ORAL PRESENTATION

Using Logistic Regression to Predict Recovery of Mayfly Populations in Acid Mine Impaired Streams based on Current and Future In-stream Habitat and Water Chemistry

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Abstract

A series of taxon-specific regression models of occurrence were developed for five mayfly genera (*Caenis, Isonychia, Stenonema, Stenacron* and *Baetis*) inhabiting streams impaired by acid mine drainage in in the Western Allegheny Plateau of the Appalachian Mountains. Historical distributions (presence/absence) in state records over several decades were used to develop and test predictive models of mayfly occurrence based on catchment characteristics (drainage area, gradient), in-stream habitat variables (substrate, channel morphology, pool and riffle quality) and water chemistry variables. Models for *Isonychia* and *Stenonema* had the best classification rates (81%), and included both habitat (QHEI) scores and chemical indicators of acid mine drainage. Models of occurrence of *Caenis, Stenacron* and *Baetis* had classification accuracies between 50% - 75% and were based on water chemistry with no in-stream habitat features as significant predictor variables. The accuracy of the models was tested in two ways 1) a case study of how the models might be applied by watershed managers within a single watershed (ten sites in Sunday Creek) and 2) a test using approximately 30 sites across three watersheds. In each test, the probability of occurrence of four mayflies (*Caenis, Isonychia*, *Stenonema* and *Stenacron*) was compared to the actual occurrence of mayflies sampled in 2012. The models were good predictors of the actual occurrence of *Stenonema* at sites, but results for other mayfly species were more variable. Predictive models that combine key habitat features with water chemistry can be more accurate in predicting biological recovery under different remediative scenarios than those based on water chemistry alone.