

Assessing the Effects of Nutrients on Agricultural Streams: Implications for Nutrient Criteria and Stream Restoration

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Elevated nitrogen and phosphorus concentrations are a leading cause of water quality impairment in the United States and agriculture is a major source of nutrients. The U.S. Geological Survey's National Water-Quality Assessment Program is studying nutrient-biota interactions in eight agricultural areas across the United States. Each study area includes 30 wadeable stream sites, which were selected to capture a broad nutrient gradient. Data on nitrogen and phosphorus, algal and invertebrate communities, benthic and sestonic algal chlorophyll *a*, and habitat were collected at each site during the growing season. Stream metabolism and denitrification were assessed at a subset of sites. Results from these studies have identified a number of important issues related to agricultural streams: (1) nutrient concentrations and algal biomass are rarely correlated due to excessive nutrient concentrations and habitat limitation; (2) agricultural streams often are heterotrophic and may be unable to significantly reduce downstream transport of nitrate, (3) groundwater inflow can continue to be a nitrogen source for an extended period regardless of changes in management practices. The large excess of nutrients in agricultural streams and the complex interactions of nutrient sources, habitat, and biota, need to be considered to arrive at realistic expectations regarding nutrient criteria and stream restoration.