

1995. An investigation into the health status and diseases of wild dogs (*Lycan pictus*) in the Kruger National Park, *Journal of the South African Veterinary Association* 66:18-27.

Cheetah Extinction: Genetics or Extrinsic Factors?

The debate addressed by Laurenson et al. (*Conservation Biology* 9:1329-1331) is interesting and important because the cheetah is indeed considered a "classic case" of low genetic variation and subsequent inbreeding depression. Unfortunately, the controversy appears to pivot around the perpetuation of a false dichotomy: that either genetics or extrinsic factors are likely to drive cheetahs to extinction.

It is simply not possible to separate genetic factors from environmental ones when addressing concerns over small population persistence. From the standpoint of population dynamics, inbreeding depression does not manifest solely (or even mostly) as congenital birth defects, monstrous abnormalities, or rampant reproductive failure. Rather, inbreeding depression operates through subtle modifications in birth and death rates that interact with other factors to increase extinction probability (e.g. Soulé 1987; Mills & Smouse 1994).

I do not question the field techniques or analysis of the Laurenson et al. research. I only suggest that both morphology and behavior—including parental care and defense against predators—span a range of phenotypic expression that surely has some genetic component. To the extent that behaviors and morphology have a genetic component, it is inevitable that genotypic changes leading to decreased fitness (inbreeding depression) could affect population persistence.

Again, I am not arguing that "genetic factors are the biggest threat to cheetahs." Laurenson et al. have aired vital issues to be weighed in evaluating conservation threats. However,

their arguments do not reject the hypothesis that genetic factors join with environmental and predation factors to decrease vital rates in cheetahs. Though a simple dichotomy makes for an aesthetically pleasing debate, a view toward interactions between genetics and environmental, behavioral, and demographic factors would move us further toward helping small and isolated populations. To say this another way, I quote from the last sentence of the article commonly cited (or mis-cited) as advocating the position that genetic concerns are of minimal importance in small wild populations (Lande 1988:1459, emphasis mine): "The immediate practical need in biological conservation for understanding the interaction of demographic and genetic factors in the extinction of small populations therefore may provide a focus for fundamental advances at the interface of ecology and evolution."

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Clearcut Consolidation a Status Quo Solution

John Hagan's editorial (*Conservation Biology* 9:975-976) provided some insightful comments regarding conservation biology and value systems of scientists. Specifically, I appreciate his comments about different interest groups "learning how to

listen to each other." I also agree with his point that a scientist may have values, but these should not affect the results or conclusions from scientific studies. However, I am upset by some of his other statements, especially regarding clearcuts.

I do agree that many bird species, and guilds of birds, respond positively to logging, including clearcuts. I suggest, however, that it is the challenge of conservation biology to think beyond the individual timber sale and to consider the landscape perspective. In this regard, we see that the proportion of logged land exceeds unmanaged lands in unprecedented levels. It may be prudent to ask, what are the limiting factors in a system? Even if biodiversity is increased by logging, what is the native diversity at the landscape level? How has this been altered? Unfortunately, misrepresentation is pervasive and clouds attempts to find common ground and, more importantly, an understanding of what conservation biology is about.

I commend Hagan in his attempt to minimize fragmentation by consolidating clearcuts. I believe, however, that it is inappropriate for conservation biologists to accept the status quo (such as unsustainably higher timber volumes) that has been shown to degrade ecological systems. Instead of arguing for consolidation of logging, conservation biologists should argue for a lower, more sustainable level of cut. This is not an "environmentalist's" value judgment, but rather an interpretation from hundreds of scientific studies.

Our field is just beginning to blossom into intelligent management practices. I continually look for some vision in the agencies responsible for managing our lands. This vision is not there. As conservation biologists we need to create that vision and provide a model for future management.

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