Predicting Values for Target Analytes Using Continuously-Monitored Water-Quality Parameters

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The U. S. Geological Survey (USGS), in cooperation with Treasure Valley municipalities, conducted an analysis to determine whether continuously-monitored water-quality parameters at the Boise River near Parma, Idaho could be used to predict nutrient (total nitrogen and phosphorus) concentrations on a continuous basis. The USGS developed multiple linear regressions using continuously-monitored water-quality readings and 38 nutrient samples collected during the same time period. The regression equations that were deemed "best" were then used to predict nutrient concentrations in the Boise River on a continuous basis within a certain confidence interval. Specific conductance was used as a surrogate for total nitrogen and chlorophyll-a was used as a surrogate for total phosphorous. Stream flow and seasonal variables were added to both regression equations to improve the correlation between the explanatory and observed values. Total nitrogen and total phosphorus concentrations were predicted using regression equations that represented 97.8% and 68.8%, respectively, of the variability in the sample data. The potential for developing additional surrogate relations exists for the Boise River near Parma. For example, turbidity may prove to be a successful surrogate for suspended sediment or for E. coli concentrations. Once a surrogate relation is established, periodic collection of samples will be required to verify surrogate relationships over time and over a variety of different hydrologic conditions.