Interactions between water quantity and quality and the impacts to an economically-important fishery

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Tenkiller Ferry is a 5,220 ha reservoir on the Illinois River in eastern Oklahoma that was impounded for flood control and hydroelectric power. Rainbow trout were established as the primary mitigation for the loss of the warm-water fishery in the lower Illinois River. No instream flow standards or water storage have been allocated to support the trout fishery. Inconsistent supply of water from the reservoir resulted in an increase in violations of state water-quality standards. Trout stockings were suspended in 2011 for the second time in 60 years as a result of insufficient water quantity and quality. Concern from local anglers and state and federal legislators coupled with two documented fish kills in 2011 led to the development of two new engineered options: Construction of a bypass pipe, and a Super Saturated Dissolved Oxygen System (SDOX). Temperature and dissolved-oxygen conditions were collected continuously through the summer months at several locations from the dam downstream approximately 10 km. Flow, dissolved oxygen, and temperature data were used to calibrate a model predicting dissolved oxygen as a function of discharge to recommend a summer minimum flow. Cooperation of agencies to obtain feasible management options will allow continued sustainability of this economically-important fishery.