

Methodology

We used data from a 40-year long term experiment on the rodent community near Portal, AZ. Beginning in 1977, kangaroo rats – the dominant group at the site – have been removed from experimental plots, and the rodent communities on control and treatment plots have been censused monthly. We used long-term data on community structure and community-level energy use to explore how community-level function has responded to kangaroo rat removal, and how functional resilience has shifted over time as the habitat structure and rodent community have undergone major transitions.

Essay

The functional resilience of communities to species loss is a key question for both applied and basic ecology. How do we expect communities to fare as some species are lost, or as connections between regional and local communities become disrupted? Do species tend to compete strongly in a zero-sum dynamic? Do species tend to be functionally substitutable, or is there low redundancy among coexisting species? This project provides an important and unique new perspective on these questions by combining experimental manipulations with long-term monitoring to show how functional resilience is contingent on the species and traits present in a local assemblage and the broader regional community, and how this resilience can break down over time as conditions change. We discuss the fundamental ecological processes that may contribute to the temporal variability and context-dependence of energetic compensation, and the consequences for functional resilience of assemblages more broadly. We hope that these results will be of interest to a wide ecological audience, and inspire new ways of thinking about functional resilience in rapidly changing ecosystems.