EEB313 Project Proposal: Shahd Daoud, Abby Frix, Sylvia Sun

Climate change is an ever-important topic concerning species abundance, especially aquatic organisms and their morphological responses to increasing air temperatures[1]. Understanding morphology changes with respect to growing temperatures enables researchers and conservationists to better predict the larger-scale ecological effects of climate change[2]. Furthermore, investigating the differences in morphology temperatures will help scientists predict and form conservation plans based on the rise or fall in salamander patterns. In specific, our model aims to predict future morphology changes in Eastern red-backed salamanders. Eastern red-backed salamanders exist in two pattern categories: 'Leadback' and 'Redback'[3]. 'Leadback' salamanders have a uniform dark-gray to black colouring, and 'Redback' salamanders have a reddish stripe that runs down their entire back to the tail[3].

To investigate this, we will use Eastern red-backed salamander abundance data collected from the Government of Canada[4] to infer annual growth rates for both morphs. Using that, we will plot thermal response curves, with non-linear regression, of both morphs' growth rates as a function of temperature. These components can then be used to inform a mathematical model of how salamander abundances change under different conditions. For this study, we will focus on different climate scenarios - specifically increasing temperatures and more variability in temperature. We will examine the behaviour of the mathematical model and in particular the frequencies/abundances of the ecomorphs under the different climate regimes (and varying how interaction strengths/types change as functions of temperature). The key variables used to determine this will be abundances of the ecomorphs, climate (air temperatures), and years. With the proportion of redback to leadback salamanders as our response variable. We will get this proportion by using abundance data of the different salamander morphs across time to observe yearly growth rates.

Works Cited

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2. Hill GM, Kawahara AY, Daniels JC, Bateman CC, Scheffers BR. Climate change effects on animal ecology: butterflies and moths as a case study. Biological Reviews. 2021;96(5):2113–26.
3. Eastern Redback Salamander [Internet]. CT.gov - Connecticut's Official State Website. [cited 2024 Oct 16]. Available from: https://portal.ct.gov/deep/wildlife/fact-sheets/eastern-redback-salamander
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