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

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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°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

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RECENT COLLECTION OF A FALSE SPIKE (*QUADRULA MITCHELLI*) IN THE SAN SABA RIVER, TEXAS, WITH COMMENTS ON HABITAT USE

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ABSTRACT

Similar to other rare and endemic freshwater mussel species in Texas, the distribution and life history of the False Spike, *Quadrula mitchelli*, is poorly understood. Few recent locality records suggest that *Q. mitchelli* has been extirpated from much of its range and is declining in numbers at an alarming rate, which has led to it being petitioned for listing under the Endangered Species Act. We present our findings of the discovery of one live individual collected on the San Saba River, TX and provide information regarding the species' habitat use. The discovery represents the second known population in Texas and the only record of a live individual from the San Saba River. Knowledge of habitat use may help identify populations in other streams and allow managers to develop recovery plans for *Q. mitchelli*. However, given the rarity of this species, *Q. mitchelli* potentially faces extinction unless prompt conservation action is taken by state and federal agencies.

KEY WORDS Freshwater mussels, Unionids, Texas, False Spike, Rare Species

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STATUS OF FRESHWATER MUSSELS IN THE MIDDLE FORK HOLSTON RIVER, VIRGINIA

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ABSTRACT

Six sites in the Middle Fork Holston River (MFHR), Virginia, were surveyed in 2010 and 2011 using catch-per-unit-effort (CPUE, no./h) and 0.25 m^2 quadrats to assess changes in the mussel fauna since a previous survey in 1998. Since 1998, species richness declined from 15 to 11, compared to a historical richness of at least 20 species. To date, extirpated species are dominated by short-lived species, but all remaining species are declining rapidly. Mussel abundance, both as density (number/m^2) and CPUE, declined by ≥50% since 1998 at most sites, and several species collected during this study were represented by only a few individuals. There was no evidence of recent reproduction at the survey sites. Although the federally endangered *Epioblasma florentina aureola* appears to be extirpated, two species proposed for federal listing, *Pleuronaia dolabelloides* and *Ptychobranchus subtentum*, persist in the river. The MFHR appears to be another example of an enigmatic mussel decline characterized by curtailed recruitment and subsequent erosion of the fauna over time, despite a lack of obvious impacts to the stream. Twenty-six reaches in the MFHR watershed are listed as impaired, primarily by sediment and *E. coli*, suggesting that nutrient enrichment coupled with increases in streambed embeddedness could produce elevated substrate ammonia concentrations, which are toxic to juvenile mussels. In addition, limited sediment quality data indicate that metals, PCBs, and DDE are present in the stream and also may inhibit recruitment or have sublethal effects on adult mussels. The MFHR is an important refuge for the diverse Tennessee River basin mussel fauna, and identification and remediation of specific factors responsible for mussel declines are urgently needed.

KEY WORDS Freshwater mussels, Unionidae, Middle Fork Holston River