Winter philopatry in White-crowned Sparrows *(Zonotrichia leucophrys)*

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Faithfulness to home or philopatry (from the Greek, love of fatherland) at nesting time is well known in many species of migratory birds from Song Sparrows, *Melospiza melodia* (Nice 1937) to Adelie Penguins, *Pygoscelis adeliae* (Sladen and Tickell 1958). Somewhat less well known is winter philopatry in migratory birds (Wharton 1941, Mewaldt 1964, Moreau 1969).

In this paper I provide a profile of winter returns to a 400 m^2 study plot on a suburban residential lot in San Jose, California, by one winter's population of 503 White-crowned Sparrows *(Zonotrichia leucophrys)*. Many individuals of this substantial wintering population visit the plot (see Mewaldt 1964b for aerial photograph) daily from October to early April. Since first studied in 1954, this population has rebounded quickly from several displacement experiments (Mewaldt 1964a and b; Mewaldt, Cowley, and Won 1973; Ralph and Mewaldt 1975 and 1976) and from some other lesser experimental stresses. By the fall of 1972 it seemed to have recovered well from the most recent displacements in early 1971.

Transient White-crowned Sparrows as well as transients of other migratory species do not usually visit our study plot in fall and visit in only very small numbers in late spring (Mewaldt 1964b). Our specific winter population apparently builds up from birds in lateral dispersal movement after their urge to migrate has dissipated. About 95% of captures were in Glenhaven Standby "Potter" ground traps baited with chick scratch (finely cracked corn and wheat) and the rest in similarly baited funnel traps or in mist nets.

This report deals with the 380 Gambel's Sparrows *(Z.l. gambelii)* and 123 Puget Sound Sparrows *(Z.l. pugetensis)* captured to 31 March in the 1972-73 winter season, and the first captures of returning survivors of this group in each of 1973-74, 1974-75, and to 18 January in 1975-76 (Table 1). To simplify discussion I have lumped AHY and ASY birds (see North American Bird Banding Manual. Vol. 1, 1972) together as adults, and HY and SY birds together as yearlings. In this treatment it is particularly important, in reference to 1972-73 and to 1973-74 birds, to keep segregated (1) returning adults banded in the 1971-72 season or sooner, (2) new adults, and (3) yearlings. The comparative attachment of these three groups to our study plot differs substantially (see Ralph and Mewaldt 1975). For the several cases in which birds returned in a later season, having missed capture in an intermediate season, I have recorded them as though caught in the missed intermediate season.

RESULTS

Of 503 White-crowned Sparrows captured in the 1972-73 season, 34 percent (170) returned in 1973-74 (Table 2). This 34 percent figure really has little meaning in relation to philopatry because the 503 birds included (1) some transients, (2) some birds which were present but then dispersed beyond visiting radius of the study area (3) some birds too "wise" to enter my traps again.

Of far greater meaning are the 28 of 53 (53%) Gambel's Sparrows and the 25 of 41 (61%) Puget Sound Sparrows which, as returned adults in 1972-73, returned again in 1973-74. These percentages are minimal and might have been higher had I been clever enough to capture all that returned. We may add substance to the survival percentage by calculating from Table 2 that, of 264 proved returners (1972-73 and 1973-74), 135 returned (1973-74 and 1974-75) for 51 percent minimum survival from capture in one winter season to capture in the next. This rate of return is indeed the same as the 51 percent (270 of 530) return of established adult White-crowned Sparrows found by Dr. and Mrs. Jean M. Linsdale from 1937 to 1948 (Mewaldt 1956).

It is also noteworthy that although only 29 percent (74 of 256) of yearling Gambel's Sparrows returned in 1973-74, of the 74 now returned new adults (1973-74) 53 percent (39) returned in the 1974-75 season. This difference of 24 percentage points is probably

Gambel's White-crowned Sparrow

Period		Population 72-73 Ret Ads	New Ads	Year-lings	Returns 73-74 Ret Ads	New Ads	Year-lings	Ret 74-75	Ret 75-76*
Oct	1-15	7	2	25	7	1	8	15	7
	16-31	6	0	29	4	0	10		
Nov	1-15	5	10	52	3	6	11	21	4
	16-30	11	11	23	6	3	8		
Dec	1-15	6	7	14	3	1	6	16	7
	16-31	12	22	52	3	2	12		
Jan	1-15	2	4	18	2	1	8	9	5
	16-31	1	2	21	0	0	5		
Feb	1-15	1	3	8	0	0	3	2	1
	16-28	1	5	7	0	1	0		
Mar	1-15	1	2	4	0	1	3	2	1
	16-31	0	3	3	0	0	0		
All Gamb.		53	71	256	28	16	74	65	25

Puget Sound White-crowned Sparrow

Period		Population 72-73 Ret Ads	New Ads	Year-lings	Returns 73-74 Ret Ads	New Ads	Year-lings	Ret 74-75	Ret 75-76*
Oct	1-15	0	1	1	0	0	0	3	2
	16-31	9	0	3	3	0	1		
Nov	1-15	5	5	9	3	2	1	10	6
	16-30	10	2	8	6	2	6		
Dec	1-15	8	3	6	6	1	0	2	0
	16-31	12	9	9	5	0	2		
Jan	1-15	1	0	5	0	0	3	2	1
	16-31	2	2	6	1	1	3		
Feb	1-15	1	2	3	1	1	1	0	0
	16-28	0	1	4	0	0	1		
Mar	1-15	0	1	1	0	0	0	0	0
	16-31	0	1	1	0	1	1		
All Puget		41	26	56	25	8	19	17	9
Total G & P		94	97	312	53	24	93	82	34

*To January 18, 1976.

Table 1. First captures of 503 White-crowned Sparrows, in the 1972-73 winter season and their first returns in each of the 1973-74, 1974-75, and 1975-76 winter seasons at San Jose, California.

largely due to late site fixation in yearlings (Ralph and Mewaldt 1975), but could be partially accounted for by higher mortality in yearlings than in the same birds when more than a year old.

We can derive from Table 1 that my trapping program, which included 200 to 300 captures and recaptures of White-crowned Sparrows a week in the 1973-74 season, yielded only 25 percent of the total season's returns in October, 31 percent in November, 23 percent in December, 14 percent in January, and 3.5 percent in each of February and March. It is apparent that saturation trapping throughout the season is necessary to comprehend the sample. Even so, 13 of the 118 "returns" in 1973-74 were *not* detected in 1973-74, but were captured in 1974-75 or 1975-76 and thus known to be alive in the 1973-74 season (see above). If we hypothesize 40 percent mortality, there must have been another nine, or a total of 127 "returns" present, only 105 of which were actually handled in the 1973-74 winter season. This suggests that another 7 percent (i.e. 9 of 127) may have been alive in the vicinity of the study plot and totally undetected. Here the empirical approach to analysis breaks down and more sophisticated methods are useful (e.g. see North American Bird Banding Manual, Volume I, page B-7 and B-8 for bibliography).

Gambel's Sparrow

Group	Population 1972-73	Number returned (per cent) 1973-74	1974-75	1975-76*
Returned adults	53	28 (53)	16 (57)	5 (31)
New adults**	71	16 (22)	10 (62)	4(40)
Yearlings**	256	74 (29)	39 (53)	16 (41)
Total	380	118 (31)	65 (55)	25 (38)

Puget Sound Sparrow

Group	Population 1972-73	Number returned (per cent) 1973-74	1974-75	1975-76*
Returned adults	41	25 (61)	9 (36)	4 (44)
New adults**	26	8 (31)	3 (38)	2 (67)
Yearlings**	56	19 (34)	5 (26)	3 (60)
Total	123	52 (42)	17 (33)	9 (53)
Total both races	503	170 (34)	82 (48)	34 (42)

*To January 18,1976

**Beginning with the fall of 1973, all birds can be classified as returned adults.

Table 2. Returns by race and age.

PROJECTIONS

Projections of survival data to possible conditions on the breeding grounds or along the migratory route are tempting. In the 1974-75 season 55 percent (65 of 118) adult Gambel's Sparrows returned (Table 2), but only 33 percent (17 of 52) adult Puget Sound Sparrows. This suggests that conditions for survival of adults in the Puget Sound area of Washington and British Columbia, where our San Francisco Bay area wintering population nests (Cortopassi and Mewaldt 1965) — or en route — were poor in 1974. We see a reversed situation in preliminary data for 1975-76 which show only 38 percent (25 of 65) return of adult Gambel's Sparrows, but 53 percent (9 of 17) return of adult Puget Sound Sparrows. This suggests a return to normal in the Puget Sound area in 1975, but poor conditions for adult survival along the migration route or wherever (?) in Canada or Alaska our Gambel's Sparrows breed.

Season	Total White-crowned Sparrows	Percent Gambel's Sparrows	Percent Puget Sound Sparrows
1972-73	503	76	24
1973-74	511	78	22
1974-75	563	80	20
1975-76*	452	87	13

*To 18 January 1976

Table 3. Percentage of Gambel's and Puget Sound Sparrows in a San Jose, California population 1972-73 to 1975-76.

It is equally tempting to derive data on productivity in the summer of 1972. Here data suggest 124 adult (62 pairs) Gambel's Sparrows fledged 4.13 young (N = 256) per pair, whereas 67 adult (33.5 pairs) Puget Sound Sparrows fledged only 1.67 young (N = 56) per pair. What is the significance of this difference? An attractive assumption is that conditions were abnormally poor for reproduction in the Puget Sound area in 1972. In fact, my data reveal a steadily decreasing percentage of Puget Sound Sparrows in the total White-crowned Sparrow winter population on our San Jose study area from 24 percent in 1972-73 to 13 percent in 1975-76 (Table 3). This assumes, however, that numbers of Gambel's Sparrows remained stable from year to year while absolute numbers of Puget Sound Sparrows were decreasing. Perhaps the converse was true.

The 4.13 yearlings per 2.0 adult Gambel's Sparrows compares very well with the 4.09 young Gambel's Sparrows fledged per nest in central Alaska found by Professor James R. King (personal communication). This even suggests (probably erroneously) nearly identical survival of fledglings and adults from the time of fledging on their northern nesting grounds to time of capture at San Jose. It is also well known in birds generally (Lack 1968) and in White-crowned Sparrows more specifically (DeWolfe 1968a, 1968b) that clutch size tends to be higher at higher latitudes. Thus Professor DeWolfe reports that Gambel's Sparrows produced 4.74 eggs per clutch in northern Alaska (68 degrees N) compared to Puget Sound Sparrow production of 3.56 eggs per clutch in northern California (41 degrees N). However, while Gambel's Sparrows in Alaska are single brooded, Puget Sound Sparrows typically attempt two or three broods (DeWolfe 1968a, 1968b). Thus the 1.67 yearlings per 2.0 adult Puget Sound Sparrows in San Jose in the 1972-73 winter season was probably abnormally low.

How significant or how important are the observations in the foregoing paragraphs? We cannot know until we have data from a substantially greater number of stations. The WBBA White-crowned Sparrow project may prove useful in this context. Hopefully we shall be able to assimilate comparable data taken simultaneously from a wide spectrum of stations. Such an analysis for one year will determine how much variation to expect among stations. It will instruct us on how much reliance we can place upon data collected from one station, from a few strategically located stations, or from a larger number of widely scattered stations. By having such data for a period of years we can learn a great deal about annual variation. *Most hopefully we can then monitor long term trends in the health of entire species.*

TIME OF RETURN

Do individual birds tend to return to their winter home at the same time each winter? Certainly we, as bird banders, frequently note that specific birds are trapped about the same date each fall or winter. First encounters of individual Gambel's Sparrows and Puget Sound Sparrows in the 1973-74 season are plotted against each individual bird's first encounter in the 1972-73 season in Figure 1.

The scatter seems higher than I expected and the linear regressions have low correlation, yielding a coefficient of only 0.225 for the Gambel's Sparrow and -0.076 (slight negative correlation) for the Puget Sound Sparrows. For the record, the least squares regression lines are $Y = 0.165X + 59.6$ for Gambel's Sparrow and $Y = -0.052X + 99.6$ for the Puget Sound Sparrow. Standard errors of estimates are 28.2 and 28.6 respectively. Because the correlation coefficients are so low and standard errors of the regressions are so large, Donald F. Radke (personal communication) recommended the following analyses to improve understanding and predictability.

By taking the difference between the first encounter dates for the two seasons for each bird and plotting this difference against the first encounter date of the first season, a trend is seen (Figure 2). Positive differences indicate later first encounter dates the second season and negative, earlier. Indeed, the correlation coefficients are much higher, being -0.767 for Gambel's and -0.842 for Puget Sound Sparrows. The least squares second degree regression curves are $Y = -0.00266X^2 - 0.2848X + 35.76$ and $Y = 0.00238X^2 - 1.676X + 135.67$ respectively. The standard error of estimate (68% of data fall in the band of the estimated value plus or minus one standard error; 95% in plus or minus two standard errors) is 27.8 and 28.2. Here the standard error is about 1/6 of the total swing in estimated values.

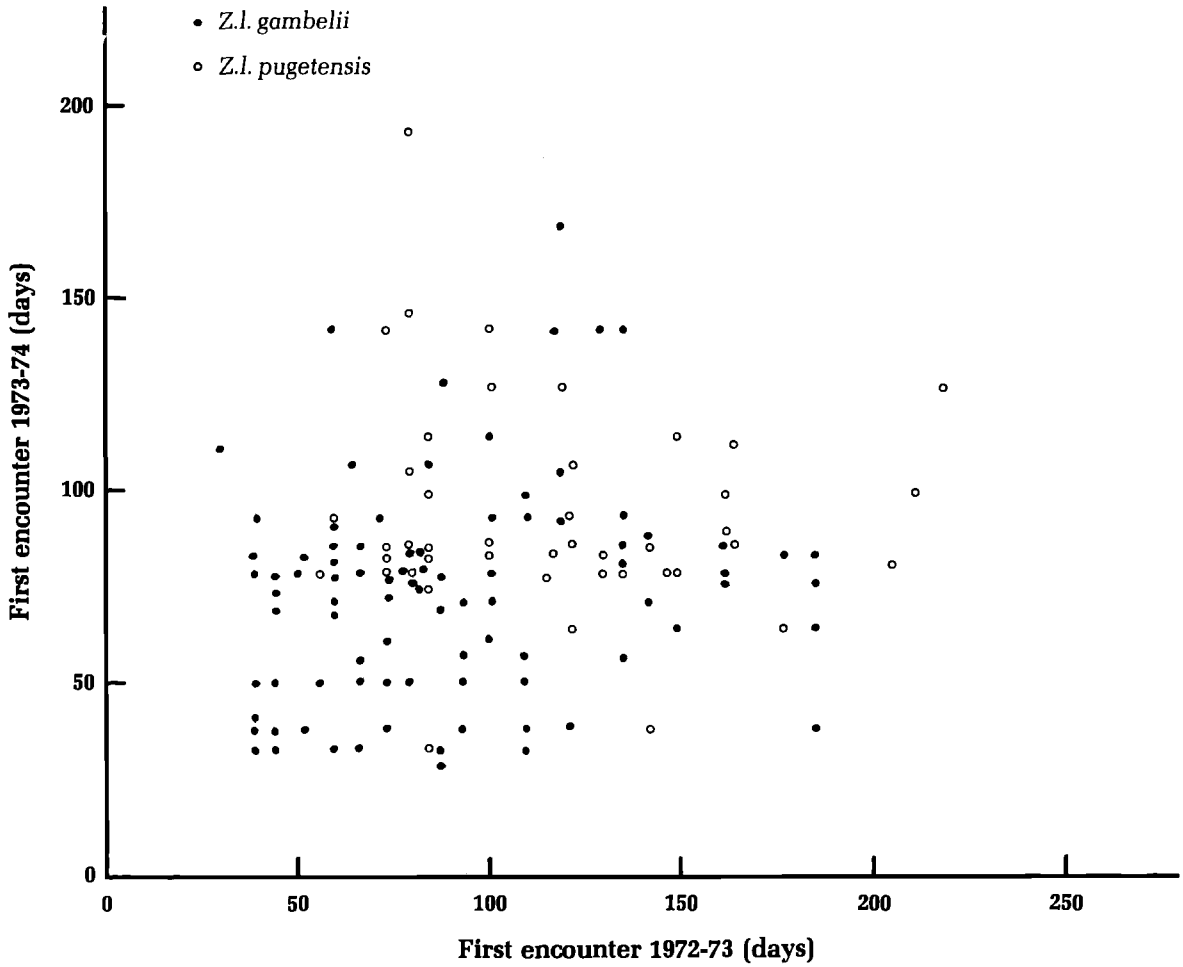

Figure 1. Relationship between first encounters of individual White-crowned Sparrows on their wintering grounds in 1972-73 and 1973-74 by days from 1 September. By linear regression from zero, Y = 0.823X and by least squares regression, Y = 0.149X + 65.6 (for both races).

As would be expected, the trend is even clearer when a two-week moving average of the difference is taken (Figure 3). Now the correlation coefficients are high, being −0.960 and −0.967 for Gambel's Sparrows and Puget Sound Sparrows respectively, and with standard errors of estimate of 10.21 and 12.76. The curves are $Y = -0.0038X^2 - 0.0132X + 22.40$ and $Y = 0.00100X^2 - 1.425X + 125.93$. It is possible that the moving average may be more representative of the population behavior than the raw difference, since it may smooth the variations in day-to-day banding effort and local weather effects.

In any event, the first encounters for the second season were more closely grouped than were the same encounters the first season. As a group those birds (30, races combined) which were first handled prior to the end of October in 1972-73 were first trapped later in 1973-74, whereas the larger group (117) which were processed from 1 November onward in 1972-73 were first trapped earlier in 1973-74. We may conclude that encounter times in the second year were not random — that they were not independent of first processing in the first year. Even if the birds were present in the vicinity of the station from early October onward, they tended to be first caught in very roughly the same order, but somewhat earlier in the second season. This latter is, of course, based on the rather fragile assumption that my effectiveness in the two seasons was equal, or at least that I was not more effective in the second season.

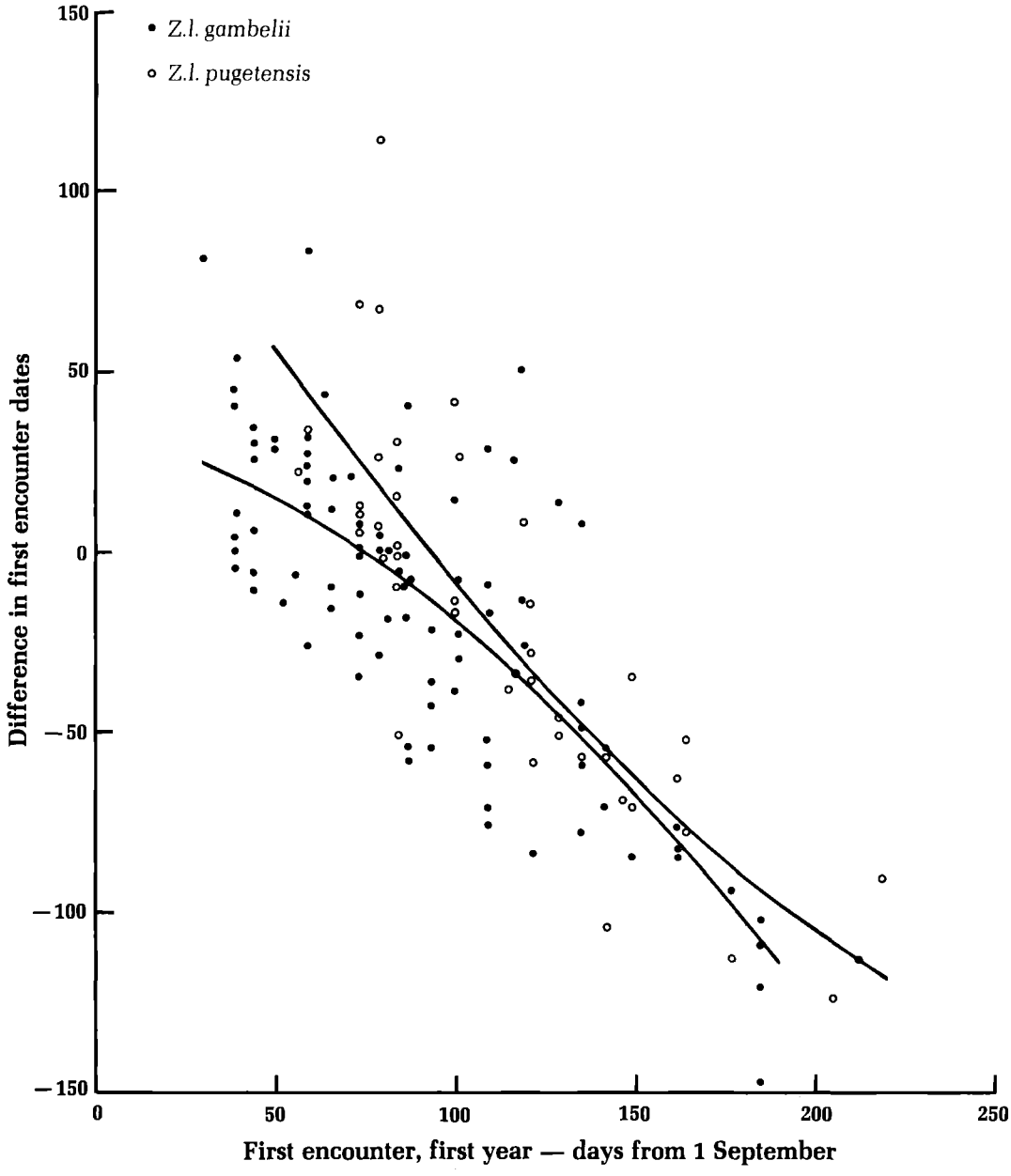

Figure 2. Differences in first encounter dates of individual White-crowned Sparrows between 1972-73 and 1973-74.

SUMMARY

Of 503 White-crowned Sparrows of two migratory races *(Zonotrichia leucophrys gambelii* and *Z.l. pugetensis)* handled in the 1972-73 winter season, 170 returned one or more times in the next three winters. Actual survival of from 53 to 61 percent of already winter-home-imprinted groups of birds from one season to the next was obtained. Realizing that some birds are not recaptured even though they survive from winter to winter, it is likely that 60 percent or greater survival is common in migratory White-crowned Sparrows. Further statistical testing on a larger sample of data is anticipated.

Although individual birds tend to be recaptured in approximately the same order they were captured the previous winter season, they also tend to return earlier in the second season.

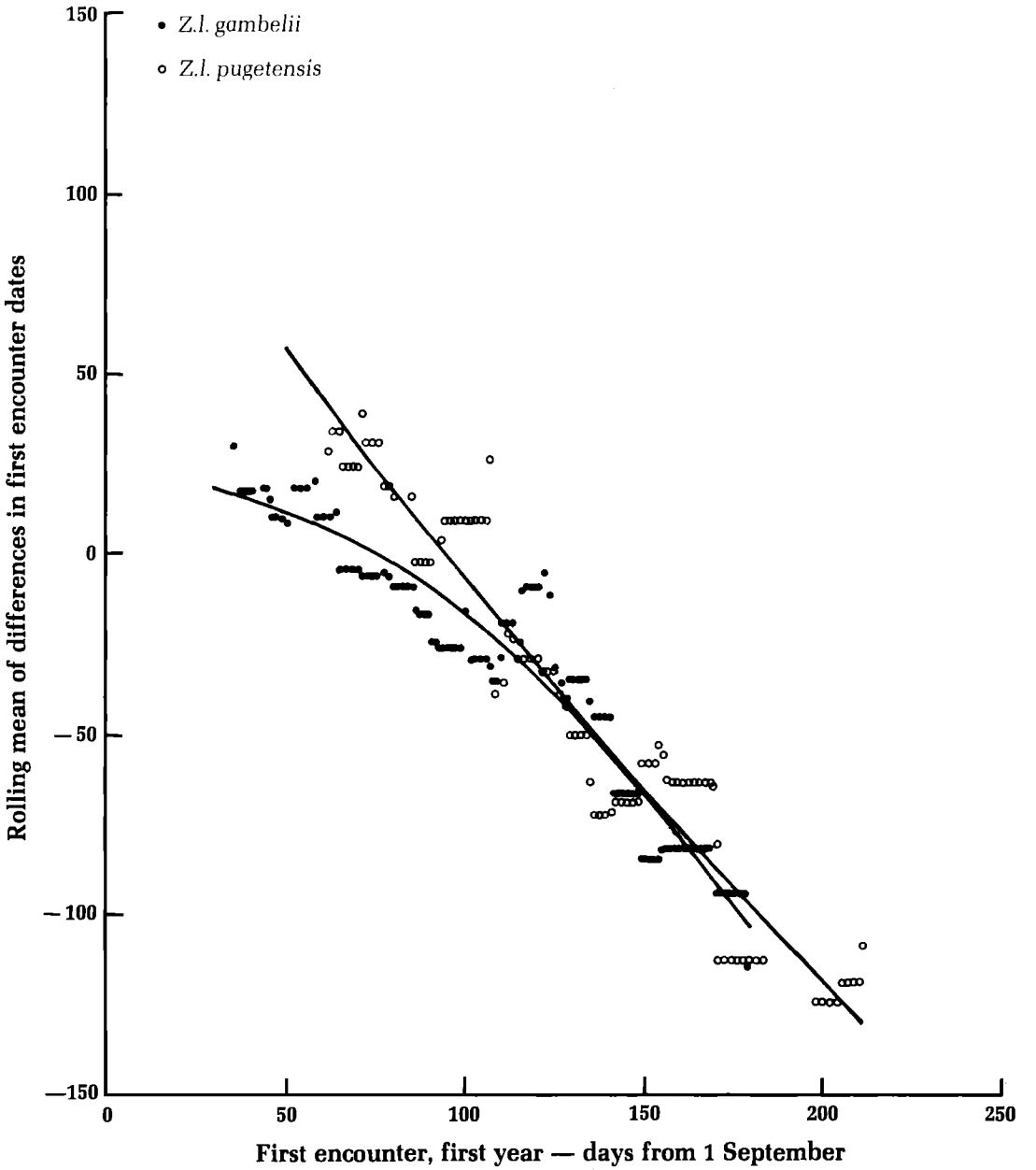

Figure 3. Rolling mean plot of the trend of differences in second year first encounter dates of White-crowned Sparrows in relation to time of first encounter in the first year.

Several projections from return data are made regarding population survival and productivity. It is emphasized, however, that a broader data base will be essential to inspire confidence in such projections. The WBBA White-crowned Sparrow Project, in which widely scattered cooperators are simultaneously gathering data may reveal short- and long-term trends in White-crowned Sparrow population levels on regional and continental bases.

ACKNOWLEDGEMENTS

I thank James R. King, Eleanor L. Radke, and Donald F. Radke for their review of this report and their suggestions for its improvement. I am grateful to Frances L. Mewaldt for assistance, encouragement, and patience.

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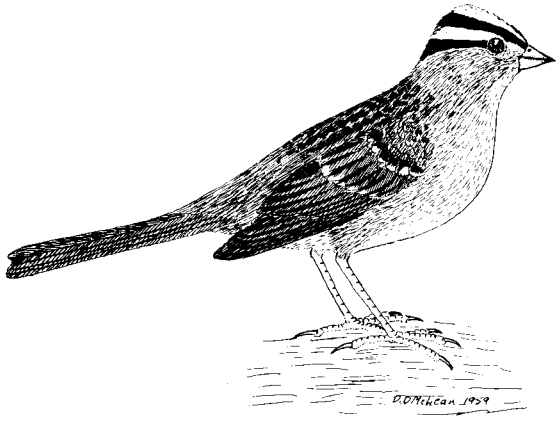

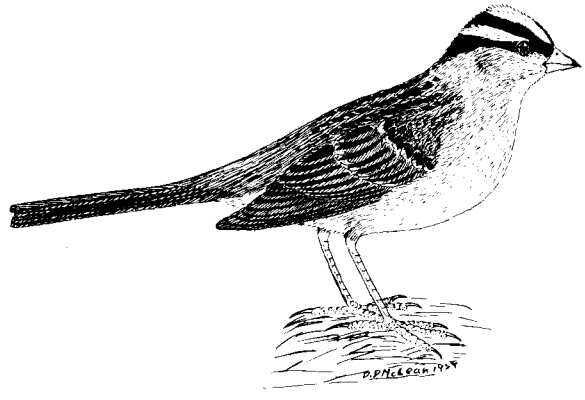

Possible Pitfalls in Museum Specimen Data

Mary H. Clench[1]

Daniel Gray's recent interesting article on aging and sexing American Redstarts (*EBBA News*, 36: 143-146) and Mrs. Foy's follow-up (*EBBA News*, 37: 43-44) prompt me to write about some of the problems that can arise when using museum skins.

Unless a person is thoroughly familiar with museum work and techniques he tends to assume that data on labels are **invariably** correct. They are not. Collectors, preparators, curators, and museum helpers are people, and although we try to be scrupulously accurate in everything we do, errors can occur.

The most common mistakes on labels are probably in the age and sex designations. The sex marked on a label should be (and, of course, usually is) based on the careful examination of the internal gonads of the bird after it was skinned. In very small birds, however, it is easy to mistake the paired adrenal glands (which lie close to the gonads) for the tiny paired testes in a non-breeding male, or to miss the