



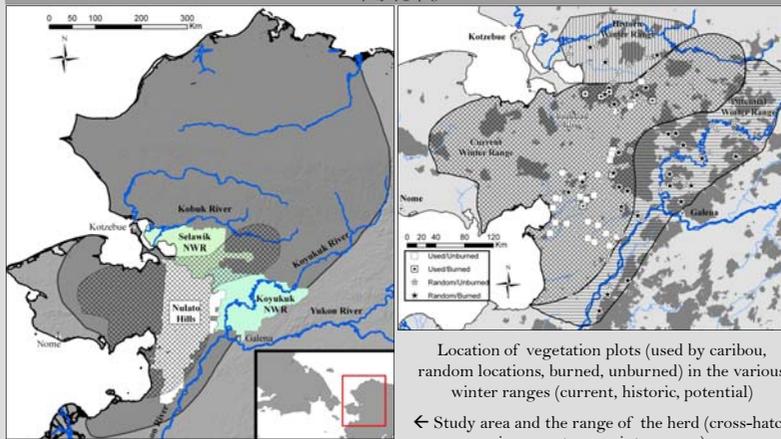
Habitat selection by overwintering caribou relative to lichen abundance, wildfires, grazing, and landscape characteristics in northwestern Alaska

Abstract

Nutrition can influence population dynamics through effects on body condition and in turn calf recruitment and survival. Lichens constitute a large portion of the diet of overwintering caribou. We investigated the vegetative and physiographic characteristics of the winter range of the Western Arctic Herd using 3 broad comparisons: random versus caribou locations, burned versus unburned locations, and among the current, historic and potential winter ranges. Lichen abundance was > 3 times greater at caribou locations than found at random. In the current winter range, lichen abundance was > 4 times greater at unburned locations than at recently (< 58 years) burned locations, but there were few other differences. Low lichen abundance in the historic range, likely due to sustained grazing pressure, suggests that range deterioration can lead to range shifts. Recovery may be slowed by continued grazing and trampling during migration, as well as by wildfire and climate change. The potential winter range is unlikely to be utilized regularly by large numbers of caribou due to low lichen abundance, extensive riparian habitat, high moose densities, and greater prevalence of wildfire. Our results suggest that lichens are important to overwintering caribou that face the energetic costs of predator avoidance and migration.

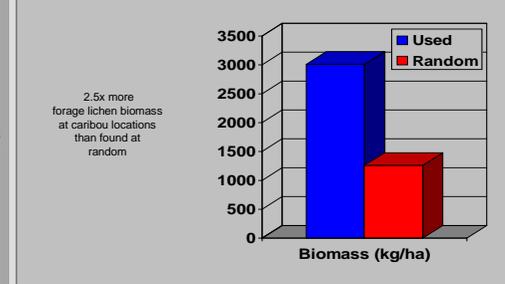
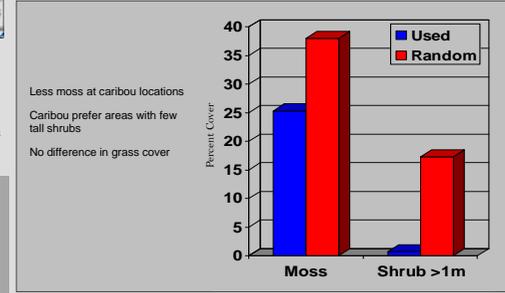
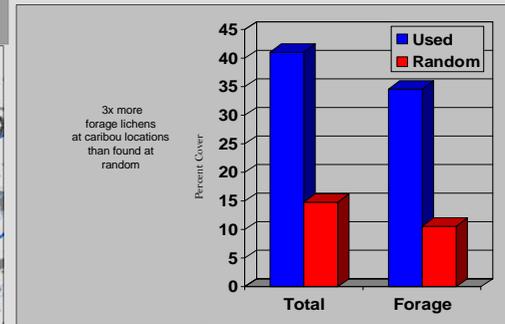
Kyle Joly^{1,2}, F. Stuart Chapin III² and David R. Klein²

¹National Park Service, Gates of the Arctic National Park and Preserve, Arctic Network Inventory and Monitoring Program
²University of Alaska Fairbanks, Department of Biology and Wildlife, Institute of Arctic Biology
 Kyle_Joly@nps.gov

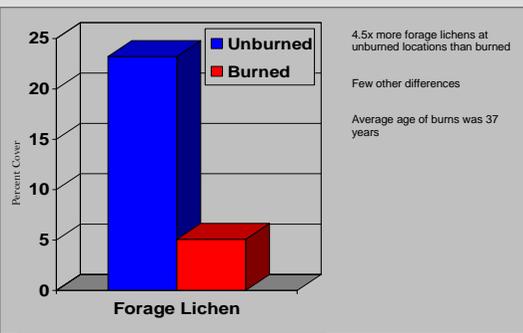


Location of vegetation plots (used by caribou, random locations, burned, unburned) in the various winter ranges (current, historic, potential)
 ← Study area and the range of the herd (cross-hatch is current core winter range)

Caribou versus Random Plots



Unburned vs. Burned Plots

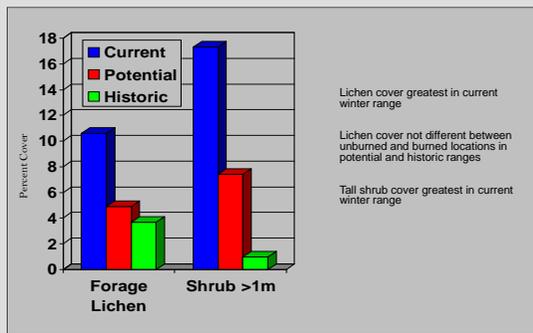


Abundant forage lichen (light yellow) can be found in stands that have remained unburned for the past 50-60 years, such as this peat plateau.



Even moderate to light severity burns can kill lichens (white area in foreground). After 30-40 years, burned and unburned locations can be difficult to tell apart except the difference in forage lichen abundance.

Range Differences



The lichen-rich ridges of the Nulato Hills located within the herd's current winter range.



Tussock tundra is common in the historic winter range, but lichen abundance is reduced as compared to the current winter range.



Due to extensive riparian and deciduous habitats, low lichen abundance and frequent fires, an area identified as potential winter range is unlikely to be used heavily.

Conclusions

Large, migratory herds of caribou seek out winter range with abundant lichen biomass. These herds can substantially affect this resource. Once depleted, caribou may expand or shift their distribution to find new areas with high lichen abundance. The additional energetic expense of migrating further, combined with additional predation risk, may be detrimental to caribou populations. Moreover, recovery of depleted winter ranges may take decades. This recovery period may be extended due to changes in climate. Increased wildfire activity and shrub abundance combined with expansion of deciduous forests, all of which are predicted under climate change scenarios, will further retard lichen growth. This may in turn negatively impact caribou and the subsistence users that rely upon this critical resource.

Shrubs encroaching on top of lichen-rich ridges →

