Evaluating Bottom-Up And Top-Down Effects On Elk Survival And Recruitment: A Case Study In The Bitterroot Valley

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Understanding the contribution of recruitment rates to overall growth rate in ungulate populations is a fundamental challenge in wildlife management. Ungulate populations with low recruitment rates may result in population level declines over time. In the southern Bitterroot Valley of western Montana, the decline of elk (*Cervus elaphus*) populations and calf recruitment occurred concurrently with wolf (*Canis lupus*) recovery. However, a multitude of abiotic, bottom-up and top-down factors likely affect recruitment rates and the relative affects of these factors on elk calf survival rate likely vary temporally throughout the first year. We studied cause-specific mortality of elk calves to understand the role of competing mortality risk on calf recruitment in the East Fork and West Fork of the Bitterroot Valley, Montana. A total of 66 neonatal elk calves were captured in spring 2011 and an additional 31 6-month

olds in late November 2011. We will analyze survival using a Weibull parametric survival model, and cause-specific mortality using a competing risks framework. Preliminary analyses suggest the potential for competing risks between black bears, mountain lions, and wolves. As the study progresses into the second year, we will evaluate the role of summer range nutritional resources on maternal condition, lactation performance, and calf birth weights and survival. Our study will fill a gap regarding the role of summer vs winter mortality in elk and the role of nutrition in first year survival. The study will complement previous studies on elk population dynamics and inform elk population management following carnivore recovery.