**Exploring the distributions of species in mixed/short grass prairies in Pleistocene and Holocene North America**

Possible follow-up research topics for individuals or small groups:

1. Explore the differences between a cow, a bison and a mammoth. Using allometric equations (e.g., see appendixes in J.H. Peters. 1984. The ecological implications of body size), compute the difference in various life history factors such as metabolic rate, forage requirements, home range, fecundity, population size. Based on these computations, what might be some of the likely consequences of the time transgressive shift in the body size of the largest herbivores in North America?
2. Examine shifts in other species that likely co-occurred with mammoth (or mastodon). For example, prairie dogs are characteristic animals of short/mixed grass prairies – does their geographic range change over time in concert with shifts in the range of the largest grassland species? Is the shift in geographic range more sensitive to climate (temperature changes) over the late Quaternary or do prairie dogs also respond to the extinction of mammoths from the ecosystem?
3. Explore the changes in the geographic range of *Bison* (all species) within the late Quaternary. Calculate the range and the movement of the range (shift in centroid) for 5 ka time slices over the last 25 ka? Are shifts in geographic range more sensitive to climate (e.g., temperature changes) over the late Quaternary or do bison expand their range in response to the extinction of megaherbivores from the ecosystem?
4. Using data on the distribution of livestock across the United States (e.g., <http://nca2009.globalchange.gov/agriculture> or other sites), calculate the overlap between Bison today and the distribution of livestock. Biomass is computed as the number of animals x their body mass. How does the biomass of livestock compare with that of bison today? In the historic past?
5. Explore the consequence of westward expansion and the agricultural transition. What other crops or modifications might be visible in the Neotoma database (e.g., wheat, corn, etc)? What other datasets might be relevant for thinking about the accelerated pace and deepening impact of human landscape modification?