Gasaway, W. C., R. O. Stephenson, J. L. Davis, P. E. K. Shepherd, and O. E. Burris. 1983. Interrelationships of wolves, prey, and man in interior Alaska. Wildlife Monographs 84:1-50. https://www.jstor.org/stable/3830554?seq=1#page_scan_tab_contents

Abstract

The interrelationships among wolves (Canis lupus), moose (Alces alces), caribou (Rangifer tarandus), and man were studied in a 17,060 km2 area in interior Alaska during the 1970's, and historical data from the 1950's and 1960's were reviewed and re-evaluated. Objectives of this study were to define factors limiting a moose and caribou population; to review moose-wolf relationships in ecosystems where wolf populations are, to a large extent, naturally regulated; to demonstrate the effects of man's harvest of prey species on the wolf-prey relationship; and to identify problems of managing prey populations for hunting and nonconsumptive human use where wolf populations are naturally regulated. Moose and caribou populations increased following a wolf reduction program in the 1950's and reached peak abundance in the 1960's. Deep snow and heavy browsing caused an initial crash of moose in 1965-66. Moose continued to decline until 1976, primarily due to periodic deep snow, harvest by man, and predation by wolves. These factors were interactive, each altering the impact of the others. The long-term effect of moose mortality from deep snow was to increase the impact of predation by lowering moose/wolf ratios. Hunting and wolf predation were the principal causes of moose mortality from 1971-75. Harvests removed from 6-19% of the moose population annually; mean harvest rate equaled mean yearling recruitment. After 1974, harvest removed 2% of the moose. Predation by wolves removed an estimated 13-34% of the moose during winters 1973-74 and 1974-75 and a high proportion of calves during summer. Mortality from predation during winter exceeded recruitment of calf moose, and together hunting and wolf predation caused a rapid decline in moose. Hunting by man and predation by wolves were also the primary proximate mortality causes in the decline of caribou. However, calf recruitment was so low from 1971-75 that a significant decline would have occurred without hunting. After 1973 when hunting was stopped, predation limited the population. Following a 61% reduction in wolves in 1976, survival of calf and yearling moose increased 2- to 4-fold, adult mortality declined, and the moose population increased. Survival of caribou calves also increased significantly, and the population grew rapidly. Dall sheep were a minor prey species in this predator-prey system. The impact of wolf predation on the sheep population was minor compared with impacts on moose and caribou populations. Analysis of moose, caribou, and wolf management in our study area demonstrated that caution must be exercised in harvesting ungulates in ecosystems where wolves are essentially naturally regulated. Mortality from severe winters, hunting, and wolf predation were largely additive. In this and other studies, wolf predation sustained ungulate declines that were initiated by other factors, causing ungulates to occasionally reach low densities. From the standpoint of ungulate management, no sensitive, fast-acting feedback mechanism exists that naturally decreases numbers of wolves as prey density declines; therefore, predation can have an antiregulatory effect on ungulate populations. The escape of ungulates from control by wolves may be an infrequent event under natural conditions. If so, this poses a problem for wildlife managers seeking to maintain at least moderate ungulate densities. When wolf predation limits a depressed ungulate population, managers can either wait for a natural recovery, which could require decades, or reduce numbers of wolves. Prey/wolf ratios can assist in the initial interpretation of wolf-prey relationships. Where predators occur at near-natural levels, managers should not use survival of young ungulates as an indicator of the vegetation-ungulate relationship because predation on young animals obscures this relationship.