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09-Dec-2021

Dear Ms. Diaz:

Thank you very much for submitting your manuscript "Maintenance of community function through compensation breaks down over time in a desert rodent community" # ECY21-1030 to Ecology. The reviewers and I appreciate the work you have accomplished. We are willing to consider a revised version for publication in the journal, assuming that you are able to modify the manuscript according to the recommendations.

Your revisions should address the specific points made by each reviewer. Both provide constructive suggestions to improve the ms. I agree that an explanation of mathematical procedures will avoid confusion over the R code, as suggested by Rev #1, and that a figure of body mass of the rodents involved in this study would be very useful, as suggested by Rev #2.

To submit your revised manuscript, log into https://mc.manuscriptcentral.com/ecology and enter your Author Center. You will find your manuscript title listed under "Manuscripts with Decisions." Under "Actions," click on "Create a Revision." Your manuscript number has been appended to denote a revision. Please DO NOT upload your revised manuscripts as a new submission.

When submitting your revised manuscript, you must include a "Response to Reviewer Comments" (you will find a corresponding field for this in ScholarOne) that shows your responses to the review comments and the changes you have made in the manuscript. If you disagree with a reviewer's point, explain why.

Please note that the field in ScholarOne does not retain type formats such as italics, boldface, or colors, so please format the responses accordingly. We suggest you upload a separate file for your Author Response document and use our template: https://www.esa.org/wp-content/uploads/2021/04/Author-Response-to-Reviewers-Template.docx.

Please include a "track changes" version of your manuscript. The "track changes" files should contain "track changes" in the file name and be labeled as an "Additional File for Review but NOT for publication" . The "clean" copy of your manuscript should be labeled as your "Main Document".

IMPORTANT: Your original files are available to you when you upload your revised manuscript. Please delete any redundant files before completing the submission.

Because we are trying to facilitate timely processing of manuscripts submitted to Ecology, your revised manuscript should be uploaded as soon as possible, preferably within the next six weeks. The final due date in the ScholarOne system is 09-Mar-2022.

If you cannot submit by the final due date, you must create a new submission for your manuscript. If creating a new submission, be sure to note the previous manuscript ID (ECY21-1030) in the online submission form and include an "Author's Response to Reviewer Comments" document using the template linked to earlier in this message.

Once again, thank you for submitting your manuscript to Ecology and I look forward to receiving your revision.

Sincerely,

Dr. Marco Festa-Bianchet
Subject-matter Editor, Ecology
m.festa@USherbrooke.ca, Marco.Festa-Bianchet@USherbrooke.ca

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Editorial Office note: In addition to revisions according to the review comments below, please make revisions to your paper to conform to the journal style at this stage, especially the tables, figures, and supporting information, anticipating the possibility that your paper may be accepted for publication. If the journal style is not followed at submission of the revision, we may return the manuscript to you for further revision before sending it along to the Subject-matter Editor. Closely following the Author Guidelines at this stage would expedite the production of your paper for publication, should it be accepted. Find them here: [https://esajournals.onlinelibrary.wiley.com/hub/journal/19399170/resources/author-guidelines-ecy#Accepted_Manuscripts]

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Reviewer Comments to Author:

Reviewer: 1

Comments to the Author
This manuscript studies the link between community function and structure by measuring the changes of a desert rodent community in Arizona. An interesting feature of this study is the long time series (over 30 years) gathered on these desert rodents within an experimental setting that includes exclosures.

I found the manuscript interesting and well written. Overall, I have only minor concerns that need to be addressed about the manuscript.

1 - Make sure all acronyms used on the manuscript are defined. For example, “SG” is never defined.

2 - L39: Define “community function”

3 - L104-105: “...the habitat at the study site has transitioned from desert grassland to scrub...”

Why? Is it because of the rodent community or because of other environmental constraints? Please give more details. This information is important because if it is caused by the rodent species themselves, it could have important implication for the rodent community structure.

4 - L111-112: Move this small paragraph to the end of the Method section.

5 - L114-120: Could the exclosure with small holes prevent other species (e.g. larger predators of rodents) to enter in the exclosure thus influencing the dynamic of the rodent community and potentially the environment (see my comments above)? Please explain.

6 - L126-130: On these lines a description of the time periods used for comparison are presented. This description should explain in details why the boundaries of each time period was selected as they were.

7 - L131: “5.69 * (m^0.75)”. In the context of the study, it is important to explain the meaning of this equation and of the different values in this equation.

8 - L153: “… using the form response ~ time period + CORCAR1(census period)…”

What does this mean exactly? Especially the CORCAR1() part. This would be clearer if mathematical equations were used to describe the model instead of R code.

9 – Following up on comment 8, I strongly believe that presenting pseudo-code (or R code) in a manuscript as was done here may lead to confusion and result in misunderstanding of the model that was actually used and as such I recommend using mathematical equation instead. For example, in the explanation giving prior to the pseudo-code presented on L164-165 (response ~ time period * treatment), it is not clear what the relationship between the different parts of the explanatory variable in model. In R, the code presented means that the “response” is modelled with the “time period” variable, the “treatment” variable and the interaction between “time period” and “treatment”, while in the explanation given, the text seems to imply (although this is not clear) that only “time period” and “treatment” are interacting. Obviously, this has important implication in the results and the interpretation given to the model. Note that if only the interacting terms were to be considered, “:” should be used instead of “*” in R.

In any case, this needs to be clarified.

10 - L159 and L164: “quasibinomial”. Explain why a quasibinomial link model was used instead of the more traditional binomial model… or any other model for that matter.

Reviewer: 2

Comments to the Author
This manuscript provides important updates to the long-term results from a rigorous experiment that excluded functionally-important rodents, kangaroo rats. First, it finds that the previously reported functional compensation by the pocket mouse has substantially decreased in the past decade, after a community reorganization event. Second, it finds that the kangaroo rat energy use has also decreased in the past two decades. Together, these results demonstrate the importance of long-term experiments, and how species colonization and fluctuations can alter ecosystem functioning and the ability of remaining or colonizing species to functionally compensate for lost species. I agree with the authors that 'this type of temporary, context-dependent compensation may be common.' I have only one main suggestion, as well as many specific suggestions that I hope will help further improve this manuscript, which is already strong.

To help compare with other studies, I recommend including a figure, even if only in the supplement, presenting raw rodent body mass in grams. Although I am not questioning the importance of these metabolic and energetic calculations, many other theoretical and experimental studies considering biodiversity and ecosystem functioning have reported the biomass of various trophic levels and functional groups of species. In addition to these metabolic rate and energetic estimates, which are a nonlinear function of measured body mass (as shown on L131) and which depend on the combinations of body mass and numbers of individuals, a broad readership would also be interested in the raw body mass results for the treatments and key species. How does rodent biomass compare between treatments and change over time? This question seems relevant to the framing of the paper.

Additional specific recommendations:

Abstract
L23-24: The main results statements would be stronger if the words 'changed' and 'changes' are avoided and replaced by directional statements. For example, rather than stating that the degree of functional redundancy

changed on L24, it is much clearer to state that there was decreased functional overlap, as nicely stated on L27.

L32: I recommend removing 'zero-sum constraints' from this sentence in the abstract because the results do not support this assumption, as explained in the discussion. Including this here, without further explanation, might suggest the opposite to readers.

Introduction
L42: I believe 'have similar functional traits' is too specific here, given that ecosystem functioning depends not only on functional composition and traits, but also on species interactions, the latter of which are often poorly predicted by functional traits. The results of hundreds of randomized biodiversity experiments tend to show large effects of species richness on ecosystem functioning, even when all the same species and traits are present at different levels of species richness (i.e., to study effects of richness independent of changes in composition). Thus, when a species is lost from a community, two things change: species composition (which species and traits are present) and species richness (how many species and what variation in traits are present). Perhaps you are focused on the special case, though, where the lost species is replaced, and thus composition and traits shift, without a change in richness? How did rodent richness change between treatments and over time?

L58: Perhaps begin a new paragraph with the sentence beginning 'Even without...' because you make two very important points in this paragraph (shifts in composition and shifts in functional redundancy).

Methods
L110: Somewhere in the methods, it would be good to describe the measurements. For example, how and how often were body mass measurements made?

L115: I appreciate the land acknowledgement.

L122, L136: Given the small and unbalanced sample sizes (4 controls and 5 exclosures), it makes me uncomfortable that the data were combined across all plots within treatments. Note that there may be effects of the number of fluctuating variables (plots in this case) on the temporal mean and variance (Yachi and Loreau 1999 PNAS). I recommend randomly choosing 4 of the 5 exclosures to ensure a balanced design and that any treatment differences are not due to differences in sample sizes.

L151-154: Given that results for all variables were combined across plots within treatments (as stated on L136), was there any replication for these repeated measures analyses? What sources of variation are included or excluded in the 95% confidence and credible intervals in Fig. 1? It would help to clarify this in the Methods.

Results
L173: It would help to add a few words clarifying what 19% and 55% are in reference to. If I understand correctly, then these are the percentages of KR energy use in control plots during these respective periods. Is this correct?

Discussion
L206: I recommend changing 'substantially' to 'partly' or 'incompletely' because the energetic compensation shown in Fig. 1B is very far from complete, even during the middle period of time.

L208: As noted in the preceding comment, the results in Fig. 1B do not suggest that C. baileyi was able to fully compensate for KR. Thus, it seems overstated to refer to C. baileyi as a 'functional replacement' for KR.

L267-270: Yes, and there is considerable evidence that different sets of plant species promote an ecosystem function at different times and places, and under different global changes (Isbell et al. 2011 Nature). This is consistent with your results and suggests that we should not think of species' contributions to ecosystem functioning in a static sense.

L271-272: This is a strong statement, which is fully-supported by the results: 'this type of temporary, context-dependent compensation may be common.' It might help to include a clear statement such as this one in the Abstract.