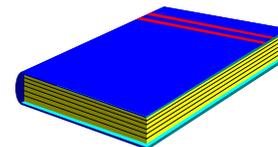


REPORT ANNOUNCEMENT

SUSQUEHANNA RIVER BASIN COMMISSION

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

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The Susquehanna River Basin Commission, in cooperation with the Pa. Department of Environmental Protection, U.S. Environmental Protection Agency, and U.S. Geological Survey, conducted a 5-year intensive study at 14 sites during the period 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.

The purpose of this report is to present basic information on annual and seasonal loads and yields of nutrients and suspended sediment (SS) measured during calendar year 2003 at these sites. Included in the report are several data comparisons aimed at removing the effects of flow in order to determine if improvements are occurring. This includes comparisons of 2003 values of total nitrogen (TN), total phosphorous (TP), and SS with the initial 5-year baseline data and with the full program baselines. Trends in flow-adjusted concentrations for the period 1985 through 2003 are also discussed.

Nutrient Monitoring Sites

Data were collected from three sites on the Susquehanna River and three sites on major tributaries in the basin during 2003. These six sites, selected for long-term monitoring of nutrient and SS transport in the basin, are:

1. Susquehanna River at Towanda, Pa.
2. Susquehanna River at Danville, Pa.
3. Susquehanna River at Marietta, Pa.
4. West Branch Susquehanna River at Lewisburg, Pa.
5. Juniata River at Newport, Pa.
6. Conestoga River at Conestoga, Pa.

Sample Collection and Analysis

Samples were collected at each of the sites to measure nutrient and SS concentrations during base flow and stormflow periods. Base flow samples were collected monthly by hand with depth-integrating samplers. Additionally, a monthly random sample was collected during the middle of each month, regardless of flow. Stormflow samples were collected daily from the start of the storm to the time when the flow receded to near its prestorm rate. These samples were collected by hand with depth-integrating samplers at all but the Conestoga River site, which is equipped with an automatic pumping sampler.

Precipitation

Precipitation data were summarized for 2003 for the Susquehanna River Watersheds above Towanda, Danville, and Marietta, Pa., and the West Branch Susquehanna, Juniata, and Conestoga River Watersheds. Precipitation ranged from 1.54 inches above normal in the watershed above Danville to 14.69 inches above normal in the Conestoga watershed.

Water Discharge

Mean water discharges for calendar year 2003 are listed, along with the long-term annual mean discharge and percent of long-term annual mean discharge for each site. The annual mean water discharge was above normal for all sites in 2003. Streamflow ranged from 147.3 percent of the long-term mean at Lewisburg to 176.2 percent at Conestoga.

Annual Nutrient and Suspended-Sediment Loads and Yields

Nutrient and SS loads were computed for each site for calendar year 2003. Loads were computed for total and dissolved ammonia, total and dissolved nitrite plus nitrate, total and dissolved nitrogen, total and dissolved organic nitrogen, dissolved orthophosphate, total and dissolved phosphorus, and suspended sediment.

The greatest loads of TN, TP, and SS were measured at Marietta, which represents the site with the greatest annual flow. The smallest loads of TN, TP, and SS were

at Conestoga, which represents the site with the lowest annual flow. The annual yields, in pounds per acre per year, of TN, TP, and SS were greatest from the Conestoga River at Conestoga, which has high concentrations of agriculture and urban. Lewisburg, which has a mostly forested watershed, had the lowest yields for TP and SS during 2003.

Seasonal Water Discharges and Nutrient and Suspended-Sediment Loads

Seasonal mean water discharges for calendar year 2003 at Towanda, Danville, Lewisburg, and Marietta were highest in the fall and lowest in the summer. This resulted in most constituents being higher during fall with the exception of SS, which was highest during the winter at each site. The 2003 seasonal discharges at Newport and Conestoga were highest in the winter. For Newport, this resulted in all parameters being highest during the winter, except for SS and all three forms of phosphorous. Conestoga flows were similar during fall, winter, and spring causing parameter highs to be mixed between these seasons. Total organic nitrogen was highest during winter for all sites regardless of flow.

Comparison of the 2003 Loads and Yields of Total Nitrogen, Total Phosphorus and Suspended Sediment with the Baselines

The annual fluctuations of nutrient and SS loads and water discharge make it difficult to determine whether the changes were related to land use, nutrient availability, or simply annual water discharge. In order to accomplish this, data during the initial 5-year sampling period were used to create a linear relationship between water discharge ratios (annual discharge/long term discharge) and annual yields. A second linear relationship was created using the entire dataset prior to 2003 for each site. The 2003 yields and discharge ratios were then plotted on these graphs to see where improvements may have occurred.

Comparison of the 2003 annual yields with the 5-year baselines indicated that there were decreases of TN at all sites except Newport. 2003 TP yields were higher than the baseline yields at Marietta and Newport. Comparisons of SS yields indicated that there were slight decreases at Marietta, Newport, and Conestoga, and significant decreases at Towanda, Danville, and Lewisburg during 2003.

Additionally, 2003 yields were compared with the yield baselines for the entire program history at each site. Results were similar to the 5-year baseline

comparison. Yields for TN, TP, and SS were lower than the baselines at all sites except for TP at Marietta and TN, TP, and SS at Newport.

Discharge, Nutrient, and Suspended-Sediment Trends

Trends for monthly mean flow and flow-adjusted concentration (FAC) were computed for the period January 1985 through December 2003 for flow, SS, total organic carbon, and several forms of nitrogen and phosphorus. Flow-adjusted trends represent the trends after the effects of flow have been removed. Trends in FAC indicate that changes have occurred in the processes that deliver constituents to the stream system. This is the concentration that relates to the effects of nutrient-reduction activities and other actions taking place in the watershed.

Trends in FAC indicate improving conditions in TN for all six sites within the Susquehanna River Basin. TP showed improving trends for all sites except Marietta, which showed no trends. Strong increasing trends were apparent for dissolved orthophosphate at all sites except Lewisburg and Conestoga. Improving trends in SS were found at all sites.

Appendix Showing Graphs of 2003 Storms and Nutrient Concentrations

2003 ended as one of the wettest years on record. As part of this program, four storms were sampled targeting one per season. An additional storm was sampled during the spring. Samples were collected daily throughout the storm at most sites and hourly at Conestoga. Appendix A of the report shows graphs of sample concentrations of TN, TP, and SS versus the flow for each storm.

This report is available on the Susquehanna River Basin Commission website at:

<http://www.srbc.net/techreport234.htm>

It also is available on compact disc.

For a copy, please contact:

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