Conclusions

Overall, macroinvertebrate conditions in the Morrison Cove area were good with slightly greater than half of the stations rated nonimpaired. Some of the best diversity and macroinvertebrate conditions existed in the tributaries originating on the forested ridges. These sites had excellent mayfly, stonefly, and caddisfly populations. Some of the best macroinvertebrate sites in the valley were C1 (Clover Creek), Y3 (Potter Creek), Y4 (Three Springs Creek), Y1 (Hickory Bottom), H5 and H4 (Halter Creek), and Y6 (Yellow Creek). Some of the sites that need further investigation and potential remediation for water quality or habitat conditions were H10 (Plum Creek), H3 (Halter Creek), H6 (Halter Creek) and possibly T1, Y5 (Beaver Creek), and the headwaters of Piney and Clover Creeks.

Nitrate concentrations are a serious concern throughout Morrison Cove. Like many predominantly agricultural areas, nitrate levels are elevated in the surface water and groundwater. The level of concern for nitrates in surface water is 1.0 mg/l, and samples from every stream site, except the two tributaries coming off the sandstone ridges, exceeded that value. Nitrate in surface water is derived from three primary sources: rainfall, decomposition of soil organic matter, and nitrogen amendments such as fertilizers or manure (Eckert 1995). Ideally, a majority of the nitrate applied to the soil should be removed by the crops. However, this is not usually the case, and the excess nitrates are flushed into the streams during rain events. The drinking water standard for nitrates is 10 mg/l, and half of the springs sampled had a yearly average exceeding that value. In rural areas where groundwater is a primary water supply for private homeowners or small municipalities, these levels of nitrates may be a concern.

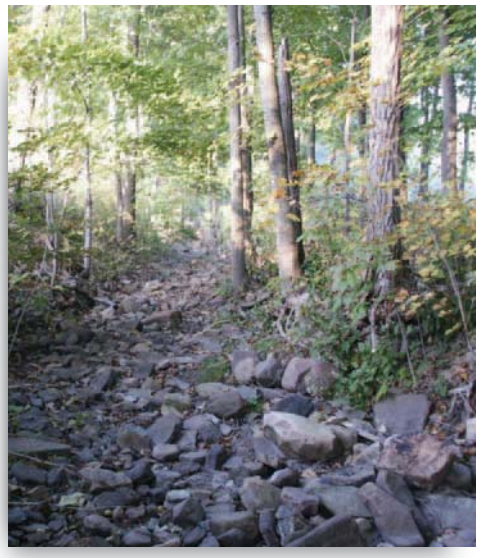
In an effort to control the nitrate problem in Morrison Cove, the Cove Area Regional Digester Project was formed to develop a way to manage animal waste in the area. The proposed process would use manure from dairy herds and produce 2.5 megawatts of electricity a day, which is enough to power over 17,000 homes. Additionally, it would remove more than 570,000 pounds of nitrogen loading and 25,000 pounds of phosphorus loading to surface water and groundwater (PA Environment Digest 2005). The groundbreaking for this facility is slated for early 2007. For more information on the Cove Area Regional Digester project, email CoveDigestor@verizon.net or call the Project Coordinator at (814) 693-4660.

Several other water quality trends in the Morrison Cove valley stand out from the data collected in this study. The highest concentrations of nitrates were found in springs, but the streams that originated in the carbonate valley of the Cove tended to have higher nitrates as well. These streams included Cabbage Creek, Potter Creek, and Three Springs Run. The highest calcium concentrations were found in the headwater area of Plum Creek, which corresponded with a band of limestone formation. The highest concentrations of sulfate were found in springs and streams around the quarrying operation. Stream sites that were spring fed tended to have more constant concentrations of sulfate, nitrate, chloride, alkalinity, and total hardness while these same parameters fluctuated with stream flow in streams that were not spring fed.

The streams in Morrison Cove would benefit greatly by some small changes in land use management practices. Many of the streams in Morrison Cove lacked sufficient protective vegetative riparian zone. Protection of the streams with additional vegetation would help maintain a cool temperature, provide a food source for some macroinvertebrates, and provide breeding habitat for the adult macroinvertebrate stage. Additionally, stream-side fencing to keep cattle out of the streams would improve habitat conditions.

Because the Roaring Spring area in Morrison Cove was identified as a Potentially Stressed Area (PSA) by SRBC, the data from this study are very important to current and future project review activities. SRBC defines a PSA as an area that meets at least two of the following criteria: (1) diminished yields, (2) declining water levels, (3) diminished stream or spring flows, (4) expanded dry stream reaches, (5) a water budget analysis indicating that withdrawals exceed the recharge for a 1-in-10 year annual drought, or (6) for developing areas, known withdrawals exceed 50 percent of the recharge for a 1-in-10 year annual drought.

SRBC staff has determined that in the Roaring Spring area, virtually 100 percent of the 1-in-10-year drought recharge is being utilized and that nearly all of the flow from the large spring is being used during times of drought.



Plum Creek tributary during dry October.

All the water from the streams and springs in Halter, Cabbage and Plum Creeks directly influences the water quantity and quality in the Roaring Spring area. Stream and spring discharge amounts are critical components in evaluating the water resources in any area. This information aids in making informed decisions about water availability, potential water supply, responses of streams to drought, and the capacity of the streams to handle pollutant loads. Data from this study will be considered by SRBC in managing the water resources of the basin. Additionally, the data from this study have been provided to the Pennsylvania Fish and Boat Commission and PADEP to supplement their own data from fisheries studies. All SRBC data from this project also will be available to the public on the SRBC website.