



## Effect of Moving Traps between Trapping Stations upon Rodent Retrapping Data

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## Effect of Moving Traps between Trapping Stations upon Rodent Retrapping Data

**ABSTRACT:** An experiment was conducted in which Sherman traps, on successive nights, were either left *in situ* or moved 10 m to the next adjacent trap station. Rodents were significantly more likely to be recaptured at a new location if the trap there was the same one they had occupied the previous night, and previously occupied traps were also significantly more likely than clean traps to capture rodents other than the original occupant. These results indicate that estimates of home range and spatial exclusivity based upon retrapping methods are likely to be influenced by hitherto ignored methodological details of trap emplacement.

### INTRODUCTION

The ecology and behavior of cryptic small mammals have been studied extensively by live trapping. Many authors have noted potential biases in these methods. Traps at different stations may not be equivalent, due to residual odors (Daly *et al.*, 1980; Wuensch, 1982); different classes of animals may not be equally trappable (Boonstra and Krebs, 1978); trapping may influence the very ranging phenomena under study (Sheppe, 1967). Despite these problems, the method is so convenient that it remains prevalent.

Retrapping of marked individuals has been used to study home range, spatial dispersion, juvenile dispersal and other aspects of behavior and demography. In most grid-trapping studies, traps are left *in situ* throughout a trapping period, but for one reason or another, the investigators in several studies have picked up traps nightly and then returned them to trapping stations without attending to trap identity (*e.g.*, Brant, 1962; Wallen, 1982). The fact that residual odors affect trap response suggests that the identity of a trap on one night may influence the probability of the same or other individuals entering that trap on the next night, and thus may bias our perceptions of home range, spatial separation and other parameters. Whether a particular trap remains at a particular trapping station or is moved among them may thus affect results. The experiment reported here was undertaken to compare data collected when traps were moved between stations with data collected when traps were stationary.

### METHODS

The experiment was conducted in eight replicates. Each replicate involved 2 consecutive nights of trapping in a previously untrapped area within the ecological reserve of the Boyd Deep Canyon Desert Research Center, Palm Desert, California. All trapping was conducted in Colorado desert habitat in which creosote bush (*Larrea tridentata*) was the dominant perennial shrub. The eight replicates were begun on 22 December 1981; 21 April, 28 April, 5 May, 18 May, 25 May, 12 December and 20 December 1982.

On Night 1 of each replicate, 80 thoroughly washed Sherman live traps (8 x 9 x 23 cm), each baited with ca. 2 g of rolled oats, were set out in 20 groups of four traps each. Within each foursome, one trap was set at each corner of a square with 10-m sides. Foursomes were set at least 40 m apart. Ten foursomes were designated "Experimental" and 10 "Control," at random. Traps were left from dusk until dawn, at which time all captured rodents were identified by species and sex, weighed, examined for reproductive condition, marked and released. Traps were left closed *in situ* throughout the day.

On Night 2 of each replicate, trapping was conducted at the same stations. Control traps remained at their original positions. Experimental traps were each moved 10 m, by rotating each foursome anticlockwise to the next station. All traps were again baited with ca. 2 g of rolled oats and left from dusk until dawn. Each captured rodent was released after its species, sex, identifying mark if any, reproductive condition, body weight and capture site were recorded.

### RESULTS

*Captures and recaptures.*—Table 1 summarizes the 542 captures of 415 individual rodents during the 1280 trap nights of the experiment. (*Perognathus longimembris*, *P. penicillatus* and *P. formosus* are lumped as "other *Perognathus* spp." due to a few uncertain identifications whereby juveniles of two species may have been mistaken for adults of the next smaller species.) Overall, 42% of trap nights produced a capture; trap success on a given night ranged from 20% to 66%.

Species differed in the proportion of individuals trapped on Night 1 who were retrapped on Night 2 (Table 1, column 3;  $\chi^2_{df} = 19.0$ ,  $p < .001$ ). In general, females marked on Night 1 were

likelier (61%) than males (45%) to be retrapped on Night 2, and this effect was significant when all species are considered together ( $\chi^2_{1df} = 5.2, p < .05$ ). *Dipodomys merriami* was the only species in which this sex difference was significant: 63% of marked females were recaptured vs. 35% of marked males ( $\chi^2_{1df} = 4.9, p < .05$ ).

*Effects of trap rotation.*—Sixteen of 63 rodents originally trapped in Experimental traps were recaptured in the same trap at its new position; by comparison, five of 64 rodents originally trapped in Control traps were recaptured at the corresponding position, i.e., the station to which the trap would have been moved had it been an Experimental trap. This difference (see Table 2) is significant (Fisher exact test,  $p = .008$ ). Thus, rodents were attracted to traps that they themselves had previously occupied.

The slight tendencies for animals originally trapped in Experimental traps to be less likely than Controls to be recaptured at the same site, and to be less likely to be recaptured at all (Table 2) are not significant.

*Effect of prior occupancy upon trap success.*—Traps that had captured an animal on Night 1 were much more likely to capture an animal on Night 2 than were those that had not (62% vs. 37%;  $\chi^2_{1df} = 36.1, p < .001$ ). This difference may depend on both residual odors and differential use of loci by rodents. To test for effects of the former factor while removing effects of the latter, a further comparison was restricted to those trap sites that were unsuccessful on Night 1. The difference remained just as large: 58% of previously occupied traps at previously unsuccessful sites were successful on Night 2 vs. 33% of those not previously occupied ( $\chi^2_{1df} = 15.5, p < .001$ ). If recaptures of the original occupant are excluded, then 52% of previously occupied traps at previously unsuccessful sites were successful on Night 2, still significantly more than the 33% of previously unoccupied traps ( $\chi^2_{1df} = 8.4, p < .01$ ). Thus, previously occupied traps were attractive not only to their original occupants but to other rodents as well.

The second animal in a previously occupied trap tended to be of the same species as the former occupant more often than would be expected by chance. Thus for example, *Dipodomys merriami* constituted 48% of 29 new captures in traps formerly occupied by *D. merriami*, but only 29% of 77 new captures in traps formerly occupied by other species. In no species was there evidence that captures were influenced by the sex of the former occupant, nor that body weight or reproductive condition was associated with differential trap response. (However, very few adults were captured *not* in reproductive condition.)

DISCUSSION

The important result of the present experiment is that moving traps in the Experimental con-

TABLE 1.—Rodents captured

	Night 1 captures	Night 2 recaptures	Proportion recaptured	Night 2 new captures	Total individuals	Total captures
<i>Heteromyidae</i>						
<i>Dipodomys merriami</i>	86	54	.63	56	142	196
<i>Perognathus fallax</i>	13	1	.08	12	25	26
Other <i>Perognathus</i> spp.	129	64	.50	95	224	288
<i>Cricetidae</i>						
<i>Peromyscus eremicus</i>	7	5	.71	1	8	13
<i>Neotoma lepida</i>	12	3	.25	4	16	19

TABLE 2.—Recapture sites of rodents initially trapped in Experimental traps (those moved to a new site for Night 2) vs. Control traps (those left at the same site)

	Total captures	Night 2 recapture site			Not recaptured
		Same position	Next position (same trap for exptl)	Elsewhere	
Night 1 Experimental trap group	124	23	16	24	61
Control	123	29	5	30	59

dition significantly affected retrapping data: (1) rodents were more likely to be recaptured at a site 10 m from their initial capture site if their original trap was moved to the new site; and (2) previously occupied traps were more successful than previously unoccupied traps. Both effects are presumably due to residual odors left on the traps. The first finding is novel. The second replicates several studies (*e.g.*, Boonstra and Krebs, 1976).

One implication is that estimates of home range and home range overlap are indeed likely to be influenced by hitherto ignored methodological details of trap emplacement. Another is that captures are likely to be more dispersed among trapping stations when traps are moved than when they are stationary.

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