

Response of benthic algal and invertebrate communities to nutrient enrichment in agricultural streams

R.W. Black¹, P.W. Moran¹, and J.D. Frankforter^{2,1}
¹Washington Water Science Center, US Geological Survey, 1201 Pacific Ave., Tacoma, WA, USA, ²Nebraska Water Science Center, US Geological Survey, 5231 South 19 Street, Lincoln, NE, USA

As part of the USGS National Water Quality Assessment Programs Nutrient Effects study, benthic algae and invertebrate communities were used to examine nutrient enrichment in the Central Columbia Plateau-Yakima River (Washington) and Central Nebraska (Nebraska) study regions. In each region, 30 independent sites were selected to represent a gradient of nutrient conditions. The study was carried out at low-flow conditions in 2003. Data collected included nutrients, benthic and seston chlorophyll-a, benthic algal and invertebrate communities, stream and riparian habitat, and basin-scale land use. Based on multivariate ordination methods, algal and invertebrate communities were significantly different between regions. Optimal nitrogen and phosphorus concentrations (nutrient optima) for each algal species calculated using weighted-averaging regression were significantly more accurate for algal communities collected in depositional habitats as compared to those collected in riffles in both regions. Distributions of nutrient optima for algae for both study regions exhibited similar patterns indicating similar community responses to nutrients across broad geographic regions. Similarities between regions were not observed for invertebrate responses. The information from this study will permit a more accurate determination of how nutrients in agricultural streams most influence biological communities and will help develop biological indicators of nutrient enrichment.