Response to Brack and Sparks

We appreciate the comments by Brack and Sparks (2021) regarding our cautionary perspective piece on how unsuitably hot bat boxes could pose threats to bats. Perhaps our paper evoked such a passionate response because conservation biologists have long considered bat boxes a critical intervention where natural roost habitat is lacking. However, we firmly assert that the complex microclimates in bat boxes (and other artificial refuges) are understudied (see also Cowan et al., 2021) and that the cavalier use of unsuitable boxes could expose bats to deadly temperatures. Further, we reaffirm that through careful study and by communicating findings to managers, we can resolve uncertainties and make bat boxes safer for bats.

As stated in our perspective, bat boxes can be modified for particular landscapes and climates to reduce overheating risk, and we are concerned that this is not the norm in conservation practice. A poor artificial roost design placed in an attractive location could yield an ecological trap—that is, a scenario where a low-quality habitat, which imposes a fitness cost, is used preferentially over higher quality habitat. As an example of a direct fitness cost, Griffiths (2021) reported 30 pups died from heat stress in a bat box in Melbourne, Australia.

While we agree bats face potentially lethal risks when using natural roosts, this possibility does not justify provisioning bats with unsuitably hot artificial roosts, for which temperatures are more readily controlled. Bat box temperatures can be sampled with relative ease, which is all the more reason to have a better understanding of their microclimates. We know that temperatures >40°C are stressful to bats regardless of roost type and, a priori, we can improve the conservation efficacy of bat boxes on this principle alone.

Following this line of logic, we disagree with Brack and Sparks’ contention that bat boxes are “not a risk to be mitigated by policy.” If hot boxes can kill threatened and endangered species, and we clearly showed that they can, then why not develop guidance and, where appropriate, protocols and policies regarding box design and landscape placement that will reduce the likelihood of adverse effects? These design elements can be simple: material, color, ventilation, and placement. Guidance on best practices is especially important when artificial roosts are used to mitigate for loss of habitat for at-risk species.

We do not discourage the use of bat boxes by the public. Rather, our manuscript suggests thinking critically about dangers posed by bat boxes and offers practical advice on how to reduce overheating risk. We agree that community engagement is important to promoting bat conservation and improving the public’s perception of bats. Bat boxes are one tool to engage the public, but it would be counterproductive if installing boxes caused harm to species they are meant to help (Ford et al., 2021).

Not all bat boxes are dangerous. However, we stand by our assertion that there are many unsafe boxes that could be easily improved. To provide safer artificial habitat for bats, we urge careful consideration of bat box design and placement, as well as additional research on box microclimates and bat responses to boxes.

CONFLICT OF INTEREST
Both the authors declare no conflicts of interest.

AUTHOR CONTRIBUTIONS
Reed D. Crawford: Writing and revision. Joy M. O’Keefe: Writing and revision.

DATA AVAILABILITY STATEMENT
Not applicable as no data were generated or used in this response.

ETHICS STATEMENT
All research and writing followed university guidelines.

Reed D. Crawford
Joy M. O’Keefe

Department of Natural Resources and Environmental Sciences, University of Illinois at Urbana-Champaign, Urbana, Illinois, USA
Correspondence
Reed D. Crawford, Program in Ecology, Evolution, and Conservation Biology, University of Illinois at Urbana-Champaign, W-503 Turner Hall, 1102 S. Goodwin Ave., Urbana, IL 61801, USA.
Email: crawfordreed4@gmail.com

ORCID
Reed D. Crawford  https://orcid.org/0000-0001-8581-5521
Joy M. O’Keefe  https://orcid.org/0000-0001-9074-6268

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