

Status of Black-Tailed Prairie Dog (*Cynomys ludovicianus*) in Sonora, Mexico

Reyna A. Castillo-Gamez

DICTUS, Universidad de Sonora, Rosales y Niños Héroes S/N, Hermosillo, Sonora, México 83000

Rafael Arenas-Wong, Luis Castillo-Quijada, Verónica Coronado-Peraza, Abigail Enríquez-Munguia, Mirna Federico-Ortega, Alejandra García-Urrutia, Alba Lozano-Gámez, Romeo Méndez-Estrella, Laura Ochoa-Figueroa, and J.R. Romo-León

Escuela de Ecología, CESUES, Ley Federal del Trabajo S/N, Hermosillo, Sonora, México, 83100

Guy Kruse-Llargo

Quinta Amalia No. 18, Hermosillo 83240, Sonora, México

Iván Parra-Salazar

Cerrada Mulatos #9, Hermosillo, Sonora, Mexico 83117

Abstract—Prairie dog is a keystone species throughout the habitat where it occurs, but its populations have declined about 98% in the last century. This species has been considered of international importance for the United States of America, Canada, and Mexico.

Only two populations are recorded for Mexico, and the westernmost (isolated by Sierra Madre Occidental from the other) remains basically unknown, in the Upper San Pedro River Watershed in Mexico. This species has been eradicated from Arizona. The closest population is hundreds of kilometers away, in New Mexico.

Since July 2003, we have been working collecting basic information that is needed for this species conservation: actual distribution, population parameters, habitat, and threats. Methodology being used is standardized to those underway in other places. Geographic Information Systems and Remote Sensing are being used as tools in range, habitat, and threats analysis. This project is in progress and final results are expected to be ready by November 2004.

Introduction

Prairie dog is a keystone species throughout the habitat where it occurs, but its populations have declined about 98% in the last century.

Historically its distribution was from Canada to Northwest Mexico (figure 1). Today, its distribution represents less than 3% of its former number.

This species has been eradicated from Arizona, for local ranchers thought them to be competing with cattle for grass. In other words, they were treated as pests. The closest population is hundreds of kilometers away, in New Mexico.

Only two populations are recorded for Mexico, and the westernmost (isolated by Sierra Madre Occidental from the other) remains basically unknown, in the Upper San Pedro River Watershed in Mexico. The one in Chihuahua is close to the Mexican town of Janos, while the one in Sonora is located north of Cananea. For a long time it was believed that this species had been extirpated from the last State, but it was re-discovered in the early 1990s.

Black-tailed prairie dogs are diurnal, burrowing rodents. Being colonialist is perhaps the most striking feature of

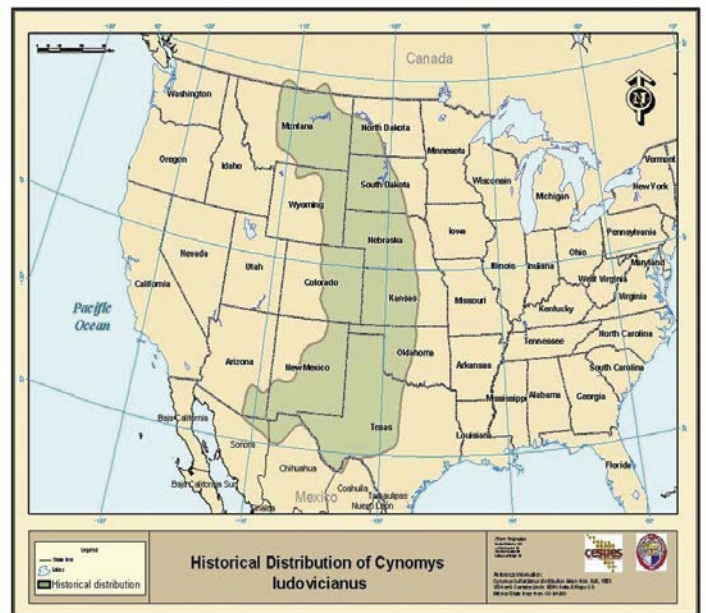


Figure 1—Historical distribution of *Cynomys ludovicianus*.

these herbivorous squirrels that forage from dawn until dusk (Hoogland 1995). During extremely cold weather, however, black-tailed prairie dogs sometimes remain underground for several consecutive days (Hoogland 1995).

The daily activities change the physical characteristics of the community, which leads to increased plant and animal diversity. Prairie dogs are a source of food for several predators, and their burrows provide homes for a variety of species, including the endangered black-footed ferret.

Prairie dogs also change their surrounding environment. For example, they alter vegetation processes by maintaining vegetation at an early growth stage, decreasing vegetative height, increasing bare ground, and increasing the percentage of forbs cover. This provides a diversity of habitat on the plains essential to wildlife species that depend upon these conditions. Prairie dogs also alter long-term soil building processes through bioturbation, or mixing of soil horizons. This in turn leads to new soil types (Koford 1958).

This project development will provide basic information to know the present status of *C. ludovicianus* colonies in Sonora, their population density, habitat situation, and present threats. This information is key in long-term conservation of the species, as well as of great help in reintroduction plans for Arizona, which have been in the mind of several researchers and agencies.

Study Area

It is located very close to the United States-México border, in the Upper San Pedro River watershed part of the Colorado River Watershed. It is located within the Mexican municipality of Cananea, from 30° 37' 12" to 31° 19' 48" North latitude and from 109° 48' 36" to 110° 37' 12" West longitude (figure 2).

The upper portion of the San Pedro River watershed is a transition between the Chihuahuan and the Sonoran Desert, with great variations in topography, climate, and vegetation.

Elevation ranges from 900 to 2,900 meters, and mean annual rainfall goes from 300 to 750 mm. Communities present in the watershed are desert scrub, grasslands, oak forest, pine forest, mesquite woodland, and riparian vegetation. Total estimated area of the upper watershed is 7,600 km² (5,800 km² in Arizona and 1,800 km² in Sonora)

It presents Regosol eutricto soil type (FAO-Unesco classification system). This type of soil is subject to erosion going from moderate to high. It comes from non-consolidated materials.

The general region shows perturbations due to heavy cattle grazing, especially in the American portion of the watershed, which has led to mesquite intrusion into former grasslands.

Methods

Burrow Density

It is being estimated using "wandering quarter method" (Catana 1963). Total and active prairie dog burrow densities are determined by running 10-m-wide parallel transects systematically through prairie dog colonies. A person walks

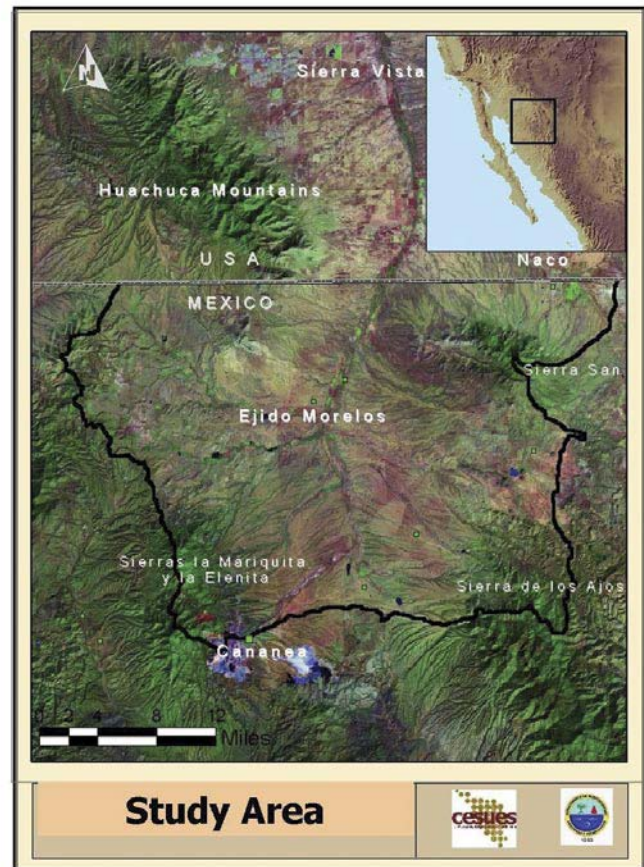


Figure 2—Study area.

in a pre-determined direction and counts active and total numbers of prairie dog burrows that are within the transect. When a partly completed transect approaches the edge of a dog town, the transect turns 90 degrees toward the unsampled section of the town. After 10 m, transects again turns 90 degrees, creating a transect parallel to the previous one, but in the opposite direction. Active burrows are being defined as those containing fresh prairie dog feces observable within or around the opening.

Population Density

All individuals within the dogtowns are counted in 15-minute periods, one per hour during daytime (visual counting method: Fagerstone and Biggins 1986; Menkens et al. 1990; Menkens and Anderson 1993; Powell et al. 1994). There are six visits planned, each one of them of two days. Already two of them have been made to this date, one in November 2003 and the other April 2004. Density is being considered and maximal values are recorded.

Range

Actual range determination will first be developed using potential distribution maps through GIS modeling (multicriteria evaluation using weighted linear combination in IDRISI32 platform, according to Jack 1999) and surveying those areas trying to locate new colonies. Potential maps will include the

next variables: soils (type, depth, and texture), land cover, slope, and exposure, following Clippinger (1989) and Proctor et al. (1998).

GPS (Garmin eTrex and eTrex Vista) were used to establish the known colonies' perimeter. ArcView 3.2 and ArcMap 8.2 were used to calculate perimeter and area.

Grassland Conservation Status and Tendencies

Land cover series were obtained from IMADES-EPA projects (Kepner et al. 2000a,b) derived from Landsat MSS (1974, 1983, 1992) and Landsat (1997) in GIS format (Erdas GIS), as well as National Forest Inventory from SEMARNAP (derived from Landsat 2000 images). Time series analysis will be performed in Idrisi32 platform, and causal analysis will be discussed with local communities and peer researchers. Those results will be correlated with socioeconomic information to establish tendencies. Socioeconomic data was obtained from Morales et al. (1994) and Arias et al. (1998).

Threats analyses will be developed after Haro-Martinez et al. (2000).

Results and Discussion

Population Density

Two censuses have been conducted at “La Palmita”: during November 2003 and in April 2004. Prairie dog density was 1.9 individuals per ha in November and 3.5/ha in April. At the Janos region in Chihuahua, much higher ranges were determined at 20.9 to 30.7 individuals per ha.

Due to its recent discovery, no records have been undertaken for the town at “La Mesa” but the first observations carried out point towards an even lower density here.

Present in both sites were females with swollen mammae indicating feeding. Reports of juveniles are expected for the next month.

Burrow Density

At “La Palmita,” 61% of the burrows were active resulting in a density of 7.8/ha of active burrows, and a total of 14.4 total burrows per ha. At “La Mesa” 42% of the burrows were inhabited adding to a density of 4.5 active burrows, and a total of 10.7 total burrows per ha.

The results shown above are in sharp contrast to the ones cited for the Janos region (Ceballos et al. 1999). The prairie dog complex there has a density per ha of 42.3 to 86.5 total burrows, and 26.9/ha to 55.6/ha of active ones.

The parameters found in the San Pedro area are well below the burrow averages in the United States where density has been established between 49 to 287 per ha (Cully 1989).

Actual Distribution

To date, two active dogtowns have been found as well as an abandoned one (figure 3). While the first one situated at “La Palmita” ranch covers 28 ha, the second one at “La Mesa” ranges at 183 ha. The extent of the populations recorded points

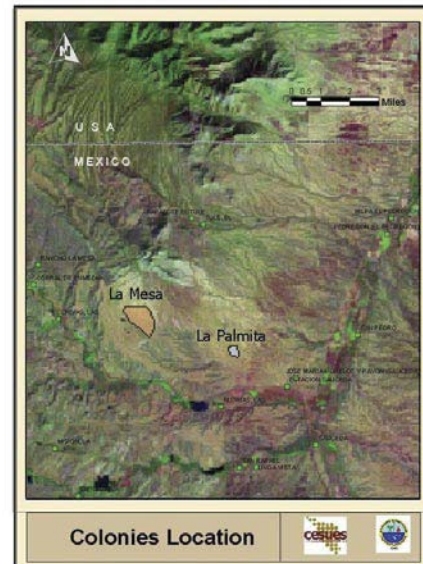


Figure 3—Colonies location.

toward a much smaller area than the one previously calculated by Ceballos et al. (1993), which suggested total range of 700 ha in the San Pedro River area.

The third town is situated at the site known as “La Traila” where according to local reports, no prairie dogs have been seen for over two years. The conditions of the few burrows found here verify this perception.

The two active colonies are 4.1 km apart, while the third, non-active one is respectively at 1.5 and 2.9 km from the other two. According to Biggins et al. (1993) no town in a prairie dog complex is more than 7.0 km away from the closest one, by which we could determine that the two active communities constitute a prairie dog complex in the region.

Potential range maps are being constructed at the present time and will be evaluated during the next surveys.

Grassland Conservation Status and Tendencies

Results showing tendencies for these variables are being compiled and conclusions are expected soon.

References

- Arias Rojo, H.; C. Watts; D. Peña; I. E. Parra; A. Haro; H. Licón. 1998. Management plan for the San Pedro River, Sonora, Mexico. San Pedro Conference Proceedings. November 8-10, 1999.
- Biggins, D.; B. Miller; L. Hanebury; B. Oakleaf; A. Farmer; R. Crete; A. Dood. 1993. A system for evaluating black-footed ferret habitat. In: J. Oldemeyer; D. Biggins; B. Miller; R. Crete, eds. Management of prairie dog complexes for black-footed ferret reintroduction. Washington, DC: U.S. Fish and Wildlife Service Biological Report 13: 73-92.
- Catana, A. J. 1963. The wandering quarter method of estimating population density. Ecology 44: 349-360.
- Ceballos, G.; J. Pacheco; R. List. 1999. Influence of prairie dogs (*Cynomys ludovicianus*) on habitat heterogeneity and mammalian diversity in Mexico. Journal of Arid Environments 41: 161-172.

- Clippinger, N. W. 1989. Habitat suitability index models: black-tailed prairie dog. U.S. Fish and Wildlife Service Biological Report 82(10.156). 21 p.
- Cully, J. F. 1989. Plague in prairie dog ecosystems: importance for black-foot ferret management. *Montana Wildl. Tech. Bull.* 2: 47-55.
- Fagerstone, K. A.; D. E. Biggins. 1986. Comparison of capture-recapture and visual count indices of prairie dog densities in black-footed ferret habitat. *Great Basin Naturalist Memoirs* 8: 94-98.
- Haro-Martínez, A. A.; I. E. Parra-Salazar y H. A. Licón-Gonzalez. 2000. Desarrollo de la metodología de amenazas potenciales a nivel ecorregional: el Golfo de California. Reporte Técnico de CECARENA a WWF, convenio. 22 p.
- Hoogland, J. 1995. *The black-tailed prairie dog: Social life of a burrowing mammal*. Chicago: Chicago University Press.
- Jack, M. 1999. *GIS and multicriteria decision analysis*. Canada: Wiley.
- Koford, C. B. 1958. Prairie dogs, whitefaces, and blue gramma. *Wildlife Monographs* 3: 6-78.
- Menkens, G. E., Jr.; S. H. Anderson. 1993. Mark-recapture and visual counts for estimating population size of white-tailed prairie dogs. In: J. Oldemeyer; D. Biggins; B. Miller; R. Crete, eds. *Management of prairie dog complexes for black-footed ferret reintroduction*. Washington, DC: U.S. Fish and Wildlife Service Biological Report 13: 67-72.
- Menkens, G. E., Jr.; D. E. Biggins; S. H. Anderson. 1990. Visual counts as an index of white-tailed prairie dog density. *Wildlife Society Bulletin* 83(3): 290-296.
- Morales, G.; I. E. Parra; M. T. Sapién; J. M. Cirett; O. Alvarez y F. Laso. 1994. *Plan de Manejo de la Reserva de Flora y fauna Silvestre y Acuáticas Sierras La Mariquita-La Elenita-Río San Pedro, Municipios de Cananea, Naco y Santa Cruz, Sonora, México*. Centro Ecológico de Sonora. Hermosillo, Sonora, México.
- Powell, K. L.; R. J. Robel; K. E. Kemp; M. D. Nellis. 1994. Above ground counts of black-tailed prairie dogs: temporal nature and relationship to burrow entrance density. *Journal of Wildlife Management* 58(2): 361-366.
- Proctor, J.; M. Beltz; W. Haskins. 1998. A GIS Model for identifying potential black-tailed prairie dogs habitat in the Northern Great Plains shortgrass prairie. *Proceedings of the 1998 ESRI International User Conference*; July 27-31; San Diego, CA.