BLACK-FOOTED FERRET PREY BASE

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ABSTRACT

Ferrets are associated with prairie dogs and eat them as well as other small mammals, birds, and insects. Ferret-prairie dog (predator-prey) computer models by Stromberg et al. (1983) and Powell et al. (in press) are reviewed. The Meeteetse prairie dog complex totals about 3,000 ha in 33 colonies. Maximum prairie dog density measured was 9.3/ha and this population has experienced "crashes." In Big Horn Basin, where the ferrets occur, about 250 colonies have been mapped (40,485 ha) with 90% of the Basin surveyed for ferrets (about 1.7% is in prairie dogs). About 21% of Wyoming has been mapped for prairie dogs (mean colony size=95 ha; n=924); an estimated 6,000 colonies exist. Prairie dog data has implication for ferret recovery. Ferrets should be transplanted via a captive breeding program immediately to prairie dog complexes meeting minimal viable ferret population requirements as described by Forrest et al. (in prep.) and Houston and Clark (in prep.).

INTRODUCTION

The earliest "full account" of the black-footed ferret by Coues (1877), based on his examination of several specimens and reports from trappers and settlers, concluded that the black-footed ferret was not at all rare on the prairies and was associated with prairie dogs on which it preyed and found shelter. Ethnographic accounts support Coues' conclusion (Henderson et al. 1969, Clark 1975). Since the 1870s, collections and study of black-footed ferrets and prairie dogs have confirmed this close predator-prey relationship (Linder et al. 1972, Figure 1).

Figure 1. Female black-footed ferret with killed white-tailed prairie dog (Photo by Tim Clark).

This paper briefly: (1) reviews literature on black-footed ferret foods and the two existing predator-prey computer simulation models, (2) describes some aspects of prairie dogs at Meeteetse (distribution, density, age structure, biomass, mortality patterns) and lists potential alternate prey, (3) describes prairie dog distribution in the Big Horn Basin and the status of prairie dog survey efforts through Wyoming, and (4) discusses some implications towards ferret recovery and future research needs. Because few results of the Meeteetse ferret studies have been published yet, some papers in preparation or in press are cited here.

Data were gathered under grants from the National Geographic Society, New York Zoological Society-Animal Research and Conservation Center, Wildlife Preservation Trust International, Inc., World Wildlife Fund-U.S., and the Charles A. Lindbergh Fund between 1973-1984. Some data on prairie dog distribution comes from the Bureau of Land Management, U.S. Fish and Wildlife Service, energy/mineral companies, and numerous ranchers. The generosity of the ranching community in the Meeteetse area and those members of the nonprofit conservation community that generously supported our work are greatly appreciated. John DuWaldt aided in construction of prairie dog life tables.

LITERATURE REVIEW OF FERRET PREY

Data on ferret foods comes from observations of ferrets under natural and captive situations and from scat analysis. Most early ferret specimens and observations of live animals come from prairie dog colonies. Black-tailed prairie dogs (Cynomys ludovicianus) were often described as the principal ferret prey, but ferrets were also collected on white-tailed (C. leucurus) and Gunnison's (C. gunnisoni) prairie dog colonies and obviously preyed on them, too.

Ferrets do use other prey. Deer mice (Peromyscus manuculatus) were found in ferret scats from South Dakota (Sheets et al. 1972). Ferrets also consumed dead prey presented to them: prairie dogs, ground squirrels (Spermophilus sp.), cottontails (Sylvilagus sp.), and birds (Hillman 1968, Henderson et al. 1969). Henderson et al. (1969) cited early reports indicating ferret use of field mice, rats, ground squirrels, gophers, rabbits, hares, birds and their eggs, and even insects.

Ferret scats (N=82) obtained from excavated black-tailed prairie dog burrows in South Dakota, contained 91% prairie dogs and 26% mice (Sheets et al. 1972). Hillman (1968) collected two scats and Henderson et al. (1969) a single scat; all three contained only black-tailed prairie dog hair and bone.

PREDATOR-PREY MODELS

The use of computer simulations to model ferret-prairie dog predator-prey relations was called for by Clark (1976) and a modeling effort then underway was described. This model has since been published

(Stromberg et al. 1983). At the time, little was known of ferret-prairie dog population interactions and no ferrets were available. Some of the assumptions (e.g., ferrets eat largely prairie dogs) for this modeling effort were based on Hillman and Linder (1973), who summarized observations of ferrets effects on prairie dogs, and based also on other carnivore and mustelid studies.

Stromberg et al. (1983) generated a predator-prey model of metabolizable energy requirements which estimated the annual prey requirements for one reproductive female ferret and her young. Gestation, lactation, and ferret pup growth were modeled. A general regression of mustelid prey biomass requirements helped verify metabolizable energy calculations (Figure 2). A range of estimated prairie dog population sizes necessary to sustain the annual predation by a female ferret and young was predicted. Limitations of the model, because of its assumptions, were discussed. Based on prairie dog densities in the literature, the model predicted that a ferret should occupy 37-95 ha of black-tailed prairie dog colonies and 167-355 ha of white-tailed prairie dog colonies. Because of higher densities in parts of the Meeteetse prairie dog complex (discussed below), ferrets can possibly be sustained there on areas at the lower end of the model.

Ferret winter energy expenditure and prey requirements at Meeteetse were estimated by Powell et al. (in press). An additive model was constructed to estimate energy expenditures for running, digging, investigating burrows, and thermoregulation. Ferret activity patterns were sampled, and Siberian polecats (M. eversmanni) were used as biological models in laboratory studies which estimated energy and nutrient content of prey species. Gross energy content, proximate analysis, and utilization by the polecats on two prey types (prairie dogs and voles, Microtus sp.) did not differ and were comparable to results for other carnivores. The polecats consumed an average of 125 kcal/day during feeding trials, which is equivalent to 104 metabolizable kcal/day. For ferrets, this indicates that 20 prairie dogs need to be eaten by each ferret during December through March. During summer months, ferrets (e.g., lactating females) might need to eat prairie dogs at several times this rate.

The Stromberg et al. (1983) model addressed annual prey requirements whereas the Powell et al. (in press) model examined only winter prey needs. The Powell et al. (in press) model is based on more recent data, including field observations of ferrets. The Stromberg et al. (1983) model determined the amount of prey that must be available to ferrets as well as absolute prey population sizes needed to support a ferret. The Powell et al. (in press) model, in contrast, estimated only the available prey needed. To fully understand ferret feeding ecology, the relationship between absolute and available prey densities, addressed differently by the two models, needs to be more fully explored. A model of ferret population organization and the relationship between "absolute prey density" and "available prey density" in relation to other ecological and behavioral variables is shown in Figure 3 and discussed by Clark (1984). Refinements need to be made in both models (e.g., age changes in food consumption, Figure 2) and these must be made based on more detailed field data of ferret trophic relationships.

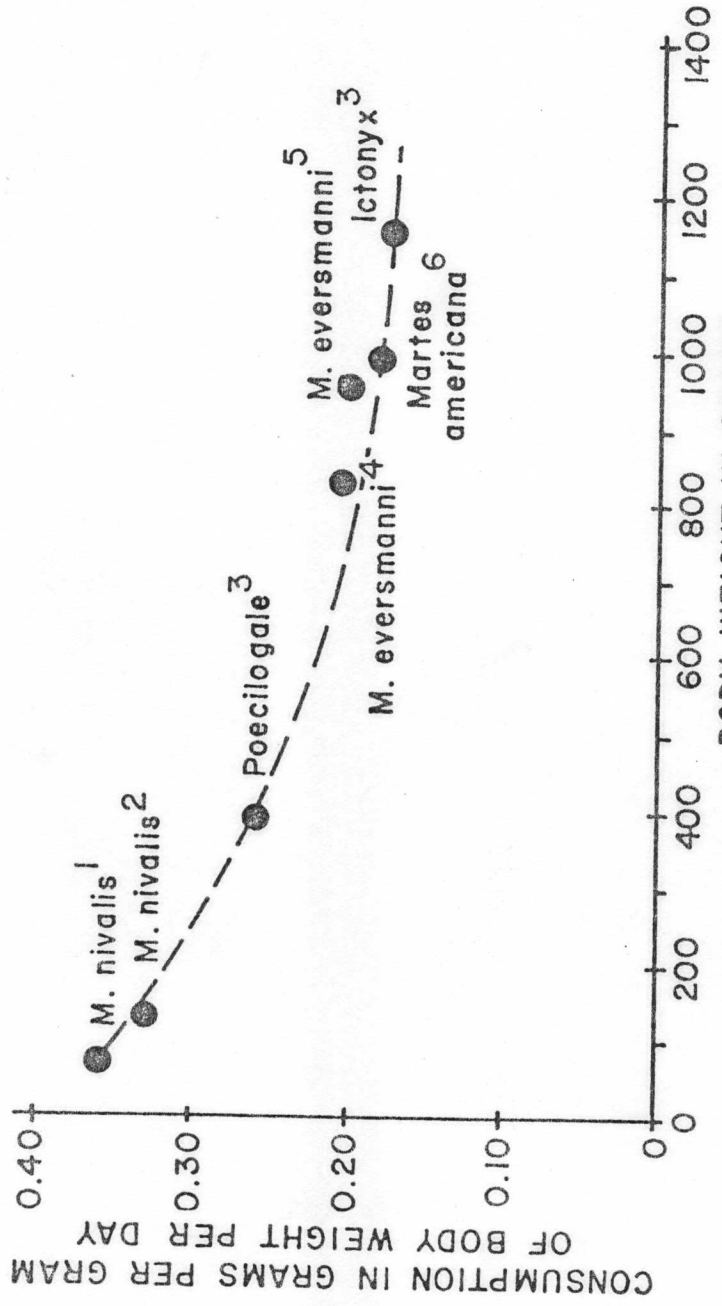

Figure 2. Food requirements of various Mustelidae (1=East and Lockie 1965; 2=Moors 1977, 1980; 3=Rowe-Rowe 1978; 4=Sviridenko 1935; 5=Powell et al. In Press; 6=More 1976).

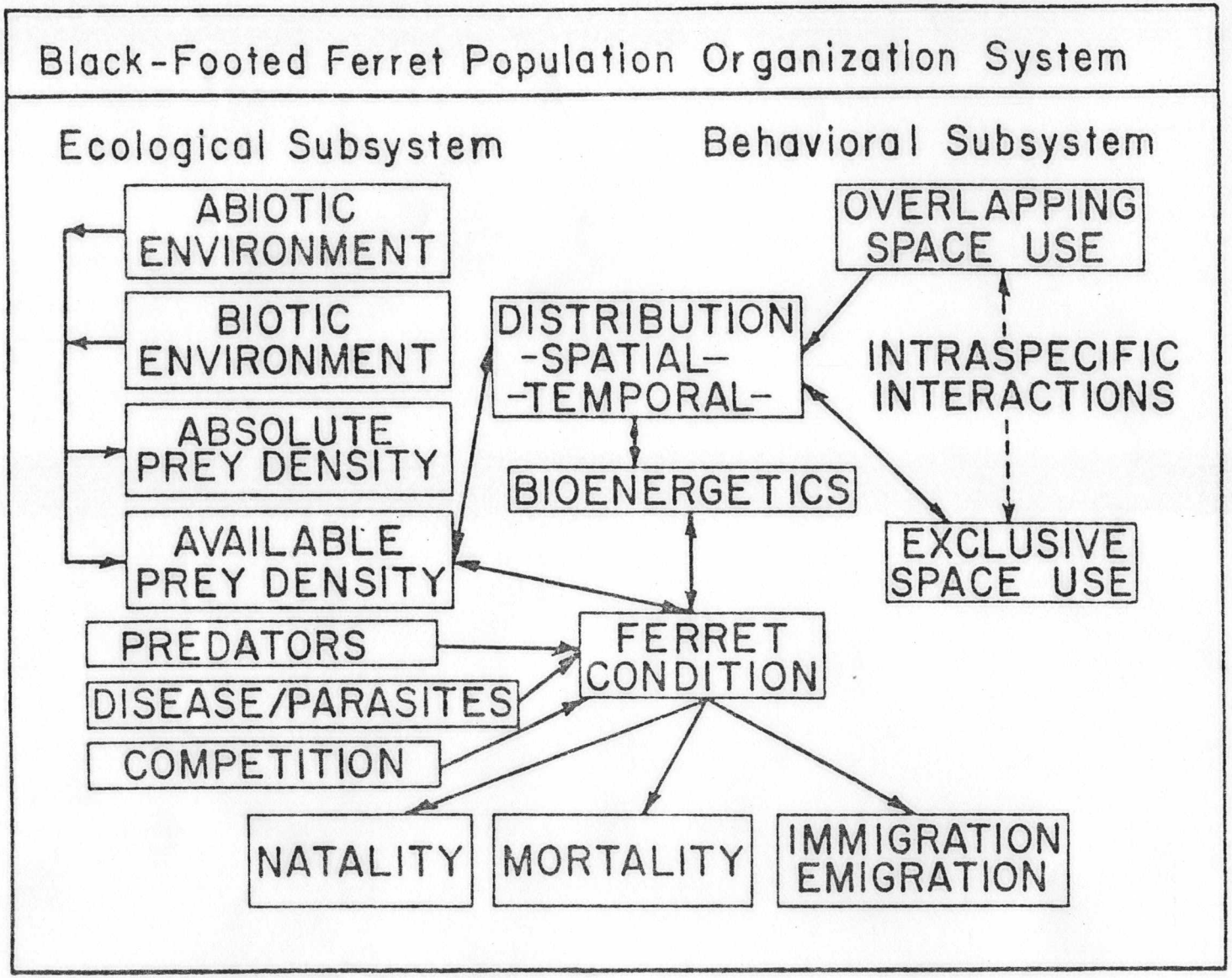

Figure 3. A model of black-footed ferret population organization system (Clark 1984).