Susquehanna River Mainstem

The Susquehanna River meanders through the Middle Susquehanna Subbasin from Towanda to Sunbury, Pa., and passes through the Northern Appalachian Plateau and Uplands, North Central Appalachians, and Central Appalachian Ridges and Valleys ecoregions. No sites sampled on the Susquehanna River during this 2008 subbasin survey had overall best biological, water quality, and habitat conditions. Of the nine sites sampled on the river, six sites had nonimpaired conditions; however, no sites had "higher" water quality. All the sites had "middle" water quality. Most of the habitat conditions were supporting or excellent.

The six nonimpaired sites were SUSQ 138 (just upstream of Danville), SUSQ 155.9 (Mifflinville), SUSQ 172.8 (upstream of Shickshinny), SUSQ 187.5 (Wilkes-Barre), SUSQ 209.1 (West Falls), and SUSQ 231.8 (North Mehoopany). None of the river sites had severely impaired conditions, but one of them had moderately impaired conditions. This site was located in Bloomsburg, Pa. (SUSQ 146.4). All the sites on the river exceeded the sodium level of concern of 20 mg/l. The highest sodium level was 33.8 mg/l at the site located upstream of Shickshinny, Pa. Two river sites also had elevated total phosphorus and orthophosphate. Those sites were located at Mifflinville and Bloomsburg, Pa. The habitat was rated excellent at three of the nonimpaired sites in Danville, Mifflinville, and north of Shickshinny, Pa. There were no sites with nonsupporting habitat and only one site had partially supporting habitat. This site was located in Wilkes-Barre, Pa., and scored low in the habitat assessment on sediment deposition, channel alteration, channel sinuosity, condition of banks, vegetative protective cover, and riparian vegetative zone width.

Hunlock Creek located in Luzerne County.

Comparison of 2008 and 2001 Data

A comparison of the current 2008 data and historical 2001 data showed mostly similar conditions. The results for the biological, water quality, and habitat conditions in the 2001 Middle Susquehanna Subbasin Survey (LeFevre, 2002) are depicted in Figure 4. There were 106 sites sampled during the 2001 survey; however, two sites (HNT 5.0 and UNTA 0.1) were removed from the list for 2008 and are not included in this report. The methods from 2001 to 2008 were very similar except for the water quality analysis methods. Therefore, the water quality analysis was repeated using current methods for the 2001 data in order to compare it to the 2008 data.

A comparison of Figures 3 and 4 indicates that the conditions in 2001 and 2008 have remained relatively the same with mostly green colors (nonimpaired, "higher", and excellent conditions) located in the northern portion and mostly red colors (severely impaired, "lower", and nonsupporting conditions) located in the Wyoming Valley (eastern) portion of the subbasin. Figures 5 and 6 show similar percent composition of biological conditions in 2001 and 2008. In 2001, 27 percent of the sites had nonimpaired, 48 percent had slightly impaired, 17 percent had moderately impaired, and 8 percent had severely impaired conditions (Figure 5). In 2008, 34 percent had nonimpaired, 40 percent had slightly impaired, 22 percent had moderately impaired, and 4 percent had severely impaired conditions (Figure 6). Four sites had the best overall conditions for biology, water quality, and habitat in both 2001 and 2008.

Those sites were in the Tunkhannock Creek, Towanda Creek, and Sugar Run Watersheds (ETNK 10.0, TUNK 11.9, STWN 0.1, and SGRR 0.4).

Individual watersheds that may indicate slight improvement or degradation from 2001 to 2008 include Catawissa Creek (improvement) and Mahoning Creek (degradation). Individual sites that had a large change in condition category from 2001 to 2008 were HARV 0.1, STNK 16.3, WBRN 0.7, and WLWR 5.2. HARV 0.1 degraded from nonimpaired to moderately impaired in biological condition and from excellent to partially supporting in habitat condition. Orthophosphate values at this site exceeded levels of concern in 2001 and 2008. STNK 16.3 degraded from excellent to partially supporting habitat conditions, mostly due to large sediment deposition noted in 2008. WBRN 0.7 degraded from nonimpaired to moderately impaired in biological condition. This site is located in the headwaters of Fishing Creek, where atmospheric deposition impacts have been of concern. A comparison of the macroinvertebrate community from 2001 and 2008 data indicates a decrease in mayflies and variety of caddisflies. WLWR 5.2 improved from moderately impaired to nonimpaired with an increase of mayflies, stoneflies, and caddisflies.

Table 4 shows a comparison of the number of parameter values that exceeded levels of concern and the percentage of the total number of sites sampled in both 2001 and 2008. These numbers were very similar for most parameters in both years, except for nitrogen, nitrate, and dissolved oxygen, which were higher in 2001, and total phosphorus, which was slightly higher in 2008. The parameters that had the highest

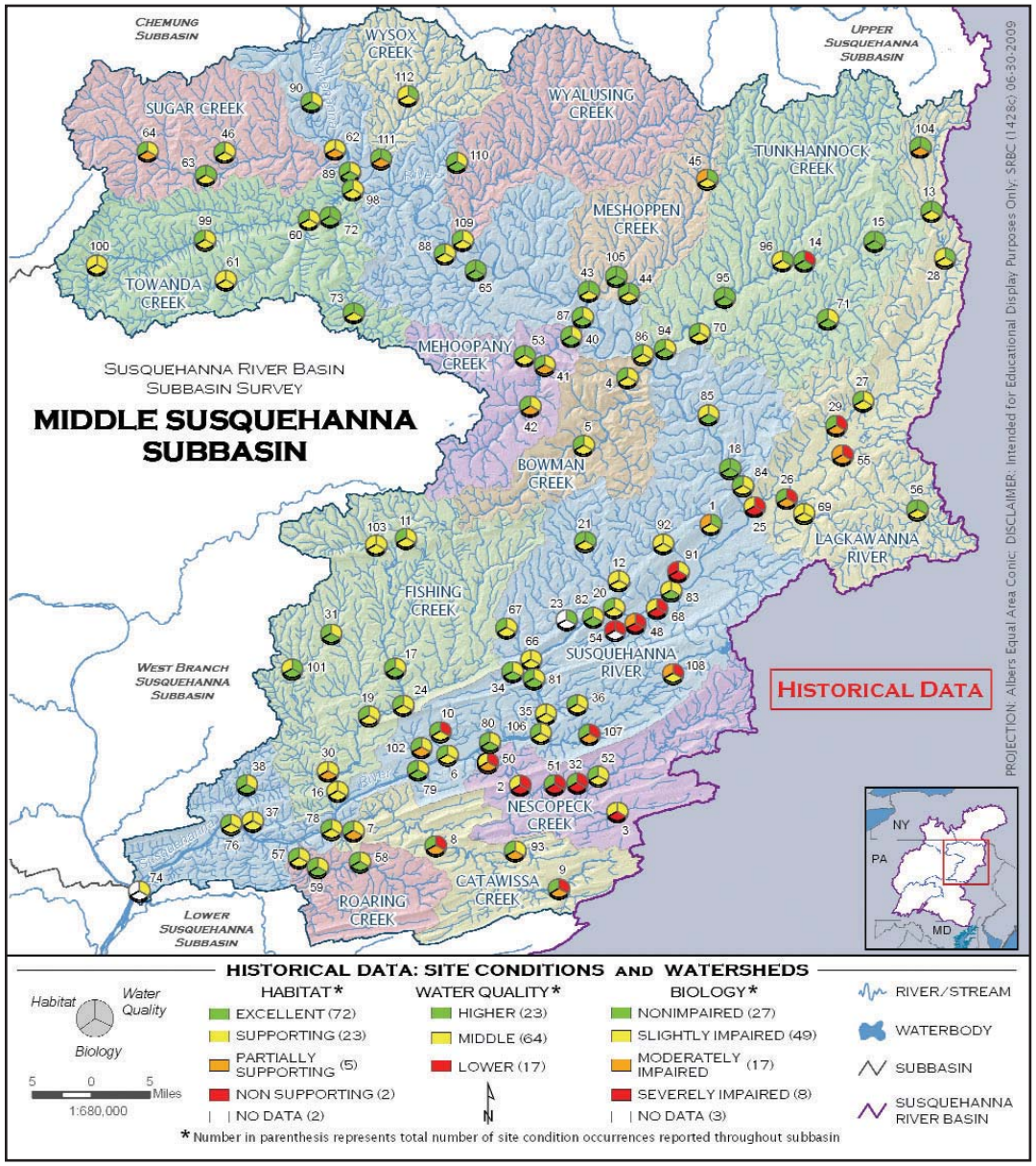

Figure 4. *Water Quality, Biological, and Habitat Conditions in the Middle Susquehanna Subbasin in 2001*

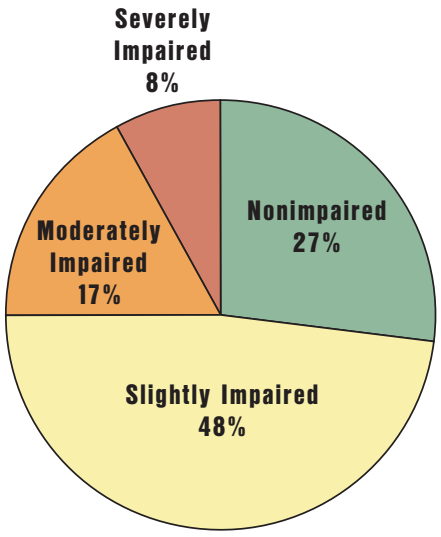

Figure 5.
Summary of Biological Conditions in the Middle Susquehanna Subbasin in 2001

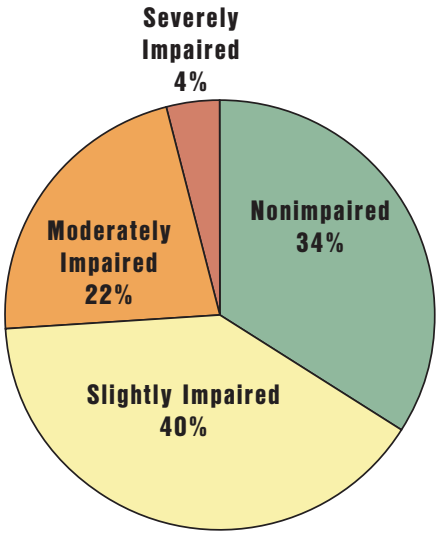

Figure 6.
Summary of Biological Conditions in the Middle Susquehanna Subbasin in 2008

number of sites exceeding levels of concern were similar in both years. These parameters were alkalinity, nitrate, nitrogen, and sodium. In 2001, alkalinity and nitrate had the highest number of sites (25), and sodium and nitrogen were close with 24 and 23 sites, respectively. The parameter to exceed levels of concern the most in 2008 was sodium (23), with alkalinity (20), nitrogen (15), and nitrate (14) being high also. The largest difference in percentage of sites between years was total nitrate, nitrogen, and phosphorus, with total nitrate and nitrogen being higher in 2001 and total phosphorus being higher in 2008.

Many of the sites had the same parameters that exceeded levels of concern in both 2001 and 2008. Also, the sites that had the overall highest or lowest values in certain parameters were the same in both years. Newport Creek had the highest values of typical AMD parameters, such as iron, manganese, and sulfate, and Little Nescopeck Creek had the highest aluminum value, lowest alkalinity, and the same pH value in 2001 and 2008. Leggetts Creek had excessively high values in nutrients and sodium in 2001, with little to no overall improvement in 2008. This site (LEGT 0.1) had the overall highest nutrient and sodium values in both surveys. Many of the Susquehanna River mainstem sites exceeded levels of concern for sodium values in both 2001 and 2008.

CONCLUSIONS

Overall, the majority of the streams in the Middle Susquehanna Subbasin were good with nonimpaired and slightly impaired ratings assigned to 74 percent of the sites sampled. There were also numerous extremely degraded streams, mostly impacted by AMD. Figures 3 and 4, which display the 2008 and historical condition categories, show that the most impaired stream sites were located in the AMD and urban land use areas on Figure 2. The watersheds most impacted by AMD were Newport Creek, Nanticoke Creek, Solomons Creek, Lackawanna River, and Catawissa Creek. Streams that were impacted by urban land use were Leggetts Creek, Lackawanna River, Sugar Creek headwaters, and Mahoning Creek. Agriculture land use was located throughout the subbasin, but was more prevalent in the southern end. Not many or severe impacts from agriculture were noted. Streams that may experience slight agricultural impacts include Wyalusing Creek, Green Creek, Briar Creek (east and west branches), Mahoning Creek, and Sugar Creek headwaters. Another pollution concern in this subbasin is acidic atmospheric deposition. Numerous stream sites had low alkalinity as the only water quality parameter that exceeded levels of concern. Many of these sites drain the same area of North Mountain and Huntingdon Mountain located near the intersections of Sullivan, Columbia, Luzerne, and Wyoming Counties. This area has waters that have been designated by the Department of Environmental Protection as potentially impacted by atmospheric deposition, including East Branch Fishing Creek. The watersheds in this survey that had low alkalinity and are located in this area include headwaters of Fishing Creek, Mehoopany Creek, Bowman Creek, and Shickshinny Creek. East Branch Briar Creek and Hunlock Creek, which are also in this area, had lower alkalinity; however, it was not lower than 20 mg/l. East Branch Fishing Creek and West Branch Fishing Creek also had elevated aluminum (higher than 200 µg/l) at the time of sampling, which is another indication of acidic atmospheric deposition influence. Schrader Creek also had low alkalinity and was located in an area of atmospheric deposition concerns.

The watersheds in the northern portion of the Middle Susquehanna Subbasin (Endless Mountain Region) appeared to be healthier, in general, then the ones in the lower portion, which was also noted in the 2001 survey. The watersheds with the majority of the best overall conditions were Tunkhannock Creek, Towanda Creek, and Sugar Run Watersheds. Other watersheds showing mostly nonimpaired conditions included Meshoppen, Hunlock, Fishing, and Roaring Creek Watersheds. Lackawanna River headwaters had good water quality; however, it was extremely degraded toward the mouth. Each ecoregion and drainage size category reference site used for the biological analysis included STNK 0.5, WMSH 1.2, TUNK 1.8, WLWR 5.2, HUNT 0.3, SBRC 0.5, and SUSQ 209.1. The sites with the best habitat scores in each reference category included TUNK 20.3, ETNK 10.0, SCHR 0.2, SCHR 11.7, HUNT 0.3, LFSH 0.1, and SUSQ 138. The most degraded watersheds in this survey were Newport Creek, Nanticoke Creek, Lackawanna River, and Solomons Creek. Other watersheds that showed some degraded conditions included Catawissa Creek, Leggetts Creek, Briar Creek, Toby Creek, Little Nescopeck Creek, Mahoning Creek, and Harveys Creek.

The results of this report were similar to those found in the 2001 Middle Susquehanna Subbasin Survey (LeFevre, 2002). Similar biological condition categories were obtained in both years and similar parameters exceeded levels of concern on the same streams. The watersheds that were identified as being the most severely degraded in 2001 (Lackawanna River, Solomons Creek, Nanticoke Creek, Newport Creek, Nescopeck Creek, and Catawissa Creek) were still degraded in 2008 (except data for Nescopeck Creek was limited to Little Nescopeck Creek in 2008). Similar watersheds that were identified as healthy in 2001 were still healthy in 2008, such as Towanda, Meshoppen, Tunkhannock, Fishing, Roaring, Mehoopany, and Bowman Creeks.

SRBC staff is conducting the Middle Susquehanna Subbasin Survey Year-2 assessment of the Lackawanna Creek Watershed, focusing on CSO systems and untreated sewage impacts. CSO systems are antiquated sewer and stormwater runoff collection infrastructure that release untreated sewage to streams when capacity is exceeded. The Lackawanna River Watershed study will include water sampling in the mainstem and tributary waters during low flow and high flow (storm events), and macroinvertebrate community assessments.