

Modeling the impacts of adaptive search intensity on the efficiency of abundance estimates

Laura Jiménez

Center for Mathematical Modeling, Universidad de Chile

I will present a modeling framework based on concepts from optimal foraging theory to determine how searchers can tune their behavior to produce optimized density estimates for a wide variety of abundance survey methods used in ecology. The modeling framework assumes that by searching faster one can cover more area but with reduced detection probability. I will show how to determine the amount of time surveyors should spend searching a patch and the corresponding search speed that minimizes uncertainty in the estimated density of a population. For this, I will start by examining how a searcher should behave in an idealized case where uncertainty in the detection probability is independent of search time. This simple case leads to analytic solutions that build intuition regarding optimized searcher behavior. I will then extend the framework to a removal survey design, and test predictions from our models using field data of zebra mussels in central Minnesota.

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