Wolf Prey Preferences in Multiple Prey Systems: Insights from the Madison Headwaters of Yellowstone National Park

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We studied wolf prey selection and kill rates during 1996-1997 through 2006-20007 winters in a newly established one predator two-prey system in central Yellowstone National Park. Prey differed substantially in their vulnerability to wolf (*Canis lupus*) predation and wolves preyed primarily on elk (*Cervus elaphus*) but also used bison (*Bison bison*) to varying degrees within and among winters. Winter severity, wolf abundance, distribution, and prey selection varied during the study, concurrent with variations in the demography, distribution, and behavior of elk and bison. Patterns of prey selection trends were strongly correlated to elk calf abundance. While wolves increasingly killed bison with increasing bison: elk ratios, snow pack duration, and wolf numbers, they did not appear to change their preference for elk. Similarly, variation in elk kill rates were not related to or reduced by increases in bison kill rates. The wolf functional response for elk was a Type II, indicative of a preferred prey, and strongly influenced by wolf abundance, as it was positively correlated with increased competition and anti-predator responses of elk. Prey-switching evaluations indicated increasing selection of bison with increasing bison: elk ratios, however no concurrent

decrease in elk predation occurred. Increased bison predation is not solely dependent on relative abundance of the two prey species; therefore it is unlikely at this time that wolf prey-switching will stabilize the system. The pervasive influence of differential vulnerability among prey species and age classes and its effects on the potential trajectories of wolf-ungulate systems in Montana is discussed.