WATER QUALITY OF INTERSTATE STREAMS IN THE SUSQUEHANNA RIVER BASIN

MONITORING REPORT NO. 11
JULY 1, 1996–JUNE 30, 1997

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SUSQUEHANNA RIVER BASIN COMMISSION

The Susquehanna River Basin Commission was created as an independent agency by a federal-interstate compact* among the states of Maryland, New York, Commonwealth of Pennsylvania, and the federal government. In creating the Commission, the Congress and state legislatures formally recognized the water resources of the Susquehanna River Basin as a regional asset vested with local, state, and national interests for which all the parties share responsibility. As the single federal-interstate water resources agency with basinwide authority, the Commission's goal is to effect coordinated planning, conservation, management, utilization, development and control of basin water resources among the government and private sectors.

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ACKNOWLEDGMENTS

The authors would like to acknowledge those who made significant contributions to the completion of this project. Darryl Sitlinger and Scott Bollinger collected all field data and water quality and benthic macroinvertebrate samples for laboratory analysis. The Pennsylvania Department of Environmental Protection, Bureau of Laboratories in Harrisburg, Pa., conducted all laboratory analysis of chemical water quality. Donna Fiscus produced all maps. JoAnn Painter edited, and Travis Stoe, Susan Obleski, and David Heicher provided reviews of this report. Additional thanks go to the United States Environmental Protection Agency, which provided funding for this project.

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ABSTRACT

The Susquehanna River Basin Commission (SRBC) used a simple water quality index (WQI) and the U.S. Environmental Protection Agency's Rapid Bioassessment Protocol III (RBP III) to assess the chemical water quality and biological conditions of 29 sample sites in the Interstate Streams Water Quality Network during fiscal year 1997. Assessment results indicate that approximately one half (55.5 %) of the sites supported nonimpaired biological communities. Differences in major sources of impairment existed between the New York-Pennsylvania border sites and the Pennsylvania-Maryland stations. In the New York-Pennsylvania border streams, there was no correlation between a single water quality parameter and RBP III score, while many correlations existed between RBP III score for Pennsylvania-Maryland streams and water quality parameters. These results suggest that water quality had a greater effect on the biological health of southern streams, while streams in the upper reaches of the basin may have been more affected by another source of impairment such as habitat degradation. These relationships, while based on a small number of observations, are presented as subjects to be considered by resource managers and legislators.

INTRODUCTION

One of the 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 U.S. Environmental Protection Agency.

The interstate water quality monitoring program includes periodic collection of water and biological samples from interstate streams. Water quality data are used to: (1) assess compliance with state water quality standards; (2) characterize stream quality and seasonal variations; and (3) build a database for the future assessment of water quality trends. 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.

SRBC's interstate monitoring program began in April 1986. For the first five years, results were reported for water years that run 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 1997, which covers July 1, 1996, to June 30, 1997

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 a total of 91 crossings. At 45 of these locations, streams flow from New York into Pennsylvania. Twenty-two 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. To date, these groupings 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 to historical pollution problems, 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 July, September, November, March, and May, while streams along the Pennsylvania-Maryland border were sampled during August, October, December, April, and June. During fiscal year 1997, sampling of Group 1 streams was reduced to quarterly sampling. New York-Pennsylvania streams were sampled July, November, February, and May, while Pennsylvania-Maryland stations were sampled August, November, February, and April. Benthic macroinvertebrates were collected in Group 1 streams during July and August 1996.

Streams judged to have a moderate potential for impacts were assigned to Group 2. Water quality and macroinvertebrate samples were obtained from Group 2 stations once a year, preferably during base flow conditions in the summer months. In this sampling period, macroinvertebrates were collected during July and August 1996.

Streams judged to have a low potential for impacts were assigned to Group 3. These stations were not sampled, but were visually inspected for signs of degradation once a year. New York-Pennsylvania border and Pennsylvania-Maryland border stream stations sampled during fiscal year 1997 are listed in Tables 2 and 3, respectively, and depicted in Figures 1 through 4.

Stream discharge

Stream discharge was measured at all stations unless high streamflows made access impossible. Several stations are located near United States Geological Survey (USGS) stream gages. These stations include the following: the Susquehanna River at Windsor, N.Y., Kirkwood, N.Y., Sayre, Pa., Marietta, Pa., and Conowingo, Md.; the Chemung River at Chemung, N.Y.; the Tioga River at Lindley, N.Y.; and the Cowanesque River at Lawrenceville, Pa. Stream discharges from USGS gaging stations are reported as instantaneous discharges in cubic feet per second (cfs). Instantaneous discharge for stations not located near USGS gaging stations was measured at the time of sampling, using standard USGS

Table 1. Interstate Streams in the Susquehanna River Basin

Stream Name	Monitoring Group (a)	Flow Direction (from→to)
Streams Along the New York – Pennsylvania Border		
Apalachin Creek	2	Pa.→ N.Y.
Babcock Run	3	N.Y.→ Pa.
Bentley Creek	2	Pa.→ N.Y.
Bill Hess Creek	3	N.Y.→Pa.
Bird Creek	3	Pa.→N.Y.
Biscuit Hollow	3	N.Y.→Pa.
Briggs Hollow Run	3	N.Y.→Pa.
Bulkley Brook	3	N.Y.→Pa.
Camp Brook	3	N.Y.→Pa.
Cascade Creek	2	N.Y.→Pa.
Cayuta Creek	1	N.Y.→Pa.
Chemung River	1	N.Y.→Pa.→N.Y.→Pa.
Choconut Creek	2	Pa.→ N.Y.
Cook Hollow	3	N.Y.→Pa.
Cowanesque River	1	Pa.→ N.Y.
Deep Hollow Brook	3	N.Y.→Pa.
Denton Creek	3	N.Y.→Pa.
Dry Brook	3	N.Y.→Pa.
Holden Creek	3	N.Y.→Pa.
Little Snake Creek	2	Pa.→ N.Y.
Little Wappasening Creek	3	Pa.→ N.Y.
North Fork Cowanesque River	3	N.Y.→Pa.
Parks Creek	3	Pa.→ N.Y.
Prince Hollow Run	3	N.Y.→Pa.
Red House/Beagle Hollow	3	N.Y.→Pa.
Russell Run	3	N.Y.→Pa.
Sackett Creek	3	Pa.→ N.Y.
Seeley Creek	2	Pa.→ N.Y.
South Creek	2	Pa.→ N.Y.
Snake Creek	2	Pa.→ N.Y.
Strait Creek	3	N.Y.→Pa.
Susquehanna River	1	N.Y.→Pa.→N.Y.→Pa.
Tioga River	1	Pa.→ N.Y.
Troups Creek	1	N.Y.→Pa.
Trowbridge Creek	2	N.Y.→Pa.
Wappasening Creek	2	Pa.→ N.Y.
White Branch Cowanesque River	3	N.Y.→Pa.
White Hollow	3	Pa.→ N.Y.
17 Unnamed tributaries	3	N.Y.→Pa.
2 Unnamed tributaries	3	Pa.→ N.Y.
2 Unnamed tributaries	3	Pa.→ N.Y.→Pa.
1 Unnamed tributary	3	N.Y.→Pa.→N.Y.

Table 1. Interstate Streams in the Susquehanna River Basin—Continued

Stream Name	Monitoring Group (a)	Flow Direction (from→to)
Streams Along the Pennsylvania-Maryland Border		
Big Branch Deer Creek	2	Pa.→Md.
Conowingo Creek	1	Pa.→Md.
Deer Creek	1	Pa.→Md.
Ebaughs Creek	1	Pa.→Md.
Falling Branch Deer Creek	2	Pa.→Md.
Island Branch Deer Creek	3	Pa.→Md.
Long Arm Creek	2	Md.→Pa.
Octoraro Creek	1	Pa.→Md.
Scott Creek	1	Md.→Pa.
South Branch Conewago Creek	2	Md.→Pa.
Susquehanna River	1	Pa.→Md.
6 Unnamed tributaries	3	Md.→Pa.
7 Unnamed tributaries	3	Pa.→Md.

(a) Group 1 streams are sampled quarterly, Group 2 streams are sampled annually, and Group 3 streams are not sampled.

Table 2. Stream Stations Sampled Along the New York–Pennsylvania Border and Sampling Rationale

Station	Stream and Location	Monitoring Group	Rationale
CASC 1.6	Cascade Creek Lanesboro, Pa.	2	Monitor for potential water quality impacts.
TROW 1.8	Trowbridge Creek, Great Bend, Pa.	2	Monitor for potential water quality impacts.
SNAK 2.3	Snake Creek, Brookdale, Pa.	2	Monitor for potential water quality impacts.
LSNK 7.6	Little Snake Creek, Brackney, Pa.	2	Monitor for potential water quality impacts.
CHOC 9.1	Choconut Creek, Vestal Center, N.Y.	2	Monitor for potential water quality impacts.
APAL 6.9	Apalachin Creek, Little Meadows, Pa.	2	Monitor for potential water quality impacts.
WAPP 2.6	Wappasening Creek, Nichols, N.Y.	2	Monitor for potential water quality impacts.
CAYT 1.7	Cayuta Creek, Waverly, N.Y.	1	Municipal discharge from Waverly, N.Y.
TRUP 4.5	Troups Creek, Austinburg, Pa.	1	High turbidity and moderately impaired macroinvertebrate populations.
COWN 2.2	Cowanesque River, Lawrenceville, Pa.	1	Impacts from flood control reservoir.
TIOG 10.8	Tioga River, Lindley, N.Y.	1	Pollution from acid mine discharges and impacts from flood control reservoirs.
SEEL 10.3	Seeley Creek, Seeley Creek, N.Y.	2	Monitor for potential water quality impacts.
SOUT 7.8	South Creek, Fassett, Pa.	2	Monitor for potential water quality impacts.
BNTY 0.9	Bentley Creek, Wellsburg, N.Y.	2	Monitor for potential water quality impacts.
CHEM 12.0	Chemung River, Chemung, N.Y.	1	Municipal and industrial discharges from Elmira, N.Y.
SUSQ 365.0	Susquehanna River, Windsor, N.Y.	1	Large drainage area (1,882 sq. mi.); municipal discharges from Cooperstown, Sidney, Bainbridge, and Oneonta.
SUSQ 340.0	Susquehanna River, Kirkwood, N.Y.	1	Large drainage area (2,232 sq. mi.); historical pollution due to sewage from Lanesboro, Oakland, Susquehanna, Great Bend, and Hallstead.
SUSQ 289.1	Susquehanna River, Sayre, Pa.	1	Large drainage area (4,933 sq. mi.); municipal and industrial discharges.

Table 3. Stream Stations Sampled Along the Pennsylvania-Maryland Border and Sampling Rationale

Station	Stream and Location	Monitoring Group	Rationale
SBCC 20.4	South Branch Conewago Creek, Bandanna, Pa.	2	Monitor for potential water quality impacts.
LNGA 2.5	Long Arm Creek, Bandanna, Pa.	2	Monitor for potential water quality impacts.
SCTT 3.0	Scott Creek, Delta, Pa.	1	Pollution from untreated sewage.
CNWG 4.4	Conowingo Creek, Pleasant Grove, Pa.	1	High nutrient loads and other agricultural runoff; Nonpoint runoff to Chesapeake Bay.
OCTO 6.6	Octoraro Creek, Rising Sun, Md.	1	High nutrient loads due to agricultural runoff from New Bridge, Md.; Water quality impacts from Octoraro Lake; Nonpoint runoff to Chesapeake Bay.
EBAU 1.5	Ebaughs Creek, Stewartstown, Pa.	1	Municipal discharge from Stewartstown, Pa.; Nonpoint runoff to Chesapeake Bay.
DEER 44.2	Deer Creek, Gorsuch Mills, Md.	1	Past pollution from Gorsuch Mills, Md., Stewartstown, Pa.; Nonpoint runoff to Chesapeake Bay.
BBDC 4.1	Big Branch Deer Creek, Fawn Grove, Pa.	2	Monitor for potential water quality impacts.
FBDC 4.1	Falling Branch Deer Creek, Fawn Grove, Pa.	2	Monitor for potential water quality impacts.
SUSQ 44.5	Susquehanna River, Marietta, Pa.	1	Bracket hydroelectric dams near the state line.
SUSQ 10.0	Susquehanna River, Conowingo, Md.	1	Bracket hydroelectric dams near the state line.

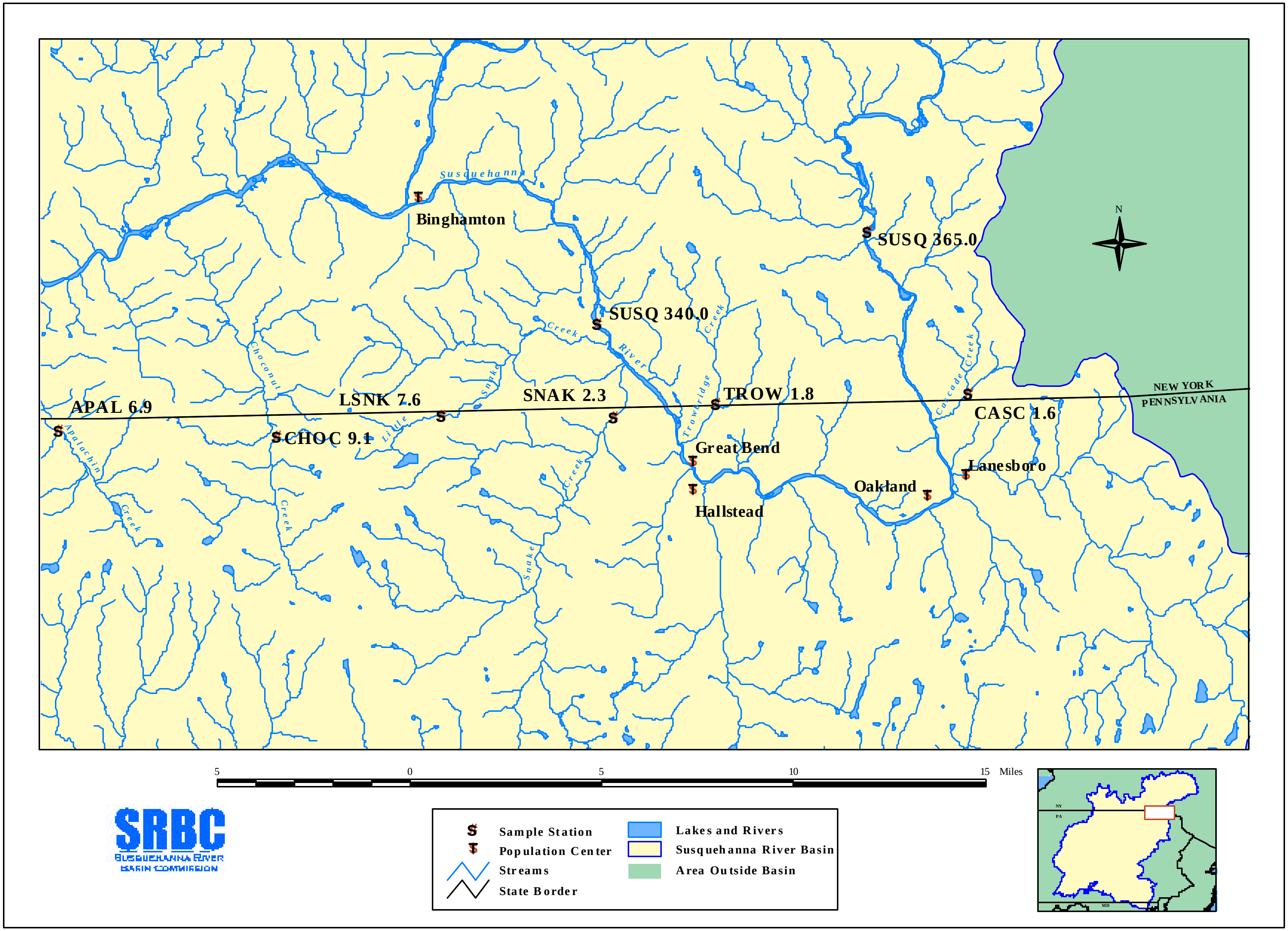

Figure 1. Interstate Streams Along the New York-Pennsylvania Border Between Apalachin Creek and Cascade Creek

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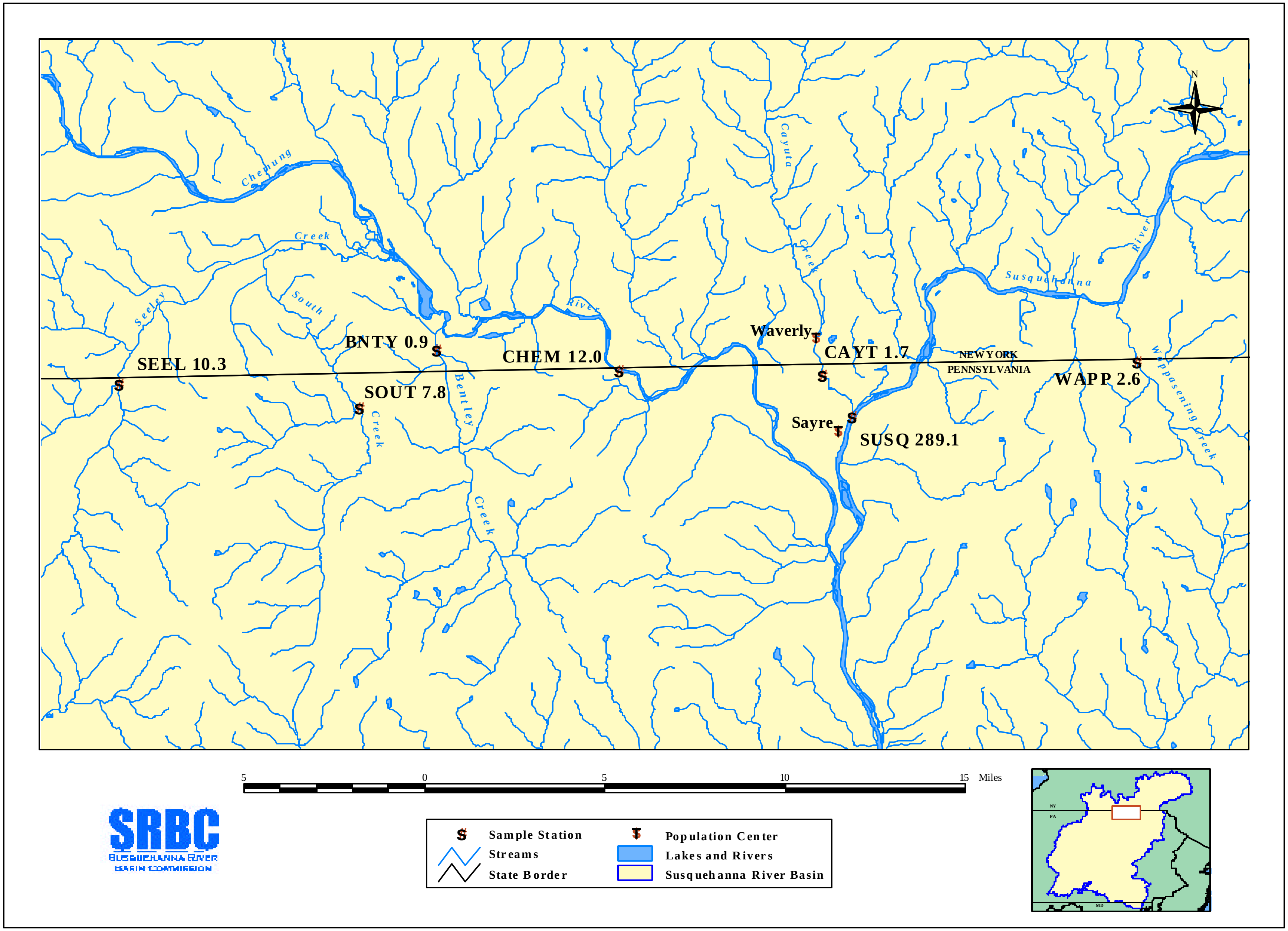

Figure 2. Interstate Streams Along the New York-Pennsylvania Border Between Seeley Creek and Wappasening Creek

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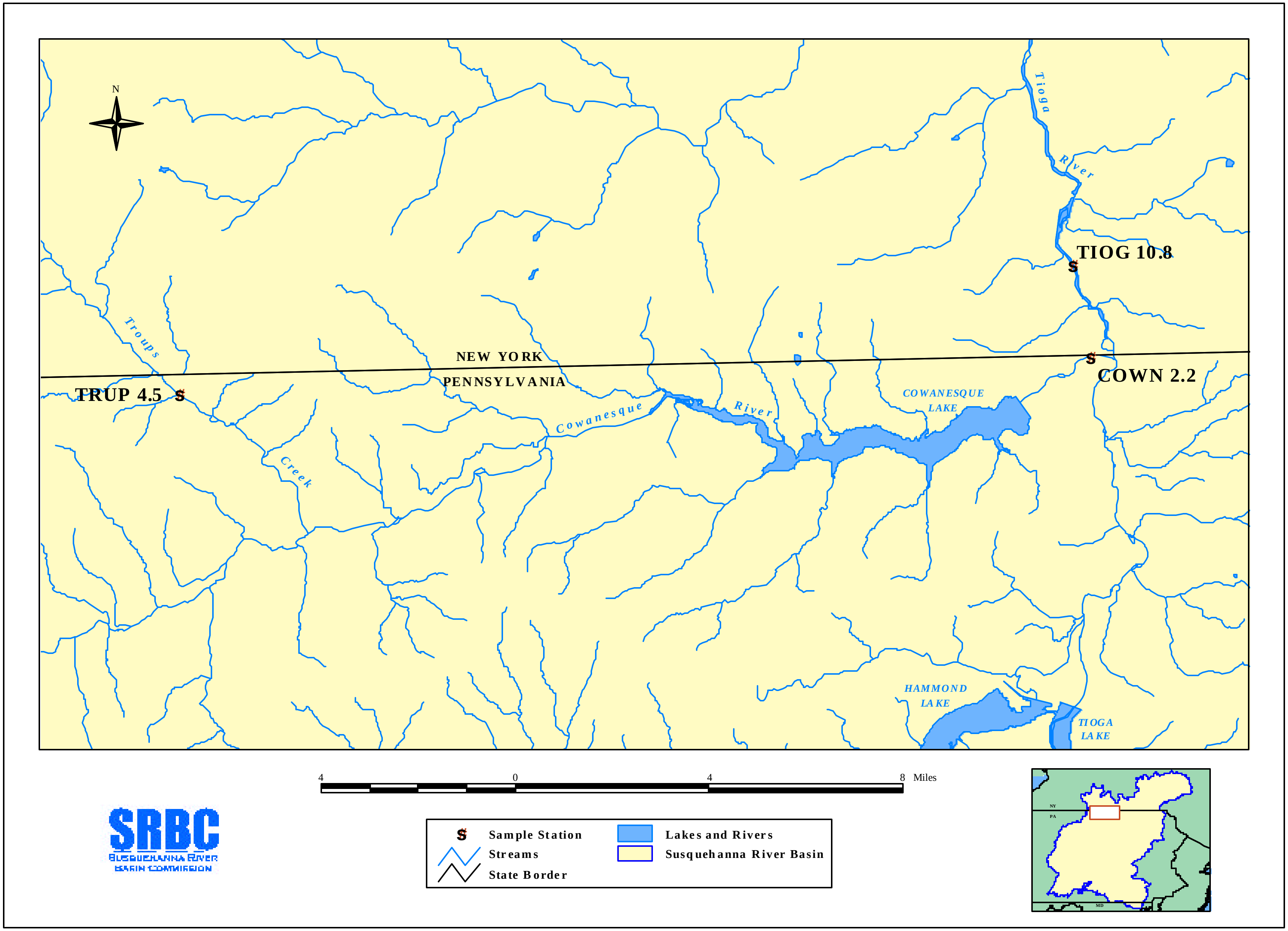

Figure 3. Interstate Streams Along the New York-Pennsylvania Border Between Troups Creek and Tioga River

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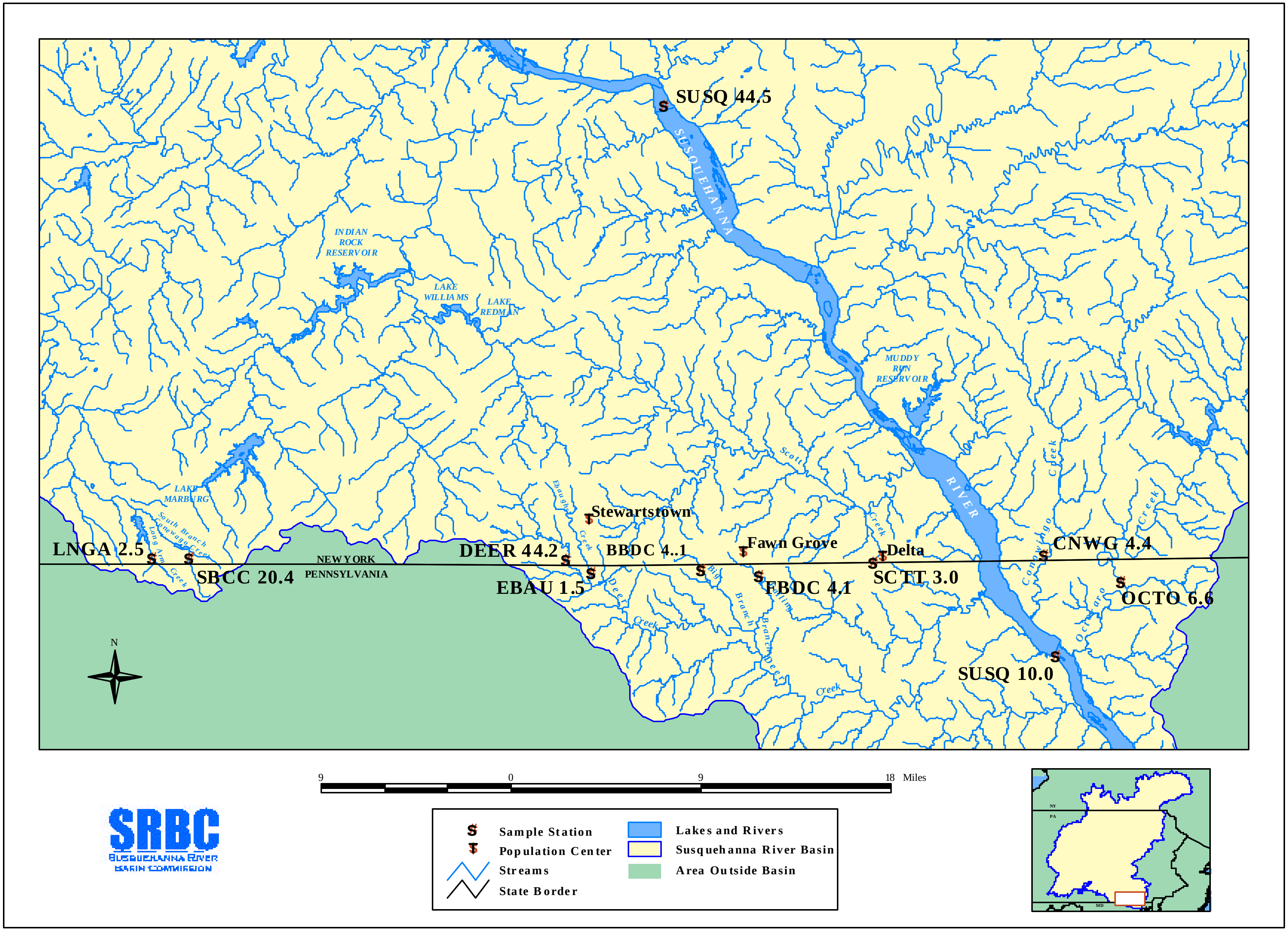

Figure 4. Interstate Sreams Along the Pennsylvania-Maryland Border

procedures. Stream discharges are tabulated according to station name and date in Appendix A.

Water samples

Water samples were collected at each of the sites to measure nutrient and metal concentrations. Chemical and physical parameters monitored are listed in Table 4. Water samples were collected using a depth-integrating sampler. Composite samples were obtained by collecting eight depth-integrated samples across the stream channel and combining them in a churn splitter that was previously rinsed with distilled water. Water samples were thoroughly mixed in the churn splitter and collected in 250 mL bottles. One raw and one filtered sample were collected for nutrient analysis. A raw and a filtered sample were collected in acid-rinsed bottles and fixed with concentrated nitric acid (HNO_3) for metals analysis. A cellulose nitrate filter with 0.45 micrometer pore size was used to obtain the filtrate for laboratory analysis. The samples were chilled on ice, and were sent to the Pennsylvania Department of Environmental Protection (Pa. DEP), Bureau of Laboratories in Harrisburg, Pa., within 24 hours of collection.

Field chemistry

Temperature, dissolved oxygen, conductivity, pH, alkalinity, and acidity were measured in the field. Temperature and dissolved oxygen were measured, using a YSI model 55 dissolved oxygen meter. The dissolved oxygen meter was calibrated at the beginning of each day when water samples were collected. A VWR Scientific model 2052 conductivity meter was used to measure conductivity. A Cole Parmer meter was used to measure pH. The pH meter was calibrated at the beginning of the day and randomly checked throughout the day. Alkalinity was determined by titrating a known volume of sample water to pH 4.5 with 0.02 normal sulfuric acid (H_2SO_4). Acidity was measured by titrating a known volume of sample water to pH 8.3 with 0.02 normal sodium hydroxide (NaOH).

Macroinvertebrate sampling

Benthic macroinvertebrates were collected from Group 1 and Group 2 stations between July 29 and August 7, 1996. The benthic community was sampled to provide an indication of the biological condition of the stream. Macroinvertebrates are defined as aquatic insects and other invertebrates too large to pass through a No. 30 sieve.

Benthic macroinvertebrate samples were analyzed using field and laboratory methods described in Rapid Bioassessment Protocol for Use in Streams and Rivers by Plafkin and others (1989). Sampling was performed using a 1-meter-square kick screen with size No. 30 mesh. The kick screen was stretched across the current to collect organisms dislodged from riffle areas by physical agitation of the stream substrate. Two kick screen samples were collected from a representative riffle at each station. The two samples were composited and preserved in a solution of glycerin and isopropyl alcohol for later laboratory analysis.

In the laboratory, composite samples were sorted into 100-organism subsamples using a gridded pan and a random numbers table. The organisms contained in the subsamples were identified to genus (except Chironomidae and Hydracarina) and enumerated. Each taxon was assigned an organic pollution tolerance value and a functional feeding category as outlined in Appendix B. A taxa list for each station can be found in Appendix C.

Data Synthesis Methods

Chemical water quality

Results of laboratory analyses for chemical parameters were compared to New York, Pennsylvania, and Maryland state water quality standards. In addition, a simple WQI was calculated, using procedures established by

Table 4. Monitored Parameters

Parameter	STORET Code
Physical	
Discharge	00060
Temperature	00010
Chemical	
Field Analyses	
Conductivity	00095
Dissolved Oxygen	00300
pH	00400
Alkalinity	00410
Acidity	00435
Laboratory Analyses	
Biochemical Oxygen Demand	00310
Solids, Dissolved Solids, Total	00515 00500
Ammonia as Nitrogen, Dissolved Ammonia as Nitrogen, Total	00608 00610
Nitrite as Nitrogen, Dissolved Nitrite as Nitrogen, Total	00613 00615
Nitrate as Nitrogen, Dissolved Nitrate as Nitrogen, Total	00618 00620
Kjeldahl Nitrogen, Dissolved Kjeldahl Nitrogen, Total	00623 00625
Phosphorus, Dissolved Phosphorus, Total	00666 00665
Orthophosphate, Dissolved Orthophosphate, Total	00671 70507
Organic Carbon, Total	00680
Calcium, Total	00916
Magnesium, Total	00927
Chloride, Total	00940
Sulfate, Total	00945
Iron, Dissolved Iron, Total	01046 01045
Manganese, Dissolved Manganese, Total	01056 01055
Aluminum, Dissolved Aluminum, Total	01106 01105
Turbidity	82079

McMorran and Bollinger (1990). The WQI was used to make comparisons between sampling periods and stations within the same geographical region; therefore, the water quality data were divided into two groups. One group contained stations along the New York-Pennsylvania border, and the other group contained stations along the Pennsylvania-Maryland border. The data in each group were sorted by parameter and ranked by increasing order of magnitude, with several exceptions. Dissolved oxygen and alkalinity were ranked by decreasing order of magnitude, while pH and acidity were not factored into the percentile scores. The rank of each chemical analysis was divided by total number of observations in the group to obtain a percentile. The WQI score was calculated by averaging all percentile ranks for each sample. Water quality index scores range from 1 to 100, and high WQI scores indicate poor water quality. Water quality scores and a list of parameters exceeding standards for each site can be found in the "Bioassessment of Interstate Streams" section, located on page 23.

Reference category designations

Three reference sites were included in this study. These three sites represented the best available conditions, in terms of habitat and biological community for each of the categories. The Susquehanna River (SUSQ 365.0) at Windsor, N.Y., was used as the reference site for all of the Susquehanna River main stem sampling stations. Sites located on the New York–Pennsylvania border were represented by Snake Creek (SNAK 2.3) at Brookdale, Pa. Snake Creek represented the best biological and habitat conditions in the Northern Appalachian Plateau and Uplands Ecoregion (Omernik, 1987). South Branch Conewago Creek (SBCC 20.4) near Bandanna, Pa., served as the reference site for sampling stations located on the Pennsylvania–Maryland border. South Branch Conewago Creek had the best biological and habitat conditions in the Northern Piedmont Ecoregion.

Biological conditions

Benthic macroinvertebrate samples were assessed using procedures described by Plafkin and others (1989). This method calculates a series of biological indexes for a stream and compares them to an unimpaired reference station in the same region to determine the degree of impairment. The metrics used in this survey are summarized in Table 5. Metrics 1 and 3 through 8 were taken directly from Plafkin and others (1989). Metric 2 (Shannon Diversity Index) was substituted for the recommended ratio of shredders to total macroinvertebrates, which required specialized sampling protocols.

The 100-organism subsample data were used to generate scores for each of the eight metrics. Each metric score was then converted to a biological condition score, based on the percent similarity of the metric score, relative to the metric score for the reference site. The sum of the biological condition scores constituted the total biological score for the sample site, and total biological scores were used to assign each site to a biological condition category (Table 6).

A summary of RBP III biological data for New York-Pennsylvania, Pennsylvania-Maryland, and Susquehanna River main stem sites can be seen in Tables 7 through 9, respectively. A high rapid bioassessment protocol score indicates a low degree of impairment and a healthy macroinvertebrate population. RBP III results for each site can be found in the "Bioassessment of Interstate Streams" section, located on page 23.

Table 5. Summary of Metrics Used to Evaluate the Overall Biological Integrity of Stream and River Benthic Macroinvertebrate Communities

Metric	Description
1. Taxonomic Richness (a)	The total number of taxa present in the 100 organism subsample
2. Shannon Diversity Index (b)	The measure of biological community complexity based on the number of equally or nearly equally abundant taxa in the community
3. Hilsenhoff Biotic Index (a)	A measure of the overall pollution tolerance of a benthic macroinvertebrate community
4. EPT Index (a)	The total number of Ephemeroptera (mayfly), Plecoptera (stonefly) and Trichoptera (caddisfly) taxa present in the 100 organism subsample
5. Ratio of Scrapers/Filterers (a)	A reflection of the riffle/run community foodbase and an insight into the nature of potential disturbance factors
6. Ratio of ETP/Chironomids (a)	A measure of community balance and indicator of environmental stress
7. Community Loss Index (a)	A measure of loss of benthic taxa between a reference station and the station of comparison
8. Percent Dominant Taxa (a)	A measure of community balance at the lowest positive taxonomic level

Sources: (a) Plafkin and others (1989); and
(b) calculated using software developed by Kovach (1993).

Table 6. Summary of Criteria Used to Classify the Biological Conditions of Sample Sites

SAMPLING AND ANALYSIS

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TOTAL BIOLOGICAL SCORE DETERMINATION

Metric	Biological Condition Scoring Criteria			
	6	**4**	**2**	**0**
1. Taxonomic Richness (a)	>80%	79 - 60%	59 - 40%	<40%
2. Shannon Diversity Index (a)	>75%	74 - 50%	49 - 25%	<25%
3. Modified Hilsenhoff Biotic Index (b)	>85%	84 - 70%	69 - 50%	<50%
4. EPT Index (a)	>90%	89 - 80%	79 - 70%	<70%
5. Ratio Scrapers/Filterers (a,c)	>50%	49 – 35%	34 – 20%	<20%
6. Ratio EPT/Chironomids (a)	>75%	74 - 50%	49 - 25%	<25%
7. Community Loss Index(d)	<0.5	0.5 – 1.5	1.5 – 4.0	>4.0
8. Percent Dominant Taxa(e)	<20%	20 – 30%	31 – 40%	>40%
Total Biological Score (f)				

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BIOASSESSMENT

Percent Comparability of Study and Reference Site Total Biological Scores (g)	Biological Condition Category
>83%	Nonimpaired
79 - 54%	Slightly Impaired
50 - 21%	Moderately Impaired
<17%	Severely Impaired

(a) Score is study site value/reference site value X 100.
(b) Score is reference site value/study site value X 100.
(c) Determination of Functional Feeding Group is independent of taxonomic grouping.
(d) Range of values obtained. A comparison to the reference station is incorporated in these indices.
(e) Scoring criteria evaluate actual percent contribution, not percent comparability to the reference station.
(f) Total Biological Score = the sum of Biological Condition Scores assigned to each metric.
(g) Values obtained that are intermediate to the indicated ranges will require subjective judgement as to the correct placement into a biological condition category.

Table 7. Summary of New York-Pennsylvania Border RBP III Biological Data

	SNAK	CASC	TROW	LSNK	CHOC	APAL	WAPP
Raw Data Summary							
Number of Individuals	118	134	140	154	108	154	137
Number of Chironomids	6	19	26	55	56	12	14
Number of EPT Taxa	10	10	14	10	10	12	8
Number of Scrapers	14	18	16	25	7	33	23
Number of Filterers	67	84	31	29	32	56	61
Number of EPT Individuals	90	105	75	54	33	70	81
Similar Taxa	19	10	12	13	11	12	8
Percent Dominant Taxa	29	28	26	55	56	17	32
Metric Scores							
Taxonomic Richness	19	17	21	23	19	22	17
Diversity Index	3.53	3.28	3.64	3.42	2.79	4.00	3.47
Hilsenhoff Biotic Index	3.94	4.03	4.03	4.31	5.43	3.56	3.99
EPT Index	10	10	14	10	10	12	8
Ratio Scrapers/Filterers	0.2	0.2	0.5	0.9	0.2	0.6	0.4
Ratio EPT/Chironomids	1.7	0.5	0.5	0.2	0.2	1.0	0.6
Community Loss Index	0	0.53	0.33	0.26	0.42	0.32	0.65
Percent Dominant Taxa	24.58	20.90	18.57	35.71	51.85	11.04	23.36
Percent of Reference							
Taxonomic Richness	100.0	89.5	110.5	121.1	100.0	115.8	89.5
Diversity Index	100.0	92.9	103.1	96.9	79.0	113.3	98.3
Hilsenhoff Biotic Index	100.0	97.8	97.8	91.4	72.6	110.7	98.7
EPT Index	100.0	100.0	140.0	100.0	100.0	120.0	80.0
Ratio Scrapers/Filterers	100.0	100.0	250.0	450.0	100.0	300.0	200.0
Ratio EPT/Chironomids	100.0	29.4	29.4	11.8	11.8	58.8	35.3
Community Loss Index	0.0	53.0	33.0	26.0	42.0	32.0	65.0
Percent Dominant Taxa	100.0	85.0	75.5	145.3	210.9	44.9	95.0
Biological Condition Scores							
Taxonomic Richness	6	6	6	6	6	6	6
Diversity Index	6	6	6	6	6	6	6
Hilsenhoff Biotic Index	6	6	6	6	4	6	6
EPT Index	6	6	6	6	6	6	4
Ratio Scrapers/Filterers	6	6	6	6	6	6	6
Ratio EPT/Chironomids	6	2	2	0	0	4	2
Community Loss Index	6	4	6	6	6	6	4
Percent Dominant Taxa	4	4	6	2	0	6	4
Total Biological Score							
Total Biological Score	46	40	44	38	34	46	38
Biological % of Reference	100	87	96	83	74	100	83

Table 7. Summary of New York-Pennsylvania Border RBP III Biological Data—Continued

	CAYT	TRUP	COWN	TIOG	SEEL	SOUT	BNTY
Raw Data Summary							
Number of Individuals	152	145	116	139	168	160	155
Number of Chironomids	36	25	87	17	74	61	36
Number of EPT Taxa	10	8	1	10	10	7	9
Number of Scrapers	28	33	0	39	4	11	4
Number of Filterers	74	26	22	67	60	78	103
Number of EPT Individuals	88	66	20	103	80	84	114
Similar Taxa	12	8	3	10	8	8	8
Percent Dominant Taxa	36	26	87	34	74	61	48
Metric Scores							
Taxonomic Richness	20	18	6	21	16	13	14
Diversity Index	3.30	3.27	1.18	3.46	2.49	2.34	2.65
Hilsenhoff Biotic Index	4.57	3.98	6.55	3.84	5.35	5.09	4.81
EPT Index	10	8	1	10	10	7	9
Ratio Scrapers/Filterers	0.4	1.3	0.0	0.6	0.1	0.1	0.0
Ratio EPT/Chironomids	0.3	0.3	0.0	0.6	0.1	0.1	0.3
Community Loss Index	0.35	0.61	2.67	0.43	0.69	0.85	0.79
Percent Dominant Taxa	23.68	17.93	75.00	24.46	44.05	38.13	30.97
Percent of Reference							
Taxonomic Richness	105.3	94.7	31.6	100.5	84.2	68.4	73.7
Diversity Index	93.5	92.6	33.4	98.0	70.5	66.3	75.1
Hilsenhoff Biotic Index	86.2	99.0	60.2	102.6	73.6	77.4	81.9
EPT Index	100.0	80.0	10.0	100.0	100.0	70.0	90.0
Ratio Scrapers/Filterers	200.0	650.0	0.0	300.0	50.0	50.0	0.0
Ratio EPT/Chironomids	17.6	17.6	0.0	35.3	5.9	5.9	17.6
Community Loss Index	35.0	61.0	267.0	43.0	69.0	85.0	79.0
Percent Dominant Taxa	96.3	72.9	305.1	99.5	179.2	155.1	126.0
Biological Condition Scores							
Taxonomic Richness	6	6	0	6	6	4	4
Diversity Index	6	6	2	6	4	4	6
Hilsenhoff Biotic Index	6	6	2	6	4	4	4
EPT Index	6	4	0	6	6	2	6
Ratio Scrapers/Filterers	6	6	0	6	6	6	0
Ratio EPT/Chironomids	0	0	0	2	0	0	0
Community Loss Index	6	4	2	6	4	4	4
Percent Dominant Taxa	4	6	0	4	0	2	2
Total Biological Score							
Total Biological Score	40	38	6	42	30	26	26
Biological % of Reference	87	83	13	91	65	57	57

Table 8. Summary of Pennsylvania-Maryland Border RBP III Biological Data

	SBCC	LNGA	SCTT	CNWG	OCTO
Raw Data Summary					
Number of Individuals	117	101	149	100	100
Number of Chironomids	14	18	79	7	2
Number of EPT Taxa	10	7	6	6	7
Number of Scrapers	9	25	1	18	40
Number of Filterers	40	29	57	34	22
Number of EPT Individuals	67	43	60	71	62
Similar Taxa	20	9	8	7	6
Percent Dominant Taxa	21	18	79	33	29
Metric Scores					
Taxonomic Richness	20	16	13	13	14
Diversity Index	3.81	3.44	2.05	2.96	2.92
Hilsenhoff Biotic Index	2.71	4.91	5.87	4.95	4.86
EPT Index	10.0	7.0	6.0	6.0	7.0
Ratio of Scrapers/Filterers	0.2	0.9	0.0	0.5	1.8
Ratio of EPT/Chironomids	4.8	2.4	0.8	10.1	31.0
Community Loss Index	0.00	0.69	0.92	1.00	1.00
Percent Dominant Taxa	17.9	17.8	53.0	33.0	29.0
Percent of Reference					
Taxonomic Richness	100.0	80.0	65.0	65.0	70.0
Diversity Index	100.0	90.3	53.8	77.7	76.6
Hilsenhoff Biotic Index	100.0	55.2	46.2	54.7	55.8
EPT Index	100.0	70.0	60.0	60.0	70.0
Ratio of Scrapers/Filterers	100.0	383.1	7.8	235.3	808.1
Ratio of EPT/Chironomids	100.0	49.9	15.9	211.9	647.8
Community Loss Index	0.0	69.0	92.0	100.0	100.0
Percent Dominant Taxa	100.0	99.4	296.1	184.4	162.0
Biological Condition Scores					
Taxonomic Richness	6	6	4	4	4
Diversity Index	6	6	4	6	6
Hilsenhoff Biotic Index	6	2	0	2	2
EPT Index	6	2	0	0	2
Ratio of Scrapers/Filterers	6	6	0	6	6
Ratio of EPT/Chironomids	6	2	0	6	6
Community Loss Index	6	4	4	4	4
Percent Dominant Taxa	6	6	0	2	4
Total Biological Score					
Total Biological Score	48	34	12	30	34
Biological % of Reference	100	71	25	63	71

Table 8. Summary of Pennsylvania-Maryland Border RBP III Biological Data—Continued

	EBAU	DEER	BBDC	FBDC
Raw Data Summary				
Number of Individuals	123	121	139	125
Number of Chironomids	29	6	18	14
Number of EPT Taxa	8	8	10	11
Number of Scrapers	22	23	14	9
Number of Filterers	46	54	69	47
Number of EPT Individuals	54	67	96	83
Similar Taxa	10	12	14	14
Percent Dominant Taxa	29	20	26	17
Metric Scores				
Taxonomic Richness	17	21	19	23
Diversity Index	3.23	3.89	3.50	4.07
Hilsenhoff Biotic Index	5.07	4.02	3.01	3.14
EPT Index	8.0	8.0	10.0	11.0
Ratio of Scrapers/Filterers	0.5	0.4	0.2	0.2
Ratio of EPT/Chironomids	1.9	11.2	5.3	5.9
Community Loss Index	0.59	0.38	0.31	0.26
Percent Dominant Taxa	23.6	16.5	18.7	13.6
Percent of Reference				
Taxonomic Richness	85.0	105.0	95.0	115.0
Diversity Index	84.8	102.1	91.9	106.8
Hilsenhoff Biotic Index	53.5	67.4	90.0	86.3
EPT Index	80.0	80.0	100.0	110.0
Ratio of Scrapers/Filterers	212.6	189.3	90.2	85.1
Ratio of EPT/Chironomids	38.9	233.3	111.4	123.9
Community Loss Index	59.0	38.0	31.0	26.0
Percent Dominant Taxa	131.8	92.2	104.5	76.0
Biological Condition Scores				
Taxonomic Richness	6	6	6	6
Diversity Index	6	6	6	6
Hilsenhoff Biotic Index	2	2	6	6
EPT Index	4	4	6	6
Ratio of Scrapers/Filterers	6	6	6	6
Ratio of EPT/Chironomids	2	6	6	6
Community Loss Index	4	6	6	6
Percent Dominant Taxa	4	6	6	6
Total Biological Score				
Total Biological Score	34	42	48	48
Biological % of Reference	71	88	100	100

Table 9. Summary of Susquehanna River Main Stem RBP III Biological Data

	SUSQ 365.0	SUSQ 340.0	SUSQ 289.1	SUSQ 44.5
Raw Data Summary				
Number of Individuals	125	101	149	141
Number of Chironomids	6	15	6	3
Number of EPT Taxa	11	11	11	9
Number of Scrapers	58	24	31	49
Number of Filterers	24	5	60	57
Number of EPT Individuals	98	37	116	115
Similar Taxa	18	7	9	7
Percent Dominant Taxa	25	26	19	30
Metric Scores				
Taxonomic Richness	18	18	20	18
Diversity Index	3.46	3.42	3.76	3.54
Hilsenhoff Biotic Index	3.67	5.12	3.98	4.40
EPT Index	11.0	11.0	11.0	9.0
Ratio of Scrapers/Filterers	2.4	4.8	0.5	0.9
Ratio of EPT/Chironomids	0.4	0.1	0.4	0.4
Community Loss Index	0.0	0.61	0.45	0.61
Percent Dominant Taxa	20.0	25.7	12.8	21.3
Percent of Reference				
Taxonomic Richness	100.0	100.0	111.1	100.0
Diversity Index	100.0	98.8	108.7	102.3
Hilsenhoff Biotic Index	100.0	71.7	92.2	83.4
EPT Index	100.0	100.0	100.0	81.8
Ratio of Scrapers/Filterers	100.0	200.0	20.8	37.5
Ratio of EPT/Chironomids	100.0	25.0	100.0	106.5
Community Loss Index	0.0	61.0	45.0	61.0
Percent Dominant Taxa	100.0	128.5	64.0	106.5
Biological Condition Scores				
Taxonomic Richness	6	6	6	6
Diversity Index	6	6	6	6
Hilsenhoff Biotic Index	6	4	6	4
EPT Index	6	6	6	4
Ratio of Scrapers/Filterers	6	6	2	4
Ratio of EPT/Chironomids	6	2	6	6
Community Loss Index	6	4	6	4
Percent Dominant Taxa	6	4	6	4
Total Biological Score				
Total Biological Score	48	38	44	38
Biological % of Reference	100	79	92	79

RESULTS

During fiscal year 1997, water quality in most interstate streams continued to meet designated use classes and water quality standards (Table 10, Appendix D). The parameter that most frequently exceeded water quality standards was total iron (Table 11, Figure 5). Only 39 out of a total of 2,521 observations exceeded water quality standards.

New York–Pennsylvania Streams

New York–Pennsylvania sampling stations consisted of 15 sites located near or on the New York–Pennsylvania border. The biological communities of nine (64.3 %) of these streams were nonimpaired. Of the remaining six sites, four (28.6 %) supported biological communities that were slightly impaired, and one (7.1 %) was severely impaired. One site (CHEM 12.0) was not sampled.

Table 10. Stream Classifications

Stream	Pa. Classification	N.Y. Classification
Apalachin Creek	CWF	D
Bentley Creek	WWF	D
Cascade Creek	CWF	C(T)
Cayuta Creek	WWF	B
Chemung River	WWF	C
Choconut Creek	WWF	C
Cowanesque River	WWF	C
Little Snake Creek	CWF	C
Seeley Creek	CWF	C
Snake Creek	CWF	C
South Creek	TSF	C
Susquehanna River @ Windsor		B
Susquehanna River @ Kirkwood	WWF	
Susquehanna River @ Waverly	WWF	B
Tioga River	WWF	C
Trowbridge Creek	CWF	C
Troups Creek	CWF	D
Wappasening Creek	CWF	C
	Pa. Classification	**Md. Classification**
Big Branch Deer Creek	CWF	III-P
Conowingo Creek	CWF	I-P
Deer Creek	CWF	III-P
Ebaughs Creek	CWF	III-P
Falling Branch Deer Creek	CWF	IV-P
Long Arm Creek	WWF	I-P
Octoraro Creek	TSF-MF	IV-P
Scott Creek	TSF	
South Branch Conewago Creek	WWF	
Susquehanna River @ Marietta	WWF	
Susquehanna River @ Conowingo		I

Table 11. Water Quality Standard Summary

Parameter	Number Of Observations	Number Exceeding Standards	Standard
Alkalinity	78	3	Pa. aquatic life
Total iron	78 78	20 5	N.Y. health (water source) Pa. aquatic life
Dissolved iron	78	4	Pa. aquatic life
pH	78	1	N.Y. aquatic life
Total manganese	78	4	N.Y. health (water source)
Nitrogen (nitrate + nitrite)	78	1	Pa. water supply
Dissolved solids	77	1	N.Y. health (water source)

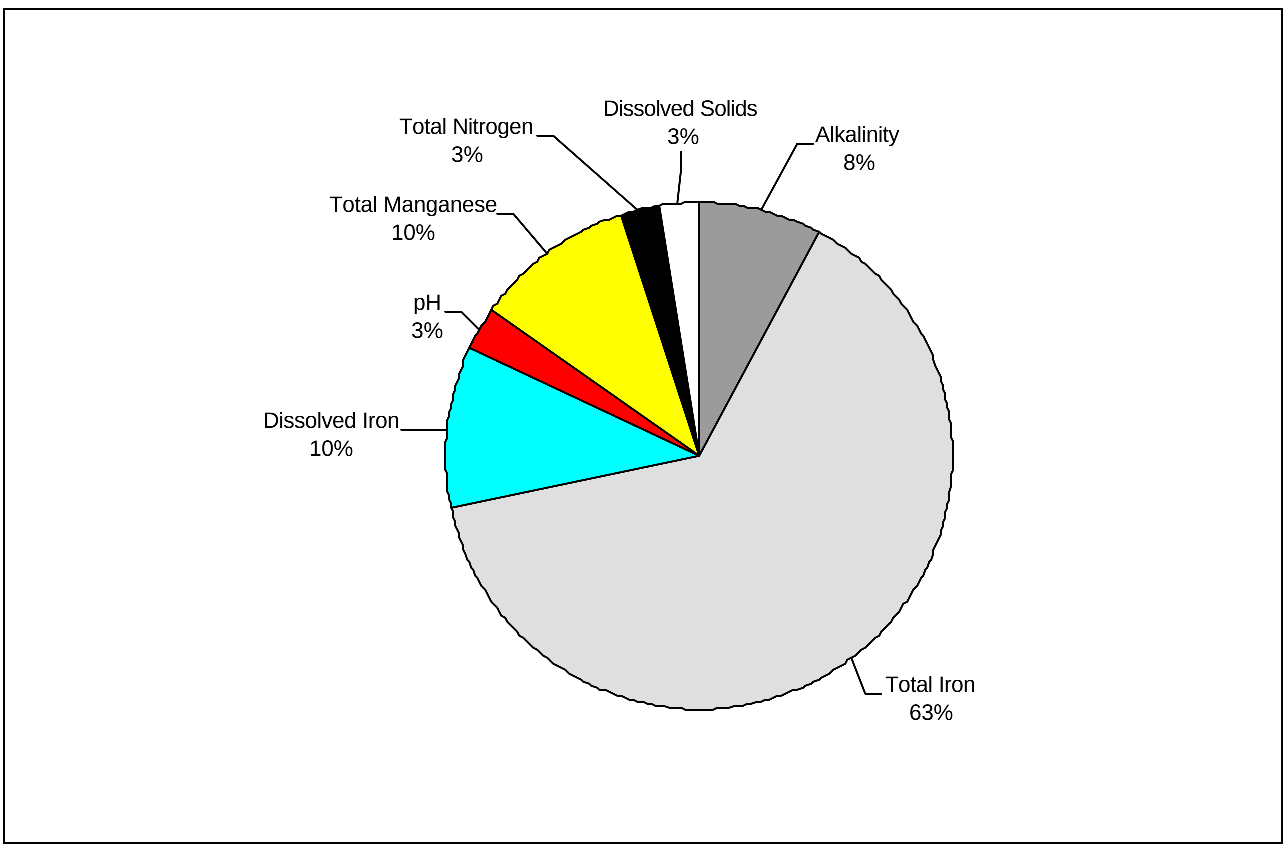


Figure 5. Parameters Exceeding Water Quality Standards

Pennsylvania–Maryland Streams

The Pennsylvania–Maryland interstate streams included nine stations located near or on the Pennsylvania–Maryland border. Four of these streams (44.4 %) were designated nonimpaired, using RBP III protocol designations. Of the remaining five sites, four stations (44.4 %) were slightly impaired, while one site (11.1 %) was designated moderately impaired.

Susquehanna River Sites

Susquehanna River main stem sites consisted of five sites located on the Susquehanna River. One station (SUSQ 10.0) was not sampled for macroinvertebrates, due to a lack of riffle habitat at the site. The biological communities of two of the sites were nonimpaired (50 %), while the remaining sites were designated slightly impaired (50 %).

BIOASSESSMENT OF INTERSTATE STREAMS

Abbreviations for water quality standards are provided in Table 12. Summaries of all stations include WQI scores, parameters that exceeded water quality standards, and parameters that exceeded the 90th percentile at each station. RBP III information also is provided, along with graphs depicting historical water quality and biological conditions over the past five years. Fiscal year 1997 WQI scores are indicated by a gray bar, and previous WQI scores are indicated by black bars in all WQI graphs.

New York-Pennsylvania Border Streams

Cascade Creek

During fiscal year 1997, Cascade Creek at Lanesboro, Pa., (CASC 1.6) showed a nonimpaired macroinvertebrate community. This stream, because it was dry, was not sampled during fiscal year 1996. However, during the 1995 fiscal year, Cascade Creek showed a slightly impaired biological community.

During the 1997 sampling period, Cascade Creek had one of the highest WQI scores of the Group 2 (annual) streams. Water quality standards for alkalinity and total and dissolved iron were exceeded, and water chemistry analysis indicated that total and dissolved ammonia also were elevated (Table 13). In spite of its elevated water quality parameters, Cascade Creek harbored several pollution-intolerant taxa, including *Isonychia* (Ephemeroptera: Isonychiidae), *Nigronia* (Megaloptera: Corydalidae), and *Acroneuria* (Plecoptera: Perlidae).

Trowbridge Creek

Trowbridge Creek at Great Bend, Pa., (TROW 1.8) had a nonimpaired biological community for the first time since sampling began in 1986. This stream was not sampled in fiscal year 1996, due to dry conditions. Impaired conditions in the past may have been influenced by several factors.

TROW 1.8 was located directly adjacent to a road, which can lead to an influx of chemicals. Impaired designations for this site in the past also may have been due to very low flow conditions, which can cause stress on the biological community of the stream. Past impaired conditions also may have been caused by chemically treated grass clippings deposited in the stream, as reported by local residents.

Water quality in Trowbridge Creek was very good, with one of the lowest WQI scores among the annually sampled streams; however, alkalinity did exceed Pennsylvania standards with a value of 18 mg/L (Table 14). A diverse macroinvertebrate community, including several pollution-intolerant taxa such as *Epeorus* (Ephemeroptera: Heptageniidae), *Isonychia*, *Paraleptophlebia* (Ephemeroptera: Leptophlebiidae), *Leuctra* (Plecoptera: Leuctridae), *Acroneuria*, and

Table 12. Abbreviations Used in Tables 13 Through 41

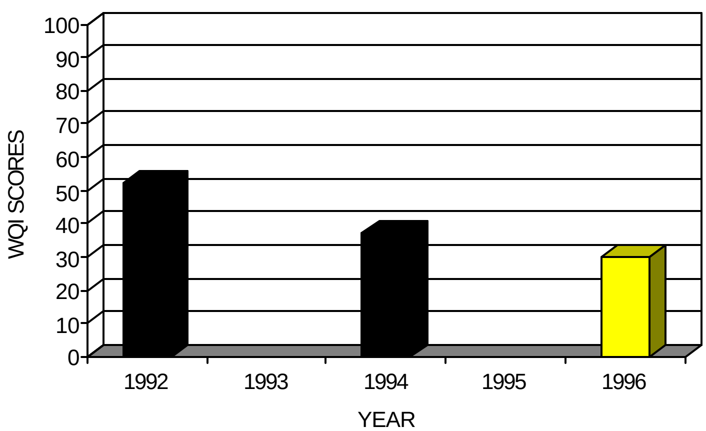
Abbreviation	Parameter
ALK	Alkalinity
BOD	Biochemical Oxygen Demand
COND	Conductivity
DAl	Dissolved Aluminum
TAl	Total Aluminum
TCa	Total Calcium
TCl	Total Chloride
DFe	Dissolved Iron
TFe	Total Iron
DKN	Dissolved Kjeldahl Nitrogen
TKN	Total Kjeldahl Nitrogen
TMg	Total Magnesium
DMn	Dissolved Manganese
TMn	Total Manganese
DNH3	Dissolved Ammonia
TNH3	Total Ammonia
DNO2	Dissolved Nitrite
TNO2	Total Nitrite
DNO3	Dissolved Nitrate
TNO3	Total Nitrate
DO	Dissolved Oxygen
DP	Dissolved Phosphorus
TP	Total Phosphorus
DPO4	Dissolved Orthophosphate
TPO4	Total Orthophosphate
DRES	Dissolved Solids
TRES	Total Solids
TSO4	Total Sulfate
TOC	Total Organic Carbon
TURB	Turbidity
WQI	Water Quality Index
RBP	Rapid Bioassessment Protocol

Table 13. Water Quality Summary Cascade Creek at Lanesboro, Pa.

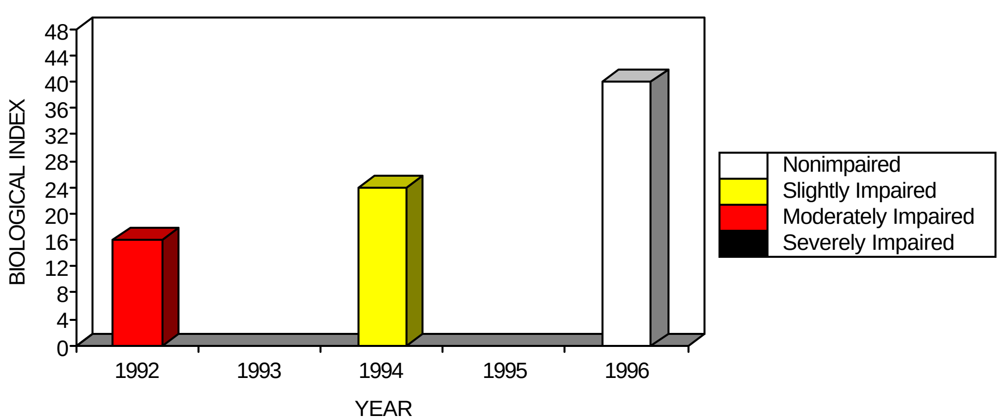
Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
ALK	07/29/96	18 mg/L	20 mg/L	Pa. aquatic life
TFe	07/29/96	813 µg/L	300 µg/L	N.Y. health (water source) and aquatic life
DFe	07/29/96	385 µg/L	300 µg/L	Pa. aquatic life

Date	WQI	Parameters Exceeding 90th Percentile							
07/29/96	30	DO	ALK	DNH3	TNH3				

Biological Summary	
Number of Taxa	17
Diversity Index	3.28
RBP III Score	40
RBP III Condition	Nonimpaired



Water Quality Index



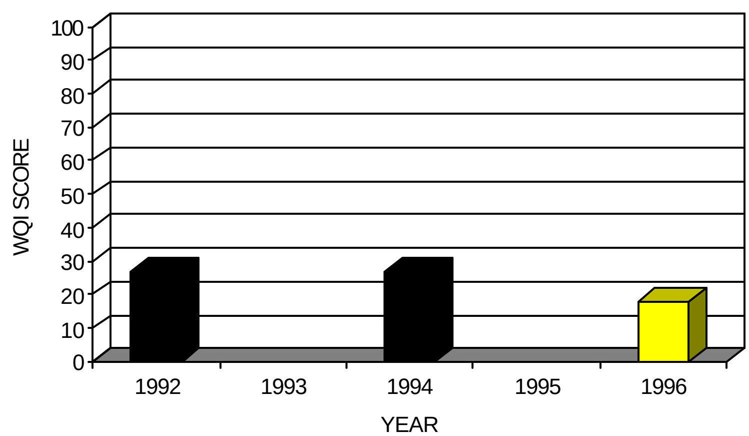
Biological Index

Table 14. Water Quality Summary Trowbridge Creek at Great Bend, Pa.

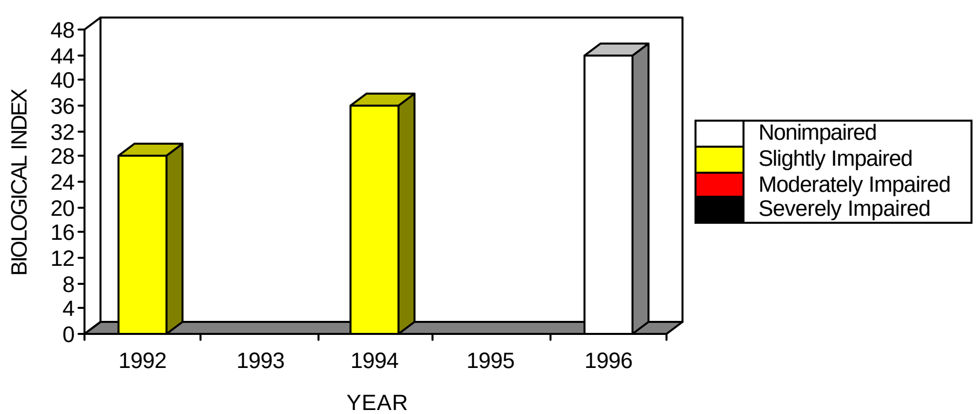
Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
ALK	07/29/96	18 mg/L	20 mg/L	Pa. aquatic life

Date	WQI	Parameters Exceeding 90th Percentile							
07/29/96	18	ALK							

Biological Summary	
Number of Taxa	21
Diversity Index	3.64
RBP III Score	44
RBP III Condition	Nonimpaired



Water Quality Index



Biological Index

that Trowbridge Creek had the highest Ephemeroptera/Plecoptera/Trichoptera (EPT) index (14) of the New York-Pennsylvania border streams

Snake Creek

Snake Creek at Brookdale, Pa., (SNAK 2.3) served as the reference site for New York-Pennsylvania border streams. This site had an excellent biological community, as well as exceptional water quality, with one of the lowest WQI scores among the Group 2 streams (Table 15). Snake Creek supported many pollution-intolerant taxa including *Ameletus* (Ephemeroptera: Ameletidae), *Epeorus, Isonychia, Nigronia, Paragnetina* (Plecoptera: Perlidae), and *Dolophilodes* (Trichoptera: Philopotamidae).

Little Snake Creek

Little Snake Creek at Brackney, Pa., (LSNK 7.6) contained a marginally nonimpaired biological community. The biological condition score of this site was 38, which is borderline between a nonimpaired and an impaired designation. A large number of midges (Diptera: Chironomidae) accounted for the marginal status of this site. Little Snake Creek was not sampled during fiscal year 1996, due to the dry condition of the stream.

Total iron, dissolved iron and total manganese exceeded water quality standards during July 1996 (Table 16). Additionally, LSNK 7.6 had one of the highest WQI scores among the annually-sampled streams. In spite of these elevated concentrations and its drought regime, Little Snake Creek contained the highest taxa richness (23) of the New York–Pennsylvania border streams. This site harbored such pollution-intolerant taxa as *Epeorus*, *Isonychia*, *Nigronia*, *Acroneuria*, and *Pteronarcys* (Plecoptera: Pteronarcyidae).

Choconut Creek

During fiscal year 1997, the biological community of Choconut Creek at Vestal Center, N.Y., (CHOC 9.1) had deteriorated from nonimpaired to slightly impaired. This designation was due to the dominance of midges at this site. Pollution-tolerant midges constituted 52 percent of the total sample at CHOC 9.1.

Water chemistry analyses indicated that water quality conditions at this site were comparable to the reference site, with no elevated parameters (Table 17). As the land use surrounding this site is largely low-density residential and farmland, the impairment designation may have been due to poor habitat surrounding the site or to low flow conditions.

Apalachin Creek

Apalachin Creek at Little Meadows, Pa., (APAL 6.9) showed a nonimpaired biological community, which was an improvement over its slightly impaired designation in fiscal year 1996. Previous impairment may have been due to a lack of suitable riffle habitat.

Total iron exceeded New York State standards with a value of 538 µg/L (Table 18). Water quality analyses indicated somewhat depressed dissolved oxygen, possibly due to still-water conditions upstream of the sampling site. Apalachin Creek showed the highest diversity index (4.00) and the lowest Hilsenhoff Biotic Index (3.56) of any of the sites in this region.

Wappasening Creek

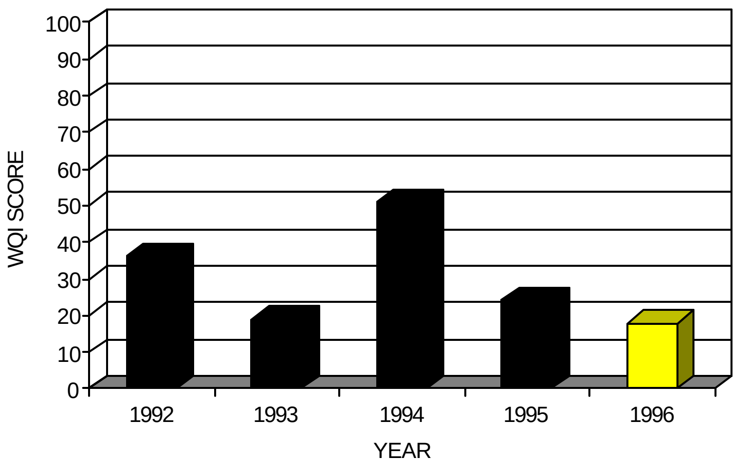
Nonimpaired biological conditions existed at Wappasening Creek at Nichols, N.Y., (WAPP 2.6) for the first time in five years. Water quality conditions at Wappasening Creek were good, and this site possessed a healthy macroinvertebrate population (Table 19). WAPP 2.6 supported several pollution-intolerant organisms, including *Atherix* (Diptera: Athericidae), *Hexatoma* (Diptera: Tipulidae), *Serratella* (Ephemeroptera: Ephemerellidae), *Isonychia*, *Nigronia*, and *Acroneuria*.

Table 15. Water Quality Summary Snake Creek at Brookdale, Pa.

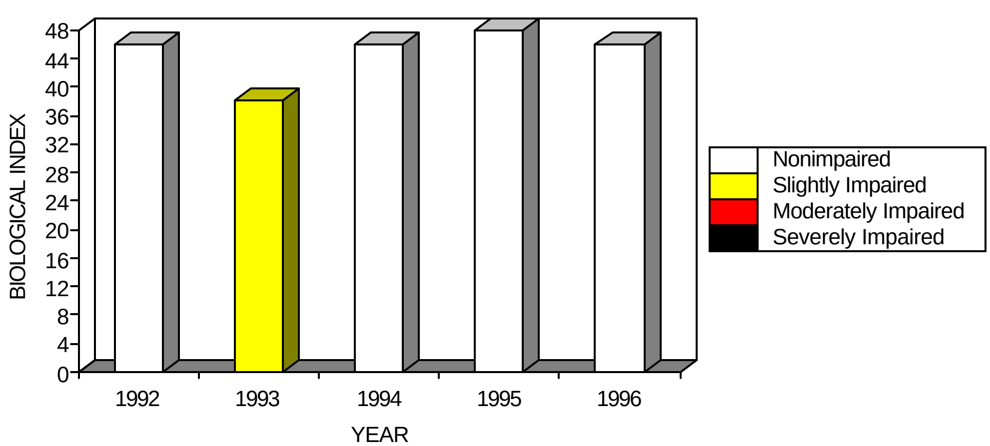
Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
None	07/29/96			

Date	WQI	Parameters Exceeding 90th Percentile							
07/29/96	18								

Biological Summary	
Number of Taxa	19
Diversity Index	3.53
RBP III Score	46
RBP III Condition	Reference



Water Quality Index



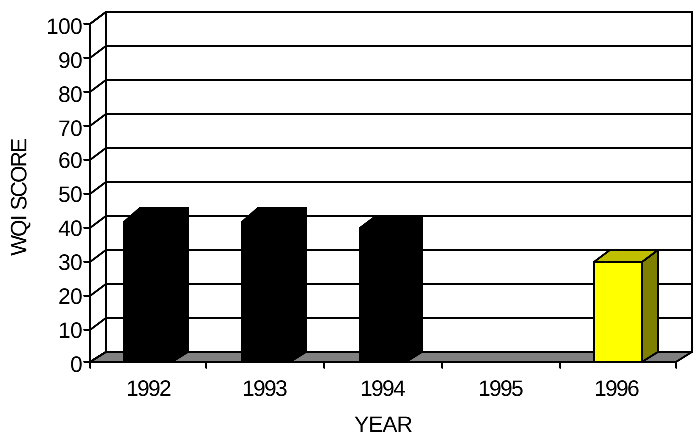
Biological Index

Table 16. Water Quality Summary Little Snake Creek at Brackney, Pa.

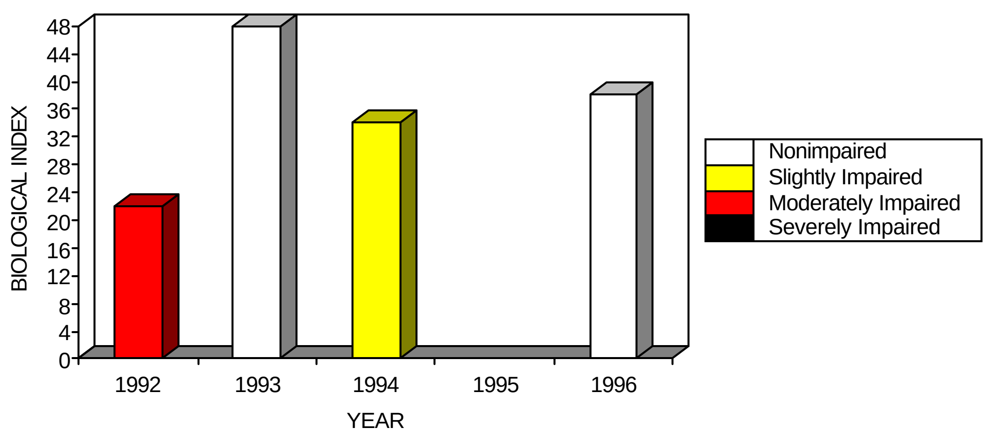
Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
TFe	07/30/96	941 µg/L	300 µg/L	N.Y. health (water source) and aquatic life
DFe	07/30/96	586 µg/L	300 µg/L	Pa. aquatic life
TMn	07/30/96	300 µg/L	300 µg/L	N.Y. health (water source) and aquatic life

Date	WQI	Parameters Exceeding 90th Percentile							
07/30/96	30	DO	TOC	DFe					

Biological Summary	
Number of Taxa	23
Diversity Index	3.42
RBP III Score	38
RBP III Condition	Nonimpaired



Water Quality Index



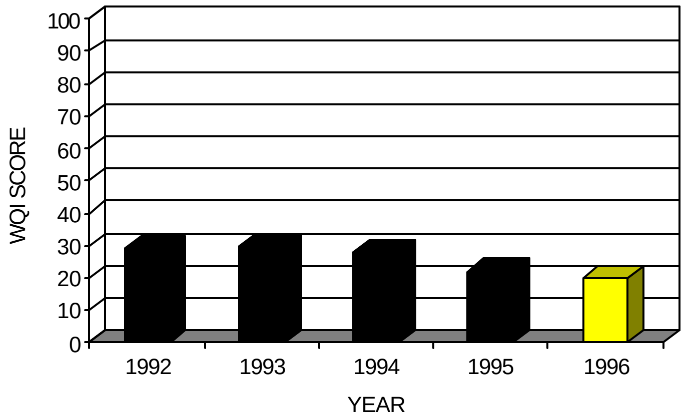
Biological Index

Table 17. Water Quality Summary Choconut Creek at Vestal Center, N.Y.

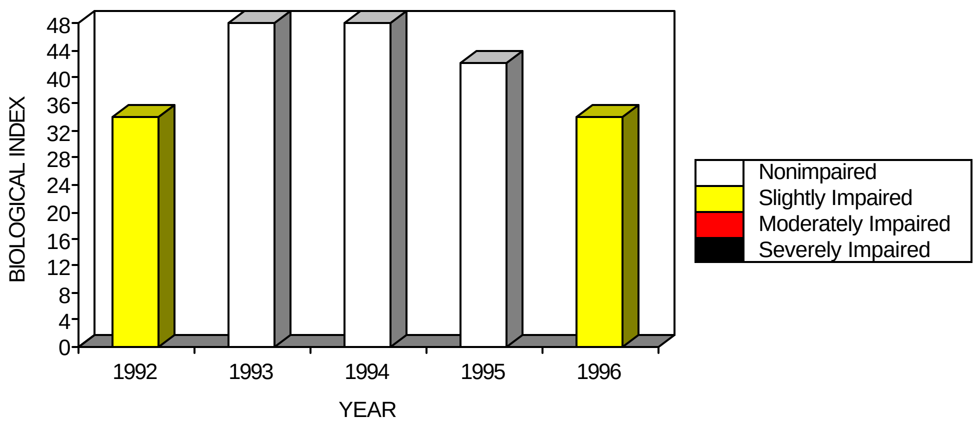
Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
None				

Date	**WQI**	**Parameters Exceeding 90th Percentile**							
07/30/96	20								

Biological Summary	
Number of Taxa	19
Diversity Index	2.79
RBP III Score	34
RBP III Condition	Slightly Impaired



Water Quality Index



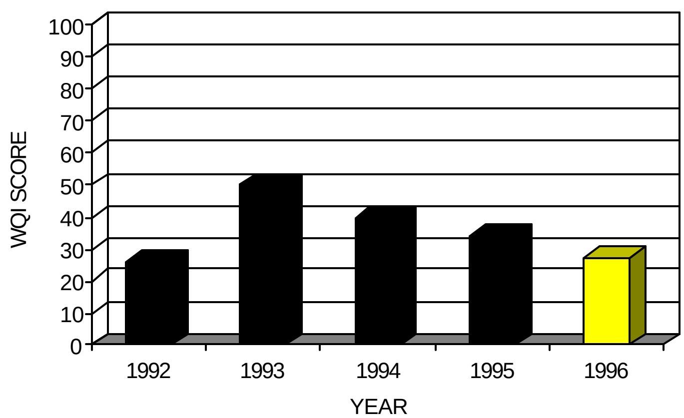
Biological Index

Table 18. Water Quality Summary Apalachin Creek at Little Meadows, Pa.

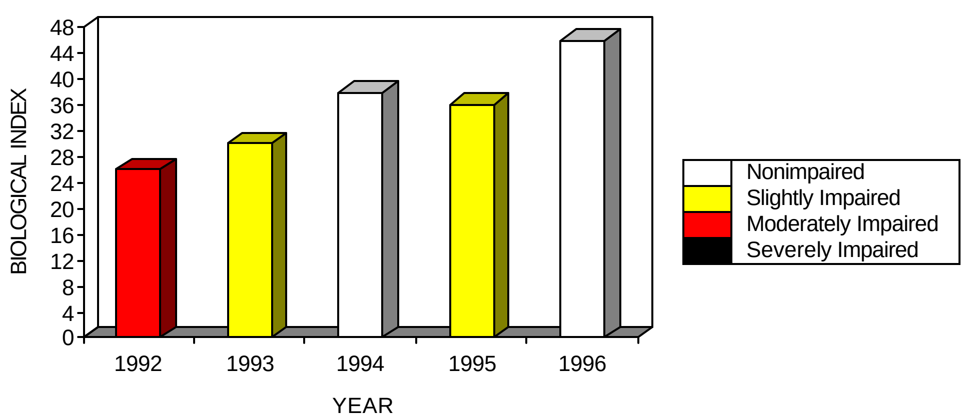
Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
TFe	07/30/96	538 µg/L	300 µg/L	N.Y. health (water source) and aquatic life

Date	WQI	Parameters Exceeding 90th Percentile							
07/30/96	27	DO							

Biological Summary	
Number of Taxa	22
Diversity Index	4.00
RBP III Score	46
RBP III Condition	Nonimpaired



Water Quality Index



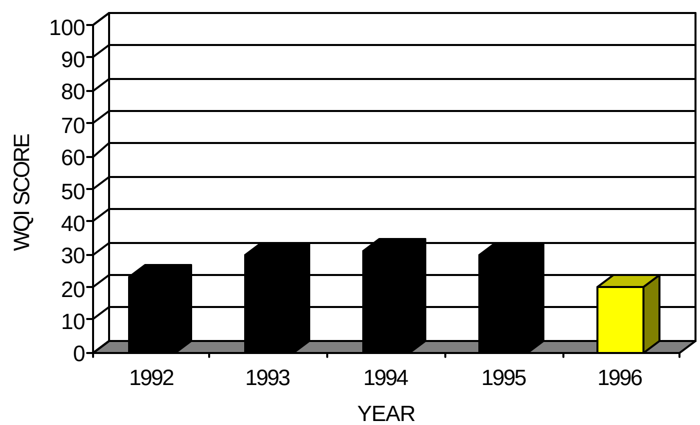
Biological Index

Table 19. Water Quality Summary Wappasening Creek at Nichols, N.Y.

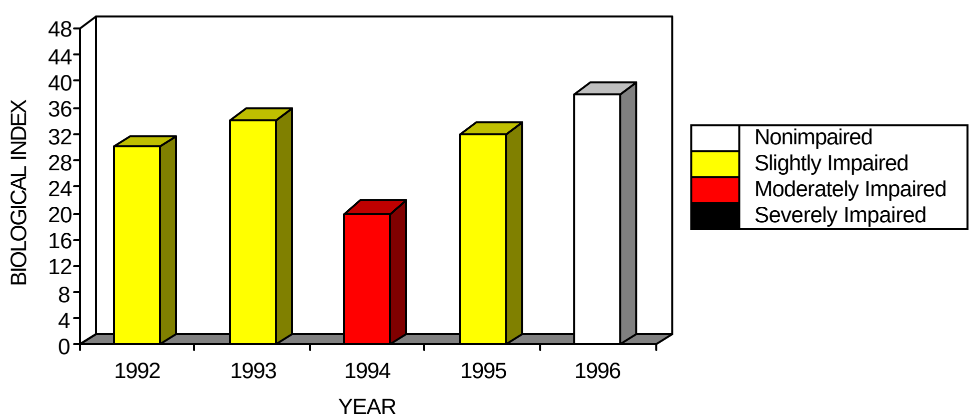
Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
None				

Date	WQI	Parameters Exceeding 90th Percentile							
07/30/96	20								

Biological Summary	
Number of Taxa	17
Diversity Index	3.47
RBP III Score	38
RBP III Condition	Nonimpaired



Water Quality Index



Biological Index

Cayuta Creek

For the first time in three years, biological conditions on Cayuta Creek at Waverly, N.Y., (CAYT 1.7) indicated the macroinvertebrate community was nonimpaired. New York water quality standards for total iron were exceeded on one occasion. Water quality analyses also verified that Cayuta Creek contained elevated concentrations of total and dissolved solids, total and dissolved nitrates, total and dissolved phosphorus, total and dissolved orthophosphate, and total calcium (Table 20).

These elevated concentrations indicated that wastewater discharges from the Waverly sewage treatment facility may have been affecting the biological community. In spite of these elevated parameters, Cayuta Creek accommodated a healthy biological community including *Isonychia* and *Acroneuria*.

Troups Creek

Troups Creek at Austinburg, Pa., (TRUP 4.5) had a nonimpaired biological community for the first time in five years. With a RBP III score of 38, this site was located on the border of a nonimpaired/slightly impaired designation. This was due largely to a combination of a large number of midges and a small number of EPT taxa.

Although the quality of the biological community was quite good, containing such pollution-intolerant organisms as *Atherix*, *Hexatoma*, *Isonychia*, *Nigronia*, and *Neoperla* (Plecoptera: Perlidae), water quality in Troups Creek was degraded. On two separate occasions, total iron exceeded standards, and, on one of these occasions, it exceeded both Pennsylvania and New York standards. Additional water quality analyses indicated that concentrations of total ammonia, dissolved and total orthophosphate, nitrates, and aluminum also were elevated (Table 21). These elevated concentrations may have been caused by a salvage yard located upstream of the sampling site.

Cowanesque River

Severely degraded biological conditions existed on the Cowanesque River at Lawrenceville, Pa., (COWN 2.2). Moderately to severely impaired conditions have existed at this site for the past five years of sampling. Increased phytoplankton production in Cowanesque Reservoir caused a shift in the macroinvertebrate community, resulting in a biological population dominated by filter-feeding organisms. Additionally, the bottom discharge dam depressed dissolved oxygen levels in the Cowanesque River downstream of the outflow. Thus, the site was heavily dominated (75 %) by pollution-tolerant Chironomidae. This site has the fewest number of taxa (6), the lowest diversity index (1.18), the highest Hilsenhoff Biotic Index (6.55), the lowest EPT Index (1), and the lowest overall RBP III score (6) of the sites in this region.

The Cowanesque River had one of the highest averaged WQI scores (61) of the Group 1 (quarterly) New York-Pennsylvania border streams. Very high concentrations of iron were observed during the fall of 1996. Total iron concentrations exceeded both New York and Pennsylvania standards on two occasions. Other standards exceeded included total manganese, dissolved iron, and pH. Water quality analyses also indicated high nutrient levels existed at this site (Table 22).

Tioga River

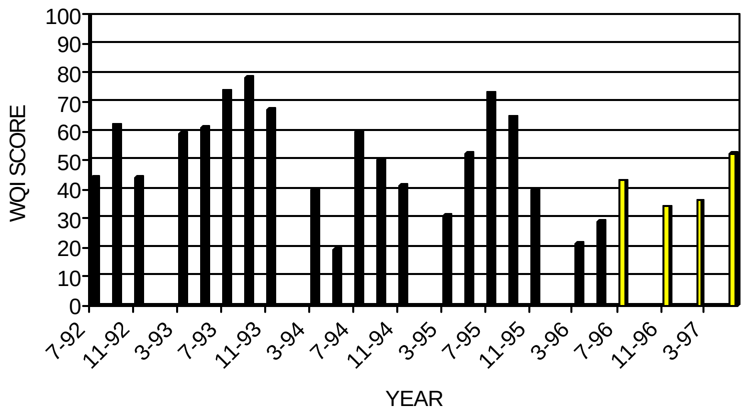
The Tioga River at Lindley, N.Y., (TIOG 10.8) had a nonimpaired biological community for the first time in three years. Chemical water quality analyses indicated that elevated concentrations of many parameters existed at this site, including sulfates, nitrites, nitrates, chloride, and manganese (Table 23). This site had the highest individual WQI score (78) of

Table 20. Water Quality Summary Cayuta Creek at Waverly, N.Y.

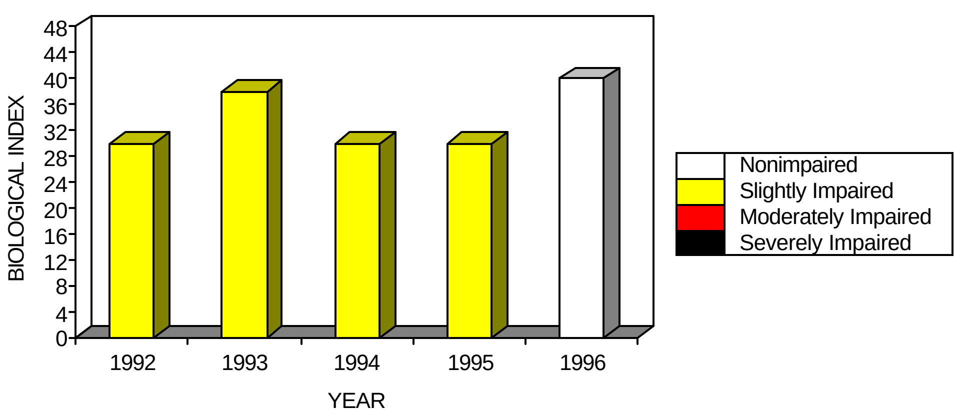
Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
TFe	11/12/96	596 µg/L	300 µg/L	N.Y. health (water source) and aquatic life

Date	WQI	Parameters Exceeding 90th Percentile							
07/30/96	43	BOD	DNO3	TNO3	TP	DP	DPO4	TCa	TPO4
11/12/96	34								
02/19/97	36								
05/06/97	52	DO							

Biological Summary	
Number of Taxa	20
Diversity Index	3.30
RBP III Score	40
RBP III Condition	Nonimpaired



Water Quality Index



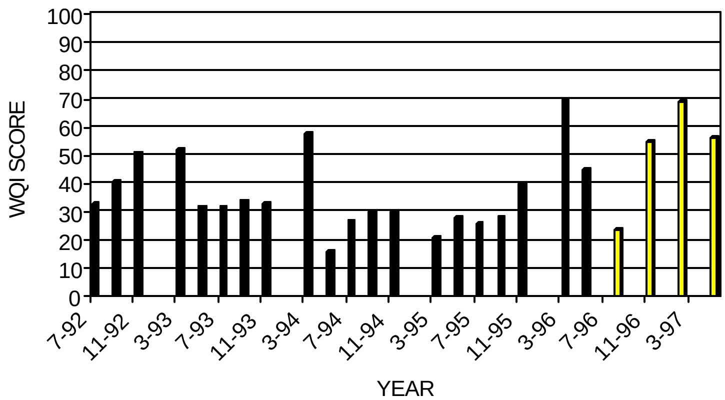
Biological Index

Table 21. Water Quality Summary Troups Creek at Austinburg, Pa.

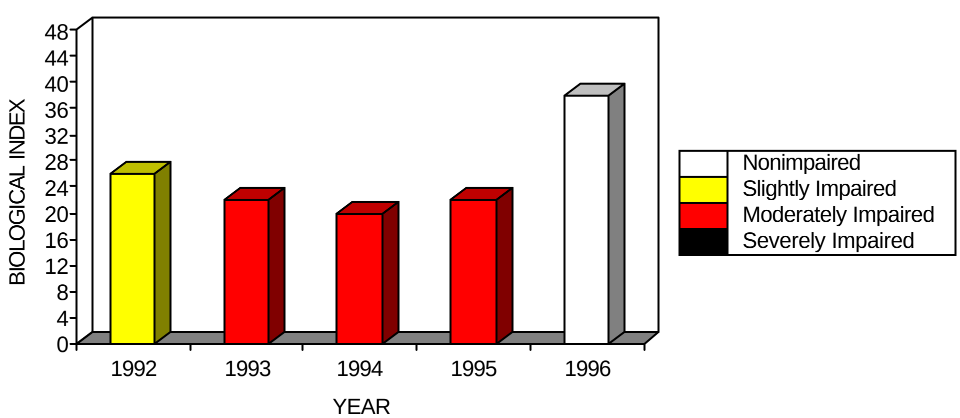
Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
TFe	11/14/96	1,360 µg/L	300 µg/L	N.Y. health (water source) and aquatic life
TFe	02/20/97	5,180 µg/L	1,500 µg/L	Pa. aquatic life
TFe	02/20/97	5,180 µg/L	300 µg/L	N.Y. health (water source) and aquatic life

Date	WQI	Parameters Exceeding 90th Percentile							
08/10/96	24	DO							
11/14/96	55	TRES	DRES	DNO3	TNO3	DPO4	TCa		
02/20/97	69	ALK	TRES	DRES	TNH3	TNO2	TP	TOC	TFe
		TAl	TPO4						
05/07/97	56	ALK	TNH3	TOC					

Biological Summary	
Number of Taxa	18
Diversity Index	3.27
RBP III Score	38
RBP III Condition	Nonimpaired



Water Quality Index



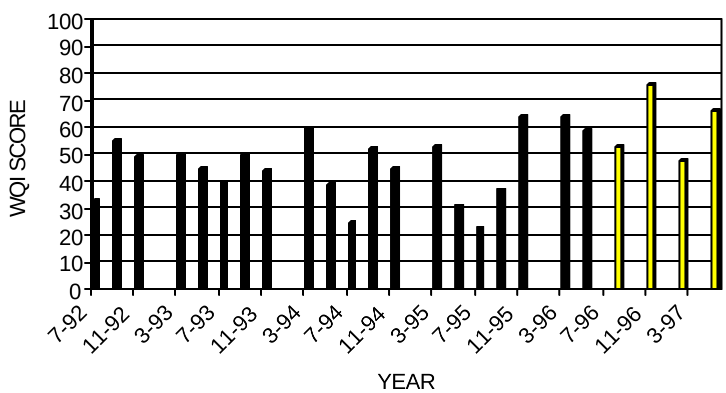
Biological Index

Table 22. Water Quality Summary Cowanesque River at Lawrenceville, Pa.

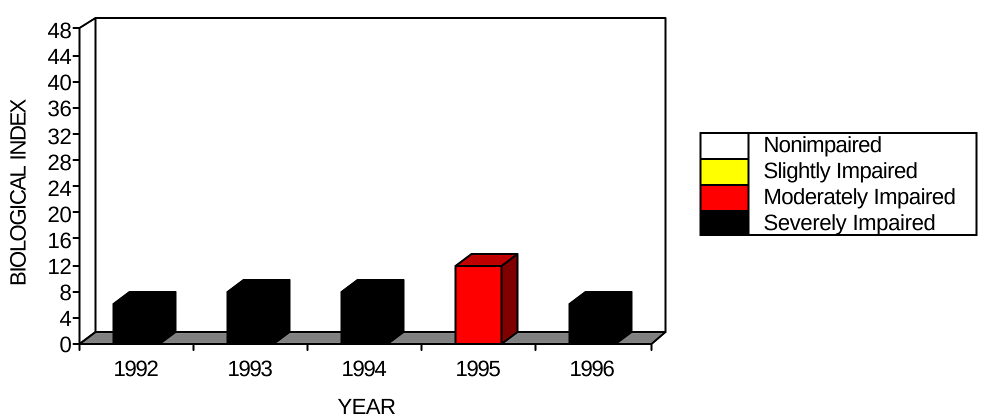
Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
TFe	08/01/96	2,060 μg/L	1,500 μg/L	Pa. aquatic life
TFe	08/01/96	2,060 μg/L	300 μg/L	N.Y. health (water source) and aquatic life
TMn	08/01/96	683 μg/L	300 μg/L	N.Y. health (water source) and aquatic life
TFe	11/14/96	13,800 μg/L	1,500 μg/L	Pa. aquatic life
TFe	11/14/96	13,800 μg/L	300 μg/L	N.Y. health (water source) and aquatic life
DFe	11/14/96	652 μg/L	300 μg/L	Pa. aquatic life
TFe	02/20/97	929 μg/L	300 μg/L	N.Y. health (water source) and aquatic life
pH	05/07/97	8.85	6.5-8.5	N.Y. aquatic life

Date	WQI	Parameters Exceeding 90th Percentile							
08/01/96	53	TNO2	TOC	TFe	TMn	DMn	TPO4	TURB	
11/14/96	76	TP	DP	TOC	TCa	TMg	TFe	TMn	TAl
		TURB							
02/20/97	48	TKN	DPO4	DFe					
05/07/97	66	DO	TNO2	DP	DPO4	TOC	TAl		

Biological Summary	
Number of Taxa	6
Diversity Index	1.18
RBP III Score	6
RBP III Condition	Severely Impaired



Water Quality Index



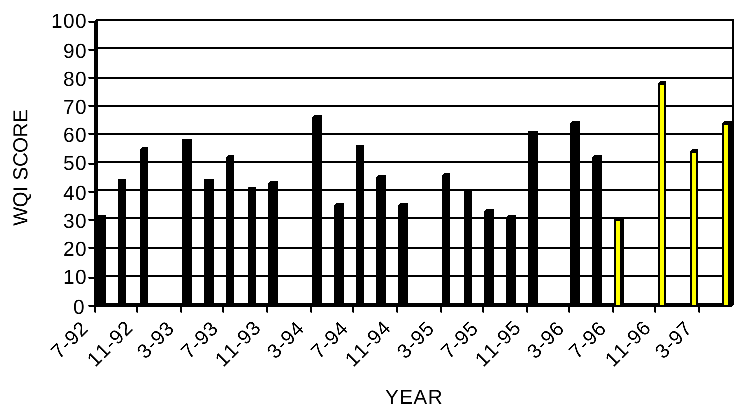
Biological Index

Table 23. Water Quality Summary Tioga River at Lindley, N.Y.

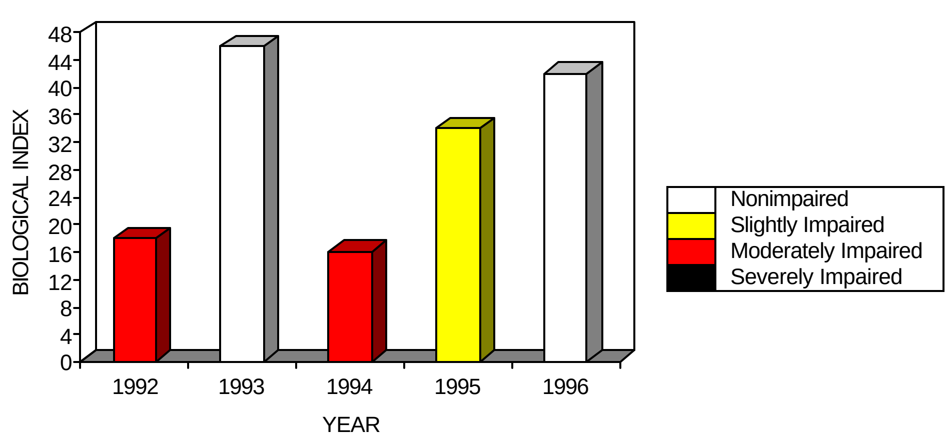
Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
TFe	11/14/96	4,920 µg/L	1,500 µg/L	Pa. aquatic life
TFe	11/14/96	4,920 µg/L	300 µg/L	N.Y. health (water source) and aquatic life
DFe	11/14/96	852 µg/L	300 µg/L	Pa. aquatic life
TFe	02/20/97	734 µg/L	300 µg/L	N.Y. health (water source) and aquatic life
TMn	02/20/97	418 µg/L	300 µg/L	N.Y. health (water source) and aquatic life
TMn	05/07/97	335 µg/L	300 µg/L	N.Y. health (water source) and aquatic life

Date	WQI	Parameters Exceeding 90th Percentile							
07/31/96	30	TSO4							
11/14/96	78	ALK	TNH3	TNO2	DPO4	TOC	TSO4	DFe	TMn
		DMn	DAl						
02/20/97	54	DPO4	TSO4	DFe	TMn	DMn			
05/07/97	64	ALK	TSO4	TMn	DMn				

Biological Summary	
Number of Taxa	21
Diversity Index	3.46
RBP III Score	42
RBP III Condition	Nonimpaired



Water Quality Index



Biological Index

the New York-Pennsylvania border sampling stations.

Poor water quality at this site was largely due to acid mine drainage in the headwaters of the Tioga River. The Tioga-Hammond Reservoir, located upstream of TIOG 10.8, alleviated some of the effects of the acid mine drainage by buffering its outflow with alkaline waters stored in Hammond Lake; however, the effects of the acid mine drainage were still observed downstream. Total iron exceeded standards on two different occasions, as did total manganese. Dissolved iron also exceeded standards on one occasion. In spite of these elevated concentrations, several pollution-intolerant organisms inhabited TIOG 10.8, including *Atherix, Heterocloeon* (Ephemeroptera: Baetidae), *Isonychia*, and *Agnetina*.

Seeley Creek

Seeley Creek at Seeley Creek, N.Y., (SEEL 10.3) contained a slightly impaired macroinvertebrate community, and had shown a slightly to moderately impaired biological community for the past nine years. Water quality analyses showed that good water quality conditions existed in this stream (Table 24). The impaired biological community may have been due to flow-related incidents. During periods of low flow, large amounts of streambed were exposed in Seeley Creek. Additionally, rechannelization and removal of the in-stream habitat may have been a source of impairment at this site.

South Creek

For the past seven years, South Creek at Fassett, Pa., (SOUT 7.8) displayed a slightly impaired biological community. With a RBP III score of 26, this site was located on the border of a slightly impaired/moderately impaired designation. The dominance of the sample by two taxa, midges and *Chimarra* (Trichoptera: Philopotamidae), produced this impairment designation. Together, these taxa comprised 75 percent of the total sample. This dominance caused a drop in several metrics, including EPT/Chironomidae, EPT Index, and Percent Dominant Taxa.

Total iron concentrations, which exceeded the New York state standard in July 1996, were elevated in South Creek (Table 25). However, in general, water quality at SOUT 7.8 was fair. Impairment at this site may have been due to poor habitat conditions or to periodic drying of the streambed.

Bentley Creek

For the third consecutive year, a slightly impaired biological community inhabited Bentley Creek at Wellsburg, N.Y. (BNTY 0.9). The biological community at this site was located on the border of a slightly impaired/moderately impaired designation. Impairment may have been due in part to rechannelization of the stream at the time of macroinvertebrate sampling. Midges and net-spinning caddisflies (Trichoptera: Hydropsychidae) dominated the macroinvertebrate sample from Bentley Creek. Additionally, a low Scraper/Filterer ratio depressed the total biological score at this site.

Water quality analyses showed elevated concentrations of total and dissolved aluminum, total and dissolved solids, and total iron. Additionally, total iron exceeded New York state standards with a value of 1100 μg/L (Table 26).

Chemung River

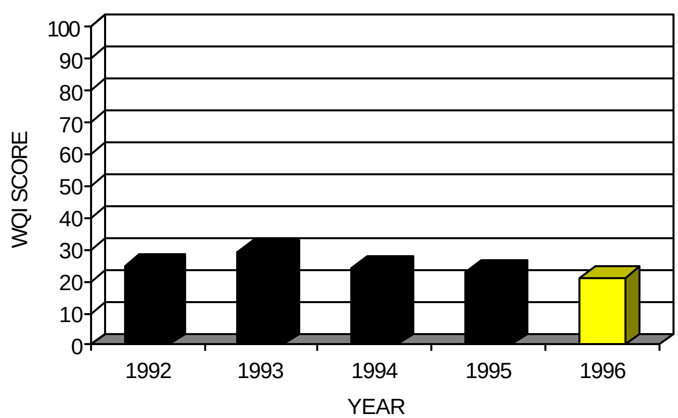
No biological data existed for the Chemung River at Chemung, N.Y. (CHEM 12.0) for fiscal year 1997. The Chemung River had the highest overall WQI scores of the Group 1 (quarterly) New York-Pennsylvania border sites. New York state standards for total dissolved solids and total iron were exceeded on separate occasions. Water quality analyses also indicated elevated concentrations of dissolved nitrites, total and dissolved nitrates, total chloride, and total orthophosphates (Table 27). These elevated concentrations of nutrients may have been due to agricultural activity in the area. Additionally, wastewater discharges from Elmira, N.Y., may have resulted in the observed elevated nutrient and chloride concentrations.

Table 24. Water Quality Summary Seeley Creek at Seeley Creek, N.Y.

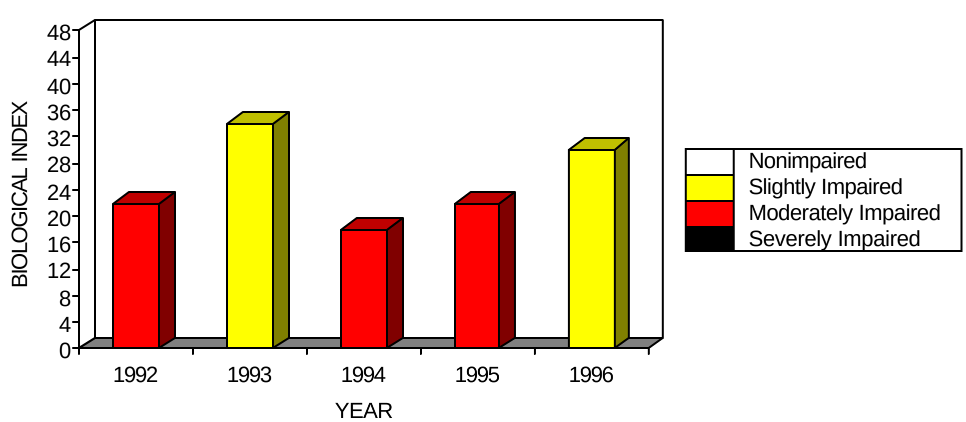
Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
None				

Date	**WQI**	**Parameters Exceeding 90th Percentile**							
07/31/96	21								

Biological Summary	
Number of Taxa	16
Diversity Index	2.49
RBP Score	30
RBP Condition	Slightly Impaired



Water Quality Index



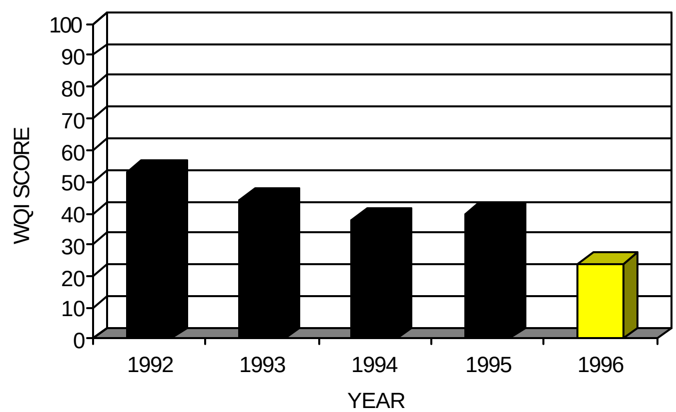
Biological Index

Table 25. Water Quality Summary South Creek at Fassett, Pa.

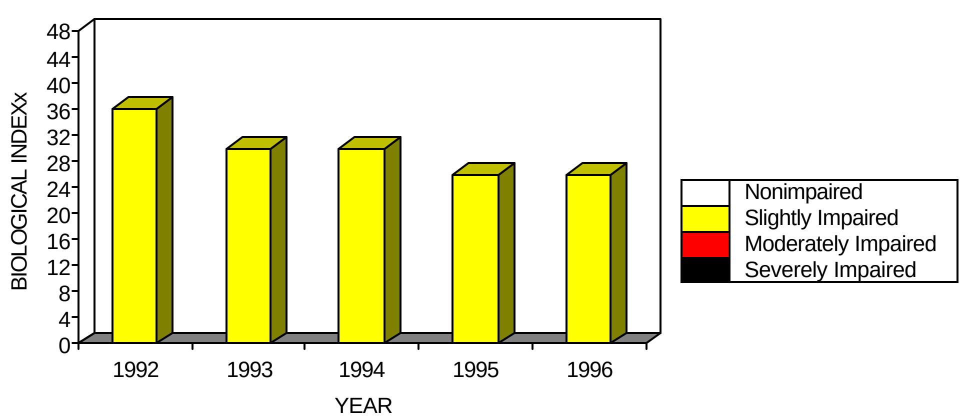
Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
TFe	07/31/96	306 µg/L	300 µg/L	N.Y. health (water source) and aquatic life

Date	WQI	Parameters Exceeding 90th Percentile							
07/31/96	24	DO	TOC						

Biological Summary	
Number of Taxa	13
Diversity Index	2.34
RBP Score	26
RBP Condition	Slightly Impaired



Water Quality Index



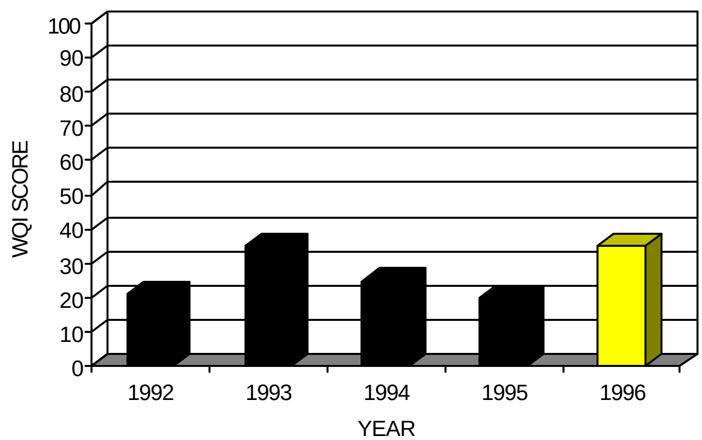
Biological Index

Table 26. Water Quality Summary Bentley Creek at Wellsburg, N.Y.

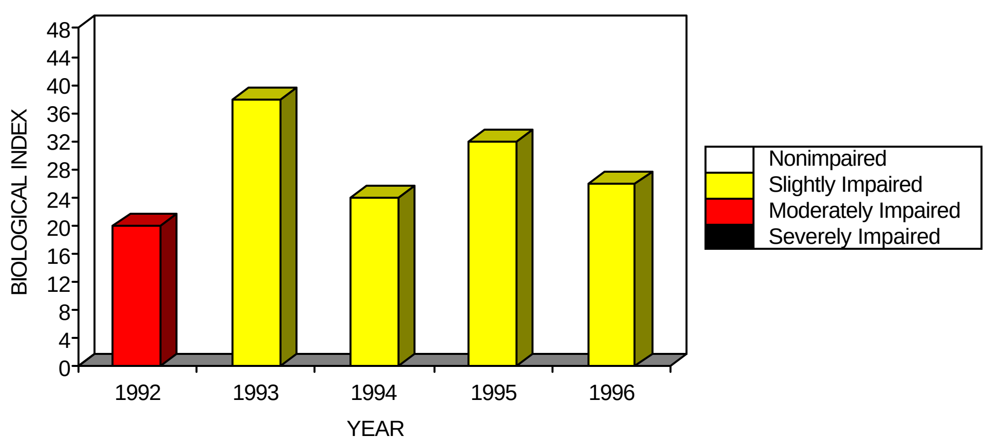
Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
TFe	07/31/96	1,100 µg/L	300 µg/L	N.Y. health (water source) and aquatic life

Date	WQI	Parameters Exceeding 90th Percentile							
07/31/96	35	TAl	DAl						

Biological Summary	
Number of Taxa	14
Diversity Index	2.65
RBP III Score	26
RBP III Condition	Slightly Impaired



Water Quality Index

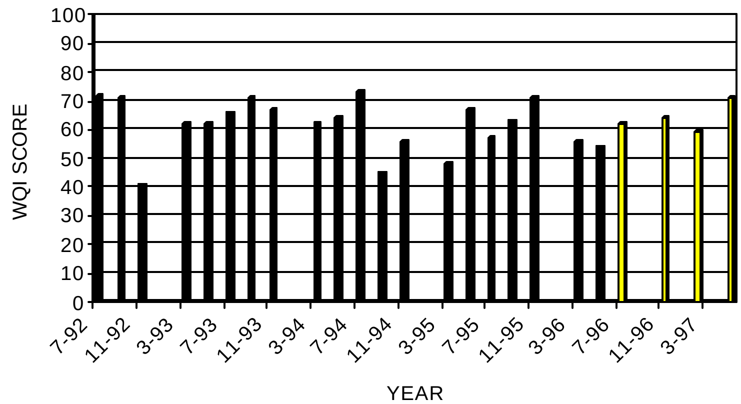


Biological Index

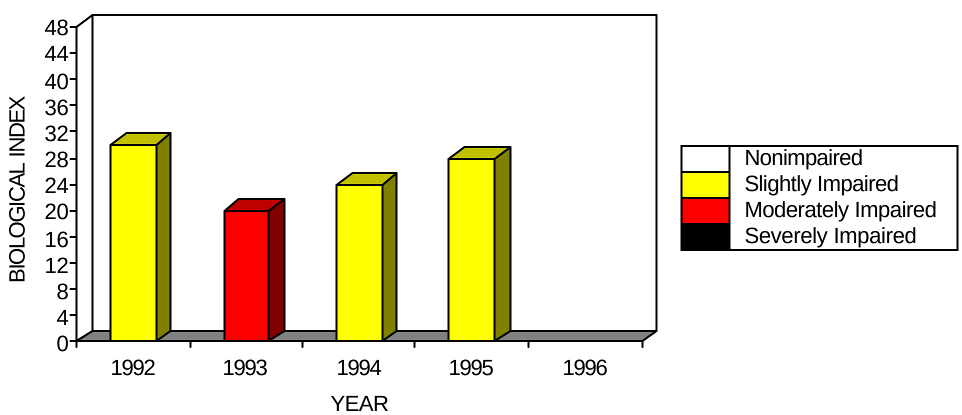
Table 27. Water Quality Summary Chemung River at Chemung, N.Y.

Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
TDS	07/31/96	644 mg/L	500 mg/L	N.Y. aquatic life
TFe	11/12/96	494 µg/L	300 µg/L	N.Y. health (water source) and aquatic life

Date	WQI	Parameters Exceeding 90th Percentile							
07/31/96	62	DO	COND	TRES	DRES	DNO2	DNO3	TNO3	DKN
		TKN	DPO4	TCa	TMg	TCl			
11/12/96	64	COND	DNO2	TP	TCa	TCl	TPO4		
02/20/97	59	COND	DNO2	DP	DPO4	TCa	TMg	TCl	
05/06/97	71	DO	COND	TRES	DRES	DKN	TKN	TOC	TCa
		TMg	TCl	TPO4					



Water Quality Index



Biological Index

Pennsylvania–Maryland Streams

South Branch Conewago Creek

South Branch Conewago Creek near Bandanna, Pa., (SBCC 20.4) served as the reference site for the Pennsylvania–Maryland border streams. South Branch Conewago Creek had the lowest WQI score (27) of the Pennsylvania-Maryland border sites. SBCC 20.4 had excellent water quality, as well as an excellent biological community (Table 28). The lowest Hilsenhoff Biotic Index (2.71) in the Pennsylvania-Maryland border region was found at this site. The benthic community contained such pollution-intolerant macroinvertebrates as *Nigronia*, *Leuctra*, *Acroneuria*, *Glossosoma* (Trichoptera: Glossosomatidae), *Dolophilodes*, and *Rhyacophila* (Trichoptera: Rhyacophilidae).

Long Arm Creek

For the second consecutive year, Long Arm Creek at Bandanna, Pa., (LNGA 2.5) had a slightly impaired biological community. This designation was largely due to the small number of EPT taxa in the macroinvertebrate community. LNGA 2.5 was located adjacent to agricultural activities, which may have been the source of impairment at this site.

Long Arm Creek showed elevated nitrate values, as did most of the streams in this region. Overall, the water quality in this stream was poor for a Group 2 stream (Table 29). In fact, LNGA 2.5 had the highest WQI score (45) of the Group 2 streams in the Pennsylvania-Maryland reference category.

Scott Creek

For the eighth consecutive year, Scott Creek at Delta, Pa., (SCTT 3.0) had a moderately to severely impaired biological community. During the 1997 sampling season, Scott Creek had a moderately impaired macroinvertebrate community, with the lowest number of taxa (13), the highest Hilsenhoff Biotic Index (5.87), and the lowest diversity index (2.05) of all streams in this region.

Although no Pennsylvania or Maryland state standards were exceeded, water quality analyses indicated that Scott Creek suffered from elevated total and dissolved ammonia, dissolved manganese, total iron, and dissolved and total orthophosphate concentrations (Table 30). Raw sewage from Cardiff, Md., continued to degrade water quality and the biological community of Scott Creek.

Conowingo Creek

Conowingo Creek at Pleasant Grove, Pa., (CNWG 4.4) had a slightly impaired biological community. This impairment designation was caused largely by the small number of EPT taxa in the subsample and by the large number of *Baetis* (Ephemeroptera: Baetidae) dominating the sample.

Total nitrogen values exceeded Pennsylvania state standards in February 1997 and were high year-round. Further water quality analyses indicated that magnesium and ammonia levels were elevated, as well as nitrates and nitrites (Table 31). As agriculture is the most prevalent land use in this area, it appears that runoff from farming practices was enriching the stream.

Octoraro Creek

Octoraro Creek at Rising Sun, Md., (OCTO 6.6) had a slightly impaired biological community. Water quality in Octoraro Creek exceeded Pennsylvania standards for alkalinity on one occasion. Further water quality analysis indicated that there was a high level of nutrient enrichment in Octoraro Creek, including elevated levels of nitrites, nitrates, orthophosphate, and phosphorus. Additionally, iron and aluminum levels appeared to be elevated (Table 32).

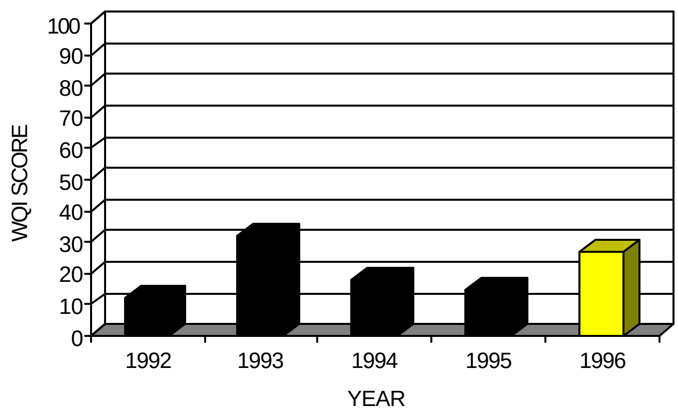
Octoraro Creek had the highest average WQI score (67), as well as the highest individual score (74) of the streams in this region. High WQI scores and the slightly impaired biological community may have been due to agricultural

Table 28. Water Quality Summary South Branch Conewago Creek at Bandanna, Pa.

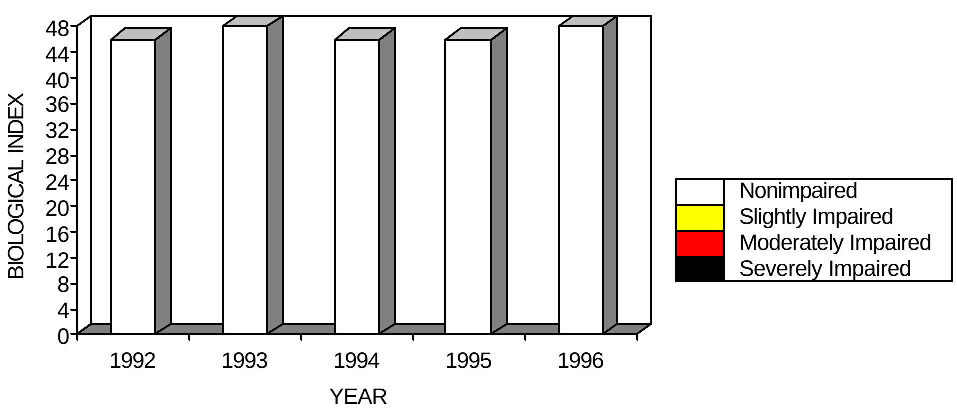
Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
None				

Date	**WQI**	**Parameters Exceeding 90th Percentile**							
08/05/96	27								

Biological Summary	
Number of Taxa	20
Diversity Index	3.81
RBP Score	48
RBP Condition	Reference



Water Quality Index



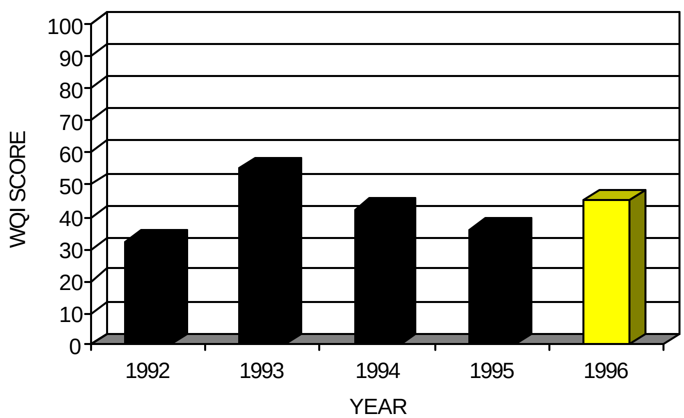
Biological Index

Table 29. Water Quality Summary Long Arm Creek at Bandanna, Pa.

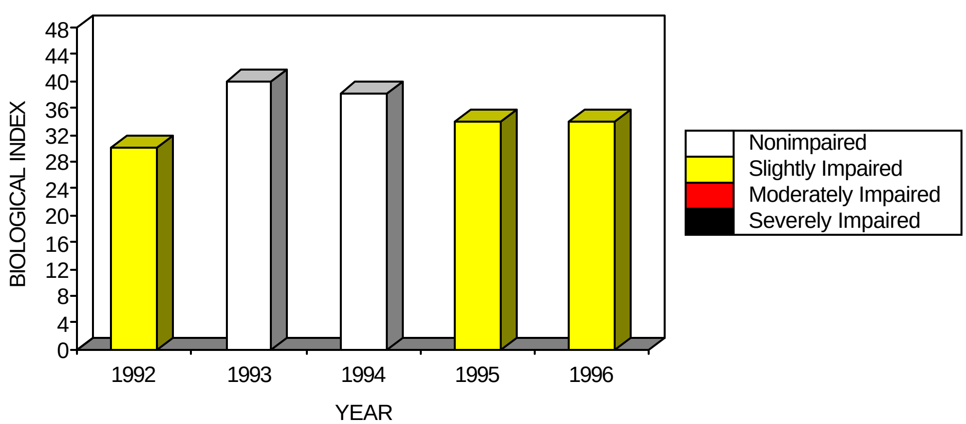
Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
None				

Date	**WQI**	**Parameters Exceeding 90th Percentile**							
08/05/96	45	DMn							

Biological Summary	
Number of Taxa	16
Diversity Index	3.44
RBP III Score	34
RBP III Condition	Slightly Impaired



Water Quality Index



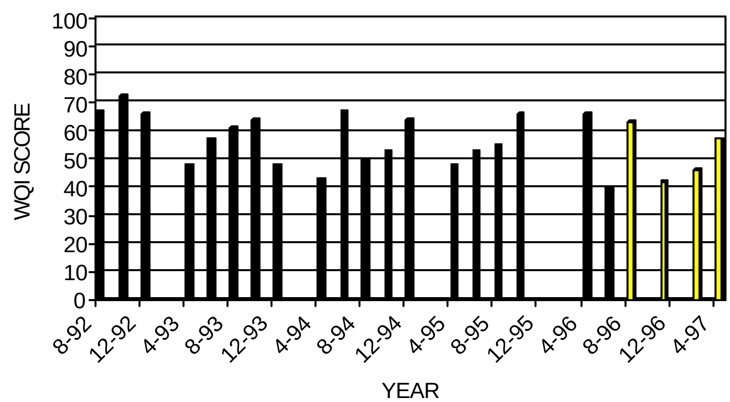
Biological Index

Table 30. Water Quality Summary Scott Creek at Delta, Pa.

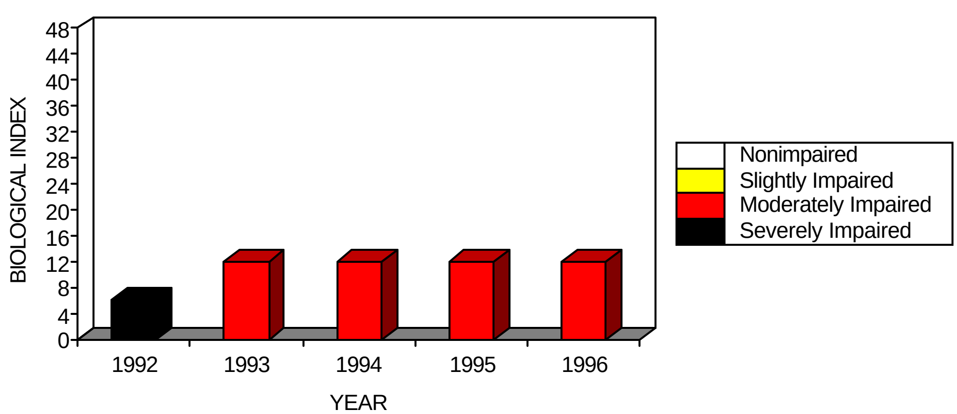
Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
None				

Date	WQI	Parameters Exceeding 90th Percentile							
08/07/96	63	DNH3	TNH3	DP	DPO4	TFe	TPO4		
11/20/96	42	DNH3	TNH3	DMn					
02/24/97	46								
04/29/97	57	DO	DP	TMg	DMn	TPO4			

Biological Summary	
Number of Taxa	13
Diversity Index	2.05
RBP Score	12
RBP Condition	Moderately Impaired



Water Quality Index



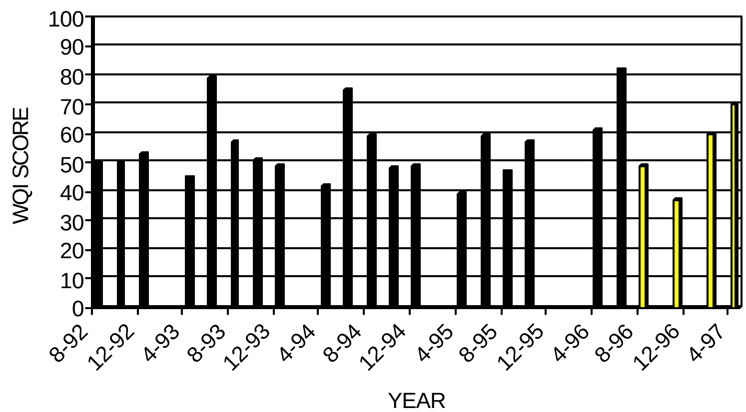
Biological Index

Table 31. Water Quality Summary Conowingo Creek at Pleasant Grove, Pa.

Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
TN	02/25/97	10.41 mg/L	10 mg/L	Pa. water supply

Date	WQI	Parameters Exceeding 90th Percentile							
08/07/96	49	DNO3	TNO3	TMg	TPO4				
11/19/96	37	DNO3	TNO3	TMg					
02/25/97	60	TRES	DRES	DNH3	TNH3	DNO3	TNO3	TMg	DFe
04/30/97	70	DNH3	TNH3	DNO2	DNO3	TNO3	DKN	TKN	TP
		DP	TOC	TMg					

Biological Summary	
Number of Taxa	13
Diversity Index	2.96
RBP Score	30
RBP Condition	Slightly Impaired



Water Quality Index

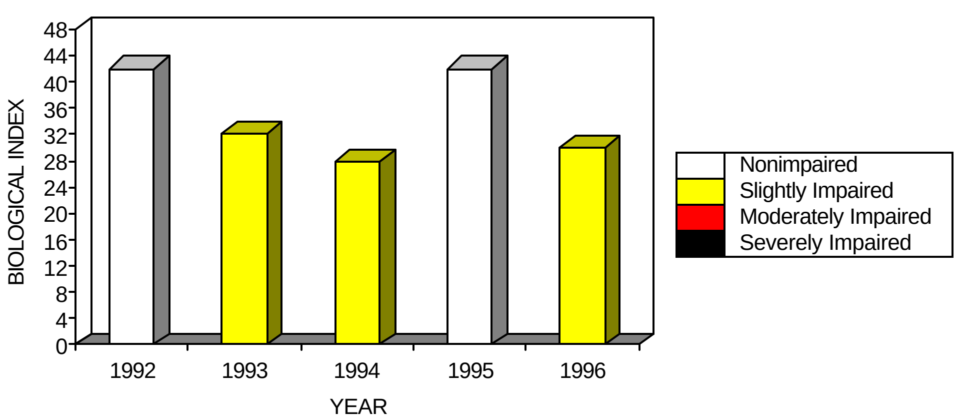


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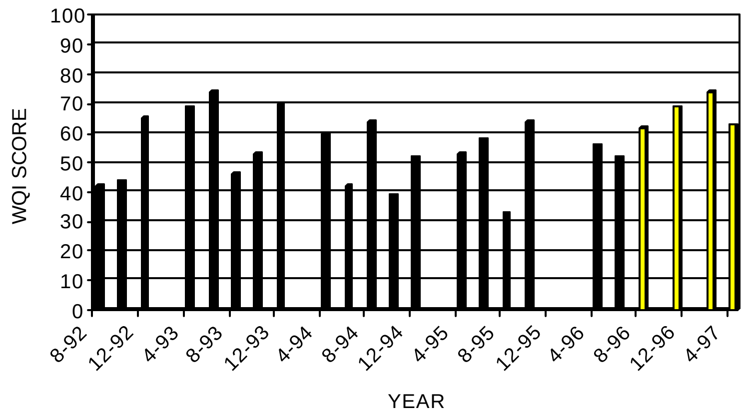
Table 32. Water Quality Summary Octoraro Creek at Rising Sun, Md.

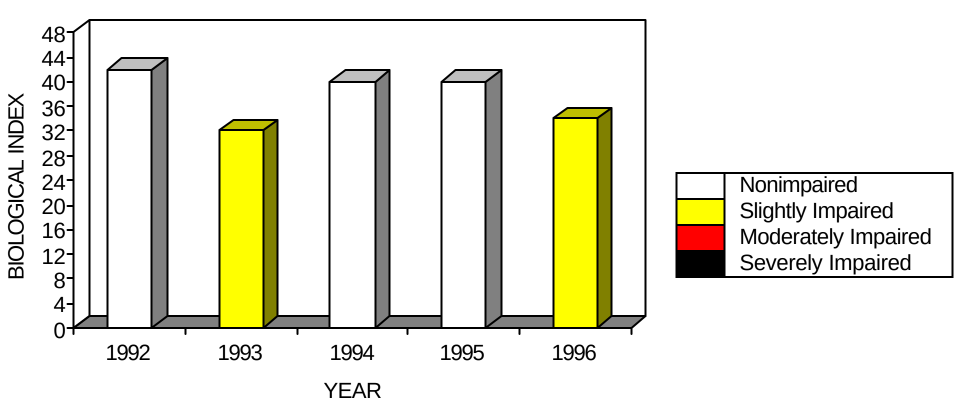
Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
ALK	04/30/97	18 mg/L	20 mg/L	Pa. aquatic life

Date	WQI	Parameters Exceeding 90th Percentile							
08/07/96	62	BOD	DNO2	TNO2	TKN	TP	TOC	TAl	
11/20/96	69	TNH3	DNO2	TNO2	TP	DP	DPO4	TOC	DFe
		TPO4							
02/25/97	74	DNO2	TNO2	TP	DP	DPO4	TOC	TSO4	DFe
		TAl	TPO4						
04/30/97	63	DO	ALK	DNO3	TNO3	TKN	TP	TMg	TFe
		TAl							

Biological Summary	
Number of Taxa	14
Diversity Index	2.92
RBP Score	34
RBP Condition	Slightly Impaired



Water Quality Index



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activities in the watershed or the impoundment at Octoraro Lake.

Ebaughs Creek

For the eighth year, Ebaughs Creek at Stewartstown, Pa., (EBAU 1.5) had a slightly to moderately impaired biological community. During the 1997 fiscal year, the designation was a slightly impaired macroinvertebrate community.

Ebaughs Creek appeared to have elevated concentrations of dissolved and total solids, chloride, and calcium (Table 33). The relatively high WQI and low RBP III scores suggested that wastewater discharges from the Stewartstown sewage treatment facility and leachate from the York County Solid Waste and Refuse Authority landfill affected the water quality and the biological community at this site.

Deer Creek

For the first time in three years, Deer Creek at Gorsuch Mills, Md., (DEER 44.2) had a nonimpaired biological community. Previous impairment may have been due to habitat conditions at the sampling site, which was located adjacent to agricultural activities. Deer Creek had the lowest average WQI score (33) and the lowest individual WQI score (26) of Group 1 streams in this region. Water quality at this stream was good (Table 34), although nitrate levels were somewhat elevated, as they were in most of the streams in this area. Deer Creek harbored a population of pollution-intolerant taxa including *Atherix, Isonychia*, *Nigronia*, *Leuctra*, and *Acroneuria*.

Big Branch Deer Creek

For the second consecutive year, Big Branch Deer Creek at Fawn Grove, Pa., (BBDC 4.1) exhibited a nonimpaired biological community. Alkalinity, which had exceeded state standards at this stream in the past, was slightly depressed, but did not exceed standards. Overall water quality appeared to be good (Table 35). A significant number of pollution-intolerant species inhabited this stream, including *Nigronia*, *Leuctra*, *Acroneuria*, *Dolophilodes*, and *Rhyacophila*.

Falling Branch Deer Creek

The biological community of Falling Branch Deer Creek at Fawn Grove, Pa., (FBDC 4.1) was designated nonimpaired after being moderately to slightly impaired for the previous three years. Former impairment may have been due to runoff from cropland adjacent to the site and to the large amount of agricultural activity in the area. During the 1997 sampling season, however, FBDC 4.1 had the highest taxa richness (23), the highest EPT index (11), and the highest diversity index (4.07) of all sites in this region. Falling Branch Deer Creek harbored a very diverse macroinvertebrate community, including pollution-intolerant taxa such as *Epeorus*, *Ophiogomphus* (Odonata: Gomphidae), *Leuctra*, *Acroneuria*, *Paragnetina*, *Dolophilodes*, and *Rhyacophila*.

Water quality data showed that alkalinity values were depressed, but did not exceed Pennsylvania state standards (Table 36). Additionally, Falling Branch Deer Creek showed elevated nitrate values, as did most of the streams in this region.

Susquehanna River Sites

Susquehanna River at Windsor, N.Y.

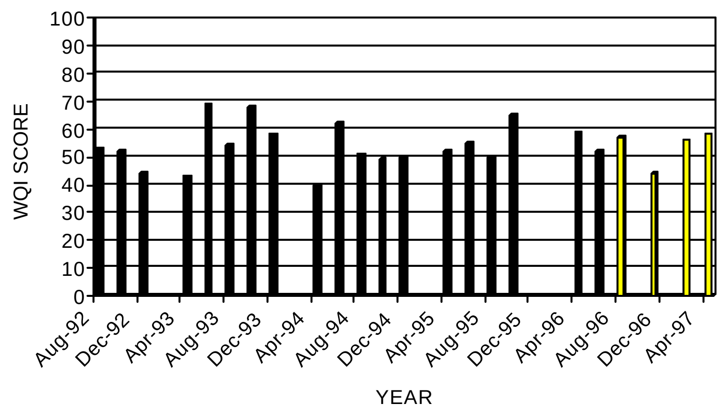
Susquehanna River at Windsor, N.Y., (SUSQ 365.0) served as the reference site for the Susquehanna River main stem sites. This site had the lowest average WQI score (40) and the lowest individual WQI score (24) of the Group 1 streams in this region. Total iron concentrations exceeded New York state standards on two occasions. Also, dissolved and total nitrates and dissolved orthophosphate concentrations were elevated at this site (Table 37). Nevertheless, SUSQ 365.0 supported a very healthy macroinvertebrate community including such taxa as *Isonychia*, *Ephoron* (Ephemeroptera: Polymitarcyidae), *Agnetina*, and *Neoperla*.

Table 33. Water Quality Summary Ebaughs Creek at Stewartstown, Pa.

Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
None				

Date	WQI	Parameters Exceeding 90th Percentile							
08/06/96	57	COND	TRES	DRES	DKN	TCa	TCl	DFe	
11/20/96	44	COND	ALK	TRES	DRES	TCa	TCl		
02/24/97	56	COND	ALK	TRES	DRES	TCa	TCl		
04/29/97	58	COND	DNO2	TNO2	DPO4	TCa	TCl		

Biological Summary	
Number of Taxa	17
Diversity Index	3.23
RBP III Score	34
RBP III Condition	Slightly Impaired



Water Quality Index

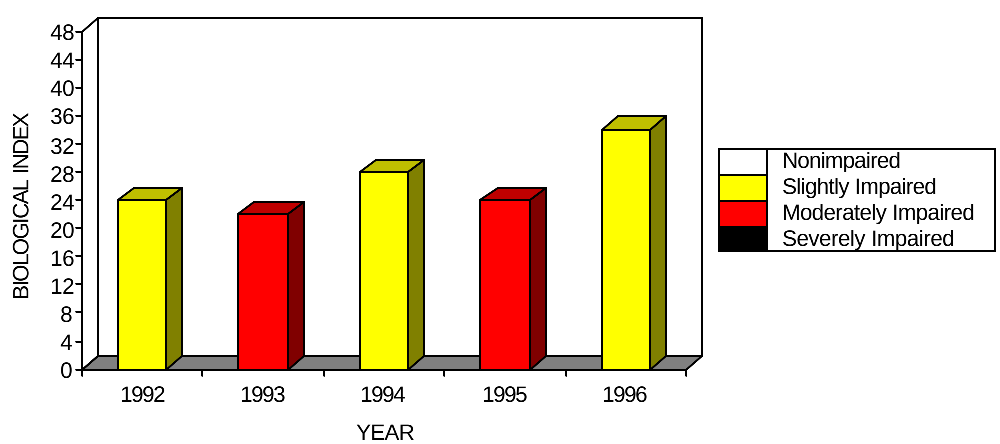


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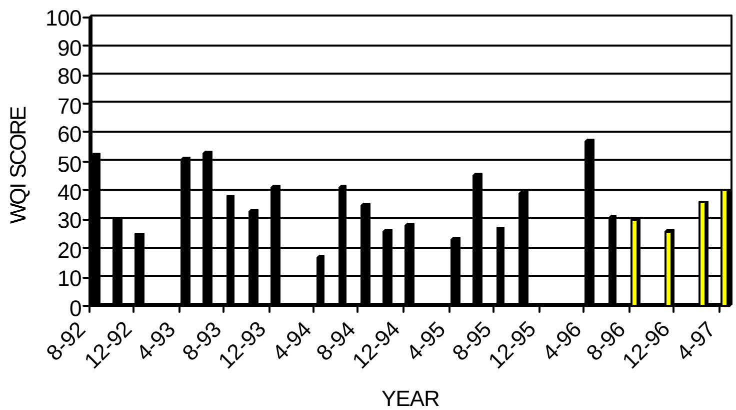
Table 34. Water Quality Summary Deer Creek at Gorsuch Mills, Md.

Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
None				

Date	WQI	Parameters Exceeding 90th Percentile							
08/06/96	30								
11/20/96	26								
02/24/97	36								
04/29/97	40								

Biological Summary	
Number of Taxa	21
Diversity Index	3.89
RBP III Score	42
RBP III Condition	Nonimpaired



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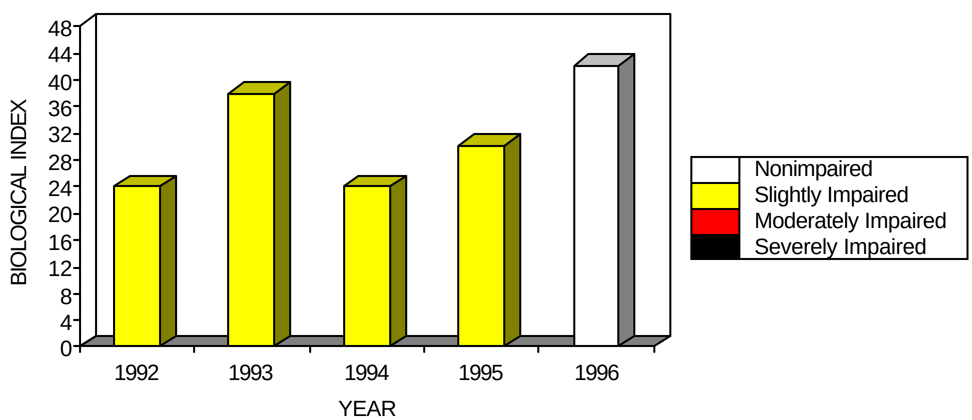

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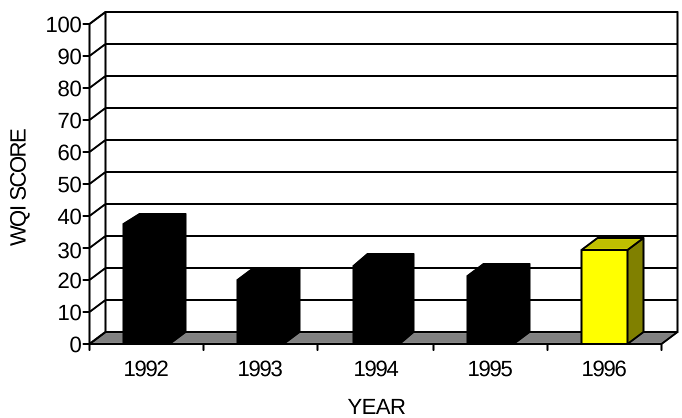
Table 35. Water Quality Summary Big Branch Deer Creek at Fawn Grove, Pa.

Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
None				

Date	WQI	Parameters Exceeding 90th Percentile							
08/06/96	29	ALK							

Biological Summary	
Number of Taxa	19
Diversity Index	3.50
RBP III Score	48
RBP III Condition	Nonimpaired



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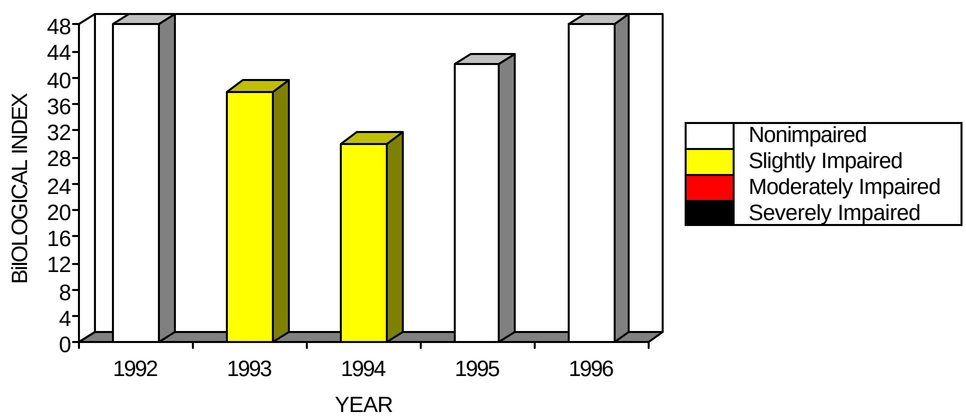

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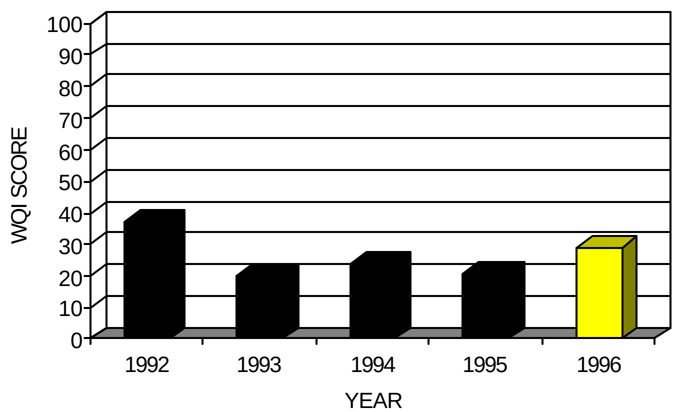
Table 36. Water Quality Summary Falling Branch Deer Creek at Fawn Grove, Pa.

Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
None				

Date	**WQI**	**Parameters Exceeding 90th Percentile**							
08/06/96	30	ALK							

Biological Summary	
Number of Taxa	23
Diversity Index	4.07
RBP III Score	48
RBP III Condition	Nonimpaired



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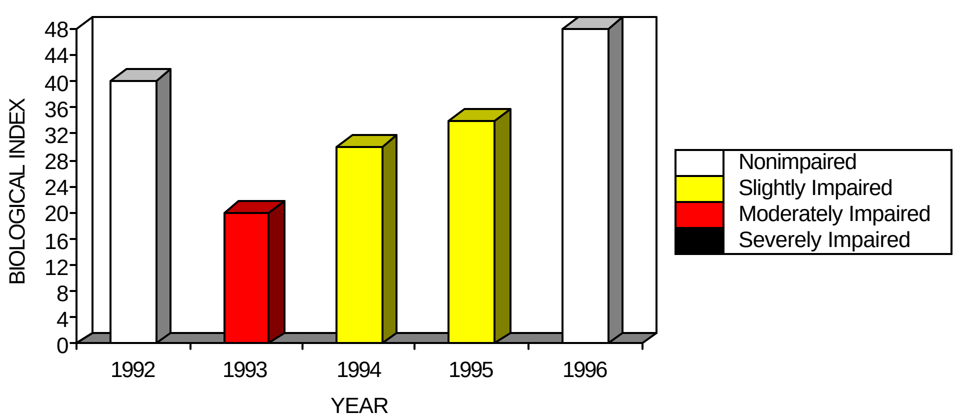

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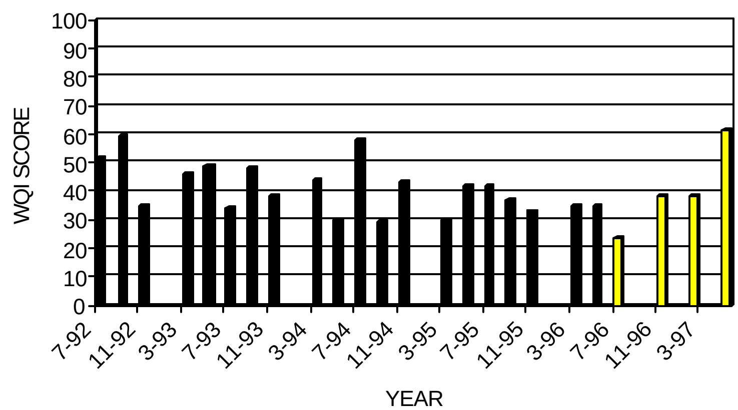
Table 37. Water Quality Summary Susquehanna River at Windsor, N.Y.

Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
TFe	07/29/96	312 µg/L	300 µg/L	N.Y. health (water source) and aquatic life
TFe	11/12/96	860 µg/L	300 µg/L	N.Y. health (water source) and aquatic life

Date	WQI	Parameters Exceeding 90th Percentile							
07/29/96	24	DO							
11/12/96	38	DP	DPO4						
02/19/97	38								
05/06/97	61	DO	DNO3	TNO3	TOC				

Biological Summary	
Number of Taxa	18
Diversity Index	3.46
RBP III Score	48
RBP III Condition	Reference



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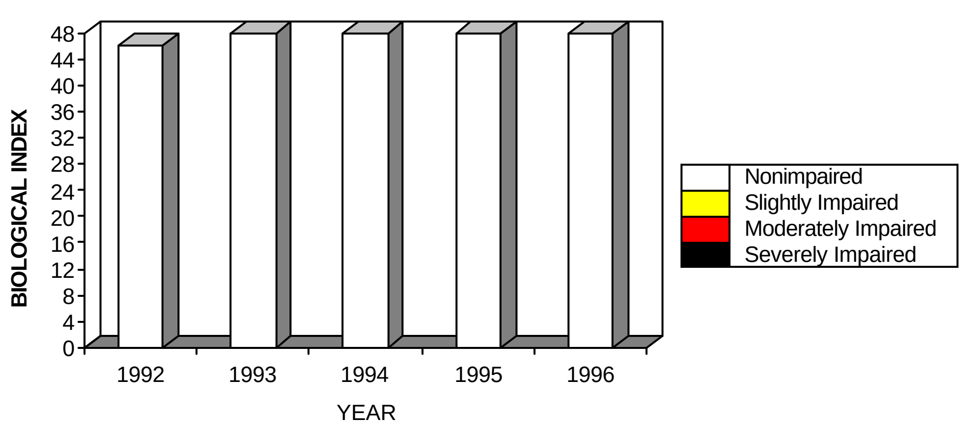

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Susquehanna River at Kirkwood, N.Y.

Slightly impaired conditions existed at Susquehanna River at Kirkwood, N.Y., (SUSQ 340.0) for the third time in four years. Impairment may have been due to the lack of suitable riffle habitat at this site. An increased number of midges inhabited this site as compared to the reference, which led to a lower value for the EPT/Chironomid metric.

Additional sources of impairment may have been due to poor water quality. Total iron concentrations exceeded New York state standards on three occasions. Additionally, water quality analyses indicated that concentrations of nitrates, dissolved and total orthophosphates, and dissolved phosphorus were elevated at this site (Table 38).

Susquehanna River at Sayre, Pa.

The Susquehanna River at Sayre, Pa., (SUSQ 289.1) had a nonimpaired biological community for two consecutive years. This site had the greatest taxa richness (20) and the highest diversity index (3.76) of all Susquehanna River main stem sites, even exceeding the reference site (SUSQ 365.0). Pollution-intolerant organisms that inhabited this site include *Centroptilum* (Ephemeroptera: Baetidae), *Isonychia*, and *Ephoron*.

Total iron exceeded New York state standards on one occasion. Water quality analyses also indicated elevated concentrations of dissolved and total nitrates and dissolved and total ammonia (Table 39).

Susquehanna River at Marietta, Pa.

The Susquehanna River at Marietta, Pa., (SUSQ 44.5) had a slightly impaired biological community. Various reasons exist for a slightly impaired designation, which include lack of suitable riffle habitat or distance from reference site. Additionally, several water quality parameters were elevated. The Pennsylvania state standard for total iron was exceeded in November 1996, while further water quality analyses indicated that this site had elevated sulfate and total aluminum levels (Table 40).

Susquehanna River at Conowingo, Md.

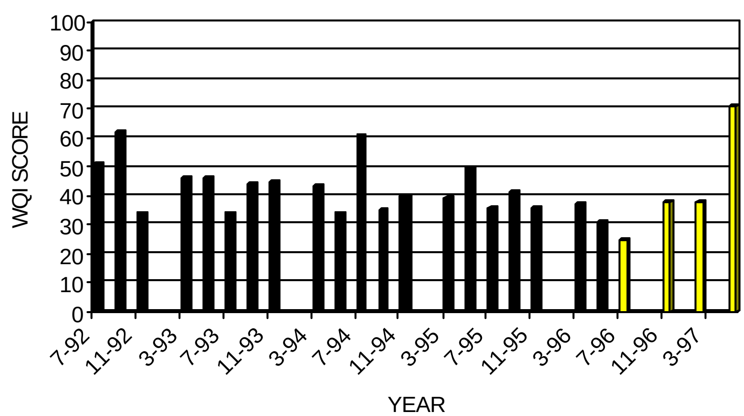
No macroinvertebrate sampling was performed at Susquehanna River at Conowingo, Md., (SUSQ 10.0) due to deep waters and a lack of riffle habitat. None of the state water quality standards was exceeded; however, analyses indicated that SUSQ 10.0 had elevated total manganese, total and dissolved iron, sulfates, and total aluminum concentrations (Table 41). Dissolved oxygen also was depressed in this area during August 1996. The Conowingo Dam impoundment, which was located directly upstream from the sampling site, may have been affecting the water quality at this site.

Table 38. Water Quality Summary Susquehanna River at Kirkwood, N.Y.

Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
TFe	07/29/96	583 µg/L	300 µg/L	N.Y. health (water source) and aquatic life
TFe	11/12/96	479 µg/L	300 µg/L	N.Y. health (water source) and aquatic life
TFe	05/06/97	303 µg/L	300 µg/L	N.Y. health (water source) and aquatic life

Date	WQI	Parameters Exceeding 90th Percentile							
07/29/96	25	DO							
11/12/96	38	ALK	DP	DPO4					
02/19/97	38								
05/06/97	71	DO	DNO3	TNO3	DP	DPO4	TOC	TFe	DFe
		TAl	TPO4	TURB					

Biological Summary	
Number of Taxa	18
Diversity Index	3.42
RBP III Score	38
RBP III Condition	Slightly Impaired



Water Quality Index

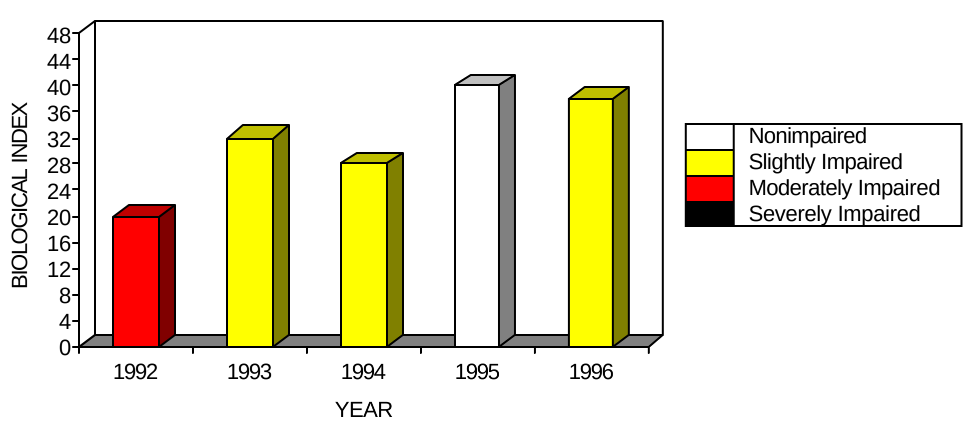


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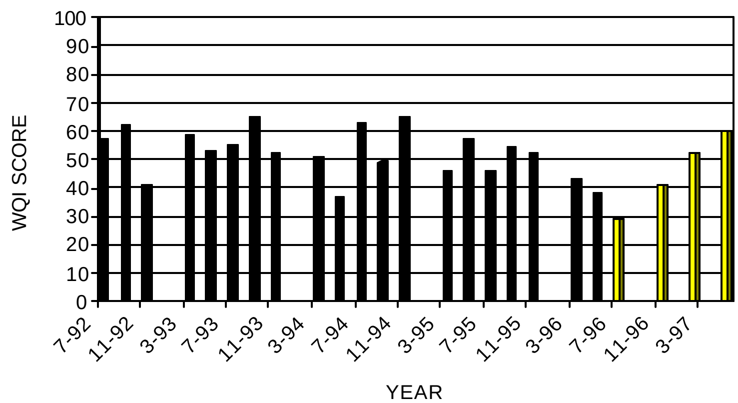
Table 39. Water Quality Summary Susquehanna River at Sayre, Pa.

Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
TFe	11/12/96	1440 µg/L	300 µg/L	N.Y. health (water source) and aquatic life

Date	WQI	Parameters Exceeding 90th Percentile							
07/30/96	29	DO							
11/12/96	41	DP	DPO4						
02/19/97	52	DNH3	TNH3	DNO3	TNO3	TURB			
05/06/97	60	DO	DNO3	TNO3	TKN	TOC			

Biological Summary	
Number of Taxa	20
Diversity Index	3.76
RBP III Score	44
RBP IIICondition	Nonimpaired



Water Quality Index

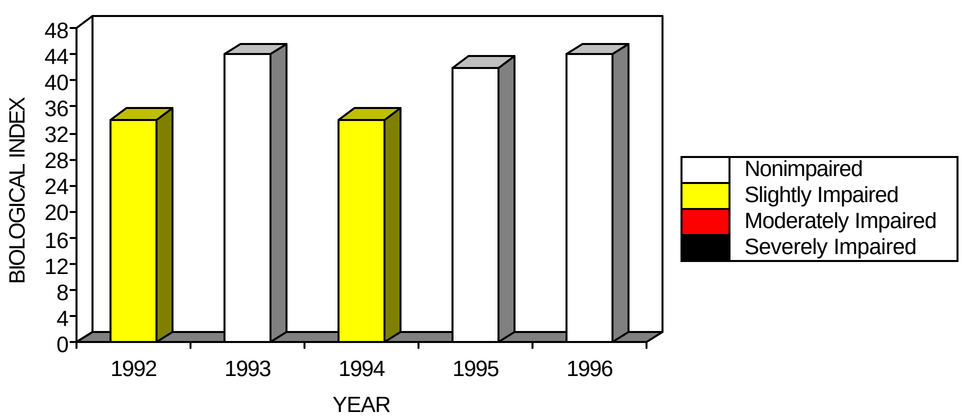


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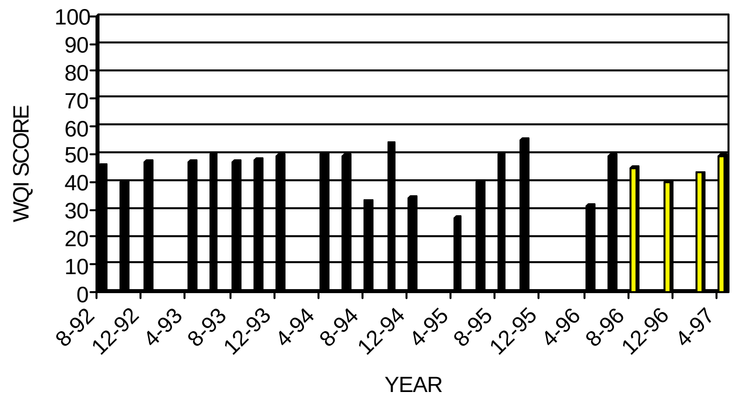
Table 40. Water Quality Summary Susquehanna River at Marietta, Pa.

Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
TFe	11/19/96	1580 µg/L	1500 µg/L	Pa. aquatic life
ALK	4/22/97	8.6	6.5-8.5	Md. aquatic life

Date	WQI	Parameters Exceeding 90th Percentile							
08/05/96	45	TURB							
11/19/96	40	TFe	TAl	TURB					
02/19/97	43	TSO4							
04/22/97	49	TRES	DRES	TPO4					

Biological Summary	
Number of Taxa	18
Diversity Index	3.54
RBP III Score	38
RBP III Condition	Slightly Impaired



Water Quality Index

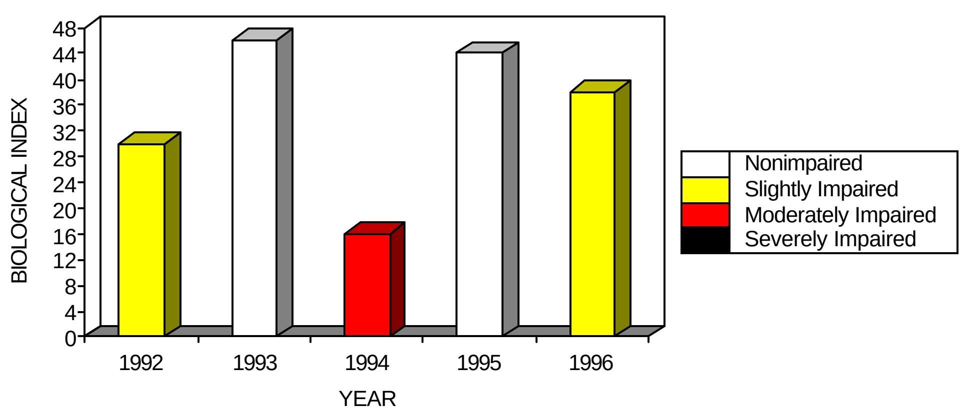


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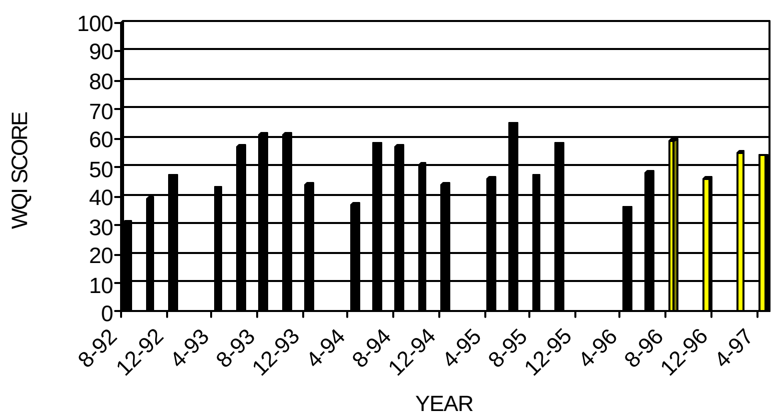
Table 41. Water Quality Summary Susquehanna River at Conowingo, Md.

Parameters Exceeding Standards				
Parameter	**Date**	**Value**	**Standard**	**State**
None				

Date	WQI	Parameters Exceeding 90th Percentile							
08/07/96	59	DO	TNH3	DNO2	TNO2	TSO4	TMn	TURB	
11/19/96	46	TSO4	TMn						
02/24/97	55	TFe	DFe	TMn	DMn	TAl	TURB		
04/29/97	54	DO	TSO4	TFe	DFe	TMn	TURB		



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MANAGEMENT IMPLICATIONS

As can be seen from the historical water quality and biological conditions, long-term studies of this nature are critical in understanding the dynamics and yearly variations in aquatic systems. Unfortunately, short-term studies are too often the rule instead of the exception in monitoring aquatic systems, due to time and monetary constraints. To obtain a true picture of ecological dynamics and possible problem areas, long-term studies such as this study are much more effective tools from a management standpoint.

Although no habitat information was gathered during this reporting period, several management implications can be extracted from the chemical water quality data and from visual inspection of the sampling area. Statistically significant relationships ($P<0.05$) observed between the chemical characteristics and the biological communities of the interstate streams are described below, as are visual clues about the habitat and land use surrounding the sites. These observations, although based on a small sample size, are presented as possible subject areas for future research and as issues to be considered by aquatic resource managers and legislators.

New York–Pennsylvania Sites

The sites in this reference category show a large degree of variability in water quality. Overall, there were no significant correlations between RBP III score and water chemistry parameters for the 15 New York-Pennsylvania border sites. This indicates that there may have been another broad source of impairment for these sites. Perhaps, habitat impairment may have been producing an effect in the biological community. The one severely impacted site (COWN 2.2) was probably impaired by the Cowanesque Reservoir, located directly upstream. The slightly impaired designation of the remaining sites may have been due largely to unstable stream substrate, the removal of instream habitat by rechannelization, and the removal of gravel for building and paving materials. Disturbance of instream habitat often reduces the abundance of macroinvertebrates and the species diversity of the area, resulting in an impairment designation.

Pennsylvania–Maryland Sites

Several statistically significant correlations existed between biological score and chemical data for the Pennsylvania–Maryland border sites. These parameters included dissolved oxygen, dissolved nitrites, dissolved phosphorus, dissolved and total orthophosphates, total magnesium, total chloride, and total iron. These results indicate that nutrient enrichment was producing a large number of the impairments in this area. Knowing the nature of the land use in the area, which is predominately agriculture and pastureland, one can extrapolate that overuse of fertilizers and agricultural runoff may have been factors in the impairment of these sites. Additionally, upon visual inspection of the area, a large amount of streambank erosion and sedimentation was detected. These factors also may have played a role in stream impairment in this region.

Susquehanna River Main Stem Sites

Only one significant correlation existed between water chemistry parameter and biological score of the sites on the main stem of the Susquehanna River. This parameter was total manganese. Due to the extremely small subsample (four sites), these results are questionable. Furthermore, due to the large volume of water that was moving through these sites at any given point in time, the effects of elevated chemical parameters may have been masked.

CONCLUSIONS

Fifteen (55.6 %) of the 29 interstate sampling sites contained nonimpaired biological communities. Biological conditions at another 10 sites (37.0 %) were slightly impaired, while moderately and severely impaired sites each constituted 3.7 percent (1 site) of the total sample

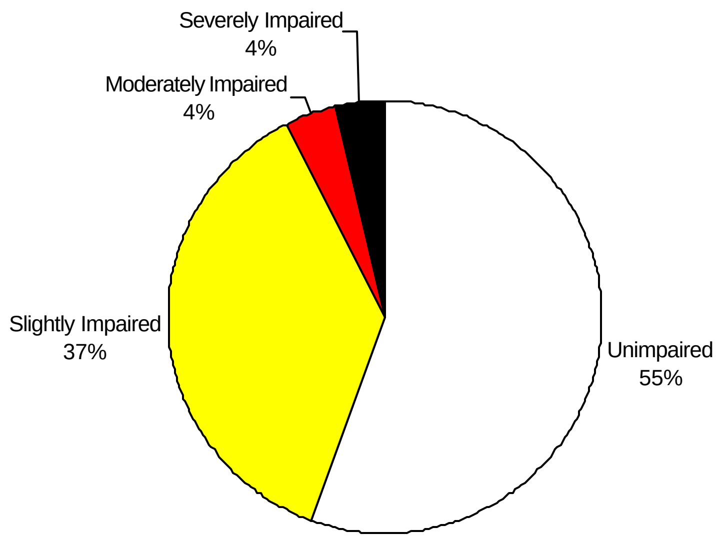

Figure 6. Summary of Biological Conditions of the Interstate Streams and Rivers

(Figure 6). Two sites were not sampled using RBP III techniques and, thus, were not averaged into the final scores. Overall, interstate streams seemed to be achieving their designated uses, and only 39 observations of water chemistry parameters exceeded state standards. Of these exceeded standards, total iron was the most common. These findings corresponded with those in past reporting periods and indicated that elevated iron concentrations were a natural condition of the streams in the basin.

Of the New York-Pennsylvania border streams, the biological communities of nine (64.3 %) of these streams were nonimpaired. Of the remaining five sites, four (28.6 %) supported biological communities that were slightly impaired, and one (7.1 %) was severely impaired. High metal concentrations appeared to be the largest source of water quality degradation in this region. There were no statistically significant correlations found between water quality parameters and biological score. These results may point to another reason such as poor habitat, for impaired biological communities in this region.

Nonimpaired biological conditions existed at four of the Pennsylvania-Maryland border streams (44.4 %). Of the remaining five sites, four stations (44.4 %) were slightly impaired, with the one remaining site (11.1 %) designated moderately impaired. Elevated nutrient levels, probably due to agricultural runoff, appeared to be affecting the water quality of streams in this region. Several water quality parameters, including dissolved oxygen, dissolved nitrites, dissolved phosphorus, and dissolved and total orthophosphates, were correlated with RBP III score for sites in this region, indicating that water quality may have had a substantial impact on the biological communities in these streams.

Of the Susquehanna River main stem sites, the biological communities of two sites were nonimpaired (50 %), while the remaining two sites were designated slightly impaired (50 %). Due to the large volume of water present at these sites, it is unlikely that a correlation between a single water quality parameter and biological score existed.

The current and historical data contained in this report provide a database that enables SRBC staff and others to better manage water quality, water quantity, and biological resources in interstate streams in the Susquehanna River Basin. The data can be used by the SRBC's signatory states to gain a better understanding of water quality in upstream and downstream areas outside their area of jurisdiction. Information in this report also can serve as a starting point for more detailed assessments and remediation efforts that may be planned in these streams.

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APPENDIX A

WATER QUALITY DATA FOR INTERSTATE STREAMS CROSSING THE NEW YORK-PENNSYLVANIA AND PENNSYLVANIA-MARYLAND BORDER STREAMS

Station	Date	Time	Discharge	Temper-ature	Conduct-ance	Dissolved Oxygen	Biological Oxygen Demand	pH	Alkalinity	Acidity
	yyyymmdd		cfs	^oC	umhos/cm	mg/L	mg/L		mg/L	mg/L
APAL 6.9	19960730	1130	2.704	18.6	97	7.62	2.3	7.05	32	6
BNTY 0.9	19960731	0830	3.019	20.7	249	8.67	2.3	7.55	104	4
CASC 1.6	19960729	1720	NA	18.3	58	8.37	2.2	6.90	18	6
CAYT 1.7	19960730	1545	43.249	19.0	345	9.84	3.3	8.20	110	2
CAYT 1.7	19961112	1450	57.294	5.4	125	9.99		7.20	40	6
CAYT 1.7	19970219	1345	53.047	3.8	230	13.48		8.05	90	2
CAYT 1.7	19970506	1325	59.909	11.1	162	9.25		7.35	56	8
CHEM 12.0	19960731	0945	443	21.2	928	7.69	2.1	8.05	142	4
CHEM 12.0	19961112	1615	16,000	6.9	161	8.91		7.10	32	4
CHEM 12.0	19970220	0905	4,770	4.2	338	13.61		8.45	92	0
CHEM 12.0	19970506	1530	1,840	12.3	260	9.32		8.35	36	0
CHOC 9.1	19960730	1015	5.965	16.9	84	8.58	2.2	7.10	22	6
COWN 2.2	19960801	1000	18	13.6	135	9.91	2.1	7.00	50	10
COWN 2.2	19961114	1145	3,630	8.7	127	9.42		6.65	36	8
COWN 2.2	19970220	1315	1,410	2.8	147	13.63		7.27	40	4
COWN 2.2	19970507	1145	119	10.2	146	9.47		8.85	42	8
LSNK 7.6	19960730	0900	0.677	17.4	120	7.88	2.3	7.10	34	8
SEEL 10.3	19960731	1245	7.597	21.1	278	9.78	1.6	8.05	100	6
SNAK 2.3	19960729	1230	17.552	18.2	96	9.22	2.3	7.30	28	4
SOUT 7.8	19960731	1110	1.206	22.3	186	8.35	1.9	7.75	62	8

Station	Date	Time	Solids, Dissolved	Solids, Total	Ammonia, Dissolved	Ammonia, Total	Nitrite, Dissolved	Nitrite, Total	Nitrate, Dissolved	Nitrate, Total
	yyyymmdd		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
APAL 6.9	19960730	1130	80	90	0.09	0.09	<0.004	0.004	0.33	0.33
BNTY 0.9	19960731	0830	210	284	<0.02	0.03	<0.004	0.004	0.22	0.22
CASC 1.6	19960729	1720	36	36	0.21	0.21	<0.004	<0.004	0.04	0.04
CAYT 1.7	19960730	1545	238	240	<0.02	0.03	0.004	0.004	0.88	0.90
CAYT 1.7	19961112	1450	124	124	<0.02	<0.02	0.006	0.010	0.24	0.24
CAYT 1.7	19970219	1345	130	146	0.02	0.05	<0.010	<0.010	0.53	0.53
CAYT 1.7	19970506	1325	96	104	<0.02	<0.02	<0.010	<0.010	0.26	0.26
CHEM 12.0	19960731	0945	644	654	0.04	0.04	0.022	0.022	0.88	0.88
CHEM 12.0	19961112	1615	140	298	<0.02	0.13	0.014	0.040	0.54	0.54
CHEM 12.0	19970220	0905	186	202	0.07	0.07	0.020	0.020	0.86	0.86
CHEM 12.0	19970506	1530	140	152	<0.02	0.03	0.010	0.010	0.33	0.33
CHOC 9.1	19960730	1015	64	70	<0.02	<0.02	<0.004	<0.004	0.22	0.22
COWN 2.2	19960801	1000	128	166	0.05	0.10	0.014	0.034	0.70	0.72
COWN 2.2	19961114	1145	154	348	0.03	0.16	0.012	0.046	0.43	0.43
COWN 2.2	19970220	1315	110	130	<0.02	<0.02	0.010	0.010	0.70	0.73
COWN 2.2	19970507	1145	106	114	<0.02	<0.02	0.010	0.020	0.35	0.35
LSNK 7.6	19960730	0900	80	88	0.04	0.05	<0.004	<0.004	0.04	0.04
SEEL 10.3	19960731	1245	216	220	<0.02	<0.02	<0.004	<0.004	0.15	0.15
SNAK 2.3	19960729	1230	60	60	<0.02	0.03	0.004	0.004	0.20	0.20
SOUT 7.8	19960731	1110	156	156	<0.02	0.03	<0.004	<0.004	0.07	0.09

Station	Date	Time	Kjeldahl Nitrogen, Dissolved	Kjeldahl Nitrogen, Total	Phosphorus, Dissolved	Phosphorus, Total	Ortho-Phosphate, Dissolved	Ortho-Phosphate, Total
	yyyymmdd		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
APAL 6.9	19960730	1130	0.20	0.20	0.004	0.03	0.007	0.012
BNTY 0.9	19960731	0830	<0.20	<0.20	0.010	0.04	0.014	0.046
CASC 1.6	19960729	1720	0.20	0.22	0.007	<0.02	0.006	0.009
CAYT 1.7	19960730	1545	0.20	0.20	0.084	0.11	0.055	0.111
CAYT 1.7	19961112	1450	<1.00	<1.00	0.010	0.02	0.008	0.027
CAYT 1.7	19970219	1345	<0.20	<0.20	0.008	<0.02	0.002	0.004
CAYT 1.7	19970506	1325	0.21	0.21	0.006	<0.02	0.004	0.004
CHEM 12.0	19960731	0945	1.03	1.06	0.051	0.09	0.059	0.075
CHEM 12.0	19961112	1615	<1.00	<1.00	0.012	0.14	0.006	0.234
CHEM 12.0	19970220	0905	<0.20	<0.20	0.014	0.02	0.010	0.013
CHEM 12.0	19970506	1530	0.49	0.49	0.006	0.02	0.005	0.014
CHOC 9.1	19960730	1015	<0.20	<0.20	0.005	<0.02	0.006	0.007
COWN 2.2	19960801	1000	0.41	0.55	0.011	0.06	0.017	0.110
COWN 2.2	19961114	1145	<1.00	<1.00	0.015	0.15	0.011	0.066
COWN 2.2	19970220	1315	<0.20	1.54	0.010	0.02	0.009	0.011
COWN 2.2	19970507	1145	0.41	0.42	0.010	<0.02	0.009	0.012
LSNK 7.6	19960730	0900	0.20	0.28	0.008	0.02	0.008	0.011
SEEL 10.3	19960731	1245	<0.20	<0.20	0.006	<0.02	0.009	0.004
SNAK 2.3	19960729	1230	<0.20	<0.20	0.004	<0.02	0.006	0.006
SOUT 7.8	19960731	1110	0.33	0.39	0.011	0.02	0.013	0.015

Station	Date	Time	Organic Carbon, Total	Calcium	Magnesium	Chloride	Sulfate	Turbidity
	yyyymmdd		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
APAL 6.9	19960730	1130	2.0	10.10	3.09	4	<10	19.5
BNTY 0.9	19960731	0830	1.7	32.40	7.34	11	15	21.6
CASC 1.6	19960729	1720	3.0	6.67	1.93	1	12	3.2
CAYT 1.7	19960730	1545	2.3	46.20	6.89	30	23	1.0
CAYT 1.7	19961112	1450	3.9	14.20	3.28	7	11	15.8
CAYT 1.7	19970219	1345	2.7	30.90	5.79	20	<10	<1.0
CAYT 1.7	19970506	1325	2.1	18.40	4.06	12	17	2.3
CHEM 12.0	19960731	0945	2.9	48.20	12.20	208	24	4.9
CHEM 12.0	19961112	1615	5.8	17.50	3.81	14	17	235.0
CHEM 12.0	19970220	1315	2.8	38.70	7.74	42	19	<1.0
CHEM 12.0	19970506	1530	3.0	30.60	5.37	22	25	2.2
CHOC 9.1	19960730	1015	1.9	8.41	2.69	5	<10	2.1
COWN 2.2	19960801	1000	3.9	16.80	3.94	5	16	63.0
COWN 2.2	19961114	1145	6.8	15.80	5.04	12	15	272.5
COWN 2.2	19970220	1315	3.1	18.60	3.67	10	20	<1.0
COWN 2.2	19970507	1145	2.9	16.80	3.27	8	18	2.3
LSNK 7.6	19960730	0900	4.2	11.00	3.09	12	14	5.8
SEEL 10.3	19960731	1245	1.5	41.80	6.49	10	16	< 1.0
SNAK 2.3	19960729	1230	1.8	8.52	2.67	6	<10	1.0
SOUT 7.8	19960731	1110	4.2	19.10	4.20	15	11	< 1.0

Station	Date	Time	Iron, Dissolved	Iron, Total	Manganese, Dissolved	Manganese, Total	Aluminum, Dissolved	Aluminum, Total
	yyyymmdd		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
APAL 6.9	19960730	1130	87	538	103	134	<135	228
BNTY 0.9	19960731	0830	40	1,100	<10	52	2990	2990
CASC 1.6	19960729	1720	385	813	146	190	<135	<135
CAYT 1.7	19960730	1545	13	60	<10	<10	<135	<135
CAYT 1.7	19961112	1450	79	596	27	39	<135	524
CAYT 1.7	19970219	1345	28	171	13	13	<135	174
CAYT 1.7	19970506	1325	43	200	10	15	<135	<135
CHEM 12.0	19960731	0945	<10	220	14	67	<135	149
CHEM 12.0	19961112	1615	127	494	41	211	<135	460
CHEM 12.0	19970220	0905	37	296	48	61	<135	345
CHEM 12.0	19970506	1530	24	110	20	59	<135	<135
CHOC 9.1	19960730	1015	62	146	34	40	<135	<135
COWN 2.2	19960801	1000	113	2,060	365	683	<135	1610
COWN 2.2	19961114	1145	652	13,800	39	298	378	8430
COWN 2.2	19970220	1315	68	929	80	100	<135	911
COWN 2.2	19970507	1145	24	198	36	58	<135	175
LSNK 7.6	19960730	0900	586	941	280	331	<135	<135
SEEL 10.3	19960731	1245	15	15	<10	<10	<135	<135
SNAK 2.3	19960729	1230	21	33	<10	<10	<135	<135
SOUT 7.8	19960731	1110	61	306	36	80	<135	<135

Station	Date yyyymmdd	Time	Discharge cfs	Temper-ature ^{o}C	Conduct-ance umhos/cm	Dissolved Oxygen mg/L	Biological Oxygen Demand mg/L	pH	Alkalinity mg/L	Acidity mg/L
SUSQ 365.0	19960729	1600	2,300	20.5	149	8.37	2.3	7.40	51	4
SUSQ 365.0	19961112	1215	8,680	6.1	101	8.92		7.05	30	2
SUSQ 365.0	19970219	1155	1,860	2.3	186	13.43		7.55	62	4
SUSQ 365.0	19970506	1115	4,700	11.7	143	9.30		7.40	52	6
SUSQ 340.0	19960729	1345	2,700	20.7	135	8.20	2.1	7.55	54	4
SUSQ 340.0	19961112	1120	13,700	6.1	93	9.52		6.85	24	6
SUSQ 340.0	19970219	1045	1,770	2.0	176	13.49		7.40	46	4
SUSQ 340.0	19970506	0955	5,330	12.0	128	8.96		7.25	46	6
SUSQ 289.1	19960730	1430	4,210	22.2	205	8.27	2.7	7.70	68	4
SUSQ 289.1	19961112	1345	31,700	6.7	112	9.02		7.10	34	4
SUSQ 289.1	19970219	1450	4,150	3.0	261	13.40		7.75	72	6
SUSQ 289.1	19970506	1415	12,150	11.5	154	8.89		7.30	70	6
TIOG 10.8	19960731	1430	127	23.2	195	8.72	2.1	7.45	36	4
TIOG 10.8	19961114	1440	7,650	7.7	109	8.86		6.50	26	6
TIOG 10.8	19970220	1055	3,220	2.8	164	13.93		7.15	38	8
TIOG 10.8	19970507	0930	NA	11.2	160	10.19		7.30	28	8
TROW 1.8	19960729	1450	1.904	17.6	68	9.32	1.8	7.05	18	6
TRUP 4.5	19960801	1145	10.620	25.2	311	7.89	1.8	8.50	116	0
TRUP 4.5	19961114	0830	42.073	1.3	135	10.52		6.60	36	4
TRUP 4.5	19970220	1455	19.637	1.4	126	14.48		7.25	32	4
TRUP 4.5	19970507	1410	9.437	5.9	186	10.40		7.70	30	4
WAPP 2.6	19960730	1300	10.063	20.0	114	9.58	2.3	7.95	32	2

Station	Date	Time	Solids, Dissolved	Solids, Total	Ammonia, Dissolved	Ammonia, Total	Nitrite, Dissolved	Nitrite, Total	Nitrate, Dissolved	Nitrate, Total
	yyyymmdd		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
SUSQ 365.0	19960729	1600	56	56	<0.02	0.03	0.004	0.004	0.53	0.53
SUSQ 365.0	19961112	1215	82	108	<0.02	<0.02	0.008	0.010	0.52	0.52
SUSQ 365.0	19970219	1155	110	122	<0.02	<0.02	<0.010	<0.010	0.91	0.91
SUSQ 365.0	19970506	1115	102	110	<0.02	0.02	<0.010	<0.010	0.44	0.45
SUSQ 340.0	19960729	1345	96	98	<0.02	0.03	0.004	0.004	0.20	0.20
SUSQ 340.0	19961112	1120	104	110	<0.02	<0.02	0.008	0.008	0.50	0.50
SUSQ 340.0	19970219	1045	126	134	<0.02	<0.02	<0.010	<0.010	0.75	0.76
SUSQ 340.0	19970506	0955	78	94	<0.02	0.04	<0.010	<0.010	0.45	0.46
SUSQ 289.1	19960730	1430	64	130	0.02	0.02	0.008	0.012	0.67	0.69
SUSQ 289.1	19961112	1345	100	122	<0.02	0.03	0.010	0.010	0.52	0.52
SUSQ 289.1	19970219	1450	154	164	0.09	0.10	0.010	0.010	1.10	1.11
SUSQ 289.1	19970506	1415	64	80	<0.02	0.04	<0.010	0.010	0.45	0.46
TIOG 10.8	19960731	1430	178	192	<0.02	0.02	0.004	0.006	0.55	0.55
TIOG 10.8	19961114	1440	108	324	<0.02	0.28	0.012	0.066	0.41	0.41
TIOG 10.8	19970220	1055	124	138	0.04	0.05	<0.010	0.010	0.65	0.68
TIOG 10.8	19970507	0930	116	116	<0.02	0.02	<0.010	<0.010	0.34	0.34
TROW 1.8	19960729	1450	86	92	<0.02	<0.02	<0.004	<0.004	0.13	0.15
TRUP 4.5	19960801	1145	234	234	<0.02	<0.02	<0.004	<0.004	<0.04	<0.04
TRUP 4.5	19961114	0830	476	476	<0.02	0.06	0.008	0.018	0.74	0.74
TRUP 4.5	19970220	1455	360	360	0.03	0.11	0.010	0.040	0.77	0.77
TRUP 4.5	19970507	1410	116	116	<0.02	0.11	<0.010	<0.010	0.13	0.14
WAPP 2.6	19960730	1300	66	68	0.02	0.02	<0.004	<0.004	0.40	0.40

Station	Date	Time	Kjeldahl Nitrogen, Dissolved	Kjeldahl Nitrogen, Total	Phosphorus, Dissolved	Phosphorus, Total	Ortho-Phosphate, Dissolved	Ortho-Phosphate, Total
	yyyymmdd		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
SUSQ 365.0	19960729	1600	<0.20	0.20	0.010	0.02	0.007	0.016
SUSQ 365.0	19961112	1215	<1.00	<1.00	0.014	0.04	0.013	0.023
SUSQ 365.0	19970219	1155	<0.20	<0.20	0.011	0.02	0.002	0.004
SUSQ 365.0	19970506	1115	0.35	0.35	0.007	0.02	0.007	0.008
SUSQ 340.0	19960729	1345	<0.20	0.34	0.012	0.02	0.008	0.018
SUSQ 340.0	19961112	1120	<1.00	<1.00	0.014	0.04	0.012	0.033
SUSQ 340.0	19970219	1045	<0.20	<0.20	0.006	<0.02	0.005	0.006
SUSQ 340.0	19970506	0955	0.37	0.37	0.010	0.02	0.010	0.014
SUSQ 289.1	19960730	1430	<0.20	0.20	0.012	0.02	0.021	0.021
SUSQ 289.1	19961112	1345	<1.00	<1.00	0.014	0.05	0.012	0.026
SUSQ 289.1	19970219	1450	<0.20	<0.20	0.012	0.02	0.004	0.008
SUSQ 289.1	19970506	1415	0.43	0.45	0.007	0.02	0.004	0.008
TIOG 10.8	19960731	1430	0.25	0.25	0.012	0.02	0.012	0.012
TIOG 10.8	19961114	1440	<1.00	<1.00	0.013		0.013	0.056
TIOG 10.8	19970220	1055	<0.20	<0.20	0.011	0.02	0.010	0.011
TIOG 10.8	19970507	0930	0.30	0.30	0.005	<0.02	<0.002	0.010
TROW 1.8	19960729	1450	<0.20	<0.20	0.004	<0.02	0.005	0.017
TRUP 4.5	19960801	1145	<0.20	<0.20	0.006	<0.02	0.021	0.021
TRUP 4.5	19961114	0830	<1.00	<1.00	0.013	0.04	0.013	0.086
TRUP 4.5	19970220	1455	<0.20	0.52	0.012	0.05	0.008	0.035
TRUP 4.5	19970507	1410	0.31	0.32	0.005	<0.02	0.003	0.005
WAPP 2.6	19960730	1300	<0.20	<0.20	0.003	<0.02	0.005	0.005

Station	Date	Time	Organic Carbon, Total	Calcium	Magnesium	Chloride	Sulfate	Turbidity
	yyyymmdd		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
SUSQ 365.0	19960729	1600	3.4	23.30	2.54	7	11	4.2
SUSQ 365.0	19961112	1215	4.8	12.30	1.67	5	<10	8.3
SUSQ 365.0	19970219	1155	2.2	26.80	2.89	14	<10	< 1.0
SUSQ 365.0	19970506	1115	2.9	18.90	2.17	8	12	3.6
SUSQ 340.0	19960729	1345	3.3	20.70	2.58	7	11	6.2
SUSQ 340.0	19961112	1120	4.8	11.00	1.59	5	<10	28.0
SUSQ 340.0	19970219	1045	1.8	20.80	2.87	19	21	1.3
SUSQ 340.0	19970506	0955	2.9	16.00	2.23	8	24	5.3
SUSQ 289.1	19960730	1430	2.9	28.10	3.62	13	15	5.4
SUSQ 289.1	19961112	1345	5.4	13.30	2.45	7	<10	8.9
SUSQ 289.1	19970219	1450	2.2	32.00	4.59	30	<10	3.6
SUSQ 289.1	19970506	1415	2.9	19.00	2.51	11	14	2.4
TIOG 10.8	19960731	1430	2.6	22.50	6.33	7	45	8.1
TIOG 10.8	19961114	1440	7.2	13.20	3.52	12	32	242.5
TIOG 10.8	19970220	1055	2.7	21.30	4.37	10	25	< 1.0
TIOG 10.8	19970507	0930	2.0	17.80	3.99	7	34	1.9
TROW 1.8	19960729	1450	1.7	5.84	2.03	4	11	< 1.0
TRUP 4.5	19960801	1145	2.5	40.30	8.23	17	22	2.5
TRUP 4.5	19961114	0830	3.5	16.30	3.98	8	15	73.5
TRUP 4.5	19970220	1455	4.2	14.40	4.07	12	18	1.3
TRUP 4.5	19970507	1410	2.7	24.30	4.66	10	20	2.1
WAPP 2.6	19960730	1300	2.1	9.55	3.08	6	14	2.5

Station	Date	Time	Iron, Dissolved	Iron, Total	Manganese, Dissolved	Manganese, Total	Aluminum, Dissolved	Aluminum, Total
	yyyymmdd		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
SUSQ 365.0	19960729	1600	69	312	<10	18	<135	<135
SUSQ 365.0	19961112	1215	93	860	20	62	<135	599
SUSQ 365.0	19970219	1155	63	221	22	23	<135	<135
SUSQ 365.0	19970506	1115	55	256	14	24	<135	<135
SUSQ 340.0	19960729	1345	73	583	<10	58	<135	347
SUSQ 340.0	19961112	1120	103	479	20	58	<135	251
SUSQ 340.0	19970219	1045	51	167	22	22	<135	<135
SUSQ 340.0	19970506	0955	77	303	13	28	<135	182
SUSQ 289.1	19960730	1430	<50	163	<10	22	<135	<135
SUSQ 289.1	19961112	1345	140	1,440	13	68	<135	1,120
SUSQ 289.1	19970219	1450	45	186	16	21	<135	<135
SUSQ 289.1	19970506	1415	44	186	13	23	<135	<135
TIOG 10.8	19960731	1430	20	294	50	126	<135	174
TIOG 10.8	19961114	1440	842	4,920	74	309	653	4540
TIOG 10.8	19970220	1055	71	734	328	418	<135	560
TIOG 10.8	19970507	0930	20	152	296	335	<135	<135
TROW 1.8	19960729	1450	15	45	<10	<10	<135	<135
TRUP 4.5	19960801	1145	<10	99	18	18	<135	<135
TRUP 4.5	19961114	0830	83	1,360	32	43	<135	1,140
TRUP 4.5	19970220	1455	59	5,180	25	90	<135	4,010
TRUP 4.5	19970507	1410	19	69	22	22	<135	<135
WAPP 2.6	19960730	1300	21	80	<10	<10	<135	<135

Station	Date yyyymmdd	Time	Discharge cfs	Temper-ature °C	Conduct-ance umhos/cm	Dissolved Oxygen mg/L	Biological Oxygen Demand mg/L	pH	Alkalinity mg/L	Acidity mg/L
BBDC 4.1	19960806	1305	2.696	17.1	126	9.04	0.4	6.95	22	6
CNWG 4.4	19960807	1440	38.92	22.1	214	8.78	2.0	7.55	34	4
CNWG 4.4	19961119	1100	22.49	8.3	249	9.40		6.80	26	4
CNWG 4.4	19970225	1155	46.651	5.8	215	13.10		7.30	26	4
CNWG 4.4	19970430	1045	31.907	12.5	212	10.13		7.15	32	6
DEER 44.2	19960806	0940	18.462	18.6	180	8.93	0.5	7.15	36	6
DEER 44.2	19961120	0925	20.307	6.6	167	12.11		7.15	28	4
DEER 44.2	19970224	0854	18.927	3.9	171	12.56		7.25	26	4
DEER 44.2	19970429	0915	19.497	9.5	170	10.63		7.10	34	6
EBAU 1.5	19960806	1110	7.517	17.7	461	8.87	0.8	7.15	28	6
EBAU 1.5	19961120	0945	8.439	6.5	449	12.19		7.05	22	6
EBAU 1.5	19970224	1005	7.029	4.0	371	12.70		7.30	22	6
EBAU 1.5	19970429	1020	8.672	9.2	375	10.41		7.15	36	4
FBDC 4.1	19960806	1445	2.742	18.9	125	8.72	0.4	7.00	20	6
LNGA 2.5	19960805	1015	3.345	18.5	176	8.94	0.4	7.05	34	6
OCTO 6.6	19960807	1310	275.4	24.4	221	8.31	2.8	7.85	48	2
OCTO 6.6	19961119	1220	284.2	8.3	191	9.40		6.85	36	4
OCTO 6.6	19970225	1005	275.4	5.4	216	13.27		7.50	34	6
OCTO 6.6	19970430	0945	316.6	13.2	216	9.61		7.40	12	2
SBCC 20.4	19960805	1145	2.8	16.7	102	8.90	0.2	6.95	26	9
SCTT 3.0	19960807	0945	0.762	18.6	248	8.08	2.4	7.30	48	6
SCTT 3.0	19961120	1040	1.013	7.3	233	11.69		6.90	30	6
SCTT 3.0	19970224	1135	0.797	4.9	228	13.04		7.45	30	6
SCTT 3.0	19970429	1130	1.029	10.5	258	9.86		7.20	40	4

Station	Date yyyymmdd	Time	Solids, Dissolved mg/L	Solids, Total mg/L	Ammonia, Dissolved mg/L	Ammonia, Total mg/L	Nitrite, Dissolved mg/L	Nitrite, Total mg/L	Nitrate, Dissolved mg/L	Nitrate, Total mg/L
BBDC 4.1	19960806	1305	120	120	<0.02	<0.02	<0.004	<0.004	5.28	5.28
CNWG 4.4	19960807	1440	216	216	<0.02	0.02	0.014	0.014	8.17	8.31
CNWG 4.4	19961119	1100	198	198	<0.02	<0.02	0.012	0.012	9.67	9.67
CNWG 4.4	19970225	1155	278	296	0.28	0.28	0.022	0.022	10.39	10.39
CNWG 4.4	19970430	1045	16	20	0.19	0.19	0.050	0.050	7.90	7.96
DEER 44.2	19960806	0940	126	130	<0.02	<0.02	<0.004	<0.004	5.28	5.41
DEER 44.2	19961120	0925	124	124	<0.02	<0.02	0.006	0.006	5.80	5.80
DEER 44.2	19970224	0854	106	108	0.03	0.03	0.006	0.006	5.93	5.93
DEER 44.2	19970429	0915	52	52	0.15	0.15	0.010	0.010	5.02	5.21
EBAU 1.5	19960806	1110	436	436	<0.02	<0.02	<0.004	<0.004	5.81	5.94
EBAU 1.5	19961120	0945	342	342	<0.02	<0.02	0.004	0.008	6.53	6.53
EBAU 1.5	19970224	1005	274	290	0.13	0.13	0.028	0.028	6.31	6.44
EBAU 1.5	19970429	1020		84	0.06	0.06	0.050	0.060	5.53	5.55
FBDC 4.1	19960806	1445	130	130	<0.02	<0.02	<0.004	<0.004	4.49	4.49
LNGA 2.5	19960805	1015	158	158	<0.02	0.03	0.010	0.012	6.46	6.46
OCTO 6.6	19960807	1310	220	232	<0.02	0.05	0.036	0.038	5.24	5.24
OCTO 6.6	19961119	1220	167	174	0.08	0.09	0.044	0.048	6.00	6.00
OCTO 6.6	19970225	1005	132	150	0.17	0.17	0.044	0.044	8.19	8.19
OCTO 6.6	19970430	0945	60	60	0.02	0.03	0.040	0.040	7.29	7.29
SBCC 20.4	19960805	1145	100	104	<0.02	<0.02	<0.004	0.004	2.20	2.20
SCTT 3.0	19960807	0945	200	206	0.10	0.11	0.026	0.036	1.99	1.99
SCTT 3.0	19961120	1040	166	166	0.09	0.09	0.018	0.018	2.22	2.22
SCTT 3.0	19970224	1135	144	168	0.09	0.15	0.018	0.020	2.75	2.75
SCTT 3.0	19970429	1130	8	8	0.12	0.12	0.040	0.040	3.07	3.08

Station	Date yyyymmdd	Time	Kjeldahl Nitrogen, Dissolved mg/L	Kjeldahl Nitrogen, Total mg/L	Phosphorus, Dissolved mg/L	Phosphorus, Total mg/L	Ortho-Phosphate, Dissolved mg/L	Ortho-Phosphate, Total mg/L
BBDC 4.1	19960806	1305	<0.20	<0.20	0.007	<0.02	0.009	0.009
CNWG 4.4	19960807	1440	<0.20	0.43	0.016	0.06	0.012	0.043
CNWG 4.4	19961119	1100	<1.00	1.07	0.010	0.02	0.012	0.029
CNWG 4.4	19970225	1155	<0.20	<0.20	0.012	0.02	0.009	0.011
CNWG 4.4	19970430	1045	0.51	0.63	0.014	0.03	0.003	0.008
DEER 44.2	19960806	0940	<0.20	0.22	0.007	<0.02	0.009	0.010
DEER 44.2	19961120	0925	<1.00	1.00	0.007	<0.02	0.011	0.013
DEER 44.2	19970224	0854	<0.20	<0.20	0.010	<0.02	0.008	0.008
DEER 44.2	19970429	0915	0.23	0.23	0.004	<0.02	<0.002	<0.002
EBAU 1.5	19960806	1110	0.36	0.68		<0.02	0.009	0.009
EBAU 1.5	19961120	0945	<1.00	<1.00	0.009	<0.02	0.014	0.014
EBAU 1.5	19970224	1005	<0.20	<0.20	0.010	0.02	0.008	0.008
EBAU 1.5	19970429	1020	0.22	0.30	0.015	<0.02	0.014	
FBDC 4.1	19960806	1445	<0.20	<0.20	0.005	<0.02	0.009	0.009
LNGA 2.5	19960805	1015	<0.20	0.39	0.013	0.02	0.014	0.014
OCTO 6.6	19960707	1310	0.27	0.87	0.016	0.06	0.012	0.032
OCTO 6.6	19961119	1220	<1.00	1.07	0.101	0.13	0.149	0.189
OCTO 6.6	19970225	1005	<1.00	<1.00	0.032	0.03	0.032	0.032
OCTO 6.6	19970430	0945	0.32	0.65	0.014	0.03	0.003	0.008
SBCC 20.4	19960805	1145	<0.20	<0.20	0.007	<0.02	0.009	0.009
SCTT 3.0	19960807	0945	<0.20	0.27	0.043	0.05	0.037	0.045
SCTT 3.0	19961120	1040	<1.00	<1.00	0.009	<0.02	0.014	0.017
SCTT 3.0	19970224	1135	<0.20	<0.20	0.012	0.02	0.009	0.009
SCTT 3.0	19970429	1130	0.28	0.37	0.020	0.02	0.007	0.009

Station	Date yyyymmdd	Time	Organic Carbon, Total mg/L	Calcium mg/L	Magnesium mg/L	Chloride mg/L	Sulfate mg/L	Turbidity mg/L
BBDC 4.1	19960806	1305	1.8	10.10	4.89	10	<10	1.0
CNWG 4.4	19960807	1440	2.6	17.60	10.20	16	10	<1.0
CNWG 4.4	19961119	1100	1.5	16.60	9.47	16	14	2.2
CNWG 4.4	19970225	1155	1.4	13.70	9.63	17	<10	1.8
CNWG 4.4	19970430	1045	3.5	16.60	9.91	16	17	3.6
DEER 44.2	19960806	0940	1.3	15.60	5.69	17	10	1.5
DEER 44.2	19961120	0925	1.0	13.60	5.47	16	10	2.1
DEER 44.2	19970224	0854	1.1	12.50	5.62	20	11	1.7
DEER 44.2	19970429	0915	1.2	13.60	5.92	18	17	1.8
EBAU 1.5	19960806	1110	1.4	42.00	5.31	102	<10	<1.0
EBAU 1.5	19961120	0945	1.3	41.00	5.71	96	10	1.2
EBAU 1.5	19970224	1005	1.1	29.00	5.19	80	<10	1.2
EBAU 1.5	19970429	1020	1.3	30.60	5.60	79	14	1.5
FBDC 4.1	19960806	1445	1.3	8.31	4.00	14	<10	1.4
LNGA 2.5	19960805	1015	1.6	15.60	6.22	14	13	5.2
OCTO 6.6	19960807	1310	4.4	20.10	9.05	14	20	4.9
OCTO 6.6	19961119	1220	4.6	15.40	7.75	11	26	18.2
OCTO 6.6	19970225	1005	2.6	15.50	8.47	15	71	4.8
OCTO 6.6	19970430	0945	2.1	18.10	9.63	14	20	5.3
SBCC 20.4	19960805	1145	1.2	10.10	3.39	7	<10	3.2
SCTT 3.0	19960807	0945	2.7	17.4	9.04	38	18	2.8
SCTT 3.0	19961120	1040	1.7	13.9	8.30	34	<10	1.5
SCTT 3.0	19970224	1135	1.6	12.3	8.16	35	22	1.1
SCTT 3.0	19970429	1130	1.7	17.3	10.30	36	23	1.6

Station	Date	Time	Iron, Dissolved	Iron, Total	Manganese, Dissolved	Manganese, Total	Aluminum, Dissolved	Aluminum, Total
	yyyymmdd		µg/L	µg/L	µg/L	µg/L	µg/L	µg/l
BBDC 4.1	19960806	1305	20	66	12	15	<135	<135
CNWG 4.4	19960807	1440	42	187	10	14	<135	<135
CNWG 4.4	19961119	1100	64	180	11	11	<135	<135
CNWG 4.4	19970225	1155	83	147	34	34	<135	<135
CNWG 4.4	19970430	1045	33	255	53	63	<135	203
DEER 44.2	19960806	0940	22	102	<10	12	<135	<135
DEER 44.2	19961120	0925	51	195	<10	<10	<135	<135
DEER 44.2	19970224	0854	37	122	30	30	<135	<135
DEER 44.2	19970429	0915	12	96	20	20	<135	<135
EBAU 1.5	19960806	1110	180	409	57	68	<135	<135
EBAU 1.5	19961120	0945	50	94	33	33	<135	208
EBAU 1.5	19970224	1005	52	169	34	35	<135	<135
EBAU 1.5	19970429	1020	22	93	20	24	<135	<135
FBDC 4.1	19960806	1445	55	117	14	17	<135	<135
LNGA 2.5	19960805	1015	46	342	68	92	<135	243
OCTO 6.6	19960807	1310	24	447	11	97	<135	374
OCTO 6.6	19961119	1220	186	975	<10	10	<135	942
OCTO 6.6	19970225	1005	80	303	42	42	<135	269
OCTO 6.6	19970430	0945	15	337	21	71	<135	300
SBCC 20.4	19960805	1145	48	196	14	20	<135	<135
SCTT 3.0	19960807	0945	106	615	16	69	<135	219
SCTT 3.0	19961120	1040	79	184	52	59	<135	<135
SCTT 3.0	19970224	1135	65	163	61	75	<135	<135
SCTT 3.0	19970429	1130	43	192	73	76	<135	<135

Station	Date yyyymmdd	Time	Discharge cfs	Temper-ature ^{o}C	Conduct-ance umhos/cm	Dissolved Oxygen mg/L	Biological Oxygen Demand mg/L	pH	Alkalinity mg/L	Acidity mg/L
SUSQ 44.5	19960805	1320	16,800	26.6	250	8.97	<0.5	8.50	70	0
SUSQ 44.5	19961119	1220	52,000	5.2	177	12.71	1.6	7.20	36	4
SUSQ 44.5	19970219	1345	24,800	6.5	275		0.8	7.10	52	
SUSQ 44.5	19970422	1330	25,400	13.0	267		1.8	8.60	50	
SUSQ 10.0	19960807	1115		26.8	245	6.77	2.2	7.60	58	4
SUSQ 10.0	19961119	1315		6.2	166	10.17		7.05	38	4
SUSQ 10.0	19970224	1315		7.9	240	11.99		7.75	54	6
SUSQ 10.0	19970429	1240		14.4	226	9.01		7.65	52	8

Station	Date	Time	Solids, Dissolved	Solids, Total	Ammonia, Dissolved	Ammonia, Total	Nitrite, Dissolved	Nitrite, Total	Nitrate, Dissolved	Nitrate, Total
	yyyymmdd		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
SUSQ 44.5	19960805	1320	202	212	<0.02	0.02	0.008	0.008	1.38	1.40
SUSQ 44.5	19961119	1220	135	150	0.04	0.07	0.006	0.014	0.85	0.87
SUSQ 44.5	19970219	1345	182	182	0.04	0.04	0.020	0.020	1.50	1.50
SUSQ 44.5	19970422	1330	136	138	<0.02	<0.02	0.010	0.010	0.81	0.81
SUSQ 10.0	19960807	1115	214	218	0.08	0.10	0.036	0.042	1.30	1.30
SUSQ 10.0	19961119	1315	145	154	0.03	0.05	0.006	0.010	1.25	1.27
SUSQ 10.0	19970224	1315	138	152	0.05	0.05	0.012	0.014	1.64	1.64
SUSQ 10.0	19970429	1240	32	36	0.04	0.05	0.020	0.020	0.97	0.97

Station	Date	Time	Kjeldahl Nitrogen, Dissolved	Kjeldahl Nitrogen, Total	Phosphorus, Dissolved	Phosphorus, Total	Ortho-Phosphate, Dissolved	Ortho-Phosphate, Total
	yyyymmdd		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
SUSQ 44.5	19960805	1320	0.28	0.50	0.011	0.04	0.016	0.028
SUSQ 44.5	19961119	1220	0.28	0.35	0.007	0.03	0.007	0.050
SUSQ 44.5	19970219	1345	0.27	0.32	0.010	0.02	0.007	0.013
SUSQ 44.5	19970422	1330	0.27	0.46	0.006	0.02	0.005	0.010
SUSQ 10.0	19960807	1115	0.27	0.46	0.013	0.03	0.012	0.029
SUSQ 10.0	19961119	1315	<1.00	<1.00	0.013	0.04	0.012	0.046
SUSQ 10.0	19970224	1315	<0.20	<0.20	0.011	0.02	0.008	0.008
SUSQ 10.0	19970429	1240	0.30	0.48	0.011	0.02	0.002	0.004

Station	Date	Time	Organic Carbon, Total	Calcium	Magnesium	Chloride	Sulfate	Turbidity
	yyyymmdd		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
SUSQ 44.5	19960805	1320	3.3	28.2	7.24	13	30	10.4
SUSQ 44.5	19961119	1220	3.8	16.8	5.12	11	<10	54.0
SUSQ 44.5	19970219	1345	1.8	25.6	7.44	20	72	3.2
SUSQ 44.5	19970422	1330	2.6	25.4	7.23	14	23	2.3
SUSQ 10.0	19960807	1115	3.7	29.2	7.38	15	38	2.8
SUSQ 10.0	19961119	1315	3.4	17.8	5.14	9	29	33.0
SUSQ 10.0	19970224	1315	2.1	21.5	6.73	17	33	5.5
SUSQ 10.0	19970429	1240	2.0	24.1	7.04	14	35	8.6

Station	Date yyyymmdd	Time	Iron, Dissolved µg/L	Iron, Total µg/L	Manganese, Dissolved µg/L	Manganese, Total µg/L	Aluminum, Dissolved µg/L	Aluminum, Total µg/L
SUSQ 44.5	19960805	1320	29	330	14	65	<135	<135
SUSQ 44.5	19961119	1220	60	1,580	5	5	<135	1590
SUSQ 44.5	19970219	1345	46	46	<2	<2	<135	<135
SUSQ 44.5	19970422	1330	54	287	29	72	<135	<135
SUSQ 10.0	19960807	1115	14	247	10	112	<135	155
SUSQ 10.0	19961119	1315	98	1,310	45	92	<135	1,400
SUSQ 10.0	19970224	1315	85	561	116	144	<135	257
SUSQ 10.0	19970429	1240	79	362	18	148	<135	228

Appendix B

Organic Pollution-Tolerance Values and Functional Feeding Group Designations of Benthic Macroinvertebrate Taxa

Order	Family	Genus	Organic Pollution-Tolerance Value	Functional Feeding Group Designation
Coleoptera	Dytiscidae	*Agabus*	5	P
	Elmidae	*Optioservus*	4	SC
		Ordobrevia	5	SC
		Stenelmis	5	SC
	Gyrinidae	*Dineutus*	4	P
	Hydrophilidae	*Berosus*	5	CG
	Psephenidae	*Ectopria*	5	SC
		Psephenus	4	SC
	Ptilodactylidae	*Anchytarsus*	5	SH
Diptera	Athericidae	*Atherix*	2	P
	Chironomidae		7	CG
	Empididae	*Hemerodromia*	6	P
	Simuliidae	*Simulium*	6	FC
	Tabanidae	*Tabanus*	5	P
	Tipulidae	*Antocha*	3	CG
		Hexatoma	2	P
		Limonia	6	SH
		Pedicia	6	P
		Tipula	4	SH
Ephemeroptera	Ameletidae	*Ameletus*	0	CG
	Baetidae	*Acentrella*	4	CG
		Baetis	6	CG
		Centroptilum	2	CG
		Heterocloeon	2	SC
	Caenidae	*Caenis*	7	CG
	Ephemerellidae	*Serratella*	2	SC
	Heptageniidae	*Epeorus*	0	CG
		Heptagenia	4	SC
		Stenacron	4	SC
		Stenonema	3	SC
	Isonychiidae	*Isonychia*	2	FC
	Leptophlebiidae	*Leptophlebia*	4	CG
		Paraleptophlebia	1	CG
	Polymitarcyidae	*Ephoron*	2	CG
	Potamanthidae	*Potamanthus*	4	CG
	Tricorythidae	*Tricorythodes*	4	CG
Hemiptera	Gerridae	*Metrobates*	9	P
	Veliidae	*Rhagovelia*	8	P
Megaloptera	Corydalidae	*Corydalus*	4	P
		Nigronia	2	P
	Sialidae	*Sialis*	4	P
Odonata	Aeshnidae	*Boyeria*	2	P
	Coenagrionidae	*Argia*	6	P
	Gomphidae	*Gomphus*	5	P
		Ophiogomphus	1	P
		Stylogomphus	4	P
Plecoptera	Chloroperlidae	*Sweltsa*	0	P
	Leuctridae	*Leuctra*	0	SH
	Perlidae	*Acroneuria*	0	P

Order	Family	Genus	Organic Pollution-Tolerance Value	Functional Feeding Group Designation
Plecoptera	Perlodidae	*Agnetina*	2	P
		Eccoptura	2	P
		Neoperla	3	P
		Paragnetina	1	P
		Isoperla	2	P
	Pteronarcyidae	*Pteronarcys*	0	SH
Trichoptera	Brachycentridae	*Brachycentrus*	1	FC
	Glossosomatidae	*Glossosoma*	0	SC
	Hydropsychidae	*Ceratopsyche*	4	FC
		Cheumatopsyche	5	FC
		Hydropsyche	4	FC
		Macrostemum	3	FC
		Potamyia	5	FC
	Lepidostomatidae	*Lepidostoma*	1	SH
		Theliopsyche	1	SH
	Leptoceridae	*Mystacides*	4	CG
	Philopotamidae	*Chimarra*	4	FC
		Dolophilodes	0	FC
	Polycentropodidae	*Neureclipsis*	7	FC
		Polycentropus	6	FC
	Rhyacophilidae	*Rhyacophila*	1	P
Oligochaeta	Naididae		8	CG
	Lumbriculidae		8	CG
Amphipoda	Gammaridae	*Gammarus*	6	SH
Decapoda	Cambaridae	*Cambarus*	6	CG
		Orconectes	6	SH
Isopoda	Asellidae	*Caecidotea*	6	SH
Arachnoidea	Hydracarina		7	P
Pelecypoda	Corbiculidae	*Corbicula*	4	FC

APPENDIX C

MACROINVERTEBRATE DATA FOR INTERSTATE STREAMS CROSSING THE NEW YORK-PENNSYLVANIA AND PENNSYLVANIA-MARYLAND BORDERS

Order	Family	Genus	SNAK	APAL	BNTY	CASC
Coleoptera	Dytiscidae	*Agabus*				
	Elmidae	*Optioservus*	1	5		1
		Ordobrevia				
		Stenelmis	3	17	1	
	Gyrinidae	*Dineutus*				
	Hydrophilidae	*Berosus*				
	Psephenidae	*Ectopria*				
		Psephenus	9	4		
	Ptilodactylidae	*Anchytarsus*				
Diptera	Athericidae	*Atherix*	5	10		3
	Chironomidae		6	12	36	19
	Empididae	*Hemerodromia*		2	1	
	Simuliidae	*Simulium*		1	2	
	Tabanidae	*Tabanus*	1			
	Tipulidae	*Antocha*				
		Hexatoma	1	16	1	1
		Limonia				
		Pedicia				
		Tipula				
Ephemeroptera	Ameletidae	*Ameletus*	1			
	Baetidae	*Acentrella*			2	
		Baetis	14	1	7	1
		Centroptilum				
		Heterocloeon			1	
	Caenidae	*Caenis*				
	Ephemerellidae	*Serratella*				
	Heptageniidae	*Epeorus*	4		1	
		Heptagenia			2	2
		Stenacron				
		Stenonema		4		12
	Isonychiidae	*Isonychia*	6	5	5	15
	Leptophlebiidae	*Leptophlebia*				1
		Paraleptophlebia				
	Polymitarcyidae	*Ephoron*				
	Potamanthidae	*Potamanthus*				
	Tricorythidae	*Tricorythodes*				
Hemiptera	Gerridae	*Metrobates*				
	Veliidae	*Rhagovelia*				
Megaloptera	Corydalidae	*Corydalus*				
		Nigronia	1	3		3
	Sialidae	*Sialis*				
Odonata	Aeshnidae	*Boyeria*				1
	Coenagrionidae	*Argia*				
	Gomphidae	*Gomphus*				1
		Ophiogomphus		14		
		Stylogomphus				
Plecoptera	Chloroperlidae	*Sweltsa*				
	Leuctridae	*Leuctra*		2		
	Perlidae	*Acroneuria*		4		5
		Agnetina		3		
		Eccoptura				

Order	Family	*Genus*	SNAK	APAL	BNTY	CASC
Plecoptera	Perlidae	*Neoperla*				
		Paragnetina	4			
	Perlodidae	*Isoperla*		1		
	Pteronarcyidae	*Pteronarcys*				
Trichoptera	Brachycentridae	*Brachycentrus*				
	Glossosomatidae	*Glossosoma*				
	Hydropsychidae	*Ceratopsyche*	29	10	34	16
		Cheumatopsyche	11	17	14	22
		Hydropsyche		14	48	28
		Macrostemum				
		Potamyia		1		
	Lepidostomatidae	*Lepidostoma*				
		Theliopsyche				
	Leptoceridae	*Mystacides*				
	Philopotamidae	*Chimarra*	16	8		3
		Dolophilodes	4			
	Polycentropodidae	*Neureclipsis*				
		Polycentropus	1			
	Rhyacophilidae	*Rhyacophila*				
Haplotaxida	Naididae		1			
	Lumbriculidae					
Amphipoda	Gammaridae	*Gammarus*				
Decapoda	Cambaridae	*Cambarus*				
		Orconectes				
Isopoda	Asellidae	*Caecidotea*				
Hydracarina						
Pelecypoda	Corbiculidae	*Corbicula*				

Order	Family	Genus	CAYT	CHOC	COWN	LSNK
Coleoptera	Dytiscidae	*Agabus*				
	Elmidae	*Optioservus*	2	1		8
		Ordobrevia				
		Stenelmis	7	2		5
	Gyrinidae	*Dineutus*				
	Hydrophilidae	*Berosus*				
	Psephenidae	*Ectopria*				
		Psephenus	11	3		1
	Ptilodactylidae	*Anchytarsus*				
Diptera	Athericidae	*Atherix*	2	3	2	9
	Chironomidae		35	56	87	55
	Empididae	*Hemerodromia*				
	Simuliidae	*Simulium*	1	6	2	2
	Tabanidae	*Tabanus*	1			1
	Tipulidae	*Antocha*	1		1	
		Hexatoma	2			3
		Limonia				
		Pedicia				
		Tipula				2
Ephemeroptera	Ameletidae	*Ameletus*				
	Baetidae	*Acentrella*	1	2		
		Baetis	4	1		6
		Centroptilum				
		Heterocloeon				
	Caenidae	*Caenis*	1	2		
	Ephemerellidae	*Serratella*				
	Heptageniidae	*Epeorus*				1
		Heptagenia	6			
		Stenacron				
		Stenonema	2			
	Isonychiidae	*Isonychia*	18	5		7
	Leptophlebiidae	*Leptophlebia*				
		Paraleptophlebia				1
	Polymitarcyidae	*Ephoron*				
	Potamanthidae	*Potamanthus*				
	Tricorythidae	*Tricorythodes*				1
Hemiptera	Gerridae	*Metrobates*				
	Veliidae	*Rhagovelia*				
Megaloptera	Corydalidae	*Corydalus*				
		Nigronia		1		11
	Sialidae	*Sialis*				
Odonata	Aeshnidae	*Boyeria*		1		1
	Coenagrionidae	*Argia*				
	Gomphidae	*Gomphus*				
		Ophiogomphus		2		1
		Stylogomphus				
Plecoptera	Chloroperlidae	*Sweltsa*				
	Leuctridae	*Leuctra*				
	Perlidae	*Acroneuria*	1	2		17
		Agnetina				

Order	Family	Genus	CAYT	CHOC	COWN	LSNK
Plecoptera	Perlidae	*Eccoptura*				
		Neoperla				
		Paragnetina				
	Perlodidae	*Isoperla*				
	Pteronarcyidae	*Pteronarcys*				1
Trichoptera	Brachycentridae	*Brachycentrus*				
	Glossosomatidae	*Glossosoma*				
	Hydropsychidae	*Ceratopsyche*	35	5		9
		Cheumatopsyche	5	2	20	2
		Hydropsyche		1		9
		Macrostemum				
		Potamyia				
	Lepidostomatidae	*Lepidostoma*				
		Theliopsyche				
	Leptoceridae	*Mystacides*				
	Philopotamidae	*Chimarra*	15	12		
		Dolophilodes		1		
	Polycentropodidae	*Neureclipsis*				
		Polycentropus				
	Rhyacophilidae	*Rhyacophila*				
Haplotaxida	Naididae					
	Lumbriculidae					
Amphipoda	Gammaridae	*Gammarus*				
Decapoda	Cambaridae	*Cambarus*				1
		Orconectes				
Isopoda	Asellidae	*Caecidotea*			4	
Hydracarina			1			
Pelecypoda	Corbiculidae	*Corbicula*				

Order	Family	Genus	SEEL	SOUT	TIOG
Coleoptera	Dytiscidae	*Agabus*			
	Elmidae	*Optioservus*			
		Ordobrevia			
		Stenelmis	2	2	2
	Gyrinidae	*Dineutus*			2
	Hydrophilidae	*Berosus*			
	Psephenidae	*Ectopria*			
		Psephenus			1
	Ptilodactylidae	*Anchytarsus*	1		
	Athericidae	*Atherix*	1	5	4
	Chironomidae		74	61	17
	Empididae	*Hemerodromia*			
	Simuliidae	*Simulium*	1	2	2
	Tabanidae	*Tabanus*			
	Tipulidae	*Antocha*			1
		Hexatoma	9		1
		Limonia			
		Pedicia			
		Tipula			
Ephemeroptera	Ameletidae	*Ameletus*			
	Baetidae	*Acentrella*			
		Baetis	12		2
		Centroptilum			
		Heterocloeon			2
	Caenidae	*Caenis*			
	Ephemerellidae	*Serratella*			
	Heptageniidae	*Epeorus*			
		Heptagenia	1		
		Stenacron			
		Stenonema	1	8	34
	Isonychiidae	*Isonychia*	3	2	23
	Leptophlebiidae	*Leptophlebia*			
		Paraleptophlebia			
	Polymitarcyidae	*Ephoron*			
	Potamanthidae	*Potamanthus*			
	Tricorythidae	*Tricorythodes*	6		
Hemiptera	Gerridae	*Metrobates*			2
	Veliidae	*Rhagovelia*			
Megaloptera	Corydalidae	*Corydalus*			3
		Nigronia		1	
	Sialidae	*Sialis*		5	
Odonata	Aeshnidae	*Boyeria*			
	Coenagrionidae	*Argia*			
	Gomphidae	*Gomphus*			
		Ophiogomphus			
		Stylogomphus			
Plecoptera	Chloroperlidae	*Sweltsa*			
	Leuctridae	*Leuctra*	1		
	Perlidae	*Acroneuria*			
		Agnetina			1

Order	Family	Genus	SEEL	SOUT	TIOG
Plecoptera	Perlidae	*Eccoptura*			
		Neoperla			
		Paragnetina			
	Perlodidae	*Isoperla*			
	Pteronarcyidae	*Pteronarcys*			
Trichoptera	Brachycentridae	*Brachycentrus*			
	Glossosomatidae	*Glossosoma*			
	Hydropsychidae	*Ceratopsyche*	45	1	18
		Cheumatopsyche		11	7
		Hydropsyche	7	2	10
		Macrostemum		2	3
		Potamyia			
	Lepidostomatidae	*Lepidostoma*			
		Theliopsyche			
	Leptoceridae	*Mystacides*			
	Philopotamidae	*Chimarra*	2	58	3
		Dolophilodes			
	Polycentropodidae	*Neureclipsis*	2		
		Polycentropus			
	Rhyacophilidae	*Rhyacophila*			
Haplotaxida	Naididae				
	Lumbriculidae				
Amphipoda	Gammaridae	*Gammarus*			
Decapoda	Cambaridae	*Cambarus*			
		Orconectes			
Isopoda	Asellidae	*Caecidotea*			
Hydracarina					
Pelecypoda	Corbiculidae	*Corbicula*			1

Order	Family	Genus	TROW	TRUP	WAPP
Coleoptera	Dytiscidae	*Agabus*			
	Elmidae	*Optioservus*		1	1
		Ordobrevia			
		Stenelmis	7	3	7
	Gyrinidae	*Dineutus*		1	
	Hydrophilidae	*Berosus*			
	Psephenidae	*Ectopria*			
		Psephenus	8	2	7
	Ptilodactylidae	*Anchytarsus*			
	Athericidae	*Atherix*		26	16
	Chironomidae		26	25	14
	Empididae	*Hemerodromia*	1	1	
	Simuliidae	*Simulium*			1
	Tabanidae	*Tabanus*			
	Tipulidae	*Antocha*	1		
		Hexatoma	21	16	7
		Limonia			
		Pedicia			
		Tipula			
Ephemeroptera	Ameletidae	*Ameletus*			
	Baetidae	*Acentrella*	9		
		Baetis	12	9	14
		Centroptilum			
		Heterocloeon			
	Caenidae	*Caenis*		1	
	Ephemerellidae	*Serratella*			5
	Heptageniidae	*Epeorus*	4		
		Heptagenia		4	
		Stenacron			
		Stenonema		22	1
	Isonychiidae	*Isonychia*	2	1	13
	Leptophlebiidae	*Leptophlebia*			
		Paraleptophlebia	1		
	Polymitarcyidae	*Ephoron*			
	Potamanthidae	*Potamanthus*			
	Tricorythidae	*Tricorythodes*			
Hemiptera	Gerridae	*Metrobates*			
	Veliidae	*Rhagovelia*			
Megaloptera	Corydalidae	*Corydalus*			
		Nigronia	1	1	2
	Sialidae	*Sialis*			1
Odonata	Aeshnidae	*Boyeria*			
	Coenagrionidae	*Argia*			
	Gomphidae	*Gomphus*			
		Ophiogomphus			
		Stylogomphus			
Plecoptera	Chloroperlidae	*Sweltsa*	1		
	Leuctridae	*Leuctra*	1		
	Perlidae	*Acroneuria*	3		1
		Agnetina	13		
		Eccoptura			

Order	Family	Genus	TROW	TRUP	WAPP
Plecoptera	Perlidae	*Neoperla*		4	
		Paragnetina			
	Perlodidae	*Isoperla*			
	Pteronarcyidae	*Pteronarcys*			
Trichoptera	Brachycentridae	*Brachycentrus*			
	Glossosomatidae	*Glossosoma*			
	Hydropsychidae	*Ceratopsyche*	19	24	32
		Cheumatopsyche	5	1	11
		Hydropsyche	2		
		Macrostemum			
		Potamyia			
	Lepidostomatidae	*Lepidostoma*			
		Theliopsyche			
	Leptoceridae	*Mystacides*			
	Philopotamidae	*Chimarra*	2		4
		Dolophilodes			
	Polycentropodidae	*Neureclipsis*			
		Polycentropus	1		
	Rhyacophilidae	*Rhyacophila*			
Haplotaxida	Naididae				
	Lumbriculidae				
Amphipoda	Gammaridae	*Gammarus*			
Decapoda	Cambaridae	*Cambarus*			
		Orconectes			
Isopoda	Asellidae	*Caecidotea*			
Hydracarina				3	
Pelecypoda	Corbiculidae	*Corbicula*			

Order	Family	Genus	SBCC	BBDC	CNWG
Coleoptera	Dytiscidae	*Agabus*			
	Elmidae	*Optioservus*	6	8	
		Ordobrevia			
		Stenelmis		2	10
	Gyrinidae	*Dineutus*			
	Hydrophilidae	*Berosus*			2
	Psephenidae	*Ectopria*	1		
		Psephenus		1	2
	Ptilodactylidae	*Anchytarsus*		1	
	Athericidae	*Atherix*		1	
	Chironomidae		14	18	7
	Empididae	*Hemerodromia*	3	1	
	Simuliidae	*Simulium*			5
	Tabanidae	*Tabanus*			
	Tipulidae	*Antocha*	2		
		Hexatoma	4		
		Limonia			
		Pedicia			
		Tipula	1	1	
Ephemeroptera	Ameletidae	*Ameletus*			
	Baetidae	*Acentrella*			
		Baetis	1	3	33
		Centroptilum			
		Heterocloeon			
	Caenidae	*Caenis*			
	Ephemerellidae	*Serratella*			
	Heptageniidae	*Epeorus*			
		Heptagenia			
		Stenacron			
		Stenonema	1	3	6
	Isonychiidae	*Isonychia*			
	Leptophlebiidae	*Leptophlebia*			
		Paraleptophlebia			
	Polymitarcyidae	*Ephoron*			
	Potamanthidae	*Potamanthus*			
	Tricorythidae	*Tricorythodes*			
Hemiptera	Gerridae	*Metrobates*			
	Veliidae	*Rhagovelia*			1
Megaloptera	Corydalidae	*Corydalus*			2
		Nigronia	9	10	
	Sialidae	*Sialis*			
Odonata	Aeshnidae	*Boyeria*			
	Coenagrionidae	*Argia*			
	Gomphidae	*Gomphus*			
		Ophiogomphus			
		Stylogomphus	9		
Plecoptera	Chloroperlidae	*Sweltsa*			
	Leuctridae	*Leuctra*	10	6	2
	Perlidae	*Acroneuria*	9	7	1
		Agnetina			

Order	Family	*Genus*	SBCC	BBDC	CNWG
Plecoptera	Perlidae	*Eccoptura*			
		Neoperla			
		Paragnetina		1	
	Perlodidae	*Isoperla*			
	Pteronarcyidae	*Pteronarcys*			
Trichoptera	Brachycentridae	*Brachycentrus*			
	Glossosomatidae	*Glossosoma*	1		
	Hydropsychidae	*Ceratopsyche*	9	17	10
		Cheumatopsyche	4	2	
		Hydropsyche	6	24	19
		Macrostemum			
		Potamyia			
	Lepidostomatidae	*Lepidostoma*			
		Theliopsyche			
	Leptoceridae	*Mystacides*			
	Philopotamidae	*Chimarra*			
		Dolophilodes	21	26	
	Polycentropodidae	*Neureclipsis*			
		Polycentropus			
	Rhyacophilidae	*Rhyacophila*	5	7	
Haplotaxida	Naididae				
	Lumbriculidae				
Amphipoda	Gammaridae	*Gammarus*			
Decapoda	Cambaridae	*Cambarus*	1		
		Orconectes			
Isopoda	Asellidae	*Caecidotea*			
Hydracarina					
Pelecypoda	Corbiculidae	*Corbicula*			

Order	Family	Genus	DEER	EBAU	FBDC
Coleoptera	Dytiscidae	*Agabus*			
	Elmidae	*Optioservus*	4	15	2
		Ordobrevia			
		Stenelmis	14	6	5
	Gyrinidae	*Dineutus*			
	Hydrophilidae	*Berosus*			
	Psephenidae	*Ectopria*			1
		Psephenus	3	1	1
	Ptilodactylidae	*Anchytarsus*			
	Athericidae	*Atherix*	3	3	
	Chironomidae		6	29	14
	Empididae	*Hemerodromia*	1		
	Simuliidae	*Simulium*	1		2
	Tabanidae	*Tabanus*			
	Tipulidae	*Antocha*	6	1	
		Hexatoma			
		Limonia			
		Pedicia			
		Tipula		1	1
Ephemeroptera	Ameletidae	*Ameletus*			
	Baetidae	*Acentrella*			
		Baetis	7	5	3
		Centroptilum			
		Heterocloeon			
	Caenidae	*Caenis*			
	Ephemerellidae	*Serratella*			
	Heptageniidae	*Epeorus*		1	5
		Heptagenia			
		Stenacron			
		Stenonema	2		
	Isonychiidae	*Isonychia*	11	2	
	Leptophlebiidae	*Leptophlebia*			
		Paraleptophlebia			
	Polymitarcyidae	*Ephoron*			
	Potamanthidae	*Potamanthus*			
	Tricorythidae	*Tricorythodes*			
Hemiptera	Gerridae	*Metrobates*			
	Veliidae	*Rhagovelia*			
Megaloptera	Corydalidae	*Corydalus*	3		7
		Nigronia	8		3
	Sialidae	*Sialis*	1		
Odonata	Aeshnidae	*Boyeria*			
	Coenagrionidae	*Argia*			
	Gomphidae	*Gomphus*			
		Ophiogomphus	1	1	1
		Stylogomphus			
Plecoptera	Chloroperlidae	*Sweltsa*			
	Leuctridae	*Leuctra*	2	1	11
	Perlidae	*Acroneuria*	3		10
		Agnetina			
		Eccoptura			

Order	Family	Genus	DEER	EBAU	FBDC
Plecoptera	Perlidae	*Neoperla*			
		Paragnetina			6
	Perlodidae	*Isoperla*			
	Pteronarcyidae	*Pteronarcys*			
Trichoptera	Brachycentridae	*Brachycentrus*			
	Glossosomatidae	*Glossosoma*			
	Hydropsychidae	*Ceratopsyche*	7	24	8
		Cheumatopsyche	15	5	5
		Hydropsyche	20	15	17
		Macrostemum			
		Potamyia			
	Lepidostomatidae	*Lepidostoma*			
		Theliopsyche			
	Leptoceridae	*Mystacides*			
	Philopotamidae	*Chimarra*			3
		Dolophilodes			12
	Polycentropodidae	*Neureclipsis*			
		Polycentropus			
	Rhyacophilidae	*Rhyacophila*		1	3
Haplotaxida	Naididae				4
	Lumbriculidae		3		
Amphipoda	Gammaridae	*Gammarus*			
Decapoda	Cambaridae	*Cambarus*			1
		Orconectes			
Isopoda	Asellidae	*Caecidotea*		12	
Hydracarina					
Pelecypoda	Corbiculidae	*Corbicula*			

Order	Family	Genus	LNGA	OCTO	SCTT
Coleoptera	Dytiscidae	*Agabus*			
	Elmidae	*Optioservus*	16		
		Ordobrevia		6	
		Stenelmis	7	23	
	Gyrinidae	*Dineutus*			
	Hydrophilidae	*Berosus*			
	Psephenidae	*Ectopria*			
		Psephenus	2	3	
	Ptilodactylidae	*Anchytarsus*	4		
	Athericidae	*Atherix*	4		
	Chironomidae		18	2	79
	Empididae	*Hemerodromia*	2		1
	Simuliidae	*Simulium*	3		1
	Tabanidae	*Tabanus*			
	Tipulidae	*Antocha*	2		
		Hexatoma			
		Limonia			
		Pedicia			2
		Tipula			
Ephemeroptera	Ameletidae	*Ameletus*			
	Baetidae	*Acentrella*			
		Baetis	14	29	3
		Centroptilum		4	
		Heterocloeon			
	Caenidae	*Caenis*			
	Ephemerellidae	*Serratella*			
	Heptageniidae	*Epeorus*			
		Heptagenia			
		Stenacron			
		Stenonema		8	1
	Isonychiidae	*Isonychia*			
	Leptophlebiidae	*Leptophlebia*			
		Paraleptophlebia			
	Polymitarcyidae	*Ephoron*			
	Potamanthidae	*Potamanthus*			
	Tricorythidae	*Tricorythodes*			
Hemiptera	Gerridae	*Metrobates*			
	Veliidae	*Rhagovelia*			
Megaloptera	Corydalidae	*Corydalus*		1	
		Nigronia			3
	Sialidae	*Sialis*			
Odonata	Aeshnidae	*Boyeria*			
	Coenagrionidae	*Argia*			
	Gomphidae	*Gomphus*			
		Ophiogomphus			
		Stylogomphus			
Plecoptera	Chloroperlidae	*Sweltsa*			
	Leuctridae	*Leuctra*	2		
	Perlidae	*Acroneuria*			
		Agnetina			
		Eccoptura	1		

Order	Family	Genus	LNGA	OCTO	SCTT
Plecoptera	Perlidae	*Neoperla*			
		Paragnetina			
	Perlodidae	*Isoperla*			
	Pteronarcyidae	*Pteronarcys*			
Trichoptera	Brachycentridae	*Brachycentrus*			
	Glossosomatidae	*Glossosoma*			
	Hydropsychidae	*Ceratopsyche*	1	17	
		Cheumatopsyche	9	2	22
		Hydropsyche	14	1	32
		Macrostemum			
		Potamyia			
	Lepidostomatidae	*Lepidostoma*			
		Theliopsyche			
	Leptoceridae	*Mystacides*			
	Philopotamidae	*Chimarra*	2		1
		Dolophilodes			
	Polycentropodidae	*Neureclipsis*		1	
		Polycentropus			1
	Rhyacophilidae	*Rhyacophila*			
Haplotaxida	Naididae				2
	Lumbriculidae				
Amphipoda	Gammaridae	*Gammarus*		2	
Decapoda	Cambaridae	*Cambarus*			1
		Orconectes			
Isopoda	Asellidae	*Caecidotea*			
Hydracarina					
Pelecypoda	Corbiculidae	*Corbicula*		1	

Order	Family	Genus	SUSQ 365	SUSQ 340	SUSQ 289.1	SUSQ 44.5
Coleoptera	Dytiscidae	*Agabus*	3			
	Elmidae	*Optioservus*		4	1	
		Ordobrevia				
		Stenelmis	3	12	8	9
	Gyrinidae	*Dineutus*	2	3		
	Hydrophilidae	*Berosus*				
	Psephenidae	*Ectopria*				
		Psephenus	11		7	
	Ptilodactylidae	*Anchytarsus*				
Diptera	Athericidae	*Atherix*	1			
	Chironomidae		6	15	6	3
	Empididae	*Hemerodromia*				
	Simuliidae	*Simulium*				
	Tabanidae	*Tabanus*				
	Tipulidae	*Antocha*				
		Hexatoma				
		Limonia			6	
		Pedicia				
		Tipula				
Ephemeroptera	Ameletidae	*Ameletus*				
	Baetidae	*Acentrella*		1		
		Baetis	11	12	16	19
		Centroptilum			9	
		Heterocloeon				
	Caenidae	*Caenis*	1			2
	Ephemerellidae	*Serratella*				
	Heptageniidae	*Epeorus*				
		Heptagenia	25			
		Stenacron			1	10
		Stenonema	19	8	14	30
	Isonychiidae	*Isonychia*	22		13	8
	Leptophlebiidae	*Leptophlebia*				
		Paraleptophlebia				
	Polymitarcyidae	*Ephoron*	6	1	18	
	Potamanthidae	*Potamanthus*		4		
	Tricorythidae	*Tricorythodes*	3	2		
Hemiptera	Gerridae	*Metrobates*				
	Veliidae	*Rhagovelia*				
Megaloptera	Corydalidae	*Corydalus*	1		1	1
		Nigronia				
	Sialidae	*Sialis*		3		
Odonata	Aeshnidae	*Boyeria*				
	Coenagrionidae	*Argia*				2
	Gomphidae	*Gomphus*				
		Ophiogomphus				
		Stylogomphus				
Plecoptera	Chloroperlidae	*Sweltsa*				
	Leuctridae	*Leuctra*				
	Perlidae	*Acroneuria*		1		
		Agnetina	2			

Order	Family	Genus	SUSQ 365	SUSQ 340	SUSQ 289.1	SUSQ 44.5
Plecoptera	Perlidae	*Eccoptura*				
		Neoperla	6			
		Paragnetina				
	Perlodidae	*Isoperla*				
	Pteronarcyidae	*Pteronarcys*				
Trichoptera	Brachycentridae	*Brachycentrus*		2		
	Glossosomatidae	*Glossosoma*				
	Hydropsychidae	*Ceratopsyche*	2		3	
		Cheumatopsyche			19	21
		Hydropsyche			2	8
		Macrostemum			2	6
		Potamyia				
	Lepidostomatidae	*Lepidostoma*		1		
		Theliopsyche	1			
	Leptoceridae	*Mystacides*		2		
	Philopotamidae	*Chimarra*		3	19	11
		Dolophilodes				
	Polycentropodidae	*Neureclipsis*				
		Polycentropus				
	Rhyacophilidae	*Rhyacophila*				
Haplotaxida	Naididae					2
	Lumbriculidae					
Amphipoda	Gammaridae	*Gammarus*		26	1	4
Decapoda	Cambaridae	*Cambarus*			1	
		Orconectes				1
Isopoda	Asellidae	*Caecidotea*				
Hydracarina				1		1
Pelecypoda	Corbiculidae	*Corbicula*			2	3

Appendix D

Water Classification and Best Usage Relationships

New York:

The New York State water quality classifications are summarized from Water Quality Regulations for Surface Waters and Groundwaters, 6NYCRR Parts 700-705 Effective September 1, 1991, NYSDEC Division of Water, Albany, New York. Only classifications that are used in this report will be described in this section. The classes are as follows:

Class B—The best usage of Class B waters are primary and secondary contact recreation and fishing. These waters shall be suitable for fish propagation and survival.

Class C—The best usage of Class C waters is fishing. These waters shall be suitable for fish propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.

Class D—The best usage of these waters is fishing. Due to such natural conditions as intermittence of flow, water conditions not conducive to propagation of game fishery, or streambed conditions, the waters will not support fish propagation. These waters shall be suitable for fish survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.

(T)—Suffix added to classes where trout survival is an additional best use to the use classification.

Pennsylvania:

The Pennsylvania state water quality classifications are summarized from Water Quality Standards of the Department's Rules and Regulations, 25 Pa. Code, Chapter 93.3-5, effective August 1989, Pa. DER, Division of Water Quality, Harrisburg, Pennsylvania. All surface waters must meet protected water uses for aquatic life (warm water fishes), water supply (potable, industrial, livestock, and wildlife), and recreation (boating, fishing, water contact sports, and esthetics). Only classifications that are used in this report will be described in this section. The use classifications are as follows:

CWF—Cold Water Fishes: Maintenance and/or propagation of fish species including the family Salmonidae and additional flora and fauna, which are indigenous to a cold water habitat.

WWF—Warm Water Fishes: Maintenance and propagation of fish species and additional flora and fauna that are indigenous to a warm water habitat.

TSF—Trout Stocked Fishery: Maintenance of stocked trout from February 15 to July 31 and maintenance and propagation of fish species and additional flora and fauna that are indigenous to a warm water habitat.

MF—Migratory Fishes: Passage, maintenance and propagation of anadromous and catadromous fishes and other fishes that ascend to flowing waters to complete their life cycle. The MF designation is in addition to other designations when appropriate.

Maryland:

The Maryland State water quality classifications are summarized from Water Quality Regulations for Designated Uses, COMAR 26.08.02, Effective November 1, 1993, Maryland Department of the Environment, Annapolis, Maryland. All surface waters must protect public health or welfare; enhance the quality of water; protect aquatic resources; and serve the purposes of the Federal Act. Only classifications that are used in this report will be described in this section. The designated use classifications are as follows:

I-P—Water Contact Recreation, Protection of Aquatic Life, and Public Water Supply. This use designation includes waters that are suitable for water contact sports; play and leisure time activities where individuals may come in direct contact with surface water; fishing; the growth and propagation of fish (other than trout), other aquatic life, and wild life; and industrial supply. The P designation indicates that the water source may be used as a public water supply.

III-P—Natural Trout Waters and Public Water Supply. This use designation includes waters that have the potential for or are suitable for the growth and propagation of trout; and capable of supporting self-sustaining trout populations and their food organisms. The P designation indicates that the water use may be used as a public water supply.

IV-P—Recreational Trout Waters and Public Water Supply. This use designation includes cold or warm waters that have the potential for or are capable of holding or supporting adult trout for put-and-take fishing; and managed as a special fishery by periodic stocking and seasonal catching. The P designation indicates that the waters may be used as a public water supply.