

WATER AND SEDIMENT TEMPERATURES AT MUSSEL BEDS IN THE UPPER MISSISSIPPI RIVER BASIN

Teresa Newton

U.S. Geological Survey
Upper Midwest Environmental Sciences Center, La Crosse, WI 54603 U.S.A.
email: tnewton@usgs.gov

Jennifer Sauer

U.S. Geological Survey
Upper Midwest Environmental Sciences Center, La Crosse, WI 54603 U.S.A.
email: jsauer@usgs.gov

Byron Karns

National Park Service
St. Croix National Scenic Riverway, St. Croix Falls, WI 54024 U.S.A.
email: byron_karns@nps.gov

ABSTRACT

Native freshwater mussels are in global decline and urgently need protection and conservation. Declines in the abundance and diversity of North American mussels have been attributed to human activities that cause pollution, water-quality degradation, and habitat destruction. Recent studies suggest that effects of climate change may also endanger native mussel assemblages, as many mussel species are living close to their upper thermal tolerances. Adult and juvenile mussels spend a large fraction of their lives burrowed into sediments of rivers and lakes. Our objective was to measure surface water and sediment temperatures at known mussel beds in the Upper Mississippi (UMR) and St. Croix (SCR) rivers to estimate the potential for sediments to serve as thermal refugia. Across four mussel beds in the UMR and SCR, surface waters were generally warmer than sediments in summer, and were cooler than sediments in winter. This suggests that sediments may act as a thermal buffer for mussels in these large rivers. Although the magnitude of this effect was usually $<3.0^{\circ}\text{C}$, sediments were up to 7.5°C cooler at one site in May, suggesting site-specific variation in the ability of sediments to act as thermal buffers. Sediment temperatures in the UMR exceeded those shown to cause mortality in laboratory studies. These data suggest that elevated water temperatures resulting from global warming, thermal discharges, water extraction, and/or droughts have the potential to adversely affect native mussel assemblages.

KEY WORDS Native freshwater mussels, Water temperature, Mississippi River, Unionids, Climate change