UF UNIVERSITY of FLORIDA
School of Natural Resources and Environment

GRADUATE STUDENT TRAVEL GRANT APPLICATION

Travel applications must be received by deadline listed on
http://snre.ifas.ufl.edu/academics/graduate/financial-support/graduate-student-travel-grants/
Email complete applications and or questions to:
Sara Zlotnik zlotniks@ufl.edu

Name and UFID: Renata Diaz

Email: diaz.renata@ufl.edu

Advisor and Department: S.K. Morgan Ernest, WEC

Have you ever received an SNRE travel grant? If so, when? No

(Applicants are ineligible to apply if they received an SNRE travel grant during the same or previous fiscal year to the proposed travel date. The fiscal year runs from July 1 through June 30.)

Degree: ☐ M.S. ☑ Ph.D.

Expected Graduation Date (Semester/Year): Spring 2022

Travel Start Date: Virtual meeting 8/2 - 8/6/21 Travel End Date:

Presentation Type: ■ Oral Presentation ☐ Poster Presentation

Research Type: ☐ Preliminary ■ Final

Content: ■ Research conducted for SNRE thesis/dissertation

☐ Research conducted for other purpose

Conference Name: ESA Annual Meeting

Location: Virtual

Conference is (Regional/National/International):

National

Estimate Budget

(Refer to http://fa.ufl.edu/uds/default.asp#travel) **Total Estimated Cost: $** 110

Airfare	$	Mileage* ($0.445/mi)	$	Meals ($36/day)	$

Registration	110 $	State contract car rental**	$	Lodging	$

*Only if using own vehicle; includes gas allowance and wear tear on vehicle.
**Avis or Enterprise state rate only.

Additional Funding

Will your advisor be providing additional travel funds via research grants or other funds?

☐Yes ☐No ■Unsure

Have you received or applied for other travel grants for this trip?
(Please refer to http://snre.ufl.edu/graduate/travel.htm)

Award Type and Amount	**Awarded**	**Funding Denied**	**Applied, Decision Pending**	**N/A**
IFAS matching (App. required) $250	☐	☐	X	☐
GSC $350	☐	☐	☐	☐
RGP $	☐	☐	☐	☐
TCD $350	☐	☐	☐	☐
IFAS Davidson $300-domestic $650-international	☐	☐	☐	☐
Advisor's Department department $	☐	☐	X	☐
Conference funding $	☐	☐	☐	☐

Other source $	☐	☐	☐	☐

Total Amount of Funding Already Awarded $

For review only:

Is applicant active in SNRE GSC? (number of events attended) [ ]

Research Abstract:

Please provide your abstract as it was submitted to the conference.

See next pages.

Methodology:

Please provide a 100 word (or fewer) description of the methods used in the research in ways a non-expert of your field would understand.

See next pages.

Essay:

How will your presentation represent the interdisciplinary ecology program?
Please limit to approximately 250 words.

See next pages.

Energetic compensation breaks down over time in a desert rodent community

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Background and Methods

Energetic compensation can occur 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 competitive dynamic, and renders assemblage-level function resilient to species' fluctuations. When compensation is mediated by niche structure, it is contingent on the degree to which the species present in an assemblage are functionally substitutable. If species differ in their responses to changing conditions over time, shifting conditions may modulate the degree of redundancy between species and cause compensation to be variable over time – even within a single assemblage.

Some of the strongest evidence of energetic compensation has come 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 beginning in 1996, with the establishment of the functionally analogous *Chaetodipus baileyi.* We combine long-term temporal analysis of the original experiment with new implementations of the same treatments, initiated in 2015, to explore whether the historically documented energetic compensation has persisted despite major transitions in the habitat and rodent community structure at the site over time.

Results and Conclusions

Since 2010, total energy use on kangaroo rat exclosure plots declined to ~40% that on controls, compared to 70% from 1996-2010 and 24% before 1996. This coincided with a precipitous decline in *C. baileyi,* a long-term increase in the proportion of energy use from small granivores sitewide – from 5% of total energy use on control plots before 1996, to 30% after 2010 – and decreasing gains in small granivore energy use on treatment relative to control plots. While kangaroo rat removal now results in a smaller decline in total energy use than at the beginning of the study, this is due to a general increase in small granivore energy

use rather than increasing compensation from species other than the now-scarce *C. baileyi.* These findings are consistent between long-term and new experimental plots.

We suggest that over time, the degree of functional overlap between kangaroo rats and smaller granivores has decreased, weakening the potential for energetic compensation, even from species that compensated under past circumstances. Our results highlight that energetic compensation is a dynamic, contingent phenomenon. Assemblage-level resilience to species loss, and zero-sum competitive dynamics, may therefore be temporary and most detectable over long temporal scales – in this case, spanning decades.

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.