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To Migrate or Not: Application of Optimal Annual Routine Modeling to Evaluate *Mysis diluviana* Decision-Making in Diel Vertical Migration.

Recent work indicates that the macro-invertebrate *Mysis* exhibits partial diel vertical migration (DVM), whereby one part of the population remains on the lake bottom at night while the other migrates up the water column. The drivers underlying the decision to migrate remain unknown. We use concepts from optimal annual routine modeling to develop an agent-based model that simulates thousands of individual mysids' decision-making processes at an hourly time step throughout a year. The model takes into account a daily and seasonally changing environment, including light, temperature, resources, predation risk, and body condition to evaluate if multiple migration strategies can produce similar levels of fitness. In addition to testing hypotheses about migration drivers, the model, once parameters have been calibrated with real data, will help facilitate more efficient field sampling and prediction of resource availability for mysivorous fishes by evaluating the potential for seasonality in *Mysis* migration patterns.