

For Group B sites, sampling started in October 2004. Fixed date monthly samples were collected during the middle of each month for the last quarter of 2004. All samples were collected by hand with USGS depth integrating samplers. Samples were collected using the same protocol as Group A sites. At each site between 3- and 10-depth integrated verticals were collected across the water column and then composited to obtain a representative sample of the entire waterbody.

Whole water samples were collected to be analyzed for TN species, TP species, TOC, and SS. For Group B sites, SS samples were only collected during storm events. Additionally, filtered samples were collected to analyze for dissolved nitrogen (DN) and dissolved phosphorus (DP) species. All Pennsylvania samples were delivered to the PADEP Laboratory in Harrisburg to be analyzed the following workday. New York samples were sent to

Columbia Analytical Services in Rochester, N.Y., for analysis the following workday. SS concentrations for Group A sites were completed at SRBC and for Group B sites at the USGS sediment laboratory in Kentucky. The parameters and laboratory methods used are listed in Table 3.

PRECIPITATION

Precipitation data were obtained from long-term monitoring stations operated by the U.S. Department of Commerce. The data are published as Climatological Data—Pennsylvania, and as Climatological Data—New York by the National Oceanic and Atmospheric Administration (NOAA) at the National Climatic Data Center in Asheville, North Carolina. Quarterly and annual data from these sources were compiled across the

Table 3. Water Quality Parameters, Laboratory Methods, and Detection Limits

Parameter	Laboratory	Methodology	Detection Limit (mg/l)	References
Total Ammonia (TNH4)	PADEP	Colorimetry	0.020	USEPA 350.1
	CAS*	Colorimetry	0.050	USEPA 350.1
Dissolved Ammonia (DNH4)	PADEP	Block Digest, Colorimetry	0.020	USEPA 350.1
	CAS*	Block Digest, Colorimetry	0.050	USEPA 350.1
Total Nitrogen (TN)	PADEP	Persulfate Digestion for TN	0.040	Standard Methods #4500-N _{org} -D
Dissolved Nitrogen (DN)	PADEP	Persulfate Digestion	0.040	Standard Methods #4500-N _{org} -D
Total Kjeldahl Nitrogen (TKN)	CAS*	Block Digest, Flow Injection	0.050	USEPA 351.2
Dissolved Kjeldahl Nitrogen (DKN)	CAS*	Block Digest, Flow Injection	0.050	USEPA 351.2
Total Nitrite plus Nitrate (TNO23)	PADEP	Cd-reduction, Colorimetry	0.010	USEPA 353.2
	CAS*	Colorimetric by LACHAT	0.002	USEPA 353.2
Dissolved Nitrite plus Nitrate (DNO23)	PADEP	Cd-reduction, Colorimetry	0.010	USEPA 353.2
	CAS*	Colorimetric by LACHAT	0.002	USEPA 353.2
Dissolved Orthophosphate (DOP)	PADEP	Colorimetry	0.002	USEPA 365.1
	CAS*	Colorimetric Determination	0.002	USEPA 365.1
Dissolved Phosphorus (DP)	PADEP	Block Digest, Colorimetry	0.010	USEPA 365.1
	CAS*	Colorimetric Determination	0.002	USEPA 365.1
Total Phosphorus (TP)	PADEP	Persulfate Digest, Colorimetry	0.010	USEPA 365.1
	CAS*	Colorimetric Determination	0.002	USEPA 365.1
Total Organic Carbon (TOC)	PADEP	Combustion/Oxidation	0.50	SM 5310D
	CAS*	Chemical Oxidation	0.05	GEN 415.1/9060
Suspended Sediment (total)	SRBC	**		
	USGS	**		

* Columbia Analytical Services, Rochester, NY (New York sites only)

** TWRI Book 3, Chapter C2 and Book 5, Chapter C1, Laboratory Theory and Methods for Sediment Analysis (Guy and others, 1969)

subbasins of the Susquehanna River Basin and are reported in Table 4 for Group A sites. Average rainfall values for October through December for Group B sites are reported in Table 20. Due to high rainfalls in the summer (mostly from Tropical Storm Ivan), precipitation totals exceeded the LTM at all Group A sites for 2004.

WATER DISCHARGE

Water discharge data were obtained from the USGS and are listed in Table 5. Water discharges

were above the LTM at all Group A sites ranging from 127.7 percent of the LTM at Danville to 157.9 percent at Conestoga. These values were a direct effect of Tropical Storm Ivan during September 2004. High flows for September ranged from 10 percent of the annual flow at Conestoga to 19 percent of the annual flow at Newport. Figure 3 compares the 2004 discharges with the LTM discharges for each site.

Table 4. Summary for Annual Precipitation for Selected Areas in the Susquehanna River Basin, Calendar Year 2004

River Location	Season	Calendar Year 2004 Precipitation	Average Long-term Precipitation	Departure From Long-term
		inches	inches	inches
Susquehanna River above Towanda, Pa.	January-March	6.36	7.20	-0.84
	April-June	11.96	10.60	+1.36
	July-September	20.01	11.23	+8.78
	<u>October-December</u>	<u>8.57</u>	<u>8.72</u>	<u>-0.15</u>
	Yearly Total	46.90	37.75	+9.15
Susquehanna River above Danville, Pa.	January-March	6.31	7.25	-0.94
	April-June	12.18	10.70	+1.48
	July-September	20.19	11.48	+8.71
	<u>October-December</u>	<u>8.85</u>	<u>8.80</u>	<u>+0.05</u>
	Yearly Total	47.53	38.23	+9.30
West Branch Susquehanna River above Lewisburg, Pa.	January-March	8.67	8.06	+0.61
	April-June	13.29	11.23	+2.06
	July-September	24.59	12.66	+11.93
	<u>October-December</u>	<u>8.46</u>	<u>9.38</u>	<u>-0.92</u>
	Yearly Total	55.01	41.33	+13.68
Juniata River above Newport, Pa.	January-March	7.80	7.66	+0.14
	April-June	13.29	9.66	+3.63
	July-September	21.78	10.15	+11.63
	<u>October-December</u>	<u>7.77</u>	<u>8.80</u>	<u>-1.03</u>
	Yearly Total	50.64	36.27	+14.37
Susquehanna River above Marietta, Pa.	January-March	7.22	7.94	-0.72
	April-June	13.65	10.80	+2.85
	July-September	21.87	11.71	+10.16
	<u>October-December</u>	<u>8.77</u>	<u>9.10</u>	<u>-0.33</u>
	Yearly Total	51.51	39.55	+11.96
Conestoga River above Conestoga, Pa.	January-March	7.45	8.83	-1.38
	April-June	15.77	10.55	+5.22
	July-September	19.75	12.82	+6.93
	<u>October-December</u>	<u>9.28</u>	<u>10.06</u>	<u>-0.78</u>
	Yearly Total	52.25	42.26	+9.99