

## Modeling Temporal Patterns in Microtine Abundance in Denali National Park and Preserve

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Small mammal populations have been monitored in Denali National Park and Preserve since 1992. In the ensuing seven years, interannual fluctuations in abundance greater than an order of magnitude have been observed for two genera of microtines (*Clethrionomys* and *Microtus*). Using meteorological data from the same time period, we defined three annual indices that describe aspects of climate thought to affect small mammal populations: winter severity, spring onset, and spring rainfall. With the 1992-98 end-of-summer abundance estimates for each genus as the response variable, we fit a log-linear regression model with the three climate indices and indicator variables for habitat type (riparian or forest) and genus (overall  $P < 0.0001$ ). Significant differences between genera and habitat types were found for all indices. We used the model to estimate abundance from 1955 to 1991 and found concordance with known fluctuations for both genera. We also computed climate indices for 1999 and predicted abundances for the end of the current field season.

As an independent test of the model, we calculated 1991-98 climate indices for Round Lake and used the model to predict local *Clethrionomys* abundance. No correlation was found between those predictions and monitored abundance indices for that time period ( $P = 0.13$ ). The three climate indices were used in a new regression model for Round Lake and were found to be poor predictors of abundance measures (overall  $P = 0.08$ ).

This analysis supports the hypothesis that microtine abundance in Denali is driven by environmental conditions with little carry-over effect from the previous year. However, this pattern does not appear to be universal as the model does not hold for Round Lake. This could result from different weather conditions, the use of different abundance measures, or an altogether different small mammal response to weather.