Spatial Responses and Foraging Dynamics of Elk in Relation to Winter Wolf Predation Risk in Yellowstone National Park

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In the absence of an effective predator, food acquisition and energy conservation during winter largely influence spatial patterns of large herbivores in northern temperate regions. Resources are scarce and the energetic cost of movement is high; as a result animals would be expected to minimize movement to avoid unnecessary energetic costs. When a top predator is added to the system, such a strategy may not be compatible with avoiding predation risk, animals may increase their movement to avoid detection or facilitate escape. While avoiding predation, large herbivores must also balance conflicting demands of satisfying physiological needs. To evaluate spatial responses and foraging dynamics of elk (*Cervus elaphus*), with and without wolves (*Canis lupus*), we conducted an intensive telemetry-based study of the Madison-Firehole elk herd during 1991-2007. This occurred prior to significant wolf reestablishment (1991-1997), and when wolves had an established presence in the study system from 1998 through 2007. Prior to wolf-reintroduction, we randomly collected ~ 6000 elk locations, representing 5000 elk groups and 1900 independent behavioral observations (~ 950 hrs of observation time). Our data were complimented by > 5000 elk locations, representing 3500 elk groups, and 1850 independent behavioral observations (~ 925 hrs) after the reintroduction of wolves. We observed modest changes in home range size and reduced site fidelity as elk adjusted to presence of wolves, and some long distance dispersal away from core wolf use sites. Foraging behavior remained relatively stable with and without presence of wolves.