	5	9.86	183.73	4	33.85
GU-08	109.09	4	7.46	346.45	3	27.39
Little Gunpowder Falls						
LG-01	26.68	4	4.67	71.50	5	5.38
LG-02	20.94	4	4.61	50.78	5	6.99
LG-03	50.40	4	16.52	66.18	5	3.60
LG-04	40.23	5	13.78	60.20	5	8.95
LG-05	23.78	5	7.27	60.51	5	4.94
LG-07	60.73	5	22.67	90.98	5	10.15
LG-08	3.92	1	0.00	42.69	1	0.00

Site	Pollutant Parameter					
	Chloride			Hardness		
	Mean	N	Std.Dev	Mean	N	Std.Dev
Little Gunpowder Falls						
LG-09	53.01	5	18.80	122.12	5	17.78
Bird River						
BI-01	23.34	4	16.21	83.36	3	36.99
BI-02	60.78	5	10.54	116.64	4	18.43
BI-03	136.22	5	48.66	179.71	4	18.41
BI-04	115.34	5	32.70	199.20	4	7.63
BI-05	153.49	5	39.45	216.85	4	20.09

Appendix 10-3: Tidal Waters Chemical Monitoring Results

Site	TSS			TS		
	Mean	N	Std.Dev	Mean	N	Std.Dev
GR	3.9	15	5.3	326.8	15	218.8
MR	5.7	15	8.2	1,200.7	15	523.5
MS	6.0	15	10.6	1,061.1	15	893.5
BR	17.2	15	11.3	1,417.5	15	687.1
BC	23.4	12	20.0	5,099.1	11	1,250.6
PR	29.8	12	22.9	5,059.3	11	1,697.9
HM	17.1	15	29.5	1,249.8	15	949.9

Site	TKN			NO_2-NO_3		
	Mean	N	Std.Dev	Mean	N	Std.Dev
GR	0.54	14	0.11	0.60	12	0.40
MR	0.56	14	0.12	0.24	12	0.29
MS	0.48	14	0.11	0.54	12	0.43
BR	1.27	14	0.44	0.50	12	0.46
BC	0.79	12	0.21	0.12	11	0.13
PR	0.82	11	0.68	0.39	11	0.34
HM	0.52	14	0.11	0.64	12	0.47

Site	TP			OP		
	Mean	N	Std.Dev	Mean	N	Std.Dev
GR	0.045	14	0.016	0.05	12	0.00
MR	0.051	14	0.021	0.05	12	0.00
MS	0.052	14	0.020	0.05	12	0.00
BR	0.116	14	0.040	0.05	12	0.00
BC	0.061	12	0.025	0.05	11	0.00
PR	0.074	11	0.077	0.05	11	0.00
HM	0.051	14	0.024	0.05	12	0.00

Site	CU			PB		
	Mean	N	Std.Dev	Mean	N	Std.Dev
GR	.0060	13	.0070	.0008	13	.0004
MR	.0134	13	.0095	.0010	13	.0006
MS	.0083	13	.0055	.0010	13	.0009
BR	.0095	13	.0062	.0011	13	.0007
BC	.0213	12	.0100	.0015	12	.0011
PR	.0199	11	.0115	.0012	11	.0008
HM	.0101	13	.0077	.0008	13	.0004

Site	ZN			BOD		
	Mean	N	Std.Dev	Mean	N	Std.Dev
GR	.0033	13	.0040	1.7	15	1.1
MR	.0045	13	.0047	1.8	15	1.1

Site	ZN			BOD		
	Mean	N	Std.Dev	Mean	N	Std.Dev
MS	.0041	13	.0046	1.4	15	0.8
BR	.0093	13	.0088	2.7	15	1.3
BC	.0136	12	.0157	3.4	11	1.8
PR	.0100	11	.0113	3.0	10	2.7
HM	.0046	13	.0040	1.6	15	1.0
Site	**COD**			**CL**		
	Mean	**N**	**Std.Dev**	**Mean**	**N**	**Std.Dev**
GR	12.7	15	12.0	187.7	15	180.3
MR	11.4	15	10.0	760.7	15	378.7
MS	9.9	15	10.1	663.2	15	595.2
BR	14.1	15	14.7	934.1	15	525.3
BC	19.3	13	22.4	3.167.9	11	1,605.3
PR	15.5	12	17.1	3,228.0	12	1,936.6
HM	16.4	15	18.8	797.6	15	638.0