

Using ancient DNA to explore the relationship between migratory songbirds, climate and shrub abundance in Arctic tundra ecosystems from LGM to present

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Abstract: The proposed work will build upon and provide context for a current NSF funded project that focuses on how earlier spring snowmelt and increasing dominance of woody shrub cover will impact the reproductive success of songbird communities that migrate to the tundra to breed, in two important ways. First, since the past often provides clues to the future, the proposed study will determine floral and faunal assemblages at various times in the past. This will provide insight into how today's changing tundra will ultimately alter migratory songbird communities as warming and shrub expansion continues. Second, the proposed study will determine how long different songbird species have inhabited Arctic tundra ecosystems, thus contributing unprecedented insight into the evolution of coping mechanisms that will shed light on why some songbirds species (ie. Lapland longspurs, American tree sparrows) have coping mechanisms that appear to be fine-tuned to the Arctic's unpredictable environment, while others (ie. White-crowned sparrows) who are suspected to be more recent tundra inhabitants, have less well-tuned coping mechanisms. Climate Center funding will enable us to conduct preliminary ancient DNA analysis on existing core samples from the Yukon tundra, as well as on surface peat samples collected in 2010 on the North Slope of Alaska. By combining traditional paleoecologic analyses with new paleogenomic techniques we will produce a multi-trophic level paleo-time series for Alaskan tundra. Combined with climate characterization, this dataset will provide new understanding of the evolutionary history that shaped the species assemblages we see today on the tundra, and how they are likely to change as global warming continues.