

---

## **EVALUATING ASPEN RESPONSES TO CHANGES IN ELK ABUNDANCE, DISTRIBUTION AND BEHAVIOR FOLLOWING WOLF REESTABLISHMENT IN WEST-CENTRAL YELLOWSTONE NATIONAL PARK**

Timothy L. Shafer\*, Department of Ecology, Montana State University, Bozeman, Montana 59717.

David W. Roberts, Department of Ecology, Montana State University, Bozeman, Montana 59717

Robert A. Garrott, Department of Ecology, Montana State University, Bozeman, Montana 59717.

Kathryn M. Irvine, Northern Rocky Mountain Science Center, U.S. Geological Survey, Bozeman, Montana 59715

The reintroduction of wolves to Yellowstone National Park created a unique “natural experiment” to study trophic interactions in a large-scale terrestrial system among wolves, elk, and aspen. This study utilized data from a long-term elk demography study that was

established prior to wolf reintroduction. Significant changes in the abundance and distribution of the Madison headwaters elk herd were observed following wolf reestablishment. The spatial arrangement of these changes made it possible to directly test for the occurrence of a density-mediated trophic cascade. The objectives of this study were to answer the following questions: 1) was there a marked decrease in browsing pressure on aspen where elk densities declined, and 2) was there a corresponding plant-growth response indicating that aspen were released from browsing pressure? Historical browsing conditions and aspen height were observed for 31 aspen stands to assess the occurrence of a density-mediated trophic cascade following wolf reintroduction. Browse conditions and aspen morphology in stands where elk densities declined dramatically following wolf reintroduction were compared to stands that experienced persistent heavy browsing throughout this period. A major decline in browsing pressure along with a modest increase in aspen height and leader longevity was detected, supporting the hypothesis of a density-mediated trophic cascade. However, the magnitude of the growth response was weak, suggesting that browsing was not the dominant limiting factor to aspen growth in the study area and that aspen may be more strongly limited by bottom-up regulation.