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MARKING OF NOVEL OBJECTS BY KIT FOXES

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Scent marking of novel objects by kit foxes, *Vulpes macrotis*, is not well understood. Generally, kit foxes leave scats (feces) at dens, trail intersections, fence lines, and along unpaved roads (Egoscue 1962, O'Farrell 1987, Ralls and Smith 2004, Smith et al. 2005). In the closely related swift fox, *V. velox*, researchers commonly found scats near cattle guards, fence intersections, culverts, and intersections of roads and trails (Harrison et al. 2004). Kit foxes occasionally leave scats near or on conspicuous objects, including bottles, tires, and skeletal remains (Ralls and Smith 2004) and are known to mark novel objects with undersized scats (O'Farrell 1987).

Scats from the San Joaquin kit fox, *V. m. mutica*, have been found on or near cement objects, sheep carcasses, coyote skulls, cans, fenceposts, pieces of bone, power line poles, and coyote latrines (Ralls and Smith 2004). In another study of scent marking by urban San Joaquin kit foxes, most marks occurred on or near conspicuous or prominent objects, including large rocks, raised soil mounds, asphalt and concrete surfaces, shrubs, posts/poles, trees, buildings, cars, old food items, and tall vegetation. Males were more likely to mark objects than were females (Murdoch 2004[1]).

Egoscue (1962) described the fecal deposition habits of kit foxes in Tooele County, Utah, and found "scats … along trails, at dens, and occasionally near objects such as bits of bone or other animal remains." However, frequently visited 'sign' stations (old skeletons or natural objects) were not discovered. Egoscue (1962) further described unique behavior of kit foxes marking a rodent live-trap grid: "One fox left small scats on 15 of 50 traps in a single round of the trap-line, and by the third night had urinated on almost every trap." Egoscue (1962) also reported that after the marking efforts of the kit fox, the trapping success at the rodent live-trap grid dropped considerably. Here I describe fecal marking efforts of the kit fox on a live-trap grid set for diurnal rodents near Ridgecrest, CA. Kit foxes were confirmed in the study area by using infrared motion cameras (Cuddeback™ Digital, Park Falls, WI).

A live-trap grid (4 x 25, with 35 m centers; Figure 1) was established along State Route 178, approximately 15 km east of Ridgecrest, CA, in San Bernardino County (35° 38.89'N, 117° 30.30'W). The grid was located on an alluvial-colluvial slope and dominant perennials were *Ambrosia dumosa*, *Grayia spinosa*, and *Atriplex hymenelytra*. Dominant annuals include *Eriophyllum wallacei*, *Erodium cicutarium*, and *Lepidium flavum*.

[1]Murdoch, J. D. 2004. Scent marking behavior of the San Joaquin kit fox (*Vulpes macrotis mutica*). M.S. Thesis, University of Denver, Denver, Colorado, USA.

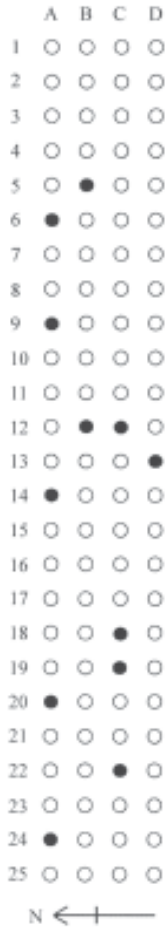

Figure 1. Small mammal trapping grid layout. Darkened circles note where kit fox scats were observed, San Bernardino County, April and May 2006.

Each rodent live-trap was placed under a cardboard A-frame shade (California Department of Fish and Game 2003[2]). The grid initially was trapped the week of 3 April 2006, and no scats were present near the trap stations. The second session was conducted the week of 15 May 2006. On 15 May, 12 kit fox scats were observed near the apex of the cardboard shades, approximately 20 cm above ground level (Figure 1). Scats were deposited sometime between 8 April and 14 May. All scats appeared similar in color and condition, and may have been deposited during one marking event.

[2]California Department of Fish and Game. 2003. California Department of Fish and Game Mohave ground squirrel survey guidelines. 5 pp.

It is not well understood why kit foxes mark novel and conspicuous objects with scats. Marking of novel objects may fall within the same behavioral category as latrine creation and use. Ralls and Smith (2004) concluded that the function of kit fox latrines is not known, but they may play a role in chemical communication. Murdoch (2004[1]) concluded that latrines probably function as a message center for canid social groups and conspecifics. O'Farrell (1987) reported that there is no evidence that kit foxes "systematically marked their territorial boundaries or sign stations with urine or feces" but scent-marking behaviors by kit foxes might play a key part in reproduction synchrony or possibly maintenance of territories. Murdoch (2004[1]) went on to state that scent marking is most likely not a function of the "bookkeeping system" in regard to marking foraging areas.

The marking of traps in Egoscue's study (1962) and the trap shades in this study are similar in that several trap locations were marked (>10%). Egoscue's (1962) small mammal trapping success dropped considerably after marking by kit fox was noted, however my trapping success did not change considerably. During the week of 3 April, 37 individual white-tailed antelope squirrels, *Ammospermophilus leucurus*, were captured, compared to 31 squirrels during the week of 15 May (H. Clark, unpub. data).

Kit foxes may mark novel objects as an exploratory action, communicating that there is something of interest in the area. In terms of small mammal traps, the marking may indicate prey in the area.

The communicative role of feces is unclear, but feces occurring on latrines and other objects may provide long-term chemical communication to conspecifics. More research is required to determine the specific functions of fecal marking of latrines and novel objects.

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