below the method detection limit (BMDL). This occurred for DNH_3 at all sites which changed from downward trends to no trends. Additionally, 2006 upward trends in DOP at Danville and Marietta changed to no trends in 2007. Trend changes from 2006 to 2007 also included SS at Lewisburg which changed from no trend due to BMDL in 2006 to a downward trend in 2007. This also occurred at Newport for dissolved kjeldahl nitrogen (DKN). No significant trends were found for flow.

INTRODUCTION

Nutrients and SS entering the Chesapeake Bay (Bay) from the Susquehanna River Basin contribute to nutrient enrichment problems in the Bay (USEPA, 1982). The Pennsylvania Department of Environmental Protection (PADEP) Bureau of Laboratories, the U.S. Environmental Protection Agency (USEPA), the U.S. Geological Survey (USGS), and the Susquehanna River Basin Commission (SRBC) conducted a 5-year intensive study at 12 sites from 1985-89 to quantify nutrient and SS transported to the Bay via the Susquehanna River Basin. In 1990, the number of sampling sites was reduced to five long-term monitoring stations. An additional site was included in 1994.

In October 2004, 13 additional sites (two in New York and 11 in Pennsylvania) were added as part of the Chesapeake Bay Program's Non-tidal Water Quality Monitoring Network. In October 2005, four more sites (three in New York and one in Maryland) were added to the existing network. This project involves monitoring efforts conducted by all six Bay state jurisdictions, the USEPA, USGS, and SRBC to create a uniform non-tidal monitoring network for the entire Bay watershed.

Purpose of Report

The purpose of this report is to present basic information on annual and seasonal loads and yields of nutrients and SS measured during calendar year 2007. Comparisons are made to LTM and to various baselines, including baselines created from the initial five years of data, the first half of the dataset, the second half of the dataset, and those created from the entire dataset for each site. Additionally, seasonal baselines were created using the initial five years of data from each site. Seasonal and annual variations in loads are discussed, as well as the results of flow-adjusted trend analyses for the period January 1985 through December 2007 for various forms of nitrogen and phosphorus, SS, TOC, and discharge.

DESCRIPTION OF THE SUSQUEHANNA RIVER BASIN

The Susquehanna River (Figure 1) drains an area of 27,510 square miles (Susquehanna River Basin Study Coordination Committee, 1970), and is the largest tributary to the Bay. The Susquehanna River originates in the Appalachian Plateau of southcentral New York, flows into the Valley and Ridge and Piedmont Provinces of Pennsylvania and Maryland, and joins the Bay at Havre de Grace, Md. The climate in the Susquehanna River Basin varies considerably from the low lands adjacent to the Bay in Maryland to the high elevations, above 2,000 feet, of the northern headwaters in central New York State. The annual mean temperature ranges from 53^{o} F (degrees Fahrenheit) near the Pennsylvania-Maryland border to 45^{o} F in the northern part of the basin. Annual precipitation in the basin averages 39.15 inches and is fairly well distributed throughout the year.

Land use in the Susquehanna River Basin, shown in Table 1, is predominantly rural with woodland accounting for 69 percent; agriculture, 21 percent; and urban, seven percent. Woodland occupies the higher elevations of the northern and western parts of the basin and much of the mountain and ridge land in the Juniata and Lower Susquehanna Subbasins. Woods and grasslands occupy areas in the lower part of the basin that are unsuitable for cultivation because the slopes are too steep, the soils are too stony, or the soils are poorly drained. The Lower Susquehanna Subbasin contains the highest density of agriculture operations within the watershed. However, extensive areas are cultivated along the river valleys in southern New York and along the West Branch Susquehanna River from Northumberland, Pa., to Lock Haven, Pa., including the Bald Eagle Creek Valley.

Figure 1. The Susquehanna River Basin, Subbasins, and Population Centers

Table 1. 2000 Land Use Percentages for the Susquehanna River Basin and Selected Tributaries

Site Location	Waterbody	Water/ Wetland	Urban	Agricultural			Forest	Other
				Row Crops	Pasture/Hay	Total		
Original Sites (Group A)								
Towanda	Susquehanna	2	5	17	5	22	71	0
Danville	Susquehanna	2	6	16	5	21	70	1
Lewisburg	West Branch Susquehanna	1	5	8	2	10	84	0
Newport	Juniata	1	6	14	4	18	74	1
Marietta	Susquehanna	2	7	14	5	19	72	0
Conestoga	Conestoga	1	24	12	36	48	26	1
Enhanced Sites (Group B)								
Campbell	Cohocton	3	4	13	6	19	74	0
Rockdale	Unadilla	3	2	22	6	28	66	1
Conklin	Susquehanna	3	3	18	4	22	71	1
Smithboro	Susquehanna	3	5	17	5	22	70	0
Chemung	Chemung	2	5	15	5	20	73	0
Wilkes-Barre	Susquehanna	2	6	16	5	21	71	0
Karthaus	West Branch Susquehanna	1	6	11	1	12	80	1
Castanea	Bald Eagle	1	8	11	3	14	76	1
Jersey Shore	West Branch Susquehanna	1	4	6	1	7	87	1
Penns Creek	Penns	1	3	16	4	20	75	1
Saxton	Raystown Branch Juniata	< 0.5	6	18	5	23	71	0
Dromgold	Shermans	1	4	15	6	21	74	0
Hogestown	Conodoguinet	1	11	38	6	44	43	1
Hershey	Swatara	2	14	18	10	28	56	0
Manchester	West Conewago	2	13	12	36	48	36	1
Martic Forge	Pequea	1	12	12	48	60	25	2
Richardsmere	Octoraro	1	10	16	47	63	24	2
Entire Basin	Susquehanna River Basin	2	7	14	7	21	69	1

Major urban areas in the Lower Susquehanna Subbasin include York, Lancaster, Harrisburg, and Sunbury, Pa. Most of the urban areas in the Upper and Chemung Subbasins are located along river valleys, and they include Binghamton, Elmira, and Corning, N.Y. Urban areas in the Middle Susquehanna include Scranton and Wilkes-Barre, Pa. The major urban areas in the West Branch Susquehanna Subbasin are Williamsport, Renovo, and Clearfield, Pa. Lewistown and Altoona, Pa., are the major urban areas within the Juniata Subbasin.

NUTRIENT MONITORING SITES

Data were collected from six sites on the Susquehanna River, three sites on the West Branch Susquehanna River, and 14 sites on smaller tributaries in the basin. These 23 sites, selected for long-term monitoring of nutrient and SS transport in the basin, are listed in Table 2, and their general locations are shown in Figure 2.

Table 2. Data Collection Sites and Their Drainage Areas

USGS ID Number	Original Sites (Group A)	Subbasin	Short Name	Drainage Area (Sq Mi)
01531500	Susquehanna River at Towanda, Pa.	Middle Susquehanna	Towanda	7,797
01540500	Susquehanna River at Danville, Pa.	Middle Susquehanna	Danville	11,220
01553500	West Branch Susquehanna River at Lewisburg, Pa.	W Branch Susquehanna	Lewisburg	6,847
01567000	Juniata River at Newport, Pa.	Juniata	Newport	3,354
01576000	Susquehanna River at Marietta, Pa.	Lower Susquehanna	Marietta	25,990
01576754	Conestoga River at Conestoga, Pa.	Lower Susquehanna	Conestoga	470
	Enhanced Sites (Group B)			
01502500	Unadilla River at Rockdale, N.Y.	Upper Susquehanna	Rockdale	520
01503000	Susquehanna River at Conklin, N.Y.	Upper Susquehanna	Conklin	2,232
01515000	Susquehanna River at Smithboro, N.Y.	Upper Susquehanna	Smithboro	4,631
01529500	Cohocton River at Campbell, N.Y.	Chemung	Campbell	470
01531000	Chemung River at Chemung, N.Y.	Chemung	Chemung	2,506
01536500	Susquehanna River near Wilkes-Barre, Pa.	Middle Susquehanna	Wilkes-Barre	9,960
01542500	West Branch Susquehanna River near Karthaus, Pa.	W Branch Susquehanna	Karthaus	1,462
01548085	Bald Eagle Creek near Castanea, Pa.	W Branch Susquehanna	Castanea	420
01549760	West Branch Susquehanna River near Jersey Shore, Pa.	W Branch Susquehanna	Jersey Shore	5,225
01555000	Penns Creek at Penns Creek, Pa.	Lower Susquehanna	Penns Creek	301
01562000	Raystown Branch Juniata River at Saxton, Pa.	Juniata	Saxton	756
01568000	Shermans Creek near Dromgold, Pa.	Lower Susquehanna	Dromgold	200
01570000	Conodoguinet Creek near Hogestown, Pa.	Lower Susquehanna	Hogestown	470
01573560	Swatara Creek near Hershey, Pa.	Lower Susquehanna	Hershey	483
01574000	West Conewago Creek near Manchester, Pa.	Lower Susquehanna	Manchester	510
01576787	Pequea Creek near Martic Forge, Pa.	Lower Susquehanna	Pequea	155
01578475	Octoraro Creek at Richardsmere, Md.	Lower Susquehanna	Richardsmere	177

SAMPLE COLLECTION AND ANALYSIS

Samples were collected to measure nutrient and SS concentrations during various flows in 2007. For Group A sites, two samples were collected per month: one near the twelfth of the month (fixed date sample) and one during monthly base flow conditions. Additionally, at least four high flow events were sampled, targeting one per season. When possible, a second high flow event was sampled after spring planting in the basin. During high flow sampling events, samples were collected daily during the rise and fall of the hydrograph. The goal was to gather a minimum of three samples on the rise and three samples on the fall, with one sample as close to peak flow as possible.

For Group B sites, fixed date monthly samples were collected during the middle of each month during 2007. Additionally, two storm samples were collected per quarter at each site. All samples were collected by hand with USGS depth integrating samplers. At each site between three 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 N and P species, TOC, TSS, 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 DP species. All Pennsylvania samples were delivered to the PADEP Laboratory in Harrisburg to be analyzed the following workday. SS concentrations for Group A sites were completed at SRBC, while concentrations for Group B sites were analyzed at the USGS sediment laboratory in Louisville, Kentucky. Additionally, one of each of the two storm samples per storm was submitted to the USGS sediment laboratory for analysis of sand/fine content. The parameters and laboratory methods used are listed in Table 3.