SUSQUEHANNA RIVER MONITORING:

Monitoring the water quality of the upper Susquehanna River, summer 1998

Gary Dewey¹

INTRODUCTION

The quality of the upper Susquehanna River was monitored between its origin at Otsego Lake and its junction with Oaks Creek during the summer of 1998. As part of an ongoing study, this module of work helps to locate possible sources of pollution so that water quality problems can be evaluated and possibly mitigated. It is also important to ensure that the assimilative capacity of the river below the Village Sewage Treatment Plant discharge point not be exceeded.

METHODS

Water samples were collected weekly and analyzed from nine different sites (Figure 1: SR 1, 3, 6, 8, 12, 16, 16A, 17, 18) for a six week period, from July 13 to August 17, 1998. These water samples were then tested for total phosphorus, nitrite+nitrate, and chlorides. Total phosphorus was tested using the persulfate digestion followed by the single reagent ascorbic acid method (APHA, 1992), nitrite+nitrate using the cadmium reduction method (APHA, 1992), and chloride using the mercuric nitrate method (APHA, 1992). Data was also obtained at the sites using a Hydrolab Reporter water quality microprobe, which was calibrated weekly following manufacturer’s protocol (Hydrolab Corp., 1993). The Hydrolab measured temperature, pH, dissolved oxygen and conductivity. Concurrent with this study, testing for fecal coliform bacteria was done on a biweekly basis from these same sites (Dewey, 1999).

RESULTS AND DISCUSSION

Temperature

This summer the temperature of the upper Susquehanna River ranged from 19.54°C at SR 17 on July 31 to 23.55°C at SR 18 on August 10. The average was 21.73°C. This summer’s river temperatures were consistently higher than last summer’s (Willies, 1997) (Figure 2), probably a reflection of lower average water levels (Albright, 1998).

¹ F.H.V. Mecklenburg Conservation Fellow, summer 1998. Present affiliation: Unatego High School
Figure 1. Susquehanna River collection sites.
Figure 2. Temperature of Susquehanna River sites, 1997 and 1998.

Figure 3. pH of Susquehanna River sites, 1997 and 1998.
pH

The pH varied from site to site, ranging from 7.45 at SR 16A on July 31 to 8.22 at SR 1 on August 10. The average was 7.86. The pH values for this summer were also consistently higher than last summer's (D. Willies, 1997) (Figure 3).

Dissolved Oxygen

The dissolved oxygen concentrations for this summer varied from site to site but mostly decreased as distance from Otsego Lake increased. This could be due to organic pollution, which depletes oxygen levels. Some possible sources of this pollution could be the Village Sewage Treatment Plant (located at SR 12) or agricultural runoff from farms. However, the dissolved oxygen concentration remained at an acceptable level of greater than 5 mg/L. It is also noted that the values for the first three sites are lower than last summer’s and the rest are higher (Willies, 1997) (Figure 4).

Conductivity

Conductivity can be defined as an indirect measurement of ions in solution. The conductivity of the Susquehanna River varied greatly from site to site. The highest reading was 313 mmho/cm at SR 17 31 on July. The lowest reading was 242 mmho/cm at SR 1 on 10 August. Compared to last summer, conductivity followed no particular pattern or trend (Willies, 1997). However, there were some complications with the Hydrolab probe (it would not calibrate conductivity), so no conclusions can be drawn (Figure 5).

Nitrate + Nitrite

Total nitrate + nitrite concentrations this summer seemed to follow a trend similar to that of last summer, which shows rapid increase downstream (Willies, 1997). However, last summer the concentrations were only tested once and this summer they were tested three times. The highest reading was 1.54 mg/L at SR 16 on 10 August. The lowest reading was 0.14 mg/L at SR 12 on 31 July (Figure 6).

Total Phosphorus

The phosphorus levels varied from site to site with a range from 7.67 ug/L at site SR 1 on 13 July to 210.48 ug/L at SR 16 on 3 August. SR 16 is located in a cow pasture, so it is normal to expect a high phosphorus level. On 31 July there was an unexpected increase in phosphorus levels between SR 8 and SR 12. This increase has also been documented in past years giving evidence of an unidentified nutrient source (Lopez and Bridger, 1996; Willies, 1997). Although concentrations were lower, the phosphorus levels seemed to follow last summer’s trend. The
Figure 4. Dissolved Oxygen of Susquehanna River sites, 1997 and 1998.

Figure 5. Conductivity of Susquehanna River sites, 1997 and 1998.
Figure 6. Nitrite+Nitrate of Susquehanna River sites, 1997 and 1998.

Figure 7. Total Phosphorus of Susquehanna River sites, 1997 and 1998.
reason for the lower concentrations may be due to decreased precipitation, which would reduce runoff from farms and other sources of nutrients (Figure 7).

Chlorides

The chloride levels varied from site to site, with a range from 9 mg/L at SR 3 on 10 August to 17.5 mg/L at SR 16A and SR 17 on 31 July. The chloride levels also remained lower than last summer's (D. Willies, 1997) (Figure 8). This may be due to decreased runoff. It was also noted that the levels consistently increased from SR 8 to SR 12. This may be due to the fact that the Village stores salt for winter road maintenance near SR 12 and some of it may be running off into the river. Also, SR 12 is located near the Village Sewage Treatment Plant, which may be contributing some chlorides. More study is required before any conclusions can be drawn.

SUMMARY

Most of the data collected this year seemed to follow trends set in earlier years (Willies, 1997; Lopez and Bridger, 1996; Austin, 1995). However, most concentrations seemed consistently lower than those documented last summer. This can be due to the increased air temperatures, lower water levels, and less precipitation. It seems that the river's ability to assimilate pollution at current levels has not been exceeded.

REFERENCES


Figure 8. Chlorides of Susquehanna River sites, 1997 and 1998.