

RESPONSE OF NORTH AMERICAN MAMMAL COMMUNITIES TO LATE QUATERNARY ENVIRONMENTAL FLUCTUATIONS

GRAHAM, Russell W., Dept. of Geology, RCC, Illinois State Museum, 1920 10 1/2 Street South, Springfield, IL 62703

The late Quaternary was a time of rapid environmental fluctuations. The last glacial maximum was reached about 20 ka with continental glaciers covering most of Canada as well as the northeastern and upper midwestern United States (U.S.). Glacial ice physically displaced entire terrestrial biomes and the cooler climates altered distributions of species outside of the glacial limits. About 14 ka, the climate began to warm rapidly and glacial ice retreated northward, opening new landscapes for colonization by terrestrial biotas. Maximum warmth was reached between 9-5 ka with a time transgressive progression from west to east.

Radiocarbon chronologies allow for fine scale (100's to 1000's of years) resolution of mammal responses to these changes. Mammal communities did not respond as intact units but individual species shifted diachronically along environmental gradients. As a result, many late Pleistocene mammal communities contain associations of extant species that do not occur together today and appear to be ecologically incompatible. Pleistocene mammal communities also had a greater diversity of species than either Holocene or modern ones. This greater diversity was, in part, due to the existence of a diverse megafauna that became extinct at the end of the Pleistocene (10 ka). However, Pleistocene small mammal guilds with extant species, especially insectivores and microtine rodents, were also more diverse. Rapid changes in small mammal species distributions, diversity patterns, and clinal shifts around 10 ka strengthens environmental models for the end-Pleistocene extinction.

Modern mammal communities began to appear at the end of the Pleistocene and into the Holocene. In the eastern U.S., the species composition of these communities has been stable for the last 10 ka, although vegetational communities have shown change throughout the Holocene. In other parts of the U.S., middle Holocene warming caused some species to shift their geographic ranges. However, species composition of communities was not significantly altered. Understanding these changes not only provides a better perspective for viewing mammal communities of the past but it may also give insight into those of the future as climate will continue to vacillate, whether induced naturally or anthropogenically.