



Assessment of Interstate Streams in the Susquehanna River Basin

Monitoring Report #26

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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 80 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 www.srbc.net/interstate_streams/archive.htm.

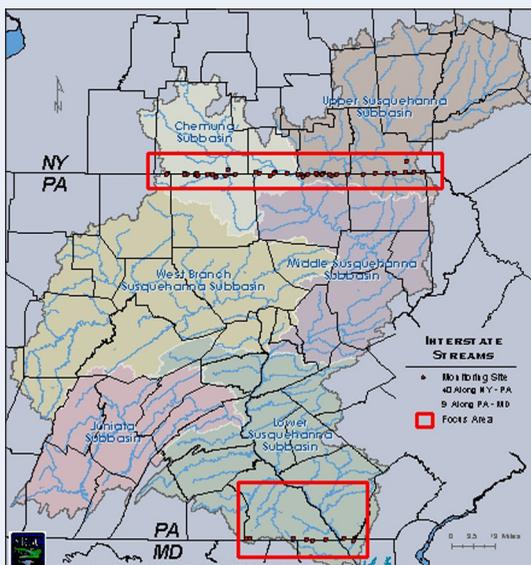


Figure 1. Locations of Interstate Streams Sampling Sites

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 2012 Interstate Streams report contains analyses of monitoring data collected from January 1, 2012 to December 31, 2012.

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 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 2012 and at Group 3 sites during May 2012. 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 three passes over a stream reach equivalent to ten times the average wetted-width, with a range of 100-400 meters. Fish community data were collected at all wadeable Group 1 and 2 NY-PA streams in 2012 except SEEL 10.8 where anomalous conditions were encountered. 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. Fish community data are presented in the form of commonly used metrics for use in multiple analyses.

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 2012, the reference sites were the North Fork Cowanesque River (NFCR 7.6) near North Fork, Pa., for NY-PA streams, and the Susquehanna River at Windsor, N.Y. (SUSQ 365) for the large rivers group. The reference site for Group 3 streams was Smith Creek (SMIT) near East Lawrence, Pa.

Table 1. Explanation of Sites

	Potential for Impacts	Number of Sites	Sampling Frequency
Group 1	Highest	17	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

Macroinvertebrates

In 2012, 69 percent of the NY-PA interstate streams assessed had a biological community deemed nonimpaired or slightly impaired. Nonimpaired biological communities were present at 11 of 40 streams assessed (27 percent), while three were considered severely impaired.

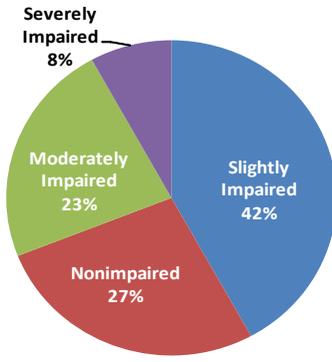


Figure 2. 2012 NY-PA Interstate Streams: Combined Biological Assessments

Physical Habitat

Physical habitat was rated as being excellent or supporting at 77 percent of the streams evaluated. Of the 40 total sites where physical habitat was assessed, 11 were rated as excellent, while three were nonsupporting.

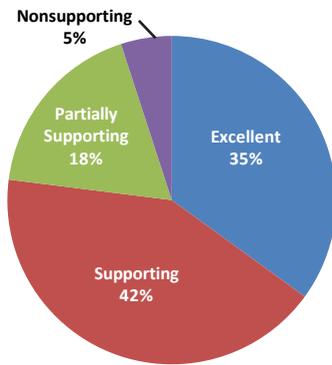


Figure 3. 2012 NY-PA Interstate Streams: Combined Habitat Assessments

Water Quality

Water quality was sampled quarterly at Group 1 streams, while Group 2 and 3 streams were sampled once. Field chemistry was performed on every site visit. All data were analyzed together and results are presented as individual observations exceeding state water quality standards. 2012 marked the first year in which laboratory water quality data were collected at Group 3 streams and incorporated into the overall analysis. In total, 61 of 584 (10 percent) individual parameter observations were outside of water quality standards.

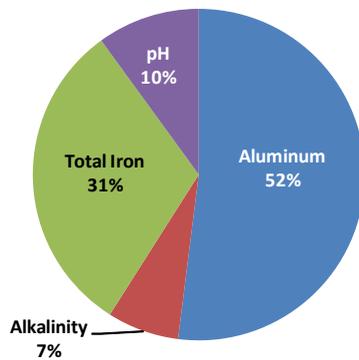


Figure 4. Parameters Exceeding Water Quality Standards

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	73	4
Total Aluminum	NY aquatic (chronic)	100 µg/L	73	32
Total Iron	NY aquatic (chronic)	300 µg/L	73	19
	PA aquatic life	1500 µg/L		
Nitrate plus Nitrite	PA public water supply	10 mg/L	73	0
pH	NY general	6.5-8.5	73	6
	MD aquatic life	6.5-8.5		
	PA aquatic life	6.0-9.0		
Total Manganese	NY aquatic (chronic)	300 µg/L	73	0
Turbidity	MD aquatic life	150 NTU	73	0
Dissolved Oxygen	PA aquatic life	5.0 mg/L	73	0

barium, bromide, lithium, and strontium. Laboratory water quality testing was added to the annual monitoring occurring at all 21 Group 3 streams assessed in the project. Previous years' analyses had only included laboratory water chemistry testing at Group 1 and 2 streams. None of the parameters associated with natural gas extraction and development were detected in elevated concentrations during the 2012 monitoring year.

As part of SRBC's Remote Water Quality Monitoring Network (RWQMN), real-time water quality monitoring stations were installed on a number of streams, which are part of the Interstate Streams project. Streams jointly monitored by the RWQMN and the Interstate Streams project include Apalachin Creek, Choconut Creek, Snake Creek, Tioga River, and Wappasening Creek. Additionally, the RWQMN continuously monitors Hammond Creek, a major tributary to the Group 1 interstate stream, Seeley Creek. Supplemental water quality monitoring conducted since 2010 as part of the RWQMN project on streams shared within the spatial bounds of the two projects supported the findings of the Interstate Streams monitoring (Dawn Hintz, personal communication, May 2013).

In 2012, biological assessments were performed on four of these shared streams (Apalachin Creek, Choconut Creek, Snake Creek and Wappasening Creek). All four streams received biological condition ratings of "slightly impaired" or "nonimpaired" suggesting minimally impaired biological communities. Analysis of macroinvertebrate samples collected independently through the RWQMN project revealed similar community structure and comparable scores in commonly used metrics. Available physical habitat conditions displayed greater variation with Choconut Creek possessing "excellent" habitat conditions while Apalachin Creek was deemed "nonsupporting." Snake Creek and Wappasening Creek were rated as "supporting" and "partially supporting," respectively. Variables contributing to streams scoring poorly in habitat condition were mainly related to flooding events in September 2011 and subsequent remediation efforts.

All NY-PA interstate stream monitoring sites are located within watersheds underlain, partially if not entirely, by natural gas-containing shale formations. Water quality and biological monitoring at many of these sites began in 1989 with the initiation of the Interstate Streams Water Quality Network project. Beginning in 2008, many of the watersheds within the project's geographic bounds began experiencing natural gas extraction and development activities. In 2012, SRBC added monitoring for specific oil-and-gas-related elements to the suite of routine parameters included in the laboratory water quality portion of the Interstate Streams project. These parameters included measuring concentrations of

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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 2012 (CY-12) web-based report and summarizes all the findings. The full web-based report can be found online at http://www.srbcc.net/interstate_streams/index.aspx. Data for these interstate stream sites, both current and historical, are available by contacting SRBC.