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# Is Site Fidelity to a Winter Area Reversible for Some Adult White-crowned Sparrows?

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## INTRODUCTION

White-crowned Sparrows (*Zonotrichia leucophrys*) show fidelity to a winter area (Mewaldt 1976, Ralph and Mewaldt 1976). Fidelity is established (or fixed) by mid-January among immature *Zonotrichia* spp. wintering in central California and is probably irreversible for adults (Ralph and Mewaldt 1975). Barrentine (1990) studied intra-seasonal fidelity among Gambel's White-crowned Sparrows (*Z. l. gambelii*) that had been displaced from a winter roost and found that adults were more tenacious than immatures to a home roost.

This study reports patterns of site fidelity in a cohort of White-crowned Sparrows that were displaced from a winter roost in 1989-90 and returned to the area in two subsequent winters, 1990-92. The fidelity that sparrows exhibit for a winter roost is compared to that found for winter feeding areas (Ralph and Mewaldt 1975). Evidence is provided to indicate that site fixation is reversible for some displaced adult White-crowned Sparrows.

## METHODS

Gambel's White-crowned Sparrows were mist-netted at dusk at two communal roosts for three winter seasons (1989-92) near Bakersfield, California (lat-long 352-1190). Roosts (sites A and B) consisted of patches of mature quail brush (*Atriplex lentiformis*) that were separated by 3.7 km. Site A was the home roost and site B was the new roost for 119 displacements (47 immature and 72 adult sparrows) made between 1 December 1989 and 23 February 1990 (refer to Barrentine 1990).

Fidelity to a winter roost was determined by recapturing individuals from the cohort displaced in 1989-90. Members of this cohort were expected to return to either site A or B in the winters of 1990-91 and 1991-92.

Recapture efforts at roosts were intensive, but not equal, between sites and years. In 1990-91, 18 netting sessions were completed at site A (between 1 December and 27 March) and 42 netting sessions at site B (between 22 September and 26 April). In 1991-92, 18 netting sessions were completed at site A (between 4 December and 9 April) and 38 netting sessions at site B (between 26 September and 10 April).

## RESULTS AND DISCUSSION

Sixteen percent (19/119) of the Gambel's White-crowned Sparrows displaced in 1989-90 were recaptured at least once during 1990-92 (Table 1). Return frequencies for displaced immatures and adults were statistically similar when returns for sites A and B were combined (two-tailed Fisher's exact test,  $P = 0.61$ ).

The proportion of returning sparrows in this study is similar to that found by Ralph and Mewaldt (1975). They reported that approximately 14% of over 900 *Zonotrichia* spp., displaced 4-160 km from home feeding areas, returned to either the home area or new area the following winter.

**Table 1.** Number and percent of Gambel's White-crowned Sparrows that returned to the home roost (site A) and to new roost (site B) in the two seasons (1990-92) following the season of displacement (1989-90).

	Birds Displaced from Home Roost, 1989-90	Birds Returning to Home Roost, 1990-92		Birds Returning to New Roost, 1990-92	
	N	N	%	N	%
HY/SY	47	1	2.1	5	10.6
AHY/ASY	72	11	15.3	2	2.8
TOTAL	119	12	10.1	7	5.9

**Birds returning to the home roost** — A significantly greater proportion of adults, compared to immatures, returned to the home roost after displacement (two-tailed Fisher's exact test,  $P=0.03$ ). The proportion of displaced adults that returned (15.3%) is similar to that found by Ralph and Mewaldt (1975). In their study, 16.9% of 384 displaced adult *Zonotrichia* spp. returned to the home feeding area the following winter.

**Birds returning to the new roost** — A greater proportion of immatures, compared to adults, returned to the new roost after displacement; however, differences in proportions were not statistically significant (two-tailed Fisher's exact test,  $P=0.11$ ). The proportion of displaced immatures that returned (10.6%) is similar ( $P>0.50$ ) to that found by Ralph and Mewaldt (1975) for short-distance displacements. They found that 4.9% of 41 immature *Zonotrichia* spp. displaced 1-20 km returned to the new feeding area the following winter.

It is notable that two adults in this study, both displaced in the first week of December 1989, returned to the new roost in 1990-91. (These birds were recaptured on 29 November 1990 and 4 January 1991.) This behavior was not observed among more than 400 adults that were displaced 4-160 km by Ralph and Mewaldt (1975). Thus, they concluded that site fixation to a winter area may be irreversible for adult *Zonotrichia* spp.

**Is site fidelity to a winter area reversible for some adult White-crowned Sparrows?** — Although not well-studied, the winter home range for *Zonotrichia* spp. is approximately 20 ha (Ralph and Mewaldt 1975), and flock movements for *Z. l. gambelii* seldom exceed 0.9 km (Blanchard and Erickson 1949). Unlike other studies, which have examined sparrow fidelity to a feeding area (Ralph and Mewaldt 1975, 1976), this study examines sparrow fidelity to a winter roost. Roosts and feeding areas represent important, but different, components of a winter home range. Since communal roosts contain sparrows from multiple feeding flocks, it is possible that sparrows in this study may not have been displaced outside their winter home range. That is, the winter home range for displaced sparrows may have included both roost sites.

It is not likely that the winter home range for displaced sparrows included roost sites A and B because roosts were separated by 3.7 km. Moreover, in three seasons of concurrent mist-netting and banding at both sites, no evidence was found to indicate that sparrows moved between roosts (except, of course, among displaced birds). Thus, it is compelling to interpret the behavior of the two adult sparrows that returned to the new roost as evidence that site fidelity (or fixation) to a winter area may be reversible, at least for some displaced adult White-crowned Sparrows.

Anecdotal evidence indicates that *Zonotrichia* spp. fidelity to a winter feeding area, or to a home area, may be more fluid than fixed in some individuals (Barrentine and McClure in press, Mewaldt 1964). The socio-behavioral and/or environmental factors that influence fidelity to a winter home area are subjects for further research.

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