# Project Summary
## Rocky Mountains Cooperative Ecosystem Studies Unit

**Project Title:** Modeling the Consequences of Wolf Recovery on the Northern Yellowstone Elk Population

**Type of Project:** Research

**Funding Agency:** National Park Service, Yellowstone National Park

**Effective Dates:** August 1, 2002 – February 15, 2003

**Funding Amount:** $12,000

**Investigators and Agency Representative:**

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**Project Abstract:**

Prior to the reintroduction of wolves into Yellowstone, NPS funded the development of several population projection models to forecast the potential consequences of wolf recovery on ungulates in the greater Yellowstone ecosystem. These models forecast a 5-30% reduction in the northern range elk population owing to the reintroduction of wolves into the ecosystem, and lower reductions for bison, moose, and mule deer. However, these models did not accurately anticipate the magnitude of hunting removals from the portion of the elk population wintering outside of the park, or the functional (i.e., kill rates) and numerical (i.e., abundance) responses of wolves. Since the reintroduction of wolves, the park has implemented a broad monitoring and research program to evaluate the proposition that wolves will ultimately regulate the elk population at a level sharply lower than that established prior to wolf reintroduction. These efforts have resulted in the accumulation of detailed information regarding the abundance, classification, vital rates, and removals of ungulates and their predators. There is a need to incorporate this information into a population projection model that can more accurately forecast trends in the dynamics of the northern Yellowstone elk population and be routinely up-dated as better information becomes available. Such an effort would provide essential information for resource managers to make better-informed management decisions, defend park policies/practices, and respond to criticisms regarding the alleged effect of wolves on the Yellowstone ecosystem.

**Outcomes with completion dates:** 1) Database and analyses relating weather variables (e.g., snow water equivalent, summer precipitation, drought index) to variance in vital rates for elk; 2) Database and derived mathematical functions explaining variance in vital rates for elk (e.g., adult female survival, reproductive rate, age of first reproduction, survival to reproductive age, age structure) owing to density-dependent and density-independent factors; 3) Population projection model that incorporates best estimates of vital rates and forecasts realistic estimates of future population trends of the northern Yellowstone elk population; and 4) review and comments on a long-term vital rates monitoring program for the northern Yellowstone elk population that provides necessary information to measure and evaluate the demographic consequences of wolf recovery on the population.

**Keywords:** Yellowstone National Park, elk, wolves, northern range, modeling

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*Date Annual Report Received:*

*Date Final Report Received:*

*Publications, etc. on file:*