

Spring 2017 Undergraduate Research Symposium Proposal

Diet Composition and effects of food resources on population dynamics of the Eastern Newt at Kingfisher Pond: A Long-term Field study

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Abstract:

Declines in amphibian populations have been noted worldwide since the 1960s. Proposed causes of amphibian population declines globally include extrinsic factors like habitat modification, disease and UV-B radiation. Intrinsic factors, such as food resource limitations and intraspecific competition, would be expected to cause population oscillations. Long-term studies are needed to discern whether changes in population size are due to one or both of the above factors.

The Liberty University Ecology and Environmental Science classes have been conducting a population ecology study of the Eastern newts (*Notophthalmus viridescens*) in Kingfisher Pond annually since 1998, using a mark/recapture methodology. Newts captured through seining were given a permanent elastomer mark. Population size has oscillated from a low of 503 in 2005 to a high of 3033 in 2014. Hypothesizing food resources as the main cause of these oscillations, 10 newts, typically five females and five males, were collected monthly by seining, beginning February 2016. The newts were anesthetized post-capture and their weight, length, and sex were recorded once movement ceased. Their stomachs were then pumped using dechlorinated tap water in a syringe with tubing attached. Stomach contents flushed into a petri dish were examined under a stereo microscope. Newts were then placed in a recovery tub until consciousness was regained and then later transported back to the pond.

Newts were found to consume prey throughout the year, even when water temperatures were between 5 and 6 C. Main prey orders identified were Volvocales, Ostracoda, Diptera, Cladocera, Ephemeroptera and Copepoda. Volvocales dominated numerically, followed by Ostracoda, both of which were small organisms, less than one mm in size. Seasonally, there was an inverse relationship between the numbers of Volvocales and Ostracoda in the diet of the newts. Volvocales comprised over 90% of the contents of the newt's diet in the winter, and this order made up the highest numerical portion of the diet in the fall. In contrast, Ostracoda made up less than 10% of the diet in both winter and fall, but was the primary order found in diet in the spring. Fluctuations of food consumed by the male and female newts were reflected in their condition indices as derived from the residual method. Female newts were shown to have lower condition indices in the winter and summer, while males follow a reverse trend. These variations in condition factors were hypothesized to stem from the demands of breeding and the seasonal fluctuations of food. To better ascertain prey population size residing in Kingfisher Pond, various sediment sampling methods are currently being explored. Once a sampling method is established, prey population numbers, prey consumption by newts and newt population size can be quantified and related to each other in order to understand the dynamics between newt predators and their prey.