Wolf and Elk Predator-Prey Dynamics in Banff National Park Alberta

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Wolves recolonized Banff National Park (BNP) in the early 1980s, and quickly regained their role as top carnivore for the primary prey species, elk. Research has established that wolf predation is an important limiting factor for elk and moose, and was correlated with significant elk population declines. Effects of wolf predation were also detected on other ecosystem components in a fashion consistent with a top-down trophic cascade. However, whether wolves can regulate elk to low density has not been addressed. I used wolf kill rates of elk, wolf and elk densities measured during winter from 1985-2005 to test whether wolf predation regulated elk to low densities. I fit simple prey dependent and ratio-dependent models to time series data to estimate the functional response of wolves to changes in elk density. I used linear and non-linear models to estimate the numeric response of wolves to changes in elk density. Model selection methods were used to select the best functional and numeric response models for wolves and elk. I then combined functional and numeric responses to estimate wolf predation rate as a function of elk density to identify dynamic equilibrium states. Evidence suggests wolves can regulate elk to low densities in this multiple-prey system where predator prey dynamics were largely driven by type II prey-dependent functional response and a Y-intercept in the numeric response. I compared kill-rates from Yellowstone National Park and other areas to model predictions, and discuss the generality of these results across wolf-elk systems.