Letter from the Desk of David Challinor
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Zoos often justify their collections of rare and endangered animals by the need to keep such stock available for eventual reintroduction to the wild. Scientists hope that such rare animals might retain enough of their "wild" genes to survive even after several generations of zoo life. Researchers now have enough data to reach some preliminary conclusions about the feasibility of successful reintroductions of numerous reptiles, birds and mammals. This month's letter describes such reintroduction efforts and some of their unexpected consequences.

Before seriously attempting any reintroduction the captive population must be at a critical threshold total--that is with enough animals available to offset an initial heavy mortality following first release. The total number clearly varies between species according to their potential vulnerability in the wild. For example, half-grown Galapagos tortoises are considerably less vulnerable after release than young primates of an equivalent age. Furthermore, new training techniques of animals to be released have contributed to higher survival rates. Thus when releasing a zoo bred tamarin paired with a wild bred one, the latter "trains" its mate more effectively than any human could.

Protecting the reintroduced species when released is all important. The National Zoo and its cooperating partners have successfully bred several generations of the endangered black-footed ferret--an important prairie dog predator. A decade or more ago a distemper virus almost extirpated these weasels so that their recent reintroductions were scattered among prairie dog colonies in three or four states. Such dispersal reduced the risk of all the reintroduced ferrets being wiped out by another distemper plague. As expected, some individual ferrets were more successful than others in adapting to the wild, but individuals were hard to track as they spent virtually all their time underground. Scientists had hoped to fill a longstanding gap in our knowledge of how quickly a naïve predator (the zoo bred ferret) would be able to catch a naïve prey, i.e. the prairie dogs who had lived for many generations without sharing their colonies with ferrets. These rodents, however, had not been entirely predator free below ground, for living with them were other predators, such as rattlesnakes and burrowing owls.

Tracking released animals is a complicated task; size is an important factor. Easier to observe than ferrets are the successful reintroductions of large avian predators; bald eagles, peregrine falcons and recently, harpy eagles, released on the Smithsonian's Barro Colorado Island in Panama. The larger the bird or mammal the more powerful the radio tracking device it can carry, thereby ensuring accurate long distance monitoring. Radio collar transmitters on wolves have been particularly effective in following the expansion of wolf range and their contact with naïve prey.

Wolves are relatively long-lived, adaptable to a variety of prey and habitats, cooperative hunters and suffer from few predators other than man. No wonder they have been so intensely studied, more so perhaps than any other mammalian predator in the United States, except for the coyote. That canid is still successfully expanding its range (except where it must compete with wolves) despite all the poisoning, trapping and shooting campaigns of federal and state agencies. The longest wolf research project began on Lake Superior's Isle Royal in 1958, where, only ten years previously, wolves had crossed the ice to the island where there was a well established moose population. They soon eliminated the resident coyotes, and became the primary predator of moose.

The establishment of the island wolf pack began a fascinating prey/predator study that continues to this day, forty-two years later. Both wolf and moose populations fluctuated and accurate annual counts were made by plane in winter when both species were clearly visible against the snow. By 1980 the wolf population peaked at about fifty; one to every four square miles--an astounding density. There were clearly too many of them for this 200 square mile island and two years later the wolves were down to only fourteen individuals. Although there were still plenty of moose, the number of wolves did not increase; in 1988, the National Park Service decided to capture some to learn what the problem might be. Until then no wolf had been handled by humans. After twelve years of collaring and blood sampling, scientists found that disease was the major cause of wolf decline and furthermore that all wolves sampled were descended from one female, making them all highly inbred. In 1994 the wolf population started expanding and it is now at the long term average of about twenty-five closely related wolves. The Park Service will determine how much longer such manhandling is justified as new techniques, which furnish DNA readings from scat analyses, can obviate the need for tranquilizing the animals to draw blood.

Knowledge gained from the study of this island's wolf population can be applied to other isolated wolf packs. For example, there are about 80 wolves of several packs in the mountains along the Norway/Sweden border. They are the last remnant of an aggregation that spread over much of Fenno-Scandia a century ago. These isolated wolves are threatened by a controlled cull of about twenty animals by Norwegian authorities who are under enormous political pressure to do so from local farmers whose sheep have been killed by wolves. The farmers on the Swedish side, however, have lost virtually no sheep to wolf predation; naturally the Swedes are strongly opposed to the proposed cull--an expensive exercise estimated to cost $240,000. What makes the difference are the contrasting styles of sheep husbandry. Swedish farmers keep their flocks in fenced pastures, and Norwegians let their sheep run free all summer in the mountains and try to round them up in the fall. A change in livestock management in Norway seems like a reasonable solution to the problem, but to change political game management is as intractable a problem in Norway as it is in the United States.

The problem of wolf predation in Norway seems minor when compared with that confronting farmers in Minnesota. With full protection of wolves in the Boundary Waters Canoe Area along the Canadian Border, 2,000 wolf pups are born each spring in Minnesota and the annual cull of about 200 wolves by State and Federal wildlife officers for livestock depredation has virtually no effect on the state's rising wolf population. There are probably more wolves there now than a century ago, because there are so many more deer, their principal prey. The current conflict between wolves and livestock and pet owners is based on their sharing the same habitat and is compounded by today's lack of experience in living with wolves. For example, managing livestock in a manner similar to the Swedes can reduce predation. Dead domestic stock must be buried, not just tossed over a fence where a wandering wolf can acquire a taste for beef or lamb. Dogs will have to be trained to stay near their houses. During harsh winters many householders inadvertently attract wolves by feeding deer near their houses. Not only do the deer become more vulnerable to predation, but so do pets.

People and pets are not the only ones that must adapt to a new predator. Pigeons, for example, must learn to be wary of urban peregrines and Yellowstone's big ungulates, such as elk, bison and moose have to adapt to recently arriving wolves in their midst. Currently a fascinating scenario is being played out in the area of Yellowstone Park where newly arrived wolves began attacking local elk and moose. Joel Berger's (a University of Nevada professor and NZP research associate) recent paper* reported that in one generation moose in North America and Scandinavia became wary of a new predator--the wolf. Berger and colleagues first studied moose in Alaska, where they found that moose were very sensitive to olfactory signals or predator calls and immediately increased their vigilance. However in Wyoming's Grand Teton National Park moose had not been exposed to bears or wolves for at least 75 years (about ten moose generations). When these moose were observed they showed no reaction while hearing taped wolf howls or smelling fresh bear or wolf urine and feces. Such loss of predator alertness clearly can have serious consequences. In the five years since 1996, when grizzlies were reintroduced to Jackson Hole there have been at least ten bear kills of moose recorded in five years. Farther south in Yellowstone Park where a small population of grizzlies survives, no moose predation by them had been observed from 1959 to 1992, indicating that moose there had learned to be alert for bears.

However, moose can learn and Berger and his team found that after moose cows lost their calves to the first wave of wolves to enter Jackson Hole, the cows rapidly became alert to wolf howls. Berger's observations show that naïve moose can learn quickly--in only one generation--to adapt to a new predator. However, if the new predator can eliminate the naïve prey fast enough, as may have been the case of human hunters in the New World 12-15,000 years ago, then such predatory behavior could indeed be a crucial factor in the rapid extinction of the pleistocene megafauna in North

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* J. Berger, Swenson, J.E. and Persson, IL, Recolonizing Carnivores and Naïve Prey: Conservation Lessons from Pleistocene Extinctions, Sci 291, 1036 (2001)

America. If young ungulates are targeted first, adult breeders should then have time to adapt to new strategies to ensure survival of subsequent young and thereby avoid extirpation.

Berger's research furnishes valuable lessons for understanding the effects of predator reintroductions on their prey, be they sea otters on urchins or hunting dogs on gazelles. Until now less than half of carnivore reintroductions have been considered successful. To be so the naïve prey population has to be large enough to sustain an initial high mortality, especially of the young. The introduced predator must also be sufficiently experienced not only to hunt successfully but to maintain its territory. Canids seem more successful in the latter requirement than felids, because despite a large captive population of cheetahs to draw from in South Africa, no reintroduced cheetahs have been able to establish a propagule (a viable breeding population). Future success in reestablishing threatened populations of both prey and predator species will require considerably more knowledge of what allows the reintroduced animals to adapt to new habitats and we can be optimistic because such information is constantly accumulating. As long as we are increasingly conscious of the importance of biological diversity, opportunities will continue to re-establish animals in those now protected habitats where they once abounded.

David Challinor
Phone: 202-673-4705
Fax: 202-673-4607
E-mail: ChallinorD@aol.com