BENTHIC IMPAIRMENTS & TMDL PROCESS

Bordering the Page and Rockingham County lines, Naked Creek appears to be a healthy stream, flowing out of the Shenandoah National Park on its way to the Shenandoah River. Unfortunately, water quality can be measured in many ways and looks can be deceiving. Naked Creek is on the impaired waters list and is undergoing a total maximum daily load (TMDL) study based on the unhealthy number, diversity and type of aquatic life within the water. The South Fork of the Shenandoah River is also impaired for benthic quality.

A TMDL study determines the total pollutant amount a water body can receive and still meet water quality standards. There are four steps to the TMDL process: a study which identifies sources for a particular pollutant and recommends how much those sources must be reduced to meet water quality standards, an implementation plan detailing how to decrease the pollutant load, implementing the plan and monitoring to measure the effectiveness of actions implemented. Naked Creek and the South Fork are currently in the study phase for the benthic impairment.

"Benthic" refers to the macroinvertebrate aquatic organisms (that fish and birds eat) living in a body of water. Benthic organisms include clams, crayfish, aquatic snails, aquatic worms, leeches, certain insect nymphs and larvae (e.g., mayflies, stoneflies, dragonflies, etc.), and adult aquatic insects (e.g., riffle beetles). Changes in water quality generally result in changes in the benthic community.

Benthic macroinvertebrates (macro-organisms can be seen with the naked eye and invertebrate means lacking a backbone) are "living indicators" of present and past water quality conditions. The Environmental Protection Agency (EPA) has determined the method for assessing benthic communities in freshwater rivers and streams and the Virginia Department of Environmental Quality has done the testing using that method.

During the beginning of a benthic impairment TMDL study, stressors are identified which could lead to a decrease in the numbers, types and diversity of the life in the stream. These stressors can be either physical or a pollutant. Common benthic stressors include dissolved oxygen, excess nutrients (i.e. fertilizer), suspended solids, toxins, elevated levels of sediment, organic matter, suspended solids, pH extremes, elevated temperatures, channel or runoff modifications, etc. When the cause(s) of the benthic impairment are determined, a TMDL is developed for each pollutant or stressor.

In the development of the TMDL study, the watershed history is studied, characterizing the watershed's size, land use, slope, soils and geology, stream channel dimension and identifying critical contamination conditions such as timing of bacteria concentration, seasonality and studying bacteria concentrations in relation to flow.

As has been stated in previous articles of this series, land use directly affects water quality. For instance, an eroding stream bank churns sediment into a stream which decreases oxygen availability and impairs aquatic life. According to the EPA, sediment is the number one non-point source pollutant in the United States.

We need your help in the Naked Creek and South Fork Shenandoah River TMDL process. If you know of areas of erosion, can provide historic data on the watersheds, or just want to know how the process is going, please contact the Page County Watershed Management Planning Team at 540-743-4808. More information on benthic impairments can be found at www.ext.vt.edu/pubs/bse/442-556/442-556.html

A booth will be set up in the commercial building at the Page Valley Fair. Come see us and find out more about Page County's water conditions and resources. This article was written by Chris Anderson, member of the Watershed Management Planning Team.