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HOW MANY BLACK-TAILED PRAIRIE DOGS WERE THERE?: A DIALOGUE DEMONSTRATES BOTH THE PROCESS OF SCIENCE AND THE ROLE OF SCIENCE IN ENVIRONMENTAL ISSUES

Determination of the historical distribution and abundance of a species that might be at risk through declining numbers represents an important dimension of the scientific assessment of population viability. The invited "Dialogue" in this issue addresses this environmental issue for the black-tailed prairie dog (*Cynomys ludovicianus*). A recent debate over what approach to take to the future management, if any, of the black-tailed prairie dog in Nebraska and other plains states highlights both the importance of such studies and the underlying process of science. The outcome of this discussion will likely have important implications for natural resource management in the plains. Thus, this issue fits our criteria for a "Dialogue."

Our aim with these "Dialogues" is to provide a forum for reasoned exchange of opinions on the data available on important issues in the plains, both to inform and to stimulate rational discussion leading to science-based policy and management decisions. Science progresses through the presentation of ideas, with the support for them, matched against the challenges to those ideas. The challenges must assess the idea and its database and present alternative ideas and data to support them. The determination of baseline numbers, and so the magnitude and rate of change from that baseline in recent times, provides an excellent illustration of this process.

In this Dialogue, Dallas Virchow and Scott Hygnstrom challenge the present, widely held view that the numbers of black-tailed prairie dogs have declined significantly in post-settlement times. Using quotes and numbers from historical accounts of the occurrence of the prairie dog by the early explorers and settlers, they build a case that occurrence and abundance of the prairie dog in the shortgrass prairies and midgrass regions to the west of the tallgrass region in the Great Plains cannot be used to estimate the presettlement abundance of the species in tallgrass areas. They argue that the activities of early settlers, including the introduction of domestic livestock, actually increased habitat for the black-tailed prairie dog. If this occurred before most estimates of early prairie dog abundances, then those numbers likely overestimate pre-settlement abundance, specifically in the tallgrass region of the Great Plains. In addition, Virchow and Hygnstrom challenge the concept of "super-abundance" as one that is applied uncritically. In sum, they argue that the evidence suggests that much higher numbers of the black-tailed prairie dog in presettlement days is not supported by

the historical data, particularly in the tallgrass prairie region. The implication is that the numbers of black-tailed prairie dogs has not really declined dramatically and so the species likely does not need to be protected.

These points have important implications, biologically, economically and politically. Thus, the evidence they use and other evidence thought to be relevant by scientific colleagues who disagree with their conclusions also merit scrutiny. Craig Knowles, Jonathan Proctor, and Steven Forrest accepted this assignment. These authors also review the historical evidence and challenge its completeness; they also add contemporary evidence from on-going ecological interactions that they argue is relevant to interpreting the historical notes. Using their interpretation of the combined data, they argue that: 1) categorization of historical accounts by date as pre- or post-settlement needs to be made more carefully; 2) a limited number of routes through the plains limits the estimates of distribution and abundances based solely on the historical record; and, 3) ecological interdependencies provide other evidence that higher numbers of the black-tailed prairie dog occurred before cattle grazing became common and led to the deliberate attempts to exterminate this "grazing" small mammal. In sum, they argue that all of the evidence, together, does provide strong support for the hypothesis that pre-settlement black-tailed prairie dog populations were wider spread and much larger throughout their potential range. The implication is that the numbers of black-tailed prairie dogs have declined dramatically; if so, it adds support for the decision by the U.S. Fish and Wildlife Service that the species should be considered for protection.

Since we invited the companion paper to represent the opposing perspective, we also invited Virchow and Hygnstrom to respond and to address the points raised by Knowles and colleagues. That response clearly demonstrates that some major differences in interpretation of the historical data exist. In addition, Virchow and Hygnstrom question the relevance and precision of the contemporary data in relation to an estimate of presettlement abundance of black-tailed prairie dogs. The point-counterpoint-response format provides each group with an opportunity to present the data and their interpretation of it. Together the papers provide an opportunity for everyone to think about the issues, to evaluate the arguments and to reach our own conclusion on the issue, basically to participate in the scientific process.

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