A survey of Belding's Savannah Sparrows in California

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photographs by Bruce Peterson

BELDING'S SAVANNAH SPARROW (*Passerculus sandwichensis beldingi*) is one of a few birds that reside year round in the coastal salt marshes of southern California. The race ranges from Goleta in Santa Barbara County, California, south to El Rosario, Baja California, Mexico (Grinnell and Miller 1944; van Rossem 1947; A.O.U. 1983).

The relatively small numbers of individuals documented in the recent past and alarming losses and degradation of salt marsh habitat led to listing of this taxon as endangered by the state. Belding's Savannah Sparrow is also a Category 2 candidate for federal listing.

Estimating population sizes of this rare passerine is difficult. Although breeding territories usually consist of very small patches of Pickleweed (*Salicornia virginica*), foraging occurs throughout the marsh, often well away from the nesting sites (Bradley 1973; Massey 1977; Massey 1979). Moreover, the birds are relatively secretive. A search for nests can lead to abandonment by the birds or to inadvertent mechanical damage to nests never found.

Two previous estimates of the California population have been made. Bradley (1973) did not include several marshes in his census and estimated a total of about 1059 pairs. Massey (1977) visited all of the known sites in the state and estimated about 1610 pairs. The purpose of our investigation was to provide an update on the status of Belding's Savannah Sparrow in California, and document the current condition of the habitat.

Censusing Technique

Searches for territorial Belding's Savannah Sparrows were conducted at 30 different marshes in California. Counts were usually conducted in the early morning up to a maximum of three hours after sunrise. This time was very rarely exceeded and only when overcast conditions appeared to be responsible for a prolonged period of morning song.

The census dates spanned the period of March 27 through July 17, 1986, but most of our censusing was conducted in April and May 1986.

All known territorial individuals were counted at each marsh. Territoriality was manifest through singing, scolding, extended perching together of presumed mates, nest-building, feeding young, and aerial chases. In cases where aerial chases were circular, with the chased individual leaving the area and the chaser returning to the vicinity of the original perch site, a single territory was counted. In cases where the individual being chased eventually held its ground once removed from the original site of confrontation, two territories were counted. Single, perched, but nonsinging individuals were also counted as territory holders, where the spacing of several individuals in the marsh was quite uniform and most of the perched birds were singing. This latter manifestation of territoriality was used conservatively to avoid over-counting by inadvertently including mates of singing individuals. With enough observation time in a given patch of Pickleweed, it invariably became clear which perched nonsinging individuals should be counted. Such individuals were often joined eventually by presumed mates or strongly held their ground over an extended period, when much more obvious territoriality was being manifested in adjoining territories. Our actual censusing time at all 30 marshes totaled 151 hours.

State Census Results And Discussion

The 1986 census resulted in a population estimate of about 2274 pairs of Belding's Savannah Sparrows in 27 marshes (Table 1). This total is about 40 percent higher than the 1977 estimate (Massey 1977). Two small populations, those at the Newland Avenue Marsh and at the Aliso Creek Marsh, were newly discovered, whereas three others apparently have been extirpated, those at McGrath Beach State Park, Sunset Aquatic Park, and Beacon Island. Numbers were appreciably (50 percent or more) larger than the 1977 estimates at nine marshes and appreciably smaller at eight marshes. Three of the increases, however, those at Goleta Slough, Carpinteria Marsh, and Los Penasquitos Lagoon, approached or returned to 1973 population levels.

Eight marshes had populations of 100 pairs or more, collectively making up 75 percent of the total. The population at Point Mugu alone comprised about 20 percent of the total, and about 35 percent of the state population was detected in the marshes on land owned by the U.S. Navy, including Point Mugu, Anaheim Bay, and Camp Pendleton. Adding in the population in Tijuana Estuary, a portion of which is also owned by the Navy, raises that percentage to 45.2 percent or nearly half the state's total.

The increase in the number of Belding's Savannah Sparrows detected during this investigation was undoubtedly due in part to generally improved ecological conditions. The 1977 census followed several dry years which was manifest in the poor condition of the habitat, or at least patches of habitat, at several marshes (Massey 1977). The numerical difference between the 1977 total and the present one is about the same as the total of the increases detected at just five large marshes, Mugu Lagoon, Upper Newport Bay, Los Penasquitos Lagoon, Sweetwater Marsh, and Tijuana Marsh The greatly improved conditions at Point Mugu are probably attributable to improved tidal circulation in the western arm as a result of work done in 1978.

Table 1. Numbers of breeding pairs of Belding's Savannah Sparrows in California in 1986, compared to two previous censuses.

	Number of pairs		
Location	*1973*[1]	*1977*[2]	*1986*
Santa Barbara County			
Goleta Slough	50	28	50
Carpinteria Marsh	100	34	74
Ventura County			
McGrath Beach State Park	—	12	0
Ormond Beach	—	17	20
Mugu Lagoon	175	250	446
Los Angeles County			
Playa del Rey	25	37	32
Los Cerritos Marsh	—	5	2
Orange County			
Anaheim Bay	125	267	244
Sunset Aquatic Park	—	6	0
Bolsa Chica Wetlands	40	186	163
Newland Avenue Marsh	—	—	24
Huntington Beach Strip Marsh	—	34	47
Santa Ana River Mouth Marsh	—	—	0
Upper Newport Bay	130	83	245
San Diego County			
Aliso Creek Marsh	—	—	5
Santa Margarita River Estuary	125	106	107
Buena Vista Lagoon	0	5	1
Agua Hedionda Lagoon	37	16	45
Batiquitos Lagoon	0	20	47
San Elijo Lagoon	17	30	31
San Dieguito Lagoon	0	9	39
Los Penasquitos Lagoon	160	52	156
Mission Bay:			
Kendall-Frost Reserve	—	45	13
San Diego River Flood Control Channel	—	70	28
Beacon Island	—	4	0
San Diego Bay:			
Paradise Marsh	—	16	19
Sweetwater Marsh	—	40	118
E Street Marsh	—	18	8
Western Salt Company Dikes[3]	—	100	70
South Bay Marine Reserve	—	25	15
Tijuana Marsh	100	95	225
Totals	1,084	1,610	2,274

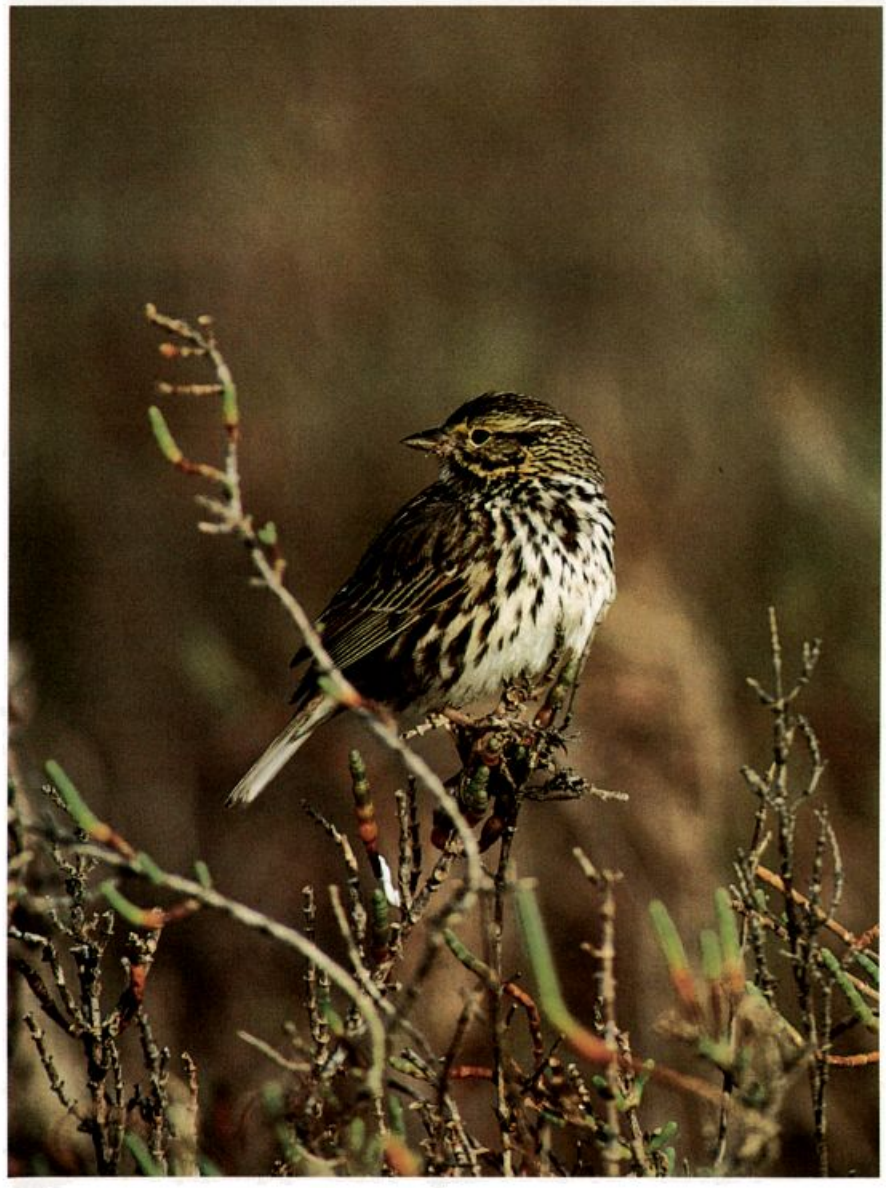
[1] *Bradley, 1973.*
[2] *Massey, 1977.*
[3] *The total for the Western Salt Company Dikes includes 8 territories at the "J" Street Marsh.*

For sheer numbers of birds, Point Mugu is unrivaled, with 19.6 percent of the total population and just over 200 more pairs of Belding's detected than in the next largest population. In terms of overall habitat suitability for the larger populations, Upper Newport Bay appears to be the most highly productive. With only about 5.2 percent of the salt marsh acreage inhabited by Belding's occurring at Upper Newport Bay, about 10.8 percent of the birds detected in the state were found there in 1986. Sweetwater Marsh, with just 2.4 percent of the total marsh area considered, hosts a density of about 2.3 pairs per hectare and 5.2 percent of the state's total of Belding's.

Extirpations were noted at three marshes, Buena Vista Lagoon contained only one territorial individual, essentially a fourth extirpation. These marshes had contained very few individuals during the earlier census periods. Presently, nine sites contain fewer than 50 individuals (25 pairs). Mathematical models have shown that with an effective population size of 50 individuals, genetic material is lost in every generation. However, smaller populations can be saved if their numbers are rapidly increased (Frankle and Soule 1981).

The 27 salt marshes currently occupied by Belding's Savannah Sparrows total approximately 2,150 hectares of salt marsh vegetation, salt flats, and small tidal channels. Excluded from this total were very large channels, ponds, and lagoons usually covered by water where the separation of acreages could be made. Only a small fraction of this total area is nesting habitat for Belding's. The upper marsh habitat is rare in southern California, since it was the easiest to fill and claim for other land uses. In such dynamic habitat over a relatively small total area in relatively few places, dramatic changes in local populations are not entirely unexpected.

The healthiest situation for the Belding's appears to be one that includes a full tidal regime and ample upper-marsh elevations. Thirteen of the 27 marshes, comprising about 59 percent of the total acreage and occupied by 70.1 percent of the Belding's detected, are subject to regular unobstructed or nearly unobstructed tidal flushing. In at least two of the 13 marshes, however, lush pickleweed has become established in small areas that are subject to tides muted by



culverts or other constrictions. Yet, six of the eight largest populations occur in marshes with full or nearly full tidal regimes. Such marshes generally also accommodate the largest wealth of other species and organisms as well.

Belding's has done well at a few localities where tidal influence is minimal or lacking, but in some of these cases at least, the long-term stability of the habitat is in question. If the health of the habitat is primarily dependent on rainfall, dry years and particularly prolonged drought will periodically take a toll on the habitat and numbers of Belding's. Much of Los Penasquitos Lagoon, for example, was cracked, parched, and unsuitable for Belding's in 1977 (Massey 1977). Wet years at places like Los Penasquitos Lagoon may even be worse, since the habitat is likely to be inundated at a time when many eggs would be vulnerable. For some pairs, the reproductive potential for an entire season could be lost and the local populations swell or decline dramatically depending upon the weather.

The long-term security of the habitat for Belding's Savannah Sparrows is intimately tied with ownership and use of the land. About 63 percent of the marshes, containing 40.6 percent of the Belding's detected in 1986, is mostly in private ownership. The most secure of the currently occupied marshes are perhaps those on land owned by the U.S. Navy. The greatest of the few success stories for Belding's since 1977, for example, has occurred at Point Mugu. As a result of a habitat enhancement proj-

ect there, tidal inundation was dramatically increased in a large section of marsh, and the number of Belding's detected nearly doubled. Point Mugu, with about 19 percent of the existing habitat for Belding's, houses approximately 20 percent of the birds detected in the state. Hopefully, the planned restoration activities at the mouth of the Santa Margarita River on Camp Pendleton will have similar results on Belding's habitat and numbers in the near future. Other relatively secure sites include those owned and managed by the California Department of Fish and Game and by the University of California. Development proposals exist at several of the marshes in private hands. Public acquisition of private holdings would increase the degree of protection for this sparrow.

There are problems associated with trespassing by people and pets at most of the marshes censused, and each could benefit, and some greatly, from habitat restoration projects. Re-establishing and maintaining a strong ocean influence at several localities would benefit many other species as well. If the needs of Belding's Savannah Sparrow are to be addressed adequately during restoration projects, however, the existing elevations of lush Pickleweed stands and their use should be considered. About 26 percent of the marshes now occupied by Belding's containing 7.7 percent of the total population, are subject to little or no tidal influence and another 7.7 percent now house 22.1 percent of the Belding's and are subject to muted or periodically reduced tides. A good percentage of the Pickleweed in such marshes is probably established at artificially low elevations and a quickly imposed full tidal regime might ruin the habitat for Belding's in some situations. However, with proper project planning and a better understanding of the autecology of shrubby *Salicornia,* lush Pickleweed might be grown at proper elevations prior to the inundation of existing stands.

Bringing the tides back and letting nature take its course may not result in the quick development of good habitat in some instances, even given proper elevations. At the Seal Beach National Wildlife Refuge, for example, an unplanted restoration area of about 41 hectares was taken down to suitable elevation in 1980. *Salicornia* cover in 1986 was fairly uniform and growing but was far from dense or tall enough to form good Belding's habitat except quite locally. In contrast, about half of the Newland Avenue Marsh was disced and destroyed in 1982, but had recovered and was functional less than two years later without any other treatment. Careful examination of such examples should lead to a better understanding of the characteristics of good habitat and allow us to facilitate its development.

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LITERATURE CITED

AMERICAN ORNITHOLOGISTS' UNION. 1983. Check-list of North American Birds. 6th edition. Allen Press, Lawrence, Kansas.

BRADLEY, R. A. 1973. A population census of the Belding's savannah sparrow, *Passerculus sandwichensis beldingi. Western Bird Bander* 48(3):40–43.

FERREN, W. R., JR. 1985. Carpinteria saltmarsh: environment, history, and botanical resources of a southern California estuary. U.C. Santa Barbara Herbarium, Publ. No. 4.

FRANKLE, I. R., and M. E. SOULE. 1981 Conservation and evolution. Cambridge Univ. Press. Cambridge, Mass.

GRINNELL, J., and A. H. MILLER. 1944 The distribution of the birds of California Pacific Coast Avifauna No. 27.

MASSEY, B. W. 1977. A census of the breeding population of the Belding's Savannah Sparrow in California, 1977 Nongame Wildlife Investigation Final Report E-1-1, Study IV, Job 1.2, to California Department of Fish and Game, Sacramento.

——. 1979. Belding's Savannah Sparrow Contract Report, Contract No DACW09-78-C-0008, U.S. Army Corps of Engineers, Los Angeles District.

ONUF, C. P. 1984. The biological and vegetation monitoring programs for the Carpinteria Estero Enhancement Project Progress Report No. 3. Marine Sci. Inst Univ. of California, Santa Barbara.

SALATA, L. R. 1981. Santa Margarita River estuary resource values and management recommendations. U.S. Fish and Wildlife Service, Washington.

VAN ROSSEM, A. J. 1947. A synopsis of the savannah sparrows of northwestern Mexico. *Condor* 49:97–107.

ZEDLER, J. B. 1982. The ecology of southern California coastal saltmarshes: a community profile. FWS/OBS-81/54, U.S. Fish and Wildlife Service, Washington.

ZEMBAL, R. L. 1986. A survey of Belding's Savannah Sparrows on the Marine Corps Base, Camp Pendleton, California, 1984–1985. U.S. Fish and Wildlife Service, Laguna Niguel, California.

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