

REPLY TO RUBENSTEIN AND RUBENSTEIN:

Time to move on from ideological debates on rewilding

Jens-Christian Svenning^{a,1}, Pil B. M. Pedersen^a, C. Josh Donlan^{b,c}, Rasmus Ejrnæs^d, Søren Faurby^a, Mauro Galetti^e, Dennis M. Hansen^f, Brody Sandel^a, Christopher J. Sandom^g, John W. Terborgh^h, and Frans W. M. Veraⁱ

In their comment (1) on our review and perspective on trophic rewilding science (2), Rubenstein and Rubenstein launch a critique not so much directed at our study as at trophic rewilding as a conservation approach. They first lament that Pleistocene rewilding has not been scientifically studied since the term was introduced. This is much in line with our study, where we conclude that empirical research on trophic rewilding is rare, fragmented, and geographically biased, with the literature dominated by essays and opinion pieces, and follow this up by providing recommendations for research opportunities and priorities. Rubenstein and Rubenstein (1) then claim that we repackage the concept of Pleistocene rewilding (3) under the new term “trophic rewilding,” defined as species introductions to restore top-down trophic interactions and associated trophic cascades to promote self-regulating biodiverse ecosystems (2). However, the two concepts are not identical. Notably, with the name and definition of trophic rewilding we provide emphasis on a clear, testable functional objective rather than on a certain time frame.

As their third point, Rubenstein and Rubenstein (1) argue that large-scale reintroductions of proxy species are too risky. Rather than dismissing an entire approach based on opinion, we argue for developing a systematic research program on the scientific basis for trophic rewilding, including for evaluating benefits and risks. Furthermore, we recommend that scientific assessments and monitoring efforts should be integrated into the increasing number of rewilding projects that are being implemented. We also believe

Rubenstein and Rubenstein (1) exaggerate the risks when comparing rewilding to geoengineering proposals, because reintroductions would concern species or functional types with long histories in the focal region and because large animals can be controlled. Further, there are a number of analogous cases of unintentional rewilding, none of which has led to ecological catastrophes [e.g., reintroductions of horses to the New World (4)].

Finally, Rubenstein and Rubenstein (1) argue that trophic rewilding is a failed conservation strategy and that we instead should focus on preserving the ecosystems and species that remain, focusing on ways to feed the increasing human population without destroying biodiversity. This is a strange critique. Given that rewilding has yet to be broadly implemented, it is hardly fair to blame it for biodiversity's precarious state. Further, Rubenstein and Rubenstein (1) seem to overlook the fact that proposals for rewilding explicitly argue for it as part of the solution to maintaining biodiversity in a human-dominated world, with relevancy in both densely populated regions and wilderness areas (3, 5). Rubenstein and Rubenstein (1) end, “It is time to be practical, not sensational. It is time to move on.” We agree. Practitioners are increasingly implementing rewilding (e.g., Rewilding Europe). It is time to move on from an essentially data-free, ideological debate to developing a scientific program for trophic rewilding science to inform policy makers and conservation practitioners, with the goal of reversing the decline in biodiversity.

^aSection for Ecoinformatics & Biodiversity, Department of Bioscience, Aarhus University, DK-8000 Aarhus C, Denmark; ^bAdvanced Conservation Strategies, Midway, UT 84049; ^cDepartment of Ecology and Evolutionary Biology, Cornell University, Ithaca, NY 14853; ^dSection for Biodiversity & Conservation, Department of Bioscience, Aarhus University, DK-8410 Rønde, Denmark; ^eDepartamento de Ecologia, Universidade Estadual Paulista, 13506-900 Rio Claro, São Paulo, Brazil; ^fInstitute of Evolutionary Biology and Environmental Studies, University of Zurich, 8057 Zurich, Switzerland; ^gWildlife Conservation Research Unit, Department of Zoology, University of Oxford, Recanati-Kaplan Centre, Oxfordshire OX13 5QL, United Kingdom; ^hCenter for Tropical Conservation, Nicholas School of the Environment and Earth Sciences, Duke University, Durham, NC 27708; and ⁱCommunity and Conservation Ecology, Groningen Institute for Evolutionary Life Sciences, University of Groningen, 9700 CC Groningen, The Netherlands

Author contributions: J.-C.S., P.B.M.P., C.J.D., R.E., S.F., M.G., D.M.H., B.S., C.J.S., J.W.T., and F.W.M.V. wrote the paper.

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¹To whom correspondence should be addressed. Email: svenning@bios.au.dk.

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- 1 Rubenstein DR, Rubenstein DI (2016) From Pleistocene to trophic rewilding: A wolf in sheep's clothing. *Proc Natl Acad Sci USA* 113:E1.
 - 2 Svenning J-C, et al. (2015) Science for a wilder Anthropocene: Synthesis and future directions for trophic rewilding research. *Proc Natl Acad Sci USA*, 10.1073/pnas.1502556112.
 - 3 Donlan CJ, et al. (2006) Pleistocene rewilding: An optimistic agenda for twenty-first century conservation. *Am Nat* 168(5):660–681.
 - 4 Naundrup PJ, Svenning J-C (2015) A geographic assessment of the global scope for rewilding with wild-living horses (*Equus ferus*). *PLoS One* 10(7):e0132359.
 - 5 Jepson P (2015) A rewilding agenda for Europe: Creating a network of experimental reserves. *Ecography*, 10.1111/ecog.01602.