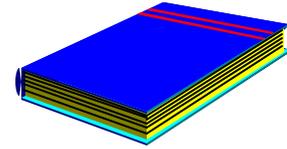


REPORT ANNOUNCEMENT

SUSQUEHANNA RIVER BASIN COMMISSION

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NUTRIENTS AND SUSPENDED SEDIMENT TRANSPORTED IN THE SUSQUEHANNA RIVER BASIN, 2001 AND TRENDS, JANUARY 1985 THROUGH DECEMBER 2001

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Pennsylvania entered into the Chesapeake Bay Agreement in 1983 with Maryland, Virginia, the District of Columbia, the USEPA, and the Chesapeake Bay Commission to assist in the effort to restore the Bay. This agreement was reaffirmed in 1987 and 1992, and significant efforts were undertaken to reduce nitrogen and phosphorus loads to the Bay.

Given that the lower Susquehanna River Basin is thought to be the single greatest source of suspended sediment to the Bay, SRBC, in cooperation with the Pa. DEP, USEPA, and the U.S. Geological Survey (USGS), 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. Calculated annual loads and yields of nutrient and suspended sediment showed year-to-year variability that was highly correlated with the variability of the annual water discharge (Ott and others, 1991; Takita, 1996, 1998). These studies also reinforced the indications from earlier studies that the highest nutrient yields come from the lower basin.

The purpose of this report is to present basic information on annual and seasonal loads and yields of nutrients and suspended sediment measured during calendar year 2001, and to compare the total nitrogen, total phosphorus, and suspended-sediment loads with the baselines established from the 1985-89 study. Seasonal variations in loads, and trends for the period January 1985 through December 2001 also are discussed.

This report includes sections on:

- Nutrient monitoring sites;
- Sample collection and analysis;
- Precipitation;

- Water discharge;
- Annual nutrient and suspended-sediment loads and yields;
- Seasonal water discharges and loads;
- Comparison of the 2001 loads and yields of total nitrogen, total phosphorus, and suspended sediment with the baselines; and
- Discharge, nutrient, and suspended-sediment trends.

Nutrient Monitoring Sites

Data were collected from three sites on the Susquehanna River and three sites on major tributaries in the basin. These six sites, selected for long-term monitoring of nutrient and suspended-sediment 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 suspended-sediment concentrations during baseflow and stormflow periods. Baseflow samples were collected monthly by hand with depth-integrating samplers. Storm- or high-flow samples were collected daily from the start of the storm to the time when the flow receded to near its pre-storm rate. Storm samples were collected by hand with depth-integrating samplers at all but the Conestoga River site, which is equipped with an automatic pumping sampler that collects a sample every half-hour.

Precipitation

Precipitation data were obtained from long-term stations operated by the U.S. Department of Commerce. Quarterly and annual precipitation data from these

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sources were summarized for 2001 for the Susquehanna River Watersheds above Towanda and Danville, Pa., the West Branch Susquehanna River and Juniata River Subbasins, the Susquehanna River Watershed above Marietta, Pa., and the Conestoga River Watershed. Precipitation ranged from 19.75 inches below normal in the Juniata Subbasin to 4.46 inches below normal in the watershed above Towanda.

Water Discharge

Mean water discharges for calendar year 2001 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 below normal for all sites in 2001. Streamflow ranged from 57.9 percent of the long-term mean at Conestoga to 72.8 percent at Towanda.

Annual Nutrient and Suspended-Sediment Loads and Yields

Nutrient and suspended-sediment loads were computed for each site for calendar year 2001. 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 total nitrogen, total phosphorus, and suspended sediment were measured at Marietta. The smallest loads of total nitrogen, total phosphorus, and suspended sediment were at Conestoga. The annual yields, in pounds per acre per year, of total nitrogen, total phosphorus, and suspended sediment were greatest from the Conestoga River at Conestoga.

Seasonal Water Discharges and Nutrient and Suspended-Sediment Loads

Seasonal mean water discharges for calendar year 2001 at Towanda, Danville, Lewisburg, Newport, and Marietta were highest in the spring (April-June), followed by winter (January-March), fall (October-December), then summer (July-September). The 2001 seasonal discharges at Conestoga were highest in the winter, followed by spring, summer, and fall. The 2001 seasonal discharges were greater than long-term discharges during the spring at Towanda. The seasonal

discharges were smaller than the long-term mean for all seasons at all other sites.

Comparison of the 2001 Loads and Yields of Total Nitrogen, Total Phosphorus and Suspended Sediment with the Baselines

Comparison of the 2001 annual yields and the 5-year baselines indicated that there were decreases of total nitrogen at all sites. Total phosphorus yields were higher than the baseline yields at Marietta, Towanda, Newport, and Conestoga and remained the same at Lewisburg and Danville. Comparisons of suspended-sediment yields indicated that there was an increase at Newport and Towanda and no change at the remaining four sites.

Discharge, Nutrient, and Suspended-Sediment Trends

Trends were computed for the period January 1985 through December 2001 for flow, suspended sediment, total organic carbon, and several forms of nitrogen and phosphorus. Results were reported for monthly mean flow, monthly load, monthly flow-weighted concentration, and flow-adjusted concentration. The results showed improving conditions in total nitrogen throughout the Susquehanna River Basin. Total phosphorus showed no trend at Towanda and Marietta, while all other sites showed improving conditions in total phosphorus for 2001. Improving conditions in suspended sediment occurred at Danville and Conestoga while all other sites showed no trend.

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

<http://www.srbc.net/techreport225.htm>

It also is available on compact disc.

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