Rupp, T. S., Olson, M., Adams, L. G., Dale, B. W., Joly, K., Henkelman, J., Collins, W. B. and Starfield, A. M. (2006), SIMULATING THE INFLUENCES OF VARIOUS FIRE REGIMES ON CARIBOU WINTER HABITAT. Ecological Applications, 16: 1730–1743.

Abstract: Caribou are an integral component of high-latitude ecosystems and represent a major subsistence food source for many northern people. The availability and quality of winter habitat is critical to sustain these caribou populations. Caribou commonly use older spruce woodlands with adequate terrestrial lichen, a preferred winter forage, in the understory. Changes in climate and fire regime pose a significant threat to the long-term sustainability of this important winter habitat. Computer simulations performed with a spatially explicit vegetation succession model (ALFRESCO) indicate that changes in the frequency and extent of fire in interior Alaska may substantially impact the abundance and quality of winter habitat for caribou. We modeled four different fire scenarios and tracked the frequency, extent, and spatial distribution of the simulated fires and associated changes to vegetation composition and distribution. Our results suggest that shorter fire frequencies (i.e., less time between recurring fires) on the winter range of the Nelchina caribou herd in eastern interior Alaska will result in large decreases of available winter habitat, relative to that currently available, in both the short and long term. A 30% shortening of the fire frequency resulted in a 3.5-fold increase in the area burned annually and an associated 41% decrease in the amount of spruce–lichen forest found on the landscape. More importantly, simulations with more frequent fires produced a relatively immature forest age structure, compared to that which currently exists, with few stands older than 100 years. This age structure is at the lower limits of stand age classes preferred by caribou from the Nelchina herd. Projected changes in fire regime due to climate warming and/or additional prescribed burning could substantially alter the winter habitat of caribou in interior Alaska and lead to changes in winter range use and/or population dynamics.