Assessment of Interstate Streams in the Susquehanna River Basin

SUMMARY REPORT

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 for more than 50 streams that cross state boundaries in the Susquehanna River Basin.

The water quality data collected in the Interstate Streams Monitoring Program are used in a number 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/interstate_streams/archive.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).

The calendar year 2011 Interstate Streams report contains analyses of monitoring data collected from January 1, 2011 to December 31, 2011.

Results for laboratory water quality analyses for chemical parameters were compared to state water quality standards and used to compute a simple water quality index (WQI). Five-year trend graphs were created for biological conditions

Table 1. Explanation of Sites

	Potential for Impacts	Number of Sites	Sampling Frequency
Group 1	Highest	21	Quarterly water quality, annual biological and habitat assessment
Group 2	Moderate	11	Annual water quality, biological, and habitat assessment
Group 3	Low	21	Annual field chemistry, biological, and habitat assessment

and water quality indices values for each monitoring site. Stream discharge data were obtained for 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 ALS Environmental, Middletown, Pa. Benthic macroinvertebrates were collected at Group 1 and 2 sites during July and August 2011 and at Group 3 sites during May 2011. Macroinvertebrates were collected using Rapid Bioassessment Protocol III protocols. 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.

Fish community data were collected by electrofishing, consisting of two passes over 75 meters of stream, at 16 wadeable Group 1 and 2 sites during May 2011. Since being incorporated into the sampling protocol in 2009, fish community data have been collected at all 23 wadeable Group 1 and 2 interstate stream sites. All fish were identified to species except sculpins (*Cottus*), which were identified to genus. A modified version of the Fish Index of Biological Integrity for Maryland Streams was used to assess fish communities.
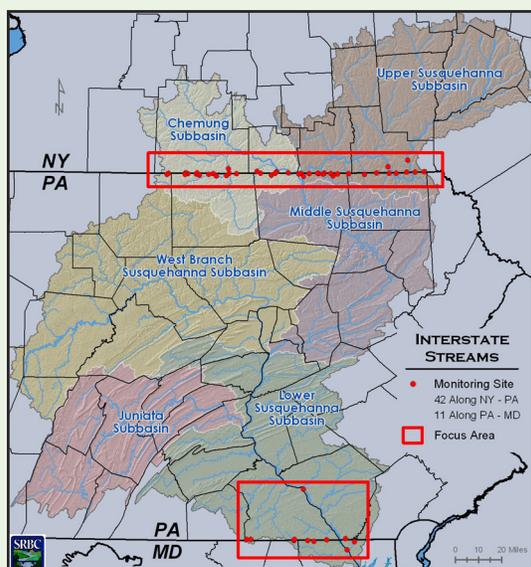
Eleven habitat parameters were evaluated at all sites. These parameters included epifaunal substrate, instream cover, embeddedness, velocity/depth regimes, sediment deposition, channel flow status, channel alteration, frequency of riffles, condition of banks, vegetative protective cover, and riparian vegetative zone width.

Reference sites are selected based on the best combination of biological conditions, water quality, and physical habitat. In 2011, the reference sites were Falling Branch Deer Creek (FBDC 4.1) for the PA-MD streams, Cascade Creek (CASC 1.6) for NY-PA streams, and the Susquehanna River at Conklin, N.Y. (SUSQ 340) for the large rivers group. The reference site for Group 3 streams was Strait Creek (STRA) near Nelson, Pa.

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Results and Discussion

Biological Condition: Macroinvertebrate Communities

In 2011, 80 percent of the interstate streams assessed had a biological community deemed nonimpaired or slightly impaired. Nonimpaired biological communities were present at 16 of 50 streams assessed (32 percent), while two sites (DENT & COWN 2.2) were considered severely impaired.
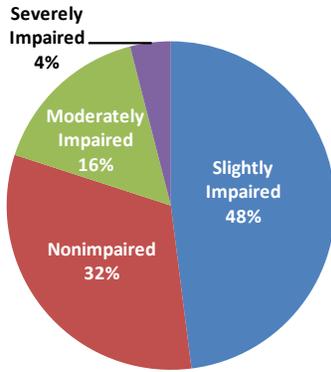
Figure 2. CY-11 Macroinvertebrate IBI Rating

- Severely Impaired 4%
- Moderately Impaired 16%
- Slightly Impaired 48%
- Nonimpaired 32%

Physical Habitat Conditions

Physical habitat was rated as being excellent or supporting for 92 percent of the streams evaluated. Of the 51 total sites where physical habitat was assessed, 26 sites were rated as excellent while only one (APAL 6.9) was nonsupporting.

Figure 3. CY-11 Physical Habitat Rating

- Partially Supporting 6%
- Nonsupporting 2%
- Supporting 41%
- Excellent 51%

Water Quality

Water quality at Group 1 sites was sampled quarterly in 2011, while Group 2 streams were sampled once. Field chemistry was performed at all Group 3 streams once. All data were analyzed together and results are presented in Figure 4. In total, 30 of the 879 (3 percent) individual parameter observations were outside of water quality standards. CY-11 observations exceeding water quality standards decreased 57 percent compared to CY-10 observations. The most common standard violation was pH followed by alkalinity.

Figure 4. Parameters Exceeding Water Quality Standards

- Total Manganese 10%
- pH 43%
- Alkalinity 33%
- Nitrate plus Nitrite 7%
- Total Iron 7%

Biological Condition: Fish Communities

Since incorporating fish community sampling to the methodology in 2009, SRBC has assessed all 23 wadeable Group 1 and 2 streams in the Interstate Streams project. Results show a balanced range of fish community conditions. It is noted no interstate stream where fish were sampled attained the highest possible rating of Excellent.
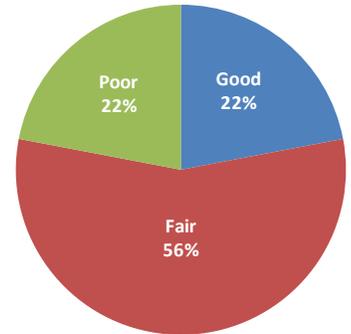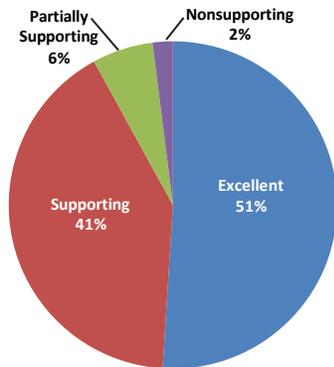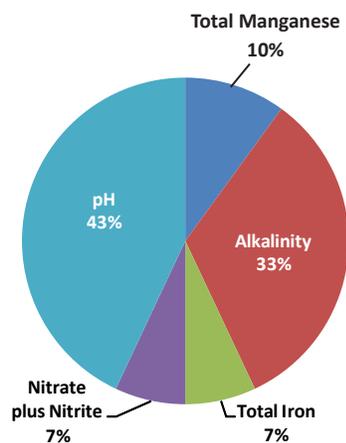
Figure 5. 2009 - 2011 Combined Fish IBI Rating

- Poor 22%
- Good 22%
- Fair 56%

Clinostomus elongatus – Redside Dace collected from Little Snake Creek (LSNK 7.6)

Table 2. Water Quality Parameter Observations and Standards

Parameter	Standard	Standard Value	Number of Observations	Number Exceeding Standards
Alkalinity	PA aquatic life	20 mg/L	123	10
Total Aluminum	NY aquatic (chronic)	100 µg/L	102	0
Total Iron	NY aquatic (chronic) PA aquatic life	300 µg/L 1500 µg/L	102	2
Nitrate plus Nitrite	PA public water supply	10 mg/L	102	2
pH	NY general MD aquatic life PA aquatic life	6.5-8.5 6.5-8.5 6.0-9.0	123	13
Total Manganese	NY aquatic (chronic)	300 µg/L	102	3
Turbidity	MD aquatic life	150 NTU	102	0
Dissolved Oxygen	PA aquatic life	5.0 mg/L	123	0

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 summary is a companion publication for the calendar year 2011 (CY-11) 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.