

Predation of Yellowstone Elk Calves

A 4-year elk calf mortality study on the Yellowstone northern range, undertaken to determine the causes and rates of mortality during the first year of elk life, has now been completed. Ever since adoption of the natural regulation policy in 1969, NPS has received considerable criticism for apparent lack of controls on the elk population. Douglas Houston, in his book on Yellowstone's elk, contended that the herd was regulated primarily by juvenile mortality in a density-dependent fashion; elk calves died at higher rates during winters when elk densities were high (based on drops in calf/cow ratios). Fall calf/cow ratios also are typically low in the population, suggesting significant mortality must also occur during summer.

Newly-born elk calves were captured each spring between 1987 and 1990 from horseback and helicopter. The calves were instrumented with motion-sensitive radio collars and released. Motion-sensitive collars double their signal pulse rate when no motion occurs for a specific period of time, indicating a likely mortality. When this occurred, field crews rode or skied into the backcountry and inspected the kill or carcass site.

More elk calves died during summer (32% of 127 marked calves) than winter (21% of marked calves). Nearly all mortality during summer was due to predation, whereas mortality in winter was primarily related to malnutrition. Almost all the winter deaths occurred during the severe winter of 1988-89, following the drought and fires of 1988. Winter elk calf mortality was relatively insignificant in the winters of 1989-90 and 1990-91, when elk numbers were reduced (supporting Houston's contention). Summer elk predation on calves, however, increased in 1989 and 1990 in spite of lower elk densities, in a density-independent fashion.

Heavier elk calves tended to survive better than lighter calves. Not surprisingly, more light calves were born following the drought and fires of 1988 and the severe winter of 1988-89. The scientific literature on many other ungulates such as red deer, caribou, and white-tailed deer also suggests progeny are lighter following severe winters or during periods of food shortage. Lighter weights at birth result in higher mortality from all causes. On Isle Royale, moose born to dams stressed by a severe winter are more vulnerable to predators throughout their lives.

Grizzly bears were one of the most significant predators on elk calves. Grizzlies killed about as many calves as coyotes and black bears combined. Based on our marking study

and elk population estimates, grizzlies killed about 950 elk calves on the northern range each year. Wolf restoration has been proposed for Yellowstone Park. If summer predation on elk calves is density-independent (see double-outlined box), then wolf predation on elk calves would likely be additive to current predation levels, i.e. the total effect of predation likely will be greater following wolf recovery.

Our study discovered that summer predation on elk calves was far more significant than had previously been suspected. Our observations of winter mortality, although limited to 4 winters, tended to corroborate the contention of Houston that winter elk calf mortality was density-dependent and a potential regulatory force on the northern winter range.

Singer and Symonds are Research Ecologist and Wildlife Biologist, respectively, with the NPS; Berger is with Telonics, Inc.

Recommended Reading

- French, S.P. and M.G. French. 1990. Predatory behavior of grizzly bears feeding on newborn elk calves in Yellowstone NP, 1986-88. International Conference on Bear Research and Management.
- Gunther, K.A. and R.A. Renkin. 1990. Grizzly bear predation on elk calves and other fauna of Yellowstone NP. International Conference on Bear Research and Management 8:329-334.
- Singer, F.J., K.K. Symonds, and A. Harting. 1992. Elk calf mortality in Yellowstone NP. 25-page mss available from Singer, Natural Resources Ecology Lab, Colorado State U, Fort Collins, CO 80523.