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## **AFTER 70 YEARS OF DATA: WHAT DO WE KNOW AND WHAT DO WE THINK WE KNOW ABOUT ELK HABITAT AND VEGETATION IN THE GALLATIN CANYON?**

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Many agency biologists use wildlife exclosures to draw inferences about wildlife habitat relative to herbivore population densities and the effect of soil and vegetation manipulation on plant community recovery. When herbivore density is high, vegetative suppression is expected, and even erosion and soil loss may be suggested. As herbivore populations

decrease, cascading trophic effects on trees, shrubs, and grasses may be hypothesized. In a case study using nearly 100 years of elk (*Cervus elaphus*) data and 70 yrs of vegetation data from wildlife exclosures in the Gallatin Canyon, we present qualitative and quantitative assessments of a series of hypotheses about elk relationships to the landscape. When elk numbers were high, USDA Forest Service and Montana Fish, Wildlife and Parks performed experimental vegetative treatments to improve range conditions: red fescue seeding, planting caragena, contour plowing to limit soil loss, sagebrush removal, and testing snow fences to trap snow to retain moisture. Several exclosures were equipped with soil traps to monitor soil erosion, hypothesized to come from range overuse by elk. After the 1990s, multiple landscape-level changes, including wolf reintroduction, resulted in substantial elk population declines. Wintering elk numbers decreased from a long-term average of 1600 to fewer than 500. Given elk numbers declined by 2/3, biologists hypothesized a trophic cascade would release to later vegetation series or climax communities. We examined the results of the early habitat manipulations and discuss their implications. We describe how several of the hypotheses were not borne out in the data when examining the entire ecological picture.