Figure 4. *Biological Conditions at Large River Assessment Stations in 2007*

DISCUSSION

Water Quality

A comparison of water quality samples from the present large river assessment project (August-September 2007) to water quality samples collected for the most recent interstate streams survey (Steffy, 2007), Upper Susquehanna Subbasin Survey (Buda, 2008), Chemung Subbasin Survey (Buda, 2007), Middle Susquehanna Subbasin Survey (LeFevre, 2002), West Branch Subbasin Survey (LeFevre, 2003), Juniata River Subbasin Survey (LeFevre, 2005), and Lower Susquehanna Subbasin Survey (LeFevre, 2006) indicates that water quality conditions on the Susquehanna River between Sidney, N.Y., and Marietta, Pa., and at the mouths of its major tributaries, are stable and generally below limits, although temperatures were greater than 25 degrees Celsius at several stations and total sodium exceeded the level of concern in many samples. From the data analysis, it appears that the Susquehanna River, in the stretch encompassed by this study, contains fairly good water quality, with some slightly elevated parameters.

Macroinvertebrate Communities Upper Susquehanna River and the Chemung River

The section of the Susquehanna River from the headwaters at Cooperstown, N.Y., to the confluence with the Chemung River at Sayre, Pa., encompasses the Upper Susquehanna Subbasin. This survey included seven stations on the mainstem Susquehanna River from Sidney, N.Y., to Sayre, Pa. The river in this part of the basin flows through mostly agricultural and forested land with some small communities and one larger population center, Binghamton, N.Y. Zebra mussels (*Dreissena polymorpha*), an aquatic invasive species, were found throughout this reach from Sidney downstream to Apalachin, N.Y., during this survey and the 2007 Upper Susquehanna Subbasin Survey. Overall, the sites at Sidney (SUSQ 394), which was rated as slightly impaired, and Windsor (SUSQ 365), N.Y., which was rated as nonimpaired, exhibited high taxa richness and diversity, although SUSQ 394 had lower values for EPT Index and percent Ephemeroptera. The station at Great Bend (SUSQ 356), Pa., where the Susquehanna River enters Pennsylvania briefly before flowing back into New York State, also had non-impaired biological conditions. This site also had the highest number of taxa (36) and highest number of EPT taxa (19) of any river station. The site at Kirkwood (SUSQ 344), N.Y., was designated as slightly impaired.

However, downstream of Binghamton, N.Y., conditions degraded slightly. At Apalachin (SUSQ 327), N.Y., the station was rated as slightly impaired, but had poor ratings for percent Ephemeroptera, number of EPT taxa, and percent dominant taxa. In fact, this site had the lowest percent Ephemeroptera of all stations in the survey (4.8 percent).

> ***"Zebra mussels (Dreissena polymorpha), an aquatic invasive species, were found throughout this reach from Sidney downstream to Apalachin, N.Y."***

At Barton (SUSQ 312), N.Y., the river seemed to improve, as this station was designated as nonimpaired. The station at Waverly (SUSQ 300), N.Y., also was rated as nonimpaired; this station had the highest diversity index of all river stations.

The Chemung River empties into the Susquehanna at Athens, Pa. At this point, the Chemung is nearly a third of the size of the Susquehanna. Staff sampled the Chemung River at Athens (CHEM 3), Pa., and found slightly impaired biological conditions during this survey.

Middle Susquehanna River and the West Branch Susquehanna River

The section of the Susquehanna River from the confluence with the Chemung River at Sayre, Pa., to the confluence with the West Branch Susquehanna River at Sunbury, Pa., is termed the Middle Susquehanna River. During this survey, 10 stations were sampled on the mainstem Susquehanna in this section of the river, in addition to a site on the West Branch Susquehanna at Lewisburg, Pa. This stretch of the river is very diverse with sections located in agricultural land, some sections flowing through forested hills, and some portions draining urban settings, particularly the Wilkes-Barre/Scranton, Pa., area. Abandoned mine drainage (AMD) is a prevalent issue within this watershed as well.

The stations near Towanda (SUSQ 271), Wyalusing (SUSQ 256), Meshoppen (SUSQ 234), and Tunkhannock (SUSQ 219), Pa., were designated as slightly impaired. SUSQ 234 had the highest Hilsenhoff Biotic Index of all Large River Assessment sites, possibly due to the large number of snails collected at the site. At West Falls (SUSQ 207) and Wilkes-Barre (SUSQ 192), Pa., the stations were designated as nonimpaired, although the number of EPT taxa was reduced at SUSQ 192. The station at Shickshinny (SUSQ 174), Pa., was rated as moderately impaired. This site is located downstream of the urban population centers of Wilkes-Barre and Scranton, Pa., and may be impacted by both urban runoff and AMD from the surrounding watersheds. The poorest scores for taxonomic richness, percent dominant taxa, number of EPT taxa, and Shannon diversity index in this survey were recorded at SUSQ 174. The stations at Berwick (SUSQ 157) and Bloomsburg (SUSQ 149), Pa., were designated as slightly impaired, although SUSQ 149 had the lowest percent Chironomidae score in the survey. The station on the Susquehanna River near Danville (SUSQ 138), Pa., was designated nonimpaired.

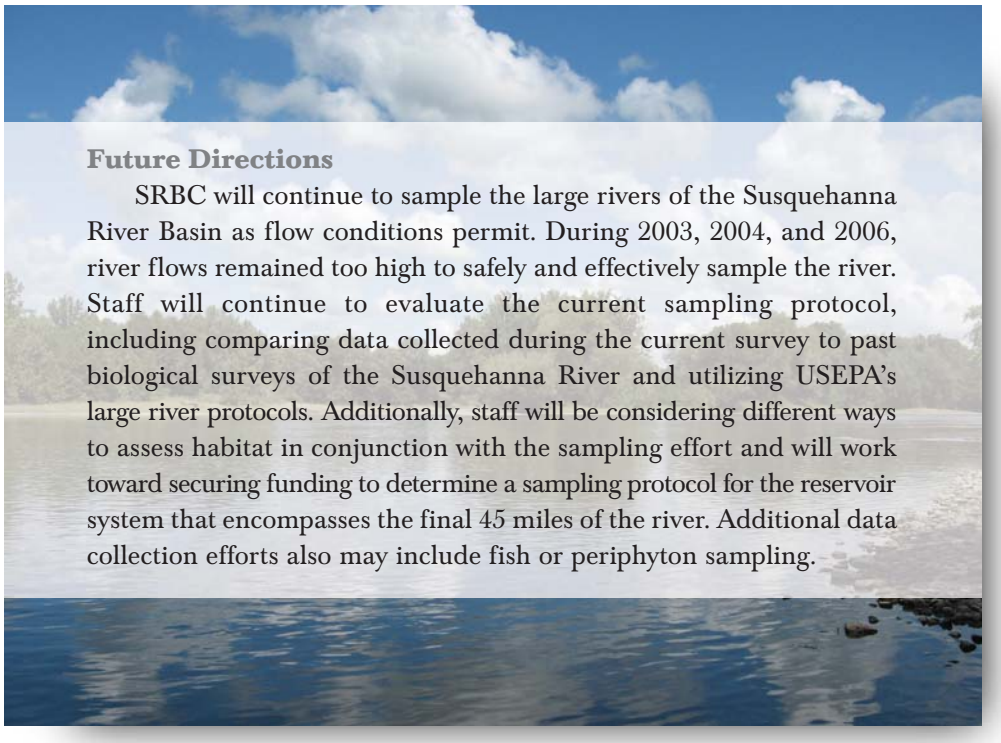
Staff collected a sample near the mouth of the West Branch Susquehanna River at Lewisburg (WBSR 8), Pa. This site was designated as moderately impaired, with low EPT diversity and a large number of midges in the sample. The West Branch Susquehanna is impacted heavily by AMD from the headwaters to downstream of Williamsport, Pa.

Lower Susquehanna River and the Juniata River

The portion of the watershed from the confluence of the mainstem with the West Branch Susquehanna River to the outlet of the Susquehanna River at Havre de Grace, Md., is termed the Lower Susquehanna River Subbasin. Staff sampled five stations on the mainstem Susquehanna River and one station on the Juniata River during this survey. This subbasin contains a large amount of agricultural land and several larger population centers, including Harrisburg, York, and Lancaster, Pa. The final 45 miles of river are ensconced in a series of reservoirs and were not sampled for this survey.

Staff sampled the biological condition of the river downstream of Sunbury (SUSQ 122), Pa., which was designated as slightly impaired, with a low number of EPT taxa. The stations at McKees Half Falls (SUSQ 106) and Halifax (SUSQ 94), Pa., also were rated as slightly impaired, although SUSQ 94 had the best scores of Hilsenhoff Biotic Index and percent Ephemeroptera of all stations in the survey. However, SUSQ 94 also had a depressed number of EPT taxa, which offset the high scores from the other metrics. At Fort Hunter (SUSQ 77), Pa., the station was rated as nonimpaired, while at Marietta (SUSQ 45), Pa., the biological condition category was slightly impaired.

A station was located near the mouth of the Juniata River near Duncannon (JUNR 2), Pa. This site was rated as moderately impaired, with poor scores for percent dominant taxa, number of EPT taxa, and percent Chironomidae.



Future Directions

SRBC will continue to sample the large rivers of the Susquehanna River Basin as flow conditions permit. During 2003, 2004, and 2006, river flows remained too high to safely and effectively sample the river. Staff will continue to evaluate the current sampling protocol, including comparing data collected during the current survey to past biological surveys of the Susquehanna River and utilizing USEPA's large river protocols. Additionally, staff will be considering different ways to assess habitat in conjunction with the sampling effort and will work toward securing funding to determine a sampling protocol for the reservoir system that encompasses the final 45 miles of the river. Additional data collection efforts also may include fish or periphyton sampling.