Letter From the Desk of David Challinor
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Both human and naturally caused manipulations of wild animal populations frequently trigger unexpected results. In the late 1980's, for example, wolves moved south from Glacier National Park on Montana's border with Canada. The first pioneers were solitary animals, but they dispersed into wild areas along the Idaho/Montana border. Some may have even reached Yellowstone National Park (YNP). Wolves have fascinated me since childhood. As a boy in New York City (10-12), I used to roller-skate across Central Park to visit the American Museum of Natural History. My favorite diorama was entered through a curtain where a darkened scene of three wolves loping across the snow in the moonlight awaited me. This month's letter considers the effect wolves have on the ecosystem when they reoccupy territories from which they have been absent for scores of years. The first example is the natural invasion of Isle Royal about 65 years ago, and the second is the Park Service's carefully planned release of wild-caught Canadian wolves into the Greater Yellowstone Ecosystem (GYE) seven years ago.

In the late 1940's, a pack of wolves crossed the ice from the Canadian mainland to Isle Royal in Lake Superior. Since then, both the number of moose already there and the new wolf population have fluctuated considerably, but both are still on the 200-square mile island. Wolf presence curbed the total number of moose, which has yet to approach its pre-wolf population size. However in the 1980's, 36 of the 50 island wolves died when humans accidentally introduced a lethal canine parvovirus. With only 14 wolves left, moose multiplied rapidly until a balance was restored after the particularly severe winter of 1996, when hundreds of moose died of starvation. The wolf was the moose's only mammal predator, for it had not taken long for wolves to eliminate coyotes on the island. For the latter, no escape was possible unless and until lake-ice bridged the 14 mile gap to the mainland.

Coyotes were not the only organism affected by the wolf arrival; so also were balsam fir trees, a favorite winter moose browse. By analyzing the trees' growth rings, foresters discovered a direct correlation between fir growth and size of the wolf population: the more wolves, the less moose, and thus the more tree growth. In such a relatively small island ecosystem, the plant/animal inter-relations appear relatively straightforward, but as soon as scientists delve deeper, the relationships become increasingly complicated and the dynamics harder to analyze. For instance, when stressed for food, do moose eat more conifer browse than hardwood? If so, what effect does that have on litter composition, or on nutrient cycling in the soil? Even low moose numbers have a profound effect on forest succession because they are such heavy browsers. Their influence can, in turn, be affected by such natural phenomenon as fire,

wind-throw, insect and/or pathogen attack on vegetation, etc. It is unlikely Isle Royal's forest will ever reach equilibrium because there are too many unpredictable factors that can abruptly skew "normal" forest succession.

In sharp contrast to Isle Royal, the effect of controlled introduction of wolves into the GYE, an area about 10 times larger than the island, may take centuries to understand. When Yellowstone Park was created in 1872, bison and other large ungulates were harvested for hides and meat. Park officials worried whether the herds of elk and bison could be sustained in the Park so they began winter feeding elk in Jackson Hole, as well as practicing predator "control." As a result of this policy, wolves were extirpated by the 1930's. Elk rapidly proliferated and their numbers were controlled by a combination of field shooting and trapping until the YNP herd was reduced by 75% to about 4,000. Eventually in the early 1970's, the Park Service's policy of field shooting elk within the Park ceased and debate started on how best to achieve "natural" control of these ungulates.

Emotions ran high on the efficacy of shooting elk and bison that strayed beyond Park boundaries. Montana wildlife agents shot stray bison because it was believed that those infected with brucellosis (an abortion inducing disease in cattle) could spread the disease to domestic livestock. The issue of shooting to prevent disease spread is still heavily charged politically, despite their being no experimental evidence that bison bulls can transmit brucellosis by breeding with a domestic cow, a relatively rare event in any case.

Management policy of megafauna populations such as bison, elk, deer, mountain sheep and goats, pronghorn antelope, and even feral horses and donkeys, is ultimately determined by our current political and social attitudes. The wolf is a good example of how attitudes change. In what is now the U.S., the wolf was considered anathema by the first European arrivals and remained so until the mid-20th century. Bounties were paid to speed their eradication and the few that survived lived only in northern Minnesota's remote forests and along its Canadian border. In the south, the Red wolf subspecies barely survived in the dense forests of Mississippi, Arkansas and Louisiana. But then extraordinary change in attitude occurred. Research begun on Isle Royal shortly after the wolves arrived, by Professor Durwood Allen of Purdue and his student Dave Mech, began to popularize these intriguing predators. The social structure of wolf packs was clarified and the creation and dissolution of packs was intensely monitored. Tourists were lured to Ontario in the winter by the opportunity to listen to wolves responding to recorded wolf howls; occasionally visitors would be rewarded with an actual sighting.

The key turning point in wolf recovery was probably their listing as "threatened" in the lower 48 states under the Endangered species Act in 1974. This change in status banned poisoning and indiscriminant shooting and was understandably opposed by the

livestock industry, which predicted mass predation. Fortunately, this did not happen. A recent paper in the Journal of Wildlife Management (Oakleaf, J.K. et al, JWM 67 (2): 299-306, 2003) reported that in an area studied in east central Idaho, the presence of wolves had an insignificant effect on calf mortality and even on cattle behavior. The researchers radio-marked 231 calves during the 1999-2000 grazing season. This represented a third of the calves on a 30,000 ha (72,000 ac) grazing allotment. Only 13 of the 231 marked calves died; eight succumbed to causes other than predation—wolves killed four and coyotes one. Wolves killed calves that averaged 24 days younger than the surviving calves. Calf predation appeared correlated with calf age and nearness to wolf home ranges and/or rendezvous sites.

Wolves in this area were established in 1996 but, for various reasons, all the initially introduced wolves and their progeny were gone by the winter of 2000. That spring, however, one of the original wolves returned with an unknown adult to start a new pack. Thus during the study, the livestock in this grazing allotment shared space with as many as 15 wolves (more than half of which were puppies in 1998) and eight wolves (two adults and six pups) in 2000. Although the wolf population varied over the two seasons monitored, the wolves killed a total of 16 calves, including untagged ones. Therefore, out of the total 688 cow/calf pairs grazing during these two seasons, only about 1.2% each year succumbed to wolves, while 2.3% of the calves died from nonpredation causes. From this evidence, wolves in the study area fed primarily on other prey; calves were a secondary food source. In fact, there was virtually no evidence that cattle, on the grazing allotment studied, altered their behavior to avoid or protect themselves from wolf predation. This is further evidence that wolf/livestock interactions were rare.

Presently, about 14,000 elk still overpopulate the GYE compared to what we know of population sizes 50 or more years ago. Yellowstone wolves thus have a surfeit of prey. Their respective populations, however, will continue to rise and fall because of myriad uncontrollable causes: diseases, susceptibility to fire, drought, winter snowmobile traffic, etc.

The Yellowstone wolves do not yet prey extensively on bison (pop. 4,000); should they start doing so, their impact on elk would certainly change. So far, wolves have had an insignificant effect on the ecosystem. Their 50% coyote reduction is probably the most obvious change, but even this condition could be transitory.

In the summer of 2000, there were just over 200 wolves (before the spring's pups were counted). Within the Park there were 14 packs (132 individuals) and outside it another 14 packs (84 wolves). The initial wolf population growth within the Park was quick but has now slowed, with most of the current gain occurring outside the Park. Within YNP, packs are splitting and some will establish new territories wherever suitable

ones are available. Elk continue as the main summer prey (92% of wolf kills), of which almost half are calves. In winter, cow elk represent about 60% of wolf kills. Most adult elk killed are old, with a mean age of 14 for cows.

One interesting sidelight is that pronghorn fawns have increased their survival since wolf introduction because coyotes were their primary predator. Wolf kills also benefit scavengers, which in GYE are ravens (numerically the most numerous), but also magpies, both bear species and coyotes. Grizzly bears can generally keep wolves away from carcasses that the wolves have killed. Cougars have actually increased in the northern mountainous part of the GYE as they occupy rocky outcrops and river cliffs unsuitable for wolves. There is relatively little interaction between these two predators, and in the few instances where it has been observed, three or four wolves can easily drive a cougar away from a carcass. There have been, however, two documented cases of a male cougar killing a single wolf by ambush.

From these observations, it is unlikely that any kind of equilibrium in the GYE will ever be reached. Even if people stopped trying to control the megafauna, extraneous factors such as weather and disease can alter prey/predator and ungulate/forage ratios. Human interference will undoubtedly remain an important influence on plant and animal composition within the GYE. For example, cow elk and calves are still harvested by hunters in the fall when they leave the Park—about 2,000 a year are thus culled. That number could go up or down depending on how public attitude controls the political force in game management. The Fish and Wildlife Service downgraded grey wolves on April 5 from “endangered” to “threatened.” The new category allows for more stringent measures to control wolves believed to be preying on livestock. The same agency has indicated that it may delist wolves completely by the end of the year, which would leave their protection up to each state. Such an approach is consistent with the management of the environment by the current administration, but many scientists and even lay people disagree and would like to see the studies I have discussed above continue for a longer period.

The future of the wildlife in the GYE will be determined by how public attitudes influence wildlife policy decisions. Attitudes change, as illustrated by the reaction of people towards wolves. They will continue to change and the only conclusion we can draw is that the future will be different from the present. As a compulsive optimist, I like to think that some wolves will continue to live in the lower 48, at least through the lives of my grandchildren.

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