Sediment and phosphorus dynamics in a highly managed irrigated watershed of southern Idaho

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Extended Abstract

Hydrologic processes in highly managed agricultural systems share some similarities with rainfed systems but have distinct characteristics that present both opportunities and challenges for modeling and water quality improvement efforts. The Twin Falls Canal Company (TFCC) irrigation project diverts water from the Snake River to provide irrigation water to 82,000 ha of agricultural land in southern Idaho. Sediment and phosphorous (P) load to the Snake River from irrigation return flow has been a major concern in the region. Practices implemented over the years to mitigate sediment and P load to the river ranged from project-level sediment reduction and P removal structures such as water quality ponds to farm-level sedimentation ponds. One of the most profound agricultural changes in the TFCC irrigation project is the conversion of historically dominant furrow irrigated fields to sprinkler irrigation at a rate of 2% per year (Bjorneberg et al. 2020) for the past 20 years. These changes have had beneficial impact on surface water quality but present new challenges concerning groundwater supplies. This study uses water quality data collected at return flow monitoring sites in TFCC as part of the USDA-NRCS Conservation Effect Assessment Project (CEAP) to study the effect of various project- and field-level water quality improvement practices on irrigation return flow water quality.

The benefit of conversion from surface irrigation to sprinkler systems coupled with other on- and off-farm water quality improvement practices is evidenced as a gradual decline in sediment and P concentration at the project level between 2006 and 2018 (Figure 1). Further reductions are expected in the future as more farms convert from surface irrigation to sprinklers and technologies developed to improve irrigation efficiency.

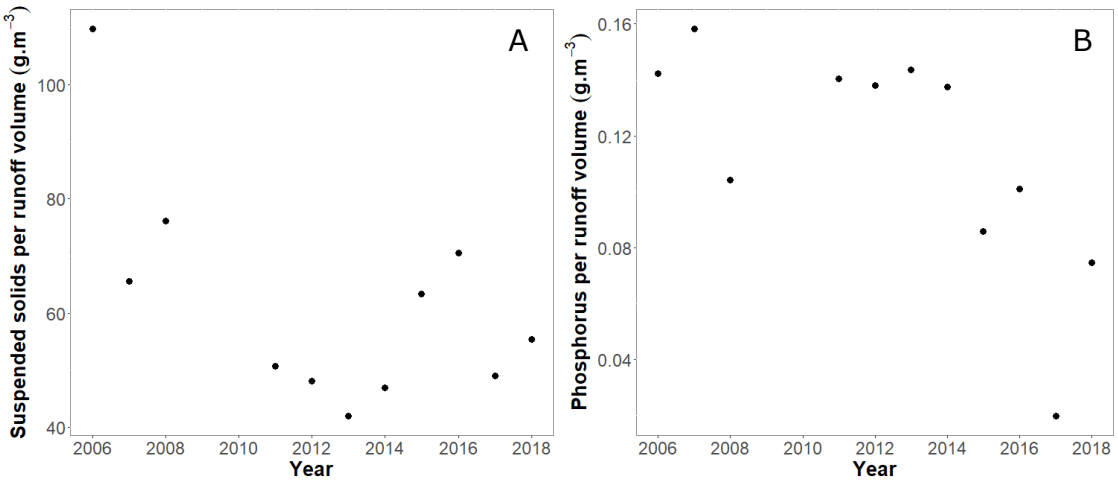

Figure 1. Total suspended solids (filtered through 25 µm sieve) (A) and total phosphorus (B) per unit return flow volume measured at 7 monitoring sites in the Twin Falls Canal Company irrigation project.

Reference

Bjorneberg, D.L., B.A. King and A.C. Koehn. 2020. Watershed water balance changes as furrow irrigation is converted to sprinkler irrigation in an arid region. J. Soil Water Conserv. 75: 254-262. doi:10.2489/jswc.75.3.254.