

**Optimal decision rules for dispersal under activity-mortality tradeoffs for small ectotherms in thermally-structured landscapes** SEARS, Michael W.\*; POLNASZEK, Timothy; ARTITA, Kimberly S.; Southern Illinois University; Southern Illinois University; Southern Illinois University [msears@zoology.siu.edu](mailto:msears@zoology.siu.edu)

Many animals perform much of their daily activity under the threat of predation. This threat is one further stress for ectotherms that must perform behaviors, such as foraging, while navigating complex thermal environments. In previous models, we have examined optimal decision rules for dispersal given the thermal preferences and physiological capacities of individuals under different configurations of habitat in thermally-structured landscapes. Here, we add a risk of mortality while foraging on the surface by implementing additional decision rules that mediate activity by an individual's state of satiation. That is, hungry individuals are more likely to forage than satiated individuals, and mortality risk while foraging is higher than when not foraging. We use a logistic function to describe the relationship between satiation and foraging activity. In addition to optimizing decisions for movement through thermally-heterogeneous habitat, we optimize the shape of the satiation-activity function that maximize net energy intake per time discounted by mortality. These simulations were compared under different probabilities of mortality and foraging success (or food abundance) for different spatial configurations of thermal habitat. Ongoing work is relaxing implicit risks of mortality by implementing explicit predator-prey interactions in our thermally structured landscapes. We suggest that formulations and tests of the costs and benefits of thermoregulation should explicitly consider risks of mortality, in addition to net energetic gains, when considering optimal thermoregulatory strategies.