Flow Reduction to Reduce Mercury Flux from Contaminated Sediments to Surface Water

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When clean river water was added to maintain stable minimum streamflow in the upper reaches of a mercury-contaminated creek, mercury concentrations and flux increased across a 400 m reach of stream near the point where additional flow was added. Deposits of metallic mercury lying on a clay hardpan underlying 50 cm of armored soft sediments were acting to generate high concentrations of dissolved mercury (>50 µg/L) within the interstitial streambed water. Diffusion and advection of that water into the surface flow produces an additional flux of 1.0 - 2.0 g/d of mercury, a substantial fraction of the total mercury input to the creek. When reduction in flow augmentation cut headwater flow by 50%, mercury input decreased from 1.1 to 0.5 g/d. The action holds promise reducing mercury inputs from the streambed without losing the ecological benefits of more stable temperature, flow, and water quality in the stream headwaters.