

The Kaibab Deer Incident: A Long-persisting Myth

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One of the most cherished fables of modern biology is the tale of the Kaibab deer. The myth goes basically as follows: Before 1906, a population of Rocky Mountain mule deer shared a portion of the Kaibab plateau in northern Arizona with cattle, sheep, and an array of predatory creatures. The deer provided coyotes, wolves, mountain lions, bears, and bobcats with venison and were compensated in return by a carnivorous mode of zero population growth which prevented overgrazing on their range. In 1906, however, Theodore Roosevelt proclaimed the Kaibab a federal game refuge, and his minions proceeded to disrupt nature's delicate balance, dispersing the cattle and sheep which had competed with the deer for forage and eradicating many of the predators. The deer population, about 4,000 when the refuge was established, freed from its usual checks and balances, multiplied vigorously, reaching, in 1924, a peak of an estimated hundred thousand animals, only to be punished for gross biotic hubris in the classic manner. With the range worn out by overgrazing, starvation and attendant illnesses reduced the herd, quite ruthlessly and in a few years, to slightly more than its size at the turn of the century.

These events have been interpreted theoretically as a "classic instance" where "the effects of disruption of prey-predator relationship can be readily seen" (Kormondy 1969), or even more theoretically as a typical example of a delayed density-dependent death rate (Lack 1954). Practical conservationists view the situation as "perhaps the most celebrated of such cases" where predator control injures the species wildlife biologists are attempting to

protect (Owen 1971), while one popular commentator has noted, "The lesson of the Kaibab had to be learned over and over again throughout the West" (Mattheissen 1964).

What actually happened to the real deer out there on the Kaibab is not, apparently, quite so well understood as the myth would lead us to believe. Caughley (1970), reviewing ungulate irruptions, in general, within a more specific study of the Himalayan thar,¹ concludes, "data on the Kaibab deer herd . . . are unreliable and inconsistent, and the factors that may have resulted in an upsurge of deer are hopelessly confounded." Readers should consult the Caughley article and its sources for full details of the sequence of oversimplifications and distortions which have resulted in the Kaibab story as it now exists. Reinspecting the original documents and publications on the topic, Caughley discovered that the extent of the initial population irruption is not clear. Without question an increase in deer occurred, followed by overgrazing and decline. During 1924, however, the period when the deer were presumably most numerous, various observers estimated their population as high as 100,000, as low as 30,000, with guesses of 50,000, 60,000, and 70,000 bridging the interval. A dramatically explicit graph, reprinted in many textbooks, the latest to cross my desk being *Invitation to Biology* (Curtis 1972), is based on the maximum estimate and evolved by unjustified tamperings with an original which was itself based on a number of speculations and dubious assumptions.

¹Definitions may be in order here — the sort of rapid population increase which the Kaibab deer achieved has been termed an *eruption* or, by purists, an *irruption*, the latter term distinguishing the biotic event from what volcanoes do. A Himalayan that looks something like a goat.

Moreover, while pumas and coyotes were, without question, removed from the range throughout the crucial period, sheep and cattle were also banished; the reduction in sheep alone from 1889 to 1908 might have totaled 195,000 animals, more than the mule deer at the height of their profligacy. Hence the irruption of deer, whatever its extent, may in large part have resulted from an increased food supply after removal of other herbivores which had competed with the deer for browse. A description of the fate of the Kaibab deer as "a well-documented example of what can happen when predators are removed" (Platt and Reid 1967) or "a case where the role of the predator is plainly seen" (Johnson, Delaney, Cole, and Brooks 1972) is scarcely justified.

Nonetheless, the incident has exercised an irresistibly attractive force. A survey of 28 general biology texts² which have accumulated on my bookshelves since 1965 yielded 17 accounts of the Kaibab episode. Of these latter, 16 clearly stress the primary importance of the reduction of predators in causing the upsurge in deer population and 7 contain variants of the faulty graph. The use to which the episode is put is in many ways as serious a problem as the inaccuracy of the data from which the saga is derived. If the facts are in question and the role of the predator uncertain, extensive theorizing and extrapolations to issues of morality would seem unwise.

Some retellings are indeed lowkeyed while others are written in highly colored language. Simpson and Beck (1969) for instance interpret the Kaibab events as an illustration of "unforeseen and disastrous possibilities of ignorant interference in natural communities"

²List available upon request; I have quoted here only one edition of each text.

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while Nelson, Robinson, and Boolotian (1970) see them as an example of a "common consequence of man's attempts to reorganize ecosystems to suit his whims". Phillips (1971) subheads a paragraph "The Kaibab Deer Disaster" and Baker and Allen (1971) find the Kaibab ecosystem "caught in a vicious cycle". Keeton, in his 1972 edition, continues to define the case as a "classical example" of what happens "when people set out to protect the prey from their 'enemies' (sometimes only to preserve them for their human ones) by killing the predators," dropping his 1967 description of the villains of the piece as "well-meaning and misguided" and man as "the most destructive predator alive." These are clearly milder days on campus and with simple exaggeration Etkin, Devlin, and Bouffard (1972) strike the cadences of an old-fashioned dormitory bull-session in their claim that "... the deer almost destroyed the plant cover by overgrazing. Whole herds were wiped out in winter and the species might have been lost if they had not been rescued by bringing in cattle fodder for them."

I personally blench recalling instances — at least yearly for more than a dozen years — when I myself used, often dramatically and with gestures, the Kaibab example in a classroom situation. Science contains a self-correcting element, and authors of general texts cannot be blamed for accepting the conclusions of specialists much more than the teacher in the lecture hall. Still, if as now seems evident, what these writers claimed is not justified by the facts of what happened there in Arizona, the myth retains at least some value for our times. With the recent upsurge of interest in the environmental aspects of biology, so great a number of similar texts in general biology, ecology, and wildlife conservation are being produced that it is difficult to choose the best among them. The rapidity with which, in subsequent editions of these works, our authors and/or editors respond to demonstrations of faulty examples and spurious interpretations of dubious facts might well be a very useful criterion for our selection. One still cannot contemplate the Kaibab incident without extracting some moral from its consequences; all things considered, *Caveat emptor* would seem as good as any.

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The October 1972 cover of *BioScience* featured a photograph of a hornbill from Indonesia submitted by Walter H. Hodge and labeled a rhinoceros hornbill. Ornithologist Dillon Ripley properly identifies the bird as a young male of the wreathed hornbill, *Rhyticeros plicatus*, which he says is called "Boerong taun" (the "year" bird in Indonesian).