

SURVIVAL OF HOUSE SPARROWS AND HOUSE FINCHES IN KERN COUNTY, CALIFORNIA

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INTRODUCTION

From January 1963 through April 1973, 8,791 birds of 91 species were banded at various sites in Kern County, California, as part of a study to determine the involvement of birds as hosts of arthropod-borne viruses. From the banding and recapture records for these birds, data on 118 House Sparrows (*Passer domesticus*) and 44 House Finches (*Carpodacus mexicanus*) were selected for the estimation of average annual survival rates.

Kern County is located in the southern end of California's San Joaquin Valley. It is bounded by the Sierra Nevada to the east, the Tehachapi Mountains to the south, and the South Coast Ranges to the west. Rainfall averages less than six inches annually. Much of the area is irrigated; cotton, rice and other grains are principal crops. Birds were collected at three locations: Poso Creek, an uncultivated foothill site 10 miles northeast of Bakersfield, and two cultivated sites on the valley floor, Tracy Ranch near Buttonwillow, and the Belridge area south of Lost Hills.

METHODS

Mist nets and ground traps of several kinds were used (Sudia et al., 1970). Nets were most effective if placed with a background of tall shrubbery or buildings.

Initially, trapping efforts were irregular. Beginning in May 1965, a routine monthly schedule was followed until October 1966; then trapping was reduced to alternate months. After April 1968, trapping was done only in the late summer and fall, except for a final period of five days in April 1973.

All new birds were banded. Species, band number, sex, age (adult or immature), date and location were recorded for each capture. Birds were held in cages for a short time to allow recovery from handling and then were released.

The data used for estimation of survival rates included only records from birds for which the date of final recapture occurred at least 12 months after the banding date. Rates were estimated by the method of maximum likelihood, using the FORTRAN computer program of Roberts (1971). Additional estimates were made using the simpler method described by Robbins (1969).

RESULTS AND DISCUSSION

Of the 8,791 birds banded during the 10-year period, 885 were recaptured one or more times. These data are summarized in Table 1, which also gives the numbers of known survivors of each species at six-month intervals and the maximum time (in months) a banded bird of each species was confirmed alive by recapture. The longest recapture record was that of a male House Sparrow

TABLE 1.

Summary of birds banded in Kern County, California, January 1963 - April 1973

Species	No. banded	Recaptured No. Percent	No. known survivors (months)				Months to final recapture
			6	12	18	24	
Roadrunner	5	1 20	1	—	—	—	9
Common (Red-shafted) Flicker	24	3 13	1	—	—	—	10
Downy Woodpecker	6	1 17	—	—	—	—	3
Nuttall's Woodpecker	7	1 14	—	—	—	—	1
Western Kingbird	4	1 25	—	—	—	—	2
Black Phoebe	20	4 20	1	1	1	1	28
Cliff Swallow	220	29 13	18	13	4	2	34
Mountain Chickadee	10	2 20	—	—	—	—	4
White-breasted Nuthatch	10	2 20	—	—	—	—	2
Mockingbird	90	8 9	5	4	3	3	24
American Robin	28	1 4	—	—	—	—	2
Hermit Thrush	89	7 8	—	—	—	—	2
Loggerhead Shrike	46	4 9	—	—	—	—	5
Orange-crowned Warbler	34	2 6	1	1	—	—	14
Audubon's Warbler	181	1 4	1	1	—	—	16
Common Yellowthroat	11	1 9	—	—	—	—	3
House Sparrow	2,649	375 14	231	118	74	49	66
Red-winged Blackbird	145	3 2	—	—	—	—	1
Tricolored Blackbird	478	2 4	1	1	—	—	16
Northern (Bullock's) Oriole	80	20 25	9	8	3	1	24
Brewer's Blackbird	124	25 20	9	6	3	3	33
Brown-headed Cowbird	159	5 3	1	1	—	—	13
Black-headed Grosbeak	44	1 2	—	—	—	—	1
House Finch	2,107	117 6	73	44	28	18	55
Rufous-sided Towhee	9	2 22	—	—	—	—	2
Lark Sparrow	61	2 3	2	1	—	—	12
Sage Sparrow	7	1 14	—	—	—	—	1
Dark-eyed (Oregon) Junco	28	3 11	—	—	—	—	2
White-crowned Sparrow	1,004	186 19	65	53	25	21	35
Golden-crowned Sparrow	199	43 22	20	13	2	—	22
White-throated Sparrow	1	1 100	—	—	—	—	4
Fox Sparrow	29	4 14	1	1	—	—	13
Lincoln's Sparrow	61	1 2	—	—	—	—	4
Song Sparrow	102	26 25	8	6	4	1	24
57 other species	719	0 —	—	—	—	—	—
TOTAL	8,791	885 10	448	272	147	99	66

banded as an adult at Tracy Ranch on 19 January 1966 and re-taken at the same site on 28 July 1971.

An earlier banding and recapture study of birds in the Bakersfield area (McClure, 1962a and b) reported captures of more than 12,000 individuals of 75 species, with House Sparrows, White-crowned Sparrows, and House Finches predominating. Where comparisons were possible, McClure's recapture success was similar to that shown in Table 1. He had fewer long-term (12 months or more) known survivors of resident species, possibly due to the larger proportion of nestlings included in his sample.

House Sparrows and House Finches together comprised 54% of the total birds banded and 56% of those that were recaptured (Table 1). Both species are residents in the area and are known to be hosts of Western Equine Encephalomyelitis and St. Louis Encephalitis viruses (McClure et al., 1962). The maximum likelihood estimates of average annual survival rates for these two species are given in Table 2.

TABLE 2.

Maximum likelihood estimates of average annual survival, S, for House Sparrows and House Finches.

Species	Number of birds	Estimated sampling rate	S	Standard error of S
House Sparrow	118	.172	.553	.038
Female	53	.115	.599	.056
Male	65	.236	.512	.050
Adult	72	.161	.509	.049
Immature	46	.185	.615	.059
House Finch	44	.220	.699	.086
Female	15	.200	.998	.206
Male	29	.231	.655	.104
Adult	34	.250	.719	.098
Immature	10	.111	.640	.179

Survival rates were calculated for each sex and for each age-at-banding group. Although there are noticeable differences in rates, especially between female and male House Finches, none of these paired differences was found to be statistically significant. House Finches, however, do have a significantly higher survival rate than House Sparrows ($P < .005$).

The survival rates calculated by Robbins' method were .542 for House Sparrows and .563 for House Finches. Both of these are within the 95% confidence interval for the corresponding maximum likelihood rates ($S \pm 1.96 \text{ SE}$).

The estimated sampling rates, based on recapture records of birds that survived two or more years (Roberts, 1971) were low (Table 2). This was expected, due to the overall lack of uniformity in sampling effort throughout the 10-year period.

Robbins also calculated theoretical survival curves for various values of S, assuming that S remains constant throughout the post-banding life of the bird. Under this assumption, the expected proportion of birds surviving for Y years after banding would be $P = S^Y$. The median length of survival after banding would then be that value of Y for which $P = \frac{1}{2}$, or

$$Y = \ln .5 / \ln S.$$

Using the values of S from Table 2, the median survival time after banding is 1.2 years for House Sparrows and 1.9 years for House Finches.

SUMMARY

Recaptures of nearly 10 percent of 8,791 birds banded between 1963 and 1973 in Kern County, California, are summarized. Estimated survival rates, calculated by two methods, and median survival time are greater for House Finches than for House Sparrows.

ACKNOWLEDGMENTS

This research was supported in part by Research Grant AI 03028 from the National Institute of Allergy and Infectious Diseases, and General Research Support Grant I-SO-1-FR 05441 from the National Institutes of Health, U.S. Department of Health, Education and Welfare.

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94720. Received 26 October 1974, accepted 18 January 1976.*