Dear Dr. Hansen,

On behalf of my co-authors, I am excited to resubmit a manuscript, “Diverse migratory portfolios drive inter-annual switching behavior of elk across the Greater Yellowstone Ecosystem,” for exclusive consideration by Ecosphere.

In a time when rapid environmental and anthropogenic changes are altering wildlife migrations around the world, ecologists and conservationists urgently seek a stronger understanding of how and why migratory behaviors are changing. Some individuals alternate between migratory and non-migratory behaviors, but the drivers underlying these behavioral switches are not well understood. We evaluated the dynamics of individual switches in migratory tactics across a broad spatiotemporal scale using movement data from more than 360 elk in 20 herds spanning the Greater Yellowstone Ecosystem (GYE). First, we classified migratory tactics using a technique that allows natural patterns of behavior to emerge from the data, rather than lumping individuals into predetermined binary tactics of either migration or non-migration. Then, we tested seven hypotheses to explain why individuals change among each of the migratory tactics we identified.

Using this unprecedentedly large dataset, we uncovered a higher diversity in movement tactics, and more frequent switches between said tactics, than previously reported in the system. Perhaps most interestingly, we found that elk in herds with a higher diversity of movement tactics were not only more likely to switch tactics, but were more likely to switch tactics effectively in response to adverse conditions. We also determined that behavioral switches alone do not explain observed declines of migratory behavior in the GYE. Our findings indicate that the ability to switch migratory tactics may be key to maintaining ungulate migratory behavior as these animals experience increasing environmental changes.

This paper has far reaching implications in fields ranging from large mammal conservation and natural resource management to animal decision-making theory and communication. It also offers evidence that some individuals can respond dynamically and effectively to changes brought about by human-induced climate change and alterations of natural landscapes.

Thank you for your consideration,

Gabriel R. Zuckerman