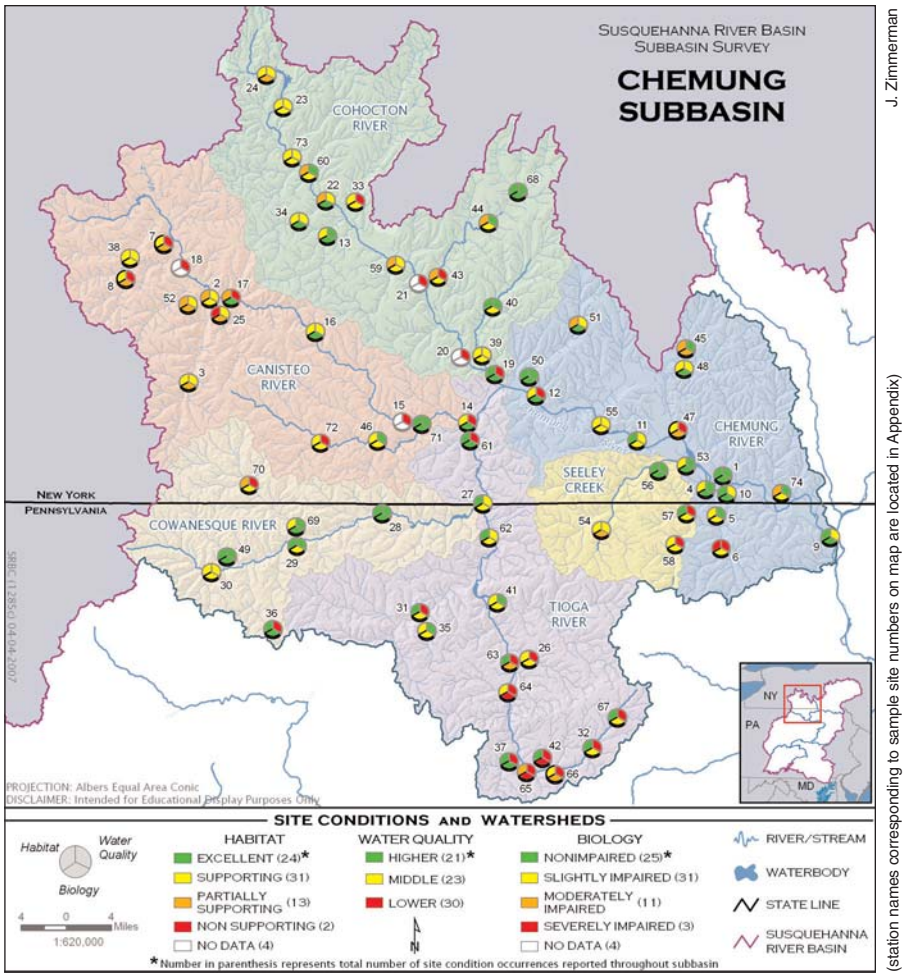
RESULTS/DISCUSSION

Water quality, biological (macroinvertebrate) community, and habitat site conditions for each sampling site in 2006 throughout the Chemung Subbasin are depicted in Figure 4. Seven sites, BDWN 0.3, COWN 12.0, NFCR 0.1, POST 0.6, SOUT 2.0, TOBE 1.9, and TUSC 0.4, demonstrated the best overall conditions in each category with nonimpaired macroinvertebrates, "higher" water quality, and excellent habitat. Twenty-one sites (28 percent) did not exceed levels of concern and received "higher" water quality ratings. Twenty-three sites (31 percent) slightly exceeded levels of concern and received a "middle" water quality rating, and 30 sites (41 percent) received a "lower" water quality rating. Nonimpaired biological conditions were found at 25 sites (36 percent), slightly impaired conditions were found at 31 sites (44 percent), moderately impaired conditions were found at 11 sites (16 percent), and severely impaired conditions were found at three sites (4 percent). Habitat conditions were excellent at 24 sites (34 percent), supporting at 31 sites (44 percent), partially supporting at 13 sites (19 percent), and nonsupporting at two sites (3 percent).

The parameters to exceed levels of concern at the most sites were aluminum (29), sodium (19), and total nitrogen (17) (Table 4). The sites with the highest number of parameters exceeding levels of concern were BNTY 5.7 (5), CANA 6.7 (5), CNST 33.0 (5), MORR 0.8 (9), TIOG 29.8 (5), TIOG 35.4 (5), and TIOG 39.6 (6). The highest or lowest value for each parameter is printed in bold on Table 4. The highest values for metals were manganese (11,900 µg/l), iron (11,000 µg/l), and aluminum (9,193 µg/l). The highest values for nitrogen forms were 4.07 mg/l for total nitrogen, 2.0 mg/l for nitrate-n, and 0.04 mg/l for nitrite-n. Total phosphorus and orthophosphate maximum values were 0.69 mg/l and 0.484 mg/l, respectively. The highest sodium value was 92.3 mg/l, and total suspended solids and turbidity were 168 mg/l and 214.5 NTU, respectively. The lowest pH was 3.2, the highest acidity was 130 mg/l, and four sites had an alkalinity of zero (Table 4).



J. Zimmerman

(station names corresponding to sample site numbers on map are located in Appendix)

Figure 4. *Water Quality, Biological, and Habitat Conditions in the Chemung Subbasin in 2006.*

Some of the streams in the Chemung Subbasin Survey also were sampled as part of the Interstate Streams Monitoring Program, which is an annual monitoring program conducted on streams that cross state lines in the Susquehanna River Basin. SRBC staff collected quarterly or annual water chemistry, macroinvertebrates, flow, and habitat information on Bentley Creek, Seeley Creek, South Creek, Troups Creeks, Chemung River, Cowanesque River, North Fork Cowanesque River, and Tioga River at the Pennsylvania/New York state line. Assessments of these interstate streams from the 2006 Interstate Streams report http://www.srbc.net/pubinfo/techdocs/Publication_244/techreport244.htm are compared to the Subbasin Survey Program assessments throughout this report. An Interstate Streams Website is now available at http://www.srbc.net/interstate%5Fstreams/, and includes the most recent data and assessments.

Section 303(d) of the Clean Water Act requires a Total Maximum Daily Load (TMDL) to be developed for any waterbody designated as impaired, or not meeting the state water quality standards or its designated use. Streams in Pennsylvania are being assessed as part of the PADEP's Instream Comprehensive Evaluation Program, and if found to be impaired, a TMDL is calculated for the watershed. In New York, NYSDEC performs assessments through its Statewide Waters Monitoring Program. Table 5 lists Pennsylvania watersheds that have been identified as impaired, their impairment causes, the dates sampled, and the Chemung Subbasin Survey stations located in impaired sections. Table 6 includes a list of Chemung Subbasin Survey streams on the WI/PWL that were determined to have minor impacts, threatened, or

impaired and the causes and sources listed. More information on the Pennsylvania and New York TMDL programs is available on the web at http://www.dep.state.pa.us/watermanagement_apps/tmdl/default.asp and http://www.dec.ny.gov/chemical/31290.html, respectively .

COWANESQUE RIVER WATERSHED

This watershed is mostly forested and agricultural land cover with small towns and villages. The overall quality of the entire watershed was good; however, sections and tributaries of the Cowanesque River are listed as impaired on the integrated list (Table 5). Only one of the samples from this survey (COWN 0.1) was sampled in a section that was on the integrated list. Some of these impairments are from point source issues, such as municipal treatment plants and industrial discharges, which may be working towards compliance. Other impairments appear to be from agricultural practices and possible mercury deposition. Also, the Cowanesque River is impounded by the Cowanesque Reservoir near Lawrence, Pa., which impacts the river below the dam.

The most upstream site sampled on Cowanesque River was COWN 29.6 in Westfield, Pa. This site had a slightly impaired biological condition, "middle" water quality, and supporting habitat

Table 4. *Chemung Subbasin Sites with Water Quality Values Exceedng Levels of Concern*

Site	Sample Site	Alkalinity mg/l	Aluminum T µg/l	Hardness T mg/l	Iron T µg/l	Magnesium T mg/l	Manganese T µg/l	Nitrate-N T mg/l	Nitrogen T mg/l	Orthophosphate T mg/l	Phosphorus T mg/l	Sodium T mg/l	Sulfate T mg/l	T Org Carbon mg/l	T Susp Solid mg/l	Turbidity NTU	Acidity (Field) mg/l	pH (Field)	Specific Conductivity (Field) µmhos/cm	Water Temperature (Field) °C	TOTAL
2	BENN001.2																			28.2	1
3	BENN008.3									0.063										29.5	2
6	BNTY005.7		5887		**11000**						0.177				**168**	**214.5**					5
7	CANA001.7		244									32.5									2
8	CANA006.7							1.34	1.54	0.12	0.149	44.6									5
9	CHEM002.5								1.32			31.8									2
10	CHEM018.5								1.65			31.7									2
11	CHEM028.0											27.3									1
12	CHEM039.8		243						1.05			24.4									3
14	CNST001.0		662																	27.9	2
15	CNST007.7		790									20.3								26.6	3
16	CNST022.6											25.7								28.5	2
17	CNST033.0		274							0.084	0.13	30.6								26.2	5
18	CNST038.7		208									34.3								27.7	3
19	COHO000.5											**92.3**								27.6	2
20	COHO004.0		243						1.18												2
21	COHO014.6		246						1.25			80.8									3
22	COHO025.0							1.28	1.42												2
23	COHO037.5							**2**	2.25												2
24	COHO046.3		216						1.15												2
25	COLB000.8																			27	1
26	CORY001.5		242												72						2
27	COWN000.1																			25.1	1
30	COWN029.6								**4.07**	**0.484**	**0.69**			**24.8**							4
31	CRKD008.0		270																		1
32	FELL000.1	0.2	398															4.8			3
33	FMIL001.1		223						1.16												2
34	GOFF003.1							1.83	1.89			33.4									3
36	JEMI007.7		396																		1
37	JOHN000.1	9.4	316																		2
38	KARR000.1											32.9								26.1	2
39	MEAD000.1																			25.3	1
42	MORR000.8	**0**	**9193**		2420	**35.3**	**11900**						**410**				**130**	**3.2**	827		9
43	MUDC001.1		263																		1
47	NEWT000.6			**301**					1.39			67.8							**870**		4
48	NEWT009.7											23.7									1
51	POST008.8								1.39			24.5									2
52	PURD000.3									0.088	0.105									**30.9**	3
54	SEEL011.4							1.02	1.76												2
55	SING000.9							1.54	1.56			31.4									3
57	SOUT005.9		302																	26.1	2
58	SOUT009.1		235																		1
59	STOK000.3											21.9									1
61	TIOG006.2		239																		1
62	TIOG016.3		212																		1
63	TIOG029.8	**0**	1920				1510								46			4.8			5
64	TIOG035.4	**0**	2710				1770										26	4.05			5
65	TIOG039.6	**0**	4320		2510		2660										48	3.5			6
66	TIOG042.3	3.2	400																		2
67	TIOG049.2	14.2	295																		2
70	TRUP005.8		251																		1
72	TUSC012.9		235																	25.2	2
73	TWVE000.5							1.24	1.36												2
	TOTAL	8	29	1	3	1	4	7	17	5	5	19	1	1	3	1	3	5	2	15	

*Most extreme values for each parameter are printed in bold.

** Most extreme values for each parameter are printed in bold.*

Table 5. *Chemung Subbasin Survey Streams Identified as Impaired Streams Requiring a TMDL on PADEP's Integrated List of All Waters*

PA State Water Plan	Watersheds	Major Sources of Impairment	Stations in Impaired Sections
4A	Cowanesque River	Upstream Impoundment/Organic Enrichment/Low D.O.:2002, Source Unknown/Mercury:2002, Agriculture/Nutrients:2002, Municipal Point Source/Nutrients:2002, Industrial Point Source/ Thermal Modifications:2002, Industrial Point Source/ Cause Unknown:2002, Removal of Vegetation/Siltation:2002.	COWN 0.1
4A	Fellows Creek	Abandoned Mine Drainage/Metals, pH:2002	FELL 0.1
4A	Jemison Creek	Golf Courses/Nutrients:2002	
4A	Johnson Creek	Abandoned Mine Drainage/Metals, pH:2002	JOHN 0.1
4A	North Branch Cowanesque River	Agriculture/Siltation, Nutrients:2002	
4A	Tioga River	Source Unknown/Mercury:2002, Upstream Impoundment/ Siltation:2002, Abandoned Mine Drainage/pH, Metals:2002, Atmospheric Deposition/pH:1998, Road Runoff/Siltation:2002, Small Residential Runoff/Siltation:2002.	MORR 0.8, TIOG 16.3, TIOG 29.8, TIOG 35.4, TIOG 39.6, TIOG 42.3
4B	Chemung River	Source Unknown/Mercury:2002	CHEM 2.5

conditions. This site had the highest nitrogen, total phosphorus, total orthophosphate, and total organic carbon in this survey (Table 4). Two tributaries were sampled downstream of that site: North Fork Cowanesque River (NFCR 0.1) and Jemison Creek. NFCR 0.1 had overall good conditions in all categories. Biological condition was nonimpaired, water quality was "higher," and habitat was excellent. This stream was monitored in the Interstate Streams Program upstream from NFCR 0.1 at the Pennsylvania/ New York state line. During the July 2004 Interstate Streams Program sampling effort, biological and habitat conditions were nonimpaired and excellent, respectively. The headwaters of Jemison Creek, JEMI 7.7, had nonimpaired biological condition and excellent habitat, but water quality was considered "lower" due to a high aluminum value, potentially from naturally occurring aluminum. Jemison Creek served as a reference site for those sites in Ecoregion 62. This stream is listed as impaired near the mouth due to elevated nutrient levels.

The site on Cowanesque River downstream of Jemison Creek, COWN 20.5, still had slightly impaired biological conditions; however, the water chemistry parameters did not exceed levels of concern, and the habitat in this location was excellent. Troups Creek enters the Cowanesque River downstream of COWN 20.5 with good water quality conditions. The site at the mouth of Troups Creek (TRUP 0.4) served as one of the reference sites for Ecoregion 60, small drainage. TRUP 0.4 had nonimpaired biological condition, "higher" water quality, and supporting habitat, although the upstream site (TRUP 5.8) in New York State was slightly impaired possibly due to habitat conditions, which were partially supporting. At TRUP 5.8, the condition of banks was poor, and the riparian vegetated width was inadequate. The water quality was rated "lower" due to elevated aluminum, which could originate from soil eroding off the banks. There is also a wastewater treatment plant upstream that recently upgraded its treatment system, which could improve

S. Buda

Cowanesque Reservoir Dam near Lawrence, PA.

D. Sitlinger

Troups Creek after high water near the PA/NY state line.

Table 6. *Chemung Subbasin Survey Streams and Lakes on NYSDEC's WI/PWL as Threatened, Minor Impacts, Need Verification, or Impaired Segment*

Stream	Status	Causes	Sources
Almond Lake	Impaired Segment	Silt/Sediment, Aesthetics	Hydro Modification, Streambank Erosion
Bennetts Creek, Lower, and minor tribs	Minor Impacts	Silt/Sediment	Streambank Erosion
Bennetts Creek, Upper, and tribs	Minor Impacts	Silt/Sediment	Streambank Erosion
Canacadea Creek, Lower, and tribs	Minor Impacts	Silt/Sediment, Nutrients, Unknown Toxicity	Municipal, Unknown Source, Urban/Storm Runoff
Canacadea Creek, Upper, and minor tribs	Minor Impacts	Silt/Sediment	Streambank Erosion
Canisteo River, Middle, and minor tribs	Minor Impacts	Silt/Sediment	Streambank Erosion
Canisteo River, Middle, and minor tribs	Minor Impacts	Silt/Sediment	Streambank Erosion
Canisteo River, Middle, and minor tribs	Impaired Segment	Water Level/Flow, Restricted Passage, Unknown Toxicity	Habitat Modification, Unknown Source
Chemung River, Lower, Main Stem	Threatened	Pathogens	Agriculture
Cohocton River, Lower, and minor tribs	Need Verification	Nutrients	Agriculture
Cohocton River, Middle, and minor tribs	Threatened	Nutrients	Agriculture
Cohocton River, Middle, and minor tribs	Threatened	Nutrients	Agriculture
Cohocton River, Upper, and minor tribs	Threatened	Nutrients	Agriculture
Colonel Bills Creek	Minor Impacts	Silt/Sediment	Streambank Erosion
Demmons Pond	Minor Impacts	Algal/Weed Growth	Habitat Modification
Diven/Heller Creek and tribs	Minor Impacts	Unknown Toxicity	Unknown Source
Dry Run and tribs	Minor Impacts	Silt/Sediment	Streambank Erosion
Fivemile Creek, Lower, and tribs	Minor Impacts	Nutrients, Pesticides	Agriculture
Kopper Pond	Impaired Segment	Priority Organics	Industrial, Tox/Contam. Sediment
Lake Salubria	Impaired Segment	Algal/Weed Growth, Nutrients	Habitat Modification, On-Site/Septic Syst
Lamoka Lake and Mill Pond	Impaired Segment	Algal/Weed Growth	Habitat Modification
Loon Lake	Threatened	Problem Species	Habitat Modification
Meads Creek, Lower, and minor tribs	Minor Impacts	Silt/Sediment	Habitat Modification, Streambank Erosion
Meads Creek, Upper, and tribs	Minor Impacts	Silt/Sediment	Habitat Modification, Streambank Erosion
Mud Creek and tribs	Need Verification	Nutrients (phosphorus), Pathogens	Agriculture
Newtown Creek, Lower, and tribs	Minor Impacts	Nutrients, Unknown Toxicity	Urban/Storm Runoff
North Branch Newtown Creek and tribs	Need Verification	Nutrients	Agriculture
Purdy Creek and tribs	Minor Impacts	Silt/Sediment	Streambank Erosion
Seeley Creek and minor tribs	Threatened	Water Level/Flow	Hydro Modification, Streambank Erosion
Smith Pond	Impaired Segment	Algal/Weed Growth, Nutrients	Habitat Modification, On-Site/Septic Syst
Tioga River, Main Stem	Minor Impacts	Silt/Sediment, Water Level/Flow, Acid/Base (pH)	Hydro Modification, Other Source
Tobehanna Creek and tribs	Need Verification	Algal/Weed Growth, Nutrients, Silt/Sediment	Agriculture
Tuscarora Creek, Upper, and tribs	Need Verification	Aesthetics, D.O./Oxygen Demand, Ammonia, Nutrients	Municipal
Twelvemile Creek and tribs	Minor Impacts	Nutrients	Agriculture
Waneta Lake	Impaired Segment	Algal/Weed Growth	Habitat Modification

**Additional suspected and possible causes and sources. See WI/PWL document for details.*

in-stream conditions. Troups Creek also was sampled quarterly as part of the Interstate Streams Monitoring Program at the Pennsylvania/New York state line from July 2004 to June 2005. The macroinvertebrate community sampled in July 2004 was rated slightly impaired, and the habitat was supporting. This Interstate Streams Program site was similar in quality to the upstream Subbasin Survey Program site, TRUP 5.8, and also had elevated aluminum and iron, possibly from eroding stream banks (see photograph on page 8).

COWN 12.0 in Elkland, Pa., had overall good conditions. The biological condition was nonimpaired, the habitat was excellent, and the water quality was "higher." Downstream of Cowanesque Lake at COWN 0.1, however, the conditions degraded slightly. The biological condition was slightly impaired, the water quality was rated "middle," and the habitat conditions remained excellent. The temperature at COWN 0.1 at the time of sampling exceeded water quality levels of concern. COWN 0.1 and a site upstream directly below the dam (COWN 2.2) are sampled in the Interstate Streams Program. SRBC staff rated the biological conditions at COWN 0.1 as nonimpaired and the habitat as supporting in July 2004; however, COWN 2.2 was rated moderately impaired with partially supporting habitat. These sites had elevated iron and aluminum values at the time of sampling. In previous years, COWN 0.1 was rated slightly or moderately impaired, although usually had improved conditions compared to COWN 2.2. This recovery at COWN 0.1 in 2004 compared to previous years' conditions may be due to water quality improvements to the dam discharge, which were implemented around 2000 (Lazorchick, 2007).

S. Buda

Tobehanna Creek near Tyrone, NY.

CANISTEO RIVER WATERSHED

The headwaters of Canisteo River Watershed around Hornell and Canisteo, N.Y., had numerous impaired sites in this survey. Moderately impaired biological conditions were found at five sites in this area. Staff sampled at two stations in Canacadea Creek, one towards the headwaters and one at the mouth; both sites had moderately impaired biological conditions, "lower" water quality, and supporting habitats. Total nitrogen, total nitrate-n, total phosphorus, total orthophosphate, and total sodium exceeded water quality levels of concern at the headwaters site (Table 4), while total sodium and total aluminum exceeded levels at the downstream station.

Another tributary to Canisteo River was Karr Valley Creek, which had slightly impaired biological condition, "middle" water quality, and supporting habitat. Purdy Creek and Colonel Bill's Creek had moderately impaired biological conditions and "middle" water quality due to temperature exceeding standards; total phosphorus and orthophosphate also exceeded levels of concern at Purdy Creek (Table 4). In addition, habitat was impaired at both sites with Purdy Creek conditions rated as partially supporting and Colonel Bill's Creek as nonsupporting. Purdy Creek habitat was impaired due to channel alteration and lack of adequate riparian buffer and Colonel Bill's Creek due to excessive sediment deposition and poor condition of banks. Purdy Creek was channelized with rip rap and a levee on the left bank.

Bennetts Creek had two sample sites, one near the headwaters, BENN 8.3, and one at the mouth, BENN 1.2. BENN 8.3 was moderately impaired, while BENN 1.2 had only slightly impaired biological conditions. Both sites had "middle" water quality; BENN 8.3 exceeded orthophosphate and temperature levels of concern, and BENN 1.2 exceeded temperature levels of concern (Table 4). BENN 1.2 had a lower habitat rating, with partially supporting habitat, whereas BENN 8.3 was rated as supporting.

Although many of the tributaries had impaired biological conditions, the Canisteo River site downstream of Hornell and Canisteo, N.Y., (CNST 33.0) had nonimpaired biological condition. However, at the time of sampling, total aluminum, total phosphorus, orthophosphate, sodium, and temperature exceeded levels of concern. Upstream at CNST 38.7, where only water chemistry samples were collected, total aluminum, sodium, and temperature exceeded levels of concern. The habitat at CNST 33.0 was rated as partially supporting, mostly due to poor condition of banks and lack of adequate vegetated riparian buffer. Downstream at a site in West Cameron, N.Y., (CNST 22.6), biological

conditions were still rated as nonimpaired, but water chemistry improved to "middle" and habitat to supporting. At CNST 22.6, sodium and temperature exceeded levels of concern. These sections of Canisteo River are listed on NYSDEC's WI/PWL as an "impaired segment" at CNST 38.7 and as having minor impacts at CNST 33.0 and CNST 22.6. This section of the Canisteo River warrants further study and monitoring.

J. Orr

Tioga-Hammond Reservoir near Tioga, Pa.

Tuscarora Creek enters the Canisteo River near the mouth. Tuscarora Creek had slightly high total aluminum and temperature, slightly impaired biological conditions, and supporting habitat in the headwaters; however, the overall conditions at the mouth (TUSC 0.4) were optimal with nonimpaired biological conditions, "higher" water chemistry, and excellent habitat. This site at the mouth served as a reference site for Ecoregion 60, medium drainage size. A tributary to Tuscarora Creek, North Branch Tuscarora Creek, was sampled in this survey and had slightly impaired biological conditions, "higher" water quality, and supporting habitat. Two additional sites were sampled on the Canisteo River upstream and downstream of Tuscarora Creek. Only water quality information was collected at the upstream site and revealed high total aluminum, sodium, and temperature. Downstream of Tuscarora Creek, total aluminum and temperature were still high at the time of sampling, although biological conditions were nonimpaired, and habitat was supporting.

TIOGA RIVER WATERSHED

The headwaters of the Tioga River Watershed are located in Ecoregion 62 where there are numerous abandoned mine land areas (Figures 2 and 3). Abandoned mine drainage (AMD) from this area pollutes the Tioga River for most of its length. Numerous tributaries have AMD influences, including Fellows Creek, Johnson Creek, and Morris Run, which were sampled in this survey. All the sites had excellent habitat due to the forested nature of this area, except for Corey Creek, which had supporting habitat. The sites on Corey Creek and Fellows Creek had slightly impaired biological condition and "lower" water quality. The water quality at Corey Creek exceeded levels of concern for total aluminum and total suspended solids, while at Fellows Creek parameters of concern were alkalinity, total aluminum, and pH. Problems with sediment embedding the stream substrate were noted during Corey Creek's habitat assessment. This stream has suffered from severe streambank erosion, and efforts are being made through the Corey Creek Watershed Association to implement natural stream channel design (http://www.tiogacountypa.us/tioga/cwp/view.asp?A=928&Q=435165).

Many of the AMD tributaries had acidic conditions and therefore did not support acid-sensitive mayflies. Fellows Creek had no mayflies, since the alkalinity was only 0.2 mg/l. Johnson Creek at the mouth (JOHN 0.1) had higher alkalinity, although it still exceeded levels of concern. However, JOHN 0.1 was rated nonimpaired, largely due to the presence of a few mayfly taxa and many stoneflies. A passive treatment system was constructed in the headwaters of this watershed in Fall 2006, so future improvement may be noted. Morris Run was severely impaired due to AMD. Alkalinity, aluminum, iron, magnesium, manganese, sulfate, acidity, pH, and conductivity exceeded levels of concern. Morris Run had the highest aluminum, magnesium, manganese, sulfate, acidity (field), and lowest pH (field) of all the sites in the Chemung Subbasin Survey. MORR 0.8 only had two taxa in the sample, an acid-tolerant beetle (Dytiscidae: Agabus) and midge larvae.

Three samples from tributaries in the middle of the Tioga River Watershed had slightly impaired biological conditions and supporting or excellent habitat ratings. These sites were Crooked Creek, Hills Creek, and Mill Creek. Crooked Creek and Hills Creek were located upstream of the Hammond Reservoir. Crooked Creek had "lower" water quality due to slightly elevated aluminum, but no water quality values exceeded levels of concern at the sites on Hills Creek and Mill Creek.

The sites on the mainstem Tioga River were all biologically impaired except for the site at the mouth TIOG 6.2, which was nonimpaired. This site was downstream of the Cowanesque River, which may have helped to dilute the AMD. Aluminum still slightly exceeded levels of concern at this site; however, the value was close to the level of concern (239 µg/l) and might not have been representative of usual aluminum levels. No other parameters exceeded levels of concern at TIOG 6.2. At TIOG 16.3, only aluminum slightly exceeded levels of concern (212 µg/l). This site was downstream of the Tioga/Hammond Reservoir, which may have helped precipitate some metals in the water column. All the sites upstream of Tioga/Hammond Reservoir had either moderately or severely impaired biological conditions, except for the headwater site near Chases Mills, Pa., which was slightly impaired. Alklinity and aluminum exceeded levels of concern at all of the sites upstream of the reservoir. Manganese and pH (field) exceeded levels of concern at TIOG 29.8, TIOG 35.4, and TIOG 39.6, along with TSS at TIOG 29.8 and acidity at TIOG 35.4 and TIOG 39.6. The worst site with

regard to water quality was TIOG 39.6 in Blossburg, Pa., which also had high iron and the highest manganese and aluminum of the Tioga River sites. Additionally, habitat was degraded at this site due to embeddedness of substrate from AMD precipitate. The biological conditions at TIOG 35.4 and TIOG 39.6 were severely impaired, containing only two taxa in the macroinvertebrate sample. The conditions of the Tioga River also are monitored at Lindley, N.Y., quarterly each year as part of the Interstate Streams Program. Unfortunately, during the past two years, staff were unable to collect a biological sample due to high flows; however, in the past, this site has been rated slightly impaired. Elevated iron and aluminum levels often have been noted at this site.

COHOCTON RIVER WATERSHED

The biological conditions throughout Cohocton River Watershed were mostly nonimpaired and slightly impaired, except for the headwater site, which was moderately impaired. This site (COHO 46.3) was in an area surrounded by wetlands and had slightly high aluminum and nitrogen. The habitat was supporting, but had low scores for sediment deposition, condition of banks, and vegetated riparian width. The macroinvertebrate population improved at the two sites downstream to slightly impaired north of Cohocton, N.Y., (COHO 37.5), and nonimpaired south of Avoca, N.Y., (COHO 25.0). Staff could not sample for macroinvertebrates at the next two sites downstream (COHO 14.6 and COHO 4.0) during this survey; however, the site at the mouth of the Cohocton River (COHO 0.5) also had a nonimpaired biological condition. Water quality problems potentially threaten this river with high total nitrogen nitrate, aluminum, and sodium levels at various sites in the watershed. The highest total nitrate value in the survey was at a site on Cohocton River (COHO 37.5) and very high sodium levels were recorded at COHO 14.6 and COHO 0.5. These high sodium values may not be representative of usual conditions; however, further sampling of sodium as part of the Year-2 survey will be conducted on this river.

L. Steffy

Cohocton River near Avoca, NY.

S. Buda

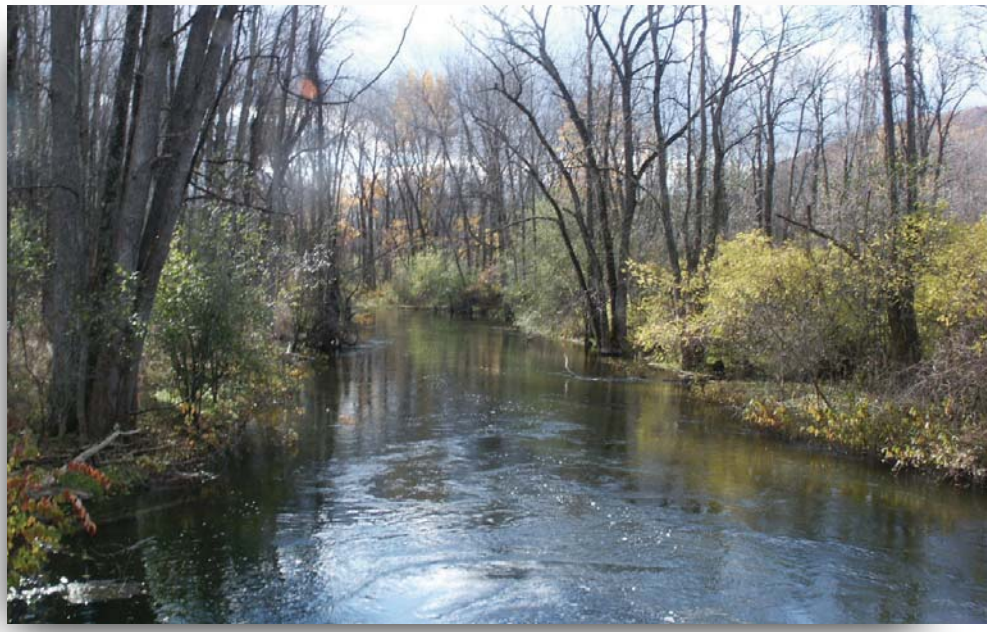
Five Mile Creek near Kanona, NY.

Three tributaries in the headwaters of Cohocton River Watershed that enter the river from the east are Twelvemile, Tenmile, and Five Mile Creeks. All three tributary sites had slightly impaired biological conditions. Habitat conditions were supporting at Twelvemile and Five Mile Creeks and partially supporting at Tenmile Creek. It appears that Tenmile Creek's slightly impaired biological condition may be due to habitat conditions. Embeddedness, velocity/depth regimes, sediment deposition, channel flow status, and riparian vegetated width all received low scores in the habitat assessment. Water quality conditions at Tenmile Creek were "higher" with no parameters exceeding levels of concern at the time of sampling. The slight biological impairment at Twelvemile and Five Mile Creeks may be due to water quality impairments. Total nitrogen exceeded the level of concern slightly at Five Mile and Twelvemile Creeks. Total nitrate levels at Twelvemile Creek and total aluminum values at Five Mile Creek also exceeded concern levels.

Goff Creek and Campbell Creek enter Cohocton River from the west, and both had nonimpaired biological conditions. The habitat at these two sites was supporting, and the water quality on Campbell Creek was "higher" quality. At Goff Creek, total nitrogen, total nitrate, and total sodium slightly exceeded levels of concern. Stocking Creek also enters Cohocton River on the west bank and had a slightly impaired macroinvertebrate condition, due to a dominance of pollution-tolerant midge larva. Sodium only slightly exceeded levels of concern, but the habitat was partially supporting.

Mud Creek is the largest tributary in the Cohocton River Watershed and includes two large lakes, Waneta and Lamoka Lakes, in the headwaters. Tobehanna Creek is a small tributary to Lamoka Lake that was sampled during this survey. The site near the mouth indicated overall optimal conditions

S. Buda



Mud Creek near Bradford, NY.

with nonimpaired biology, "higher" water quality, and excellent habitat. Downstream of these lakes, a site on Mud Creek (MUDC 10.5) had slightly impaired macroinvertebrates, possibly due to partially supporting habitat. None of the water quality parameters sampled during this survey exceeded levels of concern at the time of sampling. This site had a large number of pollution-tolerant amphipods (Gammaridae: Gammarus) that may have influenced the biological condition rating. This amphipod is often abundant in limestone streams; however, MUDC 10.5 did not have many characteristics of a limestone stream except for higher alkalinity. Possibly there was a spring or groundwater influence at the sample site. The area surrounding MUDC 10.5 included numerous wetland areas. Downstream at MUDC 1.1, biological conditions were still slightly impaired, and habitat was still partially supporting.

Meads Creek Watershed is mostly forested (Figure 3); however, turbid water has been noted during high flows. The macroinvertebrate population was rated slightly impaired at two sites on Meads Creek. The site at the mouth had supporting habitat, and temperature slightly exceeded the level of concern. It is possible that this creek is slightly impaired from times of high flows when runoff contributes pollutants from certain land use practices that can aggravate impairment if not properly managed, such as logging and natural gas drilling. The watershed is also known to be flood-prone. This stream will be sampled more intensively in the Year-2 subbasin survey project.

CHEMUNG RIVER WATERSHED

The Chemung River Watershed had a mixture of tributaries with optimal conditions as well as those that possibly were impacted by pollutants, such as nitrogen and sodium. A few tributaries that crossed the Pennsylvania-New York state line had sites that were rated in different condition categories in each state. The mainstem Chemung River had mostly nonimpaired conditions.

Post Creek was one of the highest quality streams in the Chemung Subbasin Survey. The macroinvertebrate community at both sites sampled on Post Creek indicated nonimpaired biological condition. The site in the headwaters (POST 8.8) had slight nutrient enrichment and localized habitat impacts compared to Post Creek near the mouth (POST 0.6). Overall optimal conditions were noted at POST 0.6. This stream may be a good candidate for protection from further habitat degradation. Another stream in the Chemung River Watershed with overall optimal conditions of nonimpaired biology, excellent habitat, and "higher" water quality was Baldwin Creek. BDWN 0.3 served as one of the reference sites for Ecoregion 60, small drainage areas.

Sing Sing Creek and Newtown Creek had nitrogen and sodium levels that exceeded levels of concern. Sing Sing Creek was slightly impaired and had supporting habitat. The macroinvertebrate sample from Sing Sing Creek was dominated by filter-feeding caddisflies and lacked stoneflies. Newtown Creek at the mouth (NEWT 0.6) also lacked stoneflies and had moderately impaired biological conditions. Hardness, conductivity, nitrogen, and sodium exceeded levels of concern at this site, which may warrant further study. The habitat was rated supporting, with embeddedness as a concern. A tributary to Newtown Creek, North Branch Newtown Creek, also had a moderately impaired biological condition. The macroinvertebrate sample was dominated by midges and other tolerant taxa. This biological impairment possibly may be due to the habitat impairment, which was rated partially supporting with low scores for riparian vegetated width and epifaunal (riffle habitat) substrate. Channel flow was low at the time of sampling, so the impairment may have been due to temporary low

S. Buda

Meads Creek near Meads Creek, NY.

S. Buda

Bentley Creek stream channel restoration project near the PA/NY state line.

flow conditions. Another source of the impairment may be due to a water chemistry pollutant that was not included in the laboratory tests. Newtown Creek upstream of North Branch Newtown Creek was nonimpaired and had a supporting habitat. The sodium concentration (23.7 mg/l) at the time of sampling was slightly higher than the level of concern, but not as high as measured at NEWT 0.6 (67.8 mg/l).

South, Seeley, and Bentley Creeks all cross the Pennsylvania-New York state line from Pennsylvania into New York. During this survey, the sites sampled in Pennsylvania showed slight or moderate impairment, although the sites downstream in New York had nonimpaired biological conditions. Seeley Creek had moderately impaired biological conditions in the headwaters with slightly high nutrient levels. The habitat was rated supporting at both upstream and downstream sites, although low flow conditions were noted as a possible threat to the stream quality. South Creek is a tributary to Seeley Creek and contained two sites in Pennsylvania rated as slightly impaired during this survey. Aluminum exceeded levels of concern at both of these sites, and the uppermost site lacked adequate vegetated riparian zone width. The site at the mouth in New York State (SOUT 2.0) had optimal biological, water quality, and habitat conditions.

Bentley Creek also had nonimpaired biological conditions and "higher" water quality at the mouth in New York State. Conditions at both upstream sites in Pennsylvania were slightly impaired, most likely due to habitat conditions, which were rated nonsupporting at the most upstream site. Dredging, regrading, and other such disturbances were evident in Bentley Creek, resulting in low scores for channel condition, instream cover, velocity/depth, channel flow status, and channel alteration. The water chemistry analysis at the uppermost site indicated high turbidity, total suspended solids, total phosphorus, iron, and aluminum values. The phosphorus and metals were probably from soil particles in this highly turbid sample. Currently, impairment at the upstream sites does not seem to impact the site at the mouth of Bentley Creek, but may in the future.

These streams are all sampled as part of Interstate Streams Program at sites along the Pennsylvania/New York state line. Seeley and South Creeks both had slightly impaired biological conditions and supporting habitat in July 2004. Bentley Creek had nonimpaired biological conditions and supporting habitat in July 2004. Aluminum and iron were sometimes elevated at these sites during quarterly sampling, possibly due to runoff and higher flows.

Wynkoop Creek, a tributary near the mouth of the Chemung River, had a slightly impaired macroinvertebrate community, partially supporting habitat, and "higher" water quality. This site near the mouth of Wynkoop Creek had degraded habitat conditions that may have impacted the biological condition slightly. Staff noted excess sediment in addition to a lack of desirable pool and riffle habitat and riparian vegetative zone. The water chemistry results did not indicate any impairment, and the macroinvertebrate community contained numerous sensitive taxa. This stream site may be a candidate for protection from further habitat degradation.

The mainstem Chemung River sites contained mostly nonimpaired biological conditions, except for the site at West Elmira, N.Y., (CHEM 28.0). The habitat was rated excellent at all the sites, except for CHEM 39.8 in South Corning, N.Y. Sodium exceeded levels of concern at all four Chemung River sites, total nitrogen at three sites, and aluminum at one site. The aluminum was elevated at CHEM 39.8, which is the site downstream of where the Tioga and Cohocton Rivers merge near Corning, N.Y. The elevated sodium levels may have been from the Cohocton River. The Chemung River is monitored quarterly for the Interstate Streams Program. Unfortunately, a macroinvertebrate sample was not collected over the past two years due to sampling difficulties; however, in the past the Chemung River at Chemung, N.Y., had slightly impaired or nonimpaired biological conditions. Iron and aluminum were sometimes elevated at this site.