Charles E. Kay

WOLF RECOVERY, POLITICAL ECOLOGY, AND ENDANGERED SPECIES

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The federal government and environmental groups who would like to see wolves returned to the West under protection of the Endangered Species Act (ESA) claim that the public supports wolf recovery, and that science is on their side. The former director of the National Park Service, for instance, was quoted as saying that "there is little scientific basis for most objections being raised to wolf reintroduction" (Fischer 1987:30). Others contend that "half-truths and misrepresentation of facts continue to thwart" (Miller 1988:5) wolf recovery, and Defenders of Wildlife has said that people who oppose wolf reintroduction are "aggressively anti-science" (Neal 1992:A8). Are wolf proponents right? Or are there aspects of this issue that they have purposefully overlooked?

I am committed neither to having wolves in the West nor to keeping them out. I am committed, though, to science being used responsibly in policy debates, something I have not yet seen with wolf recovery. My analysis indicates that the federal government and other wolf advocates have taken liberties with the truth, with science, and with the Endangered Species Act.

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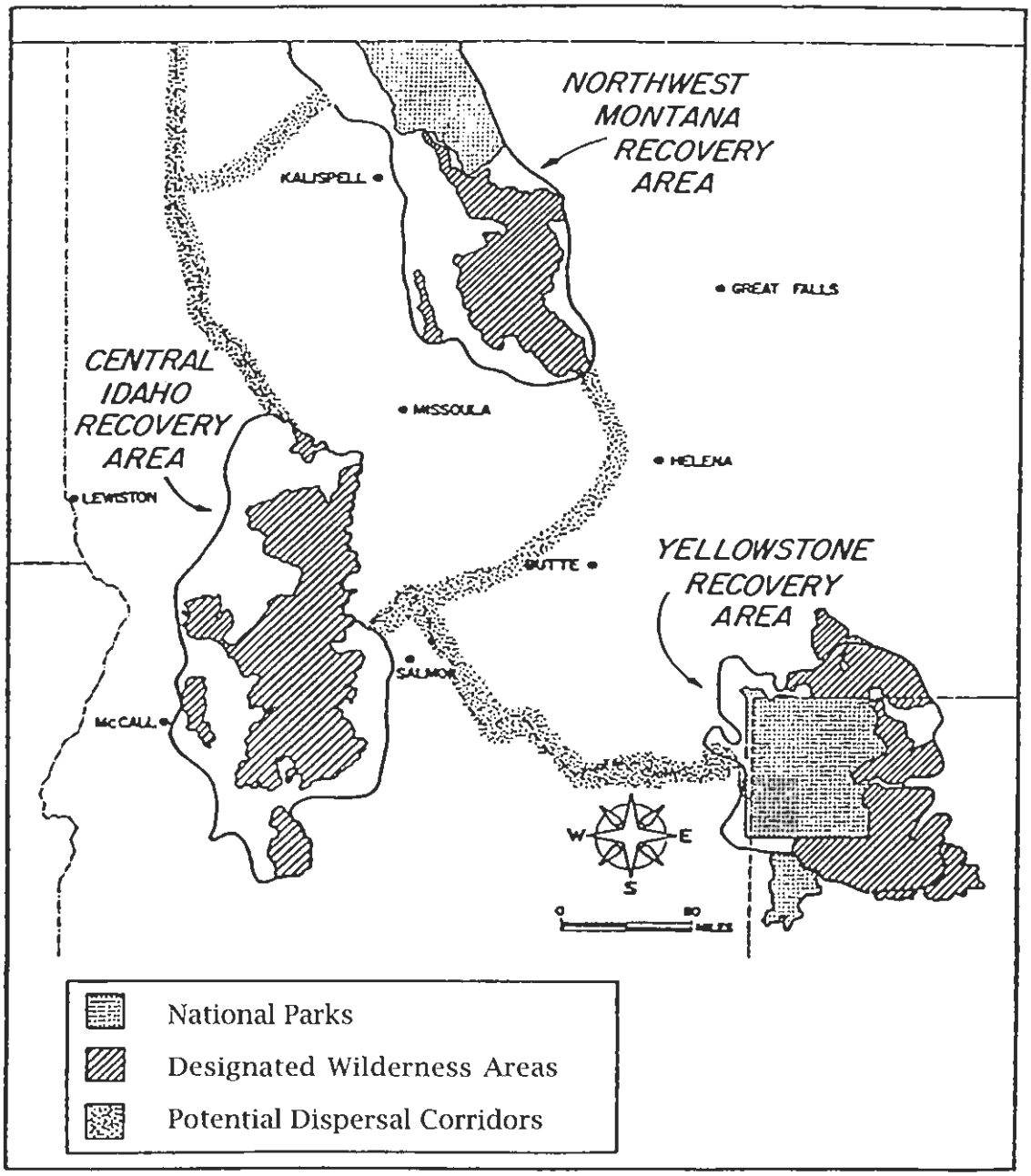
NUMBER OF WOLVES

Far and away the most important aspect of the wolf debate is how many wolves we are talking about 100? 300? Or 2,000? The number of wolves is central to any discussion of whether predation will limit ungulate numbers, whether hunting might have to be curtailed or eliminated, and how much livestock depredation might occur. When Defenders of Wildlife first began to lobby for wolf reintroduction, they talked of "35 to 45 wolves" in all of Yellowstone Park (Randall 1981:31). This was echoed by an early National Park Service (1975:5) report, which said, "the final numbers [of wolves] that would winter within the park and be compatible with other interests on adjoining lands are expected to range between 30 and 40 wolves." Now plans call for 10 wolf packs totaling approximately 100 wolves in Yellowstone.

In 1987, the U.S. Fish and Wildlife Service finalized its recovery plan for wolves in the northern Rocky Mountains as mandated by the Endangered Species Act. Besides Yellowstone, the plan addresses wolf recovery in northwest Montana and central Idaho (see Figure 1). According to that document, if a minimum of 10

Figure 1. (opposite) Northern Rocky Mountain wolf recovery areas. This map is from the U.S. Fish and Wildlife Service's (1987) wolf recovery plan and shows how that agency has misled the public from the very start. Note that all the wolf dispersal corridors follow the Continental Divide or other mountaintops. Wolves, however, generally disperse in early spring, when those areas are all deep with snow, and they invariably disperse down valleys where there is little or no snow. This was well known before the U.S. Fish and Wildlife Service developed its wolf recovery plan, so the agency evidently lied when it developed this figure. Western valleys, after all, are mostly private land, and ranchers are worried that wolves will prey on their livestock. So if you are trying to promote wolf recovery, which is what the U.S. Fish and Wildlife Service has been doing, then the last place you want to tell the public wolves will be dispersing is through those people's backyards. By claiming that wolves would disperse along high mountain chains that are, for the most part, uninhabited and in public ownership, the U.S. Fish and Wildlife Service hoped to reduce public opposition to wolf reintroduction. Where wolves from Canada have naturally recolonized northwest Montana, those animals have not only dispersed along valley bottoms, but denned there as well.


NORTHWEST MONTANA RECOVERY AREA
KALISPELL
GREAT FALLS
CENTRAL IDAHO RECOVERY AREA
MISSOULA
HELENA
LEWISTON
BUTTE
YELLOWSTONE RECOVERY AREA
SALMON
McCALL
W
E
S
National Parks
Designated Wilderness Areas
Potential Dispersal Corridors

wolf packs breed in any one recovery area for three successive years, the wolves in that area are to be downlisted from endangered to threatened status. When at least 10 breeding pairs have been maintained for at least three successive years in all three recovery areas, wolves are to be completely removed from the Endangered Species List. While the wolf is listed as either threatened or endangered, hunting and trapping are not to be permitted except by agents of the federal government who may remove individual wolves that prey on livestock (U.S. Fish and Wildlife Service 1987).

Government and environmental wolf advocates have assumed that breeding packs would contain, on average, 10 wolves. This implies that each recovery area would be downlisted from endangered to threatened at approximately 100 wolves. At 100 wolves in each of the three recovery areas, or 300 total wolves, the species would be removed from the endangered list. According to the U.S. Fish and Wildlife Service (1987:19), "the goal of 10 breeding pairs in each of three recovery areas was established after extensive literature review and consultation with a number of U.S. and Canadian biologists/wolf researchers," but the agency published none of that evidence. So how did the government actually arrive at these figures? And are they realistic?—that is, do they meet ESA requirements?

To find out, I filed an official Freedom of Information Act request with the U.S. Fish and Wildlife Service (Buterbaugh 1991). In reply, the agency admitted that it had "not contracted or undertaken any studies which deal with minimum viable populations of the Northern Rocky Mountain wolf," and added that "there are no records in the files of our Denver Regional Office or the Cheyenne Fish and Wildlife Enhancement Office referencing any specific materials [which were] used in determining recovery numbers for the Northern Rocky Mountain wolf." I brought this to the attention of noted conservation biologist Dr. Michael Soule, who said, "My guess is that the 10-pack number is more a political than a biological threshold."

Because the U.S. Fish and Wildlife Service developed its recovery goals of 10 wolf packs and 100 wolves in each area with little, or no, supporting scientific evidence, all the government's recent wolf recovery reports, population models, and studies regarding possible impacts on big-game hunting are arbi-

trary and capricious. They represent not science but a masterful job of deception.

To meet the legal mandate of the Endangered Species Act and biological requirements for minimum viable population size, 1,500 to 2,000 wolves as one interbreeding population will be required (see Figure 2). Although the science of determining minimum viable population size is still developing, numbers alone are not the only criteria (Soule 1987). Genetic variation must also be considered. Maintaining genetic variability is important because inbreeding has serious consequences for the long-term health of any population. Restrictive mating systems, where a few individuals do the majority of breeding, greatly reduce a population's effective size.

Assume, for instance, that you have 10 breeding packs totaling 100 wolves. Since the alpha male and female are usually the only breeding individuals in each pack, a hypothetical population of 100 wolves in 10 packs has an effective breeding size of only 20 individuals per generation. To maintain genetic variation sufficient to cope with environmental uncertainty, and to guard against natural catastrophes, it is necessary to maintain populations of at least 1,500 to 2,000 individuals (Woodruff 1989; Thomas 1990). A Canadian study recommended a minimum of 1,450 wolves (Dueck 1990), and a recent U.S. study called for 2,000 (Dietz 1993).

Based on their arguments for large minimum viable populations in a host of other species—the northern spotted owl and the grizzly bear being the best-known examples—it is difficult to believe that environmental groups have not voiced similar concerns over wolf recovery goals in the West. After a federal court ruled that 2,180 pairs of, or approximately 4,500, spotted owls were necessary to meet ESA requirements (Boyce and Irwin 1990:134) and environmentalists sued demanding 2,000 grizzlies, why would only 300 wolves be enough? It appears that the 100-wolf recovery figures are little more than an elaborate confidence game orchestrated by the federal agencies and others.

The government proposed 100 wolves in each area, knowing that the numbers would not be enough to meet ESA requirements of minimum viable population size, and environmental groups did not object, knowing that 300 wolves would raise less political opposition than 1,500 to 2,000 wolves. Wolves arrive and

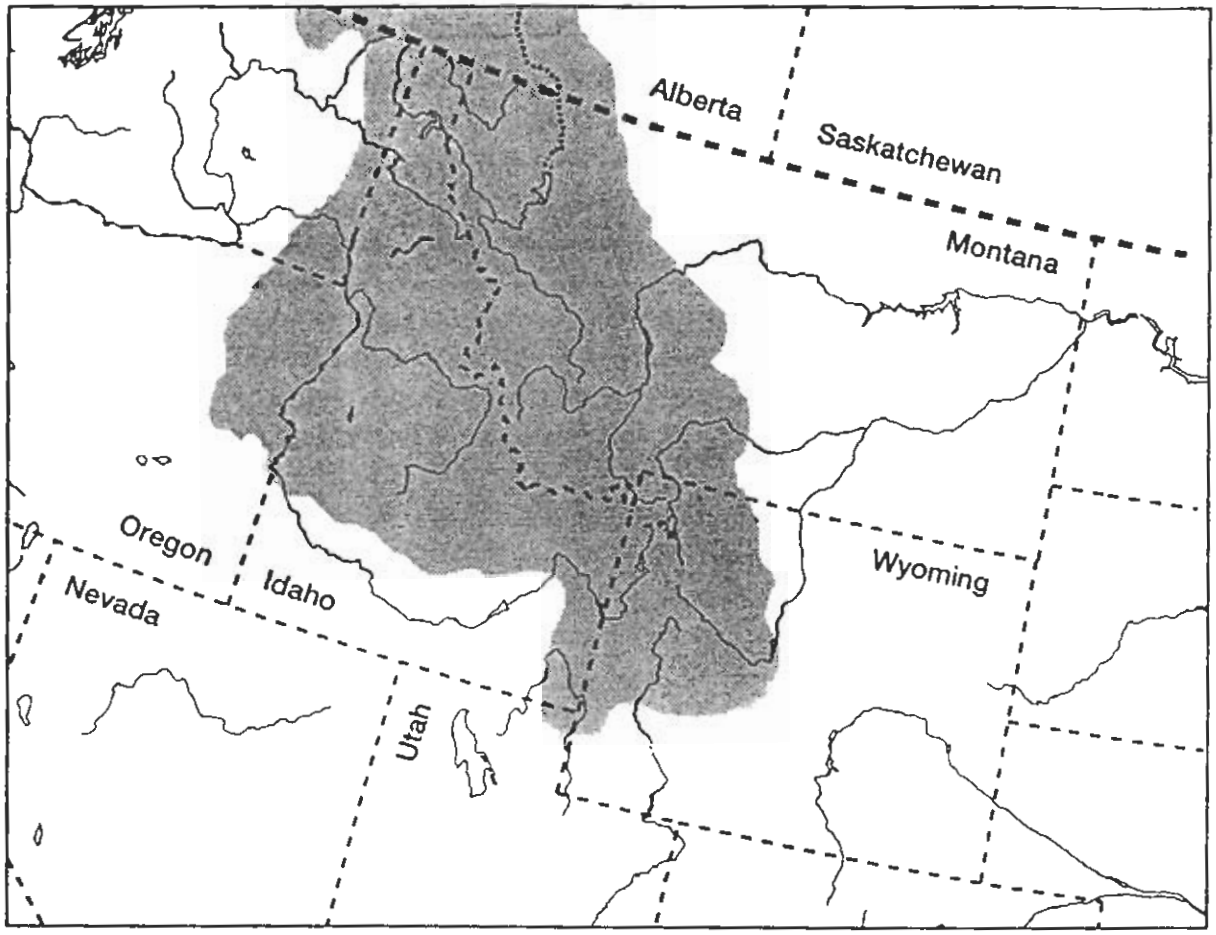


Figure 2. Projected area occupied by the 1,500 to 2,000 wolves that will be needed to satisfy minimum viable population size requirements and legal mandates in the northern Rockies. This may appear excessive, but it is nearly identical to the area environmentalists have demanded for grizzly bear recovery (Shaffer 1992). Plans for wolf recovery are under way in Utah, Colorado, Washington, Arizona, and New Mexico as the wolf is listed as an endangered species in all the 48 lower states except Minnesota, where it is listed as threatened. Wolf reintroduction is also being considered in New York and Maine.

increase to 300. The government moves to delist. Environmentalists sue and win. The wolf population is allowed to reach 1,500 or more. Environmentalists are happy, the federal agencies are happy, and the public realizes—too late—what has happened.

Minnesota provides an example of how the federal courts might rule on the legal question of what wolf population size will be required before that species can be delisted in the northern Rockies. In the early 1980s, an estimated 1,200 to 1,500 wolves occupied 13 to 17 million acres in Minnesota. At that time, the U.S. Fish and Wildlife Service proposed transferring wolf management authority to the state. This would have allowed wolves to be taken by hunters and trappers. In essence, though not in fact, the government moved to delist the wolf. The federal agencies were immediately sued by a consortium of 14 environmental groups led by Sierra Club and Defenders of Wildlife (Woodsum 1984).

In granting the plaintiff's request to prevent wolves from being returned to state management, the judge noted that the Endangered Species Act allows regulated taking (i.e., public hunting and trapping) *only* in the "extraordinary case where population pressures within an ecosystem cannot be otherwise relieved" (*Sierra Club v. Clark*, 577 F. Supp. 783, 1984; Defenders of Wildlife 1984). Based on this ruling, federal or state officials must be able to establish, by a preponderance of evidence, that wolf population pressure in an ecosystem is so extraordinary as to warrant public hunting and trapping. Given the limited resources of the state and federal agencies and the biology of the species, it will be virtually impossible ever to meet the burden of proof established by the court under the Endangered Species Act. If 1,200 to 1,500 wolves were not enough to return that species to state management in Minnesota, it appears doubtful that 100 animals in each of three separate areas would be sufficient to delist wolves in the northern Rockies. There are now more than 2,000 wolves in Minnesota, yet the U.S. Fish and Wildlife Service still has not returned wolf management to the state.

There is also the additional problem of linkage. Wolves in Minnesota have now clearly surpassed the number needed to remove that species from the Endangered Species List (Harrison 1991), yet the U.S. Fish and Wildlife Service has no plans to delist the eastern timber wolf because wolf populations in the neighboring states of Wisconsin and Michigan are far short of the goals

established under the Eastern Timber Wolf Recovery Plan (U.S. Fish and Wildlife Service 1978; Harrison 1991). Delisting the wolf in one area, Minnesota, is linked to wolf numbers in two adjacent states, so despite reaching the recovery goal in Minnesota, that wolf population will not be returned to state management, will not be subjected to hunting or trapping, will continue to increase, and will continue to expand its range throughout Minnesota and adjacent states. Wolves have already been reported in both North and South Dakota (Licht and Fritts 1994).

In fact, no one knows if the wolf population in Minnesota will ever be delisted. Wolves have been transplanted into Wisconsin and Michigan, but those animals, as well as natural migrants, have been killed by local residents. If the illegal killings continue and if those acts prevent wolf numbers in Wisconsin and Michigan from increasing, the wolf population in Minnesota will never be removed from the Endangered Species List under the present recovery plan. Even if there were 5,000 wolves in Minnesota, under current regulations, the species would not be delisted. This holds one state hostage to what happens in other areas.

A similar situation could develop in the northern Rockies. Remember that under the approved recovery plan, once wolves in any one of the three recovery areas reach 10 breeding packs (approximately 100 wolves) for three consecutive years, the population in that area will be downlisted from endangered to threatened status. That population, though, will remain under federal control, and hunting or trapping of wolves by the public will not be permitted. Only when all three areas simultaneously reach their recovery goals will the species be removed from the Endangered Species List and management returned to the states.

Assume that wolves are transplanted into or naturally reach central Idaho and Yellowstone (this has already occurred—see below). Say the wolves in Yellowstone reach their recovery goal of 100 animals and that the wolves already in northwest Montana do the same, but for whatever reason the wolves in central Idaho do not. Under this scenario and the present recovery plan, wolves in Yellowstone and Montana would remain under federal control, and those populations would be allowed to grow and expand their range. Even if there were 1,000 wolves in Yellowstone and another 1,000 in Montana, that species would remain on the Endangered Species List unless there were also at

least 100 wolves in central Idaho. Sound far-fetched? Not at all. Remember, it is now happening with the eastern timber wolf.

Based on legal precedents and biological requirements for minimum viable populations, it is unlikely that published wolf recovery goals will withstand legal scrutiny or be upheld by the courts. Instead of about 300 total wolves, biology and legal precedents mandate 1,500 to 2,000 wolves as a continuous interbreeding population throughout the better part of Idaho, most of western Montana, much of western Wyoming, and perhaps even parts of eastern Oregon and Washington (see Figure 2). Needless to say, 1,500 to 2,000 wolves will have a much greater impact on ungulate numbers, hunting opportunities, and livestock operations than that projected in government reports. Since wolf populations can increase at 50 percent or more each year, and since wolves are known to disperse up to 200 miles or more, wolves will quickly repopulate the entire West.

It must also be remembered that the wolf is listed as an endangered or threatened species in all the 48 lower states and that plans are under way for wolf recovery in Utah, Colorado (Bennett 1994), Arizona, and New Mexico. Washington state may already have more wolves than Montana. Wolf reintroductions are being considered for New York and Maine (Van Ballenberghe 1992), and the red wolf has already been released in the Southeast. Under the present Endangered Species Act, wolves must be restored to every state with suitable habitat; at least, that is how the act is being interpreted by environmental organizations.

When I (Kay 1993) first published this analysis of wolf recovery population goals, I was roundly condemned by the U. S. Fish and Wildlife Service. Subsequent events, however, support the analysis I have just presented. Montana and Idaho, for instance, recently issued draft plans for when wolf recovery will be turned over to state managers (Rachael 1995, Ream 1995). Both documents claim that 20 wolf packs are needed in each area before hunting and trapping will be allowed. Thus, they have effectively doubled the number of wolves needed to meet ESA requirements with a minimum of public review and without benefit of a supplemental EIS. Moreover, one environmental group has announced its opposition to delisting wolves in Montana, Idaho, and Wyoming until wolves are also fully recovered in Colorado (Anonymous 1995).

DO WOLVES LIMIT UNGULATE NUMBERS?

During the late 1800s and well into the mid-1900s, it was universally believed that predation in general, and wolf predation in particular, had a devastating impact on ungulate numbers. Wolves were considered such "a decided menace to the herds of elk, deer, mountain sheep [bighorns], and antelope" that the Park Service "exterminated" the wolf from Yellowstone by 1930 (Weaver 1978:9). Similar campaigns of eradication were common across North America. Public opinion, though, began to change during the 1950s and 1960s. Today wolves are seen by many as an integral part of the "balance of nature." According to this view, wolves rid the game herds of the sick, the old, and the unfit, so wolf predation actually benefits ungulate prey by preserving the health of the herds (Wilderness Society 1987:12; Glick et al. 1991:72; Thompson 1991).

These same people believe that wolves regulate their own numbers through social means, primarily territoriality, and therefore do not overutilize their ungulate prey (National Park Service and Fish and Wildlife Service 1990a:21, 1990b:1-57; Williams 1990:38). A corollary view is that wolf predation results in compensatory survival and natality in ungulate populations (National Park Service and Fish and Wildlife Service 1990b:3-42). According to this scenario, ungulate populations are food limited, and wolf predation, by removing some animals from the population, increases the food supply for the remaining ungulates. Since those animals are then better fed, they die less frequently and increase their birthrate, offsetting the effects of wolf predation. Scientific studies, however, have shown this logic to be an inappropriate representation of ungulate predator-prey systems.

Recent research in Alaska, as well as British Columbia, Yukon, Alberta, and other Canadian provinces, indicates that wolves and other carnivores limit ungulates more often than not (Seip 1989a, 1989b, 1991, 1992a, 1992b; Messier 1989a, 1989b, 1991, 1994; Bergerud 1990, 1992; Ballard 1991, 1992; Gasaway et al. 1992; Carbyn et al. 1993; Dale et al. 1994; Hatter and Janz 1994). These studies can be summarized as follows. (1) In many situations, wolves and other predators limit ungulate populations below the level set by food resources; that is, ungulates are not resource limited or "naturally regulated," and any compensatory response

of the ungulate population to predators is not enough to offset predation losses. (2) Human predation and carnivore predation on ungulate populations are additive, not compensatory. (3) If grizzly or black bears are present, they often prey heavily on newborn and, to a lesser degree, adult ungulates. Wolf and bear predation are additive, not compensatory, and together they can have a major impact on ungulate numbers. In some areas, grizzlies kill more ungulates than wolves (Gasaway et al. 1992). (4) If ungulate populations have been reduced by severe weather, human hunting, or other causes, wolves and other predators can drive ungulate numbers even lower and maintain them at that level. This condition is commonly called a predator pit, and there is no field evidence that ungulates can escape from a predator pit even if hunting is banned, unless wolves and other predators are reduced by direct management actions, that is, predator control.

As Alaskan biologists have noted, "prey [ungulate] populations can reach extremely low densities under natural conditions, contrary to the 'balance of nature' concept" (Gasaway et al. 1983:6). Today, ungulate populations across most of Canada and Alaska are being kept at low levels by the combined actions of carnivorous predators even in areas where the ungulates are not hunted, such as in national parks.

It must be remembered that wolves limit ungulate numbers by reducing recruitment and increasing adult mortality, not by killing off all the game, instances of surplus killing notwithstanding. Take a hypothetical population of 100 adult female ungulates (for this analysis, we need not worry about the male segment of the herd). In any given year, a number of adult females die from natural causes, disease, or predation. When expressed as a percentage, this is termed the adult female mortality rate. In that same year, a number of calves or fawns are born, but those young also face disease, accidents, and predation, and only a few survive their first year of life to join the adult population. This is called the recruitment rate. For a stable population, recruitment must balance adult mortality. If recruitment is less than adult mortality, the population will decline, and if it is greater, numbers will increase (Bergerud 1990, 1992).

Research has shown that wolves and other predators prey most heavily on young-of-the-year, which lowers the recruitment rate of the prey populations. Predators also kill a few prime-age

adults. By increasing adult female mortality and at the same time lowering recruitment, predators can cause ungulate populations to decline. Stabilizing recruitment for caribou is about 15 female yearlings per 100 cows. Caribou herds with few predators have recruitment rates of 20 to 40 per 100 cows, which allows those populations to increase, while caribou herds subject to heavy predation have recruitment rates of 10 or less (Bergerud 1990, 1992). So predation causes ungulate populations to gradually decline over time--wolves do not normally wipe out game herds in a single year or two.

This is what happened in Canada and Alaska (Seip 1989b). During the 1950s and 1960s, when wolf control was widespread and effective, game herds grew and the north country became known as a hunter's paradise. Government wolf control ended by 1970, and predator populations began to expand, but it took 10 years or longer before significant declines were seen in game herds. In Wood Buffalo National Park, for instance, there were approximately 12,000 bison when wolf control was terminated; today there are fewer than 3,500, and the population is still dropping. Wolf predation of calves has been identified as the primary factor responsible for that decline as the bison are not hunted (Carbyn et al. 1993).

Recent research has also demonstrated that multi-ungulate species systems, such as exist in Yellowstone and throughout the West, are actually less resilient than simpler predator-prey systems. Ungulate species vary in their susceptibility to wolf predation, and "wolves may limit the numbers of a more vulnerable, less abundant prey species [such as deer, bighorn sheep, or antelope] when wolf numbers are set by a less vulnerable, more abundant prey species," such as elk, moose, or bison (National Park Service and Fish and Wildlife Service 1990b:4-6). It has also been shown that wolves with access to alternative foods, such as that available at garbage dumps, maintain higher populations and reduce ungulate numbers to lower levels than would be possible if they did not have those other food sources (Crete et al. 1981). This is why bear predation can have a major impact on ungulate populations. Because the number of bears is determined primarily by vegetal foods, bears can take ungulates down to low levels without having an adverse effect on bear numbers.

Prior to European settlement in British Columbia, moose were

virtually absent and woodland caribou were the most common ungulate. Wolves were rare because they were tied to den sites during the breeding season and therefore could not follow migrating caribou. Today, moose have spread throughout the province, permitting wolves to increase as they now have an alternative source of food. Those wolves, though, prey heavily on the more vulnerable caribou whenever the latter can be located. This has led to the widespread decline of woodland caribou in British Columbia. That is to say, caribou have declined because of the addition of moose to the predator-prey system (Bergerud et al. 1984; Bergerud and Elliot 1986; Seip 1989a, 1992a).

A similar situation may develop in Yellowstone and other wolf recovery areas where large elk populations could permit wolves to take smaller ungulate species, such as deer, to very low levels. In northern British Columbia, wolves caused a substantial decline in the most vulnerable ungulate species and then switched to the next most vulnerable ungulate until it also declined. The wolves cascaded down the list of available ungulate species from the most vulnerable to the least vulnerable until all ungulate populations had been substantially reduced (Elliot 1989). Across Canada and Alaska, moose and caribou populations not subject to heavy predation have densities 10 times greater than populations where carnivore numbers are high (Bergerud 1990, 1992; see Table 1).

In its rush to wolf recovery, the U.S. Fish and Wildlife Service has tried to downplay the impacts wolves will have on western ungulate populations. While the agency has acknowledged that "wolves can play a role in depressing ungulate populations," it claims that "such conditions are not the norm in North America" (National Park Service and Fish and Wildlife Service 1990b:1-57). There is little evidence, however, in the original Alaskan and Canadian research studies to support this contention. The opposite appears to be more the norm; that is, predation depresses ungulate populations even when humans are allowed to kill predators.

The National Park Service and the Fish and Wildlife Service (1990a, 1990b, 1990c) also appear to have biased the computer codes on the two wolf-ungulate models they commissioned to support wolf recovery—those models predict that wolf recovery

Table 1. The impact of carnivore predation on caribou populations in North America. In eastern Canadian forests where caribou have no effective antipredator strategy, wolves can take caribou populations to very low levels, especially in areas where wolves have alternative prey such as white-tailed deer. By dispersing to high-elevation areas to calve, mountain caribou avoid some of the effects of wolf predation, but wolves still have a significant impact on those herds. By migrating long distances, caribou can avoid most impacts of carnivore predation, but those populations still have lower densities than herds without predators. Long-distance migrations primarily evolved as a strategy to avoid predation, not as a strategy to secure additional food (Bergerud 1990, 1992; Seip 1991; Crete and Huot 1993:2295). Mean caribou densities from Seip (1991:47).

Caribou population	*Predation intensity*	*Mean caribou density (no./mi^2)*
Predators absent	None	19.30
Migratory herds	Moderate	2.80
Mountain herds	High	0.39
Eastern-forest herds	Extreme	0.08

will have little impact on ungulate populations or sport hunting. In written testimony presented to the congressionally mandated wolf management committee, Dr. Robert Taylor, a noted modeler and predation expert, said in reference to one of the agencies' models that he was "forced to conclude that this is a wholly unacceptable effort. It relies on datasets of questionable utility...it employs obsolete simulation approaches, and it reflects inadequate attention to uncertainty in assumptions and parameters. Perhaps more serious, I do not see how it can be much improved."

While Taylor found that the other model (Boyce 1992) "contain[ed] some elements of a useful model for the YNP wolf-elk situation," he nevertheless added that it "falls short, however, in several aspects." According to Taylor, "the model is conceived in such simplistic terms that it cannot, at best, be expected to provide much more than a gross approximation to

what will happen [if wolves are reintroduced because] it misrepresents the predatory impact of wolves and their internal population dynamics....The sensitivity analysis is inadequate, considering that many of the parameter values are mere guesses....The net effect of these problems is that none of the conclusions [on probable wolf-ungulate interactions] can be justified at this time." Since his testimony, Taylor obtained the computer codes for this model, made a single, yet reasonable, change to one of the model's assumptions of how wolves interact with their ungulate prey, and found that the model's output was drastically different from what has been published by the agencies; that is, the model is not robust.

Since the agencies modeled only the impact of 100 wolves in each of the three recovery areas, not 1,500 to 2,000 interbreeding wolves, since the models themselves are suspect, and since the agencies have not addressed the additive impacts of bear or mountain lion predation, the conclusion that wolves will have insignificant impacts on ungulate populations is not warranted and cannot be sustained. If these factors had been properly considered in a more realistic model, there is little doubt that the results would have been vastly different and would not have supported agency wolf recovery claims.

Environmentalists, however, like to cite Michigan's Isle Royale National Park as an example of a place where large numbers of moose and wolves live in harmony (Mech 1970; Peterson 1977, 1995; Peterson et al. 1984; Peterson and Page 1988; McLaren and Peterson 1994). They also cite Isle Royale as proof that wolves have no effect on ungulate numbers. This, though, is incorrect because Isle Royale is not representative of predator-prey systems in the rest of North America. Moose densities on Isle Royale are 10 times higher than anywhere else in Canada where moose are subject to carnivore predation (Messier 1994). There are three major reasons for this difference.

First, of all North American ungulates, moose is the most difficult species for wolves to kill. If they have a choice, wolves will usually kill any ungulate besides moose. So the impact of wolves on Isle Royale's moose is less than if other ungulates inhabited the island. On islands off the Alaskan coast, for instance, introduced wolves killed off all the black-tailed deer (Merriam 1964; Klein 1970).

Second, there are no bears on Isle Royale. Again, this is not comparable to mainland situations; as noted above, it is generally the combined effect of wolf and bear predation that limits ungulate populations. In other words, where black and/or grizzly bears are common, as in the western parts of the United States and western Canada, the Isle Royale situation simply does not apply.

Third, as an island in Lake Superior, there is no immigration of wolves to Isle Royale. Moose first colonized the island in the 1920s, and a single pair of wolves arrived during the 1950s, but since that time no other wolves have reached the island (Wayne et al. 1991; Peterson 1995). Lake Superior seldom freezes, and Isle Royale is 20 miles from the mainland. Without immigration, when wolf numbers fall as the most vulnerable moose are killed off, the moose population rebounds faster than the wolves can recover. This allows the moose to "get ahead" of the wolves, something that does not happen in other areas. On the mainland, lone wolves and dispersing animals quickly reoccupy any area vacated by other wolves. This keeps wolf numbers high and allows those predators to exert a significant influence on their prey.

Finally, wolves and moose on Isle Royale do not represent some idyllic "balance of nature"; instead, that national park exhibits many signs of ecological degradation. Overgrazing has eliminated most understory shrubs and aquatic plants that moose prefer (Murie 1934; Hansen et al. 1973; Krefting 1974; Aho and Jordan 1979), and moose overbrowsing is so severe that even common tree species are declining (Brandner 1986; Risenhoover and Maass 1987; Brander et al. 1990; McLaren and Peterson 1994). By eliminating deciduous trees such as aspen, and at the same time promoting the dominance of unpalatable species such as spruce, moose have changed not only plant species composition but soil chemistry and soil fertility as well (Pastor et al. 1987, 1988, 1993; McInnes et al. 1992; Pastor and Naiman 1992). Clearly, moose overbrowsing has altered the ecosystem over the entire island. Archaeologically and historically, there is no evidence that moose inhabited Isle Royale before the 1900s. Any moose that reached the island in pre-Columbian times would soon have fallen prey to Native Americans who, at least seasonally, inhabited Isle Royale (Kay 1994).

DO PREDATORS LIMIT HUNTING OPPORTUNITIES?

Sport hunting is a multibillion-dollar industry in the West (Loomis et al. 1985; Donnelly and Nelson 1986; Sorg and Nelson 1986; Duffield 1988). Not only is hunting important to economies in the area, but it is also a deeply held social tradition. So it is not surprising that many people have expressed concern about the impact wolf predation will have on western big-game herds and hunting opportunities. Groups who advocate wolf recovery, however, such as the National Parks and Conservation Association, contend that "fears over wolf impact on big-game hunting...are unfounded" (Miller 1988:6). And according to government reports "sport hunting for any big-game species need not be eliminated or reduced just because wolves are restored" (National Park Service and Fish and Wildlife Service 1990a, 1990b:4-77 to 4-78, 1990c:6). This simply is not true, especially given the thousands of wolves that may ultimately come to inhabit the West.

With few exceptions, big-game guides and outfitters remain in business only if they can locate old-age male ungulates (i.e., trophy elk, trophy deer, etc.) for their paying clientele. Many local sports hunters also seek trophy animals. Fish and game departments in Wyoming, Montana, and Idaho are already under intense public pressure to improve the "quality" of big-game herds by managing for older-age males (Wildlife Division 1985; Montana Dept. of Fish, Wildlife, and Parks 1986). The departments have all instituted regulations that reduce male mortality so that their game herds will contain a greater proportion of older-age males. That hunters favor male ungulates is no secret. Even when either-sex permits are issued, hunters take an overwhelming preponderance of males.

Although it is commonly acknowledged that wolves and other carnivores normally kill a disproportionate number of young-of-the-year and old animals, few people realize that predators also take a disproportionate number of males. In one Minnesota study, over 70 percent of wolf-killed white-tailed deer were males, primarily older males (Mech and Frenzel 1971:41). Thus, there is little question that wolves and sport hunters would compete for many of the same animals. With a large population of wolves, fewer old-age male ungulates will be available to sports hunters. As in the case of Wood Buffalo National Park, wolves

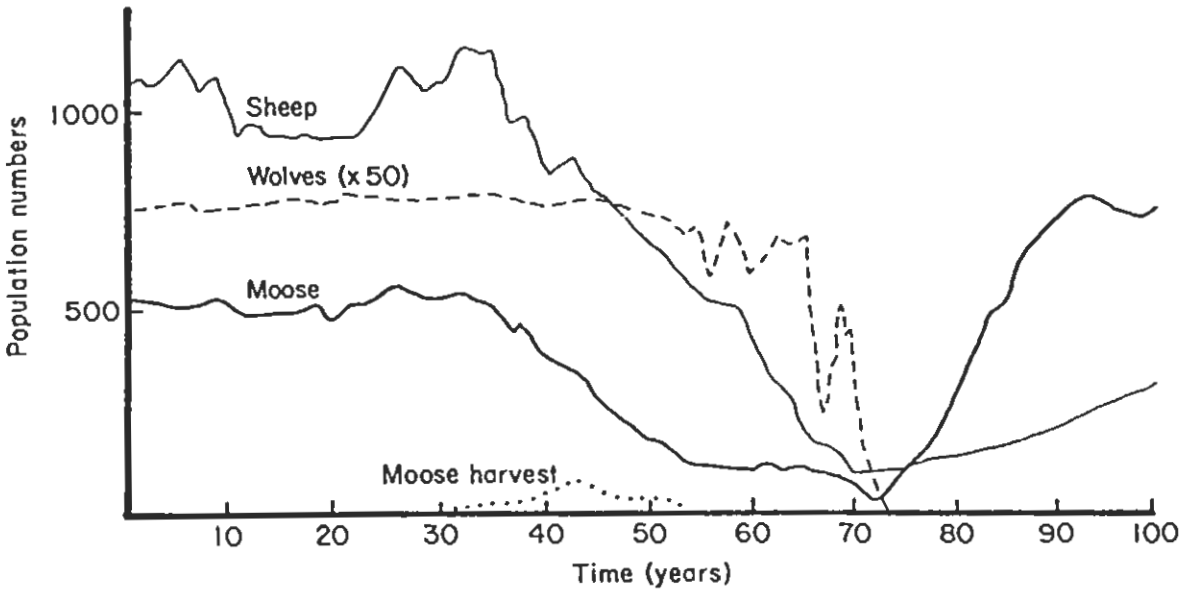


Figure 3. Model of Alaskan wolf-ungulate interactions simulated under circumstances in which human harvest of moose triggered a decline in both predator and prey. Without hunting, wolf, moose, and Dall sheep numbers are low, but relatively stable. The addition of a small amount of human moose harvest, though, destabilizes the entire system. Even after hunting is halted, wolves continue to drive the moose population downward. The wolves then switch to Dall sheep and drive those numbers down as well. In this simulation, wolves go extinct before they can kill the few remaining ungulates, allowing prey populations to recover. Grizzly bear predation on newborn moose calves—and to a lesser extent, on adult moose—is also important in this system, but that factor was not modeled separately. Instead, grizzly predation was included in calculation of moose survival rates internal to the model. In this simulation, hunters removed less than 8 percent of the moose population annually, which is not an excessive harvest rate for systems without wolves, yet the moose population still declined. This illustrates the additive nature of wolf and human predation. In areas of Europe where predators are absent, hunters kill more than 50 percent of the fall moose population each year without any long-term decline in moose numbers. Adapted from Haber (1977) and Walters et al. (1981).

alone can completely eliminate any "surplus" ungulates that would otherwise be available for human consumption.

The combined effect of sport hunting and wolf predation on a common ungulate prey can be seen in a computer simulation model developed for Alaska. Without hunting, wolf, moose, and Dall sheep numbers are low, but relatively stable. The addition of a small amount of human moose harvest, though, destabilizes the entire system (see Figure 3). Even after hunting is halted, wolves continue to drive the moose population downward. The wolves then switch to Dall sheep and drive those numbers down as well. In this simulation, wolves go extinct before they can kill the few remaining ungulates, allowing prey populations to recover. This model was developed by wolf advocate Gordon Haber, and he uses it to call for a reduction of, or a ban on, sport hunting. According to Dr. Haber, ungulate populations subjected to wolf-bear predation can, at best, maintain a human harvest rate of only 6 to 7 percent, not the 20 to 30 percent common throughout areas of North America where wolves are absent (Warrick 1992).

The relationship of predators, ungulates, and hunting on a larger scale can be seen in a comparison of British Columbia with Sweden and Finland. Both areas are roughly the same size and contain approximately equal amounts of moose habitat. Yet during the 1980s, the overwinter moose population in Sweden-Finland numbered around 400,000 animals and was increasing, while the overwinter moose population in British Columbia numbered around 240,000 and was declining even though habitat was not limiting. Hunters in Sweden and Finland killed nearly 230,000 moose a year, whereas hunters in British Columbia harvested only 12,000 to 14,000 animals per year (Child et al. 1991).

Although habitat conditions do vary, the overriding difference in the two systems is a virtual absence of predators in the Scandinavian countries. Wolves and bears are rare throughout Sweden and Finland, while wolves, grizzlies, black bears, and mountain lions are common in most of British Columbia. The effect of predation on hunting is seen when hunter harvest is compared to the size of overwinter moose populations. In Sweden-Finland, hunter harvest was 57 percent of the precalving moose population (Cedarlund and Sand 1991) while it was only 5 percent in British Columbia—an 11-fold difference. This suggests that

unchecked predation by a combination of carnivores can reduce hunting opportunities by at least a factor of 10.

Simulation models of ungulate populations in eastern Idaho and along the East Front portion of northwest Montana's wolf recovery area indicate that where hunter mortality balances recruitment in stable ungulate populations, the addition of wolves will cause the game herds to decline. Those studies conclude that "the presence of wolves means that hunter harvest will likely [have to] be confined to male [ungulates] most of the time" (Peek and Vales 1989; National Park Service and Fish and Wildlife Service 1990b:3-164). In other words, antlerless seasons will have to be eliminated for many western ungulate herds because most of those populations are already subject to high levels of human harvest. So even if you are just a meat hunter, your hunting opportunities will decline precipitously as wolf populations expand to their full potential.

WOLF CONTROL

In its *Northern Rocky Mountain Wolf Recovery Plan,* the U.S. Fish and Wildlife Service (1987:33) claimed that "if predation on big-game herds is determined to be in significant conflict with management objectives of a state wildlife agency, wolf control that would not jeopardize wolf recovery would be considered." Other federal agencies have suggested that wolves may have to be killed "to control excessive predation on ungulates" (National Park Service and Fish and Wildlife Service 1990a:3). As one government report put it, "because some populations of prey [ungulates] that may be used by wolves are already harvested [by hunters] at near maximum sustained yield...it may indeed become biologically prudent to reduce wolf populations in some areas" (National Park Service and Fish and Wildlife Service 1990b:1-58). Is wolf control, though, a viable option? After reviewing the available evidence, I am forced to conclude that the federal government and other wolf advocates have mentioned wolf control only to placate sport hunters and to gain acceptance for wolf recovery, not as a statement of fact within the realm of even remote possibility.

Experience in Canada suggests that certain environmental groups will never allow wolves to be killed so that hunters can

harvest more ungulates. Debate over British Columbia plans to experimentally reduce the number of wolves to see if ungulate populations would increase has been, to say the least, extremely political, protracted, and divisive (Archibald et al. 1991). In Alberta, ensuing controversy has prevented most wolf control (Gunson 1992). A spokesman for the 150,000-member Canadian Wildlife Federation declared that "wolf control should never be considered unless a prey [ungulate] population is truly endangered, and the problem should always include a [total] ban on hunting" (Haley 1984).

Even in Alaska, where there are approximately 7,000 wolves, intense opposition, including several legal challenges, has effectively stopped the state's wolf control program. A recent proposal by the Big Game Board to kill 300 wolves to increase moose availability for subsistence and sport hunters was met with vocal objections orchestrated primarily by outside animal-rights organizations. Under a threatened international boycott of the state's tourist industry, Alaska's governor tabled plans for wolf control (Williams 1993).

Experience also suggests that opposition to wolf control is seldom ultimately based on scientific evidence, but rather on ethical and moral concerns (Clarkson 1989). Speaking on behalf of the World Wildlife Fund Canada, Monte Hummel (1989:140–42) asked, "Let's assume for the sake of argument that...in a politically neutral environment it can be scientifically shown that wolves *are* indeed the primary limiting factor on a given prey population, which incidentally I personally *do* believe to be true in many cases....Is it ethically justifiable to manipulate wild [wolf] populations to ensure that human predation [hunting] can be maximized?" The answer, he indicated, was no. A recent Canadian opinion poll found that 90 percent of the people surveyed were opposed to "killing of wolves to provide more big game for the hunting community" (Hoffos 1987:55).

Given these precedents, there can be little doubt that a wolf control program anywhere in the West would be subjected to intense scrutiny by the national media and the federal courts. The ensuing battle would pit sport hunters, ranchers, and others against antihunting and animal-rights groups from across the nation and around the world. Given the depth of emotions elicited in the past, the battle would be a political bloodbath. All

parties in the western wolf debate should fully understand that wolf control, and especially wolf control to increase ungulate numbers for hunters, is unlikely to be allowed by the court of national public opinion, even if it were permitted by judicial courts. This, of course, assumes that wolves would somehow lose their endangered-species protection, for there is not a court in the land that would allow wolf control as long as that animal remains on the Endangered Species List.

It should also be realized that the wolf's impact on ungulate herds is really not a scientific issue with most wolf advocates. Their desire to have large numbers of wolves is based on value judgments (see below). As one person noted, "The wolf is almost a religious symbol to these people" (Dawson 1988). There is nothing wrong with value judgments. I object, however, when those arguments are shrouded in scientific cloth and the Endangered Species Act.

LIVESTOCK PREDATION

Most opposition to wolf recovery has come from livestock interests and their political allies. Even if wolves are somehow limited to only 100 animals in Yellowstone Park, approximately 20 to 40 wolves would disperse to surrounding areas each year, a fact whose significance has not been lost on ranchers bordering the park. In Montana, where wolves are naturally recolonizing the northern Rockies, individual wolves have moved "over 300 miles in just a few days" (Turner 1991) and one wolf was killed approximately 500 airline miles from where it was born (Pletscher et al. 1991; Ream et al. 1991). Even in areas with established wolf populations, wolves commonly disperse 30 to 100 miles, and dispersing wolves occasionally travel 400 to 500 miles. Stockmen are worried not only about how many of their sheep and cattle wolves may kill, but also about the costs associated with changing their management practices to accommodate wolves.

To alleviate these concerns, the U.S. Fish and Wildlife Service has developed interim wolf control plans for its northern Rocky Mountain recovery areas, including Yellowstone. According to those documents, wolves that prey on livestock will be killed or otherwise removed at the federal government's expense. The "control plans are based on the concept of wolf control to

enhance propagation or survival of the species. Control of problem wolves is expected to reduce the hostility towards wolves that would result in illegal killing....[B]y removing the few wolves that kill livestock and [thereby] enhancing the survival chances of non-offending wolves, the FWS believes its control program will actually contribute to the recovery of the wolf in the Northern Rocky Mountains" (National Park Service and Fish and Wildlife Service 1990b:1-29).

The federal agencies have also produced evidence showing that actual livestock depredations have been remarkably low in Minnesota, Alberta, and British Columbia (Fritts et al. 1992). Livestock operators, however, have questioned the applicability of those data to the western United States. They point out that the situations may not be comparable because the topography is different, ungulates make longer seasonal migrations, and colonizing wolves may behave differently than established populations, and besides, wolves in Canada can be shot on sight; that is, those wolves are not protected by the Endangered Species Act. Experience with Montana's naturally recovering wolves tends to support their concerns.

Most ungulates in the northern Rockies winter at low elevations near private lands and domestic livestock. Wolves would have to winter in those same areas, and they would probably also den there because pups are born early in the spring while most ungulates are still on their winter ranges. The ungulates, however, usually migrate to higher-elevation summering areas before wolf pups can leave their dens. This would place breeding wolves with high food demands in areas with few wild ungulates but abundant livestock. These circumstances may force wolves to prey on livestock to support their growing young.

This appears to be what has happened in Montana. For whatever reason, wolves outside of the Glacier National Park-North Fork of the Flathead area, where there are few livestock, have all denned in valley bottoms in relatively close proximity to humans. They have not stayed in wilderness areas. To date, nearly every one of those wolf packs has eventually turned to livestock and has had to be controlled. Based on the pattern observed in Montana, reintroduced wolves may cause a number of problems for neighboring ranchers. Within a week or so after wolves were transplanted to central Idaho in early 1995 (see below), one of

those animals had already turned to killing livestock (Burns 1995). When wolves eventually reduce game populations (see above), the wolves will then be forced to kill even more livestock.

In Canada and Minnesota, the government compensates ranchers when they can prove that wolves killed their livestock, but this is not true in the western states. The federal government has no wolf compensation program, nor do state agencies; thus, wolf-killed livestock is another example of the government taking private property under the Endangered Species Act without compensation. In response to these concerns and in an effort to enhance wolf recovery by preventing "the development of a shoot-on-sight mentality," Defenders of Wildlife raised $100,000 to compensate ranchers for animals that will be lost to wolves. Those claims, though, must first be verified by federal agents or local officials (Fischer 1989, 1995). While this has been hailed by most wolf advocates as a good-faith effort on their part, it has been soundly criticized by the radical environmental group Earth First!, which sees Defenders' compensation program as another subsidy to ranchers. It believes wolves have "earned their right to be here merely by being native to North America. Earth First! favors a ram-it-down-their-throat approach" (Skeele 1991).

For their part, many ranchers are not entirely pleased with Defenders' compensation program, claiming that they are not raising animals to feed to wolves or other predators. Other ranchers have pointed out that Defenders will compensate them only for the market value of their dead livestock. For instance, if a wolf-killed cow had a market value of $600, the rancher would be given a check for that amount. The ranchers, on the other hand, claim that it actually costs them more than $600 to replace that cow. They point out that there are time costs and other expenses involved in (1) finding the kill, (2) getting a government agent to verify the kill, and (3) obtaining a replacement animal from a distant market and transporting it back to the ranch.

My personal experience with insurance suggests that the ranchers' position has some merit. When I first heard this argument, I must admit, I did not give it much thought—until I was robbed. While conducting research in Yellowstone, someone cut the back out of my tent and stole all my camping equipment. First I had to report the theft and have the sheriff fill out a report (verify the kill); then I had to deal repeatedly with my insurance

company before receiving compensation; and finally I had to replace all the lost equipment. Not only was my regular work schedule interrupted, for which I received no compensation, but I also spent the better part of two days finding and buying replacement equipment. The nearest town of any size was 80 miles away, which would also be true if one had to buy livestock at auction. All in all, this experience convinced me that livestock interests have raised a valid point that should be given due consideration. Moreover, there is also a major problem in proving that missing livestock were actually killed by wolves.

Although some have viewed Defenders' compensation program as an innovative free-market approach to endangered species preservation, others claim it is only a public relations ploy designed to promote wolf introductions. As opponents note, Defenders has said that it will pay for verified livestock losses only as long as wolves are on the Endangered Species List (Fischer 1995). So when wolf populations become high and livestock losses increase, Defenders will no longer compensate ranchers. In addition, since Defenders' program has no force in law (Fischer 1995), it can be terminated at any time even if wolves are still on the Endangered Species List.

The federal agencies have stated that when wolf "depredations on livestock occur, control actions are imperative" and that offending animals will be dealt with "quickly and effectively" (National Park Service and Fish and Wildlife Service 1990b:1-55). The Park Service has stated that "wolves will be easy prey for trappers if killing them should become necessary" (Wise 1987). Experience in Montana, however, suggests that it may be difficult and expensive to control offending animals. When a pack of six wolves killed livestock on the Blackfeet Indian Reservation, government trappers were summoned to remove the offending animals. By its own admission, the federal government spent $41,000 on that wolf control effort, yet all the wolves were never killed (Dawson 1988). Another source put the total, "all costs considered," at perhaps $100,000 (Jonkel 1987).

In at least one case in Montana, members of the Wolf Action Group, an offshoot of Earth First!, attempted to disrupt government efforts to trap a wolf that had killed livestock near Kalispel (U.S. Fish and Wildlife Service 1991:14). Since wolves are very sensitive to human disturbances, all one has to do to defeat wolf

control is to leave human scent on or near government traps, that is, urinate on them. If it becomes common practice for individuals or certain groups to interfere with government trappers, the offending wolves will be much more difficult to catch. Groups such as PETA (People for the Ethical Treatment of Animals) who oppose all hunting and killing of wildlife, have advised members to go into the field and physically prevent animals from being killed. If even a small, but dedicated, number of people decide that all killing of wolves should be prevented, the government's claim that depredating wolves will be "quickly" removed may not be realized. In addition, some of the more radical environmental groups have suggested that they may sue to stop all wolf control. They contend that even killing depredating wolves is unlawful under the Endangered Species Act (Goble 1992).

WHY SHOULD WOLVES BE REINTRODUCED TO YELLOWSTONE?

During the early 1970s, the Park Service began to manage Yellowstone Park under a program called "natural regulation," where nature is allowed to take its course with minimal human interference. Without exception, environmentalists have been widely enthusiastic about "natural regulation." The same people who wholeheartedly are behind "natural regulation" also contend that wolves are needed, according to former Utah Congressman Wayne Owens, "to restore a balance to Yellowstone National Park. The wolf is the only missing piece" (Fischer 1988:17). "A principal predator is missing....[T]o have a large population of ungulates without such a predator in the system is not natural. It's an absence that has ecological significance" (Cauble 1986:24). When asked if they felt that wolves could help "maintain balanced wildlife populations" in Yellowstone, 91 percent of those interviewed said yes (MacNaught 1987:519). And others contend that Yellowstone is "a fairly intact ecosystem, except for the wolf. It's the missing link" (Schneider 1981:8).

Some have gone so far as to claim that in the absence of wolves, Yellowstone's elk and other ungulates have overpopulated the park and overgrazed the range. Speaking for Defenders of Wildlife, Dick Randall (1980:189) said, "The solution to a good part of the [elk] overpopulation problem comes softly on four

feet, weighs about a hundred pounds, believes strongly in the family virtues, and has been absent from Yellowstone for about the same length of time the elk problem has plagued park officials. Of course: the grey wolf." Thomas Miller (1988:7) of the National Parks and Conservation Association added that "the benefits from restoration of the wolf to its native Yellowstone include prevention of habitat deterioration and overpopulation by ungulates." In recent testimony before Congress, even Secretary of the Interior Bruce Babbitt contended that wolves are needed to control Yellowstone's soaring elk population.

Not only are claims that wolves would lower ungulate populations and restore a balance with the plant communities logically inconsistent with assertions that wolves would not limit ungulates or hunting opportunities (see above), but proponents of reintroduction, who all support "natural regulation," apparently do not realize that their concept of the wolf's place in the natural scheme of things is contrary to one of the major assumptions of the "natural regulation" paradigm. According to "natural regulation," predation is an assisting, but nonessential, adjunct to the regulation of ungulate populations. Ungulates are limited by resources (food). If wolves were present, they would kill only the animals slated by nature to die from other causes, primarily starvation, so, wolves would not lower Yellowstone's ungulate populations (Kay 1990).

The Park Service has never said that wolves must be restored to Yellowstone to prevent elk and other ungulate numbers from becoming so large that those herbivores would overuse their range. So if you believe that wolves need to be reintroduced in Yellowstone to restore a "balance of nature," control ungulate numbers, or prevent range abuse, logic dictates that you also have to be opposed to "natural regulation." You cannot have it both ways.

Moreover, claims that wolves need to be restored because "every species that was in the park when white men first came to the region is still there, except one [the wolf]" (Dawidoff 1992:40) are also racist, as are similar claims about restoring the wolf as the system's top predator. Native Americans were the ultimate keystone predator, not wolves, and Native Americans once structured Yellowstone and other ecosystems (Kay 1994, 1995). If environmentalists really want to restore Yellowstone's

preeminent predator, then they should be lobbying for the return of the park to Native Americans. Instead, by inference, they denigrate native peoples as primitive starving savages, or worse, as original conservationists.

HISTORICAL DISTRIBUTION AND ABUNDANCE OF WOLVES IN YELLOWSTONE

The plan to reintroduce wolves in Yellowstone is predicated, in part, on the premise that large numbers of wolves inhabited that ecosystem before the Park Service eliminated them from the park (Askins 1992; Wright 1992:144-45). According to some, "[wolves] were a relatively common sight in Yellowstone when it was declared the nation's first national park in 1872" (Anonymous 1987). Dick Randall (1980:188), of Defenders of Wildlife, claimed that "when trappers and explorers reported on the Yellowstone region in the mid-1800s, they sang [of] a land teeming with bison, elk, mule deer, bighorn sheep, and antelope. The great carnivores—grey wolf, grizzly bear, and mountain lion—flourished."

As part of my scientific research in the Yellowstone Ecosystem, I conducted a continuous-time analysis of journals left by early explorers, systematically recording all observations of ungulates and other large mammals, including wolves. Between 1835 and 1876, 20 different expeditions spent a total of 765 days traveling through the Yellowstone Ecosystem on foot or horseback, yet no one reported seeing or killing even a single wolf. Wolf sign, primarily howling, was reported on only three occasions. Since these early observers lacked scientific training, they easily could have mistaken coyote howls or other animal calls for wolves. Besides, when these journals were written, even trained scientists called coyotes wolves or prairie wolves. There certainly is no evidence in historical journals which even remotely suggests that large numbers of wolves were common in Yellowstone during the 1835–1876 period (Kay in press).

Other records indicate that wolves were also not particularly common after Yellowstone Park was established. During the late 1800s and early 1900s, few observations were recorded of wolves in the park. "Wolves inhabited the area in unknown but seemingly low densities" (U.S. Fisb and Wildlife Service 1987:1).

From 1914 to 1926, when the Park Service was actively working to eradicate wolves from Yellowstone, they killed 136 wolves. This may seem like a lot, but it included only 56 adults over a 13-year interval. Park Service records also suggest that during this time there were, at most, only four wolf packs in the park, and possibly only two (Weaver 1978:11). So, available information does not support the belief that large numbers of wolves inhabited Yellowstone at any point in recorded history. There is no support for the belief that restoring 10 wolf packs to the park would reestablish "natural" conditions. In fact, the data suggest that wolves were always rare in Yellowstone. Native hunting was so intense that historical and pre-Columbian ungulate populations were very low, which, in turn, accounts for the relative scarcity of carnivorous species such as wolves (Kay 1994, 1995, in press).

THE ENVIRONMENTAL IMPACT STATEMENT

In June 1993, the U.S. Fish and Wildlife Service released its draft Environmental Impact Statement (EIS) for wolf recovery in the northern Rockies. After a series of public hearings and after accepting written comments, the agency issued its final EIS in April 1994. It received over 160,000 comments on the draft EIS, the most ever received under the Endangered Species Act. Public comments ran 2 to 1 in favor of restoring wolves to the northern Rockies. Under the agency's preferred alternative, naturally recolonizing wolves in northwest Montana were given full ESA protection. In Yellowstone and central Idaho, though, the agency proposed to reintroduce wolves as nonessential experimental populations. This was done to deflect local criticism and to allow ranchers more latitude in shooting wolves caught in the act of killing livestock on private land (U.S. Fish and Wildlife Service 1994, Fischer 1995).

As of early 1995, at least two different lawsuits had been filed to block wolf recovery, but the federal courts refused to grant the plaintiffs injunctive relief. Thus, the U.S. Fish and Wildlife Service, with the consent of the Alberta provincial government, began capturing wolves in Canada. So far, over a dozen wolves have been released in central Idaho (termed a hard release) while Yellowstone's wolves were held in three large

fenced enclosures on the park's northern range. This is termed a soft release, and it is hoped that this will encourage the wolves to remain in the park.

Some wolves released in Yellowstone quickly left the park and at least three have been shot in violation of the ESA. Other Yellowstone wolves killed livestock and at least one domestic dog in the park. Wolves released into central Idaho have also wandered widely and killed livestock. Nevertheless, as this is being written (early 1996), the U.S. Fish and Wildlife Service is capturing more Canadian wolves for release in Idaho and Yellowstone

The U.S. Fish and Wildlife Service has admitted that wolf recovery will cost at least $12 million, but that figure may be low, and it certainly does not reflect the costs of full wolf recovery in the West. Nevertheless, this still comes to $40,000 per wolf and is an enormous expense for a species that is not biologically endangered. After all, there are an estimated 60,000 wolves in Canada (Theberge 1991), 2,000 in Minnesota (Harrison 1991), and another 7,000 in Alaska (Van Ballenberghe 1992). Wolves are on the Endangered Species List only because the ESA protects sub-species and populations as well as species.

Noted Montana biologist Dr. Charles Jonkel (1987) has raised an interesting question regarding wolves. He has wondered if the money and political capital being spent to reintroduce wolves into Yellowstone and central Idaho might not be better spent on preserving wolves and wolf habitat in other parts of North America. How much time and money will be spent to put 100 or so wolves in Yellowstone? Dr. Jonkel has suggested that those same efforts, if redirected, could perhaps save thousands of wolves in other areas—places where wolves presently exist, but where development threatens their continued survival.

Others have suggested that funds expended on wolf recovery might be better spent on truly rare animals such as whooping cranes, black-footed ferrets, or other globally endangered species. Testifying before the U.S. Senate Committee on Energy and Natural Resources, Kay Kool (1990), former Director of the Montana Department of Fish, Wildlife, and Parks, noted that "the attention and resources focused on the wolf compete with and drain the limited federal dollars and energy needed to keep truly endangered species from extinction."

The U.S. Fish and Wildlife Service claims that it needs billions of dollars to carry out its mandate under the Endangered Species Act. Currently about $100 million is being spent annually by state and federal agencies to protect endangered species. Over one-half of that total, though, goes to less than 2 percent of the species listed as threatened or endangered. Instead of spending its budget on the animals and plants most in need of protection, the agencies spend their funds on "charismatic megafauna" such as grizzly bears and wolves (Mann and Plummer 1993; Dwyer et al. 1995: 738-739). This may garner the agencies public support, but it does little to protect the majority of endangered species. With so many other species in much greater need, it is easy to see why many conservationists consider wolf recovery an inappropriate use of government funds. But then, wolf recovery has very little to do with wolves.

HIDDEN AGENDAS

As University of Wyoming geography professor James Thompson (1993:165) recently noted, "wolf recovery is [only] a 'stalking horse' for the larger issue of land use change." Even environmentalists have admitted that "on the deepest level the issue of...wolf recovery is not about wolves. [Instead] it is about control of the west" (Askins 1993:5). Simply put, environmentalists are using wolf recovery and the Endangered Species Act to run ranchers out of the country and to thwart multiple use of public lands. It is also a way for animal-rights and antihunting groups to ban all hunting and use of wildlife. Is this what Congress had in mind when it passed the Endangered Species Act? There is no evidence to even remotely suggest that it is.

EPILOGUE

Alaskan and Canadian wildlife agencies are concerned that wolf advocates may unwittingly be helping to destroy wildlife habitat, wilderness, and eventually wolves themselves (Gasaway 1989:134). In British Columbia, expanding wolf populations have decimated game herds to the point that today there are fewer hunters in the province, which translates into less public support when wildlife officials have tried to oppose development pro-

jects (Hatter and Janz 1994). Black-tailed deer on Vancouver Island, for instance, need old-growth forest to survive during winters—forests that are worth millions of dollars if they are logged. With few deer left to protect, the B.C. government has been reluctant to curtail logging. The same is true in Alaska's coastal forests. More wolves = fewer deer = less public support for wildlife = more clear-cuts.

After reviewing the northern Rockies wolf recovery plan, biologists from the University of Idaho concluded that "in the presence of wolves, more intensive monitoring of both predator and prey will be needed" (Peek and Vales 1989; National Park Service and Fish and Wildlife Service 1990b:3-164). This increased responsibility and its associated costs will fall to western state fish and game agencies, which are funded solely from hunting-license sales and federal excise taxes on sporting goods, not general fund appropriations. When wolves eventually decimate ungulate herds, hunting will have to be curtailed, so revenues available to the state wildlife agencies will fall precipitously. Who then will pay for the needed monitoring, and, for that matter, wildlife management in general? Sportsmen, after all, are the ones who have done the most to nurture and protect the West's wildlife populations, not environmentalists. Wolf recovery is a bad idea whose time has apparently come—unless, of course, the Endangered Species Act can be changed.

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