

Raptors of Boulder Valley Ranch Population
OSMP Studies 4923



Jones, Stephen

RAPTORS OF BOULDER VALLEY RANCH
POPULATION TRENDS: 1980-1982

Stephen Jones
For Boulder Audubon Society,
Boulder Citizens for Open Space

ACKNOWLEDGEMENTS:

Thanks to Tom and Ridi Van Zandt, who provided data from the Boulder County Wildlife Inventory, and to Betsy Chronic, Karen Aronsen, and Sandra McNew, who helped with some of the field research.

Stephen Jones

January 28, 1983

RAPTORS OF BOULDER VALLEY RANCH: POPULATION TRENDS,
1980-1982

I. INTRODUCTION

Boulder Valley Ranch has long been one of the most productive raptor habitats in Boulder County. It is a nesting area for great horned owls, red-tailed hawks, and burrowing owls; a roosting area for northern harriers; and a hunting area for golden eagles, ferruginous hawks, rough-legged hawks, prairie falcons, and kestrels.

In March and April of 1981, approximately 2,000 prairie dogs were illegally poisoned with strychnine on the ranch property. Several song-birds and one red-tailed hawk were found dead near the poisoned burrows.

At the time there was considerable debate about the long range effects of this poisoning on the raptor population. Since I had spent several hundred hours at Boulder Valley Ranch observing raptors during previous years and had made raptor counts in October of 1980 and April of 1981, I decided to conduct a study of population trends and predator-prey relationships.

Not surprisingly, this study raised more questions than it answered about the effects of prairie dog poisoning and other management practices at the ranch on the raptor population; but it did reveal trends and relationships which bear watching

in future years.

II. THE STUDY AREA

The study area includes most of the western half of Boulder Valley Ranch and about 100 acres of private land to the south (see Map 1).^{*} This is the area that was covered by the October 1980 and April 1981 counts. It contains several great horned owl and red-tailed hawk nesting sites, and at least one burrowing owl nesting site. It also includes what has been historically one of the largest northern harrier roosting sites in Boulder County.

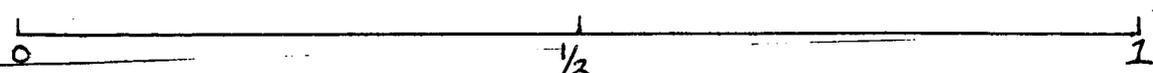
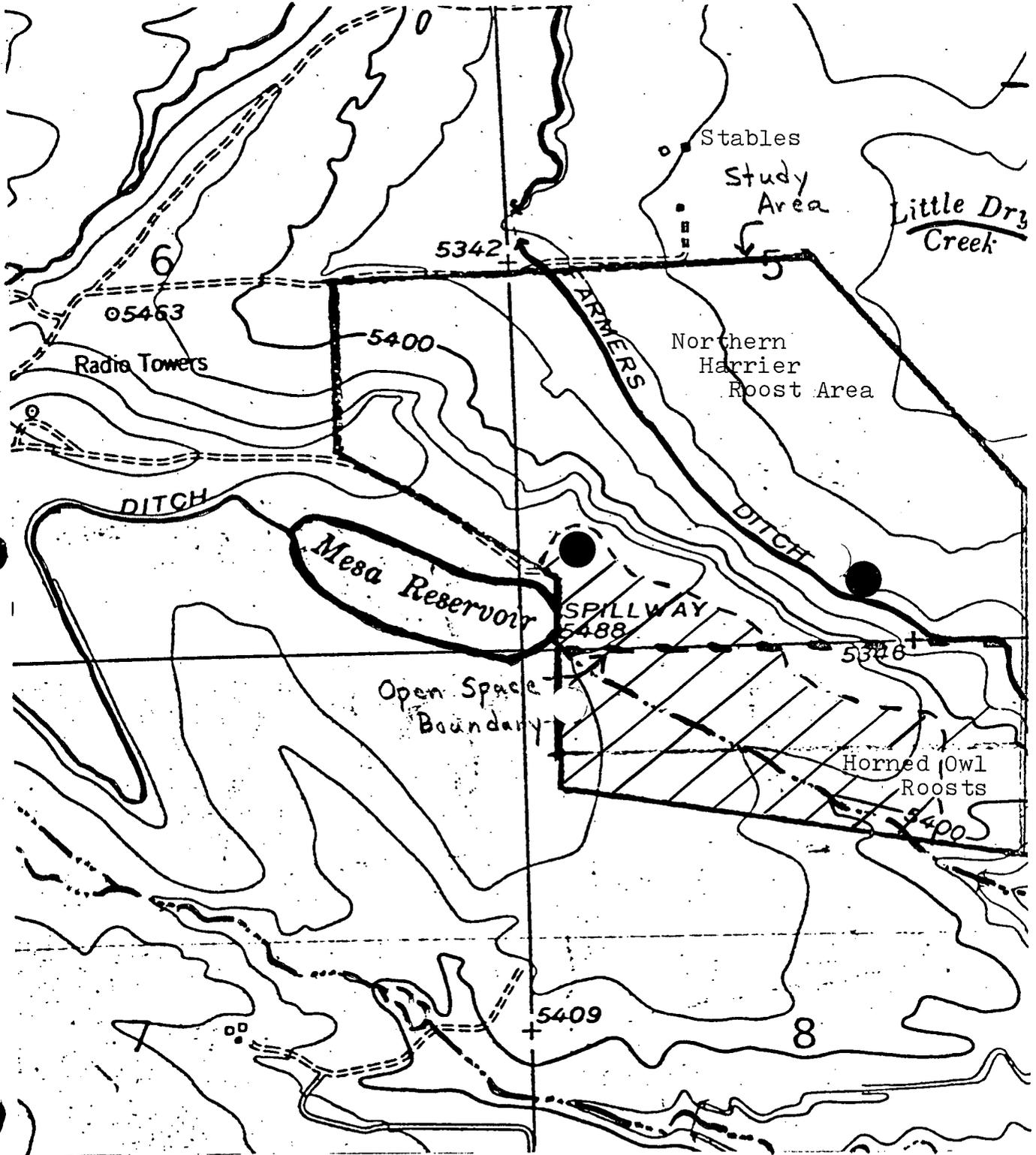
The area is mostly pasture and grassland, with foothills shrub and plains riparian ecosystem interspersed. A large prairie dog town is located in the southern section of the study area, covering most of the private property and extending into the open space. The pasture to the east of Farmer's Ditch once supported a prairie dog colony which was completely eliminated by the poisoning in spring, 1981.^{**} Other mammals found in the area include jackrabbits and cottontails, deer mice and meadow mice (voles), and thirteen-lined ground

^{*}There are few trees on the eastern portion of the ranch. Thus, the western half includes 80 to 90 percent of the roosting sites for raptors.

^{**}The area that was poisoned includes the prairie dog colony between Farmer's Ditch and the edge of the study area, and a much larger prairie dog colony immediately east and north-east of the study area. The colony near Farmer's Ditch had been controlled (some poisoning with zinc phosphide) by the city in previous years.

STUDY AREA: BOULDER VALLEY RANCH

- Horned Owl nesting site
- Red Tailed Hawk nesting site
- Burrowing Owl nesting site
- /// Prairie Dog colony



Scale = 1" = 980'

squirrels. Coyotes and red foxes are also found irregularly in the study area.

III. METHODS

In October 1980, October 1981, and October 1982, I made systematic counts of the raptors in the study area. In November, 1982, I collected pellets and examined their contents to see what the raptors had been eating.

The method of the count was predetermined by the methods used in October, 1980, prior to the poisoning incident. I walked a two-mile course beginning at the north end of the ranch, following Farmer's Ditch to the southeast, crossing the open space boundary, and then circling back, east of Mesa Reservoir. Raptors were marked on the map according to where they were first sighted, or, if they were first sighted outside the study area, according to where they first entered the study area. All counts were made between the last week in September and the second week in November to correspond as closely as possible with the dates of the October 1980 census. In 1980 two counts had been made. In both 1981 and 1982, five counts were made.

To check the accuracy of my counts for 1981 and 1982, I walked the route several times with other observers. Their sightings corresponded closely with my own. Also, to minimize the variability resulting from changing weather conditions and time of day, I made all the counts between 12 noon and 4 p.m. on days when the temperature exceeded 45 degrees and the wind

velocity was low.

In November, 1982, I walked all the fence lines within the study area. Wooden fence posts serve as butcher blocks for raptors.* I collected pellets and bone fragments from these roosting sites. By analyzing skull fragments of the prey I was able to make a rough determination of what the raptors had eaten that fall.

IV. DESCRIPTION OF RAPTORS

1. Northern Harrier (Marsh Hawk): For several years northern harriers have roosted in the cottonwoods along and to the east of Farmer's Ditch. Northern harriers are communal roosters. Often, large numbers will roost in a single site and then fan out in the evening to hunt as far as five miles away.

Many of the northern harriers at Boulder Valley Ranch hunt in the marshes surrounding Boulder Reservoir. Their preferred food is meadow mice, although they have often been observed hunting in and around prairie dog colonies.

Although some northern harriers nest in Boulder County, they are most abundant during the fall and spring migrations, and they are usually more abundant in winter than in summer.

2. Red-tailed Hawks: Red-tailed hawks are common in Boulder County during migration. During the past few years some

*I decided it would be too time consuming to look under the roost trees as well. Some raptors may prefer trees to fence posts, so this might skew the results.

have over-wintered at Boulder Valley Ranch. In addition, a pair of red-tailed hawks has nested successfully at BVR each of the past two years.

Red-tailed hawks prey mostly on small rodents, especially mice and voles. I have not observed them preying on prairie dogs.

3. Rough-legged hawks: This is another winter resident. Rough-legged hawks usually arrive some time in September and stay into April. Their nesting grounds are far to the north in the Arctic tundra.

Their preferred foods are similar to those of red-tailed hawks.

4. Ferruginous Hawk: This largest of North American hawks preys on a variety of rodents, including prairie dogs. Ferruginous hawks are uncommon in Boulder County in summer, but fairly large numbers are often seen in winter.

5. Golden Eagles: Golden Eagles fly down from the foothills to Boulder Valley Ranch specifically to hunt prairie dogs. A golden eagle eyrie is located in Buckingham Park, approximately four miles northwest of the ranch. The eagles nesting in this eyrie feed their young a diet consisting almost exclusively of prairie dogs. Nevertheless, eagles are only occasionally sighted at BVR, probably because of their shyness of people.

6. Great Horned Owl: Great horned owls have nested at BVR for several years, occupying year-old red-tailed hawk nests.

They feed on almost anything, including mice, prairie dogs, squirrels, crows, and even skunks. The horned owls at BVR commonly roost in the cottonwoods just south of the open space boundary. Here, they appear to make a rather easy living hunting young prairie dogs each spring. In summer, 1980, I found more than 50 prairie dog skulls lying under a favorite horned owl roost tree.

7. Burrowing Owl: Burrowing owls were observed nesting in the study area on the mesa near Mesa Reservoir in 1980 and 1981. No observations were made in summer, 1982, so it is not known whether they nested there that year. Burrowing owls are summer residents only (May 1-September 30). They subsist on insects, small rodents and small birds.

8. Prairie Falcon: Prairie falcons have been sighted in the area, but they are uncommon.

9. Kestrel: Kestrels are rather common in Boulder County throughout the year. A number were sighted in the study area in 1980, but none were sighted in 1981 and 1982. Their favorite foods are insects, small rodents, and small birds.

V. RESULTS

In 1980 a total of eight species and 31 individuals were sighted in two observations. This is an average of 15.5 individuals per count. In 1981 five species and 29 individuals were sighted in five observations. This is an average of 5.8 individuals per count. In 1982 four species and 13 individuals were sighted in five counts. This is an average of 2.6

TABLES I AND II

BOULDER VALLEY RANCH RAPTOR POPULATION: 1980--1982

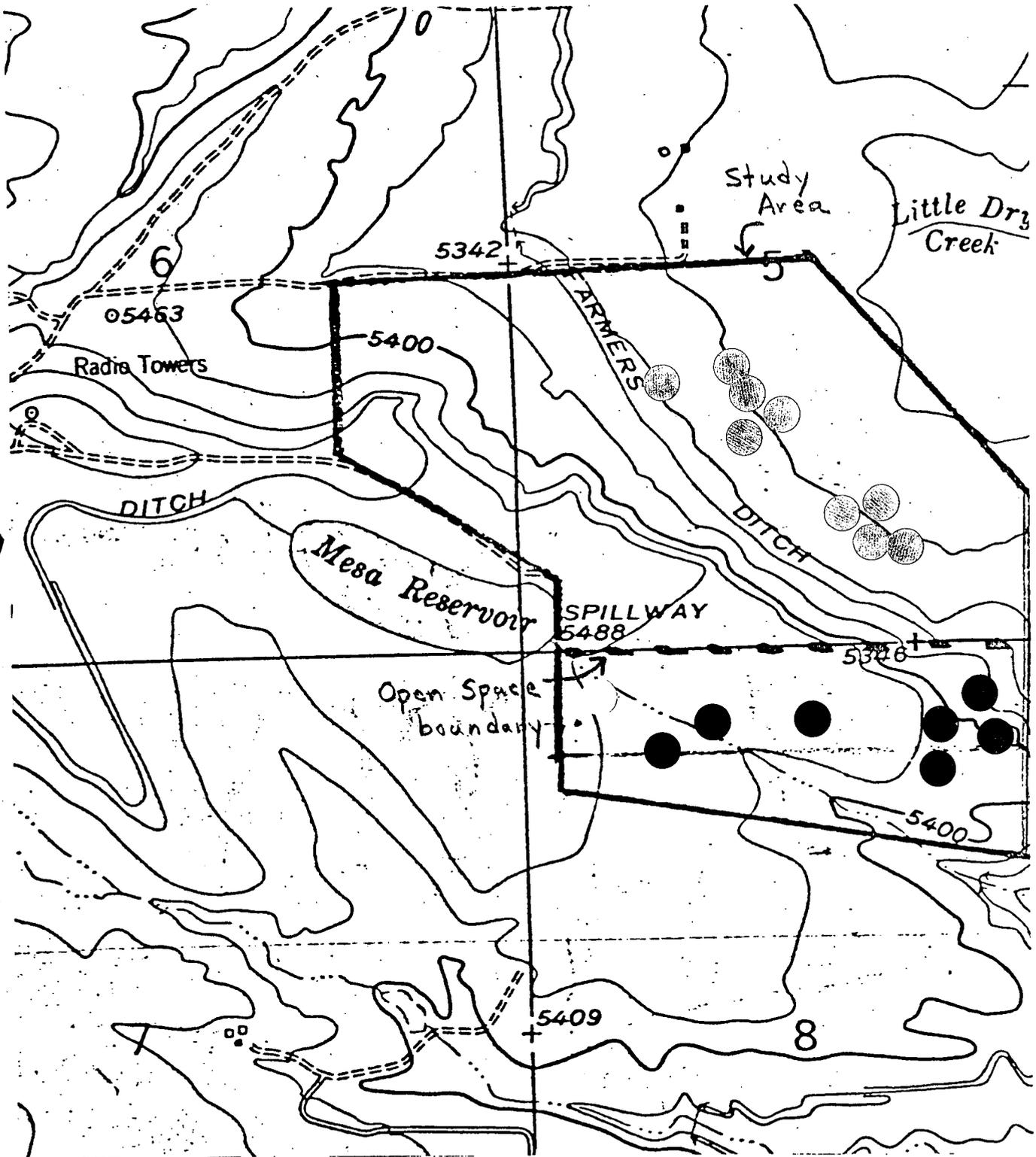
Date	Northern Harrier	Red Tailed Hawk	R. Legged Hawk	Ferrug. Hawk	Horned Owl	Kestrel
10/8/80	5	2	2	1	1	4
10/15/80	4	2	1	-	3	3
1980 Avg.	<u>4.5</u>	<u>2.0</u>	<u>1.5</u>	<u>.5</u>	<u>2.0</u>	<u>3.5</u>
10/4/81	3	1	-	-	-	-
10/10/81	4	-	2	1	1	-
10/11/81	4	-	2	1	-	-
10/18/81	2	1	2	-	1	-
9/27/81	-	3	-	-	1	-
1981 Avg.	<u>2.6</u>	<u>1.0</u>	<u>1.2</u>	<u>.4</u>	<u>.6</u>	-
10/11/82	-	-	-	1	-	-
10/18/82	-	3	2	-	-	-
10/25/82	-	2	-	-	-	-
11/1/82	-	-	-	1	2	-
11/8/82	-	1	-	-	1	-
1982 Avg.	-	<u>1.2</u>	<u>.4</u>	<u>.4</u>	<u>.6</u>	-

Other sightings; 1980, prairie falcon (2), golden eagle (1).

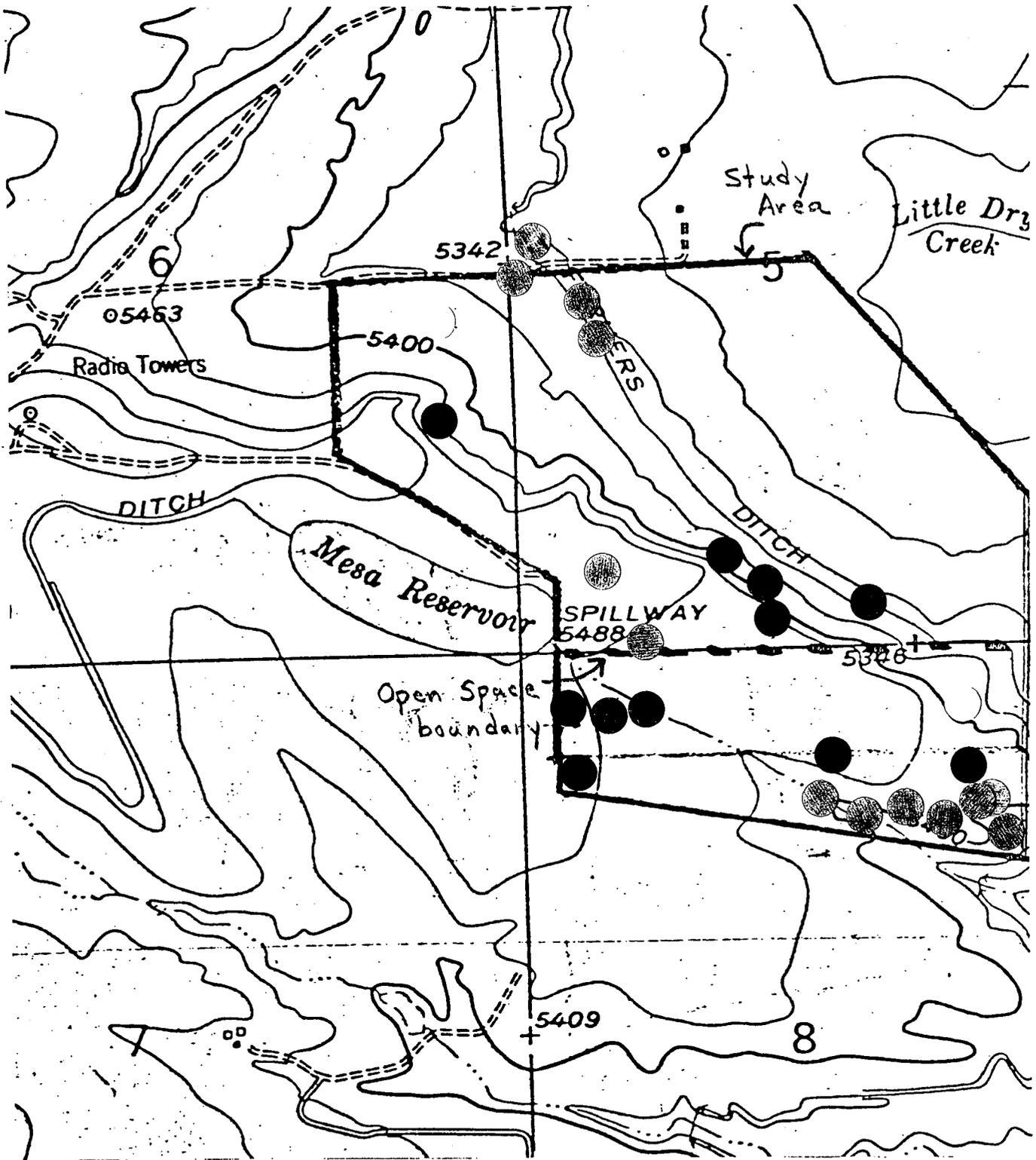
TOTAL RAPTORs: 1980--1982

Year	Harrier	Buteos	Owls	Falcons	Eagle
1980	4.5	4.0	2.0	4.5	.5
1981	2.6	2.6	.6	-	-
1982	-	2.0	.6	-	-
Avg.	1.8	2.6	.8	.7	.1

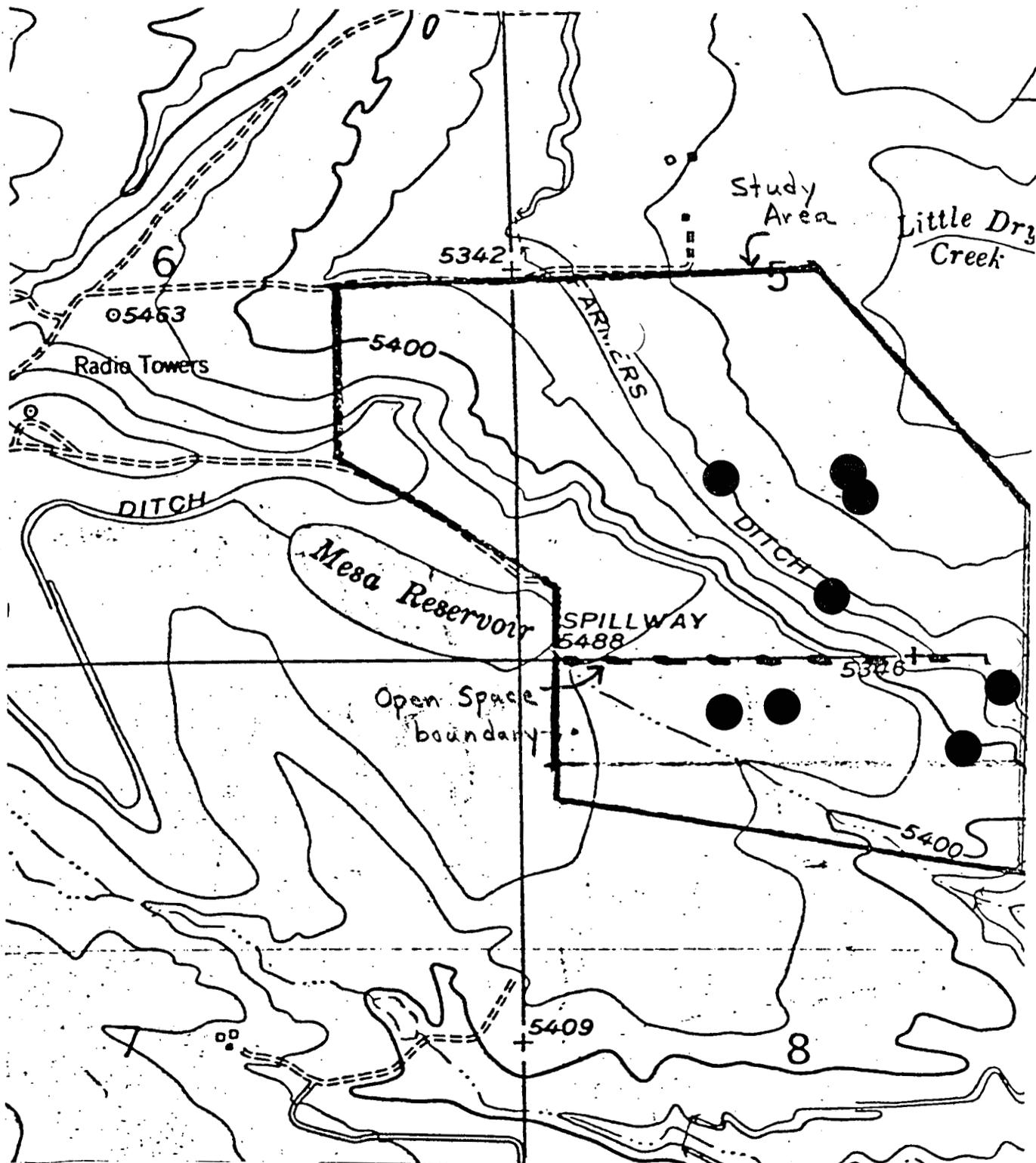
- Northern Harrier
- Red Tailed Hawk
- Rough Legged Hawk
- Ferruginous Hawk



- Northern Harrier
- Red Tailed Hawk
- Rough Legged Hawk
- Ferruginous Hawk



- Northern Harrier
- Red Tailed Hawk
- Rough Legged Hawk
- Ferruginous Hawk



individuals per count.

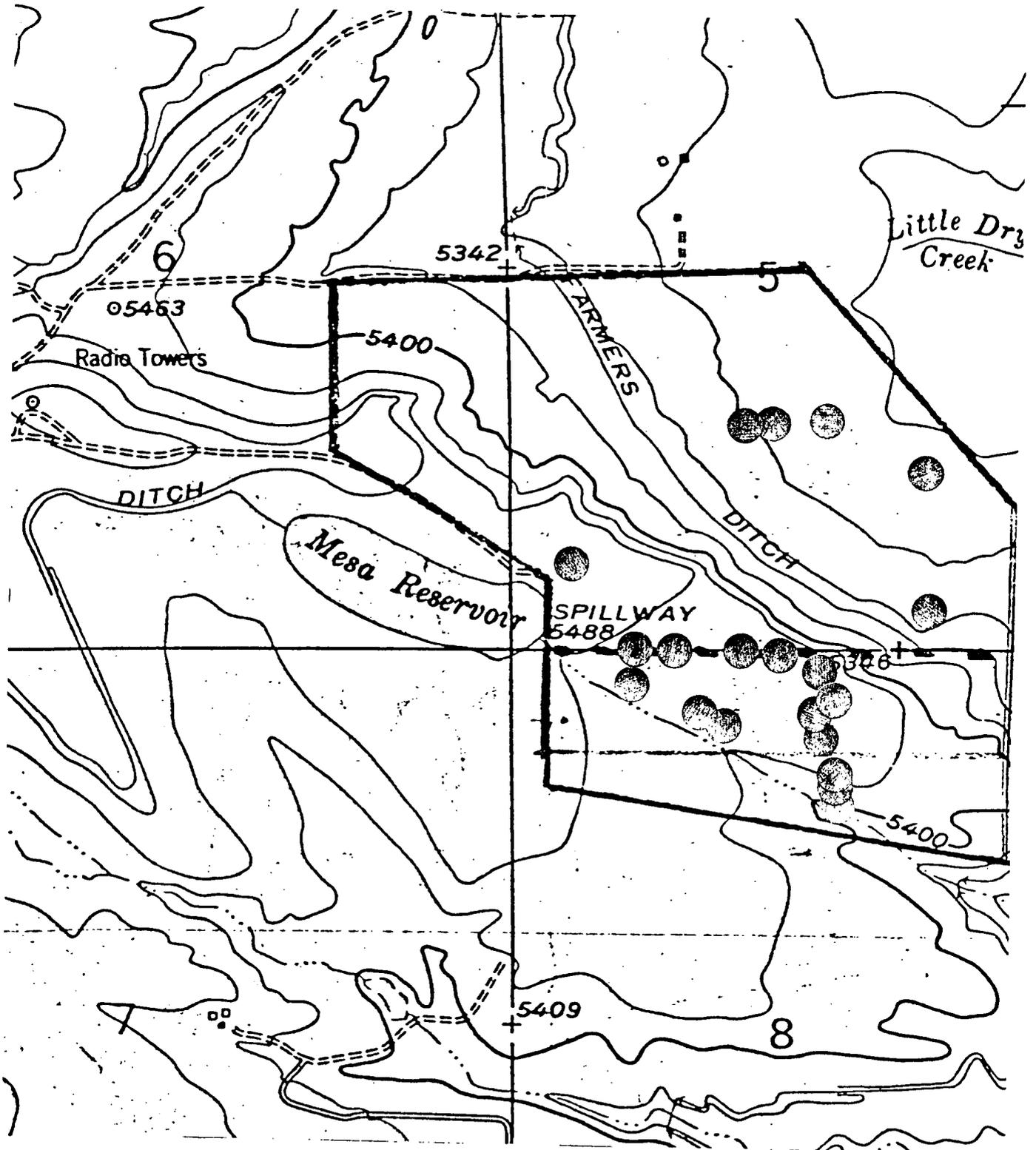
The most striking decline was in the number of kestrels and harriers sighted. Kestrels declined from 3.5 per count in 1980 to zero in 1981 and 1982. Harriers declined from a per count average of 4.5 in 1980 to 2.6 in 1981 to zero in 1982. Additionally, there was a slight decline in the overall buteo population, and a decline in the number of species sighted.

Raptors were fairly evenly distributed over the study area, with the largest numbers over three years concentrated in the private land south of the open space boundary. However, there was a noticeable change in distribution of individual species from year to year. After 1980, the northern harriers abandoned their traditional roosting area (which they had occupied for at least four years). In 1981 the only sightings of northern harriers occurred along the north and south limits of the study area. In 1982, no northern harriers were sighted in the study area. By fall, 1982, it appeared that red-tailed hawks, and perhaps ferruginous hawks, were beginning to move into the area formerly occupied by harriers (the cottonwoods along and to the east of Farmer's Ditch).

Analysis of pellets and bone fragments found prairie dogs to be the most popular food, with mice and voles a close second. The results are given below:

prairie dogs	15
mice and voles	13
rabbits	2

PELLETS (ROOSTING SITES): NOV., 1982



song birds	1
various insects	approx. 10

Pellets were most concentrated along and to the south of the southern open space boundary. The least number of pellets was found along the fence lines close to Longhorn Road and to the stables.

VI. DISCUSSION

A number of explanations for the decline in harriers and kestrels at BVR suggest themselves, and we will consider them one by one.

1. County-wide Raptor Population Trends

To see if the decline in raptors, and especially harriers and kestrels, merely reflected county-wide population trends, I examined reports from the Boulder Audubon Wildlife Inventory for October 1980, 1981, and 1982. The figures are shown in Tables 3, 4, and 5.

It appears from these figures that the population trends at BVR basically mirrored the county-wide population trends. The Boulder Wildlife Inventory reports show a dramatic decline county-wide in harriers and kestrels and a significant decline in buteos. There are some problems, however, with the Boulder Wildlife Inventory figures. First, the counting method for 1980 (bi-monthly) was different from that of 1981 and 1982 (monthly). Second, the Audubon Inventory is rather informal: there are no controls on the number of hours of observation

TABLES III, IV, AND V

BOULDER AUDUBON WILDLIFE INVENTORY: 1980--1982*

Date	Northern Harrier	Red Tailed Hawk	R. Legged Hawk	Ferrug. Hawk	Horned Owl	Kestrel
10/80	46	107	12	24	1	38
10/81	15	51	2	13	1	17
10/82	14	16	14	3	5	22

AUDUBON INVENTORY TOTAL RAPTORS

Date	Harrier	Buteos	Horned Owl	Falcons	Eagle
10/80	46	143	1	43	10
10/81	15	66	1	22	4
10/82	4	23	5	3	2

AUDUBON INVENTORY: RANDOM SPECIES

Date	Mallard	Harrier	Rock Dove	Crow	House Finch
10/80	3,237	46	620	881	67
10/81	523	15	139	381	46
10/82	472	4	73	252	93

*An informal, non--scientific count conducted each month by members of Boulder Audubon.

or the number of individuals reporting sightings.

Looking at the figures in Table 4 it is hard not to arrive at the conclusion that more counting was done in 1980 than in the other two years. To test this I randomly chose four common species found in Boulder County and looked at their numbers in the Wildlife Inventory (Table 5). You can see that the population figures for all of these species were significantly higher (as much as six times) in 1980 than in 1981.

To adjust the Wildlife Inventory data for fluctuations in the amount of counting and reporting that was done annually, I figured raptors as a percent of the total number of birds counted for each year. The result is the raptor population index shown in Table 6.

As you can see from Table 6, even with the adjustment for "over counting" in 1980, the figures still show a sharp decline in raptor sightings in Boulder County. This is particularly true for northern harriers and kestrels. Also, the county-wide figures correspond roughly to those for the study area.

If the Boulder Wildlife Inventory figures are accepted as accurate, we can conclude that a significant cause of the population decline observed at BVR was a general decline in Boulder County's raptor population.

2. Decline in Meadow Mouse Population

Over the three years of the study I noticed an apparent decline in the population of meadow mice at Boulder Valley Ranch.

TABLE VI

RAPTOR INDEX: 1980--82.

<u>Year</u>	<u>Harrier</u>		<u>Buteo</u>	
	<u>County*</u>	<u>Study Area</u>	<u>County**</u>	<u>Study Area</u>
1980	100	100	100	100
1981	79	58	109	65
1982	21	0	40	50

* Based on $\frac{\text{Harriers}}{\text{Total Birds}}$, Audubon Inventory.

** Based on $\frac{\text{Buteos}}{\text{Total Birds}}$, Audubon Inventory.

In spring and fall, 1980, low-lying regions of the study area were literally honey-combed with meadow mouse runways. By 1982 runways were hard to find. It is well known that meadow mouse populations are subject to wild fluctuations, and that raptors (particularly northern harriers and the smaller hawks) tend to congregate where meadow mice are most abundant. This is particularly true with respect to northern harriers, who often depend on microtus as their primary food supply

Although local practices, such as poor range management and draining of marshy areas, could impact microtus populations, the county-wide decline of northern harriers leads one to suspect that the meadow mouse decline may also be county-wide.

It should be noted here that the above conclusions appear, at first glance, to contradict the pellet analysis which shows raptors consuming more prairie dogs than mice and voles at BVR. However, pellets were collected only in November 1982, presumably a down year for meadow mice. It is likely that pellet contents would be different in years when the meadow mouse population was high. Further study is needed to bear this out.

3. Weather

In October 1980 and October 1981, temperatures were well above average, whereas in October, 1982, they were below average. Raptor populations are likely to be highest in periods of warm weather when soaring conditions are better and prey are more active.

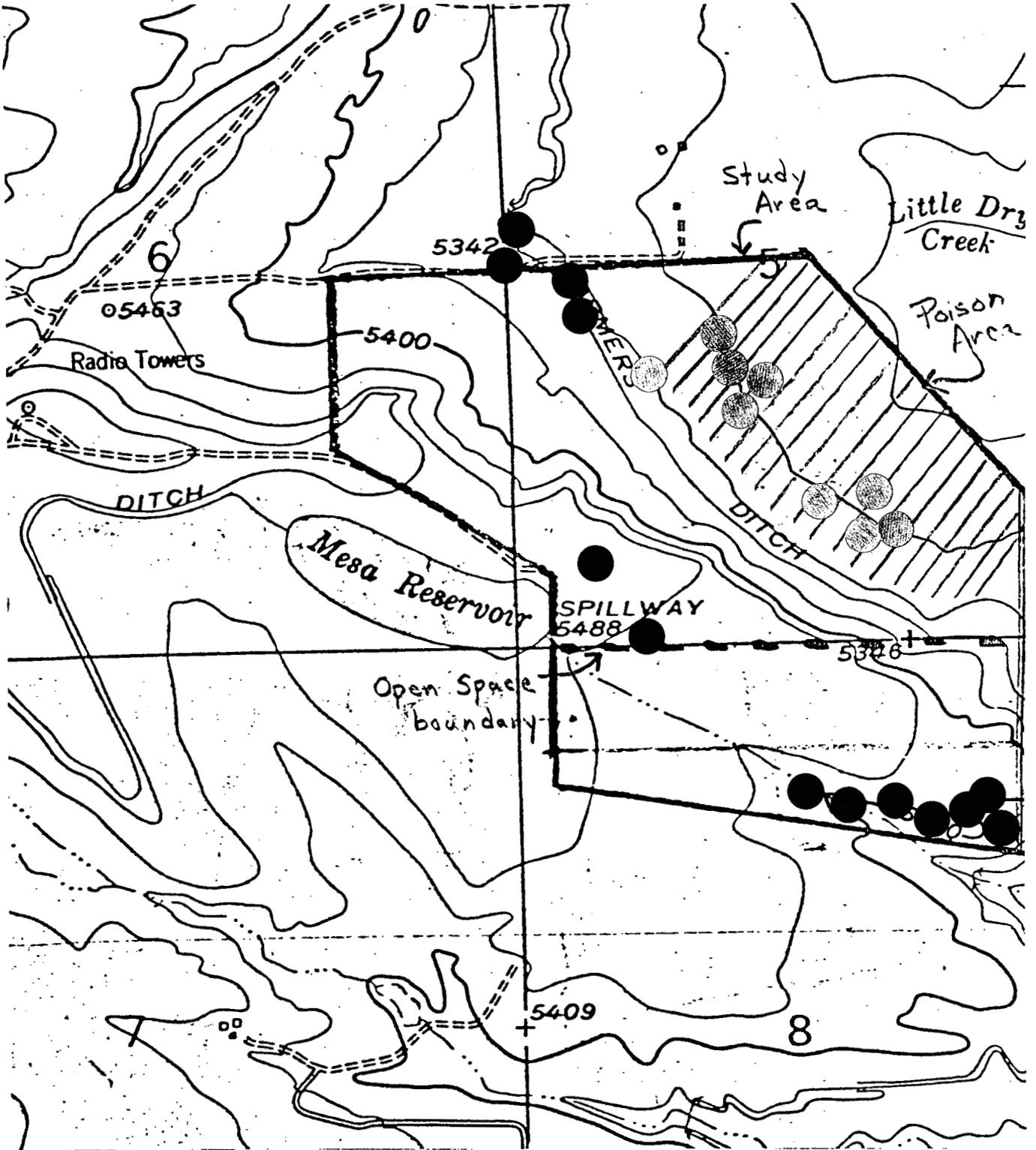
4. Poisoning of Prairie Dogs and Other Species

Although the decline in the numbers of harriers at Boulder Valley Ranch appears to be sufficiently explained by the previous points, questions are raised by the pattern of northern harrier dispersal observed in 1981 and 1982.

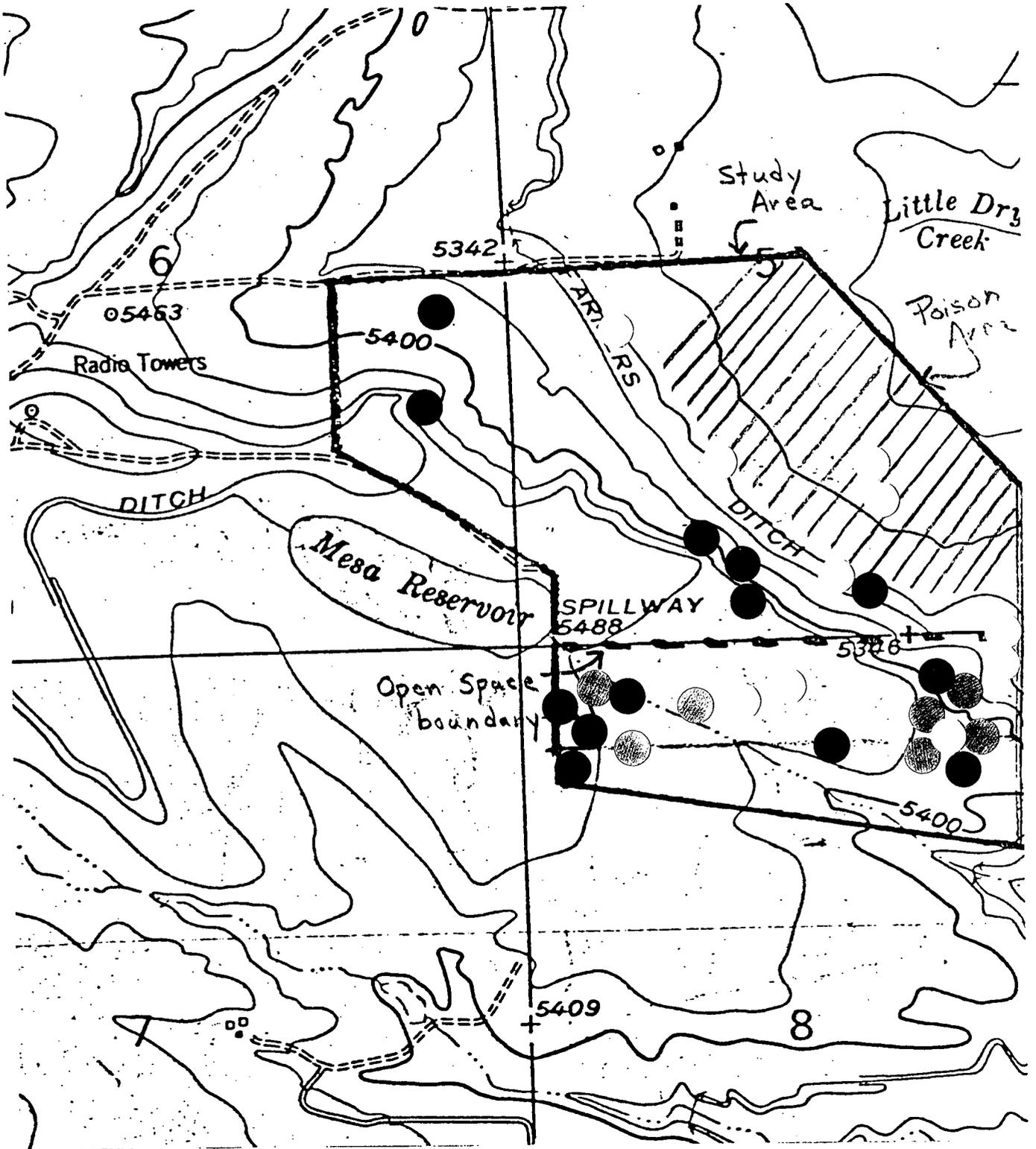
Map 6 shows the location of northern harriers sighted during the three years. In 1980 all sightings occurred in the traditional roosting area. This is part of the area where prairie dogs were poisoned in spring, 1981. In fall, 1981, a number of harriers were sighted, but all the sightings occurred outside the traditional roosting area. Most of these observations were of harriers hunting in prairie dog towns south of the open space boundary. In 1982 no harriers were sighted.

To understand why northern harriers, whose preferred food is meadow mice, might choose to roost near prairie dog towns, we need to examine the daily activity pattern of the BVR harriers. In 1979 and 1980, they could usually be observed during the late morning and afternoon roosting in the cottonwoods along and to the east of Farmer's Ditch or hunting in prairie dog towns. Whether they were hunting prairie dogs or other species that were easier to see in areas where vegetation had been removed by the prairie dogs is not known. On only one occasion was a northern harrier observed with a prairie dog in its talons. In the late afternoon, generally about one half hour before sunset, the harriers usually dispersed to their meadow mouse hunting grounds around Boulder Reservoir. The

- 1980
- 1981
- 1982



1980
1981
1982



evening hunting of meadow mice went on well into the night.

It is possible that prairie dog towns serve as a secondary hunting area for harriers during times of the day when meadow mice are inactive. This could explain why harriers would choose to roost in areas near prairie dog towns. Further observations of harrier hunting behavior and more analysis of pellet contents are necessary to confirm this hypothesis.

Another possibility is the disturbance of the roosting area (through bulldozing of prairie dog burrows, changes in the vegetative cover, or increased human activity) may have driven the harriers out.

A third, though remote possibility, is suggested by Map 7, which shows the distribution of buteos over the three years. Prior to 1982, the field east of Farmer's Ditch was occupied only by northern harriers. In 1982 we see a number of red-tailed hawks and an occasional ferruginous hawk moving into this area. Red-tailed hawks have nested in the cottonwoods along Farmer's Ditch for at least the past two years. Thus there is the chance that the presence of nesting red-tails in the area has contributed to the dispersal of the harriers. My suspicion is that the opposite is probably true: that the buteos are simply moving into a niche vacated by the harriers. This conjecture is supported by the historical nature of the harrier roosting site and the fact that the red-tailed hawks did not appear regularly in the area east of Farmer's Ditch until after the harriers had left.

VII. CONCLUSIONS

Between 1980 and 1982 there was dramatic decline in the raptor population at Boulder Valley Ranch. The rate of decline appears to be consistent with general population trends in Boulder County.

The decline in the BVR raptor population could have resulted from any one or more of the following:

1. Decline of the meadow mouse population.
2. Changes in fall weather patterns.
3. Human intervention through poisoning of prey species or disturbance of hunting areas.
4. Changes in raptor migration patterns.

Further study would be necessary to determine which of these factors are most significant.

Prairie dogs were found to be an important food for raptors at BVR. Analysis of pellets in fall, 1982 suggested that more prairie dogs were eaten that year than any other prey species, exceeding the aggregate of mice and voles.

Raptors were fairly evenly distributed over the study area. The largest concentrations were in the portion to the south of the open space boundary. This area is the site of a large prairie dog colony and is the most remote part of the study area.

A change in the distribution pattern of raptors occurred in 1981 and 1982. The harriers apparently abandoned their historical roosting area along and to the east of Farmer's Ditch,

and, in 1982, red-tailed hawks and some ferruginous hawks appeared in the area.

VIII. FUTURE RESEARCH

Over the next two years I hope to expand the count to include all of BVR. I also hope to institute a count in April. I will also continue with the pellet analysis and make systematic measurements of the vole population.