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Movin' & Groovin' Salamanders: Conservation Implications of Large Scales and Quirky Sex

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Abstract
Mole salamanders (Ambystoma) and woodfrogs (Lithobates sylvaticus) are abundant in New England and depend on ephemeral wetlands for breeding. Their aquatic habitats have been well studied and are protected by several local and regional regulations. State endangered species laws also protect mabled salamanders (A. opacum), Jefferson salamanders (A. jeffersonianum), and blue-spotted salamanders (A. laterale). However, these amphbibians spend most of their adult lives in terrestrial habitats that remain poorly protected and elusive to researchers.

In chapter 1, I developed a novel technique using passive integrated transponders for tracking small animals. I used this technique to track marbled salamanders walking up to 200 m from their breeding pond during post-breeding migrations.

In Chapter 2, I examined the importance of multiple habitat variables for predicting the distributions of woodfrogs and spotted salamanders at 455

ponds in western Massachusetts. Based on a variable-comparison technique I developed, the best predictor for either species of amphibian was the amount of forest in the surrounding vii landscape. Both species were found more frequently in upland forests where the ponds are least protected by state and federal wetland regulations.

In chapter 3, I used my data from chapter 2 and three other similar data sets to conduct an analysis of spatial scale and to parameterize a recently published resistant kernel model. The complex model parameterized by an expert panel did significantly worse than the null model. The distributions of both amphibians were best predicted by measuring the landscape at very large scales (over 1000 m). The most effective scales for conservation may be largest for organisms of intermediate dispersal capability.

In chapter 4, I explored the evolution and genetics of the Jefferson/blue-spotted/unisexual salamander complex. I framed research into the fascinating unisexual reproductive system with a model that relates nuclear genome replacement, positive selection on hybrids, and biogeography of the species complex. I parameterized this model using genetic data taken from salamanders spanning Massachusetts and an individual-based breeding simulation. If paternal genomes are transmitted to offspring with the frequencies reported from laboratory experiments, then my model suggests that there must be strong selection favoring unisexuals with hybrid nuclei.

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