

To the Nature Communications Editorial Board,

Please find enclosed our revisions of the manuscript “Diverse interactions and ecosystem engineering stabilize community assembly” by JD Yeakel, MM Pires, MAM de Aguiar, JL O'Donnell, PR Guimarães Jr., D Gravel, and T Gross, submitted to Nature Communications. We thank all of those who took the time to provide the valuable feedback that has helped shape this revised manuscript.

In this contribution, we model the assembly of an ecological network where nodes represent ecological entities, including engineering species, non-engineering species, and the effects of the former on the environment, which we call abiotic modifiers. The links of the network that connect both species and modifiers represent trophic, service, and engineering dependencies, allowing us to evaluate the roles of multitype interactions - directly between species and indirectly through environment - on the assembly of ecological systems.

The results of our investigation show that increasing the proportion of ecosystem engineers within a community has nonlinear effects on observed extinction rates. While we find that a low amount of engineering increases extinction rates, a high amount of engineering has the opposite effect, and that the inclusion of engineering modifies the effects of service interactions on community robustness. Service interactions in many cases are the foundation of mutualisms, and we show that while high frequencies of mutualisms erode robustness in non-engineered systems, these negative effects are significantly reduced in highly engineered systems. Finally we show that redundancies in engineered effects promote community diversity by lowering the barriers to colonization.

This manuscript covers three major themes in community ecology: 1) ecological assembly, 2) the structure and function of ecological networks with multitype interactions, and 3) the inclusion of ecological engineering in models of ecological networks. Because we are integrating 3 sub-fields that are typically considered independently, our reference list is large (99 citations in the main text). While we understand that the aim of Nat Comm is 70 references, we ask that you consider this larger reference list in light of the cross-disciplinary aims of our manuscript.

Thank you for considering this revised manuscript, and please do not hesitate to let us know if there are any additional materials required to facilitate review.

Sincerely,
Justin D Yeakel