12 November 2024

Kathryn L. Cottingham, Ph.D.

Editor-in-Chief

*Ecology*

Dear Dr. Cottingham:

We are pleased to submit our manuscript “Interpreting field measurements of juvenile growth and survival rates with population growth isoclines” to *Ecology* for consideration as an article.

**Section 1: Contribution and advancement of science**

One general problem for ecology is the challenge of understanding variation of population growth rates of, small short-lived organisms in natural settings (species with a Type III survivorship). Many studies acknowledge that individual growth rates determine the time that prey spend at vulnerable sizes which interacts with mortality rates (e.g., predation) to jointly determine prey survival in size structured populations. Most examinations of this phenomenon and its relation to environmental variation (e.g., temperature, productivity) occur in carefully controlled conditions, but do not make extension to the field or consider all seasonal varying contexts. Further, despite studies on prey survival, there have been few studies that explore and illustrate the theoretical predictions of the two factors (juvenile growth and survival rates) from a population dynamic perspective.

In this paper we approached the conceptual problem of population growth being a function of combinatorial growth rates and mortality rates by creating a zero-population growth isocline (of the rates) from a previously published demographic model. The model is a size-indexed model where size at age is a function of growth. Using the isocline we illustrate the expected/describe pattern that has long been recognized and further use the isocline as a “quantitative map,” by comparing measured growth rate parameters and survival parameters in natural field settings to the isocline. This approach provided a means of interpreting how natural spatial-temporal changes in prey growth and mortality rates would be expected to influence population growth. With quantitative information about the predators the work providing further insights to population limitation by natural assemblages of predators under changing environmental conditions. To the best of our knowledge, this is the first time this approach has been used and presents a general framework that could be used to interpret or scale-up field-measured rates using models within natural field settings.

In addition to the novelty of our approach, our study species, the Florida apple snail (*Pomacea paludosa)* is a species of conservation concern because the adult snails are the only native prey of the US federally endangered Evergaldes Snail Kite (*Rostrhamus sociabilis*). Declines in the Snail Kite population in 2002 and again in 2007 have been linked to declines in populations of the Florida apple snail. Current Florida apple snail populations remain too small to support nesting in most of the Everglades. Our approach to examining recruitment using the model has generated new hypotheses about what may be limiting Florida apple snail populations.

**Section 2: Manuscript length and conclusions**

Our manuscript is 28 pages long, and the main text has a word count of 7214 (Introduction through Conclusions, References, Tables and Figure Captions). We include supplementary material that provides additional methodological detail and ecological context for the main results. We confirm that this manuscript has not been published or submitted elsewhere. We do not have conflicts of interest to disclose, and all authors have read and approved the final manuscript for submission with the ESA family of journals.

We hope you move this manuscript to review and we have suggested potential subject-matter editors and reviewers because they have the background to evaluate our findings objectively. To the best of our knowledge, those suggested have no conflicts of interest, financial or otherwise.

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Sincerely,

A black and white photo of letters

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On behalf of Mark I. Cook and Nathan J. Dorn