



The effects of temperature and predator-prey interactions on the migration behavior and vertical distribution of *Mysis relicta*

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ABSTRACT: The extent to which temperature, temperature gradients, predator smell, and prey availability influence the migratory behaviors and vertical distribution of the opossum shrimp, *Mysis relicta*, was explored through controlled laboratory experiments and comparisons with field distributions of mysids in Lake Ontario. By varying environmental conditions in 2-m tall experimental columns in a temperature-controlled room, we determined that mysids prefer temperatures between 6° C and 8° C with limited movement into waters of 12° C or higher. No mysids moved into waters above 16° C in the absence of prey. However, a higher proportion of mysids moved into temperatures of 14° C and 16° C (but not 18° C) when densities of *Daphnia pulicaria* exceeding 120 L⁻¹ were present at those temperatures. *Mysis* avoided waters with kairomones from a primary mysid predator, the alewife (*Alosa pseudoharengus*). The rate of temperature change with depth did not restrict mysid movements. A temperature preference function based on the experimental data was applied to an existing model of mysid vertical distribution. The modified model predicted the depth of maximum mysid density to within 1 m and yielded high percentage overlap index values when compared with published mysid vertical distributions in Lake Ontario. Our approach may be used to model how diurnal, seasonal, and larger climactic changes can impact both the vertical position and feeding ecology of mysids, a keystone species in many deep-water pelagic food webs.

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