Long-Term Moose Population Trends and Consequences for Willow Condition in the Southern Absaroka-Beartooth Wilderness

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Background

In the 1980s, agency managers were concerned about the status of willow in the southern Absaroka-Beartooth Wilderness (ABW). Stands appeared suppressed by ungulate browsing. In response, a 36-year effort to monitor the resident moose population and willow status was conducted. Our research summarizes these data on moose population trends and willow browsing rates and height. Our objectives are: 1) characterize moose population trends from 1985-2021, and 2) assess whether moose population fluctuations influenced willow height.

Methods

We used several indices to monitor moose relative abundance from 1985-2021, including observations on a 177km trail transect each fall, and an 89km road transect multiple times monthly. We also assessed height and browsing rates on 179 marked willow plants each spring from 1988-2021 and analyzed data from a willow exclosure that was read every decade since 1961. To address the influence of abiotic variables on willow growth, we included snow telemetry (SNOTEL) data as predictors of willow height in our analysis.

Results

We found that moose relative abundance exponentially declined since 1988 (-18% annually), supporting findings from Tyers (2003) who documented a significant decrease in moose winter habitat in the ABW following the 1988 Yellowstone fires. This population decline was also correlated with reduced willow browsing. After accounting for annual precipitation, we found that willow height increased with reduced moose browsing. Our research demonstrates that the moose population decline following habitat loss in 1988 was a major contributor to willow recovery in the southern ABW, reinforcing the significance of herbivory suppression on willow communities.