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KIT FOX POPULATION TRENDS AT THE NAVAL PETROLEUM RESERVES IN CALIFORNIA

by

Thomas T. Kato, Jerry H. Scrivner, Greg Warrick, and Brian Cypher

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Acknowledgements

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INTRODUCTION

The San Joaquin kit fox was listed as an endangered subspecies following passage of the Endangered Species Protection Act of 1966, and further classified as "rare" under the California Endangered Species Act of 1970. The San Joaquin kit fox occurs on the Naval Petroleum Reserves in California administered by the Department of Energy (DOE). A long term kit fox population monitoring program was initiated as part of DOE's mitigation strategy to comply with the Endangered Species Act. In addition to monitoring kit fox populations, the program includes assessments of kit fox prey density and assessments of predator abundance.

SLIDE #1 (ACKNOWLEDGEMENTS)

This research was funded by the U. S. Department of Energy and Chevron U. S. A., Inc.

SLIDE #2 (OBJECTIVES)

1. To describe the long term changes in the kit fox population on the Reserves.

2. To assess the roles of coyotes and lagomorphs in kit fox population dynamics.

SLIDE #3 (OVERVIEW OF NPR-1 and NPR-2) Naval Petroleum Reserve #1 (NPR-1) encompasses approximately 19,000 hectares and lies within the Lower Sonoran Grassland community. Vegetation consists primarily of valley saltbush, bladderpod, cheesebush, and the exotic red brome. Topography varies from fairly steep slopes near the interior of the reserve to flat, broad valleys at the perimeter. The major land use is production of oil and gas.

Naval Petroleum Reserve #2 (NPR-2) encompasses approximately 12,000 hectares and is adjacent to NPR-1's southern border. NPR-2 is a largely depleted oilfield and it is a checkerboard of public and private landholdings. Vegetation is similar to that of NPR-1. NPR-1 and NPR-2 include a region of hills and flats at the southwestern edge of the San Joaquin Valley just east of the Temblor range.

SLIDE #4 (KIT FOX BEING HANDLED) Kit fox population trends were evaluated using data collected during semiannual live-trapping sessions. The number of unique individuals captured each session was compared among years. During the live-trapping programs, one trap per 65 hectares was operated for 4 consecutive nights. Scent station surveys were used to assess both kit fox and coyote population trends. Lagomorph availability was evaluated using data collected from road and line transect surveys. During road surveys to assess lagomorph abundance, coyote observations were also recorded.

(NPR-1)

SLIDE #5 (GRAPH) The number of individual foxes captured per 100 trapnights on NPR-1 declined from a high of 20 in winter of 1981 to approximately 4 in 1985. The population has remained relatively steady since then at about 3 to 4 individuals per 100 trapnights.

SLIDE #6 (GRAPH) Between 1980 and 1985, the average number of coyotes observed during road surveys on NPR-1 increased. The average number of coyotes seen during road surveys ranged from 0 in 1980 to .38 in 1984.

SLIDE #7 (GRAPH) Scent-station surveys were initiated in 1984 to monitor coyote populations. Scent-station indices of coyote abundance declined between 1984 and 1990 in all three seasons studied. The fall scent station indices are represented by the broken line, the spring indices by the dotted line and summer indices by the solid line.

SLIDE #8 (GRAPH) The average number of lagomorphs seen per month on NPR-1 during road surveys steadily declined from a high of 287 in 1980 to a low of 57 during 1985.

SLIDE #9 (GRAPH) In 1984, lagomorph transects were initiated. Densities declined from a high of 182 per km2 in summer 1984 to a low of 40 per km2 in summer 1987. The vertical bars represent 95% confidence intervals.

The cause of the decline in lagomorph numbers has not been determined. The observed decline could be part of a naturally occuring population cycle that lagomorphs tend to experience on an approximately 10-year basis. The extended drought conditions may also be limiting lagomorph populations on NPR-1.

SLIDE #10 (GRAPH OF MORTALITY RATES) During the fox population decline on NPR-1 (1980-1985), the mortality rates of adult foxes increased. Predators (mainly coyotes) killed approximately 80% of the foxes for which a cause of death could be determined. Although coyotes were probably a factor in the fox decline between 1980 and 1984, it is interesting that the fox population did not increase after the coyote population decreased between 1985 and 1990. **SLIDE #11 (REGRESSION)** This suggests that there are other factors keeping the fox population at a lower level than it was in the early 1980's. One factor appears to be the density of lagomorphs. This regression of fall kit fox scent station indices and fall lagomorph densities revealed a statistically significant positive relationship. Lagomorphs were the primary prey species of foxes and during the decline in fox numbers, the proportion of lagomorphs in the diet declined and the proportion of kangaroo rats increased. Therefore, food supplies appear to be an important factor influencing fox numbers on NPR-1. Egoscue also observed that a kit fox population decline appeared to have been primarily a function of food availability.

(NPR-2)

SLIDE #12 (GRAPH) On NPR-2, the number of individual foxes trapped per 100 trapnights ranged from 24 in the summer of 1983 to 8 in summer of 1990. The number of foxes trapped per 100 trapnights in the winter ranged from 17 in winter 1984 to 10 in winter 1989. The number of foxes trapped in the winter appeared to be relatively stable and was consistently higher than the number on NPR-1. Even at its lowest level during summer 1990, the number of foxes captured per 100 trapnights on NPR-2 was more than twice that captured on NPR-1 for the same time period.

SLIDE #13 (GRAPH) Lagomorph densities on NPR-2 declined through time as they did on NPR-1. Summer lagomorph densities declined from 150 per km2 in 1986 to a low of 20 per km2 in 1990.

SLIDE #14 (GRAPH) Coyote visitation indices on NPR-2 did not show a consistent pattern between seasons. The fall and spring indices showed an initial increase followed by a decrease but the summer indices changed very little with time.

Unlike NPR-1, a regression of kit fox scent station indices and lagomorph densities on NPR-2 showed no significant trend.

Based on the close proximity of NPR-1 and NPR-2 the higher population density and stability of the population on NPR-2 was unexpected. The differences observed between the two populations may have been due to differences in availability of alternate food sources, coyote distribution or other unknown causes.

SLIDE #15 (SUMMARY)

1. When the fox population on NPR-1 declined between 1980 and 1984, it appeared to have been negatively impacted by a declining prey base (lagomorphs) and an increasing coyote population. Declining lagomorph densities may have been a more important factor because as coyote numbers declined between 1985 and 1990, the kit fox population remained stable.

2. The fox population on NPR-2 remained at a higher and more stable level than the population on NPR-1. The factors determining the higher densities and greater stability of the fox population on NPR-2 are unknown.

SLIDE # 1

ACKNOWLEDGEMENTS

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SLIDE 2

OBJECTIVES

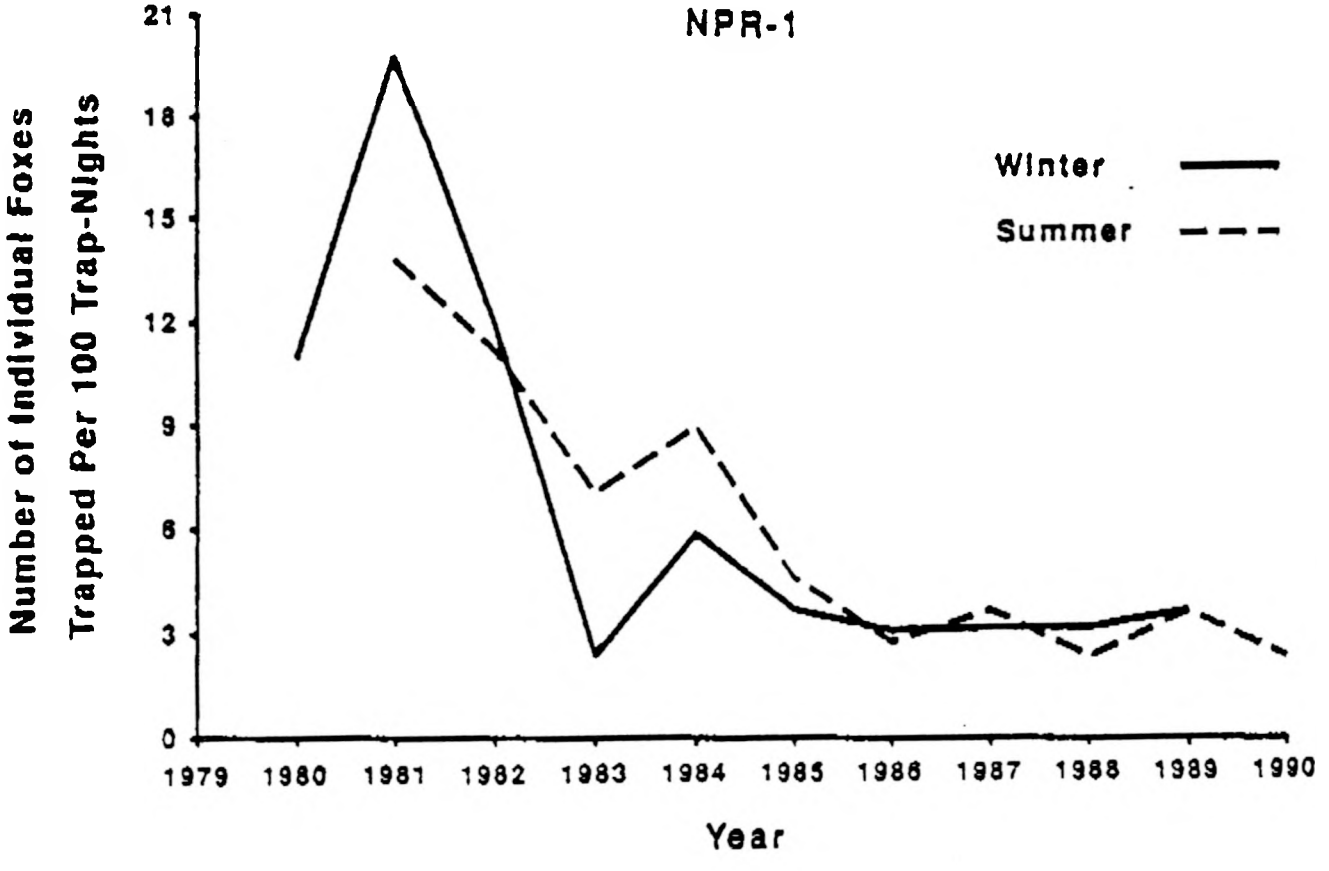
1. Describe the long term changes in the kit fox population on the Reserves.

2. Assess the roles of coyotes and lagomorphs in kit fox population dynamics.

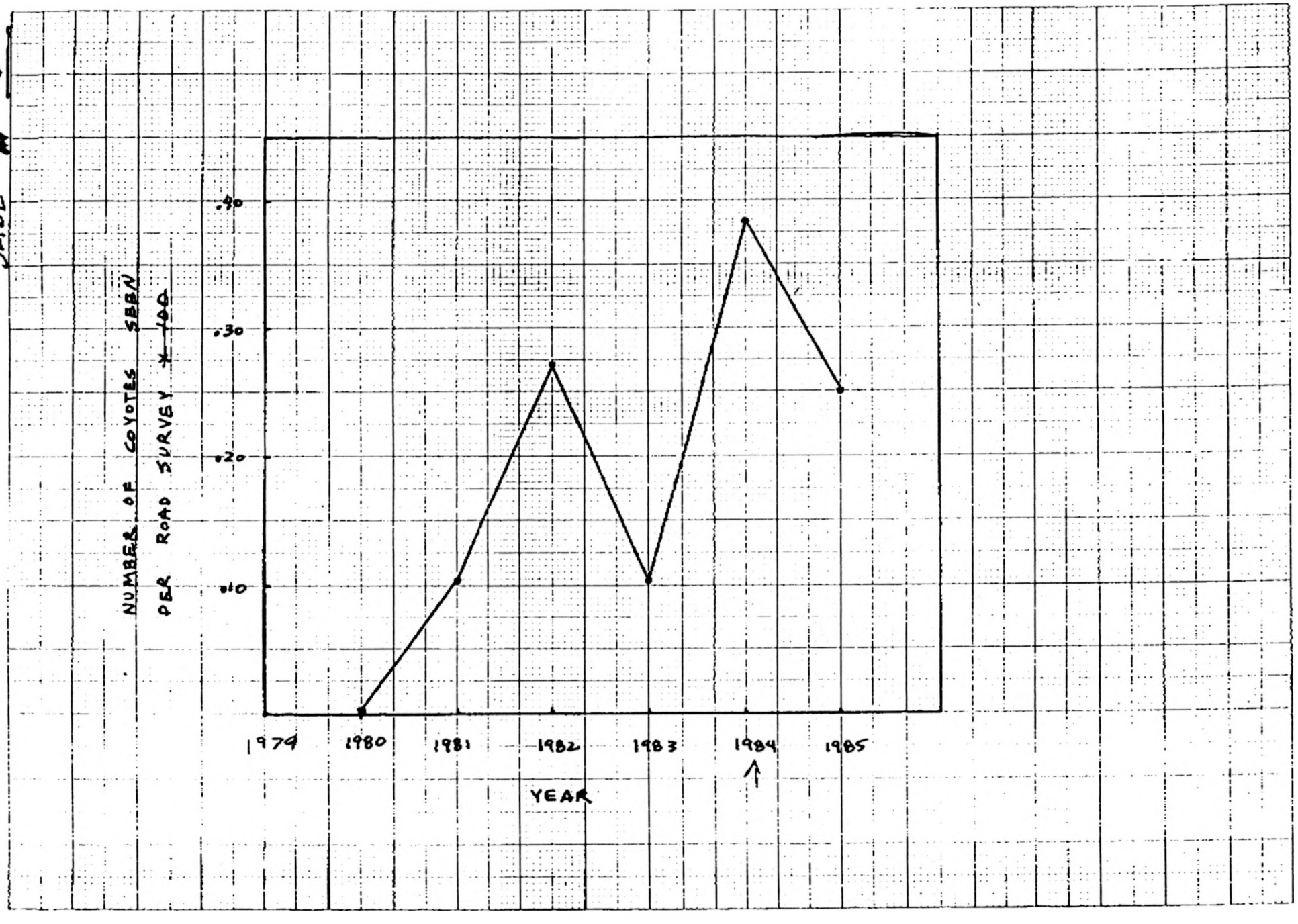
SLIDE # 3 OVERVIEW OF NPR-1 AND NPR-2

SLIDE #4 KIT FOX BEING HANDLED

SLIDE 5

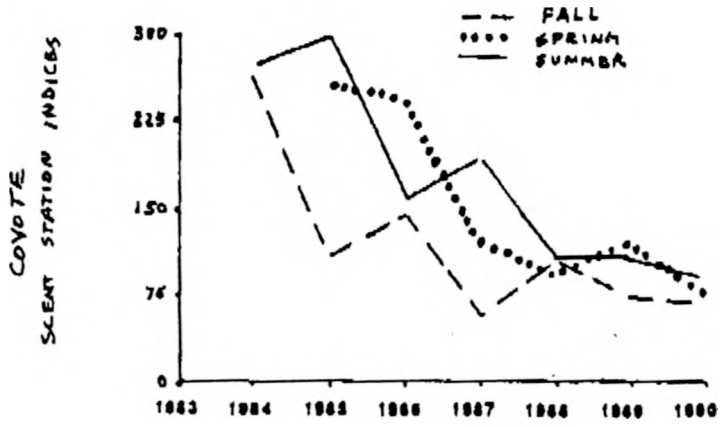

NPR-1
Number of Individual Foxes
Trapped Per 100 Trap-Nights
21
18
15
12
9
6
3
0
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
Year
Winter
Summer

SLIDE # 6

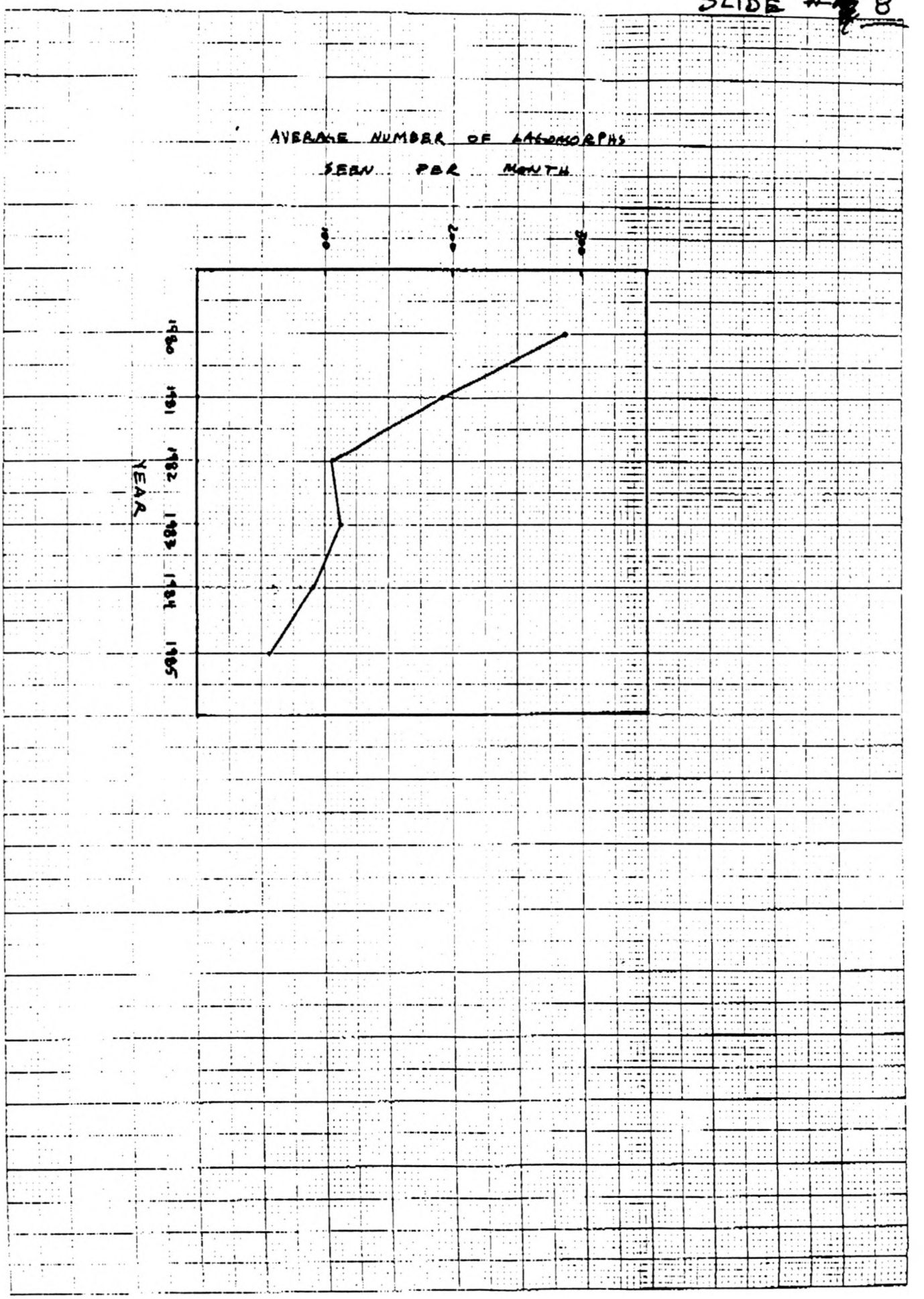

NUMBER OF COYOTES SEEN PER ROAD SURVEY * 100
.40
.30
.20
.10
1979
1980
1981
1982
1983
1984
1985
YEAR

SLIDE # 7

NPR-1

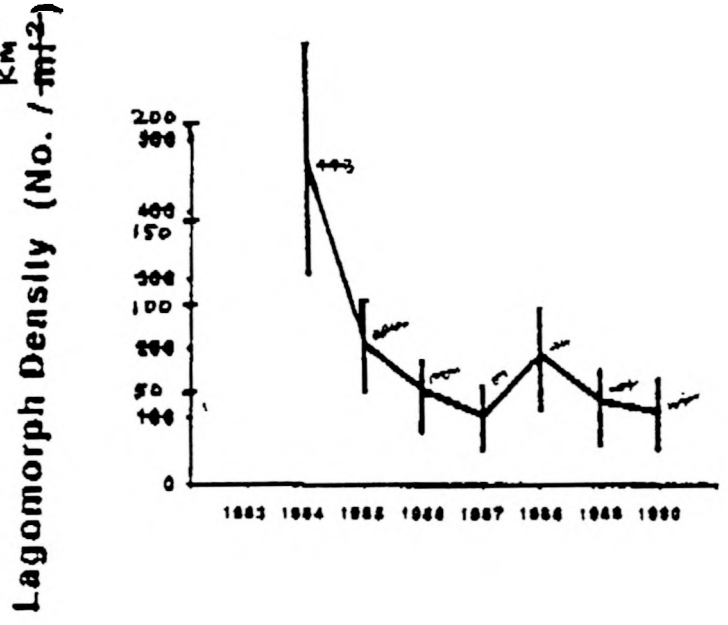

COYOTE
SCENT STATION INDICES
300
225
150
75
0
1983
1984
1985
1986
1987
1988
1989
1990
FALL
SPRING
SUMMER

SLIDE # 8

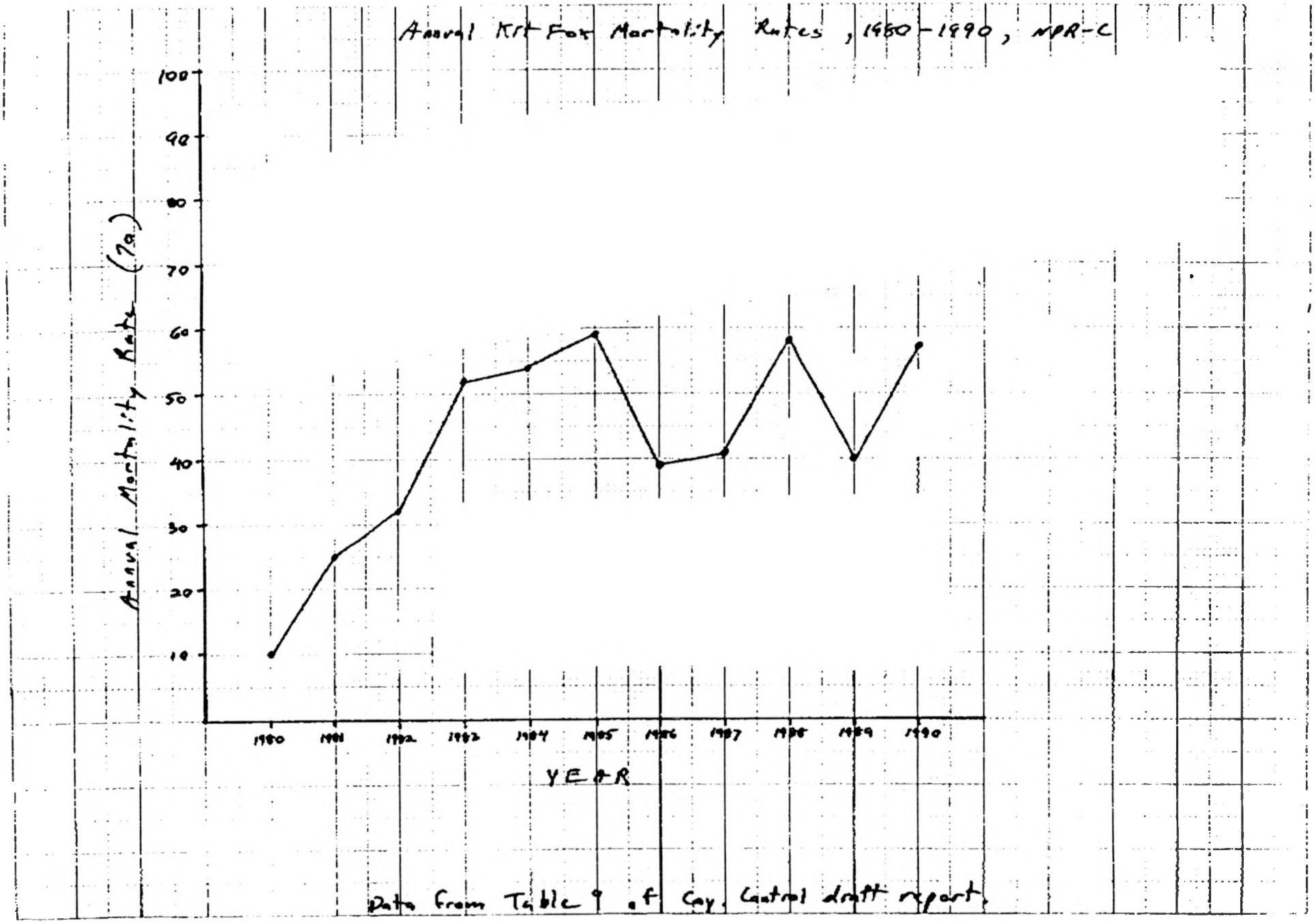


SLIDE # 9

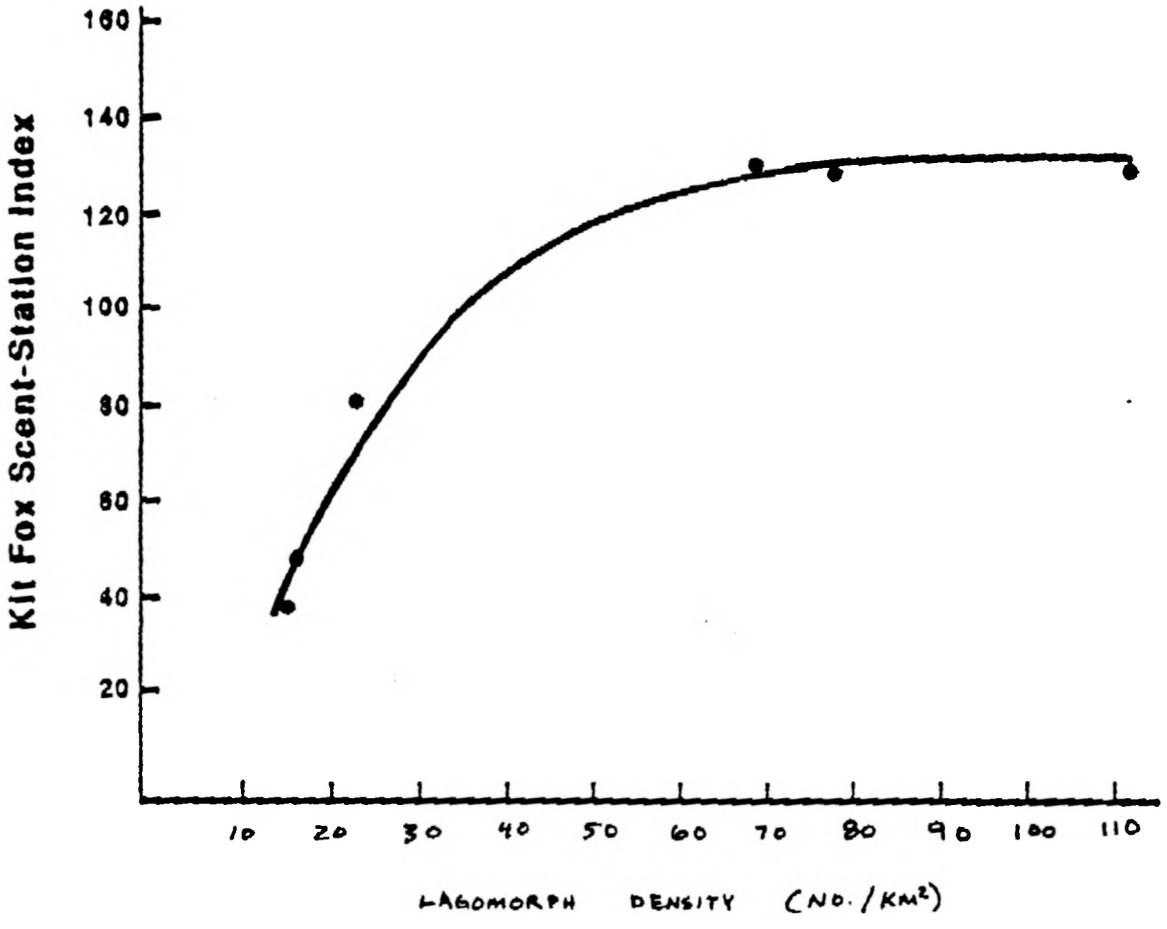
NPR-1


Lagomorph Density (No. / km²)
200
150
100
50
0
1983
1984
1985
1986
1987
1988
1989
1990

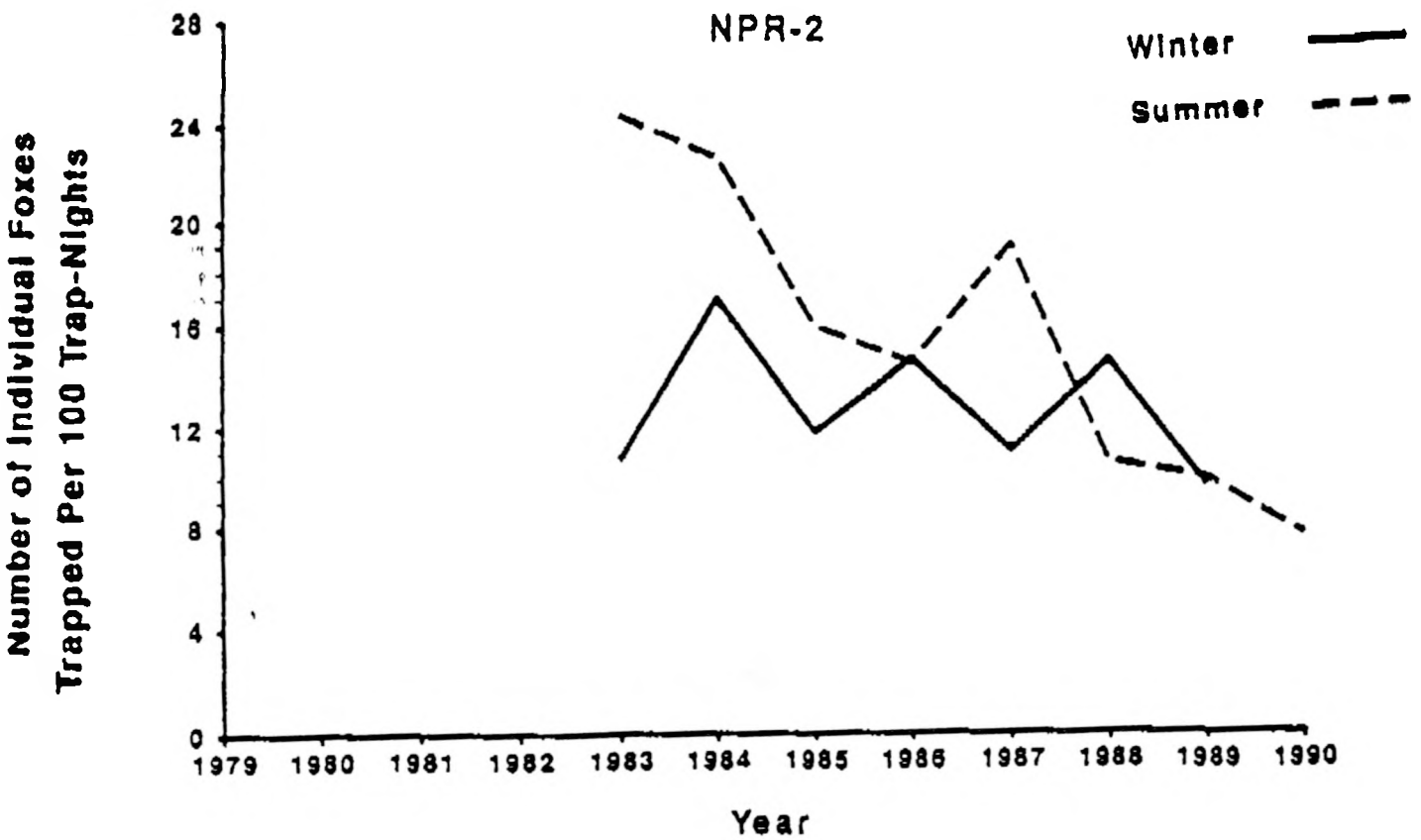
SLIDE # 10



SLIDE #11

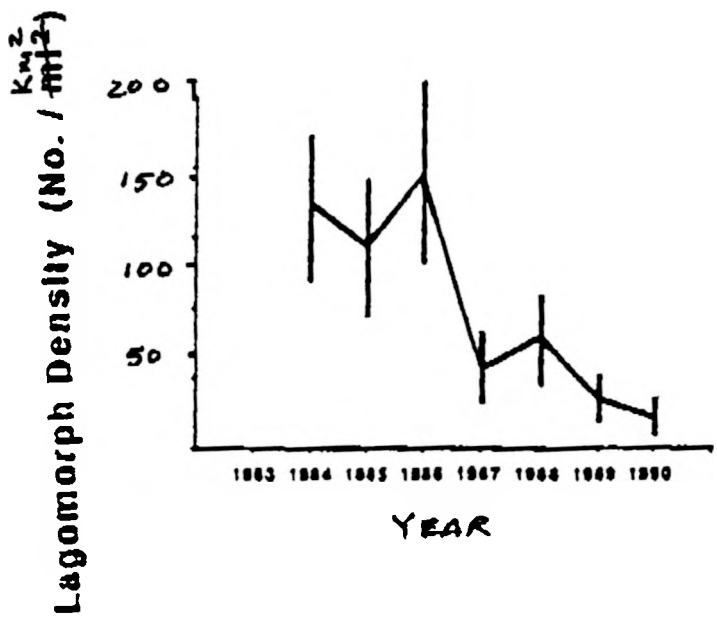

Kit Fox Scent-Station Index
160
140
120
100
80
60
40
20
10
20
30
40
50
60
70
80
90
100
110
LAGOMORPH DENSITY (NO./KM²)

SLIDE # 12


NPR-2
Winter
Summer
Number of Individual Foxes
Trapped Per 100 Trap-Nights
28
24
20
16
12
8
4
0
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
Year

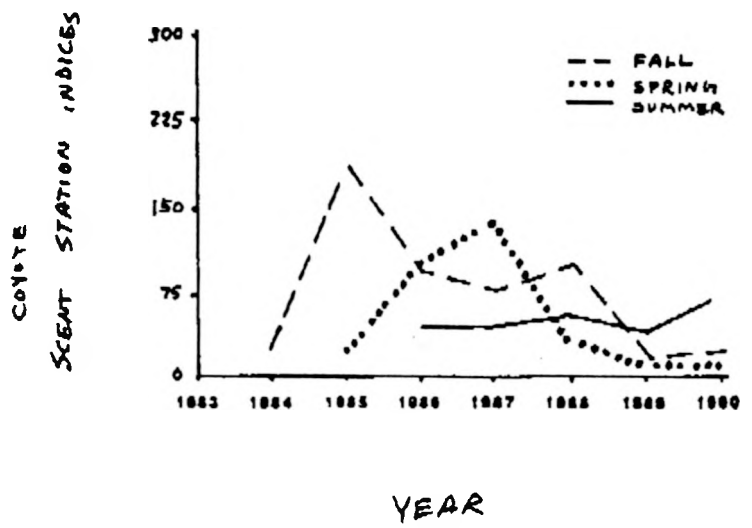
SLIDE # 13

NPR-2



SLIDE # 14

NPR-2



SLIDE #15

SUMMARY

1. WHEN THE FOX POPULATION ON NPR-1 DECLINED BETWEEN 1980 AND 1984, IT APPEARED TO HAVE BEEN NEGATIVELY IMPACTED BY A ~~DECLINING~~ DECLINING PREY BASE AND AN INCREASING COYOTE POPULATION.

2. THE FOX POPULATION ON NPR-2 REMAINED AT A HIGHER AND MORE STABLE LEVEL THAN THE POPULATION ON NPR-1.