Raptors, rodents, and conservation paleobiology: using skeletal remains to track the development of an energetically novel ecosystem in the Great Basin desert of North America

Rebecca C. Terry*†[1]

[1]Departement of Integrative Biology – 3029 Cordley Hall, Corvallis, OR, 97331, United States

Abstract

Efforts to understand the impacts of environmental change have predominantly focused on species-level responses over annual to decadal time-scales. However, many ecological processes unfold over time-scales too long for direct observation or experimentation and manifest at higher levels of ecological organization that are typically thought to be robust to perturbation, such as community richness, biomass, and energy flow.Here I examine how energy flow within small mammal communities in the Great Basin of western North America has responded to climatic and anthropogenic environmental change using fossil archives derived from long-term owl roosts. First I assess the fidelity of owl-produced small-mammal death-assemblages to the living community from which skeletal remains are drawn. Then I use these death-assemblages to reconstruct and compare baseline energy flow spanning the last _˜13,000 years to trends observed over the last century. I find that energy flow today differs markedly from that exhibited during natural climate warming in the past. The modern community is characterized by a substantial reduction in energy flow that is associated with a rise in the energetic dominance of small-bodied species with an affinity for closed grass habitats. These results highlight the valuable insight that skeletal remains can provide into the dynamics of the past, and suggest that modern replacement of desert shrublands by invasive annual grasses has led to an energetically novel ecosystem, with human impacts indirectly modifying the small mammal community in ways that differ from climate-only expectations.

Keywords: paleoecology, owl pellets, Holocene, small mammals, invasive grass

*Speaker

†Corresponding author: rebecca.terry@oregonstate.edu