

## Unseen consequences of losing large wildlife: increases in rodent immune function following large mammal defaunation

*Hillary S. Young, Rodolfo Dirzo, Kristofer M. Helgen, Douglas J. McCauley, Charles L Nunn, Paul Snyder, Kari E. Veblen, Serena Zhao and Vanessa O. Ezenwa*

Ecosystems around the world are losing large wildlife due to overexploitation, development of agriculture, and increased human densities. While research has examined the consequences of losing large-bodied animals for the abundance and composition of the smaller animals that remain, little research has considered how these changes affect animal physiology. This is a critical oversight because changes in animal physiology can have enormous consequences for ecosystem functioning and processes, including spread of disease.

We examined the effect of large wildlife removal on immune function in rodents using a large-scale exclosure experiment in Kenya, where high voltage electrified fences have effectively remove all large wildlife from plots for the past 20 years. Examining a suite of immune parameters in the most common mouse species in these plots, we found evidence of significant increases in immune function of rodents when large wildlife are absent. This effect may result from a higher number of parasites in defaunated ecosystems, which drives an increase in need for immune protection. Alternatively, observed changes may result from increased food availability in the landscape when large herbivores are removed, which allows for more energy to be devoted to immune functions.



*Zebras. Photo provided by authors.*

Either way, our research indicates that loss of large wildlife could have major consequences for rodent-borne disease dynamics via changes in immune function. For example, such changes may reduce the likelihood that increased parasite density in landscapes without large wildlife may translate to realized increases in disease prevalence in rodents.