2008 USDA-CSREES National Water Conference
Sparks, NV

Low-head dam reservoirs: sinks for nitrogen and sources of methane?

Lauren E. McGee and Virginie Bouchard

Abstract Text:

Of the two million dams in the United States, over 90% are low-head dams, small run-of-river dams measuring less than 5 m in height. Reservoirs created by large and moderately sized dams are known to serve as sinks for N and sources of CH4. Our objective was to investigate whether this trend also applies to reservoirs created by low-head dams. In late spring and summer of 2007, we collected grab sediments at three locations within five low-head dam reservoirs and their immediate-upstream riverine reference reaches. In the lab, we measured potential nitrification, denitrification enzyme activity, and potential methane oxidation. Water grab samples were also collected at varying depths at each site and analyzed for dissolved NO3, NH4, and CH4. Potential denitrification, nitrification, methane oxidation, and water column concentrations of dissolved NO3 and CH4 were not significantly different between reservoir and reference sites (ANOVAs, $p > 0.05$). However, potential denitrification, nitrification, and methane oxidation tended to have higher rates in low-head dam reservoirs; dissolved NO3 and CH4 concentrations tended to be higher in reference reaches. The concentration of dissolved NH4 was higher in the reference reaches than in the reservoir sites ($p=0.019$). Our preliminary conclusion is that low-head dam reservoirs are neither significant sinks of N nor sources of CH4.

Impact Statement:

With low-head dam removal being considered a river restoration option, it is imperative to understand how these structures alter river ecosystem function, specifically nutrient cycling and trace gas emissions. This research improves our understanding of these functions through the analysis of water quality and sediment processing parameters.