NUTRIENTS AND SUSPENDED SEDIMENT TRANSPORTED IN THE SUSQUEHANNA RIVER BASIN, 2003, AND TRENDS, JANUARY 1985 THROUGH DECEMBER 2003

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ABSTRACT

Nutrient and suspended-sediment (SS) samples were collected under base flow and stormflow conditions during calendar year 2003. The samples were collected from the Susquehanna River at Towanda, Danville, and Marietta; the West Branch Susquehanna River at Lewisburg; the Juniata River at Newport; and the Conestoga River at Conestoga, Pennsylvania, and analyzed for nitrogen and phosphorus species and SS.

Precipitation for 2003 was above average for all sites. Highest departures from the long-term averages were recorded at Conestoga with 14.68 inches above the long-term mean (LTM) leading to the highest flow at 176.2 percent of the LTM. Lowest departure from the mean was at Danville for rainfall, 1.54 above LTM, and at Lewisburg for flow at 147.3 percent of the LTM. No trends were found for flow.

This report utilizes five methods to determine whether nutrient and SS loads and yields are improving: (1) comparison with similar water year 1996; (2) comparison with initial 5-year baseline yields; (3) comparison with baseline data from beginning of program through 2002 (full program baseline); (4) comparison with the LTM; and (5) trend analysis through 2003.

Comparison with the year 1996 showed increases at Newport for total nitrogen (TN) and total phosphorus (TP) and increases for flow and TN at Conestoga. Baseline comparisons showed increases in TN and TP at Newport and an increase in TP at Marietta when compared to the initial 5-year baselines, and an increase in all three at Newport and an increase in TP for Marietta when compared to the full program baseline. Comparison with the LTM showed increases at Newport for TN, TP, and SS, increase in flow at Conestoga, and an increase in TP at Marietta. Trends in flow-adjusted concentrations (FACs) were found to be decreasing at Newport for TN and TP and no significant trend at Marietta for TP. TN, TP, and SS were shown to be decreasing at all other sites for all analysis methods.

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's (PADEP) Bureau of Laboratories, the U.S. Environmental Protection Agency (USEPA), and the Susquehanna River Basin Commission (SRBC) cooperated in a study to quantify nutrient and SS transported to the Bay via the Susquehanna River Basin.

Background

Given that the lower Susquehanna River Basin is a significant source of SS to the Bay, SRBC, in cooperation with the PADEP, USEPA, and the U.S. Geological Survey (USGS), conducted a 5-year intensive study at 14 sites from 1985-89. In 1990, the number of sampling sites was reduced to five long-term monitoring stations. An additional site was included in 1994, and sampling at these six sites has continued to the present day. Calculated annual loads and yields of nutrient and SS showed year-to-year variability that was highly correlated with the variability of the annual water discharge (Ott and