Water-Quality Conditions Near the Confluence of the Snake and Boise Rivers

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Algae blooms and fish kills have plagued a stretch of the Snake River that flows through Brownlee Reservoir along the Idaho-Oregon border. The Boise River enters the Snake upstream from this stretch at their confluence near Parma, Idaho. The U.S. Geological Survey conducted a comprehensive monitoring program in the Boise and Snake Rivers from September 2008 through October 2010, in cooperation with local municipalities, to evaluate water-quality conditions and the nutrient loading from the Boise River to the Snake River. USGS scientists monitored water-quality at three primary sites: one on the Boise River at Parma; one upstream from the confluence on the Snake River at Adrian, Oregon; and one downstream from the confluence on the Snake River at Nyssa, Oregon. Some samples also were collected from the Owyhee River, which enters the Snake River downstream of the Boise River inflow.

During the study, the Boise River contributed 11 percent of the mean annual flow and 30 percent of total phosphorus, 72 percent of orthophosphorus, 16 percent of total nitrogen, 19 percent of nitrate plus nitrite, 13 percent of suspended sediment, and 2.3 percent of chlorophyll-*a* loads to the Snake River system that were measured at Nyssa. The Snake River upstream of the confluence contributed 53 percent of total phosphorus, 39 percent of orthophosphorus, 77 percent of total nitrogen, 75 percent of nitrate plus nitrite, 50 percent of suspended sediment, and 86 percent of chlorophyll-*a* loads to those measured at Nyssa. The Owyhee River contributed 2.3 to 3.6 percent of nutrient loads.

Data from continuous water-quality monitors helped USGS scientists to develop surrogate models that were generally successful in representing daily, seasonal, and annual fluctuations of nutrients and suspended sediment. With verification over time, these models could serve as useful tools for resource managers to assess efforts to improve water quality.