

COSEWIC
Assessment and Update Status Report

on the

Black-tailed Prairie Dog
Cynomys ludovicianus

in Canada



SPECIAL CONCERN
2000

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE IN
CANADA



COSEPAC
COMITÉ SUR LA SITUATION DES
ESPÈCES EN PÉRIL
AU CANADA

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Previous reports:

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“Special concern” was formerly described as “vulnerable” from 1990 to 1999, or “rare” prior to 1990. “Vulnerable” is used in the body of this report.

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COSEWIC Assessment Summary

Assessment Summary – November 2000

Common name

Black-tailed prairie dog

Scientific name

Cynomys ludovicianus

Status

Special Concern

Reason for designation

The small Canadian population is isolated from American populations, but most of its range is in a national park. Population appears to be increasing but there is a risk of Sylvatic Plague.

Occurrence

Saskatchewan

Status history

Designated Special Concern in April 1978. Status re-examined and confirmed in April 1988, April 1999 and November 2000. Last assessment based on an existing status report.



COSEWIC

Executive Summary
from the 1999 Status Report

Black-tailed Prairie Dog
Cynomys ludovicianus

Prairie dogs occur in Canada only in extreme southern Saskatchewan, in and adjacent to the Frenchman River valley. There, the majority of prairie dogs are found within the proposed boundary of the West Block of Grasslands National Park (GNP). The nearest known prairie dog colony to the south, in Montana, is 20 km away and there are only two Montana colonies within 50 km of Canadian prairie dogs. As of 1995/96, there were 22 known prairie dog colonies in Canada and the total extent of the colonies was 931.7 ha. Compared to previous estimates of prairie dog colony sizes, the total area of grassland affected by prairie dogs may have increased by as much as 36 % since 1985 (from 686.5 ha). Recent prairie dog density counts conducted by GNP personnel were, on average, 3.6 adults·ha⁻¹ and 12.6 juveniles·ha⁻¹.

Prairie dogs live in large colonies on flat river valleys and upland grasslands, often dominated by sage (*Artemisia*) and wheat grass (*Agropyron*) plants. They usually establish colonies in areas with deep colluvial or alluvial clay soils that allow them to dig extensive burrows and build large mounds. To date, there are few published data describing the biology or ecology of Canadian prairie dogs. In more southern locales, prairie dogs reproduce once each year: mating occurs underground in the early spring. Gestation is about 35 days, litter size is approximately 3, and juveniles first emerge from their natal burrows at about 41 days of age. Young prairie dogs typically delay reproduction until their second spring (21 months of age). Males apparently do not live more than 5 years whereas females sometimes survive 8 years. Within their colonies, prairie dogs live in territorial, harem-polygynous family groups and have complex social behaviours. Although (black-tailed) prairie dogs are not considered hibernators, the northern population may hibernate to survive harsh winter conditions. Prairie dogs' colonial nature leaves them highly susceptible to ectoparasites and sylvatic plague (*Yersinia pestis*) which is transmitted by fleas.

Prairie dogs provide a prey base and create habitat for many rare and endangered species, including swift foxes (*Vulpes velox*), eastern short-horned lizards (*Phrynosoma douglassii*), prairie rattlesnakes (*Crotalus viridis*), burrowing owls (*Speotyto cunicularia*), ferruginous hawks (*Buteo regalis*), golden eagles (*Aquila chrysaetos*), mountain plovers (*Charadrius montanus*), prairie falcons (*Falco mexicanus*), and Swainson's hawks (*B. swainsoni*). Prairie dogs' population size is a critical variable concerning the potential eventual reintroduction of black-footed ferrets (*Mustela nigripes*) in Canada. Notably,

because of prairie dogs' large body size, amicable diurnal behaviours, and accessibility in GNP, they provide an important opportunity to educate Canadians about the endangered grassland ecosystem and species at risk.

Standardized surveys should be developed and coordinated to allow more accurate assessments of prairie dogs' distribution and colony size. The establishment of the proposed GNP will protect the majority (96 %, by area) of known prairie dog colonies in Canada, with 56 % of the existing colonies contained within GNP's present land holdings.

Prairie dogs occur in a small area of Canada, at the northern edge of the species' range, and are geographically isolated beyond the typical dispersal distance of southern conspecifics. Therefore, the northernmost (Canadian) population of prairie dogs remains particularly sensitive to human activities and natural events.



COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) determines the national status of wild species, subspecies, varieties, and nationally significant populations that are considered to be at risk in Canada. Designations are made on all native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fish, lepidopterans, molluscs, vascular plants, lichens, and mosses.

COSEWIC MEMBERSHIP

COSEWIC comprises representatives from each provincial and territorial government wildlife agency, four federal agencies (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biosystematic Partnership), three nonjurisdictional members and the co-chairs of the species specialist groups. The committee meets to consider status reports on candidate species.

DEFINITIONS

Species	Any indigenous species, subspecies, variety, or geographically defined population of wild fauna and flora.
Extinct (X)	A species that no longer exists.
Extirpated (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A species facing imminent extirpation or extinction.
Threatened (T)	A species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
Not at Risk (NAR)**	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)***	A species for which there is insufficient scientific information to support status designation.

- * Formerly described as “Vulnerable” from 1990 to 1999, or “Rare” prior to 1990.
- ** Formerly described as “Not In Any Category”, or “No Designation Required.”
- *** Formerly described as “Indeterminate” from 1994 to 1999 or “ISIBD” (insufficient scientific information on which to base a designation) prior to 1994.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list.



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**Update
COSEWIC Status Report**

on the

Black-tailed Prairie Dog
Cynomys ludovicianus

in Canada

David L. Gummer

1999

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INTRODUCTION

Black-tailed prairie dogs are large squirrels that are found in arid short- and mixed-grass prairie in the Great Plains of North America. The conservation status of black-tailed prairie dogs in Canada was first examined by the Committee On the Status of Endangered Wildlife In Canada (COSEWIC) during 1978 when the species was designated as *vulnerable* (then *rare*; Saskatchewan Department of Tourism and Renewable Resources 1978). The prairie dog's status was re-examined in 1988 and remained *vulnerable* (*rare*) because of the species' restricted distribution in Canada (Laing 1988). The main purpose of this report is to again: (1) review the status of prairie dogs in Canada, with particular emphasis on any new data or recent considerations regarding their status; and (2) recommend if prairie dogs' status should remain *vulnerable* (COSEWIC 1998) or be otherwise amended.

Black-tailed prairie dogs weigh between 500 and 1500 g (total body length *ca.* 40 cm; Hoogland 1995); they have brown or reddish-brown dorsal pelage and whitish ventral fur (Hollister 1916, Banfield 1974). They have relatively long tails (*ca.* 6-11 cm, > 20 % total body length) with a distinct black tip (Hollister 1916, Clark *et al.* 1971, Pizzimenti 1975, Hoogland 1995). Prairie dogs are diurnal, fossorial and mainly herbivorous (King 1955, Hoogland 1995, Hoogland 1997). They graze vegetation intensely (King 1955), dig extensive burrow systems, and build conspicuous burrow mounds (Sheets *et al.* 1971, Hoogland 1995). Aside from prairie dogs' foraging and fossorial activities, their most distinctive behaviour is the territorial "jump-yip" display during which "while stretching the length of the body nearly vertical, an individual throws the forefeet high into the air as it calls" (Hoogland 1995: 1). Prairie dogs have complex social behaviours and live in harem-polygynous family groups (Hoogland 1995).

Black-tailed prairie dogs (Sciuridae: *Cynomys ludovicianus*; Hoffmann *et al.* 1993) are the most common and widely distributed prairie dogs of the five presently recognized species in the Genus *Cynomys* (Hollister 1916, Pizzimenti 1975, Hall 1981, Hoogland 1995, Hoogland 1997). Whereas the black-tailed (*C. ludovicianus*) and Mexican prairie dogs (*C. mexicanus*) both have long tails with distinct black tips, do not hibernate, and usually occur between 700 and 1700 m elevation, in contrast, the white-tailed (*C. leucurus*), Utah (*C. parvidens*), and Gunnison's (*C. gunnisoni*) prairie dogs have shorter tails (*ca.* 3-6.5 cm, < 20 % total body length) with some white or gray hair, hibernate during winter, and occupy habitats at higher elevations (Hoogland 1995, Hoogland 1997). Black-tailed prairie dogs are distinguished from Mexican prairie dogs because the two species' geographic distributions are mutually exclusive and because Mexican prairie dogs have slightly (*ca.* 1 cm) longer tails with more black hair (distal half versus one-third; Pizzimenti 1975, Hall 1981). Mexican prairie dogs are apparently a relict population of southernmost black-tailed prairie dogs that are now geographically isolated (Hollister 1916, Pizzimenti 1975, Hoffman and Jones 1970, McCullough and Chesser 1987, Ceballos *et al.* 1993, Goodwin 1995, Hoogland 1995).

There are two subspecies of black-tailed prairie dog, *C. l. ludovicianus* and *C.l. arizonensus* (Hollister 1916, Hall 1981). The nominate (*C. l. ludovicianus*) is the

more widespread subspecies and is recognized as occurring in Canada (Banfield 1974, Hall 1981). The Arizona black-tailed prairie dog occurs only in northern Mexico and the southwestern United States (Hall 1981). However, there is insufficient evidence to support the distinction between the two subspecies (Pizzimenti 1975).

DISTRIBUTION

Black-tailed prairie dogs (henceforth 'prairie dogs') are broadly distributed across the arid grasslands in the Great Plains of west-central North America, between northern Chihuahua and Sonora, Mexico, and southern Saskatchewan, Canada (Fig. 1; Hall 1981, Hoffmann *et al.* 1993, Hoogland 1995). The Canadian distribution of prairie dogs is limited to extreme southern Saskatchewan, in and adjacent to the Frenchman River valley of the West Block of Grasslands National Park (Fig. 2; Soper 1938, Soper 1944, Wilson 1944, Beck 1958, Paynter 1962, Kerwin and Scheelhaase 1971, Banfield 1974, Millson 1976, Saskatchewan Department of Tourism and Renewable Resources 1978, Laing 1986, Laing 1987, Laing 1988, Gauthier and Boon 1994, Fargey and Marshall 1997, Parks Canada unpubl. data, Saskatchewan Environment and Resource Management unpubl. data).

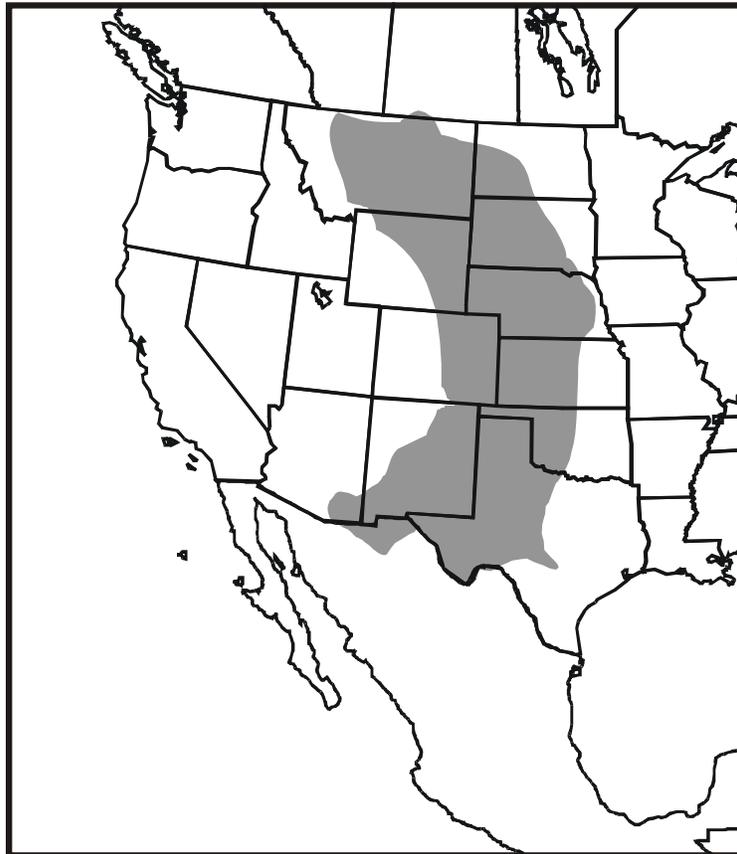


Figure 1. The distribution of black-tailed prairie dogs (Sciuridae: *Cynomys ludovicianus*; after Hall 1981).

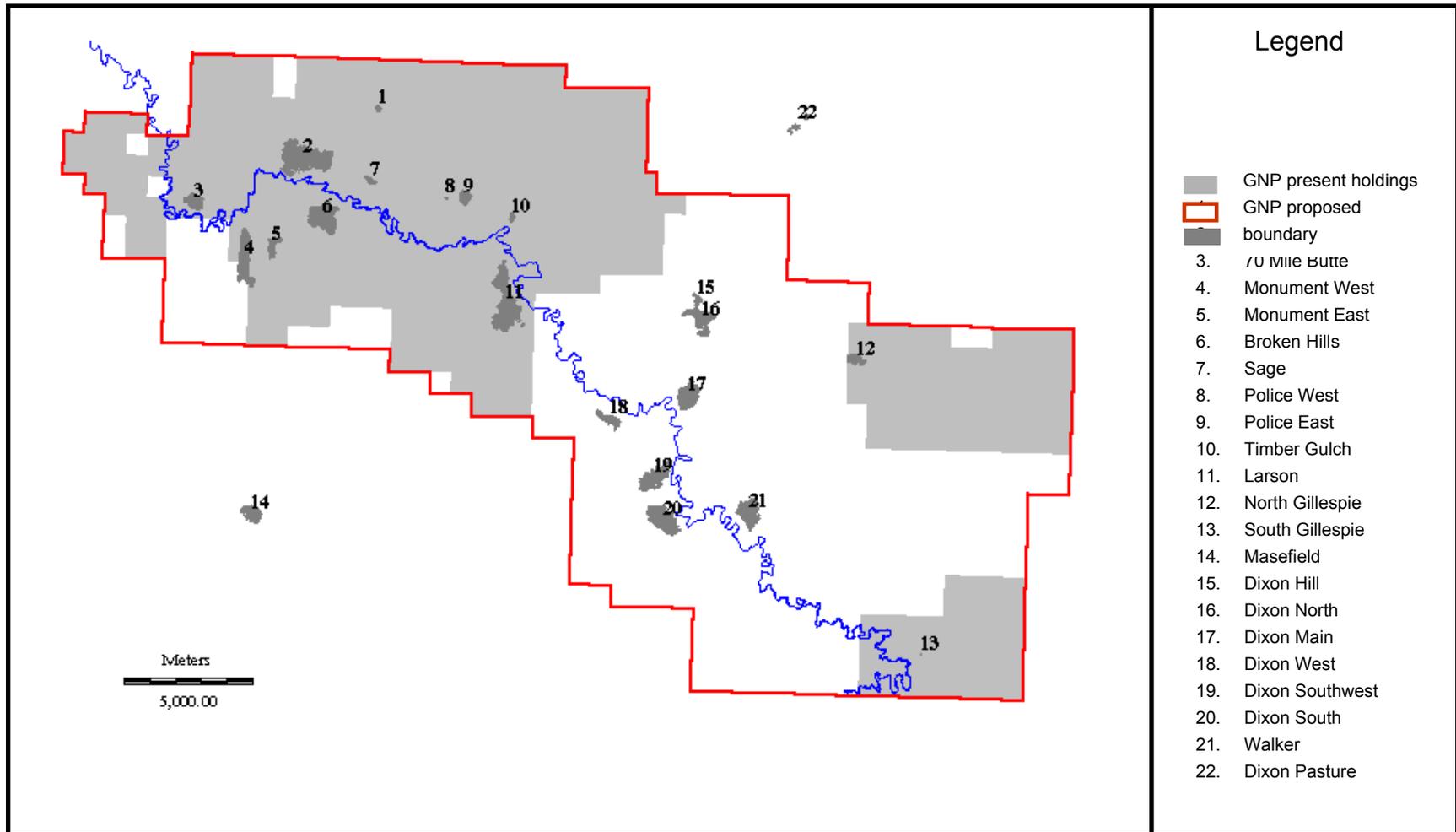


Figure 2. The distribution of black-tailed prairie dog (*Sciuridae: Cynomys ludovicianus*) colonies in and adjacent to the Frenchman River valley of southern Saskatchewan, Canada (scale 1:250,000). The colonies were most recently surveyed during 1995/96 using Global Positioning System technology (Fargey pers. comm., Parks Canada unpubl. data, Saskatchewan Environment and Resource Management unpubl. data). GNP refers to Grasslands National Park (West Block).

Across the species' geographic range, changes in land use, introduced disease (sylvatic plague) from Europe, pest control programs, and sport-shooting have compromised prairie dogs' distribution to the extent that only 2% of their historic range remains occupied (Miller *et al.* 1990). Merriam (1902) estimated that, during European settlement of the Great Plains, prairie dogs numbered over 5 billion and one very large colony in Texas may have been comprised of more than 400 million individuals. Hoogland (1997) summarized that, at present, prairie dogs occur mainly in small, isolated colonies throughout their former range, frequently in protected areas such as National Parks (e.g., GNP in Saskatchewan, Wind Cave in South Dakota, Theodore Roosevelt in North Dakota), National Monuments (e.g., Devil's Tower in Wyoming), National Wildlife Refuges (e.g., Charles M. Russell in Montana, Quivra in Kansas, Wichita Mountains in Oklahoma) and State Parks (e.g., Custer in South Dakota; Hoogland 1997).

While prairie dogs have undergone drastic declines over much of their distribution, there is no evidence that Canadian prairie dogs have experienced a similar collapse. The first documentation of prairie dogs in Canada was by Soper (1938), when he reported the discovery of a small colony northwest of Val Marie, Saskatchewan, during 1927. Unfortunately, that first known prairie dog colony was subsequently extirpated by the creation of a reservoir along the Frenchman River (Soper 1944). However, additional surveys eventually confirmed the existence of other prairie dog colonies in and adjacent to the Frenchman River valley, to the south and east of Val Marie (Soper 1944, Paynter 1962, Kerwin and Scheelhaase 1971, Millson 1976). Presumably prairie dogs were not any more widely distributed in the Canadian prairies during early European settlement.

The nearest known prairie dog colony in Montana (Montana Natural Heritage Program unpubl. data, C. Jones pers. comm.) is 20 km southeast of the nearest known Canadian prairie dog colony (no. 13 [South Gillespie] in Fig. 2). This separation distance may not be entirely insurmountable for intercolony dispersers but it is certainly well beyond the typical dispersal distance of prairie dogs in more southern locales (0.5-6.4 km; Garrett and Franklin 1988). Furthermore, there are only two known prairie dog colonies within 50 km of Canadian prairie dogs (Montana Natural Heritage Program unpubl. data, C. Jones pers. comm.).

Overall, Canadian prairie dog colonies represent a northernmost, isolated population of the species, analogous to the southernmost (Mexican) prairie dogs (*C. mexicanus*).

POPULATION SIZE AND TRENDS

There are no data available that directly describe Canadian prairie dogs' population size or trends. Population size is difficult to assess because prairie dogs' densities do not vary predictably within or between colonies (Hoogland 1995), nor are they correlated with burrow densities (King 1955, Martin and Schroeder 1978, Campbell

and Clark 1981, Hoogland 1981, Hoogland 1995). The only data available are estimates of the extents of Canadian prairie dog colonies (Table 1; Kerwin and Scheelhaase 1971, Millson 1976, Laing 1986, Laing 1988, Gauthier and Boon 1994, Fargey pers. comm., Parks Canada unpubl. data, Saskatchewan Environment and Resource Management unpubl. data). However, it is important to emphasize that while these data describe the amount of area that has been directly affected (i.e., disturbed) by prairie dogs, the data are not necessarily reliable descriptors of population size nor population trends.

According to area estimates for prairie dog colonies, it appears that the total extent of Canadian prairie dogs' colonies has increased since the previous COSEWIC status reports (Saskatchewan Department of Tourism and Renewable Resources 1978, Laing 1988). The 22 most recently (1995/96) surveyed prairie dog colonies occupy a total area of 931.7 ha (Fargey pers. comm., Parks Canada unpubl. data, Saskatchewan Environment and Resource Management unpubl. data), compared to 14 colonies that were known in 1985 and estimated as occupying a total area of 686.5 ha (Laing 1986, Laing 1988). These data translate into an estimated increase in prairie dog colonies' total area by approximately 36 % over 10 years, assuming negligible sources of systematic error. Similarly, by comparing 1995/96 to 1970 data, it appears that the total area of prairie dogs' colonies may have increased by as much as 85 % over the long-term (25 years). However, such comparisons rely on tedious assumptions that no systematic biases confound the data due to differences between observers, survey techniques, or search effort (undiscovered colonies). Therefore, these data should not be used as independent evidence of increases in prairie dogs' population size. It is important that prairie dog colony surveys be standardized to allow for more detailed, informative comparisons of colonies in the future.

Fargey and Marshall (1997) reported estimates of Canadian (GNP) prairie dogs' population densities according to visual censuses of aboveground prairie dogs (as in Menkens and Anderson 1993). Prairie dog counts were highly variable but the average densities were 3.6 adults·ha⁻¹ (including yearlings, range = 0.3-19.3, n = 7, 4 ha plots) and 12.6 juveniles·ha⁻¹ (range = 7.7-22.3, n = 7, 4 ha plots; Fargey and Marshall 1997). Hoogland (1995) reported higher averages of 18.4 adults·ha⁻¹ (range = 13.9-21.7) and 12.7 juveniles ha⁻¹ (range = 0-57) in South Dakota. However, the former surveys (Fargey and Marshall 1997) were conducted intermittently at different colonies and probably provided more of a relative index of density (to compare among plots/colonies) whereas the latter mentioned study (Hoogland 1995) involved nearly continuous observations of one small colony and is therefore a closer measure of absolute density. Fortunately, Parks Canada intends to continue prairie dog counts for at least 3-5 years in an effort to document variation in the estimates of prairie dogs' densities as well as other colony characteristics (Fargey and Marshall 1997).

Table 1. The estimated extents of black-tailed prairie dog (*Sciuridae: Cynomys ludovicianus*) colonies in and adjacent to the Frenchman River valley of southern Saskatchewan, Canada. A blank entry indicates that the prairie dog colony either did not exist or was not visited during the period. Data in parentheses are coarse estimates.

Colony ¹	Name ²	ID ³	Estimated Size (ha)				
			1970 ⁴	1975 ⁵	1985 ⁶	1993/94 ⁷	1995/96 ⁸
1	Laovenan					3.2	2.7
2	Snake Pit	C	0.6	164.0	154.0	163.6	165.0
3	70 Mile Butte	A	30.3	31.0	37.0	24.5	28.2
4	Monument West	B	72.9	254.0	57.0	72.2	72.3
	Monument East	B	30.4			13.8	17.4
6	Broken Hills	Q			78.0	95.2	81.6
7	Sage					2.9	6.1
8	Police West					0.1	0.4
9	Police East					14.0	17.3
10	Timber Gulch					2.2	4.8
11	Larson	O	0.4	4.4	77.0	110.4	132.9
12	North Gillespie	L	18.2	4.0	(12.0)	15.5	19.1
13	South Gillespie						0.2
14	Masefield	D	2.0	8.0	12.0	27.6	31.4
15	Dixon Hill	H					6.5
16	Dixon North	H	53.7	40.0	48.0		51.3
17	Dixon Main	I	44.4	80.0	43.0	57.3	58.7
18	Dixon West	G	34.3	17.6	19.0	4.0	23.3
19	Dixon Southwest	J	92.9	120.0	63.0	75.8	64.1
20	Dixon South					82.4	81.1
21	Walker	K	0.4	7.2	43.0	57.7	60.8
22	Dixon Pasture	N	121.2	24.0	(24.0)	6.6	(6.6)
		E	0.4				
		F	0.8				
		M	0.2				
		P		8.8			
		R			19.5		
Totals			503.1	763.0	686.5	828.8	931.7

¹ Standard numeric identifiers.

² Common names for prairie dog colonies.

³ Letter codes for prairie dog colonies (Laing 1988).

⁴ Kerwin and Scheelhaase 1971

⁵ Millson 1976

⁶ Laing 1986

⁷ Gauthier and Boon 1994, Saskatchewan Environment and Resource Management unpubl. data

⁸ Parks Canada unpubl. data, Saskatchewan Environment and Resource Management unpubl. data

HABITAT

Prairie dogs live in large colonies in broad, flat, river valleys and upland grasslands. Prairie dog colonies are conspicuous because vegetation is shorter within colonies compared to adjacent areas (Koford 1958, Tileston and Lechleitner 1966) due to prairie dogs' intense grazing, but also because they clip tall plants that obstruct their view of the horizon (to facilitate predator detection; King 1955, Hoogland 1995). Furthermore, prairie dogs usually colonize areas in which there is already short vegetation (Koford 1958, Clark 1979, Snell 1985, Knowles 1986), thereby increasing the efficacy of visual predator detection with minimal landscape modification (Hoogland 1995).

Vegetation in most prairie dog colonies is dominated by sage (*Artemesia*) and wheat grass (*Agropyron*; Parks Canada unpubl. data). Notably, some rare native plants occur almost exclusively in prairie dog colonies, including scarlet globemallow (*Sphaeralcea*), black nightshade (*Solanum*), pigweed (*Amaranthus*), and prairie dog weed (*Dyssodia*; King 1955).

According to the Grasslands National Park Geographic Information Systems (GIS) database (Parks Canada unpubl. data), the average vegetation species richness (biodiversity) is 51.6 (range = 43-130, n = 5742, 30 m quadrats) in prairie dog colonies. Canadian prairie dogs occur at elevations between 750 and 875 m and their colonies are usually (> 90 %, by area) on relatively flat areas or < 10° slopes. To facilitate their highly fossorial nature, prairie dogs most often occupy deep colluvial (87 %) and alluvial (13 %) clay soils, and rarely exist on glacial sediments (< 1 %).

GENERAL BIOLOGY

The northernmost (Canadian) prairie dogs have been classified as *vulnerable* for more than 20 years (Saskatchewan Department of Tourism and Renewable Resources 1978, Laing 1988, COSEWIC 1998); however, there remains to be little known about their biology and ecology. Consequently, most of the biological information presented herein is cited from studies of southern conspecifics (especially Wind Cave National Park in South Dakota, King 1955, Hoogland 1995). Presumably these data also have some applicability to the northernmost population but they should still be interpreted with caution due to the potential for substantial geographic variation (as for other species' peripheral populations; e.g., Gummer 1995, Gummer 1997). The present status review precedes publications from several research initiatives that were recently begun to investigate northern prairie dogs' behaviour, demography, life history, and physiological ecology (Fargey pers. comm., Gummer and Ramsay unpubl. data, MacDonald and Hare pers. comm., Waterman pers. comm.). Therefore, as appropriate, unpublished data and anecdotal observations are included below, *in lieu* of population-specific published data.

Prairie dogs breed predictably in the early spring of each year (Hoogland 1982a) and the breeding season is thought to vary with latitude (January in Oklahoma, February or March in South Dakota, March or April in Montana; Hoogland 1995). During 1998, following a particularly mild winter, prairie dogs in Saskatchewan mated in early March (Gummer unpubl. data). Prairie dogs usually copulate underground but there are many conspicuous aboveground behaviours that suggest underground copulation (see Hoogland 1995). Gestation is approximately 35 days and parturition also occurs underground (Hoogland 1995). Juvenile prairie dogs do not emerge from the natal burrow until several weeks after parturition. Weaning appears to be approximately 41 days (Hoogland 1995).

Litter size at birth has not been measured in a natural setting. However, laboratory studies and *in utero* counts of embryos and placental scars from pregnant and lactating females, respectively, indicate that litter size at birth is usually between 1 and 8 (Wade 1928, Anthony and Foreman 1951, Foreman 1962, Tileston and Leichleitner 1966, Knowles 1987, Foltz *et al.* 1988, Stockrahm and Seabloom 1988). Litter size at first juvenile emergence is on average 3 in South Dakota (range = 1-6, n = 361; Hoogland 1995). In Saskatchewan, average litter size at first emergence is reportedly 2.3 to 3.5 (Millson 1976) and during May 1998 newly emerged litters were observed consisting of 2 to 6 juveniles (n = 5; Gummer unpubl. data). Females do not appear to adaptively manipulate the sex ratios of their litters (Hoogland 1995). At first emergence, juveniles weigh approximately 145 g (range = 60-288, n = 1109; Hoogland 1995) but by autumn they weigh, on average, more than 500 g in South Dakota (range = 243-964, n = 367; Hoogland 1995). In Saskatchewan, during 1998, captured juveniles' masses increased from a minimum of 120 g in June to a maximum of 750 g in August (n = 12; Gummer unpubl. data).

Prior to weaning and emergence from natal burrows, litters are susceptible to infanticide and cannibalism by neighboring reproductive females (Hoogland 1985, Hoogland *et al.* 1989, Hoogland 1995). Infanticide is the major cause of juvenile mortality in South Dakota: 22 % of litters are ravaged by other lactating females that kill and cannibalize unweaned litters of close kin (Hoogland 1985, Hoogland *et al.* 1989, Hoogland 1995). Additionally, 8 % of litters are partially or entirely killed by other immigrant prairie dogs and a further 9 % of litters are abandoned by mothers and then killed and cannibalized by kin (Hoogland 1985, Hoogland *et al.* 1989, Hoogland 1995).

If juveniles survive to become yearlings (> 8 months of age; Hoogland 1995), they typically delay breeding until the second spring following birth, (i.e., *ca.* 21 months of age). However, some individuals (females 35 %, males 6 %) breed during their first year (as yearlings) and a few others (females 5 %, males 24 %) do not reach sexual maturity until their third year (Hoogland 1995).

Juvenile prairie dogs' probabilities of surviving their first year is 54% for females and 47% for males (Hoogland 1995). While females sometimes live as long as eight years, males typically do not live longer than 5 years (Hoogland 1995). Survival does not appear to be compromised by reproduction (Hoogland 1995). Survivorship of dispersers (during

May and June) is much reduced compared to that of sedentary residents (44 % versus 91 %, n = 27 and 193, respectively) with mortalities occurring equally to both genders (Garrett and Franklin 1988). Of 15 radio-collared dispersing prairie dogs that were found dead, the apparent causes of mortality included predation (n = 11), fighting with conspecifics (n = 3), and falling off of a cliff (n = 1; Garrett and Franklin 1988).

Predators of prairie dogs include badgers (*Taxidea taxus*), black-footed ferrets (*Mustela nigripes*), bobcats (*Lynx rufus*), coyotes (*Canis latrans*), long-tailed weasels (*Mustela frenata*), red foxes (*Vulpes vulpes*), bull snakes (*Pituophis melanoleucus*), prairie rattlesnakes (*Crotalus viridis*), Cooper's hawks (*Accipiter cooperii*), ferruginous hawks (*Buteo regalis*), golden eagles (*Aquila chrysaetos*), northern harriers (*Circus cyaneus*), peregrine falcons (*Falco peregrinus*), prairie falcons (*Falco mexicanus*), red-tailed hawks (*Buteo jamaicensis*), and Swainson's hawks (*Buteo swainsoni*; Sperry 1934, Olendorf 1976, Hoogland 1981, Hoogland 1982b, Powell 1982, Halpin 1983, Campbell *et al.* 1987, Hoogland 1995). Compared to solitary existence, one of the primary evolutionary benefits of prairie dogs' coloniality is probably increased predator avoidance because of the large number of individuals scanning the horizon for predators and the widespread communication of anti-predator alarm calls (Hoogland 1981, Hoogland 1983, Hoogland 1995).

Prairie dogs' diet consists mainly of grasses and forbs, including buffalo grass (*Buchloe*), grama (*Bouteloua*), prickly pear cactus (*Opuntia*), rabbitbrush (*Chrysothamnus*), scarlet globemallow (*Sphaeralcea*), thistle (*Cirsium*), wheat grass (*Agropyron*), and underground roots (Koford 1958, Hansen and Gold 1977, Summers and Linder 1978). They sometimes also eat insects such as grasshoppers and beetles (Whitehead 1927, Kelso 1939, Costello 1970, O'Meilia *et al.* 1982). Plants that are commonly found in prairie dog colonies but are not usually eaten, include horseweed (*Conyza*), prairie dog weed (*Dyssodia*), sage (*Artemesia*), and three-awn (*Aristida*) (King 1955, Costello 1970, Summers and Linder 1978). Cannibalism of juveniles, yearlings, and adults has been observed and may comprise a significant proportion of some individuals' early summer diets (Hoogland 1995). Prairie dogs also eat fresh and old plains bison (*Bison bison*) and domestic cattle (*Bos taurus*) scats, when available (Sheets *et al.* 1971, Hoogland 1995).

Prairie dogs have the reputation of being the most social of the ground squirrels. Within their expansive colonies, prairie dogs live in contiguous, territorial, harem-polygynous family groups (King 1955, Hoogland and Foltz 1982, Hoogland 1995). The family groups are referred to as "coteries" by some researchers (King 1955, Hoogland 1995). The overall size (area) and the number of burrows in a typical coterie territory is approximately one-third of a hectare with about 70 burrow entrances, though neither area nor burrow densities are consistent (Hoogland 1995). There are many exceptions, but average family groups consist of one adult male, two or three adult females, several non-breeding yearlings, and two or three litters of juveniles (Hoogland 1995). Behavioural interactions within the family group include play, allogrooming, mouth-to-mouth contacts ("kisses"), and even communal nursing, although reproductive females are fiercely territorial during pregnancy and early lactation (Hoogland *et al.* 1989).

Members of different family groups often engage in complex territorial disputes that include staring, tooth chattering, tail flaring, charges, vocalizations, fighting, chasing, and anal sniffing (King 1955, Hoogland 1995). Prairie dogs' social behaviours are thoroughly reviewed in the book "The black-tailed prairie dog: social life of a burrowing mammal" (Hoogland 1995).

Garrett and Franklin (1988) examined the complexities of dispersal in prairie dogs by mark/recapture and radio-telemetry studies in South Dakota. Intracolony dispersals (between family groups) occurred throughout the year ($n = 40$), although they were more common during the spring and winter months (73 %). Overall, 36 males (30 yearlings and 6 adults) and 4 females were found to disperse between family groups within their home colony. Garrett and Franklin also measured intercolony dispersals: of 8 male and 7 female prairie dogs that were radio-tracked as they dispersed between colonies, the average (\pm standard deviation) dispersal distance was 3.0 ± 2.2 km (range = 0.5-6.4), but males dispersed on average 1.4 km farther than females. Analyses of colony immigrants (that were identified by live capture, $n = 61$) showed that, among adult prairie dogs, females were more likely to disperse between colonies than males were. Among yearlings, males were more likely to accomplish intercolony dispersals. One ongoing study of Canadian prairie dogs involves attachment of radio-collars and monitoring of the radio-collared animals' seasonal activities. A simultaneous, secondary objective of the study is the evaluation of individuals' dispersal movements (Gummer and Ramsay unpubl. data).

According to burrow excavations, prairie dogs' underground burrow tunnels are usually 1 to 4 m deep and 4 to 32 m in length (Sheets *et al.* 1971, Hoogland 1995). Passageways are 10 to 12 cm in diameter, with the exception of elliptical nest chambers that are commonly 29 to 44 cm wide and 24 cm in height. The nests are lined with dead grasses. Other small burrow chambers have been found filled with loose soil, grass seeds, stones, and roots (Jillson 1871, Sheets *et al.* 1971), which presumably provide forage during inclement weather. Prairie dogs do not continually dig new burrows if old burrows are available: often the same burrows are used for many generations (Hoogland 1995). Occasionally, prairie dogs plug (back-fill) burrows in attempts to bury predators (e.g., black-footed ferrets or prairie rattlesnakes; Clark *et al.* 1984, Hoogland 1995).

Hoogland (1995, 1997) noted that prairie dogs appear aboveground throughout the year and he surmised that individuals do not hibernate. However, (other) prairie dog species that occur at high elevations are spontaneous hibernators (e.g., white-tailed prairie dogs; Bakko 1977, Harlow 1995). Because Canadian prairie dogs occur at higher latitude than any other population of their species, they occupy a more harsh winter climate than southern conspecifics. Therefore, the northern prairie dogs' seasonal activities and ultimately survival are probably constrained by cold winter temperatures and snow. They may need to reduce their metabolism to conserve energy during the winter months. Moreover, laboratory experiments with southern conspecifics have found that (black-tailed) prairie dogs do, infrequently, undergo shallow torpor (hibernation) when severely deprived of food and exposed to cold (Harlow 1995, Harlow and Braun 1995, Harlow 1997). Hibernation may be a more ecologically important strategy for the northernmost prairie

dogs than for southern conspecifics, given the harsh winter conditions at the northern periphery of the species' range. A research programme was begun in November 1997 with the objective of documenting northern prairie dogs' seasonal activities, body temperatures, and microclimates (Gummer and Ramsay unpubl. data). To date, (1) prairie dogs' aboveground activities (and lack thereof) were observed regularly beginning during the 1997/98 winter; (2) automatic microclimate stations were installed to continuously record soil and air temperatures at the peripheries of two prairie dog colonies; and (3) temperature sensitive radio transmitters were attached to 20 individual prairie dogs during autumn 1998. Although the species is not usually considered a hibernator, the northernmost prairie dogs may well hibernate to conserve energy during harsh winter conditions (Gummer and Ramsay 1998). This strategy might be particularly feasible for Canadian prairie dogs because of the absence of prairie dogs' most specialized predators, black-footed ferrets.

Prairie dogs reportedly have a high prevalence and intensity of numerous species of fleas, lice, and ticks, probably as a consequence of their colonial nature (Ecke and Johnson 1952, King 1955, Smit 1958, Pizzimenti 1975, Tyler and Buscher 1975, Hoogland 1979, Hoogland 1995). Prairie dogs' fleas transmit bacteria, including that which causes sylvatic (bubonic; *Yersinia pestis*) plague, an introduced disease to which prairie dogs are highly susceptible (Eskey and Haas 1940, Pollizter and Meyer 1961, Barnes *et al.* 1972, Fitzgerald and Lechleitner 1974, Barnes 1982, Cully 1989, Menkins and Anderson 1991, Barnes 1993, Cully 1993). Notably, ectoparasites were not observed parasitizing any of 104 prairie dogs that were examined between May and September 1998 (n = 202 captures), nor were any fleas observed around burrow entrances in GNP prairie dog colonies (Gummer unpubl. data). Fleas are commonly observed at prairie dog burrow entrances in more southern localities (Hoogland 1995).

Domestic animals in the vicinity of GNP have antibodies for sylvatic plague, indicating that they have been exposed to the bacteria and therefore plague is present in the immediate environment (Leighton 1997). Plague can extirpate entire prairie dog colonies very rapidly and is more likely to become an epizootic in large, densely populated colonies than in smaller colonies. It is unclear which factors initiate epizootics and therefore plague is nearly impossible to predict (Barnes 1993).

LIMITING FACTORS

Prairie dogs have a restricted distribution in Canada and therefore they are sensitive to natural and human-induced landscape changes or catastrophes. As highly social, colonial animals, prairie dogs are particularly susceptible to diseases. Plague can extirpate large colonies very quickly and plague is known to be present in the Frenchman River area. Due to existence at relatively high latitude, the northernmost prairie dogs' seasonal activities and ultimately survival are probably constrained by climate.

Prairie dogs' intense grazing and disturbance of the grassland causes them to be in conflict with cattle production; consequently, colony expansion is a concern for

grazing managers. Pest control and overall social tolerance are concerns for the long-term conservation of prairie dogs. In the United States, cultivation of native prairie, combined with poisoning and sport-shooting, have contributed to the decline of prairie dogs over most of their range.

SPECIAL SIGNIFICANCE OF THE SPECIES

As a northernmost, peripheral population of a species that occurs across a wide range of latitude, Canadian prairie dogs surely contribute significantly to the biodiversity of the Great Plains. They appear to be geographically isolated by a distance farther than maximum dispersal records for the species and therefore Canadian prairie dogs should be considered a distinct, local population. Prairie dogs were extirpated from most of their historic range in the United States and Mexico and therefore the small Canadian population is an especially valuable ecological resource.

In terms of the grassland ecosystem, prairie dogs are an important component of the natural disturbance regime of native short- and mixed-grass prairie. They disturb the vegetation and soil, thereby creating unique habitat for many rare and endangered prairie species, including swift foxes (*Vulpes velox*), eastern short-horned lizards (*Phrynosoma douglassii*), prairie rattlesnakes (*Crotalus viridis*), burrowing owls (*Speotyto cunicularia*), and mountain plovers (*Charadrius montanus*; Agnew *et al.* 1986, Hoogland 1995). Furthermore, prairie dogs provide a prey base for, among others, ferruginous hawks (*Buteo regalis*), golden eagles (*Aquila chrysaetos*), prairie falcons (*Falco mexicanus*), and Swainson's hawks (*Buteo swainsoni*). Prairie dogs' population size is also a critical variable concerning the potential, eventual reintroduction of black-footed ferrets (*Mustela nigripes*) in Canada (Hjertaas *et al.* 1992).

Notably, because of prairie dogs' large body size, amicable diurnal behaviours, and accessibility in GNP, they provide an important opportunity to educate Canadians about the endangered grassland ecosystem and species at risk.

EVALUATION AND PROPOSED STATUS

To assist the assessment of prairie dogs' status in Canada, it is valuable to review other agencies' status designations for the species and for other closely-related animals. In the United States, (black-tailed) prairie dogs are not currently protected by the Endangered Species Act, although they were considered endangered until 1974 (Hoogland 1995, Hoogland 1997, Wuerthner 1997, U.S. Fish and Wildlife Service 1998). Recently, the U.S. National Wildlife Federation petitioned the U.S. Fish and Wildlife Service for an emergency listing of the species as *threatened* because of its drastic decline from historic numbers and extent. Other prairie dog species are protected by the U.S. Endangered Species Act: Mexican prairie dogs are currently classified as *endangered* and Utah prairie dogs are *threatened* (U.S. Fish and Wildlife Service 1998).

The International Union for Conservation of Nature (IUCN) designates the black-tailed prairie dog as *lower risk, near threatened* (LR,nt) based on extensive losses of prairie dogs' habitat during the last century (Hafner 1998). The Mexican prairie dog is listed as *endangered* (EN A1cd) with a very high risk of extinction in the near future because of a population reduction of at least 50 % during the last 10 years (Baillie and Groombridge 1996). The Utah prairie dog is listed as *lower risk* (conservation dependent; LR/cd) because it is not *vulnerable* and it is presently the focus of a specific conservation programme (Baillie and Groombridge 1996).

The Nature Conservancy and Saskatchewan Conservation Data Centre (SCDC) rank prairie dogs as "apparently secure globally" (G4), "rare or uncommon" nationally (N3), and "imperiled due to rarity" at the subnational scale (S2; SCDC 1998).

In Saskatchewan, prairie dogs and their habitat are presently protected from harm under the Saskatchewan Wildlife Act (1997) and the Wildlife Habitat Protection Act (1997). It is illegal to harm prairie dogs or their habitat on crown land unless a permit is obtained from the provincial government.

The overall extent of black-tailed prairie dogs' occurrence in Canada is approximately 470 km², yet the species' area of occupancy is less than 10 km² (931 ha). Of the 22 known prairie dog colonies, the majority (20 colonies, 96 % by area) occur within the proposed boundary of GNP, with approximately 524.3 ha (56 %) contained within the National Park's present land holdings and 369.5 ha (40 %) on range lands (crown leases and private ranches) that are within the proposed boundary of GNP. Therefore, the main concern for prairie dogs' protection is the complete establishment of the proposed GNP. To date, 51 % (267.8 of 521.3 km²) of the proposed West Block of GNP has been acquired (Parks Canada unpubl. data). The remaining 37.8 ha (4 %) of prairie dog colonies that occur outside the proposed GNP, occupy habitats in the Masefield Prairie Farm Rehabilitation Administration (PFRA) community pasture (31.4 ha, 3 %) and Dixon provincial community pasture (6.6 ha, 1 %). Hence, assurance from PFRA and the Saskatchewan Department of Agriculture and Food (SAF) that the community pastures will not request permits for pest control would be ideal.

Prairie dogs occur in a very small part of Canada (< 0.01 % by area), at the northern periphery of the species' range, and appear to be geographically isolated from more southern conspecifics. Therefore, the northernmost (Canadian) population of prairie dogs is particularly sensitive to human activities and natural events. Prairie dogs should continue to be designated as *vulnerable* in Canada. Their status should remain *vulnerable* indefinitely unless both (1) significant expansion of the Canadian population occurs well beyond GNP and the Frenchman River valley; and (2) prairie dog colonies are discovered in Montana within reasonable dispersal distance of the Canadian colonies. Alternatively, if Canadian prairie dog colonies should decline due to unforeseen local events (e.g., pest control or sylvatic plague), then the species may require reclassification as a more severe conservation priority.

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