8 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, and predicting 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 study how environmental variation (e.g., temperature, seasonal changes in predator communities) influence the interactive effects of growth rates and mortality rates on the outcome of prey survival in carefully controlled conditions, but do not account for important field related contexts (e.g., seasonality). Further despite studies on prey survival, there has been few studies that have explored the theoretical predictions of the two factors in a population dynamic perspective (population growth).

Here, we addressed the question of how growth rates and mortality rates interact to determine population dynamics by creating a zero-population growth isocline from a previously published size-structured population model. We 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 influence the prey’s population growth, thus providing further insights to prey 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 to scale up predator-prey interactions studies using models within natural 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 were historically the sole 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 Evergaldes. Our approach generated new hypotheses about what may be limiting Florida apple snail populations and could present approaches to rejuvenate Florida apple snail populations for endangered Kites.

**Section 2: Manuscript length and conclusions**

Our manuscript is 27 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 enriching context for the main results. We confirm that this manuscript has not been published elsewhere. We do not have conflicts of interest to disclose, and all authors have read and approved the final manuscript for submission at *Ecology*.

Finally, should you select this manuscript for peer review, we suggest 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.

Editors:

* Evan L. Preisser, University of Rhode Island
* Marcelo Ardon, North Carolina State University

Reviewers:

* Don DeAngelis, United States Geological Survey (USGS), [don\_deangelis@usgs.gov](mailto:don_deangelis@usgs.gov)
* Michael W. McCoy, Florida Atlantic University, [mccoym@fau.edu](mailto:mccoym@fau.edu)
* James Vonesh, Virginia Commonwealth University, [jrvonesh@vcu.edu](mailto:jrvonesh@vcu.edu)

Sincerely,

A black and white photo of letters

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Nathan T. Barrus

Florida International University

Miami, Florida, USA

nbarrus1@gmail.com

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