

ELK BEHAVIORAL RESPONSES TO THE REESTABLISHMENT OF WOLVES: INTEGRATING MULTIPLE STRATEGIES TO ACCOMMODATE COMPETING DEMANDS

Claire N. Gower, Robert A. Garrott, and Matthew S. Becker, Fish and Wildlife Management Program, Department of Ecology, Montana State University, Bozeman, Montana 59717

P.J. White, Yellowstone Center for Resources, Yellowstone National Park, Wyoming, 82190

Over the past few decades a large body of literature has provided evidence that predators can influence the ways in which prey behave. This in turn may influence prey demography and predator-prey dynamics, and therefore may influence prey populations independent of direct killing. Using data collected from 1991 to 2007, we evaluated the behavior of elk (*Cervus elaphus*) in the Madison headwaters area of Yellowstone National Park in response to the colonization and establishment of wolves (*Canis lupus*). Changes in home range size, fidelity, group size, foraging, and large-scale spatial responses were evaluated. Prior to wolf colonization, grouping behavior was relatively stable and predictable as elk attempted to conserve energy and decrease starvation risk in the absence of wolves. Following reintroduction group size and group size variation increased. This more dynamic behavior

likely reflects a strategy to minimize predation and maximize food acquisition. After wolf colonization, elk moved more over the landscape as they were increasingly encountered, attacked, and displaced by wolves. Home ranges were slightly larger, with some decreases in fidelity. Long-distance dispersal and migratory movements were also adopted away from high-density wolf areas. These apparent predator-avoidance movements were never observed prior to wolf colonization or from areas where predation risk was lower. The decision to forage was heavily influenced by local snow, habitat, and time of day but remained relatively stable with and without the presence of wolves. We suspect that this lack of any substantial change in foraging behavior illustrates that elk can maintain the same level of foraging time and retain a relatively constant level of nutrition. Together these results suggest that in a harsh winter environment, elk can adaptively manage their behavior to cope with environmental constraints both in the presence and absence of wolves.