
**ASSESSMENT OF INTERSTATE
STREAMS IN THE
SUSQUEHANNA RIVER BASIN**

Monitoring Report No. 21
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INTRODUCTION

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, Md. Eighty-three streams cross state lines in the basin. Several streams traverse the state lines at multiple points, contributing to 91 crossings. Of those 91 crossings, 45 streams flow from New York into Pennsylvania, 22 from Pennsylvania into New York, 15 from Pennsylvania into Maryland, and 9 from Maryland into Pennsylvania. Many streams are small and 32 are unnamed.

One of the functions of the Susquehanna River Basin Commission (SRBC) 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 state agencies in 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 (USEPA).

The interstate water quality monitoring program includes periodic collection of water and biological samples from interstate streams, as well as assessments of their physical habitat. Water quality data are used to: (1) assess compliance with water quality standards; (2) characterize stream quality and seasonal variations; (3) build a database for assessment of water quality trends; (4) identify streams for reporting to USEPA under Section 305(b) of the Clean Water Act; (5) provide information to signatory states for 303(d) listing and possible Total Maximum Daily Load (TMDL) development; and (6) identify areas for restoration and protection. Biological conditions are assessed using benthic macroinvertebrate populations, which provide an indication of the biological health of a stream and serve as indicators of water quality. Habitat assessments provide information concerning potential stream impairment from erosion and sedimentation, as well as an indication of the stream's ability to support a healthy biological community.

SRBC's interstate monitoring program began in April 1986. For the first five years, results were reported for water years that ran from October to September. In 1991, SRBC changed the reporting periods to correspond with its fiscal year that covers the period from July to June. Reports are typically completed during the following summer for the data from the previous fiscal year. In 2007, a web-based format was initiated to provide a more user-friendly product that is easily accessible to not only government agencies but also to anyone who is interested in the condition of these streams and rivers. Recent reports are available online from the SBRC website at <http://www.srbc.net/docs/Publications/techreports.htm>.

METHODS

Field and Laboratory Methods

Sampling frequency

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

Streams with impaired water quality or judged to have a high potential for degradation due to large drainage areas or historical pollution have been assigned to Group 1. Each year, Group 1 streams are sampled in July or August, October, February, and May. Benthic macroinvertebrates are collected and habitat assessments are performed at all Group 1 streams during the summer sampling period.

Streams judged to have a moderate potential for impacts have been assigned to Group 2. Water quality samples, benthic macroinvertebrate samples, and physical habitat information were obtained from Group 2 stations once a year; usually during base flow conditions in the summer months of July or August.

Streams judged to have a low potential for impacts have been assigned to Group 3 and are sampled each May for macroinvertebrates, and habitat conditions are assessed. Field chemistry parameters also are measured on Group 3 streams at the time of biological sampling.

Stream discharge

Stream discharge is measured at all stations unless high stream flows makes access impossible. Several stations are located near U.S. 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. Recorded stages from USGS gaging stations and rating curves were used to determine instantaneous discharges in cubic feet per second (cfs). Instantaneous discharges for stations not located near USGS gaging stations were measured at the time of sampling, using standard USGS procedures (Buchanan and Somers, 1969).

Water samples

Water samples are collected at each of the Group 1 and Group 2 streams to measure nutrient and metal concentrations. Water samples are collected using a depth-integrated sampler. Composite samples are obtained by collecting several depth-integrated samples across the stream channel and combining them in a churn splitter that was previously rinsed with stream water. Water samples are mixed thoroughly in the churn splitter and collected in a 500-ml bottle and two 250-ml bottles. The 500-ml bottle is for a raw sample. Each of the 250-ml bottles consists of a whole water sample, one fixed with concentrated nitric acid (HNO₃) for metal analysis and one fixed with concentrated sulfuric acid (H₂SO₄) for nutrient analysis. The samples are chilled on ice and sent to the Pennsylvania Department of Environmental Protection (PADEP), Bureau of Laboratories in Harrisburg, Pa., within 24 hours of collection.

Field chemistry

Temperature, dissolved oxygen, conductivity, pH, alkalinity, and acidity are measured in the field. Dissolved oxygen is measured using a YSI model 55-dissolved oxygen meter that is calibrated at the beginning of each day when water samples are collected. A VWR Scientific Model 2052 conductivity meter is used to measure conductivity. A Cole Parmer meter is used to measure pH. The pH meter is calibrated at the beginning of the day and randomly checked throughout the day. Alkalinity is determined by titrating a known volume of water to pH 4.5 with 0.02N H₂SO₄. Acidity is measured by titrating a known volume of sample water to pH 8.3 with 0.02N sodium hydroxide (NaOH). Total chlorine is measured at Cayuta and Ebaughs Creeks since CAYT 1.7 and EBAU 1.5 are located downstream of wastewater treatment plants. A HACH Datalogging Colorimeter model DR/890 is used with the DPD Test and Tube method (10101) to measure chlorine concentrations.

Macroinvertebrate and physical habitat sampling

SRBC staff collects benthic macroinvertebrate samples from Group 1 and Group 2 stations in July and August and from Group 3 streams in May. The benthic macroinvertebrate community is 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 are analyzed using field and laboratory methods described in Rapid Bioassessment Protocol for Use in Streams and Rivers by Barbour and others (1999). Sampling is performed using a 1-meter-square kick screen with size No. 30 mesh. The kick screen is stretched across the current to collect organisms dislodged from riffle/run areas by physical agitation of the stream substrate. Two kick screen samples are collected from a representative riffle/run at each station. The two samples are composited and preserved in denatured ethyl alcohol for later laboratory analysis.

In the laboratory, composite samples are sorted into 200-organism subsamples using a gridded pan and a random numbers table. The organisms contained in the subsamples are identified to genus (except Chironomidae and Oligochaeta) and enumerated using keys developed by Merrit and Cummins (1996), Peckarsky and others (1990), and Pennak (1989). Each taxon is assigned an organic pollution tolerance value and a functional feeding category.

Physical habitat conditions at each station are assessed using a slightly modified version of the habitat assessment procedure outlined by Barbour and others (1999). Eleven habitat parameters are field-evaluated at each site and used to calculate a site-specific habitat assessment score. Habitat parameters are evaluated on a scale of 0 to 20 and are based on instream composition, channel morphology, and riparian zone and bank conditions. Some of the parameters to be evaluated vary based on whether the stream was characterized by riffles and runs or by glides and pools.

Data Synthesis Methods

Chemical water quality

Results of laboratory analysis for chemical parameters are compared to New York, Pennsylvania, and Maryland state water quality standards. In addition, a simple water quality index (WQI) is calculated, using procedures established by McMorran and Bollinger (1990). The WQI is used to make comparisons between sampling periods and stations within the same geographical region; therefore, the water quality data are divided into two groups. One group contains stations along the New York-Pennsylvania border, and the other group contains stations along the Pennsylvania-Maryland border. The data in each group are sorted by parameter and ranked by increasing order of magnitude, with several exceptions. Dissolved oxygen is ranked by decreasing order of magnitude, while pH, alkalinity, acidity, calcium, and magnesium are not included in the WQI analysis. The values of each chemical analysis are divided by the highest ranking value in the group to obtain a percentile. The WQI score is calculated by averaging all percentile ranks for each sample. WQI scores range from 1 to 100, and high WQI scores indicate poor water quality.

Biological and physical habitat conditions

Benthic macroinvertebrate samples are assessed using procedures described by Barbour and others (1999), Klemm and others (1990), and Plafkin and others (1989). Using these methods, staff calculates a series of biological indexes for a stream and compare them to a reference station in the same region to determine the degree of impairment. The metrics used in this survey are summarized below. Metric 2 (Shannon Diversity Index) followed the methods described in Klemm and others (1990), and all other metrics were taken from Barbour and others (1999).

The 200-organism subsample data are used to generate scores for each of the seven metrics. Scores for metrics 1-4 are converted to a biological condition score, based on the percent similarity of the metric score, relative to the metric score of the reference site. Scores for metrics 5-7 are based on set scoring criteria developed for the percentages (Plafkin and others, 1989; Ohio Environmental Protection Agency, 1987b). The sum of the biological condition scores constituted the total biological score for the sample site, and total biological scores are used to assign each site to a biological condition category. Habitat assessment scores of sample sites are compared to those of reference sites to classify each sample site into a habitat condition category.

Trend analysis

Long-term trend analysis has been performed on Group 1 streams that have been sampled since April 1986 to identify increases and decreases over time in total suspended solids, total ammonia, total nitrogen, total phosphorus, total chloride, total sulfate, total iron, total manganese, total aluminum, and the WQI. Overall these long-term trends do not change very much from year to year. Therefore, SRBC has decided to analyze for trends every five years. The next trend analysis will be in the FY-2008 Interstate Report.

The nonparametric trend test used in previous reports was the Seasonal Kendall Test, which is described by Bauer and others (1984), and Smith and others (1982). For more information on this test and how it was used to assess trends in the data see Trends in Nitrogen, Phosphorus, and Suspended Sediment in the Susquehanna River Basin, 1974-93 (Edwards, 1995), LeFevre (2003), and other previous Interstate reports.

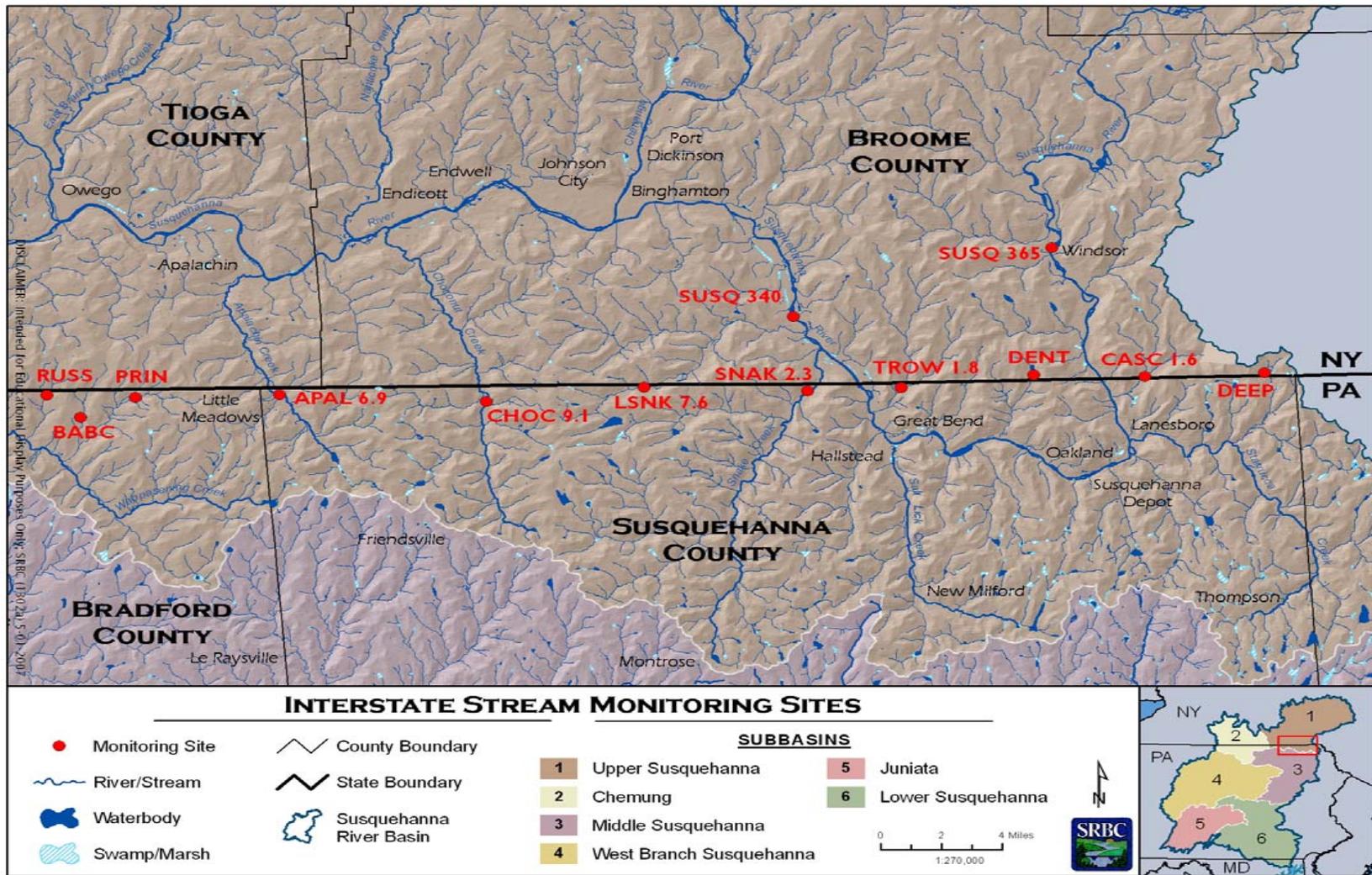
List of New York- Pennsylvania Interstate Streams

Station	Stream and Location	Monitoring Group	Rationale
APAL 6.9	Apalachin Creek, Little Meadows, PA	2	Monitor for potential water quality impacts
BABC	Babcock Run, Cadis, PA	3	Monitor for potential impacts
BEAG	Beagle Hollow Run, Osceola, PA	3	Monitor for potential impacts
BILL	Bill Hess Creek, Nelson, PA	3	Monitor for potential impacts
BIRD	Bird Creek, Webb Mills, NY	3	Monitor for potential impacts
BISC	Biscuit Hollow, Austinburg, PA	3	Monitor for potential impacts
BNTY 0.9	Bentley Creek, Wellsburg, NY	1	Monitor for potential water quality impacts
BRIG	Briggs Hollow, Nichols, NY	3	Monitor for potential impacts
BULK	Bulkley Brook, Knoxville, PA	3	Monitor for potential impacts
CAMP	Camp Brook, Osceola, PA	3	Monitor for potential impacts
CASC 1.6	Cascade Creek, Lanesboro, PA	1	Monitor for potential water quality impacts
CAYT 1.7	Cayuta Creek, Waverly, NY	1	Municipal discharge from Waverly, NY
CHEM 12.0	Chemung River, Chemung, NY	1	Municipal and industrial discharges from Elmira, NY
CHOC 9.1	Choconut Creek, Vestal Center, NY	2	Monitor for potential water quality impacts
COOK	Cook Hollow, Austinburg, PA	3	Monitor for potential impacts
COWN 2.2	Cowanesque River, Lawrenceville, PA	1	Impacts from flood control reservoir
COWN 1.0	Cowanesque River, Lawrenceville, PA	1	Recovery zone from upstream flood control reservoir
DEEP	Deep Hollow Brook, Danville, NY	3	Monitor for potential impacts
DENT	Denton Creek, Hickory Grove, PA	3	Monitor for potential impacts
DRYB	Dry Brook, Waverly, NY	3	Monitor for potential impacts
HLDN 3.5	Holden Creek, Woodhull, NY	2	Monitor for potential water quality impacts
LSNK 7.6	Little Snake Creek, Brackney, PA	1	Monitor for potential water quality impacts
LWAP*	Little Wappasening Creek, Nichols, NY	3	Monitor for potential impacts
NFCR 7.6	North Fork Cowanesque River, North Fork, PA	2	Monitor for potential water quality impacts
PARK	Parks Creek, Litchfield, NY	3	Monitor for potential impacts
PRIN	Prince Hollow Run Cadis, PA	3	Monitor for potential impacts
RUSS	Russell Run, Windham, PA	3	Monitor for potential impacts
SACK	Sackett Creek, Nichols, NY	3	Monitor for potential impacts
SEEL 10.3	Seeley Creek, Seeley Creek, NY	1	Monitor for potential water quality impacts
SMIT	Smith Creek, East Lawrence, PA	3	Monitor for potential impacts
SNAK 2.3*	Snake Creek, Brookdale, PA	2	Monitor for potential water quality impacts
SOUT 7.8	South Creek, Fassett, PA	2	Monitor for potential water quality impacts
STRA	Strait Creek, Nelson, PA	3	Monitor for potential impacts
SUSQ 365.0	Susquehanna River, Windsor, NY	1	Large drainage area (1,882 sq. mi.); municipal discharges from Cooperstown, Sidney, Bainbridge, and Oneonta
SUSQ 340.0	Susquehanna River, Kirkwood, NY	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
TIOG 10.8	Tioga River, Lindley, NY	1	Pollution from acid mine discharges and impacts from flood control reservoirs
TRUP 4.5	Troups Creek, Austinburg, PA	1	High turbidity and moderately impaired macroinvertebrate populations
TROW 1.8*	Trowbridge Creek, Great Bend, PA	2	Monitor for potential water quality impacts
WAPP 2.6	Wappasening Creek, Nichols, NY	2	Monitor for potential water quality impacts
WBCO	White Branch Cowanesque River, North Fork, PA	3	Monitor for potential impacts
WHIT	White Hollow, Wellsburg, NY	3	Monitor for potential impacts

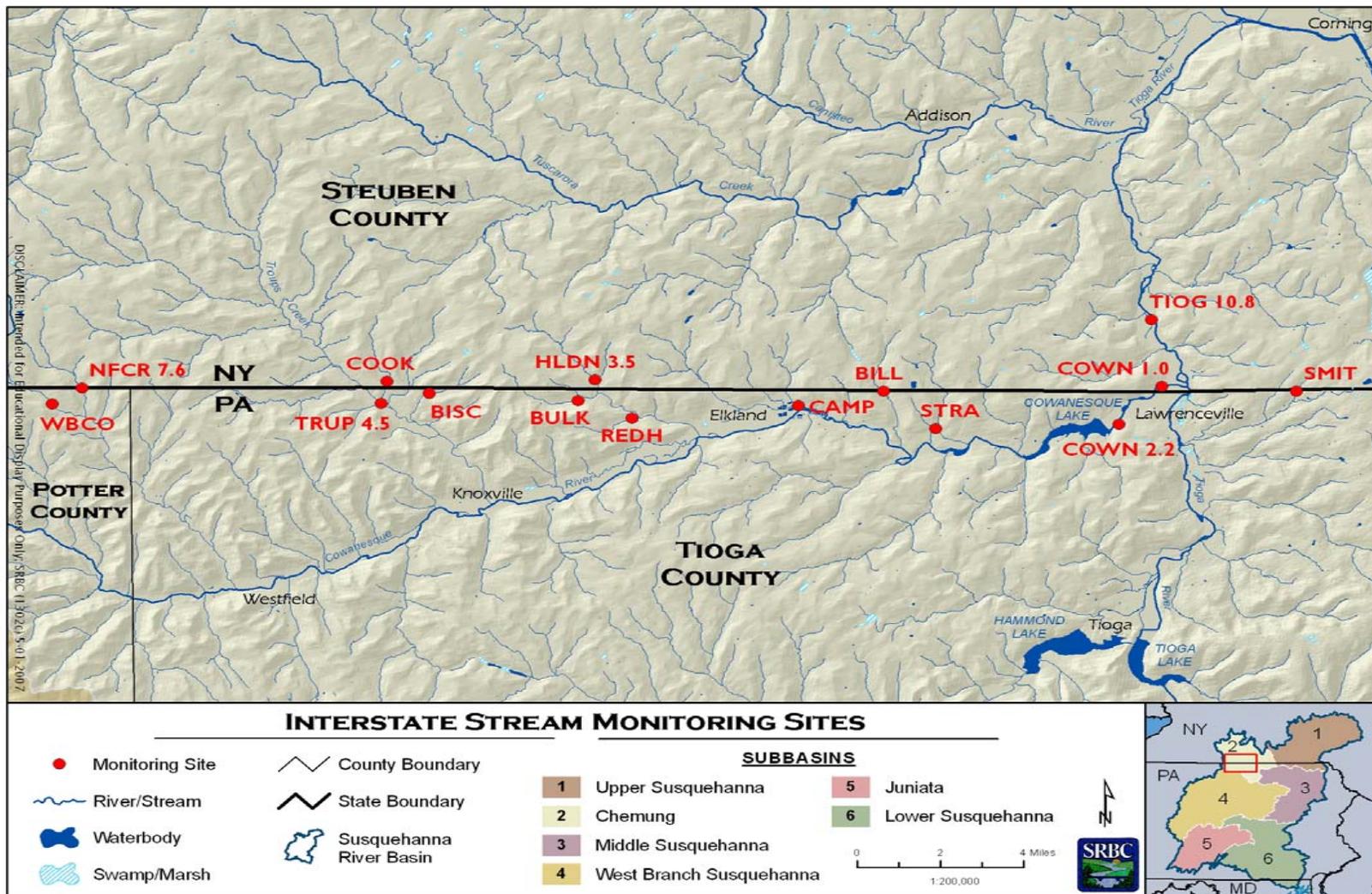
List of Pennsylvania-Maryland Interstate Streams

Station	Stream and Location	Monitoring Group	Rationale
BBDC 4.1	Big Branch Deer Creek, Fawn Grove, PA	2	Monitor for potential water quality impacts
CNWG 4.4	Conowingo Creek, Pleasant Grove, PA	1	High nutrient loads and other agricultural runoff; 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
EBAU 1.5	Ebaughs Creek, Stewartstown, PA	1	Municipal discharge from Stewartstown, PA; nonpoint runoff to Chesapeake Bay
FBDC 4.1	Falling Branch Deer Creek, Fawn Grove, PA	2	Monitor for potential water quality impacts
LNGA 2.5	Long Arm Creek, Bandanna, PA	1	Monitor for potential water quality impacts
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
SBCC 20.4	South Branch Conewago Creek, Bandanna, PA	2	Monitor for potential water quality impacts
SCTT 3.0	Scott Creek, Delta, PA	1	Historical pollution due to untreated sewage
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

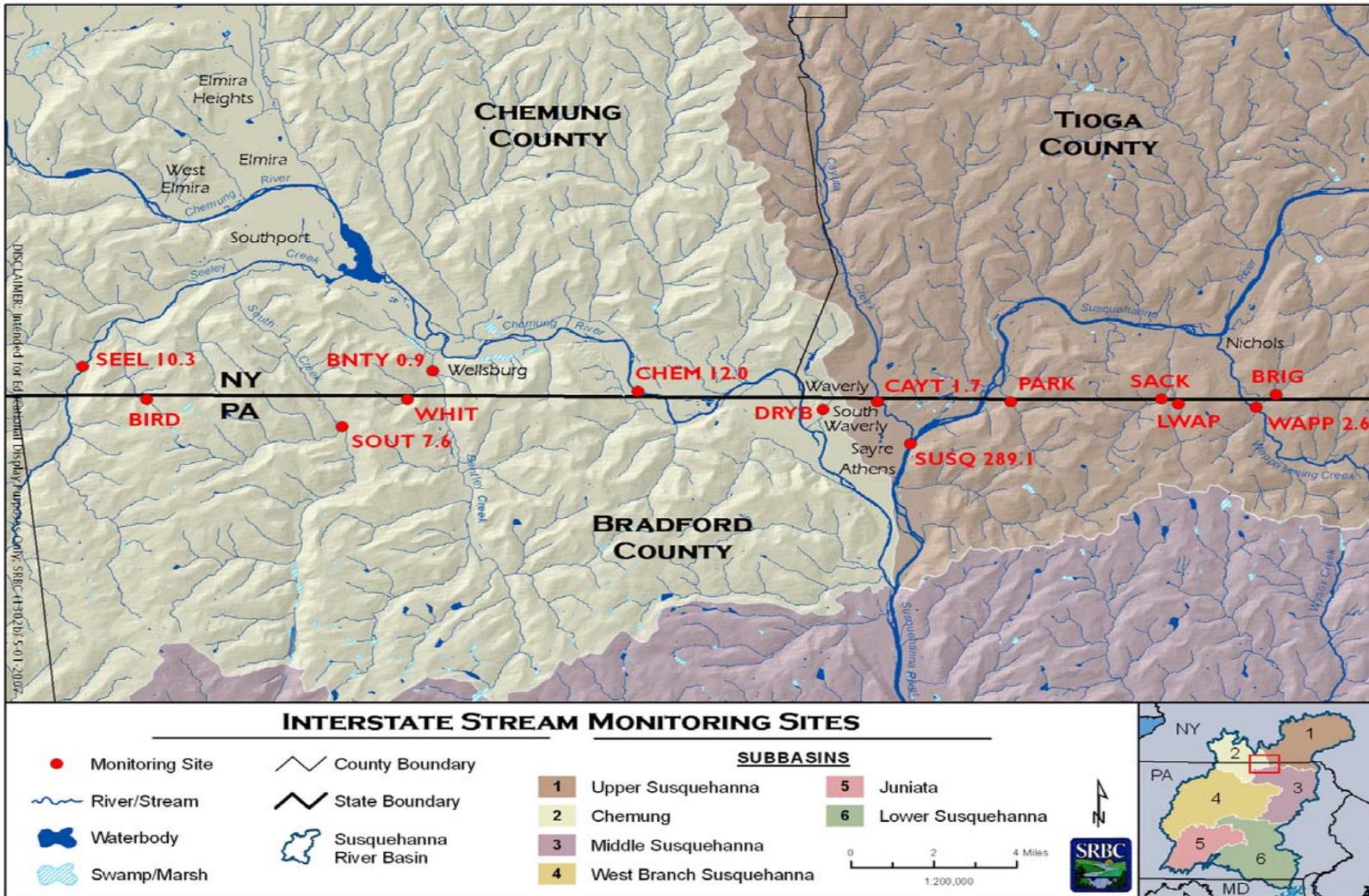
*denotes no macros were collected



Map of New York-Pennsylvania Interstate Streams (western section)



Map of New York-Pennsylvania Interstate Streams (eastern section)



Map of New York-Pennsylvania Interstate Streams (central section)

Criteria Used to Evaluate Physical Habitat

Habitat Parameter	OPTIMAL (20-16)	SUBOPTIMAL (15-11)	MARGINAL (10-6)	POOR (5-0)
1. Epifaunal Substrate (R/R)¹	Well-developed riffle/run; riffle is as wide as stream and length extends 2 times the width of stream; abundance of cobble.	Riffle is as wide as stream but length is less than 2 times width; abundance of cobble; boulders and gravel common.	Run area may be lacking; riffle not as wide as stream and its length is less than 2 times the width; some cobble present.	Riffle or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.
1. Epifaunal Substrate (G/P)²	Preferred benthic substrate abundant throughout stream site and at stage to allow full colonization (i.e. log/snags that are not new fall and not transient).	Substrate common but not prevalent or well suited for full colonization potential.	Substrate frequently disturbed or removed.	Substrate unstable or lacking.
2. Instream Cover (R/R)	> 50% mix of boulders, cobble, submerged logs, undercut banks or other stable habitat.	30-50% mix of boulder, cobble, or other stable habitat; adequate habitat.	10-30% mix of boulder, cobble, or other stable habitat; habitat availability less than desirable.	< 10% mix of boulder, cobble, or other stable habitat; lack of habitat is obvious.
2. Instream Cover (G/P)	> 50% mix of snags, submerged logs, undercut banks or other stable habitat; rubble, gravel may be present.	30-50% mix of stable habitat; adequate habitat for maintenance of populations.	10-30% mix of stable habitat; habitat availability less than desirable.	Less than 10% stable habitat; lack of habitat obvious.
3. Embeddedness^a (R/R)	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediments.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediments.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediments.	Gravel, cobble, and boulder particles are >75% surrounded by fine sediments.
3. Pool Substrate Characterization (G/P)	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
4. Velocity/Depth Regimes^b (R/R)	All 4 velocity/depth regimes present (slow/deep, slow/shallow, fast/deep, fast/shallow).	Only 3 of 4 regimes present (if fast/shallow is missing, score lower than if missing other regimes).	Only 2 of 4 regimes present (if fast/shallow or slow/shallow are missing, score low).	Dominated by 1 velocity/depth regime.
4. Pool Variability^c (G/P)	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.

Criteria Used to Evaluate Physical Habitat—Continued

Habitat Parameter	OPTIMAL (20-16)	SUBOPTIMAL (15-11)	MARGINAL (10-6)	POOR (5-0)
5. Sediment Deposition (R/R)	Little or no enlargement of islands or point bars and <5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from coarse gravel; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, coarse sand on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; >50% of the bottom changing frequently; pools almost absent due to sediment deposition.
5. Sediment Deposition (G/P)	Less than 20% of bottom affected; minor accumulation of fine and coarse material at snags and submerged vegetation; little or no enlargement of island of point bars.	20-50% affected; moderate accumulation; substantial sediment movement only during major storm event; some new increase in bar formation.	50-80% affected; major deposition; pools shallow, heavily silted; embankments may be present on both banks; frequent and substantial movement during storm events.	Channelized; mud, silt, and/or sand in braided or non-braided channels; pools almost absent due to substantial sediment deposition.
6. Channel Flow Status (R/R) (G/P)	Water reaches base of both lower banks and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate exposed.	Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
7. Channel Alteration^d (R/R) (G/P)	No channelization or dredging present.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization (>20 yr) may be present, but not recent.	New embankments present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; >80% of the reach channelized and disrupted.
8. Frequency of Riffles (R/R)	Occurrence of riffles relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream equals 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the stream width is between 15-25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is >25.
8. Channel Sinuosity (G/P)	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bend in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long time.
9. Condition of Banks^e (R/R) (G/P)	Banks stable; no evidence of erosion or bank failure, little potential for future problems; <5% of bank affected; on Glide/Pool streams side slopes generally <30%.	Moderately stable; infrequent, small areas of erosion mostly healed over; 5-30% of bank in reach has areas of erosion; on Glide/Pool streams side slopes up to 40% on one bank; slight erosion potential in extreme floods.	Moderately unstable, 30-60% of banks in reach have areas of erosion; high erosion potential during floods; on Glide/Pool streams side slopes up to 60% on some banks.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; on side slopes, 60-100% of bank has erosional scars; on Glide/Pool streams side slopes > 60% common.
(score each bank 0-10)	(9-10)	(6-8)	(3-5)	(0-2)

Criteria Used to Evaluate Physical Habitat—Continued

Habitat Parameter	OPTIMAL (20-16)	SUBOPTIMAL (15-11)	MARGINAL (10-6)	POOR (5-0)
10. Vegetative Protective Cover (R/R) (G/P) (score each bank 0-10)	>90% of the streambank surfaces covered by vegetation; vegetative disruption through grazing or mowing minimal. (9-10)	70-90% of the streambank surfaces covered by vegetation; disruption evident but not affecting full plant growth potential to any great extent. (6-8)	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation. (3-5)	<50% of the streambank surfaces covered by vegetation; disruption is very high; vegetation removed to 5 cm or less. (0-2)
11. Riparian Vegetative Zone Width (R/R) (G/P) (score each bank 0-10)	Width of riparian zone >18 meters; human activities (i.e. parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone. (9-10)	Width or riparian zone 12-18 meters; human activities have impacted zone only minimally. (6-8)	Width of riparian zone 6-12 meters; human activities have impacted zone only minimally. (3-5)	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities. (0-2)

¹R/R – Riffle/Run

Habitat assessment parameters used for streams characterized by riffles and runs.

²G/P – Glide/Pool

Habitat assessment parameters used for streams characterized by glides and pools.

^a Embeddedness

The degree to which the substrate materials that serve as habitat for benthic macroinvertebrates and for fish spawning and egg incubation (predominantly cobble and/or gravel) are surrounded by fine sediment. Embeddedness is evaluated with respect to the suitability of these substrate materials as habitat for macroinvertebrates and fish by providing shelter from the current and predators and by providing egg deposition and incubation sites.

^b Velocity/Depth Regimes

The general guidelines are 0.5 m depth to separate shallow from deep, and 0.3 m/sec to separate fast from slow.

^c Pool Variability

Rated based on the variety and spatial complexity of slow- or still-water habitat within the sample segment. It should be noted that even in high-gradient segments, functionally important slow-water habitat may exist in the form of plunge-pools and/or larger eddies. General guidelines are any pool dimension (i.e., length, width, oblique) greater than half the cross-section of the stream for separating large from small and 1 m depth separating shallow and deep.

^d Channel Alteration

A measure of large-scale changes in the shape of the stream channel. Channel alteration includes: concrete channels, artificial embankments, obvious straightening of the natural channel, rip-rap, or other structures.

^e Condition of Banks

Steep banks are more likely to collapse and suffer from erosion than are gently sloping banks and are therefore considered to be unstable. Left and right bank orientation is determined by facing downstream.

Source: Modified from Barbour and others, 1999.

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 200 organism subsample. Number decreases with increasing stress.
2. Shannon Diversity Index (b)	A measure of biological community complexity based on the number of equally or nearly equally abundant taxa in the community. Index value decreases with increasing stress.
3. Modified Hilsenhoff Biotic Index (a)	A measure of the organic pollution tolerance of a benthic macroinvertebrate community. Index value increases with increasing stress.
4. EPT Index (a)	The total number of Ephemeroptera (mayfly), Plecoptera (stonefly), and Trichoptera (caddisfly) taxa present in the 200 organism subsample. Number decreases with increasing stress.
5. Percent Ephemeroptera (a)	The percentage of Ephemeroptera in the 200 organism subsample. Ratio decreases with increasing stress.
6. Percent Dominant Taxa (a)	Percentage of the taxon with the largest number of individuals out of the total number of macroinvertebrates in the sample. Percentage increases with increasing stress.
7. Percent Chironomidae (a)	The percentage of Chironomidae in a 200 organism subsample. Ratio increases with increasing stress.

Sources: (a) Barbour and others, 1999 (b) Klemm and others, 1990

Summary of Criteria Used to Classify the Biological Conditions of Sample Sites

SAMPLING AND ANALYSIS



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. Percent Ephemeroptera (c)	>25 %	10 – 25 %	1 – 9 %	<1 %
6. Percent Chironomidae (c)	<5 %	5 – 20 %	21 – 35 %	>36 %
7. Percent Dominant Taxa (c)	<20 %	20 – 30 %	31 – 40 %	>40 %
Total Biological Score (d)				



BIOASSESSMENT	
Percent Comparability of Study and Reference Site Total Biological Scores (e)	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) Scoring criteria evaluate actual percent contribution, not percent comparability to the reference station.
- (d) Total Biological Score = the sum of Biological Condition Scores assigned to each metric.
- (e) Values obtained that are intermediate to the indicated ranges will require subjective judgment as to the correct placement into a biological condition category.

Summary of Criteria Used to Classify the Habitat Conditions of Sample Sites

DETERMINATION OF HABITAT ASSESSMENT SCORES				
Parameter	Habitat Parameter Scoring Criteria			
	Excellent	Good	Fair	Poor
Epifaunal Substrate	20-16	15-11	10-6	5-0
Instream Cover	20-16	15-11	10-6	5-0
Embeddedness/Pool Substrate	20-16	15-11	10-6	5-0
Velocity/Depth Regimes/Pool Variability	20-16	15-11	10-6	5-0
Sediment Deposition	20-16	15-11	10-6	5-0
Channel Flow Status	20-16	15-11	10-6	5-0
Channel Alteration	20-16	15-11	10-6	5-0
Frequency of Riffles/Channel Sinuosity	20-16	15-11	10-6	5-0
Condition of Banks (a)	20-16	15-11	10-6	5-0
Vegetative Protective Cover (a)	20-16	15-11	10-6	5-0
Riparian Vegetative Zone Width (a)	20-16	15-11	10-6	5-0
Habitat Assessment Score (b)				



HABITAT ASSESSMENT	
Percent Comparability of Study and Reference Site Habitat Assessment Scores	Habitat Condition Category
>90	Excellent (comparable to reference)
89-75	Supporting
74-60	Partially Supporting
<60	Nonsupporting

- (a) Combined score of each bank
- (b) Habitat Assessment Score = Sum of Habitat Parameter Scores

RESULTS

Sites that represent the best available suite of conditions, in terms of biological community, water quality, and habitat for each group of stream sites are designated as reference sites. All other locations within that grouping are compared to the reference site. The reference sites for 2006-2007 are Cayuta Creek (CAYT 1.7), Susquehanna River at Kirkwood (SUSQ 340), Deer Creek, and Deep Hollow Brook. Sites located on the New York-Pennsylvania border were compared to Cayuta Creek at Waverly, N.Y. Cayuta Creek represented the best combination of biological, water quality, and habitat conditions in the Northern Appalachian Plateau and Uplands Ecoregion. River sites in New York, Pennsylvania, and Maryland were all compared to the conditions at the Susquehanna River at river mile 340. SUSQ 340 represented the best combination of conditions of the seven river sites sampled.

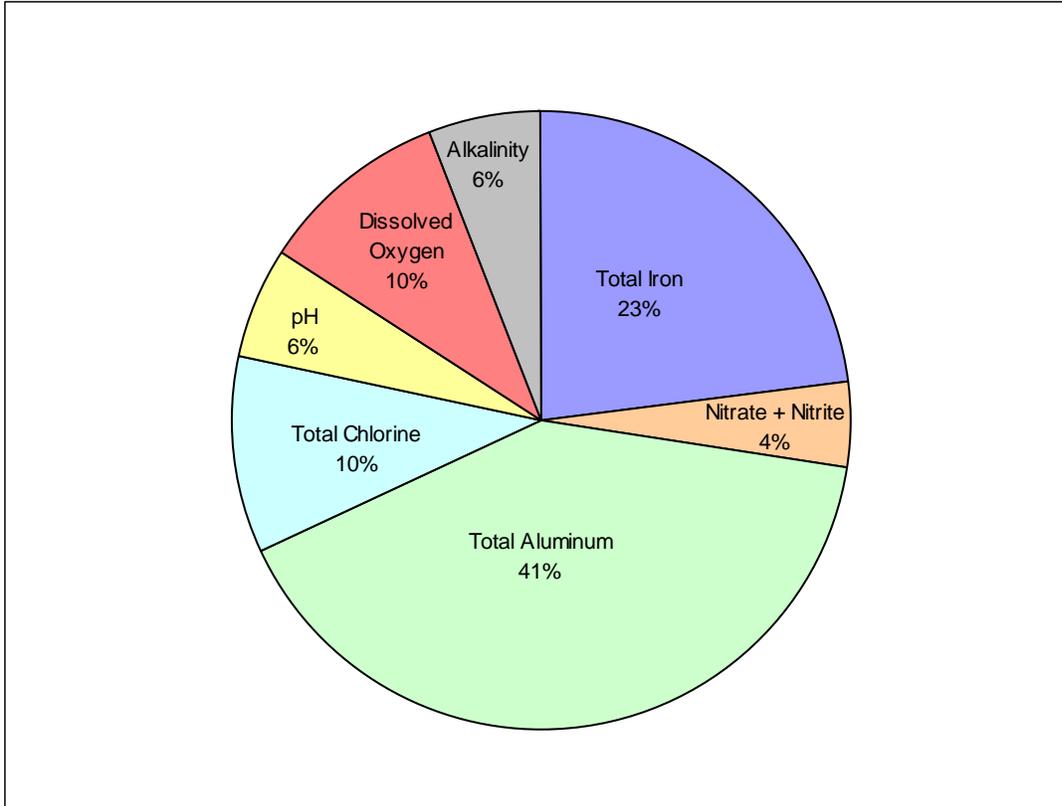
Deer Creek (DEER 44.2) near Fawn Grove, Pa., served as the reference site for sampling stations located on the Pennsylvania-Maryland border. DEER 44.2 had the best combination of biological, water quality, and habitat conditions in the Northern Piedmont Ecoregion (Omernik, 1987). Deep Hollow Brook (DEEP) near Danville, N.Y., served as the reference site for Group 3 sites, as it had the best biological, habitat, and field chemistry conditions of these sites. This was the third consecutive year that DEEP represented the best of the Group 3 sites.

Water Quality

During FY-07, water quality in approximately 30 percent of the Group 1 and Group 2 interstate streams continued to meet designated use classes and water quality standards. This is an improvement from last year's results. Twenty out of the 29 sites had parameters exceeding water quality standards, with 13 of those having more than one violation. The parameter that most frequently exceeded water quality standards was total aluminum again in 2007. Sixty-nine out of a possible 733 observations (based on the number of applicable water quality standards of each state) exceeded water quality standards.

Water Quality Standard Summary

Parameter	Standard	Standard Value	Number of Observations	Number Exceeding Standards
Alkalinity	Pa. aquatic life	20 mg/l	92	4
Total Iron	N.Y. aquatic (chronic)	300 µg/l	58	14
	Pa. aquatic life	1500 µg/l	93	2
Total Aluminum	N.Y. aquatic (chronic)	100 µg/l	58	28
Total Chlorine	N.Y. aquatic (acute)	0.019 mg/l	4	4
	Md. aquatic life	0.019 mg/l	4	3
Nitrite plus Nitrate	Pa. public water supply	10 mg/l	92	3
Dissolved Oxygen	Pa. aquatic life	5.0 mg/l	85	7
pH	N.Y. general	6.5-8.5	58	4



Parameters Exceeding Water Quality Standards

Macroinvertebrates

Fourteen (29 percent) of the 48 interstate streams sites at which macroinvertebrate samples were collected contained nonimpaired biological communities. Biological conditions at another 22 sites (46 percent) were slightly impaired, while ten sites (21 percent) were moderately impaired. This year, two sites (4 percent) were designated severely impaired. This is the first time in a few years that there have been any severely impaired sites. Five sites (SUSQ 10.0, SUSQ 44.5, TROW 1.8, SNAK 2.4, and LWAP) were not sampled using RBP III techniques due to either dry conditions or deep waters and thus, were not averaged into the final scores.

Habitat Assessment

Twenty-two (46 percent) sites had excellent habitats. Nineteen sites (40 percent) had supporting habitats, and seven sites (14 percent) were designated as having partially supporting habitats.

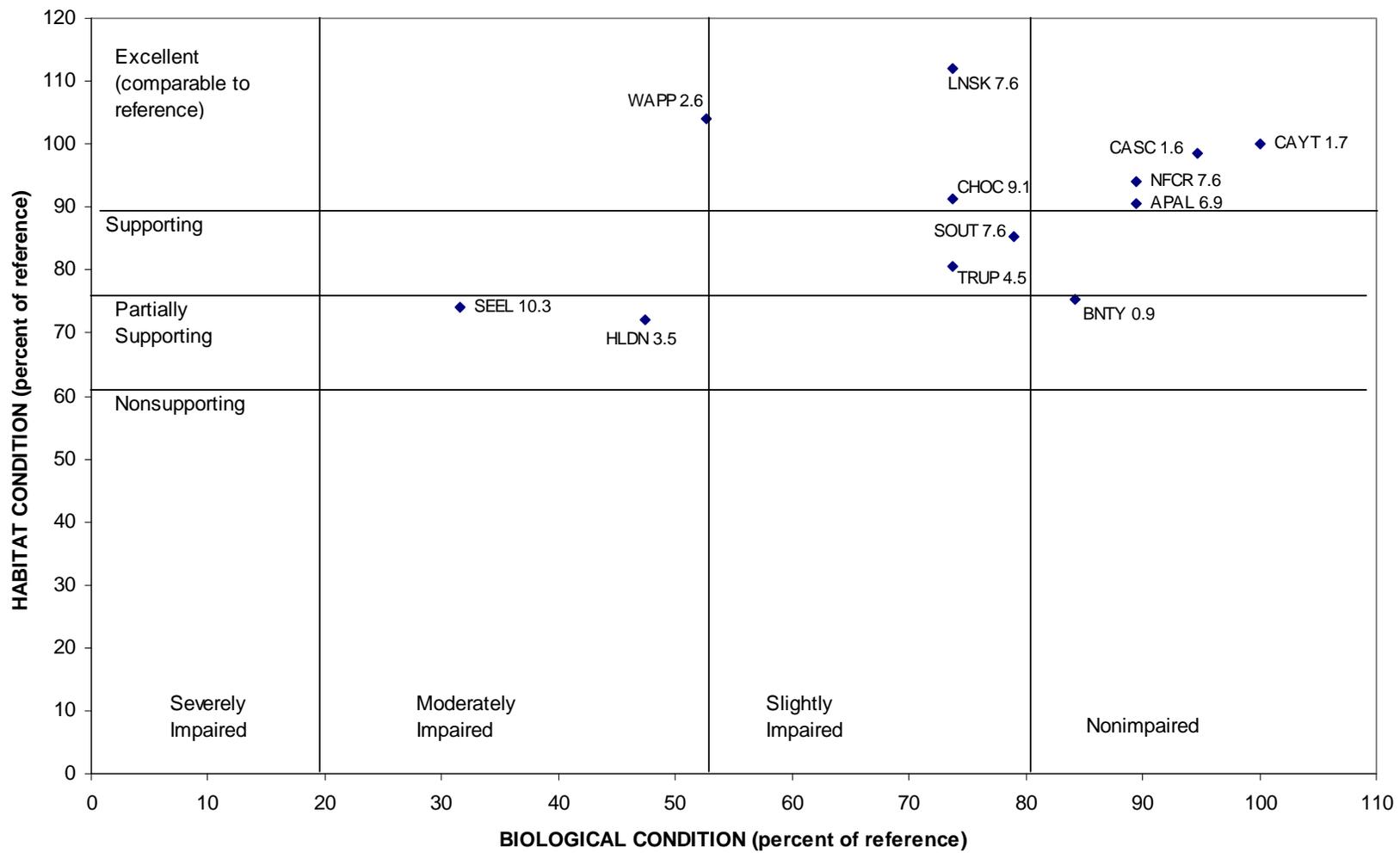
Results for New York-Pennsylvania Streams

Sites that represent the best available suite of conditions, in terms of biological community, water quality, and habitat for each group of stream sites are designated as reference sites. All other locations within that grouping are compared to the reference site. The reference sites for 2006-2007 are Cayuta Creek (CAYT 1.7), Susquehanna River 340, Deer Creek, and Deep Hollow Brook. Sites located on the New York-Pennsylvania border were compared to Cayuta Creek, Waverly, N.Y. CAYT 1.7 represented the best combination of biological, water quality, and habitat conditions in the Northern Appalachian Plateau and Uplands Ecoregion.

New York-Pennsylvania sampling stations consisted of 14 sites located near or on the New York-Pennsylvania border. During the summer sampling event, two of these streams were not sampled due to dredging at one site and a washed out bridge at the other. At these sites, Trowbridge Creek and Snake Creek, no samples of any kind were taken for FY-07. Of the remaining 12 sites, the biological community of five (42 percent) of these streams was nonimpaired. Four stream sites were slightly impaired (33 percent) and three sites (33 percent) were designated as moderately impaired. Seven of the New York-Pennsylvania sites had excellent habitats (58 percent), while three sites (25 percent) had supporting habitats. The remaining two sites ranked as partially supporting habitat. Seeley Creek and Holden Creek were the two streams that fell into the partially supporting category, due to poor scores for sediment deposition, channel flow status, and conditions of banks. The most common habitat concern among the New York-Pennsylvania streams in general is lack of riparian buffer zone along the stream banks. Water quality in the New York-Pennsylvania sites was generally good, with aluminum standards being exceeded most often. However, throughout the 20 years of interstate stream sampling, aluminum has always been elevated over the 100 µg/l standard in many border streams, and it may be a natural condition resulting from the local geology.

The reference site for the New York-Pennsylvania border streams was Cayuta Creek at Waverly, N.Y. This site had the best combination of water quality, biological community, and physical habitat of all the New York-Pennsylvania sites. The rankings for the other New York-Pennsylvania border sites are compared to the conditions in Cayuta Creek. Water quality in Cayuta Creek was good overall. There were chlorine exceedances, likely due to the proximity of the site to the Waverly, N.Y. treatment plant discharge. The macroinvertebrate community at South Creek showed high rankings for taxonomic richness, EPT Index, percent Ephemeroptera, and percent Chironomidae. In the habitat assessment for CAYT 1.7, epifaunal substrate, instream cover, embeddedness, channel flow status, and frequency of riffles were all rated in the optimal range.

The chart below summarizes the biological and habitat data for the New York-Pennsylvania streams.



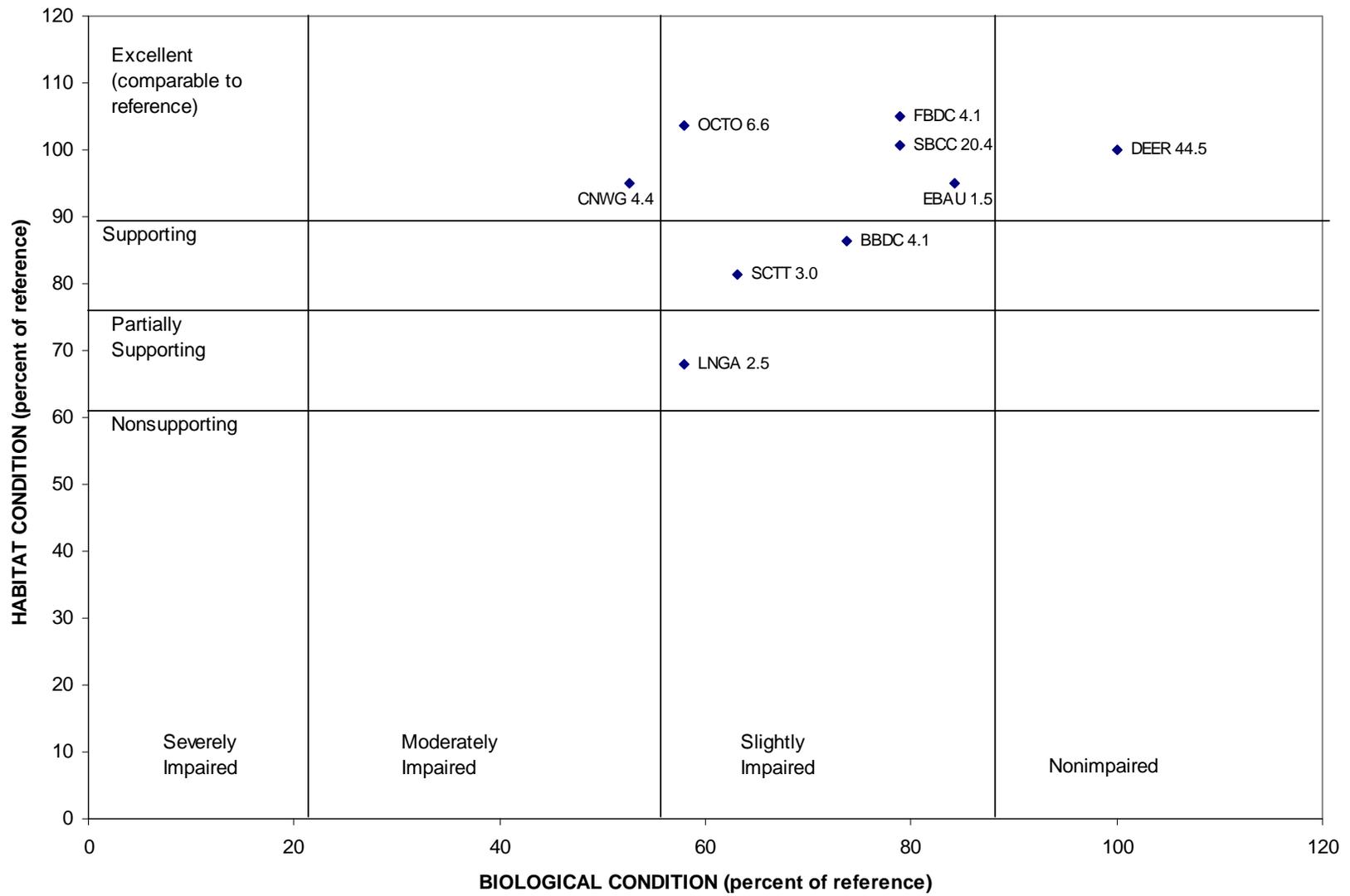
Results for Pennsylvania-Maryland Streams

Sites that represent the best available suite of conditions, in terms of biological community, water quality, and habitat for each group of stream sites are designated as reference sites. All other locations within that grouping are compared to the reference site. The reference sites for 2006-2007 are Cayuta Creek (CAYT 1.7), Susquehanna River 340, Deer Creek, and Deep Hollow Brook. Deer Creek (DEER 44.2) near Gorsuch Mills, Md., served as the reference site for sampling stations located on the Pennsylvania-Maryland border. DEER 44.2 had the best combination of biological, water quality, and habitat conditions in the Northern Piedmont Ecoregion (Omernik, 1987).

The Pennsylvania-Maryland interstate streams include nine stations located on or near the Pennsylvania-Maryland border. During FY-07, two streams (22 percent) were designated nonimpaired, using RBP III protocol designations. Six sites (67 percent) were slightly impaired, and one site (11 percent) was moderately impaired. No sites were ranked as severely impaired. Six (67 percent) of the Pennsylvania-Maryland border sites had excellent habitats, while two sites (22 percent) had supporting habitats. The remaining site, Long Arm Creek, was designated as having partially supporting habitat conditions. The most common habitat concern at the Pennsylvania-Maryland sites was the lack of a riparian buffer zone.

The reference site for the Pennsylvania-Maryland border streams was Deer Creek at Gorsuch Mills, Md. This site had the best combination of water quality, biological community, and physical habitat of all the Pennsylvania-Maryland sites. The rankings for the other Pennsylvania-Maryland border sites are compared to the conditions at Deer Creek. The macroinvertebrate community at Deer Creek showed highest rankings for taxonomic richness, Shannon Diversity Index, EPT Index, and percent dominant taxa. In the habitat assessment for DEER 44.2, epifaunal substrate, instream cover, and velocity/depth regimes were all rated in the optimal range.

The chart below summarizes the biological and habitat data for the Pennsylvania-Maryland streams.



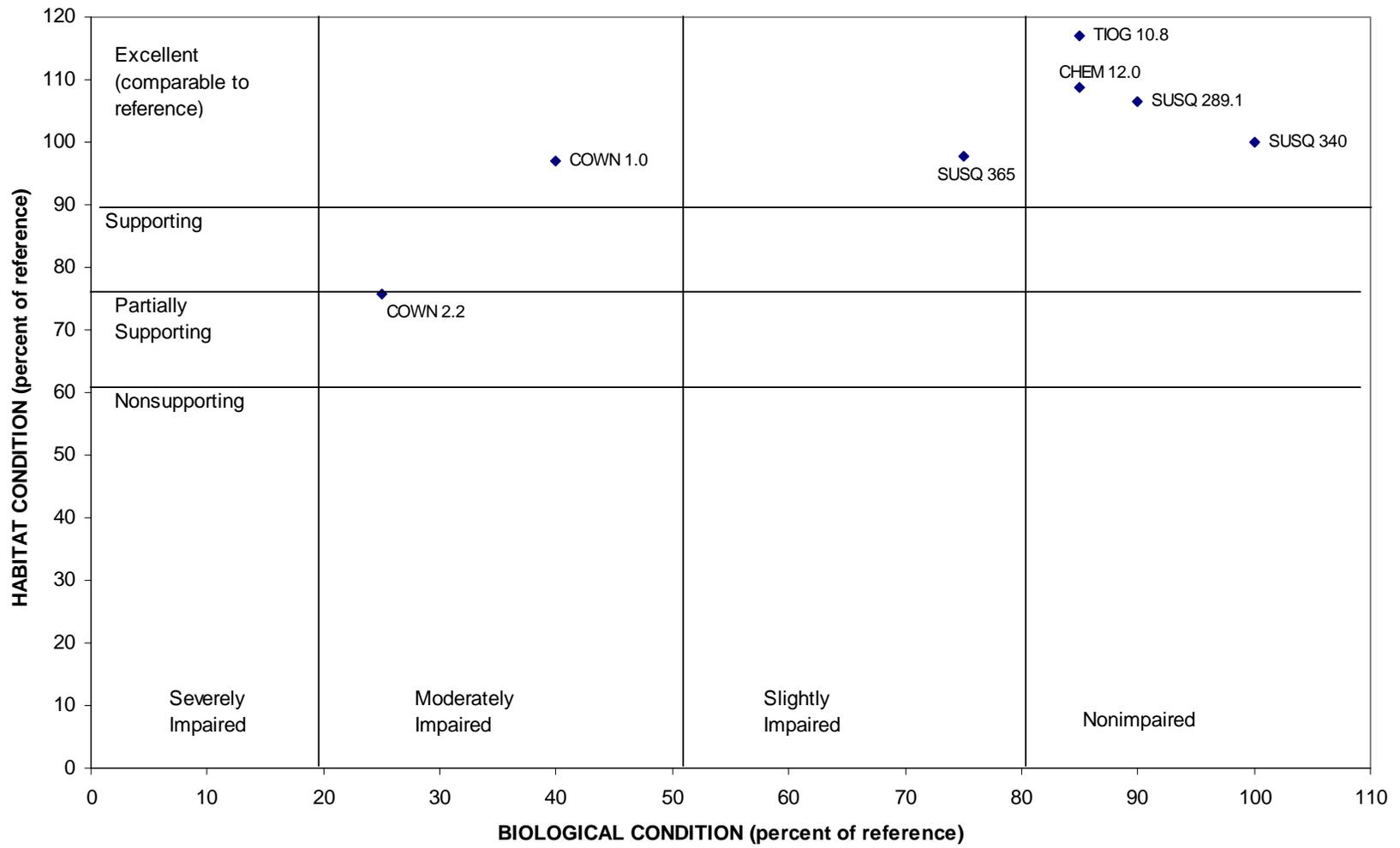
Results for River Sites

Sites that represent the best available suite of conditions, in terms of biological community, water quality, and habitat for each group of stream sites are designated as reference sites. All other locations within that grouping are compared to the reference site. The reference sites for 2006-2007 are Cayuta Creek (CAYT 1.7), Susquehanna River 340 (SUSQ 340), Deer Creek, and Deep Hollow Brook. River sites in New York, Pennsylvania, and Maryland were all compared to the conditions at the Susquehanna River at river mile 340, which is located in Kirkwood, N.Y. SUSQ 340 represented the best combination of conditions of the seven river sites sampled.

The river sites consisted of nine stations located on the Susquehanna, Chemung, Cowanesque, and Tioga Rivers. Two stations (SUSQ 10.0 and SUSQ 44.5) were not sampled for macroinvertebrates due to deep water and a lack of riffle habitat at the sites. Of the seven river sites that were sampled during FY-07, the biological community at four (57 percent) of these sites was nonimpaired. One site (14 percent) had slightly impaired biological conditions, and two sites (29 percent) were ranked as moderately impaired. Both sites on the Cowanesque River were moderately impaired and accounted for the lowest scores in each of the six biological metrics. The habitat at six (86 percent) of the river sites was excellent, and the other site (14 percent) rated as having supporting habitat. The most common habitat concern along the river sites is lack of riparian buffer.

The reference site for all of the interstate river sites was SUSQ 340. This site had the best combination of water quality, biological conditions, and physical habitat of all the sampled river sites. The rankings for the other river sites are compared to the conditions at SUSQ 340. The macroinvertebrate community at SUSQ 340 was at the top of all river sites in scores for Hilsenhoff Biotic Index, EPT Index, and percent Ephemeroptera. In the habitat assessment for SUSQ 340, epifaunal substrate, instream cover, and channel flow status were all rated in the optimal range.

The chart below summarizes the biological and habitat data for the river sites.



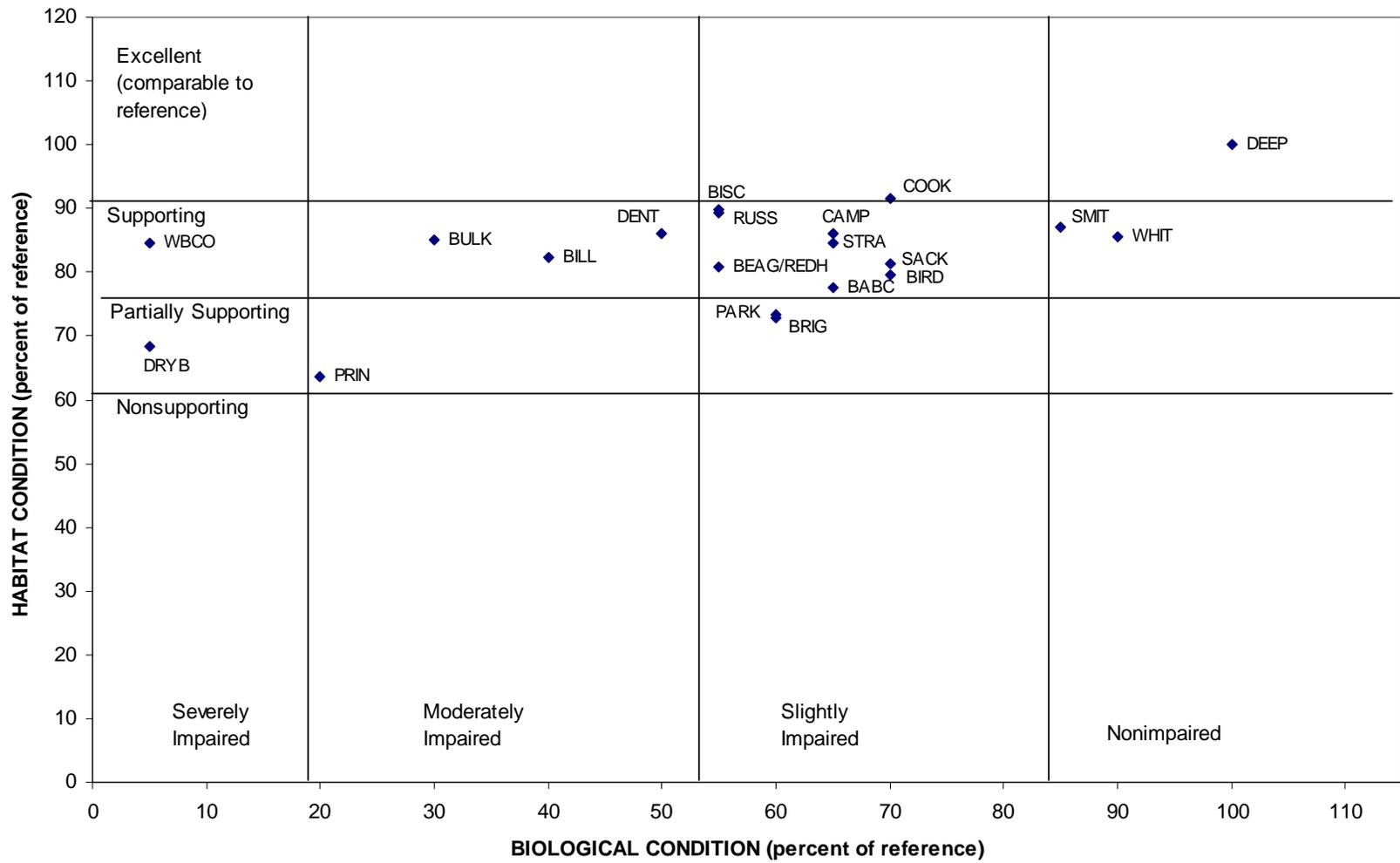
Results for Group 3 Sites

Sites that represent the best available suite of conditions, in terms of biological community, water quality, and habitat for each group of stream sites are designated as reference sites. All other locations within that grouping are compared to the reference site. The reference sites for 2006-2007 are Cayuta Creek, Susquehanna River 340, Deer Creek, and Deep Hollow Brook. Sites located on the New York-Pennsylvania border were compared to Cayuta Creek at Waverly, N.Y. Deep Hollow Brook (DEEP) near Danville, N.Y., served as the reference site for Group 3 sites, as it had the best biological, habitat, and field chemistry conditions of these sites.

Group 3 sampling stations consisted of 20 sites on small streams located along the New York-Pennsylvania border. Little Wappasening Creek is also normally sampled but was dry during 2007 sampling. Three of the 20 sites sampled (15 percent) had nonimpaired biological conditions. Eleven sites (55 percent) were slightly impaired, and four sites (20 percent) were moderately impaired. The remaining two sites (10 percent) were considered severely impaired as they had very poor biological conditions. These sites were Dry Brook and West Branch Cowanesque River. Three (15 percent) of the Group 3 sites had excellent habitat scores. Thirteen sites (65 percent) had supporting habitat conditions, while four sites (20 percent) were designated partially supporting, and no sites were nonsupporting.

The reference site for the Group 3 streams was Deep Hollow Brook at Danville, N.Y. This site had the best combination of biological community and physical habitat of all the Group 3 sites. This was the third consecutive year that DEEP represented the best of the Group 3 sites. The rankings for the other Group 3 sites are compared to the conditions at Deep Hollow Brook. The macroinvertebrate community at DEEP showed the highest scores for taxonomic richness, Shannon Diversity Index, EPT Index, and percent dominant taxa. In the 2007 habitat assessment for Deep Hollow Brook, epifaunal substrate, instream cover, embeddedness, channel alteration, frequency of riffles, vegetative protective cover, and riparian vegetative zone were all rated as optimal.

The chart below summarizes the biological and habitat data for the Group 3 streams.



BIOASSESSMENT OF INTERSTATE STREAMS

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 biological and habitat data also are provided, along with graphs depicting historical water quality and biological conditions over the past five years. A white bar indicates fiscal year 2005 WQI scores, and black bars in all WQI graphs indicate previous WQI scores. Abbreviations for water quality standards are provided below.

Abbreviation	Parameter	Abbreviation	Parameter
ALK	Alkalinity	TNO3	Total Nitrate
COND	Conductivity	TN	Total Nitrogen
TAI	Total Aluminum	DO	Dissolved Oxygen
TCa	Total Calcium	TP	Total Phosphorus
TCI	Total Chloride	TPO4	Total Orthophosphate
TFe	Total Iron	TS	Total Solids
TMg	Total Magnesium	TSO4	Total Sulfate
TMn	Total Manganese	TOC	Total Organic Carbon
TNH3	Total Ammonia	TURB	Turbidity
TNO2	Total Nitrite	WQI	Water Quality Index
TCl _n	Total Chlorine	RBP	Rapid Bioassessment Protocol
SS	Suspended Sediment	TEMP	Water Temperature

Site Results for New York-Pennsylvania Border Streams

Apalachin Creek at Little Meadows, Pa. (APAL 6.9)



Water Quality: Total aluminum and total iron exceeded water quality standards.

Biological Condition: Nonimpaired

Habitat Assessment: Excellent

Trends: Water quality, habitat conditions, and biological conditions all showed some improvement since last year at Apalachin Creek.

Other notes: Vegetative protective cover and riparian buffer zones are two areas that were identified by staff as marginal during the habitat assessment.

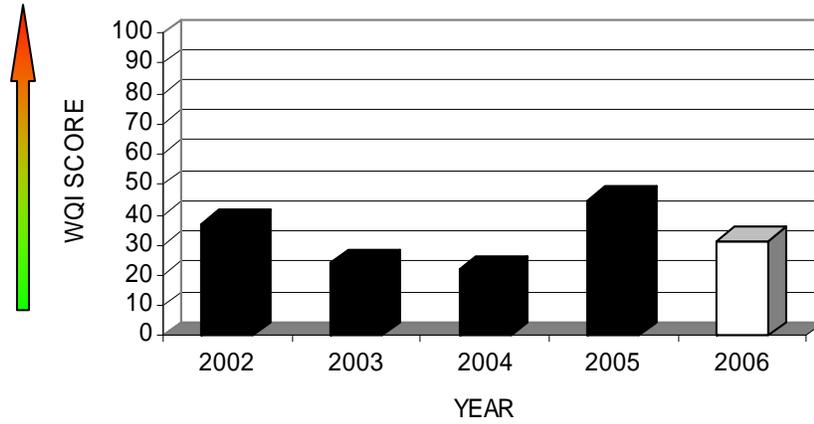
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
TFe	08/24/2006	309 ug/l	300 ug/l	N.Y. aquatic life (chronic)
TAl	08/24/2006	203 ug/l	100 ug/l	N.Y. aquatic life (chronic)

Date	WQI	Parameters Exceeding 90 th Percentile						
08/24/2006	31.2							

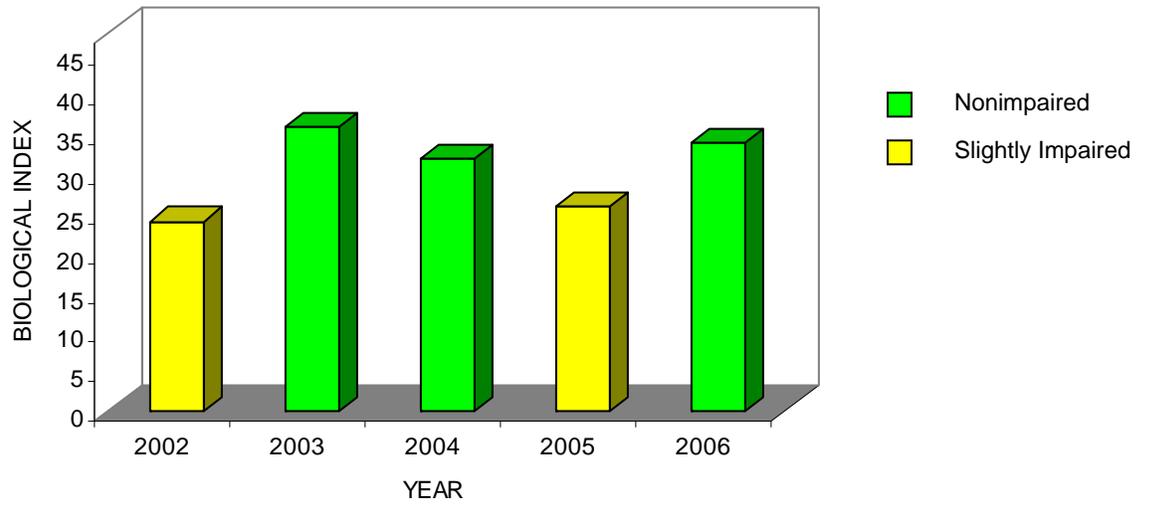
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	26
Diversity Index	2.57
Biological Score	34
Biological Condition	Nonimpaired
Total Habitat Score	136
Habitat Condition Category	Excellent

Water Quality Index



Biological Index



Bentley Creek at Wellsburg, N.Y. (BNTY 0.9)



Water Quality: No parameters exceeded water quality standards.

Biological Condition: Nonimpaired

Habitat Assessment: Supporting

Trends: Water quality showed improvement over last year, and biological conditions were upgraded from last year. Habitat ranking remained the same.

Other Notes: The Bradford County Conservation District in Pennsylvania and the U.S. Fish and Wildlife Service conducted a stream stabilization project on this stream. Rock structures, such as cross vanes and single rock vanes, have been constructed in portions of the stream to redirect the force of the flow. Staff noted poor bank conditions and inadequate riparian buffer width in the 2006 habitat assessment.

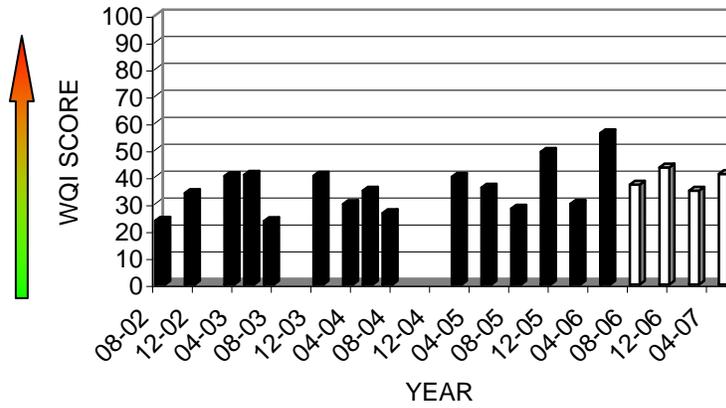
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
None				

Date	WQI	Parameters Exceeding 90 th Percentile						
08/15/2006	37.1	TEMP						
11/07/2006	43.5	DO	TEMP					
02/13/2007	34.9							
05/15/2007	41.1							

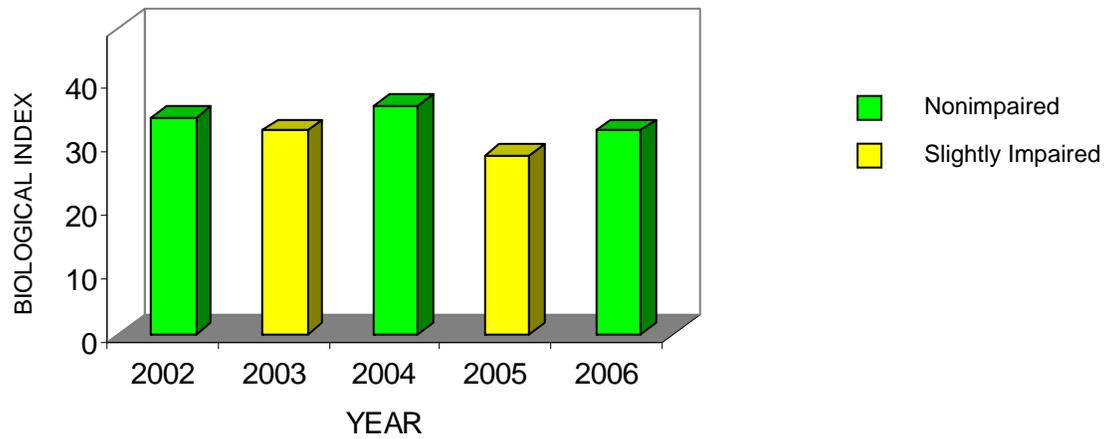
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	22
Diversity Index	2.18
RBP III Score	32
RBP III Condition	Nonimpaired
Total Habitat Score	113
Habitat Condition Category	Supporting

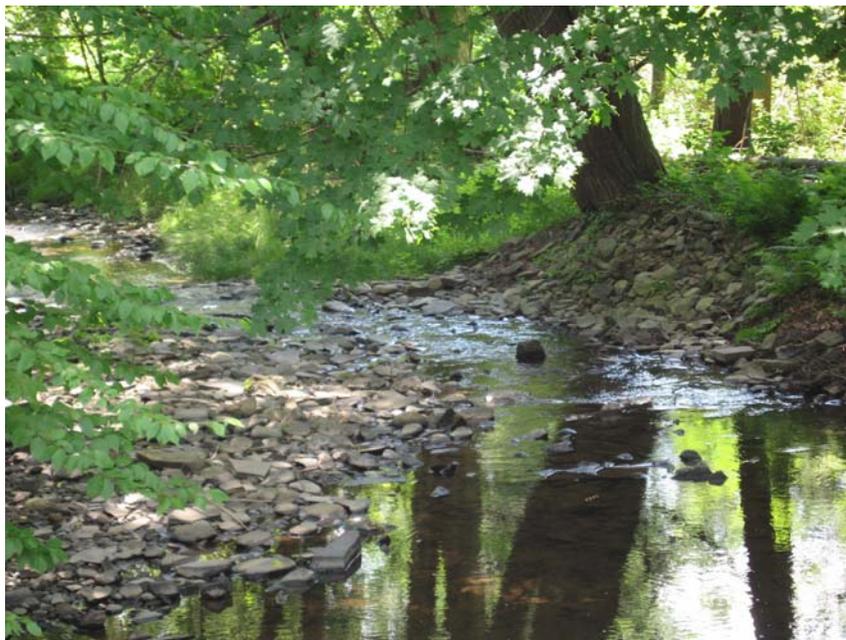
Water Quality Index



Biological Index



Cascade Creek at Lanesboro, Pa. (CASC 1.6)



Water Quality: Alkalinity, pH, total iron, and total aluminum all failed to meet water quality standards during FY-07.

Biological Condition: Nonimpaired

Habitat Assessment: Excellent

Trend: Water quality remained about the same as last year. Habitat and biological conditions were not assessed last year due to very low flows. However, both habitat and biology were ranked in the highest categories, as they have been in prior years.

Other Notes: Staff noted evidence of major flood event, with the stream substrate scoured out and considerable bed movement.

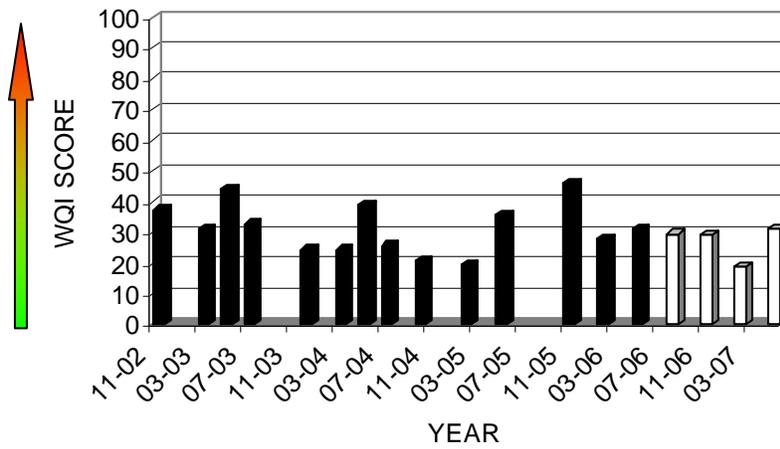
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
TFe	08/23/2006	409 ug/l	300 ug/l	N.Y. aquatic (chronic)
TAl	08/23/2006	204 ug/l	100 ug/l	N.Y. aquatic (chronic)
pH	08/23/2006	6.4	6.5-8.5	N.Y. general
pH	11/06/2006	6.1	6.5-8.5	N.Y. general
ALK	11/06/2006	12 ug/l	20 mg/l	Pa. aquatic life
ALK	02/12/2007	8 ug/l	20 mg/l	Pa. aquatic life
pH	02/12/2007	6.2	6.5-8.5	N.Y. general
pH	05/23/2006	6.4	6.5-8.5	N.Y. general
ALK	05/23/2007	14 ug/l	20 mg/l	Pa. aquatic life

Date	WQI	Parameters Exceeding 90 th Percentile						
08/23/2006	29.6	None						
11/06/2006	29.1	None						
02/12/2007	18.8	None						
05/23/2007	31.4	None						

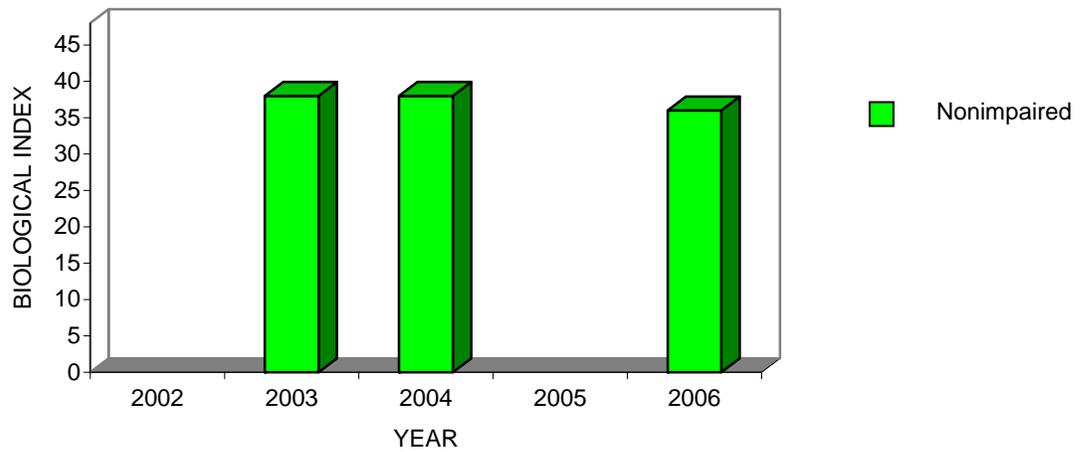
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	28
Diversity Index	2.52
RBP III Score	36
RBP III Condition	Nonimpaired
Total Habitat Score	148
Habitat Condition Category	Excellent

Water Quality Index



Biological Index



Cayuta Creek at Waverly, N.Y. (CAYT 1.7)



Water Quality: Total chlorine and total aluminum exceeded water quality standards.

Biological Condition: Reference (Nonimpaired)

Habitat Assessment: Reference (Excellent)

Trends: Water quality has remained consistent from last year. Biological conditions and habitat ranking continue to be at the highest level.

Other Notes: This site is downstream of wastewater discharges from the Waverly sewage treatment facility, which contributes to the standard exceedances for total chlorine. Cayuta Creek was used as a reference stream for the Pennsylvania-New York border sites for FY-07, as it had the best combination of conditions for biology, habitat, and water quality.

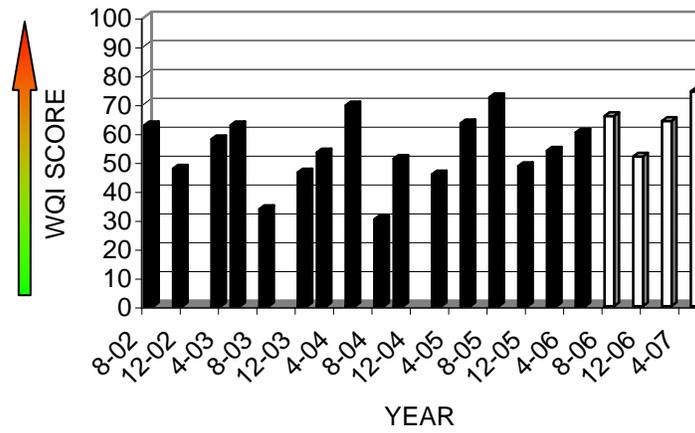
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
TCl _n	08/24/2006	0.03 mg/l	0.019 mg/l	N.Y. aquatic (acute)
TCl _n	11/06/2006	0.02 mg/l	0.019 mg/l	N.Y. aquatic (acute)
TAI	11/06/2006	222 ug/l	100 ug/l	N.Y. aquatic (chronic)
TCl _n	02/12/2007	0.04 mg/l	0.019 mg/l	N.Y. aquatic (acute)
TCl _n	05/15/2007	0.03 mg/l	0.019 mg/l	N.Y. aquatic (acute)

Date	WQI	Parameters Exceeding 90 th Percentile							
08/24/2006	65.8	TP	TNO3	TPO4					
11/06/2006	51.8								
02/12/2007	64.1	TP	TNO2	TPO4					
05/15/2007	74.3	TP	TNO2	TPO4	TCl	COND	TS		

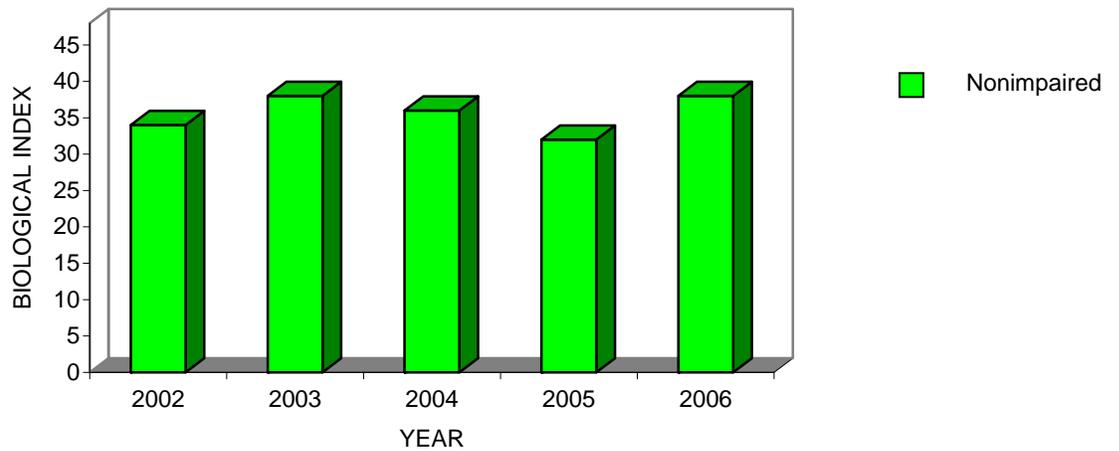
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	24
Diversity Index	2.36
RBP Score	38
RBP Condition	Reference
Total Habitat Score	150
Habitat Condition Category	Reference

Water Quality Index



Biological Index



Choconut Creek at Vestal Center, N.Y. (CHOC 9.1)



Water Quality: Total aluminum exceeded water quality standards.

Biological Condition: Slightly Impaired

Habitat Assessment: Excellent

Trends: Water quality and habitat showed some improvement over last year. Biological condition remained the same.

Other Notes: Staff noted lack of overhead cover and inadequate riparian buffer zone width.

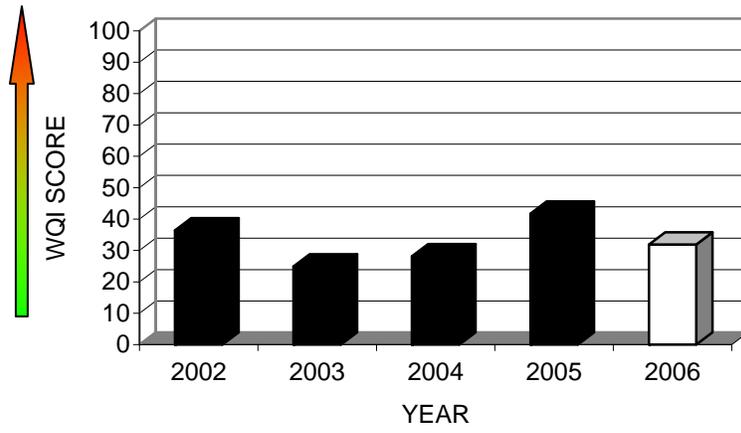
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
TAL	08/23/2006	252 ug/l	100 ug/l	N.Y. aquatic (chronic)

Date	WQI	Parameters Exceeding 90 th Percentile					
08/23/2006	31.9						

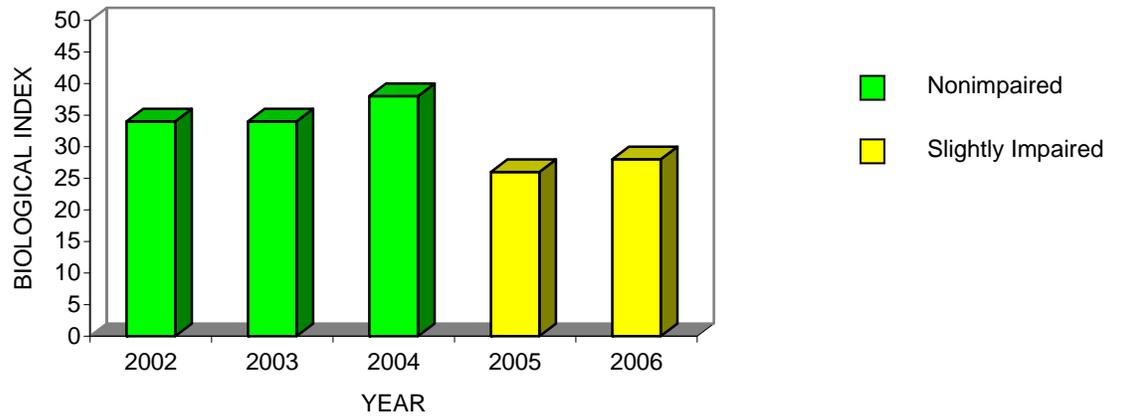
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	21
Diversity Index	2.29
RBP Score	28
RBP Condition	Slightly Impaired
Total Habitat Score	137
Habitat Condition Category	Excellent

Water Quality Index



Biological Index



Holden Creek at Woodhull, N.Y. (HLDN 3.5)

Water Quality: No parameters exceeded water quality standards.

Biological Condition: Moderately Impaired

Habitat Assessment: Partially Supporting

Trend: Holden Creek was mostly dry last year, so no sampling was conducted. This year, however, the biological condition is worse than it has been during the past five years.

Other Notes: Staff noted low flow conditions at this site as well as an obvious lack of macroinvertebrates. Staff also noted that a new bridge has been put in at this site.

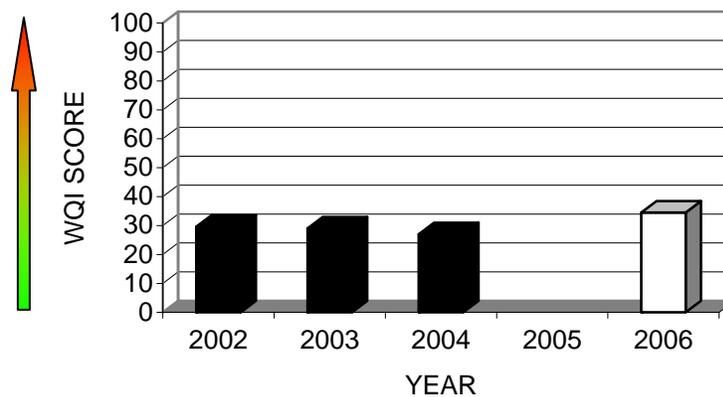
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
None				

Date	WQI	Parameters Exceeding 90 th Percentile						
08/14/2006	34.5							

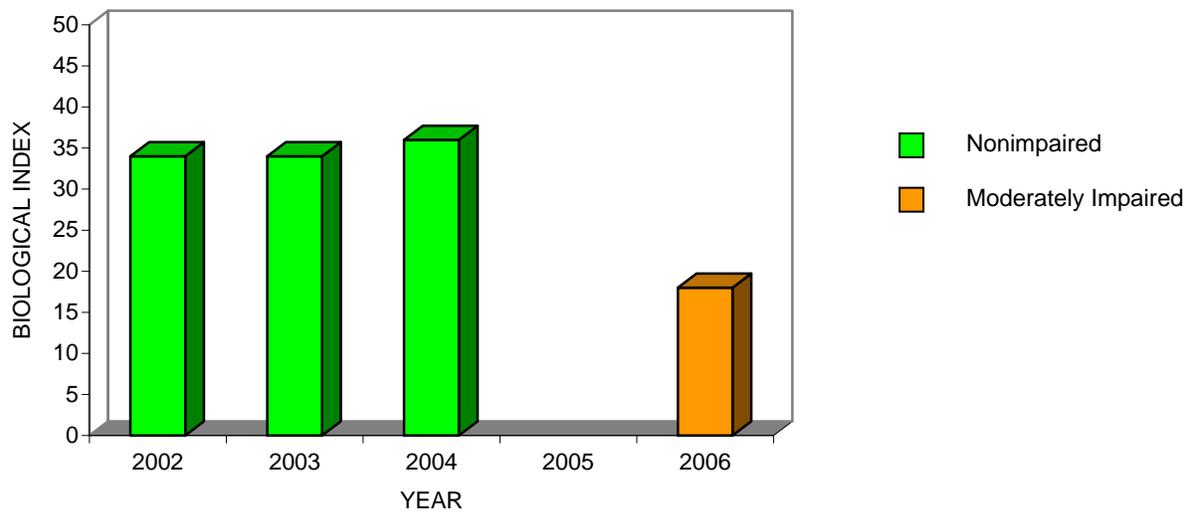
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	15
Diversity Index	1.58
RBP III Score	18
RBP III Condition	Moderately Impaired
Total Habitat Score	108
Habitat Condition Category	Partially Supporting

Water Quality Index



Biological Index



Little Snake Creek at Brackney, Pa. (LSNK 7.6)



Water Quality: Total iron exceeded water quality standards.

Biological Condition: Slightly Impaired

Habitat Assessment: Excellent

Trend: Water quality, biology, and habitat conditions have remained consistent over the past 5 years at Little Snake Creek.

Other Notes: Staff ranked epifaunal substrate and instream cover as optimal at this stream location.

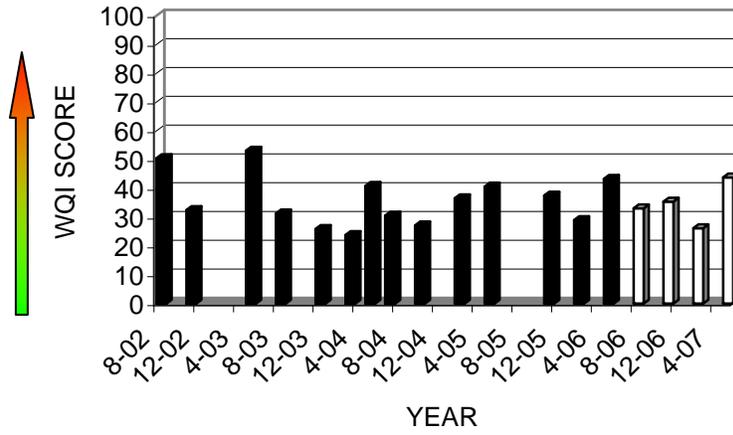
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
TFe	08/23/2006	465 ug/l	300 ug/l	N.Y. aquatic (chronic)

Date	WQI	Parameters Exceeding 90 th Percentile						
08/23/2006	33.1							
11/06/2006	35.4							
02/12/2007	26.2							
05/22/2007	43.8	DO						

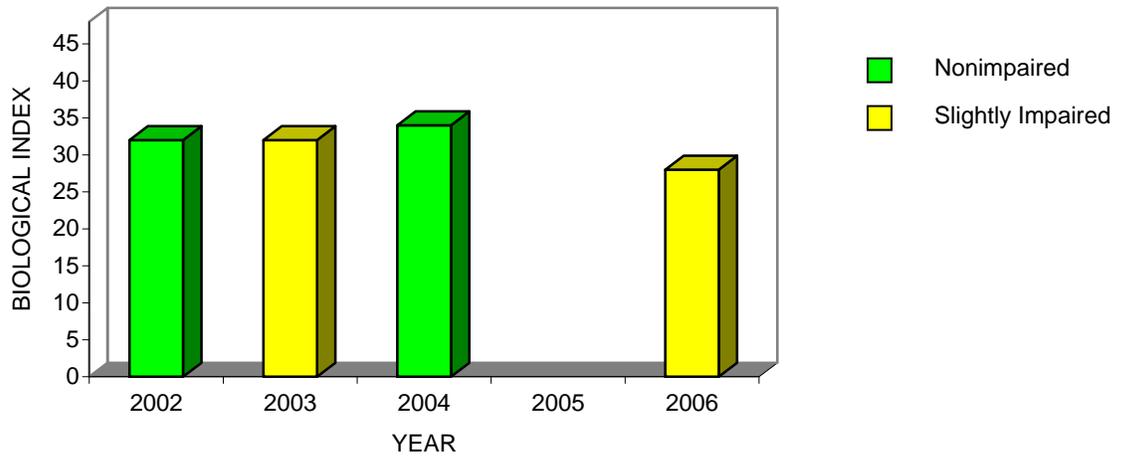
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	16
Diversity Index	2.36
RBP III Score	28
RBP III Condition	Slightly Impaired
Total Habitat Score	168
Habitat Condition Category	Excellent

Water Quality Index



Biological Index



North Fork Cowanesque River at North Fork, PA (NFCR 7.6)

Water Quality: Total aluminum exceeded water quality standards.

Biological Condition: Nonimpaired

Habitat Assessment: Excellent

Trend: Water quality, habitat, and biological conditions have remained fairly consistent over the past 5 years.

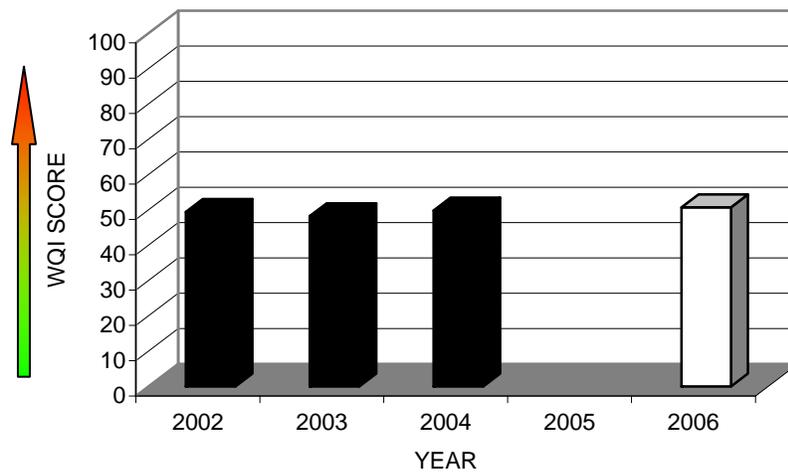
Other Notes: In the habitat assessment, staff noted that riparian vegetative zone was suboptimal, and channel flow status was marginal.

Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
TAI	08/14/2006	289 ug/l	100 ug/l	N.Y. aquatic (chronic)

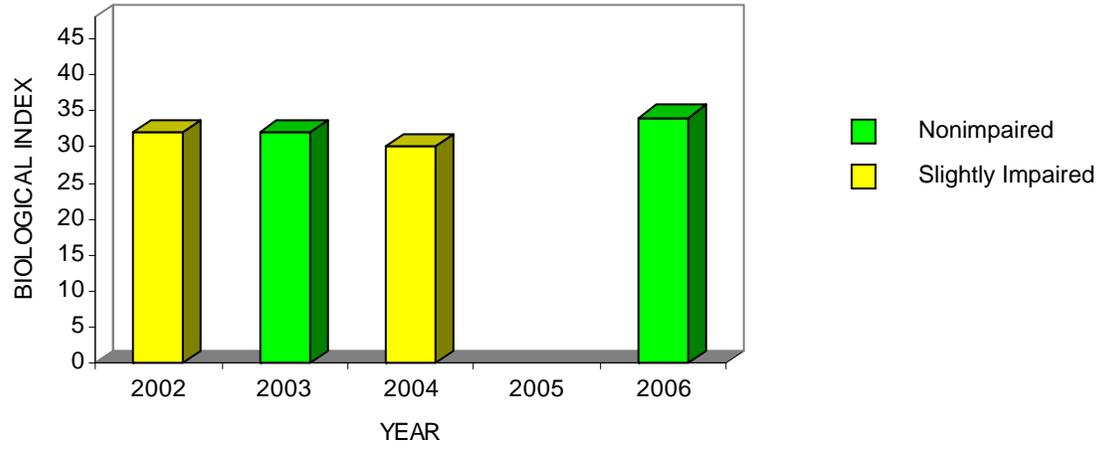
Date	WQI	Parameters Exceeding 90 th Percentile							
08/14/2006	50.7	TPO4	SS						

Biological and Habitat Summary	
Number of Taxa	22
Diversity Index	2.52
RBP III Score	34
RBP III Condition	Nonimpaired
Total Habitat Score	141
Habitat Condition Category	Excellent

Water Quality Index



Biological Index



Seeley Creek at Seeley Creek, N.Y. (SEEL 10.3)



Water Quality: No parameters exceeded water quality standards.

Biological Condition: Moderately Impaired

Habitat Assessment: Partially Supporting

Trends: Water quality remained the same as last year and was fairly good. Biological conditions remained moderately impaired, and habitat showed a marked decline.

Other Notes: New York State Department of Conservation (NYSDEC) listed Seeley Creek as “threatened” in its publication, The 1998 Chemung River Basin Waterbody Inventory and Priority Waterbodies List (NYSDEC, 1998). According to this publication, the stream is threatened by habitat alteration, streambank erosion, and instability of the stream channel. SRBC’s habitat assessment identified lack of adequate riparian buffer zone and sediment deposition to be major issues in Seeley Creek.

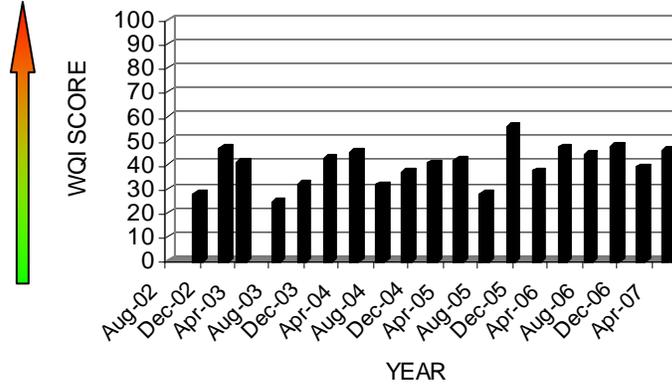
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
None				

Date	WQI	Parameters Exceeding 90 th Percentile						
08/15/2006	44.4							
11/07/2006	47.3	DO						
02/13/2007	39.0							
05/15/2007	45.8							

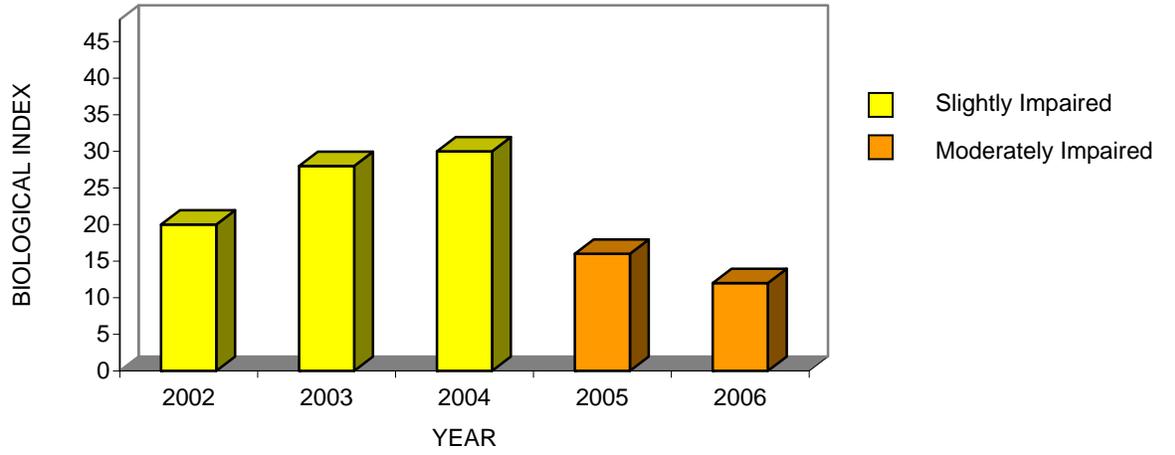
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	12
Diversity Index	1.34
RBP III Score	12
RBP III Condition	Moderately Impaired
Total Habitat Score	111
Habitat Condition Category	Partially Supporting

Water Quality Index



Biological Index



Snake Creek at Brookdale, Pa. (SNAK 2.3)



Water Quality: NA

Biological Condition: NA

Habitat Assessment: NA

Trends: In July 2006, the stream site at Snake Creek was completely destroyed due to a washed out bridge. No samples of any kind were taken. The site will be revisited in 2007-2008.

Other Notes: In 2000, SRBC staff conducted a small watershed study on the Snake Creek Watershed during the second year of the Upper Susquehanna Subbasin Survey (Diehl and Sitlinger, 2001). The study concluded that the Snake Creek Watershed was healthy and recommended that this watershed be protected.

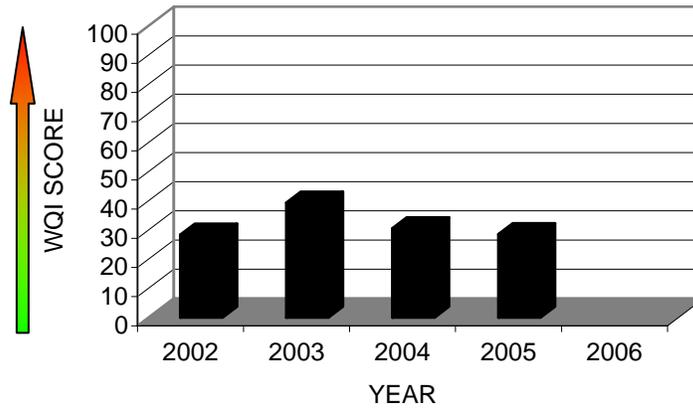
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
NA				

Date	WQI	Parameters Exceeding 90 th Percentile						
NA								

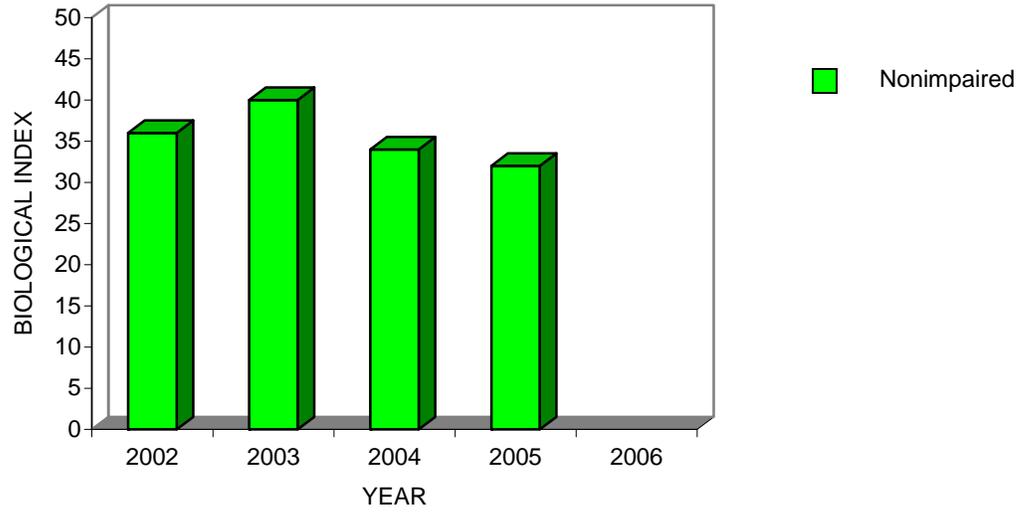
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	NA
Diversity Index	NA
RBP III Score	NA
RBP III Condition	NA
Total Habitat Score	NA
Habitat Condition Category	NA

Water Quality Index



Biological Index



South Creek at Fassett, Pa. (SOUT 7.8)

Water Quality: Dissolved oxygen did not meet water quality standards.

Biological Condition: Slightly Impaired

Habitat Assessment: Supporting

Trends: Water quality remained about the same as last year. However, biological conditions and habitat both declined since last year.

Other Notes: Staff noted lack of sufficient riparian vegetative buffer width along both sides of the stream.

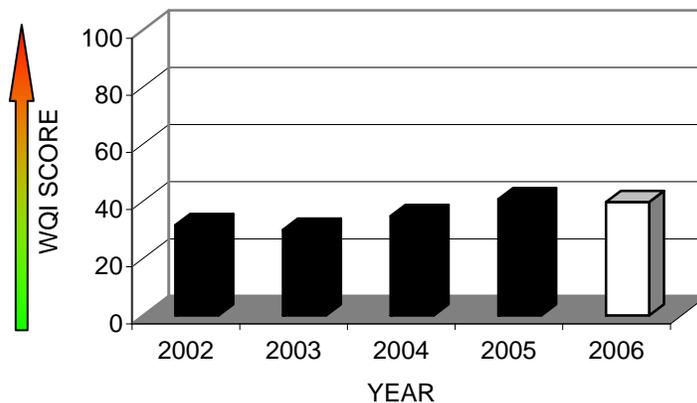
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
DO	08/15/2006	4.94 mg/l	5.0 mg/l	Pa. aquatic life

Date	WQI	Parameters Exceeding 90 th Percentile						
08/15/2006	39.7	TEMP						

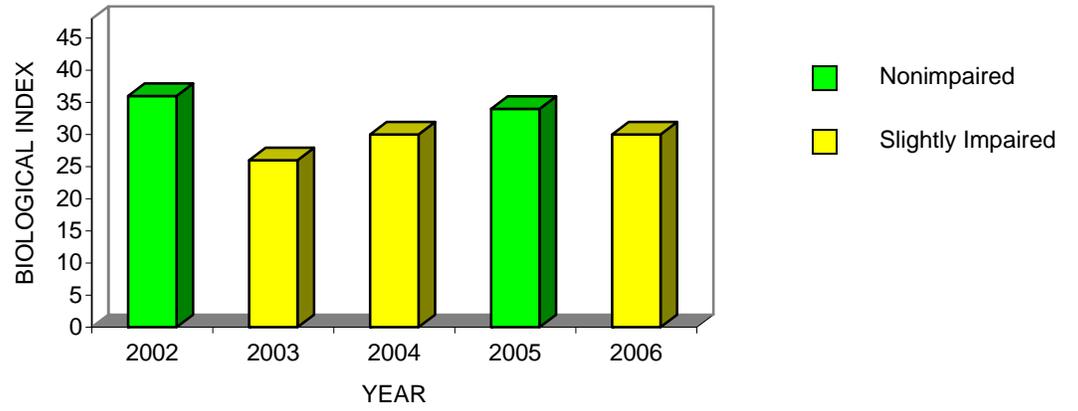
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	19
Diversity Index	2.39
RBP III Score	30
RBP III Condition	Slightly Impaired
Total Habitat Score	128
Habitat Condition Category	Supporting

Water Quality Index



Biological Index



Troups Creek at Austinburg, Pa. (TRUP 4.5)



Water Quality: Total aluminum and total iron exceeded water quality standards.

Biological Condition: Slightly Impaired

Habitat Assessment: Supporting

Trends: Water quality showed some improvement. Habitat conditions remained the same and biological index declined slightly.

Other Notes: Staff noted a lack of adequate riparian buffer zone on both banks.

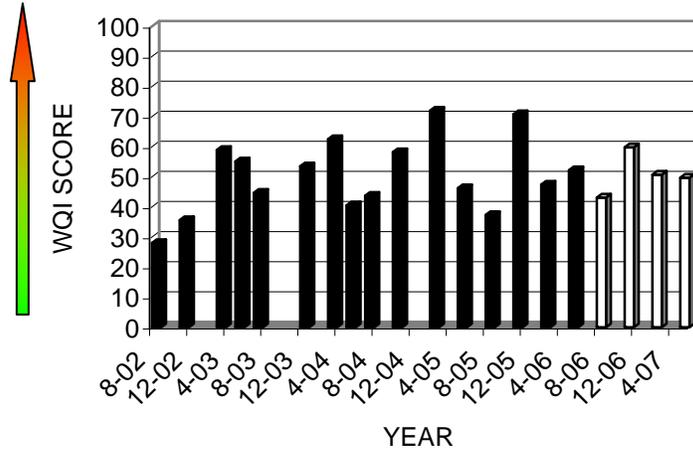
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
TFe	11/07/2006	922 ug/l	300 ug/l	N.Y. aquatic (chronic)
TAI	11/07/2006	711 ug/l	100 ug/l	N.Y. aquatic (chronic)
TAI	05/15/2007	210 ug/l	100 ug/l	N.Y. aquatic (chronic)

Date	WQI	Parameters Exceeding 90 th Percentile							
08/16/2006	43.1	TEMP							
11/07/2006	59.8	DO							
02/22/2007	50.7								
05/15/2007	49.7	TOC	DO	TEMP					

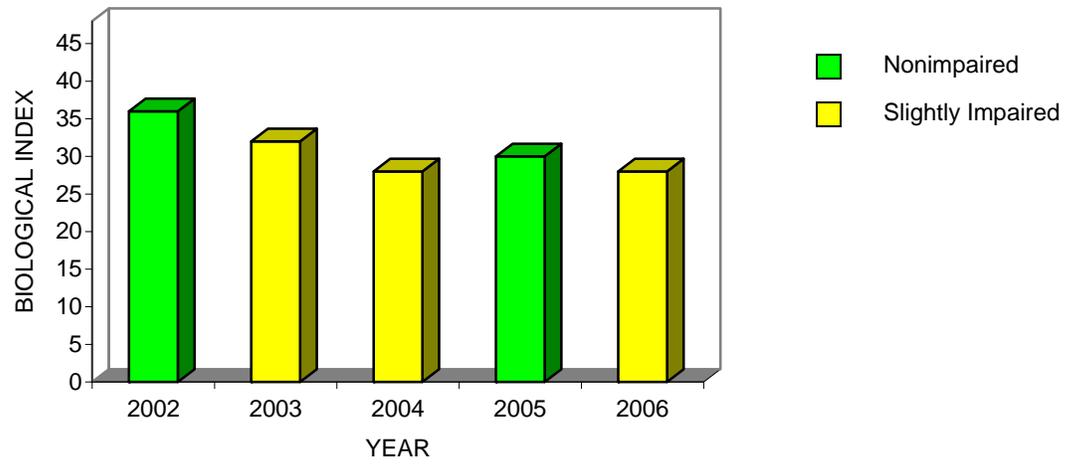
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	19
Diversity Index	2.31
RBP Score	28
RBP Condition	Slightly Impaired
Total Habitat Score	121
Habitat Condition Category	Supporting

Water Quality Index



Biological Index



Trowbridge Creek at Great Bend, Pa. (TROW 1.8)



Water Quality: NA

Biological Condition: NA

Habitat Assessment: NA

Trend: In 2006, the stream site on Trowbridge Creek was being dredged, so no samples of any kind were collected.

Other Notes: There have been no samples taken in Trowbridge Creek since 2004 due to dry conditions in 2005 and the dredging in 2006. The site will be revisited in 2007.

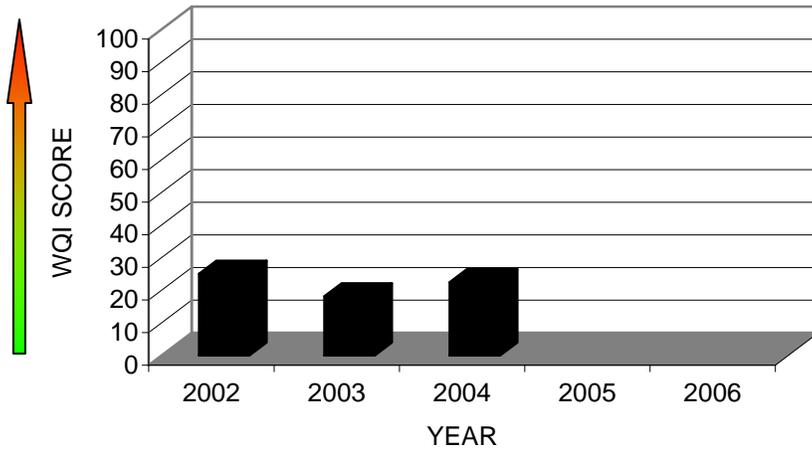
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
NA				

Date	WQI	Parameters Exceeding 90 th Percentile					
NA							

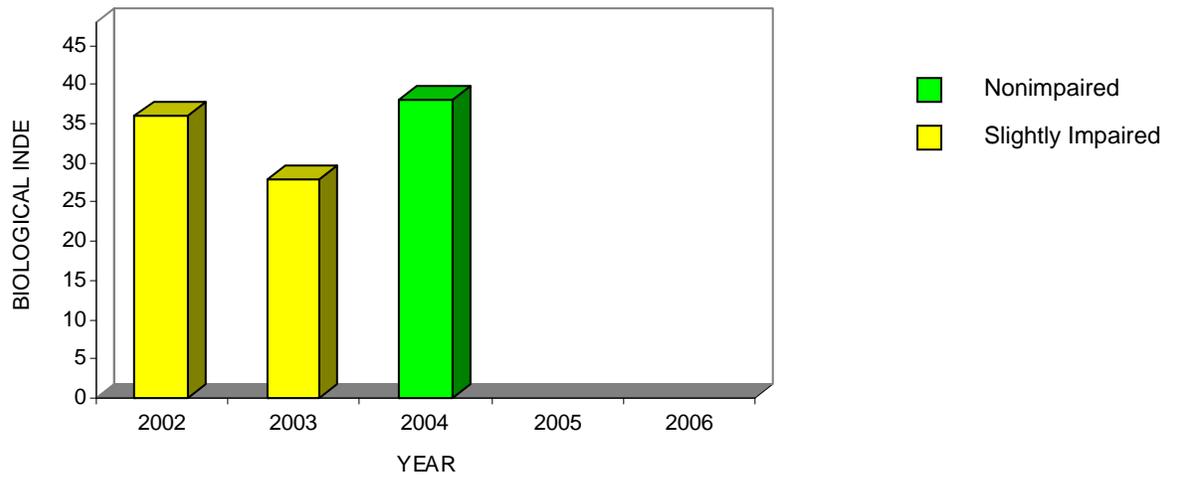
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	NA
Diversity Index	NA
RBP III Score	NA
RBP III Condition	NA
Total Habitat Score	NA
Habitat Condition Category	NA

Water Quality Index



Biological Index



Wappasening Creek at Nichols, N.Y. (WAPP 2.6)



Water Quality: No parameters exceeded water quality standards.

Biological Condition: Moderately Impaired

Habitat Assessment: Excellent

Trend: Water quality showed a slight decline overall. Biological condition was scored at its lowest ranking in the last five years.

Other Notes: Staff observed lots of bed movement from previous high flow events, as well as lack of overhead cover.

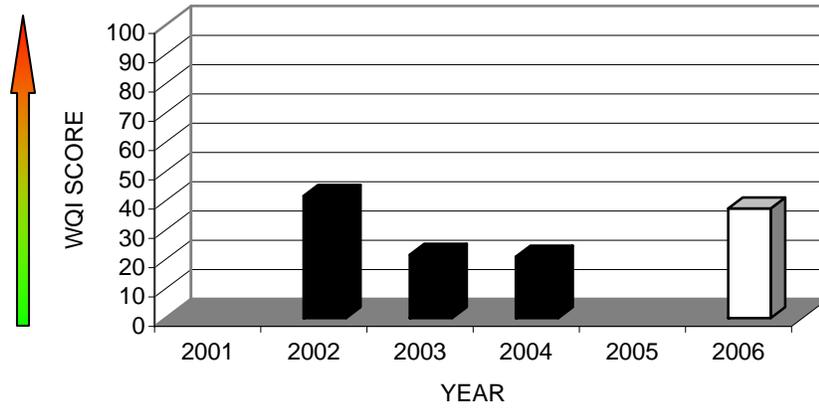
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
None				

Date	WQI	Parameters Exceeding 90 th Percentile						
08/24/2006	37.4							

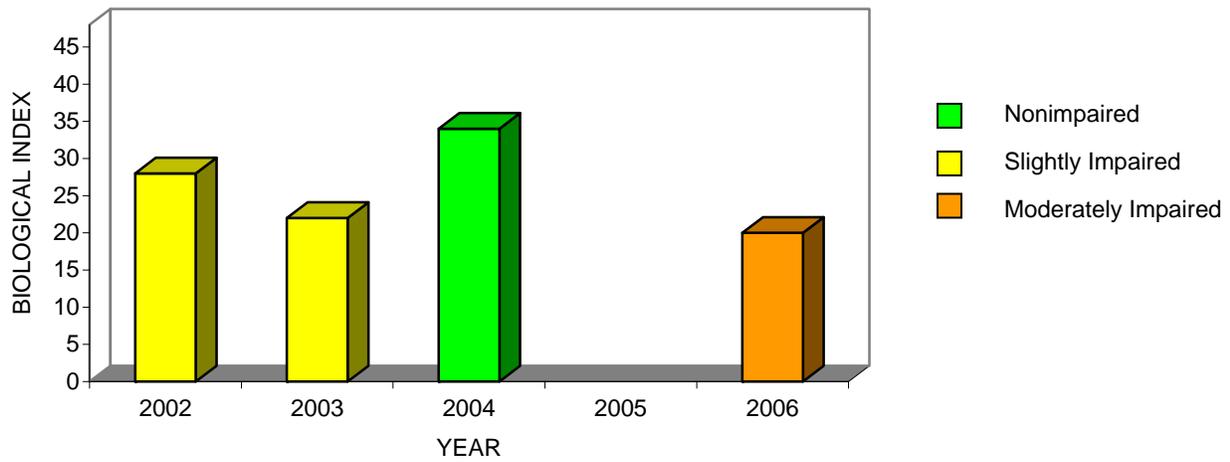
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	21
Diversity Index	1.88
RBP Score	20
RBP Condition	Moderately Impaired
Total Habitat Score	156
Habitat Condition Category	Excellent

Water Quality Index



Biological Index



Site Results for Pennsylvania-Maryland Border Sites

Big Branch Deer Creek at Fawn Grove, Pa. (BBDC 4.1)



Water Quality: No parameters exceeded water quality standards.

Biological Condition: Slightly Impaired

Habitat Assessment: Supporting

Trends: Water quality remained the same; habitat and biological conditions showed a slight decline from last year.

Other Notes: This site on Big Branch Deer Creek lacked sufficient instream cover, and the predominant substrate material was sand and silt.

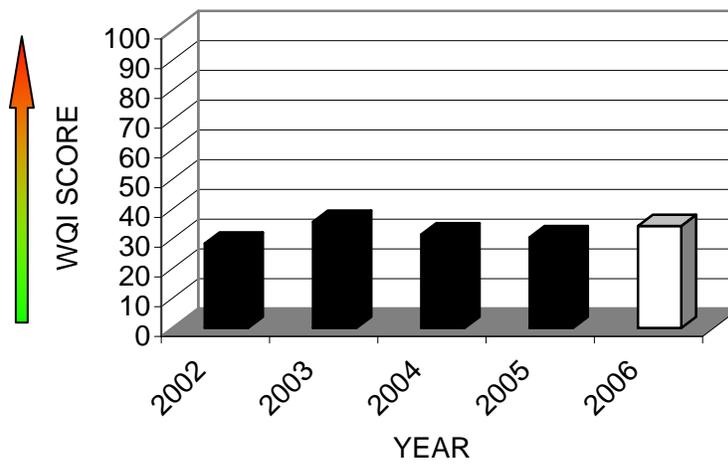
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
None				

Date	WQI	Parameters Exceeding 90 th Percentile						
07/24/2006	34.3	None						

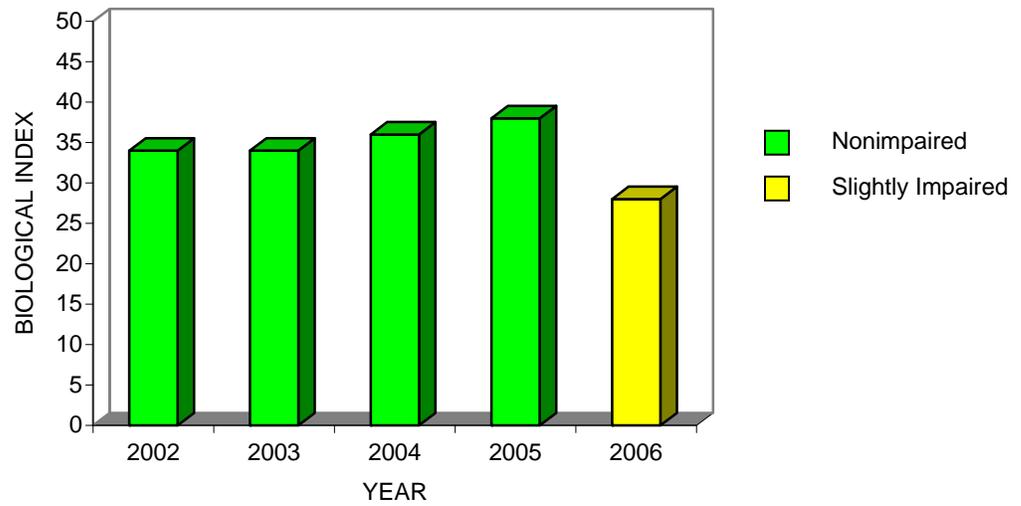
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	20
Diversity Index	2.13
RBP Score	28
RBP Condition	Slightly Impaired
Total Habitat Score	121
Habitat Condition Category	Supporting

Water Quality Index



Biological Index



Conowingo Creek at Pleasant Grove, Pa. (CNWG 4.4)



Water Quality: Nitrate plus Nitrite continued to exceed water quality parameters.

Biological Condition: Moderately Impaired

Habitat Assessment: Excellent

Trends: Water quality showed a slight decline, with the major problems still revolving around nitrogen and its compounds. Biological condition also was worse than last year, as it was downgraded to moderately impaired for the first time in the last five years. Habitat at this location remained ranked as excellent.

Other Notes: Bank conditions and riparian zone width were the primary habitat concerns noted by staff.

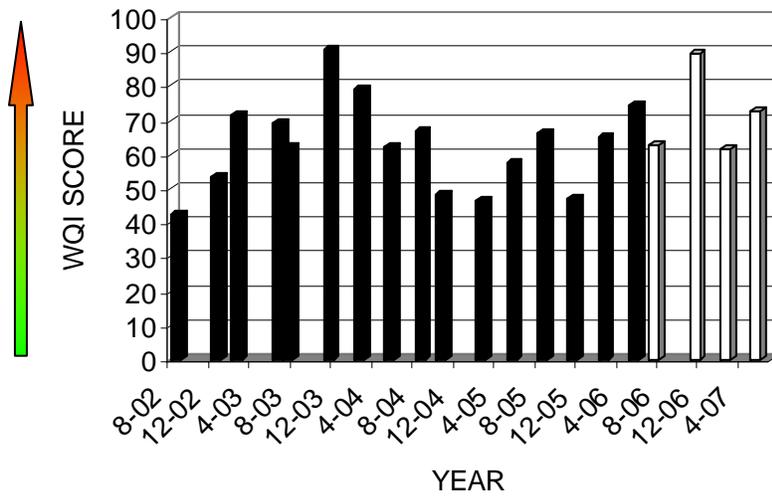
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
Nitrate + Nitrite	07/25/2006	10.34 mg/l	10 mg/l	Pa. public water supply
Nitrate + Nitrite	05/10/2007	11.14 mg/l	10 mg/l	Pa. public water supply

Date	WQI	Parameters Exceeding 90 th Percentile							
07/25/2006	62.7	TNO3	TN	TURB	TS	TAI	CON D		
10/18/2006	89.5	TNO3	TN	TURB	TS	Tal	TFe	TP	TPO4
		TNH3	TOC	SS					
02/21/2007	61.7	TNO3	TN						
05/10/2007	72.5	TNO3	TN	TNO2	TS	COND	TNH3		

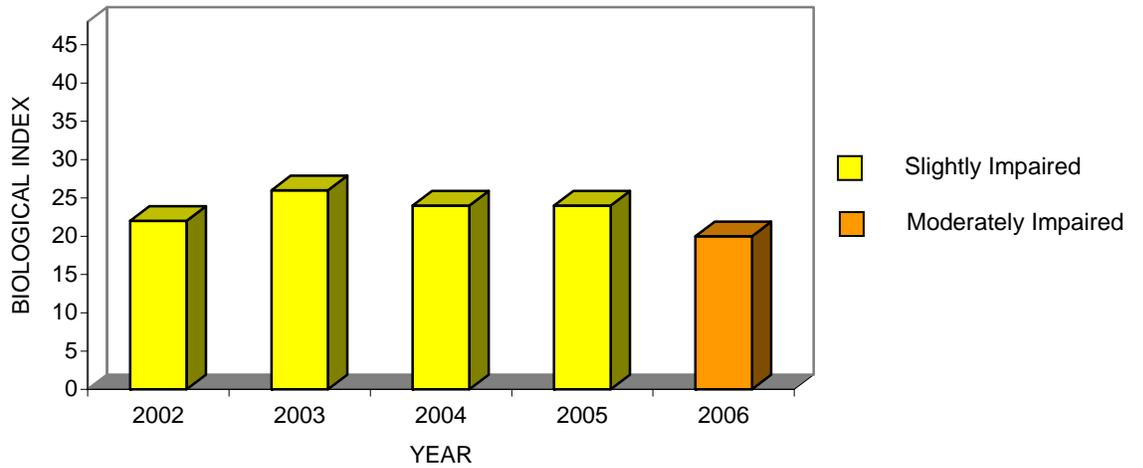
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	13
Diversity Index	1.55
RBP III Score	20
RBP III Condition	Moderately Impaired
Total Habitat Score	133
Habitat Condition Category	Excellent

Water Quality Index



Biological Index



Deer Creek at Gorsuch Milles, Md. (DEER 44.2)



Water Quality: No parameters exceeded water quality standards.

Biological Condition: Reference (Nonimpaired)

Habitat Assessment: Reference (Nonimpaired)

Trends: Water quality remained similar to last year. Habitat showed some improvement, and biological conditions remained nonimpaired, as they have been for the past five years.

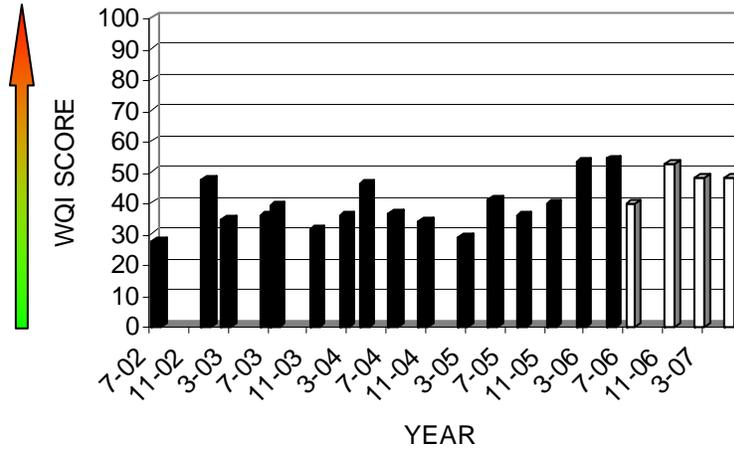
Other Notes: Deer Creek was used as a reference site this year, and as such, all other Pennsylvania-Maryland border sites were compared to the conditions here.

Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
None				

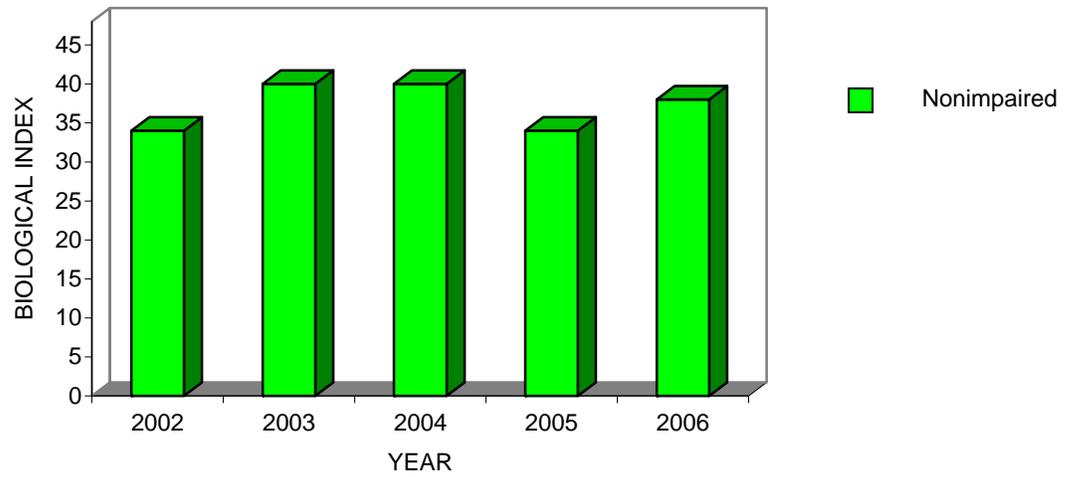
Date	WQI	Parameters Exceeding 90 th Percentile						
07/24/2006	39.6	TCl						
10/17/2006	52.5	TP	TPO4					
02/20/2007	47.9							
05/09/2007	48.2							

Biological and Habitat Summary	
Number of Taxa	26
Diversity Index	2.59
RBP Score	38
RBP Condition	Reference
Total Habitat Score	140
Habitat Condition Category	Reference

Water Quality Index



Biological Index



Ebaughs Creek at Stewartstown, Pa. (EBAU 1.5)



Water Quality: Total chlorine continues to be the only parameter that exceeds standards.

Biological Condition: Nonimpaired

Habitat Assessment: Excellent

Trends: Water quality and habitat conditions remained the same as last year. Biological condition improved to rank as nonimpaired for the first time in the last five years.

Other Notes: EBAU 1.5 is located downstream of the Stewartstown Treatment Plant.

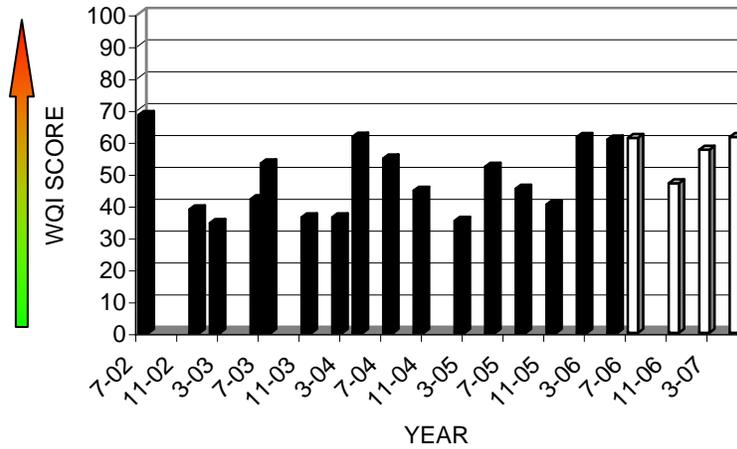
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
TCl _n	07/24/2006	0.02 mg/l	0.019 mg/l	Md. aquatic life
TCl _n	02/20/2007	0.08 mg/l	0.019 mg/l	Md. aquatic life
TCl _n	05/10/2007	0.11 mg/l	0.019 mg/l	Md. aquatic life

Date	WQI	Parameters Exceeding 90 th Percentile						
07/24/2006	61.1	TNO2	TPO4	TCl				
10/17/2006	46.9							
02/20/2007	57.4	DO	TPO4					
05/09/2007	61.4	TP	TPO4					

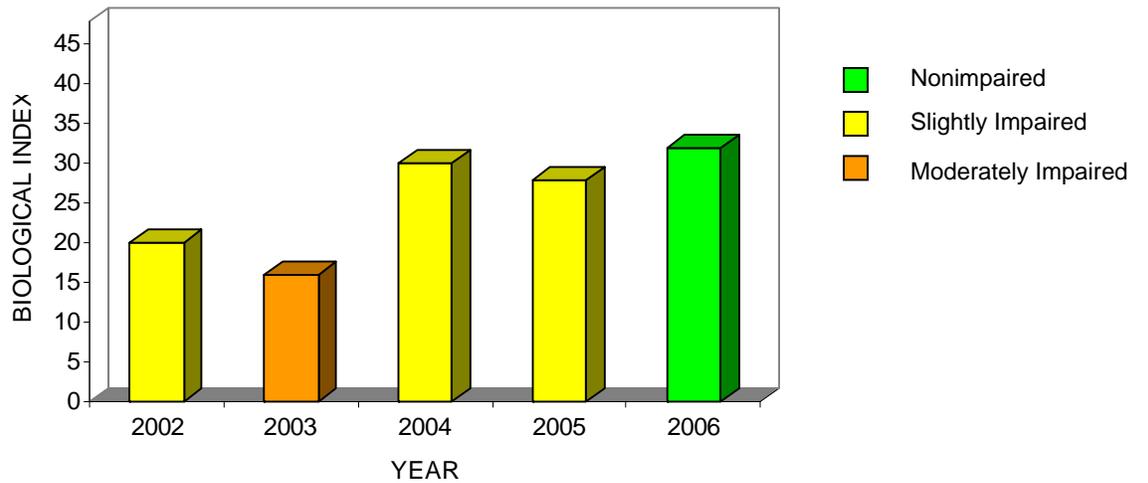
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	22
Diversity Index	2.42
RBP Score	32
RBP Condition	Nonimpaired
Total Habitat Score	133
Habitat Condition Category	Excellent

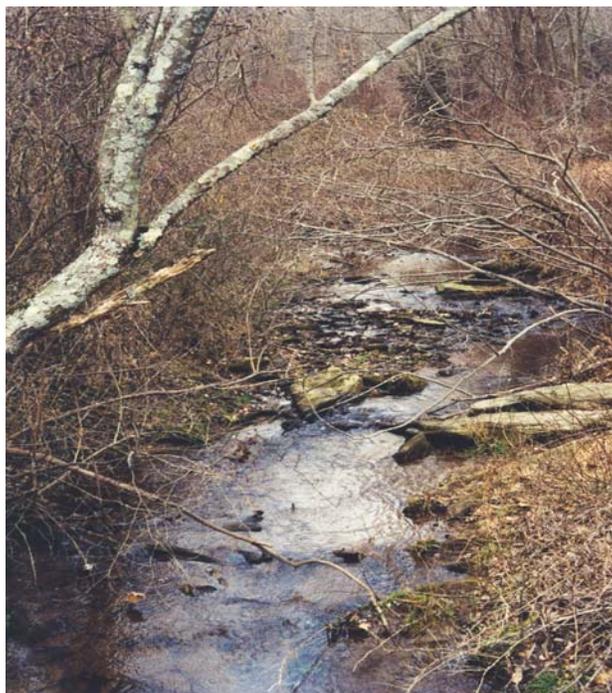
Water Quality Index



Biological Index



Falling Branch Deer Creek at Fawn Grove, Pa. (FBDC 4.1)



Water Quality: Alkalinity was the only parameter that did not meet water quality standards.

Biological Condition: Slightly Impaired

Habitat Assessment: Excellent

Trends: Biological conditions declined slightly from last year. Water quality and habitat remained the same.

Other Notes: Falling Branch Deer Creek was rated as having the best overall habitat conditions of all the Pennsylvania-Maryland border sites.

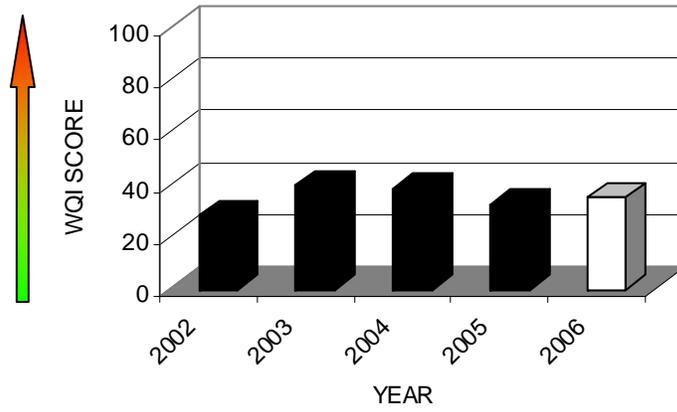
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
ALK	07/24/2006	12 mg/l	20 mg/l	Pa. aquatic life

Date	WQI	Parameters Exceeding 90 th Percentile						
07/24/2006	35.3	None						

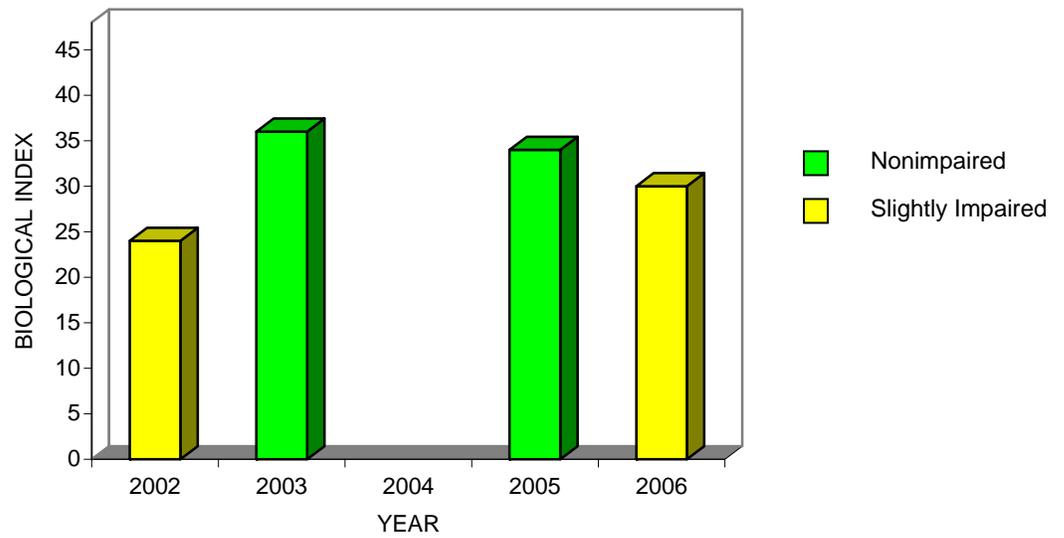
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	26
Diversity Index	2.49
RBP Score	30
RBP Condition	Slightly Impaired
Total Habitat Score	147
Habitat Condition Category	Excellent

Water Quality Index



Biological Index



Long Arm Creek at Bandanna, Pa. (LNGA 2.5)



Water Quality: No parameters exceeded water quality standards.

Biological Condition: Slightly Impaired

Habitat Assessment: Partially supporting

Trends: Biological condition was improved from last year. Water quality remained about the same, and habitat conditions declined from last year.

Other Notes: LNGA 2.5 was previously used as a cow pasture, but SRBC staff noted in July 2004 that there was no evidence of recent use as a pasture, and that the stream banks were re-vegetated. In 2006, staff again noted that the area was not being used as a pasture; however, overall habitat conditions were worse than in 2005.

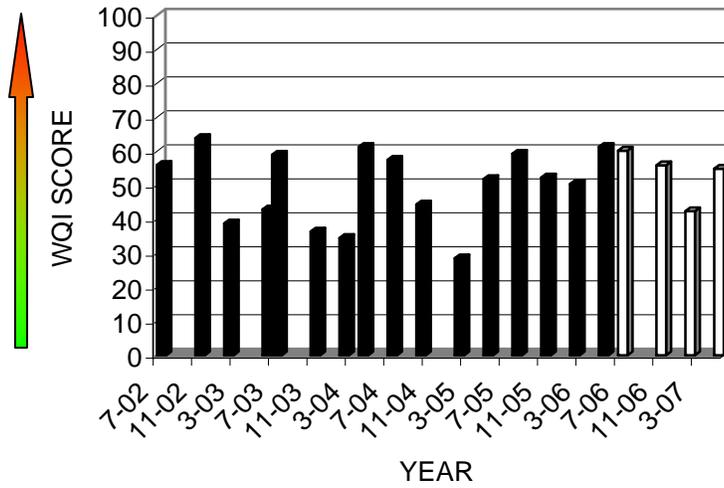
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
None				

Date	WQI	Parameters Exceeding 90 th Percentile							
07/24/2006	60.2	TPO4	TURB	SS					
10/17/2006	55.9	TMn							
02/20/2007	42.4								
05/09/2007	54.9								

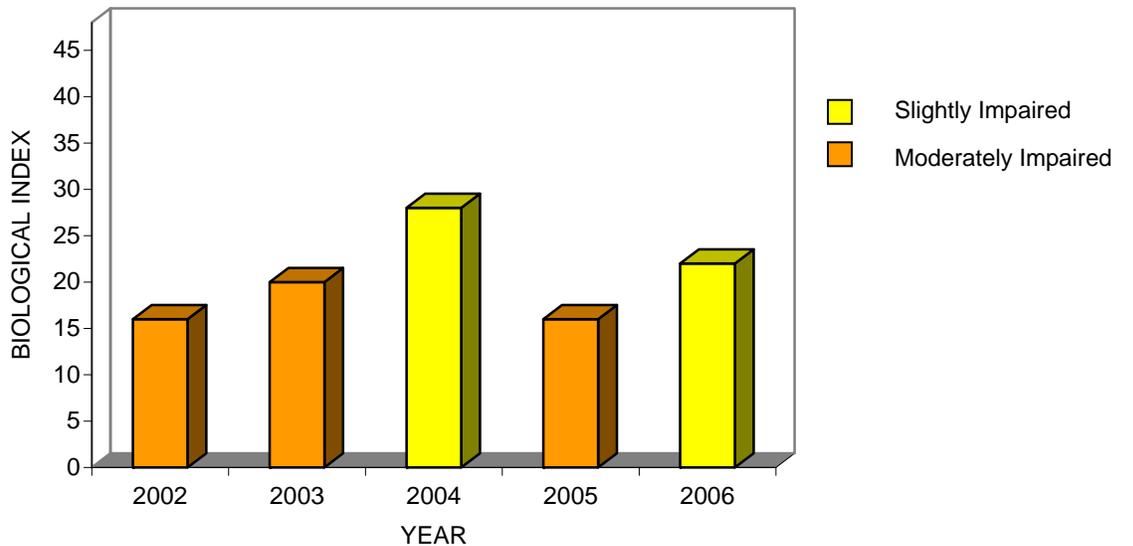
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	18
Diversity Index	1.89
RBP III Score	22
RBP III Condition	Slightly Impaired
Total Habitat Score	95
Habitat Condition Category	Partially Supporting

Water Quality Index



Biological Index



Octoraro Creek at Rising Sun, Md. (OCTO 6.6)



Water Quality: No parameters exceeded water quality standards.

Biological Condition: Slightly Impaired

Habitat Assessment: Excellent

Trends: Water quality conditions showed some improvement from last year, while habitat remained ranked as excellent. Biological conditions declined to slightly impaired after one year of being nonimpaired.

Other Notes: SRBC is currently working on a Total Maximum Daily Load (TMDL) for the Pennsylvania portion of Octoraro Creek.

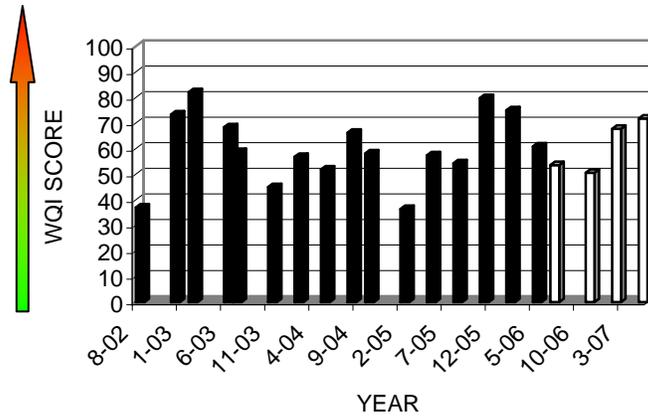
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
None				

Date	WQI	Parameters Exceeding 90 th Percentile						
07/25/2006	53.6	COND						
10/18/2006	50.6							
02/21/2007	67.8	TP	TURB	TEMP				
05/10/2007	71.8	COND	TS	TOC	DO			

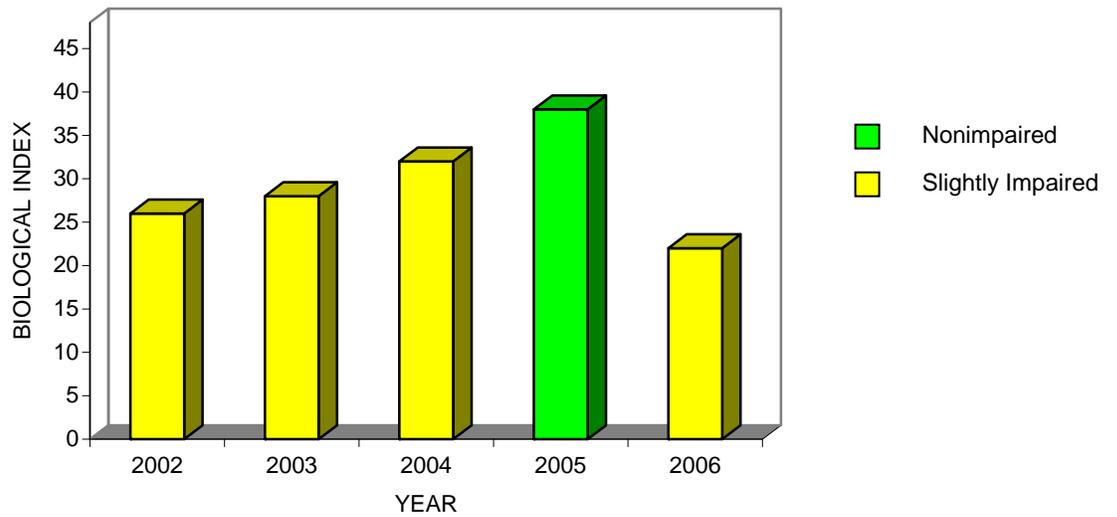
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	17
Diversity Index	1.63
RBP III Score	22
RBP III Condition	Slightly Impaired
Total Habitat Score	145
Habitat Condition Category	Excellent

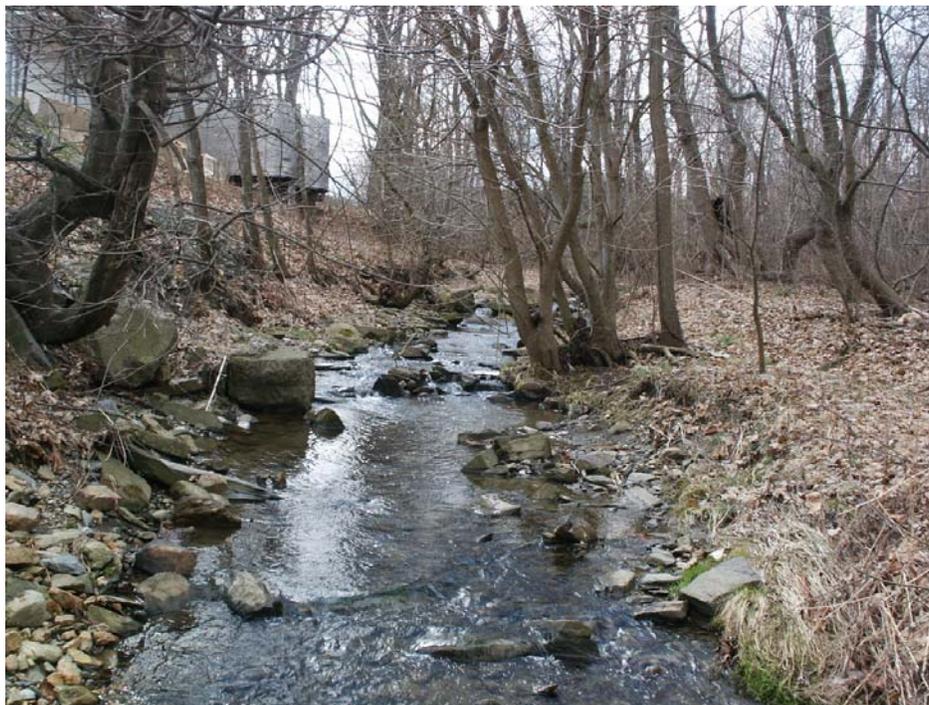
Water Quality Index



Biological Index



Scott Creek at Delta, Pa. (SCTT 3.0)



Water Quality: Dissolved oxygen did not meet water quality standards.

Biological Condition: Slightly Impaired

Habitat Assessment: Supporting

Trends: Water quality remained about the same as last year. Biological conditions have improved considerably over the last 5 years.

Other Notes: Scott Creek is typically one of the most impaired sites on the Pennsylvania-Maryland border, but it has shown some improvement in recent years. PADEP released a cause and effect survey on Scott Creek in March 2007, which concluded that Scott Creek is failing to attain its fish and aquatic life uses near the Delta Borough sewage treatment plant discharge. The main concerns are nutrients, siltation, and flow variability.

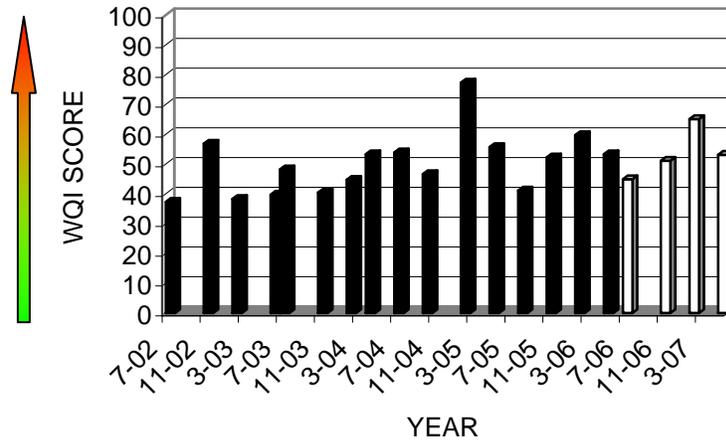
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
DO	10/17/2006	4.88 mg/l	5.0 mg/l	Pa. aquatic life

Date	WQI	Parameters Exceeding 90 th Percentile							
07/25/2006	44.9								
10/17/2006	51.1	TS	TCI	DO	COND				
02/20/2007	65.1	TS	TCI	SS	COND				
05/09/2007	53.1	TS	TCI	COND					

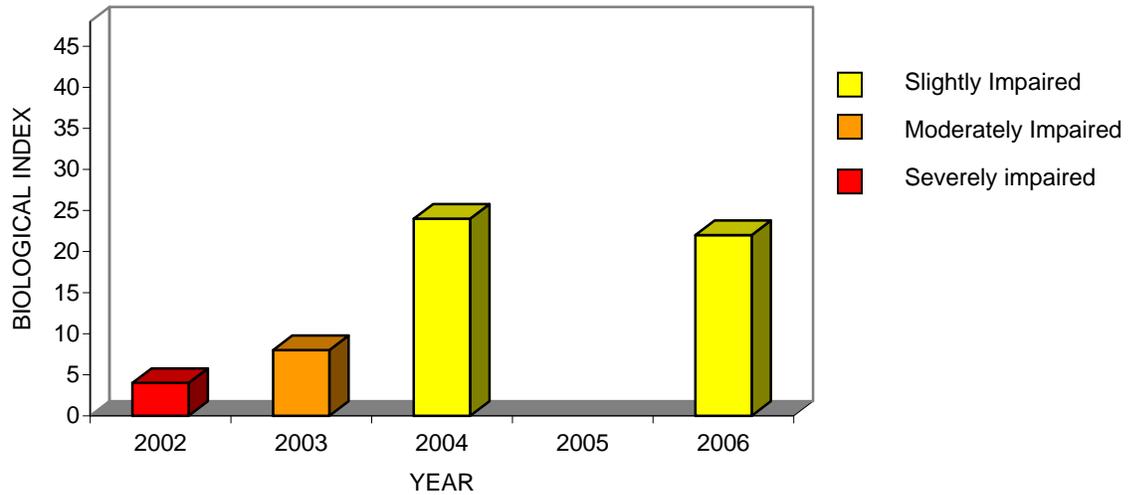
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	11
Diversity Index	1.76
RBP III Score	24
RBP III Condition	Slightly Impaired
Total Habitat Score	114
Habitat Condition Category	Supporting

Water Quality Index



Biological Index



South Branch Conewago Creek at Bandanna, Pa. (SBCC 20.4)



Water Quality: No parameters exceeded water quality standards.

Biological Condition: Slightly Impaired

Habitat Assessment: Excellent

Trends: Water quality, biology, and habitat all remained the same as last year.

Other Notes: Conditions of banks and sediment deposition were the main habitat concerns in this section of South Branch Conewago Creek.

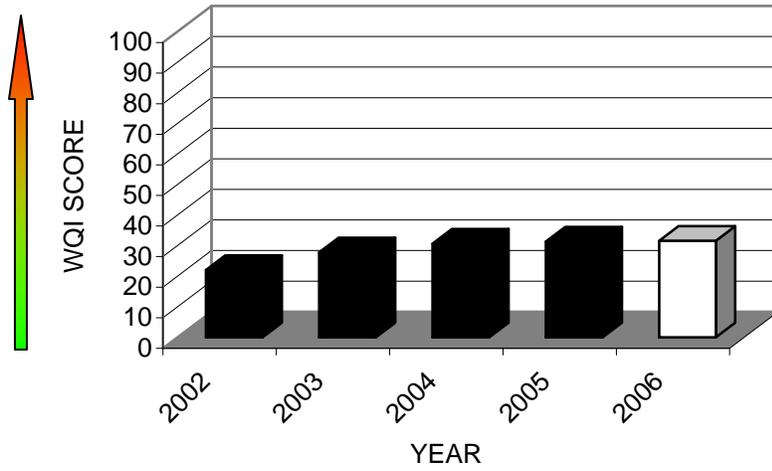
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
None				

Date	WQI	Parameters Exceeding 90 th Percentile						
07/24/206	31.6							

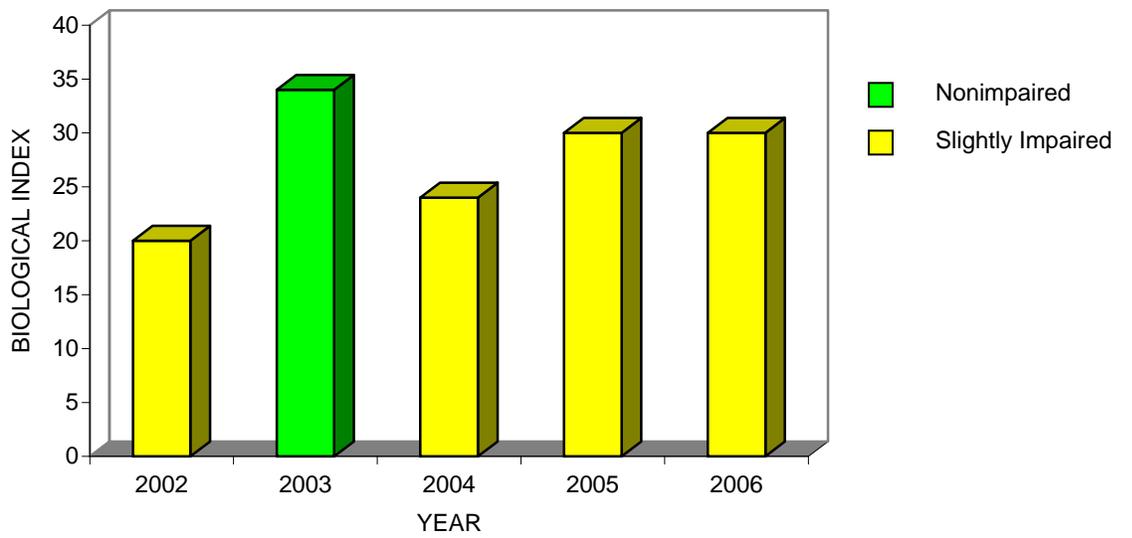
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	24
Diversity Index	2.35
RBP III Score	32
RBP III Condition	Slightly Impaired
Total Habitat Score	141
Habitat Condition Category	Excellent

Water Quality Index



Biological Index



Site Results for Large River Sites

Chemung River at Chemung, N.Y. (CHEM 12.0)



Water Quality: Total aluminum exceeded water quality standards.

Biological Condition: Nonimpaired

Habitat Assessment: Excellent

Trends: Water quality showed overall improvement over last year. Habitat and biological conditions remained the same.

Other Notes: The condition of banks and lack of adequate riparian buffer were the two main problem areas identified in the habitat assessment.

Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
TAI	08/15/2006	214 ug/l	100 ug/l	N.Y. aquatic (chronic)
TAI	11/07/2006	236 ug/l	100 ug/l	N.Y. aquatic (chronic)

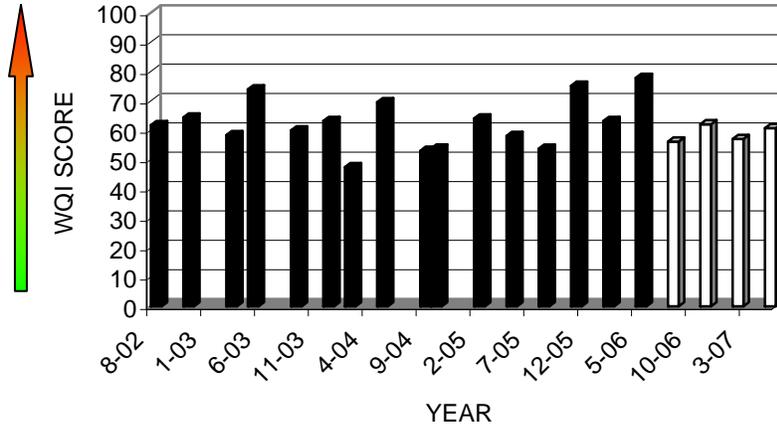
Date	WQI	Parameters Exceeding 90 th Percentile						
08/15/2006	56.1	TN	TCI	TS	COND			
11/07/2006	62.0	TN	TCI	TS	COND	TNO3	TSO4	DO
02/13/2007	57.0	TN	TCI	TS	COND	TNO3		
05/15/2007	60.7	TOC	TCI	TS	COND	DO		

For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

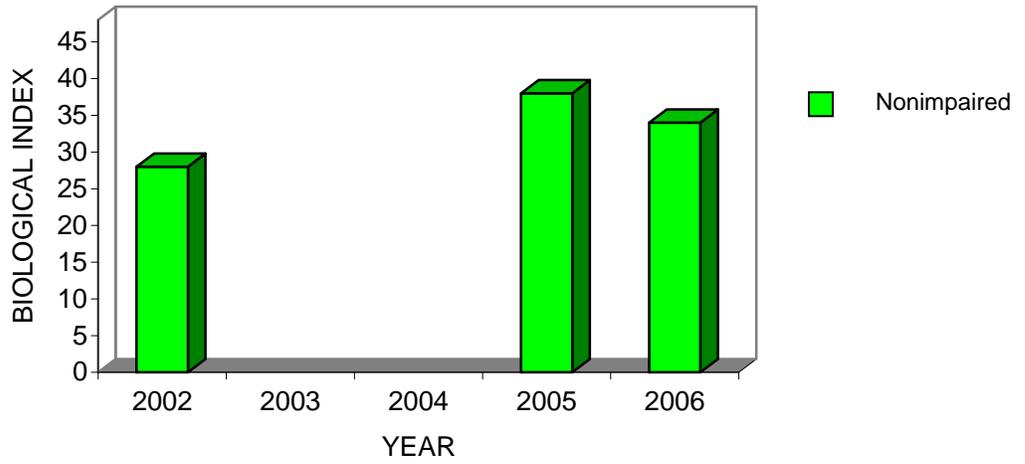
Biological and Habitat Summary	
Number of Taxa	21
Diversity Index	2.67
RBP Score	34

RBP Condition	Nonimpaired
Total Habitat Score	148
Habitat Condition Category	Excellent

Water Quality Index



Biological Index



Cowanesque River at Lawrenceville, Pa. (COWN 1.0)



Water Quality: Total aluminum and total iron exceeded water quality standards.

Biological Condition: Moderately Impaired

Habitat Assessment: Excellent

Trend: Water quality and biological conditions remained about the same at this location. Habitat showed some improvement from last year.

Other Notes: This site is a little more than a mile downstream of the Cowanesque Reservoir.

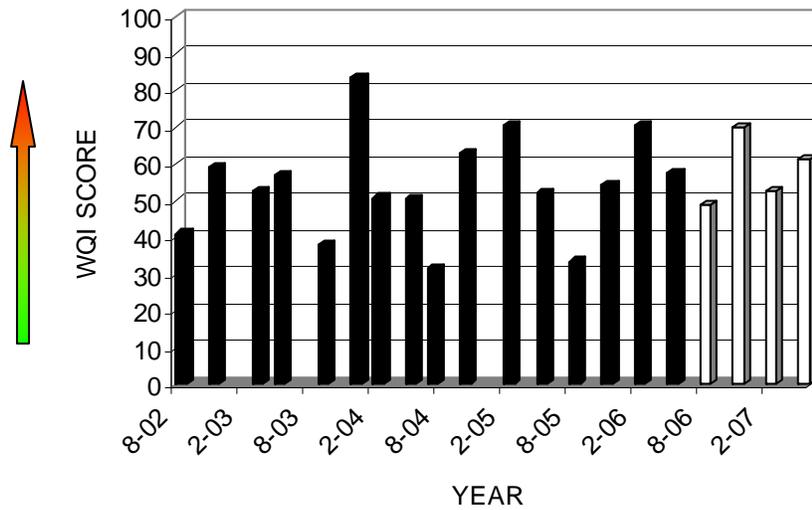
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
TAI	08/14/2006	227 ug/l	100 ug/l	N.Y. aquatic (chronic)
TAI	11/07/2006	632 ug/l	100 ug/l	N.Y. aquatic (chronic)
TFe	11/07/2006	676 ug/l	300 ug/l	N.Y. aquatic (chronic)
TFe	02/22/2007	346 ug/l	300 ug/l	N.Y. aquatic (chronic)
TAI	02/22/2007	248 ug/l	100 ug/l	N.Y. aquatic (chronic)
TAI	05/16/2007	251 ug/l	100 ug/l	N.Y. aquatic (chronic)

Date	WQI	Parameters Exceeding 90 th Percentile						
08/14/2006	49.1	TNO2	TOC					
11/07/2006	70.1	TNH3	TOC	TURB	DO	TEMP	SS	
02/22/2007	52.7	TEMP	TOC					
05/16/2007	61.5	TNO3	TOC	TURB	TN			

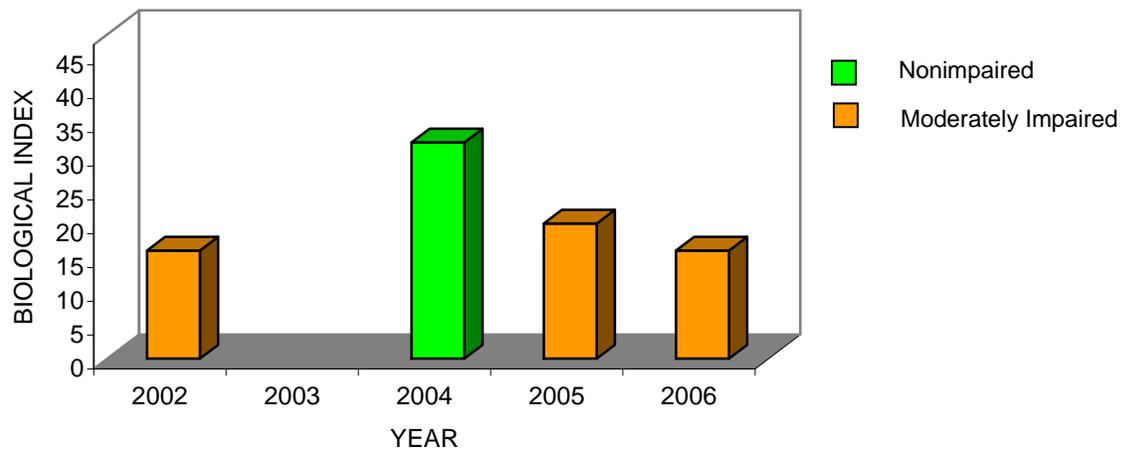
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	15
Diversity Index	1.80
RBP Score	16
RBP Condition	Moderately Impaired
Total Habitat Score	132
Habitat Condition Category	Excellent

Water Quality Index



Biological Index



Cowanesque River at Lawrenceville, Pa. (COWN 2.2)



Water Quality: Total iron, total aluminum, and dissolved oxygen failed to meet water quality standards.

Biological Condition: Moderately Impaired

Habitat Assessment: Supporting

Trends: Biological index remained moderately impaired, habitat conditions remained supporting, and water quality did not change overall during the course of the last year.

Other Notes: Sampling site located directly downstream of the Cowanesque Reservoir.

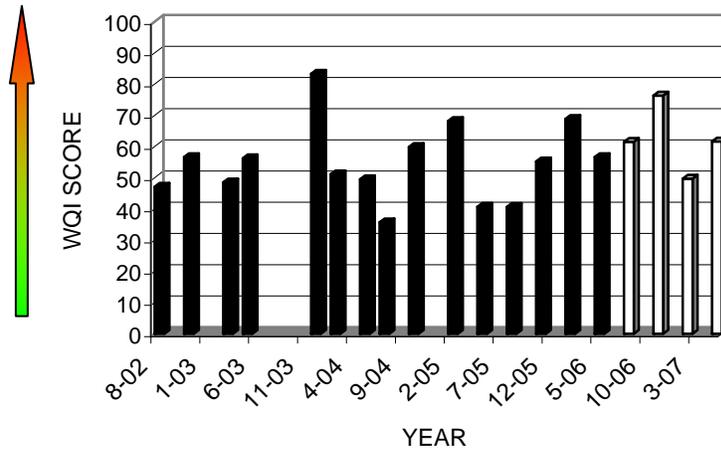
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
DO	08/14/2006	3.81 mg/l	5.0 mg/l	Pa. aquatic life
TAI	08/14/2006	425 ug/l	100 ug/l	N.Y. aquatic (chronic)
TFe	08/14/2006	540 ug/l	300 ug/l	N.Y. aquatic (chronic)
TFe	11/07/2006	1939 ug/l	300 ug/l 1500 ug/l	N.Y. aquatic (chronic) Pa. aquatic life
TAI	11/07/2006	1172 ug/l	100 ug/l	N.Y. aquatic (chronic)
TFe	02/22/2007	350 ug/l	300 ug/l	N.Y. aquatic (chronic)
TAI	02/22/2007	248 ug/l	100 ug/l	N.Y. aquatic (chronic)

Date	WQI	Parameters Exceeding 90 th Percentile							
08/14/2006	61.5	TURB	TNH3	TAI	TMn	TOC	DO		
11/07/2006	76.3	TURB	TFe	TAI	TMn	TOC	DO	TEMP	SS
02/22/2007	49.7	TURB	TOC						
05/15/2007	61.6	TURB	TNO3	TNH3					

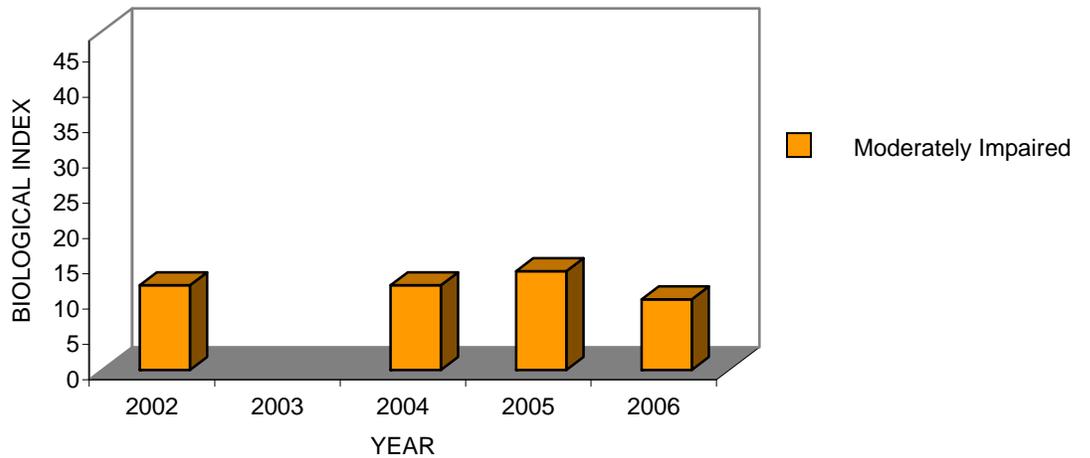
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	10
Diversity Index	0.87
RBP Score	10
RBP Condition	Moderately Impaired
Total Habitat Score	103
Habitat Condition Category	Supporting

Water Quality Index



Biological Index



Susquehanna River at Windsor, N.Y. (SUSQ 365.0)



Water Quality: Total aluminum, total iron, and dissolved oxygen all failed to meet water quality standards.

Biological Condition: Slightly Impaired

Habitat Assessment: Excellent

Trends: Habitat and water quality conditions remained about the same as last year. Biological conditions showed a bit of a decline.

Other Notes: Staff noted major bed movement from flooding event, as well as the lack of the normal shallow riffle areas present at this site.

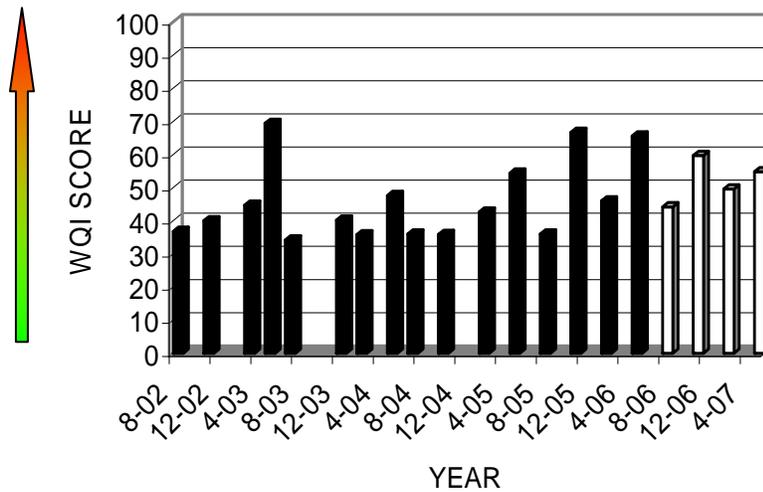
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
TAI	08/23/2006	297 ug/l	100 ug/l	N.Y. aquatic (chronic)
DO	08/23/2006	4.87 mg/l	5.0 mg/l	Pa. aquatic life
TAI	11/06/2006	218 ug/l	100 ug/l	N.Y. aquatic (chronic)
TFe	02/12/2007	484 ug/l	300 ug/l	N.Y. aquatic (chronic)
TAI	02/12/2007	233 ug/l	100 ug/l	N.Y. aquatic (chronic)

Date	WQI	Parameters Exceeding 90 th Percentile						
08/23/2006	44.2							
11/06/2006	59.7	TP	TPO4	TNH3				
02/12/2007	49.6	DO						
05/23/2007	54.8	DO						

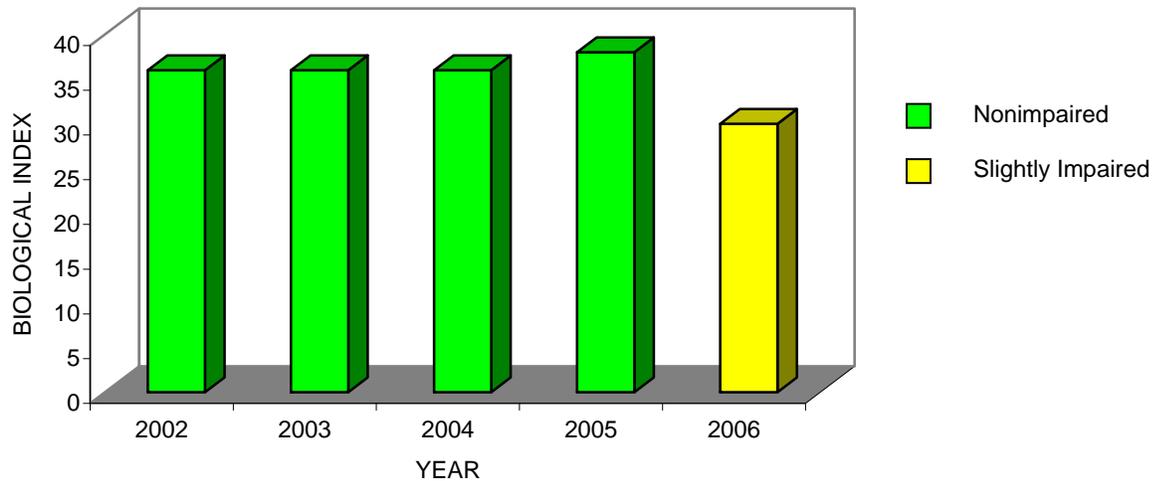
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	27
Diversity Index	2.43
RBP Score	30
RBP Condition	Slightly Impaired
Total Habitat Score	133
Habitat Condition Category	Excellent

Water Quality Index



Biological Index



Susquehanna River at Kirkwood, N.Y. (SUSQ 340.0)



Water Quality: Total aluminum and total iron both exceeded water quality standards.

Biological Condition: Reference (Nonimpaired)

Habitat Assessment: Reference (Excellent)

Trends: Water quality showed some overall improvement. Habitat and biological indices remained at the highest rankings.

Other Notes: Site upstream of Kirkwood Park. This year, SUSQ 340 was used as a reference site for all river sites, so conditions at the seven river sites were compared to conditions here.

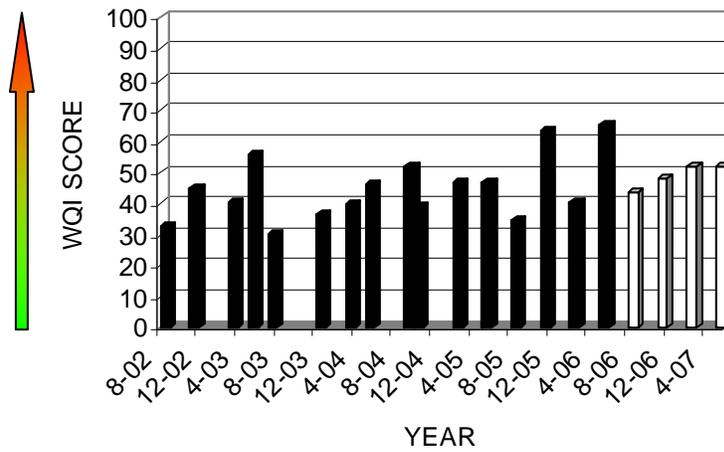
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
TAI	08/23/2006	224 ug/l	100 ug/l	N.Y. aquatic (chronic)
TAI	11/06/2006	242 ug/l	100 ug/l	N.Y. aquatic (chronic)
TFe	02/12/2007	742 ug/l	300 ug/l	N.Y. aquatic (chronic)
TAI	02/12/2007	455 ug/l	100 ug/l	N.Y. aquatic (chronic)
TAI	05/23/2007	252 ug/l	100 ug/l	N.Y. aquatic (chronic)

Date	WQI	Parameters Exceeding 90 th Percentile							
08/23/2006	43.7								
11/06/2006	47.9								
02/12/2007	51.7	TFe	TAI	SS					
05/23/2007	52.2	DO							

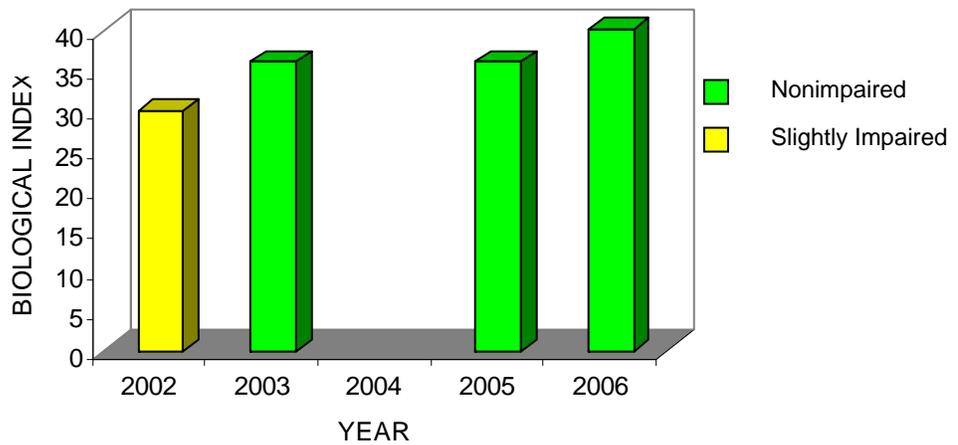
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	26
Diversity Index	2.41
RBP Score	40
RBP Condition	Reference
Total Habitat Score	136
Habitat Condition Category	Excellent

Water Quality Index



Biological Index



Susquehanna River at Kirkwood, N.Y. (SUSQ 340.0)



Water Quality: Total aluminum and total iron both exceeded water quality standards.

Biological Condition: Reference (Nonimpaired)

Habitat Assessment: Reference (Excellent)

Trends: Water quality showed some overall improvement. Habitat and biological indices remained at the highest rankings.

Other Notes: Site upstream of Kirkwood Park. This year, SUSQ 340 was used as a reference site for all river sites, so conditions at the seven river sites were compared to conditions here.

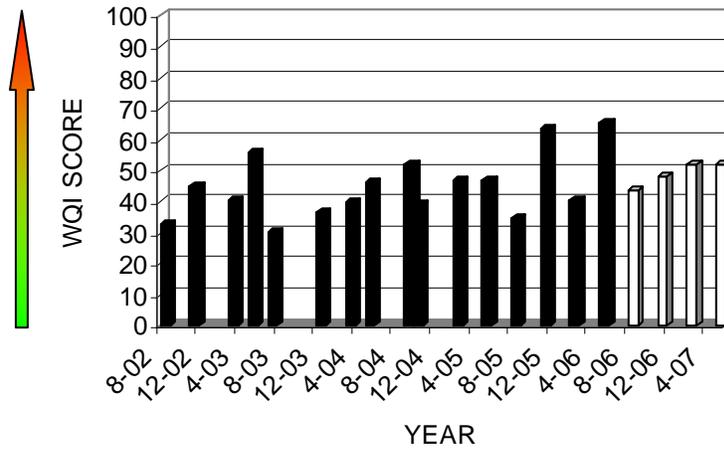
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
TAI	08/23/2006	224 ug/l	100 ug/l	N.Y. aquatic (chronic)
TAI	11/06/2006	242 ug/l	100 ug/l	N.Y. aquatic (chronic)
TFe	02/12/2007	742 ug/l	300 ug/l	N.Y. aquatic (chronic)
TAI	02/12/2007	455 ug/l	100 ug/l	N.Y. aquatic (chronic)
TAI	05/23/2007	252 ug/l	100 ug/l	N.Y. aquatic (chronic)

Date	WQI	Parameters Exceeding 90 th Percentile							
08/23/2006	43.7								
11/06/2006	47.9								
02/12/2007	51.7	TFe	TAI	SS					
05/23/2007	52.2	DO							

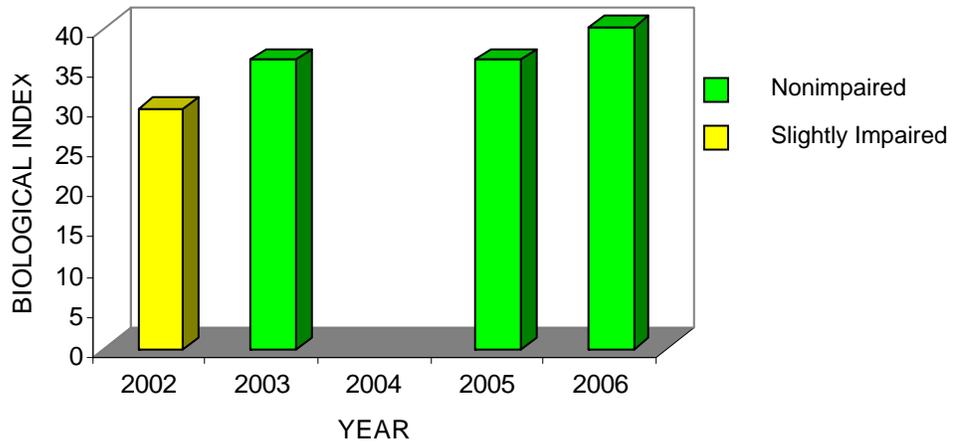
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	26
Diversity Index	2.41
RBP Score	40
RBP Condition	Reference
Total Habitat Score	136
Habitat Condition Category	Excellent

Water Quality Index



Biological Index



Susquehanna River at Marietta, Pa. (SUSQ 44.5)



Water Quality: Total iron and dissolved oxygen did not meet water quality standards.

Biological Condition: NA

Habitat Assessment: NA

Trends: Water quality has remained fairly consistent over the last 5 years at SUSQ 44.5.

Other Notes: Macroinvertebrate sampling and habitat assessment are not typically performed at SUSQ 44.5 due to deep waters and lack of riffle habitat.

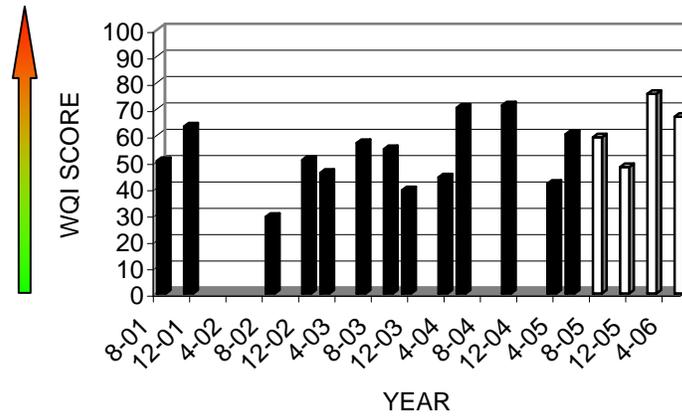
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
DO	07/03/2006	4.73 mg/l	5.0 mg/l	Pa. aquatic life
TFe	07/03/2006	7950 ug/l	1500 ug/l	Pa. aquatic life

Date	WQI	Parameters Exceeding 90 th Percentile							
07/03/2006	67.8	TFe	TP	TMn	TOC	DO			
10/18/2006	46.3	TSO4	COND						
02/21/2007	58.8	TSO4	TOC	DO	COND				
05/10/2007	66.7	TFe	TSO4	TURB	TAI	DO	TEMP		

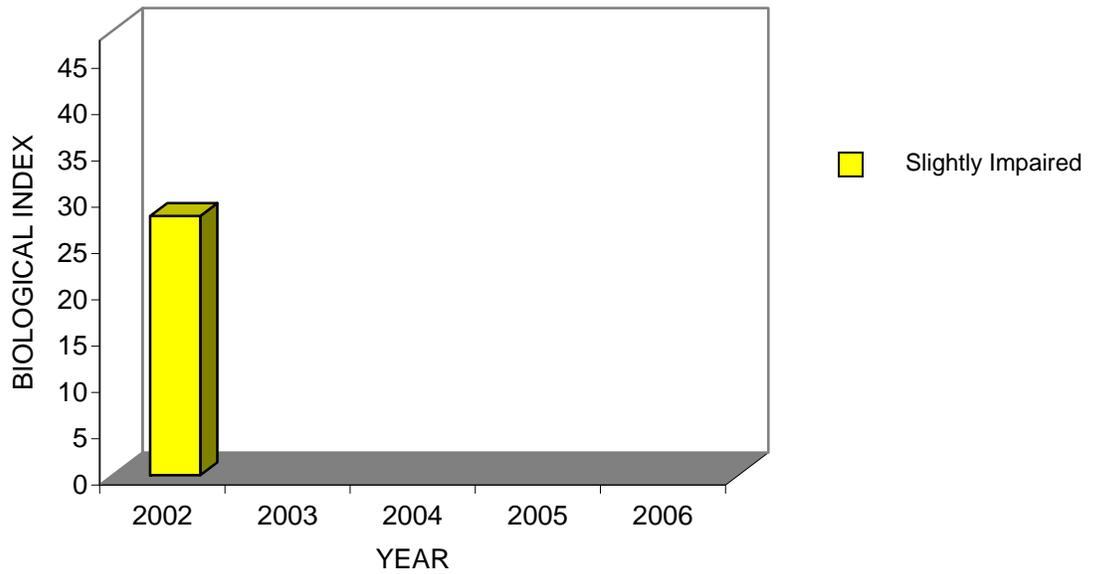
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	NA
Diversity Index	NA
RBP Score	NA
RBP Condition	NA
Total Habitat Score	NA
Habitat Condition Category	NA

Water Quality Index



Biological Index



Susquehanna River at Conowingo, Md. (SUSQ 10.0)



Water Quality: No parameter exceeded water quality standards.

Biological Condition: NA

Habitat Assessment: NA

Trends: Water quality showed an overall slightly decline from last year.

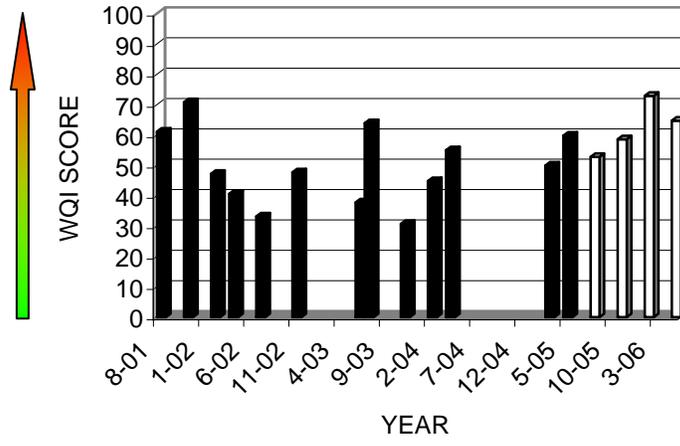
Other Notes: Macroinvertebrate collection and habitat assessments are not performed at SUSQ 10.0 due to deep waters and lack of riffle habitat. This site is only 10 miles upstream of where the Susquehanna River empties into the Chesapeake Bay.

Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State

Date	WQI	Parameters Exceeding 90 th Percentile							
07/25/2006	56.4	TSO4	TNH3	DO	TEMP	COND			
10/18/2006	56.9	TMn	TEMP						
02/21/2007	70.8	TSO4	TNH3	TMn	TFe				
05/10/2007	70.2	TSO4	SS	TMn	TAI	TURB	TFe		

For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Water Quality Index



Tioga River at Lindley, N.Y. (TIOG 10.8)



Water Quality: Total aluminum and total iron exceeded water quality standards.

Biological Condition: Nonimpaired

Habitat Assessment: Excellent

Trends: Water quality showed a slight decline, but habitat conditions remained ranked as excellent. Biological conditions were nonimpaired for the second consecutive year.

Other Notes: Lack of adequate riparian buffer was one major area where habitat improvements could be made.

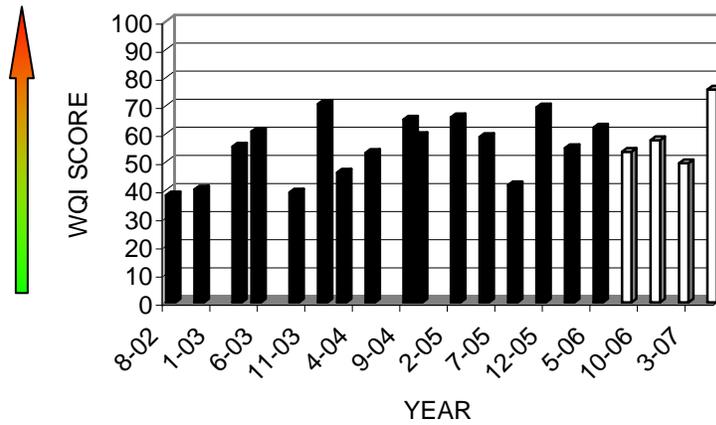
Parameters Exceeding Standards				
Parameter	Date	Value	Standard	State
TAI	08/14/2006	231 ug/l	100 ug/l	N.Y. aquatic (chronic)
TFe	08/14/2006	2254 ug/l	300 ug/l	N.Y. aquatic (chronic)
TAI	11/07/2006	398 ug/l	100 ug/l	N.Y. aquatic (chronic)
TFe	11/07/2006	384 ug/l	300 ug/l	N.Y. aquatic (chronic)
TFe	05/16/2007	493 ug/l	300 ug/l	N.Y. aquatic (chronic)
TAI	05/16/2007	422 ug/l	100 ug/l	N.Y. aquatic (chronic)

Date	WQI	Parameters Exceeding 90 th Percentile							
08/14/2006	53.6	TFe	TSO4						
11/07/2006	57.7	TSO4	DO	TEMP					
02/22/2007	49.5	TSO4	TMn						
05/16/2007	75.7	TFe	TSO4	TURB	TAI	TMn	DO	SS	

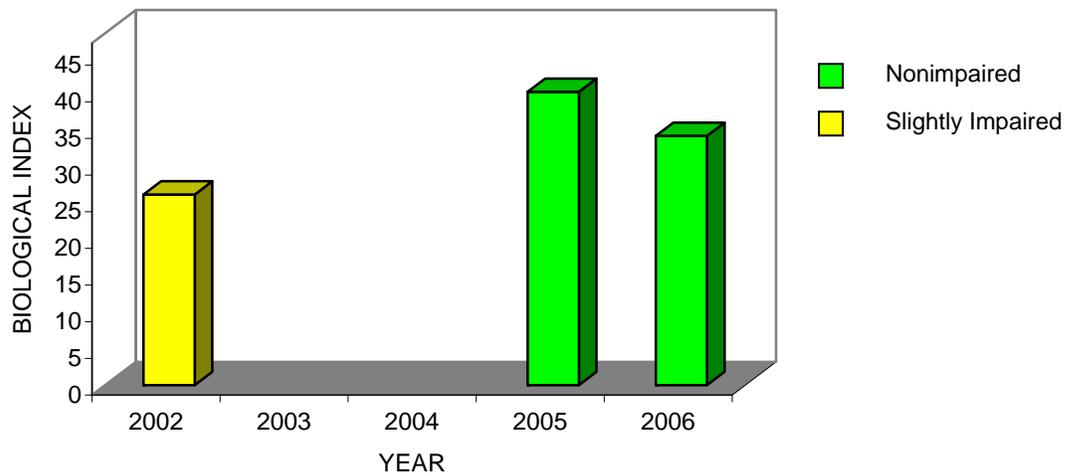
For information on the parameter abbreviations used above and data analysis procedures, go to [Methods](#).

Biological and Habitat Summary	
Number of Taxa	22
Diversity Index	2.55
RBP III Score	34
RBP III Condition	Nonimpaired
Total Habitat Score	159
Habitat Condition Category	Excellent

Water Quality Index



Biological Index



Site Results for Group 3 Streams on the New York- Pennsylvania Border

Babcock Run (BABC)



During May 2007, the macroinvertebrate community of Babcock Run near Cadis, Pa., was designated as slightly impaired, which improved slightly from last year's moderately impaired rating. BABC ranked fairly high in percent Ephemeroptera and EPT Index. The pollution tolerant Chironomidae midges were about 30 percent of the entire sample. Physical habitat conditions were rated as supporting this year, which is a decline from previous years. Staff noted poor epifaunal substrate, sediment deposition, and condition of banks. All field chemistry parameters were within acceptable limits. BABC is located in a mostly forested watershed, and the streambed is dominated by cobble substrate.

Beagle Hollow/Redhouse Run (BEAG)



Slightly impaired biological conditions existed at Beagle Hollow Run (also sometimes called Redhouse Run) near Osceola, Pa., during May 2007. Metrics with fairly high scores included percent Ephemeroptera and EPT index. However, Shannon Diversity did not rank very high, and the sample was dominated by Chironomidae. Habitat conditions were considered supporting, with good scores for frequency of riffles and vegetative protective cover but poor scores for condition of banks and channel flow status. Staff noted an abundance of green algae on the substrate. All field chemistry parameters were within natural ranges.

Bill Hess Creek (BILL)



Bill Hess Creek near Nelson, Pa., was designated moderately impaired in 2007 for the second consecutive year. The biological community showed poor scores for Shannon Diversity Index, taxa richness, and percent dominant taxa. The habitat was rated supporting again this year, with low scores given for condition of banks, velocity/depth regimes, and channel flow status. The habitat assessment did identify some very positive characteristics of Bill Hess Creek, including low amounts of sediment deposition and only slight embeddedness. All field chemistry parameters were within acceptable limits.

Bird Creek (BIRD)

In 2007, Bird Creek near Webb Mills, N.Y., was designated as slightly impaired for biological condition, which is down from its nonimpaired ranking last year. This site had good scores for EPT Index and Hilsenhoff Biotic Index. Chironomidae were the dominant taxa and made up about 25 percent of the sample. The habitat at Bird Creek was designated as supporting again in 2007, primarily due to poor conditions of banks, velocity/depth regimes, and vegetative protective cover. The primary substrate material in Bird Creek is cobble. All field chemistry parameters fell within acceptable ranges.

Biscuit Hollow (BISC)

Slightly impaired biological conditions existed at Biscuit Hollow near Austinburg, Pa., during the 2007 survey. This is the second consecutive year of slightly impaired conditions after two years of nonimpaired rankings. Biscuit Hollow had a good score for percent Ephemeroptera but just average scores for the other biotic index parameters. The physical habitat at this site was ranked as excellent in 2007, with high scores given for channel flow status, vegetative protective cover, and riparian vegetative zone width. The site had slightly eroded banks and was located in an area dominated by abandoned fields and an overgrown pasture, downstream of numerous old beaver dams. Staff noted evidence of recent high flows and at the time of sampling, flows were twice as high as normal for May. Field chemistry parameters were within acceptable ranges.

Briggs Hollow Run (BRIG)



Briggs Hollow Run near Nichols, N.Y., was designated slightly impaired during the 2007 sampling season for the third consecutive year. The sample showed good metric scores for Hilsenhoff Biotic Index and percent Ephemeroptera. The very low metric score for Hilsenhoff Index means there were a large number of pollution intolerant organisms in the sample, such as the mayfly genera *Epeorus*. However, BRIG also had a fairly low taxonomic richness and Shannon Diversity Index. The physical habitat was designated as partially supporting and was given low scores for conditions of banks, vegetative protective cover, channel flow status, and riparian vegetative zone width. All field chemistry parameters were within acceptable limits.

Bulkley Brook (BULK)

Bulkley Brook near Knoxville, Pa., had a moderately impaired biological community and supporting habitat conditions during the 2007 sampling season. The two lowest biological scores for this site were EPT Index and percent Chironomidae, which was also the dominant taxon. Low biological category scores were diversity index, EPT Index, and percent Ephemeroptera. Habitat assessment showed high scores for instream cover, frequency of riffles, vegetative protective cover, and riparian vegetative zone width. BULK is located in a forested area downstream of numerous beaver dams and continues to have a well-developed riparian zone. Staff noted that sampling was done one day after heavy rains, so flows were higher than normal. Field chemistry indicated that all parameters were within acceptable limits.

Camp Brook (CAMP)

Camp Brook near Osceola, Pa., had a slightly impaired biological community in May 2007. The biological community at CAMP consisted of a large number of the pollution intolerant stonefly genera *Alloperla* (Plecoptera: Choloroperlidae). The physical habitat of the stream was designated supporting for the second consecutive year; low scores were given for condition of banks, sediment deposition, and embeddedness. All field chemistry parameters were in the normal range. Staff noted that flow was higher than normal due to heavy rainfall the previous day.

Cook Hollow (COOK)

Cook Hollow near Austinburg, Pa., had a slightly impaired biological community for the third straight year. This site had a fairly high taxonomic richness and percent Ephemeroptera, but scored just average on all the other biological metrics. The habitat was rated as excellent, with high scores for epifaunal substrate, frequency of riffles, vegetative protective cover, and riparian vegetative zone width. This stream site is located in an area of primarily cropland, forest, and old fields. All field chemistry parameters were within acceptable limits.

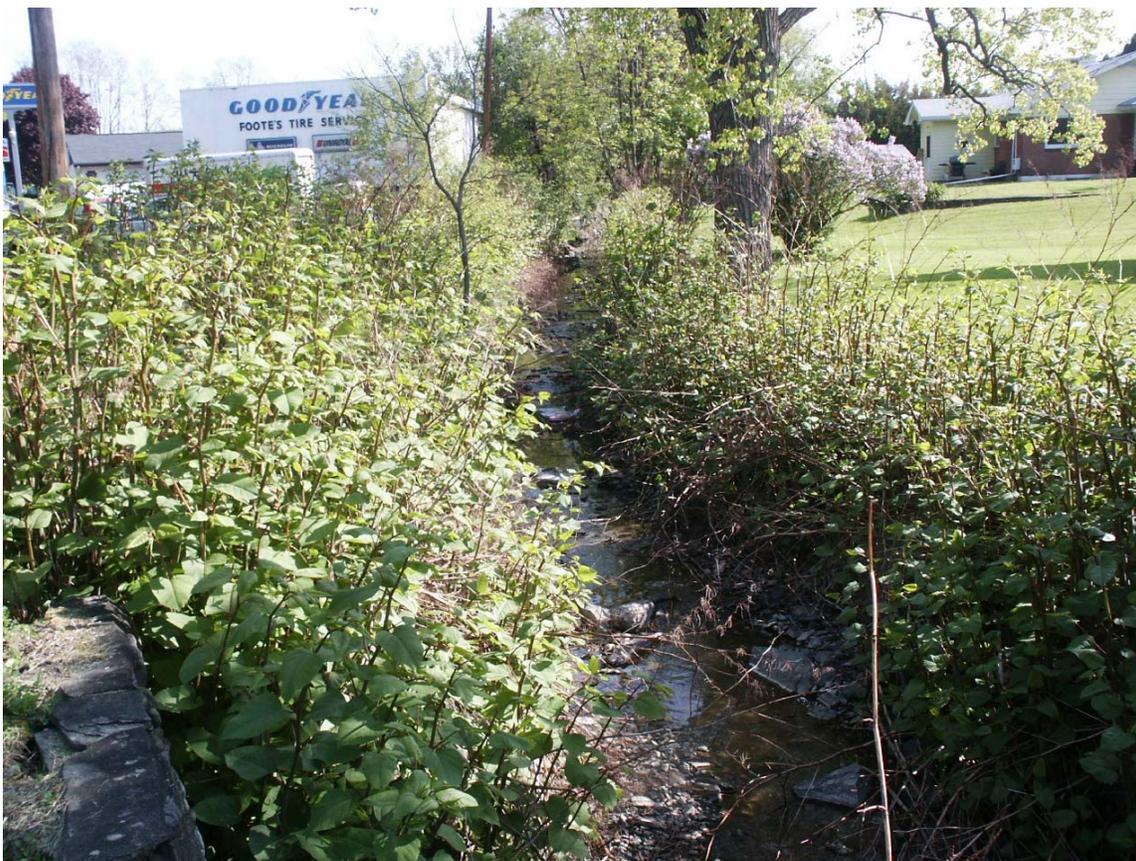
Deep Hollow Brook (DEEP)

The biological community of Deep Hollow Brook near Danville, N.Y., served as the reference site for the Group 3 streams in 2007 for the third year in a row. This site had the best combination of biological, habitat, and field chemistry conditions of the Group 3 streams. DEEP had the highest taxonomic richness, Shannon Diversity Index, and EPT Index of all Group 3 streams. Alkalinity was slightly below the Pennsylvania aquatic life standard this year, but all other field chemistry parameters were at acceptable levels. Habitat at DEEP was designated as excellent, with high scores for epifaunal substrate, frequency of riffles, instream cover, vegetative protective cover, and riparian vegetative zone width. This watershed was located in a mostly forested area, interspersed with scattered cropland and old fields, and the station was located downstream of a beaver dam.

Denton Creek (DENT)

Denton Creek near Hickory Grove, Pa., had a moderately impaired biological community during May 2007 for the third straight year. DENT had poor scores for several metrics, Shannon Diversity Index, EPT Index, and percent dominant taxa. The habitat was rated as supporting, with low scores for velocity/depth regimes, channel flow status, and sediment deposition. The sampling site was located downstream of Hawkins Lake in a mostly forested area. As in previous years, alkalinity values at DENT exceeded the water quality standards, but other field chemistry parameters were within acceptable limits in May 2007. Staff noted very low water levels during the time of sampling.

Dry Brook (DRYB)



Dry Brook at Waverly, N.Y., was sampled in May 2007, and the biological condition was rated as severely impaired. Dry Brook had the poorest scores of all the Group 3 streams for six of the seven metrics. There were no Ephemeroptera taxa, and the sample was highly dominated by Chironomidae. Habitat was rated as partially supporting with low scores for riparian vegetative zone, velocity/depth regimes, condition of banks, and vegetative protective cover. This site is located in a primarily residential area. Staff noted the presence of human refuse around the site as well as a strong sewage odor. A majority of the substrate was covered with green and pink algae. All field chemistry parameters were within the acceptable range.

Little Wappasening Creek (LWAP)

Little Wappasening Creek near Nichols, N.Y., was dry during May 2007 sampling.

Parks Creek (PARK)



Parks Creek was sampled near Litchfield, N.Y., and was designated as having a slightly impaired biological community for the third consecutive year. This site scored high on the Hilsenhoff Biotic Index, percent Ephemeroptera, and percentage of Chironomidae but fairly low for EPT Index and taxonomic richness. Parks Creek had a low habitat ranking of only partially supporting in 2007, which was mostly due to very low flow conditions at the time of sampling. Staff noted that only about 25 percent of the channel had water in it and the remainder was exposed substrate. The predominant land use is forested, with a considerable amount of woody debris and fallen trees in the stream channel. All field chemistry parameters were within acceptable ranges.

Prince Hollow Run (PRIN)



Prince Hollow Run near Cadis, Pa., was designated moderately impaired in May 2007, again showing a slight decline from its previous years rating, but still better than the severely impaired conditions of past years. This site had very low scores for percent Chironomidae, which were the dominant taxa at almost 75 percent of the sample. The habitat was rated as partially supporting, with low scores for condition of banks, embeddedness, vegetative protective cover, and riparian vegetative zone width. At the time of sampling, staff noted an abundance of brown algae in ponded areas. All field chemistry parameters were within the acceptable ranges.

Russell Run (RUSS)

Russell Run near Windham, Pa., was designated as slightly impaired in May 2007. High metric scores were given for Hilsenhoff Biotic Index, percent Ephemeroptera, and percent Chironomidae. The sample was dominated by the organic pollution intolerant *Epeorus* (Ephemeroptera; Heptagenidae). The habitat at RUSS was considered supporting, with low scores given for channel flow status and vegetative protective cover, but high scores for channel alteration, frequency of riffles, and embeddedness. Russell Run is located in a primarily forested area, and staff noted that a majority of the substrate was cobble. All field chemistry parameters were normal.

Sackett Creek (SACK)

Sackett Creek was sampled near Nichols, N.Y., and was designated as slightly impaired for biology; the physical habitat was rated supporting. This site showed good scores for Hilsenhoff Biotic Index, percent Chironomidae, and percent Ephemeroptera. Habitat was rated high for epifaunal substrate, frequency of riffles, and riparian vegetative zone, but had low scores for condition of banks and channel flow status. All field chemistry parameters were within normal ranges.

Smith Creek (SMIT)



Smith Creek near East Lawrence, Pa., was designated as having a nonimpaired biological community with supporting physical habitat for the second consecutive year in May 2007. SMIT had one of the best scores for taxonomic richness, species diversity, EPT Index, and percent dominant taxa of all the Group 3 streams. Low habitat scores were given for a number of parameters, including sediment deposition, velocity/depth regimes, embeddedness, and riparian vegetative zone width. This small stream drains a wetland area and mixed coniferous forest. There were no field chemistry parameters that exceeded state limits.

Strait Creek (STRA)



A slightly impaired biological community existed at Strait Creek near Nelson, Pa., during FY-07. The macroinvertebrate sample scored fairly well on most of the biological metrics but not exceptionally well on any of them. The physical habitat was designated supporting, and all field chemistry parameters were within normal limits. Low habitat scores were given for channel flow status, condition of banks, and riparian vegetative zone width. Staff noted that this site was located in an area of mostly forests and pastures. All field chemistry parameters were within the acceptable ranges.

White Branch Cowanesque River (WBCO)

In May 2007, White Branch Cowanesque River near North Fork, Pa., was designated severely impaired, with the worst metric scores of all Group 3 streams for Hilsenhoff Biotic Index, EPT Index, and percent Ephemeroptera. Additionally, it scored very low for taxonomic richness and species diversity. The sample was dominated by midges, comprising 70 percent of the sample. WBCO had been nonimpaired in May 2000 with a number of pollution intolerant taxa, but degraded to severely impaired by May 2003. During the last few years, conditions had slightly improved to moderately impaired, but this year, it scored back in the lowest ranking. However, the habitat was supporting due to high scores for frequency of riffles, sediment deposition, vegetative protective cover, and epifaunal substrate. WBCO is located downstream of an impoundment. Field chemistry measurements were within acceptable ranges. Staff noted the abundance of algae on the predominantly cobble substrate.

White Hollow (WHIT)

White Hollow near Wellsburg, N.Y., was designated as nonimpaired in FY-07, which was an improvement from last year's slightly impaired rating. The biological index score was high for EPT Index, taxonomic richness, Hilsenhoff Biotic Index, and percent Chironomidae. The physical habitat was rated supporting, with lower scores for condition of banks and vegetative protective cover; but higher scores for epifaunal substrate, instream cover, and frequency of riffles. All water chemistry parameters were within the normal range. This site is located in a mainly forested area.

CONCLUSIONS

Fourteen (29 percent) of the 48 interstate streams sites at which macroinvertebrate samples were collected during FY-07 had nonimpaired biological communities. Biological conditions at another 22 sites (46 percent) were slightly impaired, while ten sites (21 percent) were moderately impaired. Two sites (4 percent) were designated severely impaired. Five sites (SUSQ 10.0, SUSQ 44.5, TROW 1.8, SNAK 2.3, and LWAP) were not sampled using RBP III techniques due to either dry conditions or deep waters and thus, were not averaged into the final scores. Twenty-two (46 percent) sites had excellent habitats. Nineteen (40 percent) had supporting habitats, and seven sites (14 percent) were designated as having a partially supporting habitat.

Overall, 69 observations (4 percent) of water chemistry parameters exceeded state standards; this is a lower proportion of exceedance values than last year. Total aluminum exceeded standards most frequently with 28 violations (41 percent). Twenty out of the 29 sites had parameters exceeding water quality standards, with 13 of those having more than one violation. Total iron and total aluminum appear to be naturally high in some of these watersheds. Tioga River is the only stream that has documented abandoned mine discharge indicated by high metals and high acidity. Elevated aluminum and depressed alkalinity may be due to acid precipitation, especially in the New York-Pennsylvania border streams. Total dissolved solids, nitrate plus nitrite, and dissolved oxygen are all indicators of organic pollution.

During the summer sampling event when macroinvertebrates are collected and habitat conditions are assessed, two of the New York-Pennsylvania streams were dry so no macroinvertebrate or habitat assessment could be completed. Of the remaining twelve sites, the biological community of five (42 percent) of these streams was nonimpaired. Overall, biological conditions improved at two sites, declined at two sites, and stayed the same at the other three stations (the remaining five sites were not sampled in FY-06 due to dry conditions). High metal concentrations, particularly total iron and total aluminum, appeared to be the most common sources of water quality degradation in this region. The parameters that exceeded New York and Pennsylvania state standards were total iron, total aluminum, total chlorine, pH, dissolved oxygen, and alkalinity. Iron standards were exceeded at Apalachin Creek, Cascade Creek, Little Snake Creek, and Troups Creek. Aluminum standards were exceeded at Apalachin Creek, Bentley Creek, Cascade Creek, Cayuta Creek, Choconut Creek, North Fork Cowanesque River, Seeley Creek, and Troups Creek. Total chlorine was exceeded at Cayuta Creek, while Cascade Creek did not meet alkalinity standards. Dissolved oxygen standards were not met at South Creek, and pH standards were exceeded at Cascade Creek.

Seven of the New York-Pennsylvania sites had excellent habitats (58 percent), while another three sites (25 percent) had supporting habitat scores. Two sites had partially supporting habitat. In overall habitat ratings, two sites improved, two sites declined, and three sites remained the same as the previous year (the remaining five sites were not sampled in FY-06 due to dry conditions). The most common habitat concerns among the New York-Pennsylvania streams are lack of riparian buffer zone along the stream banks and sedimentation.

During FY-07, nine Pennsylvania-Maryland border sites were sampled. Two streams (22 percent) were designated nonimpaired using RBP III protocol designations. Six sites (67 percent) were slightly impaired, and one site (11 percent) was moderately impaired. No sites were ranked as severely impaired. Biological conditions at Pennsylvania-Maryland sites appeared to change some, with three sites showing improvement and three sites showing a decline in biological conditions.

Six (75 percent) of the Pennsylvania-Maryland border sites had excellent habitats, while two sites (25 percent) had supporting habitats. The remaining one site (11 percent) was ranked as having partially supporting habitat. Water quality at three sites exceeded Pennsylvania and Maryland water quality standards: nitrite plus nitrate at CNWG 4.4, dissolved oxygen at SCTT 3.0, and total chlorine at EBAU 1.5. The Pennsylvania-Maryland border streams are located in a heavily agricultural region, and many of the parameters that exceeded the 90th percentile at these sites were nutrients. Also, streambank erosion, lack of riparian buffers, and sedimentation created instream habitat problems in this region.

River sites consisted of nine stations located on the Susquehanna, Chemung, Cowanesque, and Tioga Rivers. This year, two stations (SUSQ 10.0 and SUSQ 44.5) were not sampled for macroinvertebrates due to deep water and a lack of riffle habitat at the sites. Of the seven river sites that were sampled during FY-07, the biological community at four (57 percent) of these sites was nonimpaired. One site (14 percent) had slightly impaired biological conditions, and two sites (29 percent) were ranked as moderately impaired. Water quality parameters that exceeded state standards were total iron, total aluminum, and dissolved oxygen. Total iron standards were exceeded at COWN 2.2, COWN 1.0, SUSQ 340.0, SUSQ 289.1, TIOG 10.8, and SUSQ 44.5. Total aluminum standards were exceeded at CHEM 12.0, COWN 2.2, COWN 1.0, SUSQ 365.0, SUSQ 340.0, SUSQ 289.1, and TIOG 10.8. Additionally, dissolved oxygen exceeded water quality standards at SUSQ 289.1 and SUSQ 365. Water quality appeared to decline slightly with an increased number of state water quality standard violations. The habitat at six (86 percent) of the river sites was excellent and the other one site (14 percent) rated as having supporting habitat.

Group 3 sampling stations consisted of 21 sites on small streams located along the New York-Pennsylvania border. One site was dry during the FY-07 sampling. Three of the 20 sites sampled (15 percent) had nonimpaired biological conditions. Eleven sites (55 percent) were slightly impaired, and four sites (20 percent) were moderately impaired. The remaining two sites (Dry Brook and White Branch Cowanesque River) were ranked as severely impaired. Overall, two of the Group 3 sites demonstrated an improvement in biological condition, eight sites showed a decline, and ten remained the same. Three (15 percent) of the Group 3 sites had excellent habitat scores. Thirteen sites (65 percent) had supporting habitat conditions, while four sites (20 percent) were designated partially supporting, and no sites were nonsupporting. In overall habitat rankings, two of the Group 3 sites were improved, eight showed some degradation, and ten remained the same as the previous year. Field water chemistry parameters were all within the normal range at all Group 3 sites, except for low alkalinity at Deep Hollow Brook and Denton Creek.

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 of interstate streams in the Susquehanna River Basin. The data can be used by SRBC's member states and local interest groups to gain a better understanding of water quality in upstream and downstream areas outside of their jurisdiction. Information in this report also can serve as a starting point for more detailed assessments and remediation efforts that may be planned on these streams.

Future Study

Future study and remediation efforts should focus on those streams that had moderately or severely impaired macroinvertebrate communities or exceeded water quality standards. Moderately impaired biological conditions were found at Seeley Creek, Wappasening Creek, Holden Creek, Conowingo Creek, both sites on the Cowanesque River (1.0 and 2.2), Bulkley Brook, Bill Hess Creek, Denton Creek, Dry Brook, Prince Hollow Run, and White Branch Cowanesque River. Additional study of stream water chemistry, biology, and habitat at varying flows may help explain some impairment problems.

During this sampling period, a large number of streams had water quality parameters that exceeded standards. These streams included Apalachin Creek, Bentley Creek, Cascade Creek, Cayuta Creek, Choconut Creek, Little Snake Creek, Seeley Creek, Scott Creek, South Creek, Troups Creek, Conowingo Creek, Ebaughs Creek, Falling Branch Deer Creek, Long Arm Creek, Chemung River, Cowanesque River (1.0 and 2.2), Susquehanna River (10.0, 44.5, 289.1, 340, and 365), Tioga River, Deep Hollow Brook, and Denton Creek. The water quality conditions of these streams should be monitored for future violations. Furthermore, the source of these pollutants should be identified. State water quality standards vary across state lines, and problems may arise when the source of these pollutants is located in an adjacent state.

All water quality data from interstate streams sampling from the mid-1980s to the present are available from SRBC upon request.

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