

Susquehanna River Basin Commission

Middle Susquehanna Subbasin Year-1 Survey

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The Susquehanna River Basin Commission (SRBC) conducted a water quality and biological survey of the Middle Susquehanna Subbasin from June to October 2008. This survey is part of SRBC's Subbasin Survey Program, which is funded in part by the United States Environmental Protection Agency (USEPA). The Subbasin Survey Program consists of two-year assessments in each of the six major subbasins (Figure 1) on a rotating schedule. This report summarizes the Year-1 survey, which consists of point-in-time water chemistry, macroinvertebrate, and habitat data collection and assessment of the major tributaries and areas of interest throughout the Middle Susquehanna Subbasin. The Year-2 survey will be conducted in the Lackawanna River Watershed over a one-year period beginning in spring 2009, focusing on combined sewer overflow (CSO) system impacts. Previous SRBC surveys of the Middle Susquehanna Subbasin were conducted in 1984 (Maliene et al., 1984), 1993 (Water Quality and Monitoring Programs Division, 1997), and 2001 (LeFevre, 2002).

DESCRIPTION of the Middle Susquehanna Subbasin

The Middle Susquehanna Subbasin drains an area of approximately 3,700 square miles in northeast Pennsylvania from Ulster to Sunbury, Pa., which includes portions of Bradford, Carbon, Columbia, Lackawanna, Luzerne, Lycoming, Montour, Northumberland, Schuylkill, Sullivan, Susquehanna, Tioga, Wayne, and Wyoming counties. Land use in the

Middle Susquehanna Subbasin consists of forested, agricultural, urban, abandoned mine drainage (AMD), and other resource extraction areas (Figure 2). The major urban centers in this area are Scranton and Wilkes-Barre, Pa. Along the eastern portion of this subbasin in the Lackawanna and Wyoming Valleys is an extensive section of abandoned mine lands (Figure 2). This area was heavily mined and the communities still deal with the industry remnants, such as coal slag piles, abandoned mines, and AMD. The subbasin boundaries contain three different ecoregions:

Northern Appalachian Plateau and Uplands

North Central Appalachians

Central Appalachian Ridges and Valleys (Omernick, 1987).

METHODS USED in 2008 Middle Susquehanna Subbasin Survey

From June to October 2008, SRBC staff collected samples from 89 stream sites throughout the Middle Susquehanna Subbasin. In June 2009, SRBC staff collected three additional samples from a few streams that were not able to be sampled in 2008. The appendix contains a sample site list with the sample site number, station name (designated by approximate stream mile), sample location description, county, latitude and longitude, ecoregion, and drainage size. Numerous sites listed in the appendix were unable to be sampled in 2008 due to

This report and detailed sampling methods, additional tables and figures, and a link to raw data are available on the Internet at www.srbc.net/pubinfo/techdocs/publication_263/techreport263.htm

The River Common at Wilkes-Barre, Pa.

Middle Susquehanna Subbasin Survey: A Water Quality and Biological Assessment, June - October 2008

Report by Susan Buda, Aquatic Ecologist



Figure 1. The Susquehanna Subbasins

dry stream conditions and other field sampling difficulties encountered, such as lack of access. These sites are marked in the appendix with an asterisk. HICK 0.5, LNSK 0.1, and LNSK 5.7 were sampled in 2009 and are marked by two asterisks. The drainage size designation was based on drainage areas, which were divided into small (<100 square miles), medium (100 - 500 square miles), and large (>500 square miles).

Staff sampled the Middle Susquehanna Subbasin Survey sites once during the Year-1 effort to provide a point-in-time picture of stream characteristics throughout the whole subbasin. Water quality was assessed by examining field and laboratory parameters that included nutrients, major ions, and metals. A list of field and laboratory parameters and their units is found in Table 1. Staff compared the data collected to water chemistry levels of concern based on current state and federal regulations, background levels of stream chemistry, or references for approximate tolerances of aquatic life (Table 2).

Staff collected macroinvertebrate samples and conducted habitat assessments using a slightly modified version of USEPA's Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers (RBP III) (Barbour and others, 1999). Detailed sampling methods, additional tables and figures, and a link to the raw data can be found on SRBC's web site at www.srb.net/pubinfo/techdocs/publication_263/techreport263.htm.

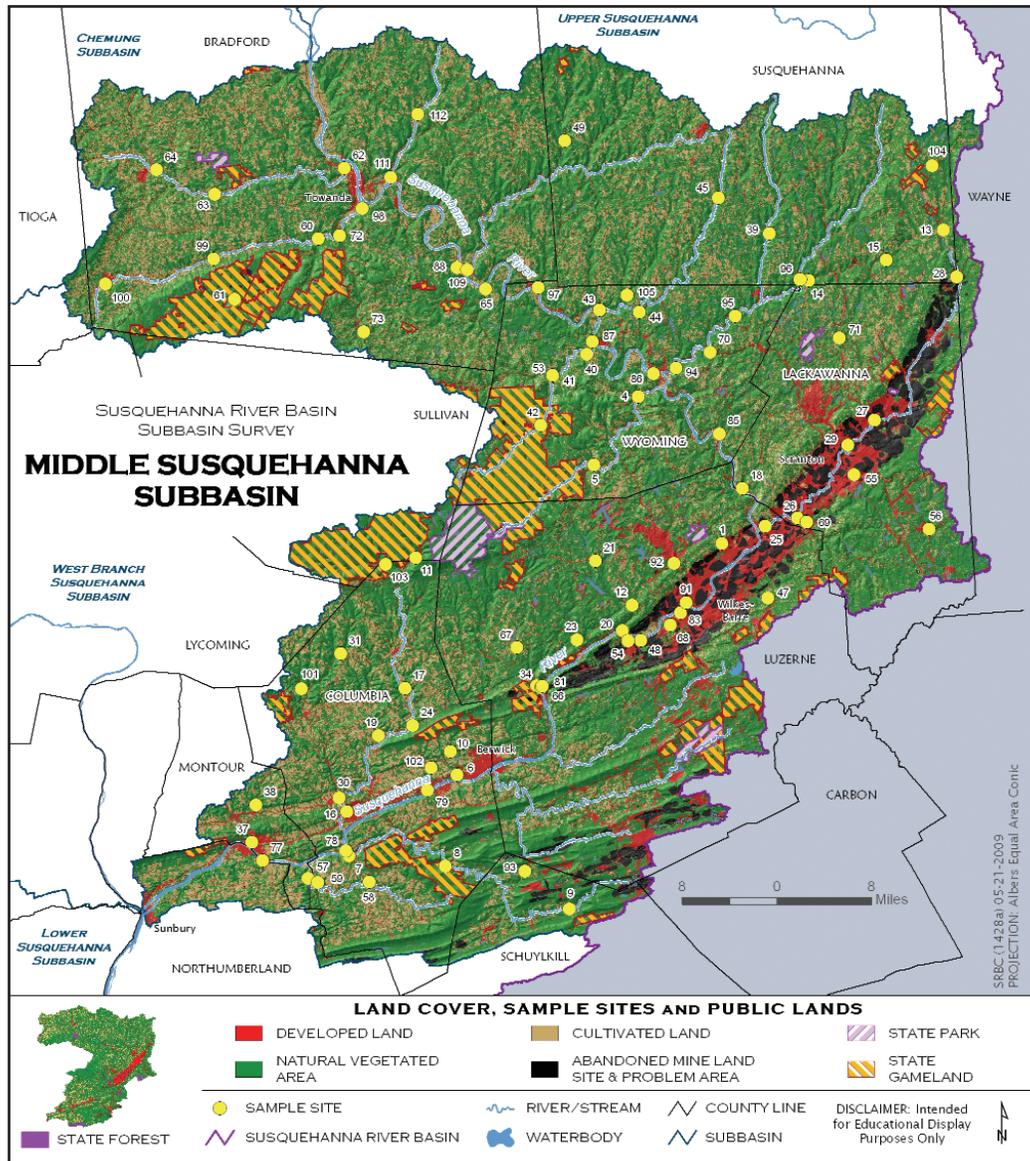


Figure 2. Land Cover, Sample Sites, and Public Lands in the Middle Susquehanna Subbasin

Table 1. Water Quality Parameters Sampled in the Middle Susquehanna Subbasin Survey

Field Parameters	
Flow, instantaneous cfs ^a	Conductivity, $\mu\text{mhos}/\text{cm}^{\text{c}}$
Temperature, $^{\circ}\text{C}$	Alkalinity, mg/l
pH	Acidity, mg/l
Dissolved Oxygen, mg/l ^b	
Laboratory Analysis	
Alkalinity, mg/l	Total Magnesium, mg/l
Total Suspended Solids, mg/l	Total Sodium, mg/l
Total Nitrogen, mg/l	Chloride, mg/l
Nitrite - N, mg/l	Sulfate - IC, mg/l
Nitrate - N, mg/l	Total Iron, $\mu\text{g}/\text{l}^{\text{e}}$
Turbidity, NTU ^d	Total Manganese, $\mu\text{g}/\text{l}$
Total Organic Carbon, mg/l	Total Aluminum, $\mu\text{g}/\text{l}$
Total Hardness, mg/l	Total Phosphorus, mg/l
Total Calcium, mg/l	Total Orthophosphate, mg/l

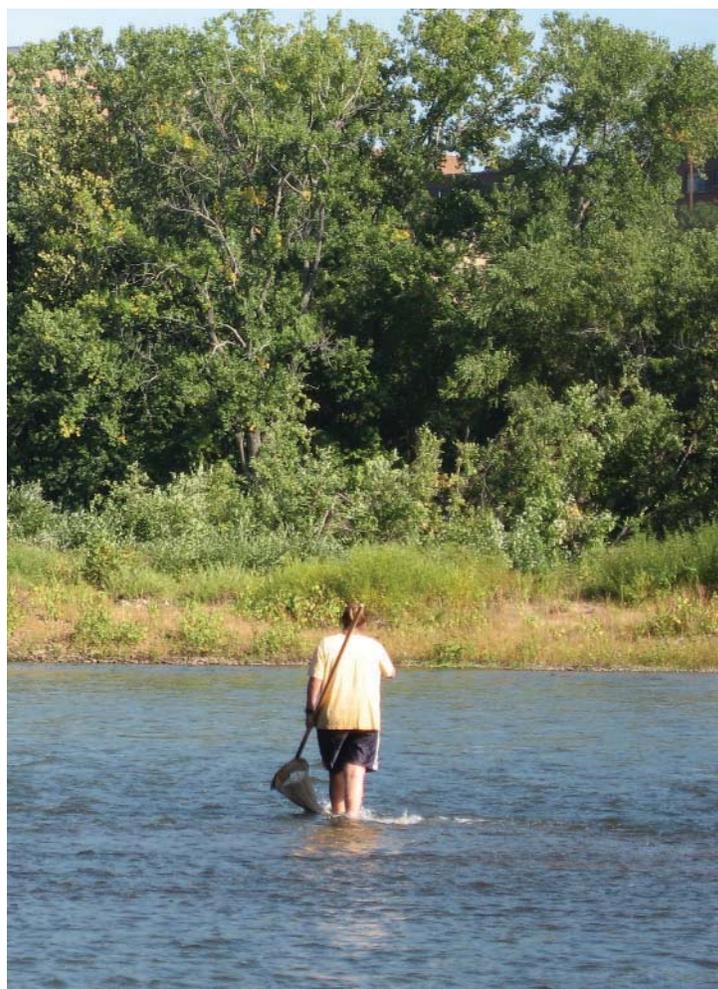
^a cfs = cubic feet per second

^b mg/l = milligram per liter

^c $\mu\text{mhos}/\text{cm}$ = micromhos per centimeter

^d NTU = nephelometric turbidity units

^e $\mu\text{g}/\text{l}$ = micrograms per liter



SRBC staff collecting macroinvertebrate samples.

Table 2. Water Quality Levels of Concern and References

Parameters	Limit	Reference Code	Reference Code & References
Temperature	>25 $^{\circ}\text{C}$	a,f	a. http://www.pacode.com/secure/data/025/chapter93/s93.7.html
D.O.	<5 mg/l	a,g,i	b. Hem (1970) - http://water.usgs.gov/pubs/wsp/wsp2254/
Conductivity	>800 $\mu\text{mhos}/\text{cm}$	d	c. Gagen and Sharpe (1987) and Baker and Schofield (1982)
pH	<5.0	c,f,g	d. http://www.uky.edu/WaterResources/Watershed/KRB_AR/wq_standards.htm
Acidity	>20 mg/l	m	e. http://www.uky.edu/WaterResources/Watershed/KRB_AR/krww_parameters.htm
Alkalinity	<20 mg/l	a,g	f. http://www.hach.com/h2ou/h2wtrqual.htm
TSS	>25 mg/l	h	g. http://sites.state.pa.us/PA_Exec/Fish_Boat/education/catalog/pondstream.pdf
Nitrogen*	>1.0 mg/l	j	h. http://www.epa.gov/waterscience/criteria/sediment/appendix3.pdf
Nitrite-N	>0.5 mg/l	f,i	i. http://www.dec.ny.gov/regs/4590.html
Nitrate-N*	>0.6 mg/l	j,k	j.* http://water.usgs.gov/pubs/circ/circ1225/images/table.html
Turbidity	>150 NTU	h	k. http://pubs.usgs.gov/circ/circ1136/
Phosphorus	>0.1 mg/l	e,j,k	l. http://www.epa.gov/waterscience/criteria/goldbook.pdf
Orthophosphate	>0.05 mg/l	l,j,k	m. based on archived data at SRBC
TOC	>10 mg/l	b	n. http://www.epa.gov/waterscience/criteria/wqctable/
Hardness	>300 mg/l	e	
Calcium	>100 mg/l	m	
Magnesium	>35 mg/l	l,i	
Sodium	>20 mg/l	i	
Chloride	>250 mg/l	a,i	
Sulfate	>250 mg/l	a,i	
Iron	>1,500 $\mu\text{g}/\text{l}$	a	
Manganese	>1,000 $\mu\text{g}/\text{l}$	a	
Aluminum	>750 $\mu\text{g}/\text{l}$	n,c	
	>200 $\mu\text{g}/\text{l}$, pH <5.0		

* Background levels for natural streams