

Allee Effects and Coexistence

Emma Walker¹ and Benjamin Gilbert¹

¹University of Toronto

May 10, 2022

Abstract

Allee effects are common to diverse taxa but their consequences for coexistence are poorly understood. Recent studies suggest they cause priority effects through ‘inverse’, or positive, density dependence when a population is at low density, but mathematical theory suggests more outcomes are possible. We develop a simple and generalizable competition model that incorporates an Allee effect, with the Allee effect characterized by its low-density strength and dissipation rate. By incorporating Allee effects into modern coexistence theory, we show how Allee effects alter both fitness differences and stabilizing differences. We then determine when Allee effects promote or limit diversity, and when modern coexistence theory fails to predict coexistence outcomes. Our model offers an intuitive extension of modern coexistence theory while identifying one of its limits for predicting diversity, and promises to guide empirical research on how Allee effects structure ecological diversity.

Hosted file

Allee effects and Coexistence for Ecology Letters.docx available at <https://authorea.com/users/332334/articles/568600-allee-effects-and-coexistence>