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# Relative effectiveness of trapping-banding vs. visual observation in a Winter Bird Population Study

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The effectiveness of various bird-censusing techniques is of obvious concern to field ornithologists and the present state of knowledge was summarized in a recent symposium (Ralph and Scott 1981). Most census work has been done in the breeding season because of the obvious importance of studies at this time and because birds are most detectable then. A number of comparisons of various visual-aural techniques with one another in the breeding season were reported, but the only quantitative comparisons of visual-aural and capture-recapture methods are those of Ekman (1981), Green (1974), and the da Pratos (1978). DeSante (1981) has used color-marked birds in an elegant test of the variable circular-plot method, but the comparison was with a mapping survey.

Winter Bird Population Studies have been conducted for over 30 years; Robbins (1972) and Brewer (1972) have discussed the accuracy and limitations. Brewer (1978) compared the WBPS with two other methods of determining densities and pointed out the problems raised by the differences in detectabilities between species. Except for the observations of Fisk (1976) which suggest that Population Studies underestimate the birds present in some situations, no comparisons have been done with capture methods.

The availability of a reasonably uniform, easily censused habitat surrounding a banding station provided an opportunity to compare the effectiveness of the WBPS and trapping-banding for determining the numbers of two common resident species using an area in southeastern Arizona. The two mobile home parks covered 16.2 ha with a plant community of mostly introduced species. The original vegetation was creosote-bush, triangle bursage and chain-fruit cholla, used by Emlen (1974) as the control for his study of breeding birds in a single family house area. The cotton farming which preceded residential use eliminated native vegetation. The predominant plants at present, mulberry trees (*Morus alba*), *Pyracantha* shrubs and lawn grasses are all introduced. Seed and hummingbird feeders are scattered through the parks.

The area, described in the WBPS (Tweits 1981), was easily censused due to its regular pattern of roads, about

50 m apart, and mulberry trees, leafless during the survey period. It was censused visually and aurally by the authors on bicycles on 6 days between 19 December 1979 and 4 February 1980 during the hours of 0830-1030. This is essentially the "direct strip count" of Emlen (1974). Since the birds were accustomed to people, problems of movement to or from observers were greatly reduced.

Trapping was done by RCT on an irregular schedule from 1 January to 6 March using 2 single cell Potter traps baited with millet, placed about 1 m apart near the middle of the census area. Birds were banded with U.S. Fish and Wildlife Service bands and released. The only two species trapped in sufficient numbers for statistically significant comparisons were Inca Dove (*Columbina inca*) and House Finch (*Carpodacus mexicanus*). The results are presented in Table I. Other species observed are listed in the WBPS (Tweits 1981). The presence of a number of seed feeders within the study area eliminates any possibility that the baited traps might be attracting birds not normally using the area.

The differences in numbers of birds observed and banded is of interest. The significantly greater numbers of House Finches banded compared to those observed are in accord with the observations of Fisk (1976) for several other species. As no thickets of shrubbery were present in the study area, we do not believe that this difference is due to consistent under-observation.

A more reasonable explanation is that the 16.2 ha study area is only a fraction of the average winter feeding range for House Finches. A recovery of a bird about 1 km from the banding site suggests a feeding territory even larger than the approximately 50 ha derived from Equation 1.

$$\text{Equation 1: } T = \frac{ab}{o}$$

where  $T$  = feeding territory size  
 $a$  = size of area surveyed  
 $b$  = number of birds banded (from Table 1)  
 $o$  = mean number observed (from Table 1)

This large feeding territory is consistent with the work of Gill and Lanyon (1965) who found that House Finches on Long Island wandered between two feeders 1.2 km apart in the non-breeding season and even to points 13-24 km away. Thompson (1960) analyzed recoveries of House Finches from 1923-1958 and found the average foreign recovery to be about 13 km from the original site. These foreign recoveries accounted for only 3.2% of the total recoveries and Thompson commented on the "relative sedentariness of local populations of House Finches."

House Finches in the eastern United States — where a rapid range expansion has taken place recently — apparently wander more widely now as Middleton (1979) reports 68 foreign encounters at two Pennsylvania stations from 1960 to 1978, while banding nearly 9000 finches, and 51 recoveries of these birds elsewhere. The range of these encounters was from <8 to 960 km with a mean of 65 km.

Inca Doves, long associated with man (Emlen 1974, Phillips, et al 1964), use a very small feeding territory in winter, approximately 8 ha (Equation 1). The high ratio of recaptures is consistent with this as is the distance of the two foreign recoveries, 10 and 75 m. No birds banded at this station have ever been trapped at a station which is 0.75 km away. Quay (1982) reports little movement by Inca Doves in winter. They appear to have similar densities in winter and the breeding season, since Emlen's (1974) density per 100 ha, 575, was within our range of observations, 180-600, although outside one standard deviation from the mean of 360.

As Van Riper (1981) has stated, extensive banding provides the best available density estimate for a population, but one must know the area used by the birds, and Ferry et al (1981) have shown that home ranges were 2 to 12 times larger than defended territories for 5 species during the breeding season. In winter, when many species have larger feeding territories than in summer, banding studies will give a more accurate estimate of

the number of birds using an area than will visual-aural methods, for all but the most sedentary species. Comparison of banding results with visual counts under favorable conditions allows estimation of the size of winter feeding territories.

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**Table 1. Number of birds observed and trapped**

Date	Observed		Trapped	
	Inca Doves	House Finches	Inca Doves	House Finches
19 December	99	15		
3 January	65	9		
10 January	54	10		
13 January	30	24		
17 January	60	18		
4 February	36	29		
1 January-7 March			27	58
Mean	57	18		
	SD 24.5	SD 7.9		
Recaptures			17	1