Comparative Age And Sex Ratios In Gambel's White-Crowned Sparrows In Relation To Year And Latitude

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INTRODUCTION

Gambel's White-crowned Sparrows *(Zonotrichia leucophrys gambelii)*, hereafter Gambel's Sparrows, are winter residents in semi-arid shrub and scrub steppe south of the 47th parallel and west of the 100th meridian (Root 1988). They are known to return to the same winter locality (Mewaldt 1964; 1976) after their first southward migration (Ralph and Mewaldt 1975). Winter populations also show a latitudinal cline of sex ratio in which the proportion of males increases with latitude (King *et al.* 1965; and Morton 1984).

This paper presents preliminary results of an ongoing, multi-year study of winter demographics in Gambel's Sparrows. We describe age and sex ratios for birds sampled at three widely separated latitudes during four winter seasons.

STATIONS AND METHODS

Gambel's Sparrows were captured during four winter seasons (September-February, 1985-86 to 1988-89) at four banding stations: three in California and one in Arizona. Although station protocols differed, we assume that the samples represent accurately the winter population at each location.

Coyote Creek Riparian Station (CCRS) is in the northern portion (Alviso sector) of San Jose, California (lat-long 371-1215, 3 m elevation). Birds were captured in mist nets and grain-baited ground traps in riparian habitat adjacent to weedy fields near the San Francisco Bay. Nets and traps were operated daily (dawn to noon) between September-October and five days a week from November to February.

The *Golf Drive Station* (GDS) in east San Jose is in a suburban residential area, 12 km ESE of CCRS at the base of the Inner Coast Mountain range (lat-long 372-1215, 80 m elevation). A mist net and several grain-baited ground and table traps were operated three to four mornings or evenings each week.

The *Bakersfield Station* is at the Environmental Studies Area (ESA) on the campus of California State University, Bakersfield (lat-long 352-1190, 150 m elevation). Sparrows were mist netted one to two days each week as they assembled to roost (at dusk) in quail brush *(Atriplex lentiformis)*.

The *Tanque Verde Ranch* (TVR) is 27 km east of Tucson, Arizona (lat-long 321-1104, 870 m elevation). Grain-baited mist nets were operated in the mornings one day each week in riparian and adjacent lower Sonoran scrub habitats.

We include here data for 7,587 individuals, each processed one or more times in the four winter seasons at the four stations. In the treatment which follows, (1) data for CCRS and GDS are combined because of their geographic proximity, (2) previously banded birds captured in subsequent seasons (returns) are counted as new individuals, and (3) birds captured after 28 February are excluded from station samples.

Gambel's Sparrows were aged by crown color. Sex ratios for immature (HY and SY) and adult (AHY and ASY) birds are estimates based on wing length (Mewaldt and King 1986).

RESULTS AND DISCUSSION

Age and Latitude

Combined samples for 1985-89 at San Jose (37° N), Bakersfield (35° N) and Tucson (32° N) show that immature birds constituted 64%, 47%, and 61% of wintering populations, respectively (Table 1). The proportion of immatures in annual samples varied notably at San Jose (51-

79%) and Tucson (54-72%). Annual variation was less prominent at Bakersfield (45-49%).

Age ratios for San Jose samples compare favorably with those of King *et al.* (1965) who found that immature birds constituted 60% (N = 2,343) of samples in central coastal California (37° N). Age ratios in Bakersfield samples parallel those reported by others. Immature birds constituted 50% (N = 949) of samples collected near Bakersfield, California (35°N) (Hardy *et al.*1965). They constituted 47% (N = 647) of populations in the Owens Valley, California (37°N); 49% (N = 1,523) at Thousand Oaks, California (34° N); and 48% (N = 23) at Brawley, California (33° N) (Morton 1984).

The proportion of immature birds in winter populations putatively decreases with latitude, which Morton (1984) attributes to differential mortality associated with migration distance. San Jose and Bakersfield samples provide evidence for a latitudinal cline in age ratios, but Tucson samples nullify this hypothesis. That differential mortality in immature birds is related to migration distance (Morton 1984) is speculative because migration distances for winter populations are unknown. The breeding distribution of Gambel's Sparrows is extensive (Banks 1964; Cortopassi and Mewaldt 1965), and it is likely that winter populations comprise individuals from varied latitudinal origins. Further study is needed.

Sex and Latitude

The proportion of males (immature and adult) in wintering populations estimated from wing length was highest at San Jose (54% and 60%), intermediate at Bakersfield (51% and 55%), and lowest at Tucson (45% and 45%). Refer to Table 2 and Figures 1, 2, and 3. These results resemble those reported for similar latitudes. Males (immature and adult) dominated (54.4% and 58.5%) winter samples from Owens Valley, California (37° N) (Morton 1984). The proportion of males in winter populations near Bakersfield, California (35° N) was somewhat less (43.8% and 54.8%) (Hardy *et al.* 1965); and was very low indeed (39.2% and 42.9%) at Thousand Oaks, California (34° N) (Morton 1984).

Our results corroborate evidence for a latitudinal cline in sex ratios in winter populations of Gambel's Sparrows (King *et al.* 1965; Morton 1984). Because the proportion of males increases with latitude, becoming more disparate between age classes (immature and adult) at higher latitudes, we believe that the mortality rates for sexes are variable and latitude dependent. That is, mortality rates for males and females are increasingly disproportionate at higher latitudes, favoring male survival.

Morton (1984) believes that a latitudinal cline in sex ratios may result from a higher mortality rate in adult females than in adult males. We concur. This assumes, however, that sexes are equally philopatric for winter localities (Cortopassi and Mewaldt 1965; and Mewaldt 1964; 1976) and that sparrows of either sex do not latitudinally shift their winter localities after the first year (refer to Ketterson and Nolan 1982). Further study is needed.

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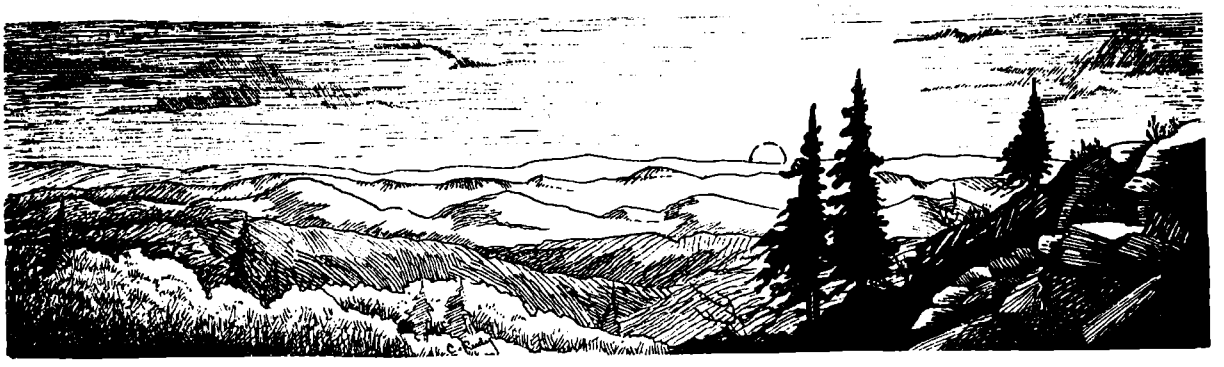
Table 1. Percent Immature Gambel's White-crowned Sparrows at San Jose and Bakersfiled, California, and Tucson, Arizona.

	SEASON									
	1985-86		1986-87		1987-88		1988-89		TOTAL	
LOCATION	%	(N)	%	(N)	%	(N)	%	(N)	%	(N)
San Jose, CA	51	(508)	79	(691)	52	(578)	69	(670)	64	(2,447)
Bakersfield, CA	48	(479)	45	(420)	45	(500)	49	(367)	47	(1,766)
Tucson, AZ	54	(692)	72	(935)	57	(1,171)	59	(576)	61	(3,374)

Table 2. Sex Ratios (percent males:percent females) of Immature and Adult Gambel's White-crowned Sparrows at San Jose and Bakersfield, California, and Tucson, Arizona.

	SEASON				
LOCATION	1985-86	1986-87	1987-88	1988-89	TOTAL
San Jose, CA					
Immature	60:40	55:45	39:61	57:43	54:46
Adult	58:42	55:45	60:40	54:46	60:40
Bakersfield, CA					
Immature	49:51	58:42	52:48	53:47	51:49
Adult	57:43	52:48	53:47	63:37	55:45
Tucson, AZ					
Immature	46:54	46:54	39:61	46:54	45:55
Adult	49:51	45:55	40:60	52:48	45:55



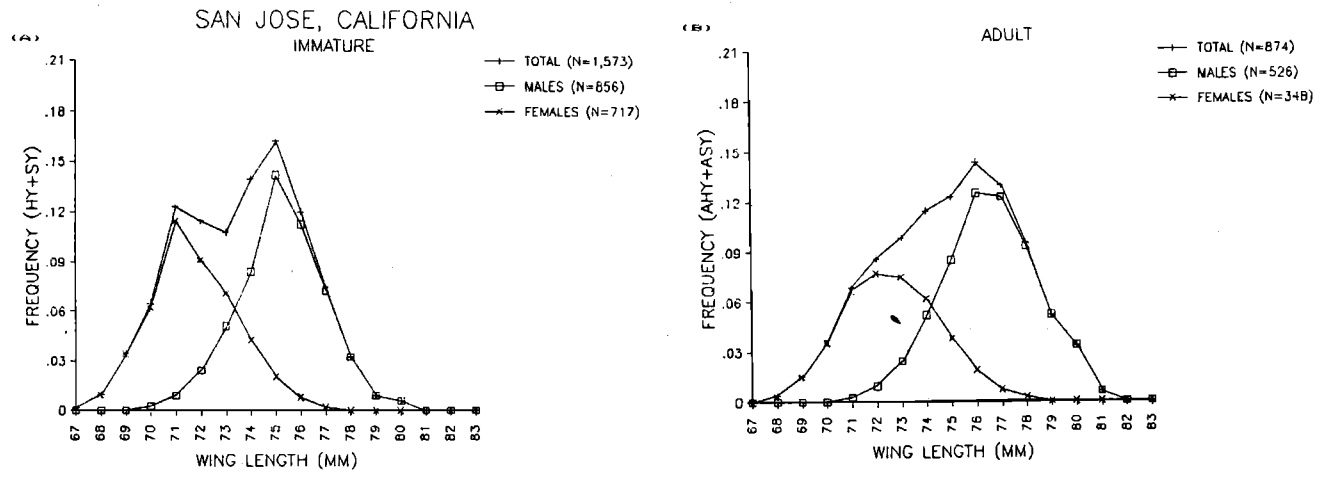


Figure 1. Calculated wing length distributions for male and female (a) immature (HY + SY) and (b) adult (AHY + ASY) Gambel's White-crowned Sparrow at San Jose, CA.

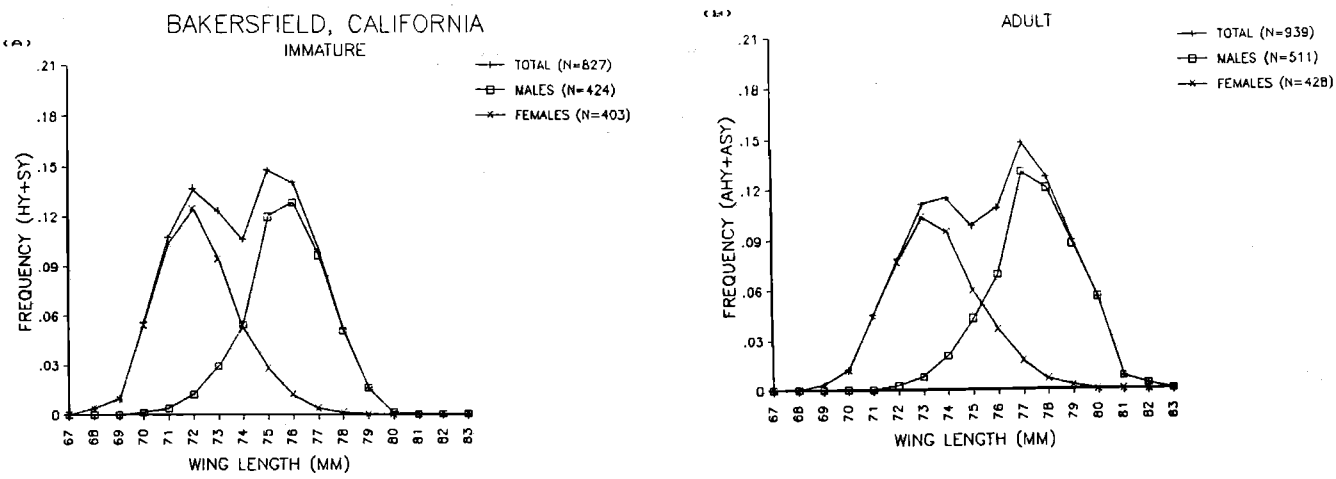


Figure 2. Calculated wing length distributions for male and female (a) immature (HY + SY) and (b) adult (AHY + ASY) Gambel's White-crowned Sparrows at Bakersfiled, CA.

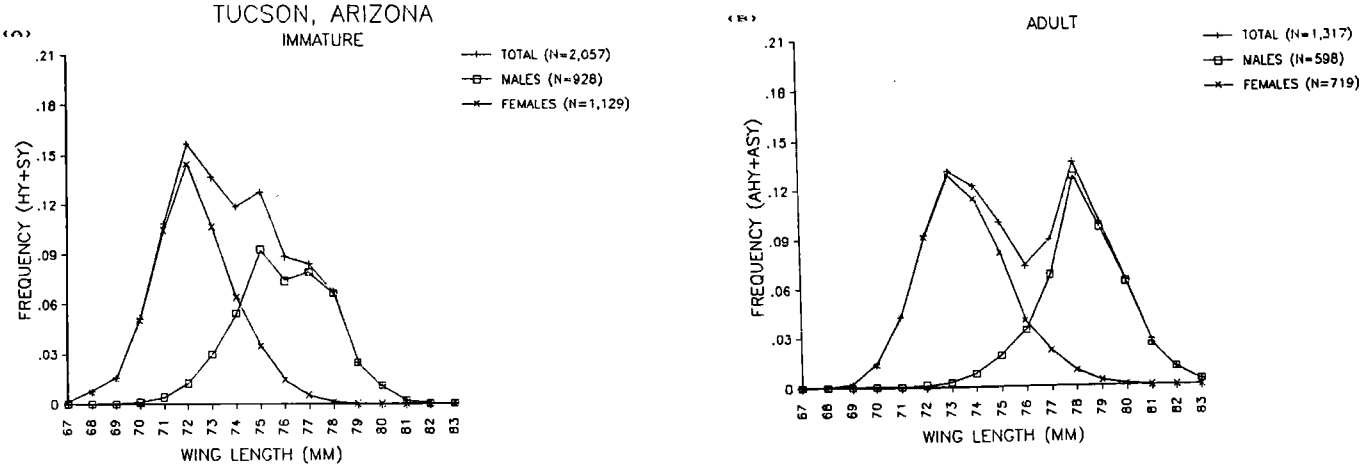


Figure 3. Calculated wing length distributions for male and female (a) immature (HY + SY) and (b) adult (AHY + ASY) Gambel's White-crowned Sparrows at Tucson, AZ.