

Water quality and biotic condition in mining-influenced Appalachian headwater streams: an overview of a long-term study¹

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Abstract: Water quality and biotic condition in central Appalachian headwater streams influenced by coal mining can be affected by multiple factors, including elevated levels of total dissolved solids (TDS). This presentation will summarize completed and ongoing, collaborative studies of the relationship between water quality and biotic condition in 28 Appalachian coalfield headwater streams since 2008. Study streams affected by varying extents of mining were selected with the intent of isolating effects of TDS while minimizing potential influence by other known stressors (e.g., impaired habitat). Six of the study streams are in a reference condition. Specific conductance (SC), a surrogate for TDS, was recorded at 15- to 30-minute intervals using automated loggers from October 2011 to present. Water samples were obtained periodically and analyzed for TDS, major ions, and trace elements. Benthic macroinvertebrate communities were assessed in all study streams using semi-quantitative methods and quantitatively in 15 of these streams. Carbon processing was assessed by evaluating leaf-litter breakdown rates during an 8-month period. Water quality measures were analyzed for seasonal variability; benthic macroinvertebrate community structure and leaf-litter breakdown rates were analyzed to determine relationships to water quality. Components of aquatic macroinvertebrate communities showed consistent sensitivity to increases in SC. We also observed strong seasonal patterns of SC along with variance of aquatic macroinvertebrate community structure within and among seasons of sampling.

Additional Key Words: Total dissolved solids, specific conductance, aquatic macroinvertebrates, mining impacts

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