In-situ phosphate measurements with the Cycle-PO4 sensor to evaluate phosphorus loadings and impact on biogeochemistry to Brownlee Reservoir.

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Phosphate is a key nutrient that can control productivity in natural waters and more frequently phosphate loadings are being dominated by anthropogenic input. Algal blooms from increased phosphate levels can cause eutrophication, odor and discoloration of drinking water, and can contribute to dominance of harmful algal species in certain systems. The Cycle-PO4 is an in-situ phosphate sensor that uses the same molybdenum blue chemical method as most lab analyzers. A Cycle-PO4 sensor was deployed in the Snake River, at the Van Ducci bridge, just downstream of Weiser, ID. This point in the watershed is just above a series of large reservoirs (Brownlee, Oxbow and Hells Canyon) and is a composite of major tributaries that run through agricultural, natural, and urban land use. The sensor analyzed the water for phosphate hourly with other biogeochemical sensors (dissolved oxygen, turbidity, temperature, conductivity, and chlorophyll fluorescence). Grab samples were taken to validate in-situ sensor performance. Results reveal that phosphate is closely coupled with discharge, but that the relationships often change from correlated to inversely correlated, and time lags between discharge events and phosphate response are evident. Because of this complex relationship, nutrient loading models that use interpolation or discharge-regression relationships are not as accurate as loadings that can be determined from continuous, hourly, nutrient measurements. Biogeochemistry in this region of the Snake River is complex, and hypotheses are presented for biogeochemical relationships between phosphorus and primary producers.