Notes and Comments

Ecology, 63(6), 1982, pp. 1967–1968

PRAIRIE DOG COLONIALITY AND BLACK-FOOTED FERRETS[1]

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Hoogland (1981) discussed the evolution of coloniality in prairie dogs (*Cynomys* spp.), concluding that coloniality evolved to reduce predation. He argued that differences in coloniality between white-tailed (*C. leucurus*) and black-tailed prairie dogs (*C. ludovicianus*) are due to habitat differences that facilitate different predator avoidance techniques. Hoogland minimized the importance of differences in predation pressure on the two prairie dog species by citing references that show that predators known to prey on one prairie dog species also prey on the other.

Fig. 1 shows the species ranges of black-tailed and white-tailed prairie dogs and the original range of the black-footed ferret (*Mustela nigripes*; Hall 1981), a specialist predator on prairie dogs. These range maps are consistent with the reports cited by Hoogland (Clark 1973, Torres 1973, Yannone 1973) to show that ferrets prey on both prairie dog species (though these reports do not specifically document ferret predation on white-tailed prairie dogs). The ferrets seen in white-tailed prairie dog towns were all at the edges of both species ranges. Thus, even though ferrets have been sighted in colonies of white-tailed prairie dogs, the range maps suggest a strong relationship between black-footed ferret predation and the differences in coloniality between the two prairie dog species.

At least two alternative hypotheses can explain the species ranges. First, dense prairie dog colonies may be better adapted than sparse colonies to detecting ferrets and therefore have evolved in the species whose range overlaps with that of the black-footed ferret. This assumes that the black-footed ferret species range is determined by some habitat (or other) characteristic independent of the prairie dog species. As Hoogland pointed out, since ferrets are largely nocturnal predators (Henderson et al. 1968, Hillman 1968), it is not clear how colony density of the diurnal prairie dogs could respond to predation by ferrets. Second, black-footed ferrets may be dependent on a dense food source, in which case sparse colony density, facilitated by vegetation characteristics, may allow white-tailed prairie dogs to avoid ferret predation. This second hypothesis implies that white-tailed prairie dog sparse coloniality has been a limiting feature for the species range of the black-footed ferret. My own research on energetics of Siberian polecats (*Mustela eversmanni*) fed black-footed ferret diets indicates that ferrets can maintain populations only in prairie dog colonies with >100 reproducing prairie dogs (R. A. Powell, *personal observation*). This colony size is consistent with Hoogland's data for black-tailed prairie dog colonies but not for most white-tailed prairie dog colonies.

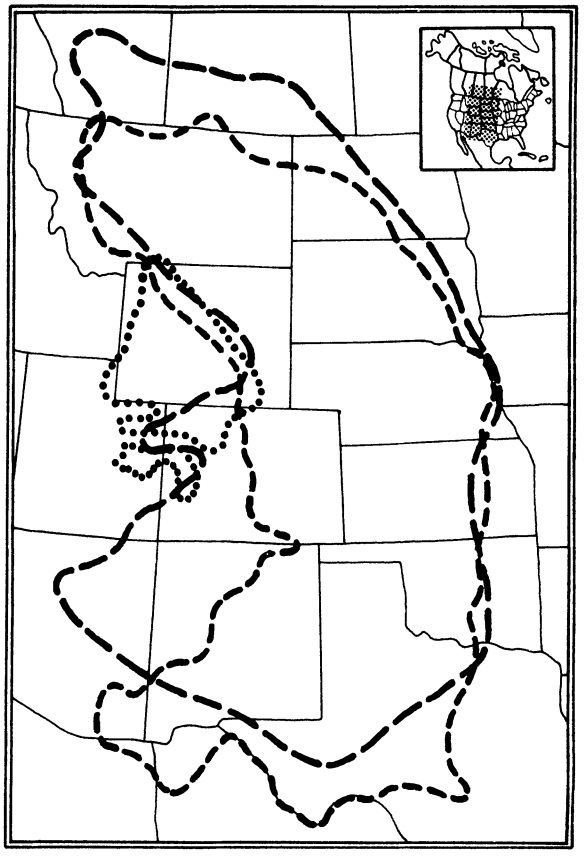

FIG. 1. Species ranges of the black-footed ferret (long dashes), black-tailed prairie dog (short dashes), and white-tailed prairie dog (dots) (redrawn from Hall 1981).

There is nothing in the species range characteristics shown in Fig. 1 that contradicts Hoogland's hypothesis that vegetation characteristics are important to differences in coloniality for the prairie dog species. However, Fig. 1 suggests that differences in predation by black-footed ferrets may have been more important than Hoogland concluded. It is unfortunate that hypotheses concerning black-footed ferret past range and

past predatory habits are nearly impossible to test due to the ferret's present scarcity.

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Ecology, 63(6), 1982, pp. 1968–1969

REPLY TO A COMMENT BY POWELL[1]

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Recently I examined the costs and benefits of coloniality in white-tailed and black-tailed prairie dogs (*Cynomys leucurus* and *C. ludovicianus*) (Hoogland 1979, 1981). I also examined whether interspecific differences in predation pressure might explain why white-tails usually form small, sparsely populated colonies while black-tails usually form large, densely populated colonies. Because black-footed ferrets (*Mustela nigripes*) prey not only on black-tails but also on white-tails (references in Hoogland 1981), I concluded that the more extreme coloniality of black-tails cannot easily be explained as an adaptation specifically aimed at reducing predation by ferrets. Powell (1982) has challenged this conclusion. Because Hall (1981) and others (e.g., Cahalane 1954) have suggested that the geographic range of the ferret overlaps extensively with the black-tail range but only marginally with the white-tail range, Powell (1982) hypothesized that either (1) ". . . dense prairie dog colonies may be better adapted than sparse colonies to detecting ferrets and therefore have evolved in the species whose range overlaps with that of the black-footed ferret" or (2) ". . . black-footed ferrets may be dependent on a dense food source, in which case sparse colony density, facilitated by vegetation characteristics, may allow white-tailed prairie dogs to avoid ferret predation." I have three comments in response to Powell's (1982) challenge.

First, Hall's (1981) range map for the ferret evidently does not include recent evidence of ferrets at white-tail colonies. Martin and Schroeder (1980), for example, recently found three ferret skulls at white-tail colonies near South Haystack, Uinta County, Wyoming, which is >400 km from the nearest edge of the black-tail range map. Clark (1978) tabulated over 80 sightings of ferrets at or near white-tail colonies in western Wyoming where black-tails do not occur (see also Clark 1980, Clark and Campbell 1981); further, Clark's (1978) data suggest that, in Wyoming at least, ferrets are probably more common in western white-tail habitats than in eastern black-tail habitats. Finally, the largest population of ferrets ever found was discovered in 1981 among strictly white-tail habitats in northwestern Wyoming (M. Stromberg, *personal communication*). Thus, I disagree with Powell's (1982) claim that "The ferrets seen in white-tailed prairie dog towns were all at the edges of both species ranges." Perhaps the ferret range map has been biased in favor of the black-tail range map until now because ". . . black-tail colonies are larger, more numerous, and more conspicuous than are white-tail colonies, and are therefore more likely to attract the attention that is necessary for the detection of a preda-

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Ecology, Vol. 62, No. 1. (Feb., 1981), pp. 252-272.
Stable URL:
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