

## **Effects of Island Park Reservoir on Sediment and Phosphorus Transport in the Upper Henrys Fork Watershed**

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The Henrys Fork River downstream of Island Park Reservoir in eastern Idaho supports a world-famous wild-trout fishery. Water is stored in the reservoir during winter and early spring and is released during irrigation season, altering river hydrology and driving sediment and nutrient dynamics. We sampled suspended-sediment and phosphorus upstream and downstream of the reservoir in 2013 and 2014. Suspended sediment loads mirror hydrology: sediment is stored in the reservoir during spring runoff and delivered to the river during irrigation season. During 2014, when relatively little water was delivered from the reservoir, annual sediment storage and delivery were nearly in balance, and suspended sediment concentration downstream of the reservoir was independent of reservoir volume. In 2013, when the reservoir was drawn down to 25% of capacity, sediment concentration was negatively correlated with reservoir volume, as was observed in 1992, when drawdown of the reservoir to minimum pool delivered 50,000-100,000 tons of sediment into the river during late summer and early fall. Sediment delivery over this same time period in 2013 was 500 tons. Like sediment, phosphorus is stored in the reservoir during runoff and delivered downstream during irrigation season, but dynamics differ because of chemical processes. Over May-December 2014, 22 tons of phosphorus were exported from the reservoir, whereas only 13 tons entered the reservoir. The majority of phosphorus delivery occurred from July to September, when orthophosphate comprised 40-100% of total phosphorus in the river. Orthophosphate comprised only a small percentage of total phosphate input to the reservoir on all sampling dates, suggesting that conversion of phosphorus in the reservoir from organic to inorganic form is responsible for much of the downstream delivery of phosphorus into the river during the summer. This phosphorus load drives a productive aquatic system based on macrophyte growth in low-gradient reaches of the river.