

## DISCUSSION

### Water Quality

The assessments conducted during the 2010 Large River Project, when compared to the results of the 2009 Large River Assessment Project (Shenk, 2010), 2008 Large River Assessment Project (Shenk, 2009), 2007 Large River Assessment Project (Hoffman, 2008), Upper Susquehanna Subbasin Survey (Buda, 2008), and Middle Susquehanna Subbasin Survey (Buda, 2009), show that most of the water quality parameters in the mainstem of the Susquehanna River and the mouths of most of its larger tributaries are below established water quality standards or recommended life tolerances. Total sodium is the parameter that exceeded its limit most often. Total orthophosphate and total phosphorus each exceeded their respective limits at least at one site. Even with these exceedances, the data analysis shows that the river from Sidney, N.Y., to Danville, Pa., has fairly good water quality.

---

*...the data analysis shows that the river from Sidney, N.Y., to Danville, Pa., has fairly good water quality.*

---

### Macroinvertebrate Communities

The Upper Susquehanna River starts at Otsego Lake in Cooperstown, N.Y., and continues to the confluence with the Chemung River in Sayre, Pa. This is a fairly rural area that mostly consists of forest and agricultural land, with the exception of one large population center, Binghamton, N.Y. Six of the 16 sites that were sampled in 2010 were in the Upper Susquehanna River area.

The most upstream site sampled was at Sidney, N.Y. (SUSQ 394), approximately 50 miles downstream of Otsego Lake. This site was rated nonimpaired with

the highest number of species collected, highest percent of Ephemeroptera, and highest number of EPT taxa of all the sites in the 2010 assessment. The site at Windsor, N.Y. (SUSQ365), was rated moderately impaired due to its low number of EPT taxa and to dominance by freshwater snails (not a negative in itself but dominance by one taxa in the macroinvertebrate community can indicate stressed conditions). The Susquehanna River flows into Pennsylvania for approximately 15 miles before it flows north back into New York. This stretch includes the site at Great Bend, Pa. (SUSQ356), which was rated as slightly impaired. This site had a high rating in species richness, Hilsenhoff Biotic Index, and percent Chironomidae but scored low in percent dominant taxa and EPT taxa.

---

*SUSQ394, approximately 50 miles downstream of Otsego Lake, was rated nonimpaired with the highest number of species collected, highest percent of Ephemeroptera, and highest number of EPT taxa of all the sites in the 2010 assessment.*

---

The first site as the river flows back into New York is located near Kirkwood (SUSQ344). This site is rated as slightly impaired due to its very poor rating in percent dominant taxa, due to the very high percentage of Elmidae and number of EPT taxa. The site near Apalachin (SUSQ327) is located just downstream of the city of Binghamton and a large tributary in the Chenango River. The site was rated as slightly impaired with good rating in taxonomic richness and Shannon-Wiener Diversity Index but very poor in number of EPT taxa. SUSQ312 is located near Nichols, N.Y.,

and rated as moderately impaired. This site scored the lowest of all sites collected in the 2010 collection year, without any metric receiving high ratings, and low ratings in four of the seven metrics. Future monitoring of this site will be helpful because in 2007 and 2009, this site was rated as one of the top sites. SUSQ300, near Sayre, Pa., is the last site in the Upper Susquehanna Subbasin. This site was moderately impaired with the only low rating in percent dominant taxa once again due to the high number of Elmidae found in the sample.

---

*Rated as moderately impaired, SUSQ312 (near Nichols, N.Y.), scored the lowest of all sites collected in the 2010 collection year.*

---

Just downstream of SUSQ300 is the confluence of the Chemung River and Susquehanna River. The Chemung Subbasin drains approximately 2,604 square miles of New York and



***Susquehanna River near Apalachin, Tioga County, N.Y.***

Pennsylvania. The primary land uses in the subbasin are naturally vegetated areas and cultivated land. For this study, there is one site (CHEM3) in the Chemung Subbasin located in Athens, Pa., approximately three miles from the mouth. This site was nonimpaired with high ratings in all categories.

The Middle Susquehanna Subbasin encompasses the stretch of the Susquehanna River from the confluence with the Chemung River, in Athens, Pa., to the confluence with the West Branch of the Susquehanna River, in Sunbury, Pa. The Middle Susquehanna Subbasin drains approximately 3,700 square miles with main land uses of forested, agricultural, urban, and abandoned mine drainage (AMD) areas. The most upstream site in the Middle Susquehanna Subbasin is located in Towanda, Pa. (SUSQ271). This site was rated as slightly impaired due to the low rating in number of EPT taxa and percent Chironomidae. Site SUSQ256, located near Wyalusing, Pa., was nonimpaired and as in years past, continued to be one of the higher rated sites. The site near Tunkhannock, Pa. (SUSQ219), was slightly impaired with low ratings in EPT taxa and percent Chironomidae.

The Middle Susquehanna River flows through the two main urban centers of

---

*The chronically low scores (in the Middle Susquehanna River) could be attributed to any number of factors from the urban areas to the AMD impacts that are also located in the Middle Susquehanna Subbasin.*

---

Scranton and Wilkes-Barre before the next site near Shickshinny (SUSQ174). This site, as in years past, scored as one of the lowest for 2010 and was moderately impaired. It received low rating in most categories, especially the number of EPT taxa and percent dominant taxa, with its only higher rating coming from percent Chironomidae. The next site downstream, SUSQ149 located near Bloomsburg, Pa., continued the moderately impaired trend from upstream as well, with very similar ratings. These chronically low scores could be attributed to any number of factors from the urban areas to the AMD impacts that are also located in the Middle Susquehanna Subbasin. Site SUSQ138, located near Danville, Pa., is the last site in the Middle Susquehanna Subbasin. With only low ratings in percent dominant taxa and number of EPT taxa as in upstream sites, it was rated as only slightly impaired.

In the 2010 study, there were two other sites sampled. The first was at the mouth of the West Branch Susquehanna River (WBSR8). The West Branch Susquehanna drains approximately 6,982 square miles from Carrolltown to Northumberland, Pa. Agricultural lands are most abundant near the mouth in the southeastern area, and the few urban areas are mostly small in size. Resource extraction is prominent in the subbasin with AMD severely impacting many streams. WBSR8 was slightly impaired, with a very low rating in EPT taxa but a high rating in Hilsenhoff Biotic Index.

The Juniata River is the last large tributary to the Susquehanna River. The Juniata Subbasin drains approximately 3,400 square miles from west of Bedford to Duncannon, Pa. The mixed land use in the Juniata Subbasin primarily includes forested areas concentrated on the ridges, with agricultural and urban areas in the valleys. One site (JUNR2), located near Amity Hall and just upstream from the mouth, was sampled for this project. This site was rated as slightly impaired, only scoring high in Shannon-Wiener diversity and taxonomic richness, and scoring moderately in the other remaining categories.

## FUTURE GOALS

The assessments of the Susquehanna River sites are fairly consistent between this study and past studies. The 2007, 2008, 2009, and 2010 Large River Assessment projects used the same protocol with very similar end results, while staff used different protocols in 2005 with very similar results. Future studies will continue, conditions permitting, and expansion of the project will be investigated. SRBC is interested in adapting lake and reservoir protocols to help assess the last 45 miles of reservoirs, as well as collecting fish community data at the current stations. SRBC also has an interest in integrating the Large River monitoring project with other SRBC monitoring efforts, particularly ongoing source water monitoring.