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DEN AND DEN-SITE CHARACTERISTICS OF COYOTES (*CANIS LATRANS*) IN SOUTHEASTERN NEBRASKA

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Sixteen pup-rearing den-sites of coyotes (*Canis latrans*) were located in southeastern Nebraska from 1976–1978. Although there was no selection for sites close to water or away from roads, dens were always located 400 m or farther from occupied farmsteads. The mean distance between neighboring dens was 3.87 km. Twelve sites were located within 1 m of brome grass (*Bromus inermis*); 15 dens were located where two cover-types met. Twelve dens were dug in loam soil; four in clay. Mean number of entrances for 10 excavated dens was 1.4, with the majority opening to the east and north.

† † †

INTRODUCTION

Denning habits of coyotes are important in understanding their ecology. Studies of coyote dens in several regions have indicated considerable variation in the type of sites selected as well as in other characteristics (Young and Jackson, 1951; Gier, 1968; Hallett, 1977; Rock, 1978). However, denning habits of coyotes in an area of intensive cultivation such as southeastern Nebraska have not been reported.

Here, I report on den ecology of coyotes in southeastern Nebraska. Data were collected from 1976–1978 while studying the spatial relationships and livestock depredations of coyotes in the same area (Andelt, 1976; Althoff, 1978). In this paper, "den" refers to the opening, burrow, and chamber, and "den-site" refers to the den and the immediate surrounding area.

STUDY AREA

Dens were located in Lancaster and Seward counties (Fig. 1). The topography of the area consists of low, rolling hills with sloping-upland and bottom-land areas. Grain sorghum, corn, wheat, oats, alfalfa, and native grasses, predominantly brome, constitute most of the vegetation in this intensively farmed portion of Nebraska. Waterways consist of brome and other native grasses, while most woody vegetation occurs along creek bottoms and fence rows.

RESULTS AND DISCUSSION

Den-Site Identification

Sixteen active pup-rearing den-sites were located in the study area (Fig. 1). Andelt (1976) and local residents provided location of six dens in 1976; I located eight dens in 1977 and two in 1978 during ground searches conducted from May through July. Pup-rearing dens were distinguished from non-pup-rearing dens and badger (*Taxidea taxus*) and rabbit (*Sylvilagus floridanus*) burrows by the presence of pups, food scraps, worn trails, bedsites, and/or diameter of den entrances.

Den-Site Characteristics

Frequency distributions of den-sites from nearest water sources, roads (including major highways and county roads), and occupied farmsteads are shown in Figure 2. Apparently, close proximity to water was not a critical site factor since more than one-half of the dens were 200 m or farther from a pond, creek, or intermittent stream. Hallett (1977) and Rock (1978) reported that most coyotes den within 100 m of water in Missouri and Saskatchewan, respectively. Although they did not present data, Young and Jackson (1951) and Gier (1968) concluded that coyotes commonly den near a water source.

Distances of den-sites from roads and occupied farmsteads provide an index to coyote tolerance of human activity. No den was located closer than 400 m to an occupied homestead; most were farther than 600 m (Fig. 2). In contrast, eight dens were less than 400 m from a road. A grid of county-maintained roads divides most of the land in the Lancaster County study area into 2.56 km^2 (sq mi) sections (Fig. 1), with one or more occupied farmsteads usually located in each section. Those dens within 400 m of a road were always situated in the farthest possible area from any homestead in the same or adjoining section.

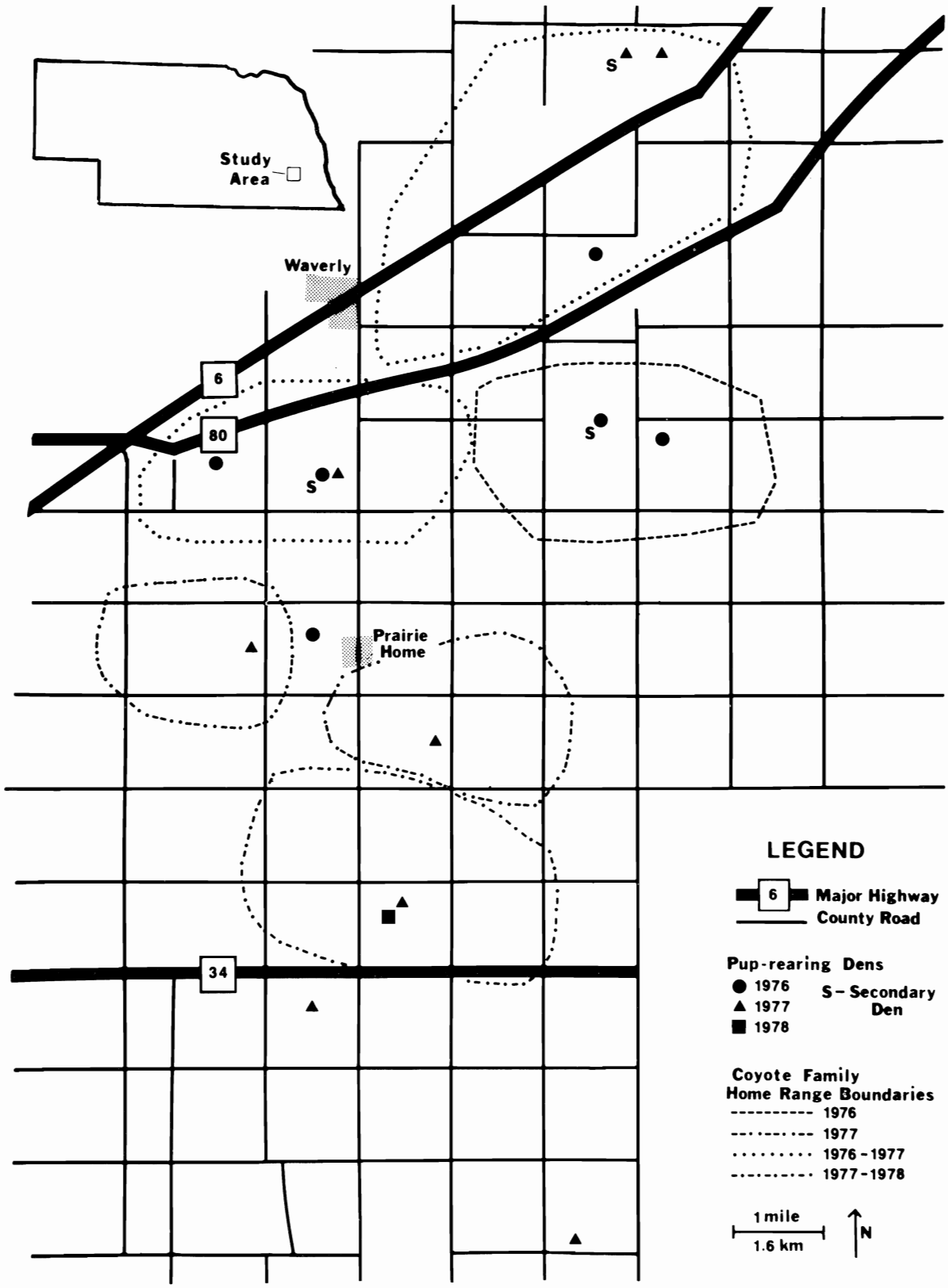


FIGURE 1. Location of 15 pup-rearing den-sites, Lancaster County study area. One den-site located in Seward County is not shown. Coyote family home-range boundaries were determined from radio telemetry data (Andelt, 1976; Althoff 1978).

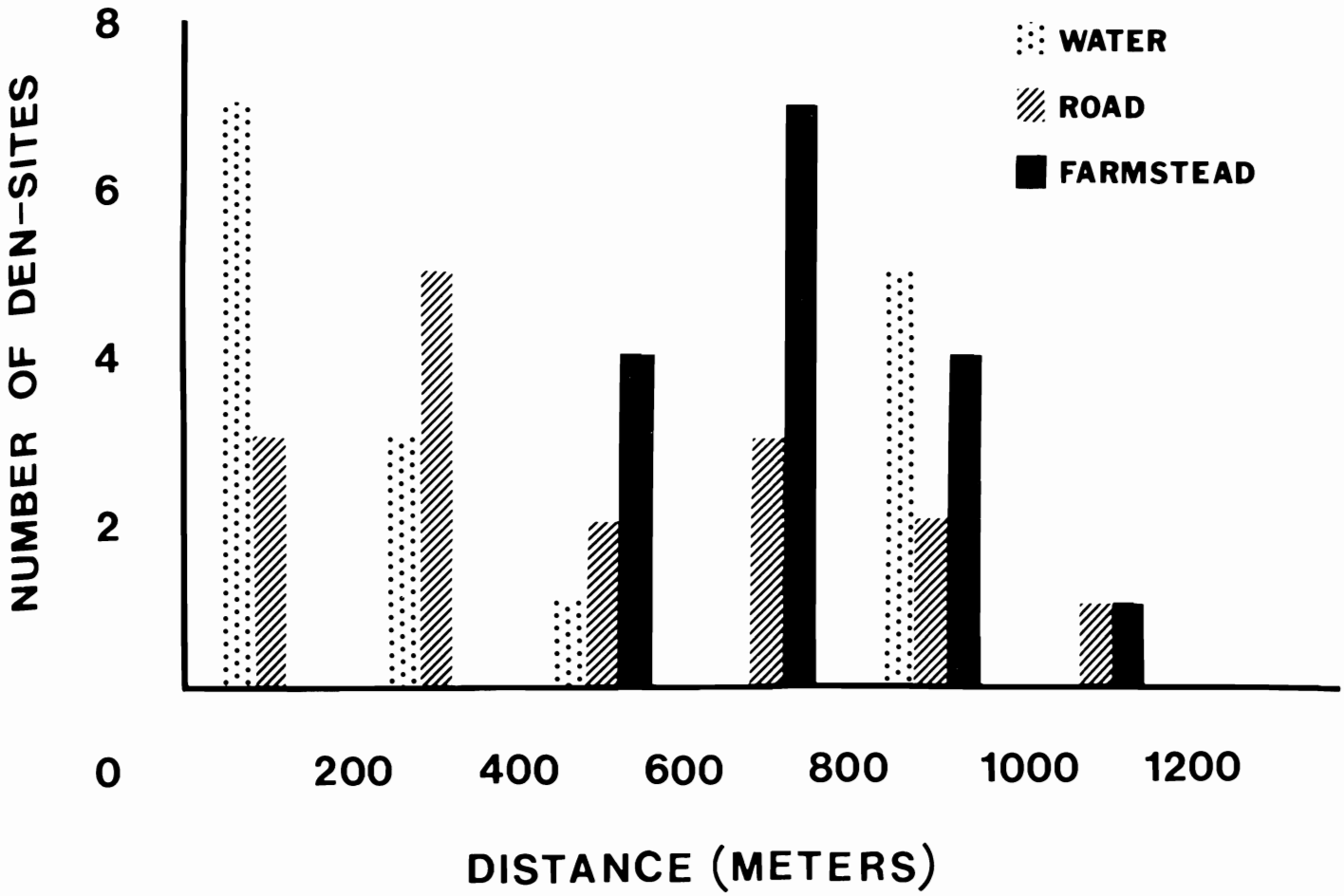
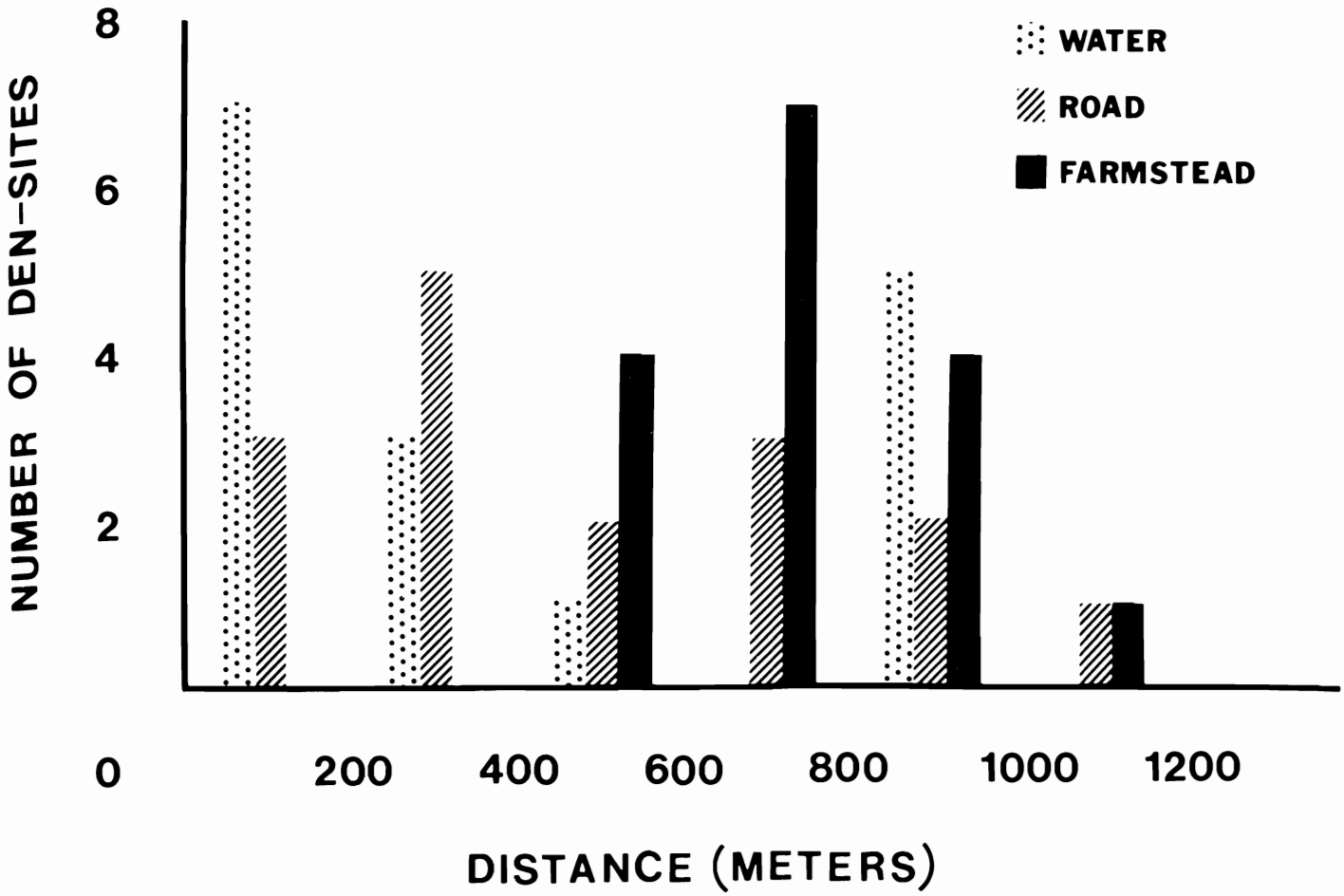


FIGURE 2. Distances between coyote dens and nearest water source, road, and occupied homestead.

The mean distance to the nearest neighboring den over the two-year period in the Lancaster County study area was 3.87 km. This compares with a mean of 2.1 km and 5.2 km between neighboring dens in parts of Missouri (Hallett, 1977) and Saskatchewan (Rock, 1978), respectively. Statistical analysis of den dispersion (Table I) was based on the method of Clark and Evans (1954). The ratio, R, between observed and expected mean-distances from each den to its nearest neighbor indicates the departure of the dispersion pattern from random. The R ratio will equal 0 if there is no spacing, 1 if there is random spacing, and 2.1491 if maximum spacing between individuals exists. Statistical significance is based on C, the standard variate of the normal curve. Thus, den dispersion as indicated by R appeared to be non-random toward maximum spacing, but the C values showed no statistical significance ($P > 0.05$, Table I). However, home ranges of coyotes based on radio telemetry (Andelt, 1976; Althoff, 1978) indicated that pup-rearing dens are in the core and not on the edge of the home range (Fig. 1).

Habitats of den-sites ranged from open patches of native grass to edges of dense thickets. Eleven den-sites were located in fence rows, native-grass patches, drainage ditches, or draws where vegetation seldom exceeded a height of 0.5 m; five sites were in thickets. None of the dens was located in a woodlot. Brome grass was within 1 m of 12 dens; four dens were concealed by the grass (*see* Althoff, 1979, for description of camouflaged den-entrances). Cover types of sorghum, wheat, or corn were within 10 m of all but one den. This is not surprising considering the intensity of agriculture in the area. Although not as much of the study area was comprised of croplands, Rock (1978) located most coyote dens in native pasture in Saskatchewan. Hallett (1977) found most Missouri dens situated along the edge between two cover-types.

Suitable denning-habitat within the core of home ranges probably dictated exact placement of dens and accounted for some variation of distances between neighboring dens. The data strongly suggest that avoidance of human activity as well



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CONCLUSIONS

These observations suggest that coyotes were highly selective in the placement of dens. Although no single characteristic was noted at all den sites, a "typical" pup-rearing den in southeastern Nebraska might be described as follows: Located at least 400 m from the nearest occupied farmstead in an area where two or more cover types meet, one of which is brome grass, the den would be dug in loam soil with a single, active entrance, at least 28 cm in diameter, opening to the north or east.

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