



2009 CSREES National Water Conference; St. Louis, MO

Developing biological indices of water quality in intermittent agricultural streams in western Oregon

William Gerth*, Randall Colvin, Alan Herlihy, Guillermo Giannico, Remegio Confessor, Jr., Gerald Whittaker, Stephen Griffith
Oregon State University
*william.gerth@oregonstate.edu

Abstract:

As part of the CEAP project, we've strived to identify and quantify linkages between conservation practices in grass producing fields and biological indicators in the Oregon Willamette River Valley. Specifically, we have assembled composite databases for fish and aquatic macroinvertebrates based on data collected in intermittent streams in the Calapooia River basin over the last six years. The ultimate goal is to use this biological information as an overall indicator of ecological quality in a basin-wide cost-benefit analyses that will depend heavily on the use of the SWAT model run under different conservation practice scenarios to predict basin water chemistry.

We investigated the response of both the fish and macroinvertebrate metrics with physical habitat, water quality, and GIS-derived landscape metrics. Our analyses revealed that the overriding factor controlling most biological condition metrics in these intermittent streams is distance to perennial water. Richness, diversity, and fish catch metrics decrease significantly as the distance to a perennial water source increases. For condition metrics related to distance to perennial water, correction equations were developed to account for this natural variation. Residuals from expected condition based on distance to perennial water were used as condition indicators for these metrics. The relationship between water chemical variables and biology metrics was quantified by multiple linear regression using an AIC weighted all subsets approach to model selection. Three of the 8 study metrics had very poor relationships with chemistry and we did not develop a final model for them. Final regression equations for the other five variables will be used in the final basin cost-benefit analysis to link SWAT model output to ecological quality.

Impact Statement:

This is a dual-purpose project that aims at: 1) quantifying linkages between conservation practices and biophysical responses (including water quality and biological indicators); and, 2) developing a model to assess tradeoffs between agricultural practices that maximize economic benefits and conservation actions that sustain or improve ecosystem services. We are at the mid-point of our project and concrete benefits are difficult to document at this stage. Nonetheless, the degree of interaction, communication and collaboration among different stakeholders this project has allowed thus far is a clear social impact worthy of consideration.

Category: CEAP

Type of Presentation: Poster Presentation