SUSQUEHANNA RIVER BASIN COMMISSION

SUMMARY REPORT

Assessment of Interstate Streams in the Susquehanna River Basin

January 1, 2009 – December 31, 2009

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The Susquehanna River Basin Commission (SRBC) established the Interstate Stream Monitoring Program in 1986 to collect data that were not available from monitoring programs implemented by state agencies in New York, Pennsylvania, and Maryland. The primary purpose of the program is to collect water quality data, assess biological conditions, and rate physical habitat at many of the more than 80 streams that cross state lines in the Susquehanna basin.

The water quality data collected in the Interstate Streams Monitoring Program are used in a variety of ways, including assessing streams for compliance with state water quality standards, characterizing stream quality and seasonal variations, providing information to SRBC's member states for Integrated Listing requirements and possible Total Maximum Daily Load development, and identifying areas for restoration and protection. Biological conditions are assessed using benthic macroinvertebrate and fish populations, which provide an indication of the biological health of a stream and serve as indicators of water quality. Habitat assessments provide information concerning potential stream impairment from erosion and sedimentation, as well as an indication of the stream's ability to support a healthy biological community.

SRBC monitors and submits an annual report on the water quality and biological conditions of more than 50 locations on these interstate streams (Figure 1). Reports and summaries for previous years are also available at http://www.srbc.net/pubinfo/techdocs/Publications/techreports.htm.

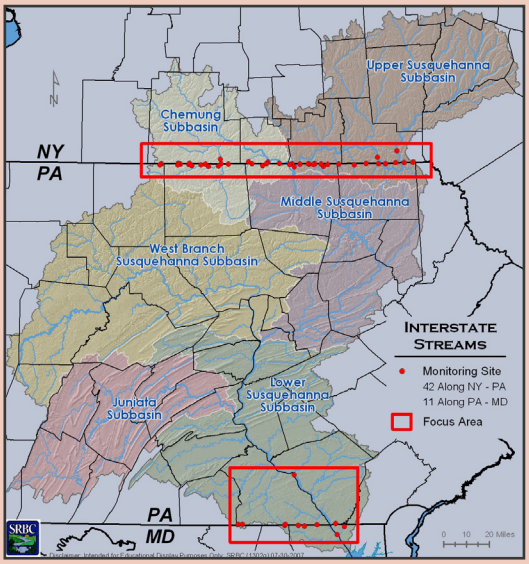

Figure 1. Locations of Interstate Streams Sampling Sites

Methods

The interstate streams are divided into three groups based on the degree of water quality impairment, historical water quality impacts, and potential for degradation (Table 1).

Table 1. Explanation of Sites

Group	Potential for Impacts	Sampling Frequency
1	Highest	Quarterly water quality, annual biological and habitat assessment
2	Moderate	Annual water quality, biological, and habitat assessment
3	Low	Annual field chemistry, biological, and habitat assessment

The CY-09 Interstate Streams report contains analyses of monitoring data from January 1, 2009, to December 31, 2009. Stream discharge data were obtained from U.S. Geological Survey gages or were measured instream, unless high stream flows made access impossible. Depth-integrated water samples were collected at each of the sites and field chemistry measurements were performed to determine certain parameters. Nutrient and metal concentrations were analyzed at the Pennsylvania Department of Environmental Protection Bureau of Laboratories. Benthic macroinvertebrates were collected using Rapid Bioassessment Protocol III protocols at Group 1 and 2 sites during July and August 2009. Macroinvertebrates were collected at Group 3 sites during May 2009. Macroinvertebrate data analysis was based on an evaluation of seven metrics, which included taxonomic richness; Shannon Diversity Index; Modified Hilsenhoff Biotic Index; Ephemeroptera, Plecoptera, Trichoptera (EPT) Index; percent Ephemeroptera; percent dominant taxa; and percent Chironomidae. A five-year trend graph of biological conditions for each site is available on the web site. Fish community data were collected by electrofishing, consisting of two passes over 75 meters, at 18 out of 23 wadeable Group 1 and 2 sites during May 2009. All fish were identified to species except sculpins (Cottus), which were identified to genus. The fish Index of Biotic Integrity (IBI) used by the Maryland Biological Stream Survey (MBSS) was adapted and used to analyze fish populations at interstate stream sites.

Eleven habitat parameters were evaluated at all sites. These parameters included epifaunal substrate, instream cover, embeddedness, velocity/depth regimes, sediment deposition, channel flow status, channel alteration, frequency of riffles, condition of banks, vegetative protective cover, and riparian vegetative zone width.

Results of laboratory water quality analyses for chemical parameters were compared to state water quality standards. In addition, a simple water quality index (WQI) was calculated, and values that exceeded the 90th percentile for each grouping were noted. A five-year trend graph of water quality for each site is available on the web site. Additionally, long-term trends analysis of water quality data at Group 1 sites was conducted using a Seasonal Kendall Test.

Reference sites are selected based on the best combination of water quality, biological conditions, and physical habitat. In 2009, reference sites were Little Snake Creek (LSNK 7.6) for the NY-PA streams, Falling Branch Deer Creek (FBDC 4.1) for the PA-MD streams, and Susquehanna River 340 at Windsor, Pa., for the large river sites. The reference site for Group 3 streams was Sackett Creek (SACK).

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Water Quality

Water quality at Group 1 streams was sampled quarterly in 2009, while Group 2 streams were sampled once. Field chemistry was performed at Group 3 streams once. All data were analyzed together and are presented below. Water quality in 39 percent of Group 1 and 2 interstate streams sites met designated use classes, with no parameters exceeding water quality standards. Nineteen out of the 31 sites had parameters exceeding standards, with 16 of those having more than one violation. The parameter that most frequently exceeded water quality standards was total aluminum, followed by total iron (Figure 2). Total iron and total aluminum appear to be naturally high in some of these watersheds but still exceed New York water quality standards. The Tioga River is the only waterway that has documented abandoned mine drainage indicated by high metals and high acidity. The Pennsylvania-Maryland border streams are located in a heavily agricultural region, and nutrient concentrations were high at many of these sites.

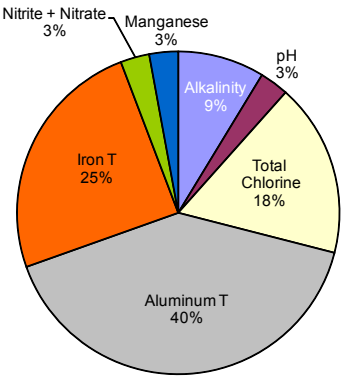

Figure 2. Parameters Exceeding Water Quality Standards

Water Quality Trends Analysis

Trends in flow-adjusted concentrations of nine constituents were analyzed at Group 1 sites for the entire period of record (1986–2009) using a Seasonal Kendall Test. In order for a trend to be considered increasing or decreasing, the p value must be less than 0.05. A p value of greater than 0.05 indicated that no trend was observed. The constituents with the highest number of sites showing a decreasing trend included total sulfate, phosphorus, ammonia, manganese, and iron, respectively. Only total chlorides and total solids were shown to be increasing in flow-adjusted concentration (Table 2).

Table 2. Number of Sites that Were Increasing, Decreasing, or Showed No Trend for Constituents of Concern

Constituent	Increasing	None	Decreasing	NA
Total Solids	3	14	3	1
Total Nitrogen		5	1	15
Total Ammonia		7	11	3
Total Phosphorus		8	13	
Total Chlorides	11	9		1
Total Sulfate		2	18	1
Total Iron		11	9	1
Total Manganese		11	9	1
Total Aluminum		18	2	1

Biological Condition: Macroinvertebrate Communities

In 2009, 16 of the 51 interstate streams sites at which macroinvertebrate samples were collected contained nonimpaired IBI scores. Biological conditions at another 22 sites were slightly impaired, while 13 sites were moderately impaired (Figure 3). No sites were designated severely impaired. The predominant reasons for low macroinvertebrate IBI metric scores at these sites were low EPT Index values, high percent dominant taxa, and poor Hilsenhoff Index values, respectively.

Biological Condition: Fish Communities

In 2009, fish sampling occurred at 18 Group 1 and 2 interstate stream sites. Large river sites, including all interstate sites on the Chemung, Cowanesque, Susquehanna, and Tioga Rivers, were not sampled for fish because of size restrictions. Fish sampling at five additional sites will occur in 2010. Of the 18 sites where fish community data were collected, nine sites earned a good fish IBI score, while eight were rated fair and one was rated poor (Figure 4).

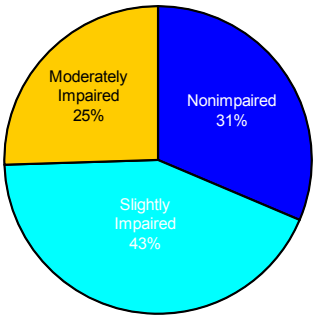

Figure 3. CY-09 Macroinvertebrate IBI Rating

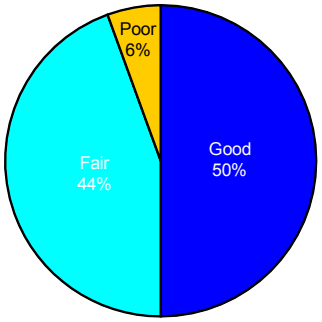

Figure 4. CY-09 Fish IBI Rating

Physical Habitat Conditions

Out of 51 sites where physical habitat was assessed in 2009, 28 sites were rated excellent. Physical habitat was rated supporting at 14 sites, seven sites had partially supporting habitats, and two sites were designated as having nonsupporting habitat (Figure 5). The most common habitat concerns throughout all interstate streams sites in 2009 were riparian vegetative zone width, condition of banks, channel flow status, and instream cover, respectively.

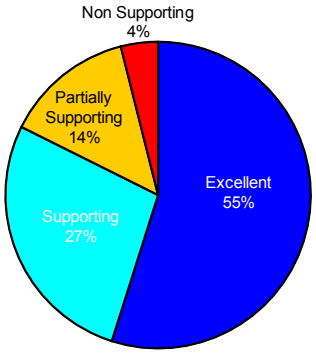

Figure 5. CY-09 Physical Habitat Rating

SRBC's Interstate Streams Monitoring Program is funded, in part, through a grant from the U.S. Environmental Protection Agency.

SRBC uses a web-based report format to make the Interstate Streams data more easily accessible to government agencies and the general public. This document is a companion publication for the calendar year 2009 (CY-09) web-based report and summarizes all the findings. The full web-based report can be found online at http://www.srbc.net/interstate_streams. Data for these interstate stream sites, both current and historical, are available by contacting SRBC.