FINAL REPORT

SECTION 6

ENDANGERED SPECIES ACT

FEDERAL AID PROJECT E-14

BLACK-FOOTED FERRET REINTRODUCTION
ASSESSMENT IN OKLAHOMA

SEPTEMBER 17, 1990 - SEPTEMBER 30, 1991

FINAL REPORT

STATE: OKLAHOMA **PROJECT NUMBER:** E-14

PROJECT TITLE: Biology of Threatened and Endangered Species in Oklahoma

STUDY TITLE: Preliminary assessment of black-tailed prairie dog colonies for reintroduction of black-footed ferrets in western Oklahoma

PERIOD COVERED: 1 October 1990 to 30 September 1991

ABSTRACT

We conducted a partial evaluation of black-tailed prairie dog (*Cynomys ludovicianus*) colonies and complexes in western Oklahoma as possible reintroduction sites for the endangered black-footed ferret (*Mustela nigripes*). We applied a standardized survey technique to Oklahoma's 2 largest complexes of black-tailed prairie dogs to estimate carrying capacities for the black-footed ferret. Complexes were delineated from topographic maps and their juxtapositions and areas measured. On 4 of the colonies, we ran a total of 73 1-km x 3-m transects and tallied numbers of active (*i.e.*, fresh feces present) and inactive (*i.e.*, fresh feces absent) burrows. These data permitted calculation of prairie dog populations and allowed estimation of the number of ferret families that could be supported within each complex. The complex on Oklahoma Land Commission property in northwestern Cimarron County was comprised of 6 colonies on 594 ha. An estimated 16,167 prairie dogs within the complex could support about 21 ferret family groups (*i.e.*, 21 breeding females, their young of the year, and 10-11 males). The complex on Rita Blanca National Grassland in southwestern Cimarron County consisted of 8 colonies on 365.5 ha. We estimated a prairie dog population of 6,503 for that complex, which could support about 8.5 ferret family groups. Preliminary surveys of prairie dog colonies across the Texas state line revealed no colonies within a 7-km radius of other colonies, which is the maximum distance recommended by the Black-footed Ferret Interstate Coordinating Committee. A few colonies persisted across the Colorado state line on the Comanche National Grassland, but they were small and subject to routine control by the U.S. Forest Service. The long-term stability of black-tailed prairie dog populations in the Oklahoma Panhandle is threatened by sylvatic plague (*Yersinia pestis*) and in the long run by a possible sale of Oklahoma State Lands under consideration by the Oklahoma legislature.

REPORT CONTENT

I. OBJECTIVES

1. Begin to evaluate known black-tailed prairie dog (*Cynomys ludovicianus*) colonies in western Oklahoma as possible reintroduction sites for black-footed ferret (*Mustela nigripes*) using the guidelines established by the Black-footed Ferret Interstate Coordinating Committee.

2. Assess prairie dog colonies in the adjoining states of Texas, Colorado, and Kansas when such towns are within 7 km of those in Oklahoma.

3. If a complete assessment is not possible given the limited funding during the proposed project duration, prepare and submit a plan that outlines needs to be accomplished, additional evaluations, and project goals.

II. INTRODUCTION

The black-footed ferret once ranged throughout mixed grass and shortgrass regions of the plains from Texas to Canada. The species became endangered as a result of widespread eradication of prairie dogs, which deprived the ferret of food and shelter in burrow networks essential for its survival.

Following the disappearance of the last known ferret population in 1974, a series of extensive surveys failed to produce evidence that the species still survived. By chance, a population was discovered near Meeteetse, Wyoming, in September 1981 (Clark 1989). The population was estimated at 128 individuals and was studied until its demise from an outbreak of canine distemper in 1986. Eighteen surviving ferrets were captured and placed in a captive propagation program (Seal 1989). The present captive population is descended from those founders.

In Oklahoma, the historic range of the ferret presumably lay within the mixed grass and shortgrass prairies and encompassed roughly the western half of the main body of the State plus the Panhandle (Lewis and Hassien 1974, Caire et al. 1989). As prairie dogs were controlled or eradicated, ferrets declined in Oklahoma as elsewhere. A few ferrets may have occurred in the Oklahoma Panhandle as recently as the early 1970's; Lewis and Has-

sien (1974) found plugged burrows, trenches, and other signs similar to those made by ferrets in South Dakota. In addition, they concluded that 63 sightings of ferrets reported by local residents may have been authentic.

Although black-tailed prairie dogs have declined statewide, they have increased in recent years in the western half of the Panhandle. A 1967 survey revealed 3,809 ha of colonies throughout Oklahoma, of which 42% occurred in the Panhandle. Colonies in Cimarron County expanded by 45% by 1971 and in Texas County by an estimated 332% by 1973 (Lewis and Hassien 1973). By 1989, prairie dogs had increased over the 1967 levels by an estimated 705% in Cimarron County and 404% in Texas County (Shackford et al. 1990). Colonies in the Panhandle showed some instability, however, because only 39% of those mapped in 1967 survived through 1989 (Shackford et al. 1990).

As black-footed ferret numbers have increased in captivity, plans have been developed for reintroducing them into the wild in suitable prairie dog colonies. Biggins et al. (1989) drafted detailed methodology for evaluating prairie dog colonies and complexes as potential reintroduction sites. The method generates an estimate of the densities of active burrows within colonies and allows for linking colonies into complexes within the known movement radius of black-footed ferrets. A curvilinear formula is then used to convert burrow density into an estimate of prairie dog numbers. This methodology was developed for white-tailed prairie dogs (*Cynomys leucurus*) in the Meeteetse complex, where the last known wild population of black-footed ferrets occurred. The regression formula was recently modified to permit calculation of densities of black-tailed prairie dogs (D. Biggins, pers. commun.).

III. STUDY AREA AND METHODS

Following a detailed, statewide survey of prairie dog colonies in 1987-89 (Shackford et al. 1990), Shackford (1991) recommended 3 portions of Cimarron County, Oklahoma, and adjacent political units as potential reintroduction sites for black-footed ferrets. We focused our work on these areas. They included: (1) a complex of colonies that extends from just east of Boise City through the southeastern portion of Cimarron County and into western Texas County, Oklahoma; (2) a complex of colonies on public lands administered by the Oklahoma Land Commission (OLC) located in northwestern Cimarron County and possibly extending into the Comanche National Grassland across the Colorado state line;

and (3) a complex of colonies on Rita Blanca National Grassland (RBNG) in southwestern Cimarron County, possibly extending across the Texas state line. Funding for this project permitted preliminary assessments of these 3 complexes.

The OLC complex occurs on shortgrass prairie interspersed with canyons and mesas. Shallow, rocky soils render most of the complex unsuitable for cultivation. Cattle are grazed under contract with the OLC. In terms of roads and amount of vehicular traffic, the OLC complex is the most remote of the 3 surveyed. The RBNG complex consists of shortgrass prairie administered by the U.S. Forest Service. Federal holdings are interspersed with private lands at about a 1:1 ratio; some of the private lands are under cultivation. The U.S. Forest Service permits grazing of cattle under lease agreements. The complex in southeastern Cimarron County occurs principally on private land, virtually all of which is either under cultivation or grazed.

Maps and descriptive data from Shackford et al. (1990) and Shackford (1991) were used to locate prairie dog colonies. Individual colonies that we mapped retain the numbers originally assigned by Shackford (1991). Boundaries of colonies were plotted on USGS topographic maps (1:24,000) using a combination of permanent features, compass bearings, odometer distances, and distances measured by Rolatapes (*i.e.*, single-wheeled instruments that record distances traveled to the nearest m) . Dot grids were used to determine areas of colonies. Colonies were measured only if they were part of the same complex; *i.e.*, if they occurred $\leq$7 km of one another as specified by Biggins et al. (1989).

Burrow densities were measured along 1-km x 3-m transects that were systematically placed at 60-m intervals. Rolatapes were used to measure length of survey lines and distances between them. A 3-m wide strip of conduit pipe attached across each Rolatape (Biggins et al. 1989) helped determine if a given burrow was inside or outside of the transect. Whenever a burrow lay on the edge of a transect, it was counted only when $\geq$50% of its opening lay inside the line.

Although Shackford et al. (1990) and others have used a combination of criteria to distinguish between active and inactive burrows, the sole criterion used in our investigation was the presence of fresh prairie dog scat $\leq$0.5 m of the burrow's opening (Biggins et al. 1989). If no scats were found, or if only light-colored, dried scats were present, the burrow was tallied as inactive. "Good" habitat for ferrets within a black-tailed prairie dog colony

has $\geq$12 active burrows/ha (D. Biggins pers. commun.). The ratio of active:inactive burrows is considered to be a reliable indicator of the health of a colony (Biggins et al. 1989).

Conversion of active burrow densities to prairie dog densities is based on intensive field studies involving repeated observations of marked and unmarked animals. For white-tailed prairie dogs at Meeteetse, a curvilinear regression equation was used (Biggins et al. 1989). More recent studies on black-tailed prairie dogs have revealed that a simple linear regression through the origin (*i.e.,* 0.31625 x active burrow density) best estimates the relationship between active burrow densities and actual densities of prairie dogs (D. Biggins, pers. commun.).

Carrying capacity for black-footed ferrets is derived from the energetic requirements of a ferret family group, which consists of 1 breeding female, her young of the year, and 0.5 breeding males. These estimates take into account such factors as weights of prairie dogs, proportion of prairie dogs actually consumed, rates of production, rates of natural losses, and area requirements of ferrets. Taken together, these factors indicate that 1 ferret family group can be supported for every 763 prairie dogs in the mid-summer population (Biggins et al. 1989).

IV. RESULTS

We investigated the complex in southeastern Cimarron County and western Texas County and determined that it was not suitable for further consideration. Aside from a few scattered holdings by the Oklahoma Land Commission, the complex occurs on private ranchlands. We surveyed Shackford's (1991) Colony #109, one of the largest in the complex, and found that it had been reduced to only half the area reported. The owner told us that he routinely poisoned prairie dogs--the most likely reason for the colony's decline. In addition, we were denied permission to survey colonies on the area's largest ranch, which suggested negative attitudes toward prairie dogs and presumably toward ferrets. Overall, we could locate only about half of the colonies surveyed by Shackford in 1988-89 within this complex, which indicated considerable instability, likely caused by plague and/or by poisoning.

Given available funding, we were able to measure 4 prairie dog colonies encompassing 676.1 ha in June and July, 1991. We selected the largest colonies at the OLC and RBNG

complexes and were able to sample between 2.58 and 4.89% of their areas. Seventy-three 1-km x 3-m transects were run to assess densities of prairie dogs. Colony #32 in the OLC complex (Fig. 1) covered 457.3 ha. Forty-four of 45 transect lines on Colony #32 contained densities of $\geq$12 active burrows/ha, or high enough to be considered "good" ferret habitat (Biggins et al. 1989). Average density of active burrows was 95.9 $\pm$ 5.96 (95% C.I.)/ha for an estimate of 30.3 prairie dogs/ha. The total population for the colony was estimated at 13,550, or sufficient to support 17.8 ferret family groups (Table 1).

Colony #33 was located in the OLC complex (Fig. 1) and covered 67.5 ha. All 11 transects passed through "good" ferret habitat and densities of active burrows averaged 60.6 $\pm$ 18.59 (95% C.I.)/ha. Average density of prairie dogs was 19.2/ha, and the estimated population size for the colony was 1,296 or enough to support 1.7 ferret family groups (Table 1). The ratio of active:inactive burrows (1.18:1.00) on Colony #33 was less than that on Colony #32 (4.37:1.00). Substantially higher counts of active burrows occurred along the north and east sides of Colony #33 (the 2 most NE transects averaged 36 active burrows each, or 120/ha; the 2 most SW transects averaged 15 active burrows, or 50/ha).

Prairie dogs were present on the smaller colonies in the OLC complex (Fig. 1), but they were not censused. If their densities were the same as on Colony #33 (a conservative estimate), the 4 colonies would have a population of 1,334. The total population estimate for the complex would then be 16,167, or enough to support 21 ferret family groups (Table 2). Officials of the U.S. Forest Service supplied a recent map of prairie dog colonies on the Comanche National Grassland, Colorado. Only 1 colony of about 10 ha was within the 7-km radius of the OLC complex.

The complex at RBNG consisted of 7 colonies on 365.5 ha. On Colony #4, we tallied an average density of active burrows of 71.3 $\pm$ 17.49 (95% C.I.)/ha, or an average prairie dog density of 22.5/ha. The estimated population size for the colony was 1,308 (Table 2). The density of active burrows in Colony #20 was 73.7 $\pm$ 17.97 (95% C.I.)/ha, which was similar to that of Colony #4. The estimated population for the 81.5 ha colony was 1,375, or enough to support approximately 1.8 ferret family groups (Table 3).

Prairie dogs were observed but not censused on the other colonies within the RBNG complex. If their population densities were similar to those of colonies #4 and #20, the total prairie dog population for the complex would be 6,503, or sufficient to support 8.5 ferret family groups (Table 2; Fig. 2). Officials of the U.S. Forest Service from RBNG indicated

that a large colony had occurred on private land along a public road approximately 3-4 km south of #20 across the Texas state line. We were unable to locate the colony and concluded that it no longer existed. No other colonies were confirmed within the 7-km radius on the Texas side of the state line.

V. DISCUSSION

Our results using the standardized methods of Biggins et al. (1989) yielded higher estimates of prairie dog populations than did the methods used by Shackford et al. (1990). Although the 2 studies found generally similar densities of active burrows, Shackford et al. (1990) used Tyler's (1968) estimate of 9 prairie dogs/ha and employed the ratio of 9.8 burrows/prairie dog when determining densities of active burrows. The method that we used was based on mark-recapture studies (D. Biggins, unpubl. data) and relied on direct conversion of active burrows to prairie dogs by multiplying the former by 0.31625. Our estimate of the population size for Colony #32 was 13,550 but Shackford et al.'s (1990) methods would estimate 4,116 by the area of Colony #32 or 4,461 based on burrow counts.

The Black-footed Ferret Interstate Coordinating Committee provides guidelines to compare complexes relative to their suitability for reintroduction of ferrets (Biggins et al. 1989), but some of the criteria are subjective (*e.g.,* future resource conflicts) and for others, we lack specific data to make judgements (*e.g.,* canine distemper potential, abundance of other predators). Therefore, in our assessment, we used 3 criteria to compare the OLC and RBNG complexes. The first criterion was the minimum guideline of 400 ha for the sum total of the areas occupied by colonies in a complex (Biggins et al. 1989). The second was an estimate of the minimum size (80) for a black-footed ferret population to have a 95% chance of persisting for 100 years (Harris et al. 1989). Under isolated conditions, small populations face high risks of extinction for demographic and/or genetic reasons. Black-footed ferrets are especially susceptible to common infectious diseases, including rabies and canine distemper, which adds to the risk of extinction in small, isolated populations. Our third criterion compared changes in the areas occupied by colonies between Shackford's (1991) surveys of 1988-89 and ours.

At 594.4 ha, the area of colonies in the OLC complex exceeds the 400 ha minimum. Twenty-one ferret family groups converts to about 84 animals [21 females plus litters totaling about 52.5 (2.5/female) and 10.5 males], which meets the minimum size for a reasonable

chance of persistence. Since Shackford's survey, the area occupied by the 6 colonies within the OLC has increased by 74% (Table 4).

The RBNG complex totaled 365.5 ha of colonies, or just less than the 400 ha recommended by the Interstate Coordinating Committee. The 400 ha minimum, however, was developed for white-tailed prairie dogs, and black-tailed prairie dogs typically occur at higher population densities (D. Biggins, pers. commun.). Moreover, we did not inspect or include a 187 ha (Colony #5) reported by Shackford (1991) because it occurred on private land and was peripheral to the main complex. It did, however, lie within 7 km of the complex and if it still exists, could increase the complex's potential. Excluding Colony #5, the estimated carrying capacity for ferrets at RBNG (*i.e.*, 8.5 family groups or approximately 34 animals) is less than half the minimum size recommended by Harris et al. (1989). Between Shackford's survey and ours, the total area occupied by colonies within the RBNG complex declined by approximately 2% (Table 4). This decline appears largely due to a 32% loss of colony area on private lands within the complex, enough to offset the 20% gain in colony area on U.S. Forest Service holdings (Table 4).

Although the OLC complex exceeds the RBNG complex by all three criteria, the OLC complex is threatened in 2 ways. First, plague was confirmed during summer 1991 in Cimarron County through Oklahoma's first known human case, which apparently was contracted northeast of Boise City on private land (J. Clark, Okla. Land Comm., Cimarron Co., pers. commun.). The spatial distribution of active burrow densities and the low ratios of active:inactive burrows on Colony #33 suggest that plague may have occurred during our survey. A. Barnes (Centers for Disease Control, Fort Collins, Colo., pers. commun.) estimated that plague will kill at least 99% of the population of a black-tailed prairie dog colony. Second, the long-term stability of the OLC complex could be threatened by proposed sale of the state school lands under consideration by the Oklahoma legislature. No final decision has been reached, but if these lands are sold, the OLC complex might be purchased by The Nature Conservancy or the Oklahoma Department of Wildlife Conservation, which would greatly enhance their suitability for ferret reintroduction.

V. MANAGEMENT SUGGESTIONS

If reintroduction of black-footed ferrets is to be considered further in Oklahoma, we believe that efforts should be directed primarily toward the OLC complex because it (1) meets the minimum area requirement established by the Black-footed Ferret Interstate

Coordinating Committee, (2) could support a minimum viable population of about 80 ferrets, and (3) appears to be expanding while the RBNG complex is stable or declining. Additionally, all of the colonies on the OLC complex are presently on public land, in contrast to >40% of the colonies on the RBNG complex in private ownership (the National Grassland is a patchwork of federal and private land). However, plague threatens the OLC complex and its effects on prairie dog abundance throughout the complex needs to be monitored closely. D. Biggins (pers. commun.) suggested that the complex be checked during summer 1992.

Our findings suggest that the application of Biggins' et al. (1989) survey methodology at prairie dog colonies that are not associated with ($\leq$7 km) the OLC and RBNG complexes is unjustified. The OLC and RBNG complexes are the largest known in Oklahoma and the only ones of suitable size for ferret reintroduction efforts. The comparison of our observations with Shackford's (1991) clearly indicate that prairie dog colonies can change in size considerably over a relatively short time. As such, it is important to continue to monitor the size, stability, and spatial distribution of the colonies within the OLC and RBNG complexes. If funding remains limited in the future, we believe that such extensive monitoring is more important than intensive measurements of prairie dog numbers. However, intensive monitoring may be useful in assessing a colony for plague (Biggins et al. 1989).

Even though the OLC complex is the most extensive prairie dog complex in the state, it is small in relation to complexes in the Intermountain West. Clark (1989) reported that the combined areas of colonies within complexes in Utah and Wyoming averaged 2,913 ha (range 566-4,298; N = 8). Eventually, though, the U.S. Fish and Wildlife Service and cooperating state agencies may want to try to re-establish at least 1 ferret population within the southern portion of the species' original range. When that happens, the key criterion will be the ferret carrying capacity of the OLC complex compared with those in Texas, Kansas, New Mexico, and southern Colorado, rather than Utah, Wyoming, Montana, or South Dakota.

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ACKNOWLEDGMENTS

Bill McAbee labored long and hard under difficult field conditions to help collect data. We thank John Shackford for his advice in planning this field investigation. Jay Clark of the Oklahoma Land Commission provided guidance and important back-ground information for those of us from "downstate". Riche Gonzalez and Glenn Reagan of the Rita Blanca National Grassland provided detailed maps of prairie dog colonies on federal land and on adjacent private land. Rowdy Wood of the Comanche National Grassland furnished maps of prairie dog colonies and information on management practices. Richard Hitchings graciously allowed us to survey prairie dog colonies on his land.

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Table 1. Estimated densities of burrows and prairie dogs in colonies #32 and #33, Oklahoma Land Commission Complex, Cimarron County, Oklahoma.

	#32	#33
Proportion in "good" habitat (%)	97.8	100
Area (ha)	457.3	67.5
No. total transects	45[a]	11
% colony sampled	2.95	4.89
Mean density of active burrows/ha	95.9	60.6
95% confidence intervals of active burrows/ha	89.6-101.6	42.0-79.2
Ratio of active:inactive burrows	4.37:1.00	1.18:1.00
Estimated average prairie dog density/ha	30.3	19.2
Estimated prairie dog population	13,550	1,296
No. ferret family groups that could be supported	17.8	1.7

[a]One transect yielded results below the minimum acceptable density for "good" ferret habitat and were not included in subsequent calculations (Biggins et al. 1989).

Table 2. Comparison of prairie dog complexes in Cimarron County, Oklahoma.

	Oklahoma Land Commission	Rita Blanca Nat. Grassland
Area of complex (ha)	2,946	5,992
Total area of colonies (ha)	594.3	365.5
% of complex in colonies	20.2	6.0
No. of colonies	6	8
Estimated no. of prairie dogs	16,167	6,503
No. ferret family groups that can be supported		
-on largest colony	17.8	1.8
-on entire complex	21.2	8.5

Table 3. Estimated densities of burrows and prairie dogs in colonies #4 and #20, Rita Blanca National Grassland, Cimarron County, Oklahoma.

	#4	#20
Proportion in "good" habitat (%)	83.3	72.7
Area (ha)	69.8	81.5
No. total transects	6[a]	11[b]
% colony sampled	2.58	4.05
Average density of active burrows/ha	71.3	73.3
95% confidence intervals of active burrows/ha	53.8-88.8	57.3-89.3
Ratio of active:inactive burrows	2.05:1.00	3.06:1.00
Estimated average prairie dog density/ha	22.5	23.2
Estimated prairie dog population	1,308	1,375
No. ferret family groups that could be supported	1.7	1.8

[a]One transect yielded results below the minimum acceptable density for "good" ferret habitat and were not included in subsequent calculations (Biggins et al. 1989).

[b]Three transects yielded results below the minimum acceptable density for "good" ferret habitat and were not included in subsequent calculations (Biggins et al. 1989).

Table 4. Changes in areas (ha) occupied by prairie dog colonies in the OLC and RBNG complexes between Shackford's (1991) surveys and this study.

Complex(Owner)	Colony No.	Area (ha) 1988-89	Area (ha) 1991	% Change
OLC (Okla. Land Comm.)	31	7.9	16.3	+106
OLC (Okla. Land Comm.)	32	246.5	457.3	+ 86
OLC (Okla. Land Comm.)	33	56.7	67.5	+ 19
OLC (Okla. Land Comm.)	34	7.4	15.1	+104
OLC (Okla. Land Comm.)	49	15.3	10.9	- 29
OLC (Okla. Land Comm.)	51	8.7	27.2	+213
Total OLC		342.5	594.3	+ 74
RBNC (U.S. For. Serv.)	4[a]	40.8	41.9	+ 3
RBNG (U.S. For. Serv.)	6	59.4	34.9	- 41
RBNG (U.S. For. Serv.)	9[a]	44.8	83.8	+ 87
RBNG (U.S. For. Serv.)	18	28.6	18.6	- 35
RBNG (USFS)	20	44.2	81.5	+ 84
Subtotal RBNG-U.S. For. Serv.		217.8	260.7	+ 20
RBNG (Private)	7	56.5	30.3	- 46
RBNG (Private)	16	30.7	4.7	- 85
RBNG (Private)	19	67.2	69.8	+ 4
Subtotal RBNG-Private		154.4	104.8	- 32
Total RBNG		372.2	365.5	- 2

[a]Reported as private by Shackford (1991) but in 1991 found predominantly on USFS land.

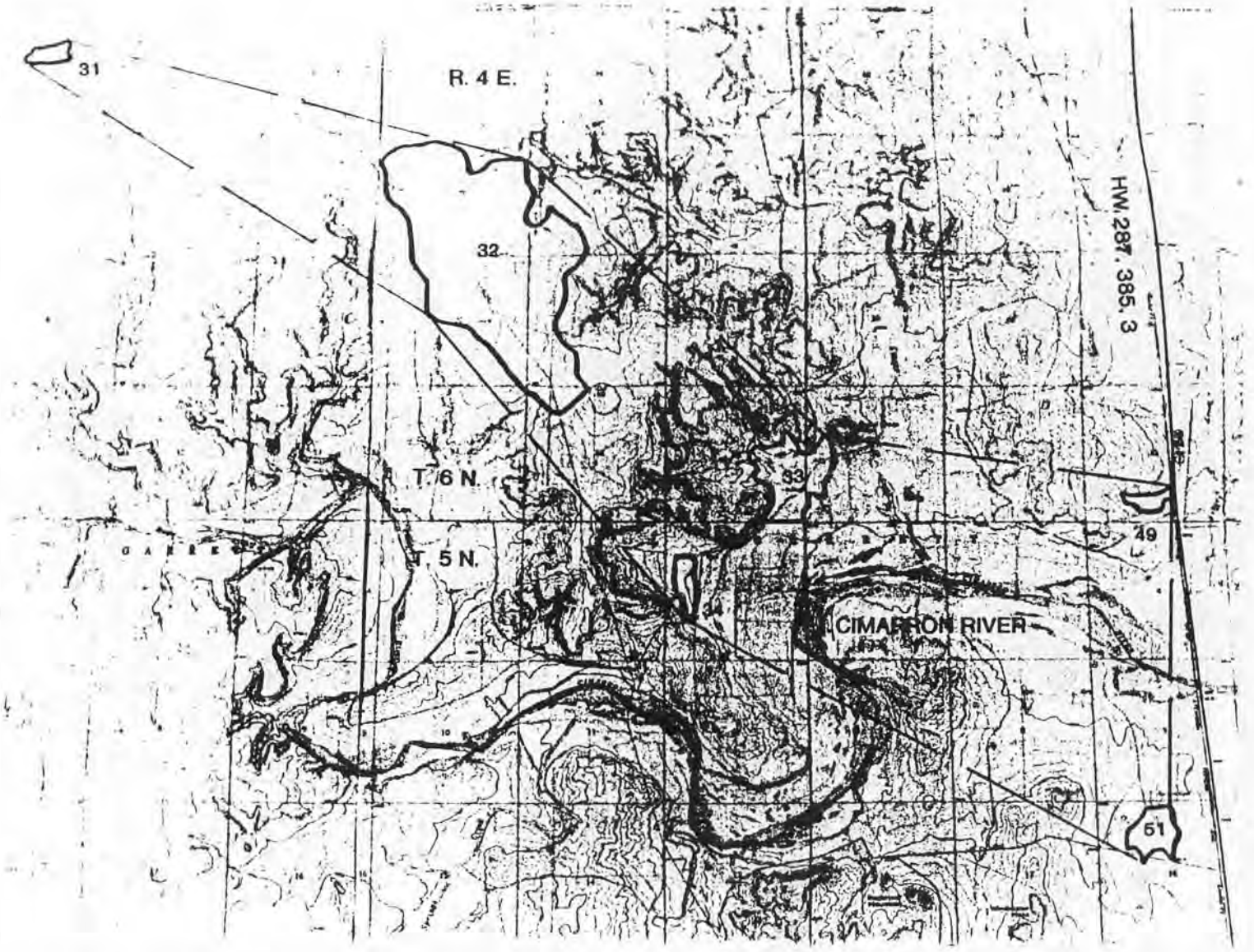

Fig. 1. The Oklahoma Land Commission prairie dog complex (broken line) and its colonies (solid lines) as measured in June and July 1991, Cimarron County, Oklahoma. Legal descriptions and colony numbers correspond to those found in Shackford (1991).

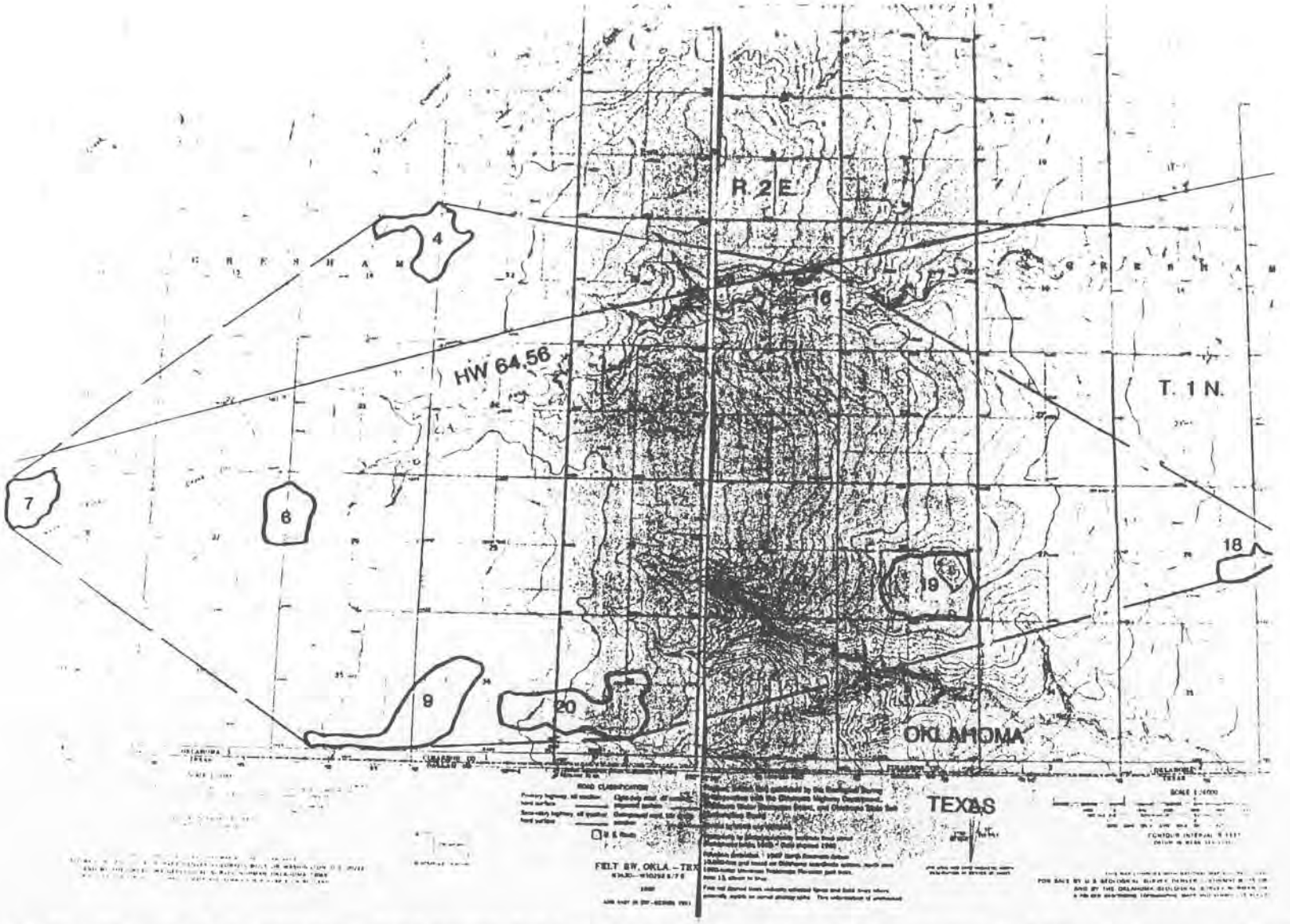

Fig. 2. The Rita Blanca National Grassland prairie dog complex (broken line) and its colonies (solid lines) as measured in June and July 1991, Cimarron County, Oklahoma. Legal descriptions and colony numbers correspond to those found in Shackford (1991).