Analysis of fecal coliform bacteria concentrations of the upper Susquehanna River

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INTRODUCTION

During the summer of 1998, fecal coliform bacteria concentrations were monitored and analyzed on the upper Susquehanna River. Elevated levels of these bacteria, which inhabit the intestinal tract of warm-blooded animals, indicate possible fecal pollution. This study helps to locate faulty septic systems and other pollution sources such as agricultural run off. Also, it ensures that the Village of Cooperstown’s sewage treatment plant is adequately disinfecting it effluent prior to discharge to the river.

METHODS

Nine different sites on the Susquehanna River (Figure 1) were tested biweekly for fecal coliform bacteria. All the equipment was sterilized before filtering. The following was sterilized using the autoclave at 121°C and 15 PSI for 20 minutes: Graduated cylinders, dilution water, and water collection bottles. Forceps were sterilized in a 95% ethyl alcohol solution that was burned off using a Bunsen burner. The filters, absorbent pads, and petri dishes were pre-sterilized. The filter funnels were sterilized in a 70% ethanol alcohol wash, then rinsed with hot water and dilution water. To ensure that no outside contamination had taken place, a blank was run between sample sites by filtering sterile dilution water and processing as usual.

Samples were filtered and the filters were aseptically transferred into the petri dishes. The petri dishes contained an absorbent filter pad with 2.2 ml of bacteria media. The samples were filtered at rates of 1, 10, and 50 ml per site to ensure an appropriate number of colonies in at least one of the dilutions. The optimum range is 20 to 80 colonies per dish. Dilution water was used to raise the volume needed to filter properly (at least 20 ml). The petri dishes were then incubated for 24-26 hours at a temperature of 44.5°C plus or minus 0.2 degrees.

After incubation, the colonies with a distinguishable blue color (Miller, 1995) were counted, averaged, and recorded. The numbers were then recorded as colonies per 100 ml.

RESULTS AND DISCUSSION

The fecal coliform bacteria concentrations for the summer of 1998 in the Upper Susquehanna River are located in Figure 2. The comparison between last summer’s (Salo, 1998) and this summer’s concentrations is located in Figure 3.

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Figure 1. Susquehanna River collection sites.
Figure 2. Fecal coliform bacteria in the Susquehanna River, summer 1998.

Figure 3. Fecal coliform bacteria in the Susquehanna River, summer 1997 and 1998.
The average fecal coliform bacteria concentrations for the summer of 1998 followed last summer's trend, though in higher concentrations. However, if the excessively high readings observed 19 August are excluded, concentrations are considerably lower than those of 1997. On 18 August 0.40 rain fell on the area, likely increasing agricultural runoff and causing a brief spike in bacteria levels. SR 16 had the highest concentration this year, which is located in a cow pasture, suggesting agricultural runoff. However, SR 18 has a considerably lower concentration value than SR 16 confirming the river's ability to assimilate this sort of pollution. Perhaps in the future agricultural best management practices may be implemented to address pollution concerns. Also, future studies on the river should record values of water level so discharge could be estimated, improving our understanding of this situation.

REFERENCES

