THE UNIVERSITY OF BRITISH COLUMBIA
Faculty of Forestry

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Dear Dr. Goymer:

Please consider our manuscript, "A four-step Bayesian workflow for improving ecological science," for consideration as a Perspective for *Nature Ecology & Evolution*.

Given the increasing aims of forecasting and prediction today, ecologists are using more complex models to leverage larger datasets (Anderson *et al.*, 2021; Muff *et al.*, 2022). Many researchers—ourselves included—were not trained in these approaches, however, which can lead to poor models and incorrect predictions and decisions.

To address this pressing gap, we outline a generalizable workflow (Grinsztajn *et al.*, 2021; van de Schoot *et al.*, 2021), which is built on fundamental scientific principles and new insights from statistics and data science. This approach moves away from a focus on null hypothesis testing, towards estimating effect sizes, using models calibrated and better understood through simulating data at multiple steps—using a number of skills more often associated with theoretical than empirical ecology. We conclude by highlighting how adopting this workflow has changed our science and how it may improve statistical and mathematical training in ecology.

The manuscript is authored by an international and interdisciplinary group of ecologists, evolutionary biologists and statisticians. The workflow follows the basics of how authors EM Wolkovich, TJ Davies and WD Pearse approach model building and leverages the insights and skills of computational statistician M Betancourt who has developed fundamental statistical workflows for diverse scientific disciplines. We have designed it to be broadly generalizable and practical, including relevant examples of forecasting shifts in animals and plants over time.

We hope that you will find this perspective, which provides a road-map for the many ecologists now building more complex models, suitable for publication in *Nature Ecology & Evolution*. By integrating simulation more fully in model building and testing this workflow can fit models that are more robust and well-suited to provide new ecological insights—allowing us to refine where to put resources for better estimates, better models, and better forecasts.

Sincerely,

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References

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