6 March 2025

Kathryn L. Cottingham, Ph.D.

Editor-in-Chief

*Ecology*

Dear Dr. Cottingham:

After revising, we are pleased to resubmit our manuscript “Interpreting field measurements of juvenile growth and survival rates with population growth isoclines” to *Ecology* for consideration as an article.

One general problem for ecology is the challenge of understanding how mortality and growth rates combine to influence population dynamics. 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.

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 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 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. 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 our previous submission, you raised concerns that although you felt the approach had general implications, we focused too much on our study organism the Florida apple snail (FAS). You encouraged us to make the general implications front and center and treat the FAS as a case study to the general approach. Through our revisions, we feel we addressed your concerns by including a new figure that illustrates the isocline approach, and describes three examples from marine, terrestrial and freshwater systems where survival and growth had sufficiently been studied for us conceptualized using hypothetical isocline. We further revised the introduction to describe these examples and how they could benefit from this approach. In addition to adding this figure, we moved our study site and location figure to an appendix and include a table illustrating the hypotheses we could offer for applied research from this approach. In the discussion, we include a short description of how others could use this approach and reframed our major conclusions toward the general implications of the isocline approach.

Although the main text word count increased by ~400 words (from 7214 to 7635; Introduction through Conclusions, References, Tables and Figure Captions), the manuscript is 30 pages long and is within your target manuscript length with one table and two figures. As before, we included supplementary material that provides additional methodological detail and ecological context for the manuscript. We confirm that this manuscript has not been published or submitted elsewhere, that we 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 we adequately addressed your concerns, and that this manuscript can be moved to review. 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