**Energetic compensation breaks down over time in a desert rodent community**

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**Background and Methods**

Energetic compensation occurs when declines in energy use from some species in an assemblage are offset by gains from others. When observed, energetic compensation is consistent with a zero-sum dynamic, and renders assemblage-level function resilient to species’ fluctuations. In strongly niche structured communities, compensation is possible when species overlap in both their resource use and their match to current biotic and abiotic conditions – such that, if one species declines, another can access those resources without being limited by another niche axis. Shifting environmental conditions may modulate the degree of overlap between species and cause compensation to be variable over time – even within a single assemblage.

Some of the strongest evidence of energetic compensation comes from long-term experiments on the rodent community near Portal, AZ. Since 1977, kangaroo rats have been excluded from experimental plots. Partial energetic compensation from smaller granivores was observed immediately, and near-complete compensation occurred after 1996, following the establishment of the complementary *Chaetodipus baileyi.* We explore whether the historically documented energetic compensation has persisted despite major transitions in the habitat and rodent community structure at the site over time, including a community reorganization event that occurred following a drought and community-wide population crash in 2010.

**Results and Conclusions**

Since 2010, *C. baileyi* has gone from being the dominant species on exclosure plots (accounting for ~65% of energy use on exclosures, and ~10% on controls) to being scarce at the site (~25% of energy use on exclosures, and absent on controls). This coincided with a decline in energetic compensation from small granivores for kangaroo rat removal, from an average of ~52% between 1996-2010 to an average of ~20% after 2010 – comparable to the level observed prior to *C. baileyi’s* establishment at the site (~16%). Other species of small granivore did not increase in abundance to absorb the available resources and offset the loss in assemblage-level function following the decline in *C. baileyi*.

In this community, energetic compensation appears to have been driven by *C. baileyi’s* fortunes at the site. We suggest that *C. baileyi’s* ability to exploit resources made available by kangaroo rat removal depended on favorable conditions at the site that have since shifted. Our results highlight that energetic compensation is a dynamic, contingent phenomenon even within a consistent set of species. Assemblage-level resilience to species loss, and zero-sum competitive dynamics, may therefore be temporary and manifest most clearly over long temporal scales – in this case, spanning decades.

Abstract Submission Guidelines

Abstract guidelines

The body of the abstract is up to 400 words, split between the two sections (up to 200 words each): 1) Background/Question/Methods, in which the objective of the study is clearly identified and the methods are described; and 2) Results/Conclusions, in which specific results of the study are explicitly reported and their implications for ecology are briefly discussed.

The abstract must primarily report on new work within the field of ecology.

Reviews of previous work are not permissible for contributed presentations.

The abstract must report specific results. The results may be preliminary, but they may not be vague. Abstracts without explicitly stated results will be rejected.

It is understandable that abstracts describing non-traditional work may lack quantitative data; however, it is still expected that the abstract will address some question and have a “take-home message” describing specific findings.

Abstracts must be clear. Poorly written abstracts will be rejected.

Abstracts must be written in English and must follow standard grammar and punctuation rules. Abstracts that do not meet this guideline will be rejected.

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For every author listed, their name, institution, and email are required information.

Missing coauthors are a very common issue. Be sure to check to make sure everyone has been included. This is under People, the second step in the process. You can follow your progress at the top of the screen.

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