
ASSESSMENT OF INTERSTATE STREAMS IN THE SUSQUEHANNA RIVER BASIN

Monitoring Report No. 16
July 1, 2001, Through June 30, 2002

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ABSTRACT

The Susquehanna River Basin Commission (SRBC) used a water quality index (WQI) and the U.S. Environmental Protection Agency's (USEPA's) Rapid Bioassessment Protocol III (RBP III) to assess the chemical water quality, biological conditions, and physical habitat of 51 sample sites in the Interstate Streams Water Quality Network from July 1, 2001 to June 30, 2002. Only 25 out of 2,784 parameter observations exceeded water quality standards. Assessment results indicate that approximately 30 percent of the sites supported nonimpaired biological communities. Water quality impacts in the New York-Pennsylvania border streams tend to be mostly from metals, while most Pennsylvania-Maryland border sites have higher nitrogen and nitrate values.

A Seasonal Kendall Test was performed on water quality parameters to determine trends and their magnitude for the period 1986-2002. Overall, an increasing trend was found in total chloride, while decreasing trends were found for total ammonia, total nitrogen, total phosphorus, total iron, and total manganese.

A Pearson Product Moment Correlation was performed on WQI, RBP III score, and physical habitat score to determine any relationships between the parameters. A significant ($p < 0.05$)

positive correlation occurred between biological community score and physical habitat score for Group 3 sites, indicating that as the quality of the habitat increased so did the quality of the biological community. No other groups of streams had correlations that were significant. These relationships, while based on a small number of observations, are presented as subjects to be considered by resource managers, local interest groups, elected officials, and other policy-makers.

INTRODUCTION

One of SRBC's functions is to review projects that may have interstate impacts on water resources in the Susquehanna River Basin. SRBC established a monitoring program in 1986 to collect data that were not available from monitoring programs implemented by New York, Pennsylvania, and Maryland. The state agencies do not assess all of the interstate streams and do not produce comparable data needed to determine potential impacts on the water quality of interstate streams. SRBC's ongoing interstate monitoring program is partially funded through a grant from the USEPA.

The interstate water quality monitoring program includes periodic collection of water and biological samples from interstate streams, as well as assessments of their physical habitat. Water

quality data are used to: (1) assess compliance with water quality standards; (2) characterize stream quality and seasonal variations; (3) build a database for assessment of water quality trends; (4) identify streams for reporting to USEPA under Section 305(b) of the Clean Water Act; (5) provide information to signatory states for 303(d) listing and possible Total Maximum Daily Load (TMDL) development; and (6) identify areas for restoration and protection. Biological conditions are assessed using benthic macroinvertebrate 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's interstate monitoring program began in April 1986. For the first five years, results were reported for water years that ran from October to September. In 1991, SRBC changed the reporting periods to correspond with its fiscal year that covers the period from July to June. This report is presented for fiscal year 2002, which covers July 1, 2001, to June 30, 2002.

BASIN GEOGRAPHY

The Susquehanna River Basin is the largest river basin on the Atlantic Coast of the United States, draining 27,510 square miles. The Susquehanna River originates at the outlet of Otsego Lake, Cooperstown, N.Y., and flows 444 miles through New York, Pennsylvania, and Maryland to the Chesapeake Bay at Havre de Grace, Maryland. Eighty-three streams cross state lines in the basin (Table 1). Several streams traverse the state lines at multiple points, contributing to 91 crossings. Of those 91 crossings, 45 streams flow from New York into Pennsylvania, 22 reaches cross from Pennsylvania into New York, 15 from Pennsylvania into Maryland, and nine from Maryland into Pennsylvania. Many streams are small, and 32 are unnamed.

METHODS

Field and Laboratory Methods

Sampling frequency

In Water Year 1989, the interstate streams were divided into three groups, according to the degree of water quality impairment, historical water quality impacts, and potential for degradation. These groupings were determined based on historical water quality and land use. To date, these groups remain consistent and are described below.

Streams with impaired water quality or judged to have a high potential for degradation due to large drainage areas or historical pollution were assigned to Group 1. Originally, water samples were collected from Group 1 stations every other month, except January and February. Sampling was alternated so that streams along the New York-Pennsylvania border were sampled during November, March, May, July, and September, while streams along the Pennsylvania-Maryland border were sampled during October, December, April, June, and August. During fiscal year 1997, water quality sampling of Group 1 streams was reduced to quarterly sampling. In this sampling period, 2001-2002, New York-Pennsylvania streams were sampled July, November, February, and April. Pennsylvania-Maryland stations were sampled July and August, November, February, and April. Benthic macroinvertebrates were collected and habitat assessments were performed in Group 1 streams during July and August 2001.

Streams judged to have a moderate potential for impacts were assigned to Group 2. Water quality samples, benthic macroinvertebrate samples, and physical habitat information were obtained from Group 2 stations once a year; preferably during base flow conditions in the summer months. In this sampling period, water chemistry, macroinvertebrate, and physical habitat information were collected during July and August 2001.