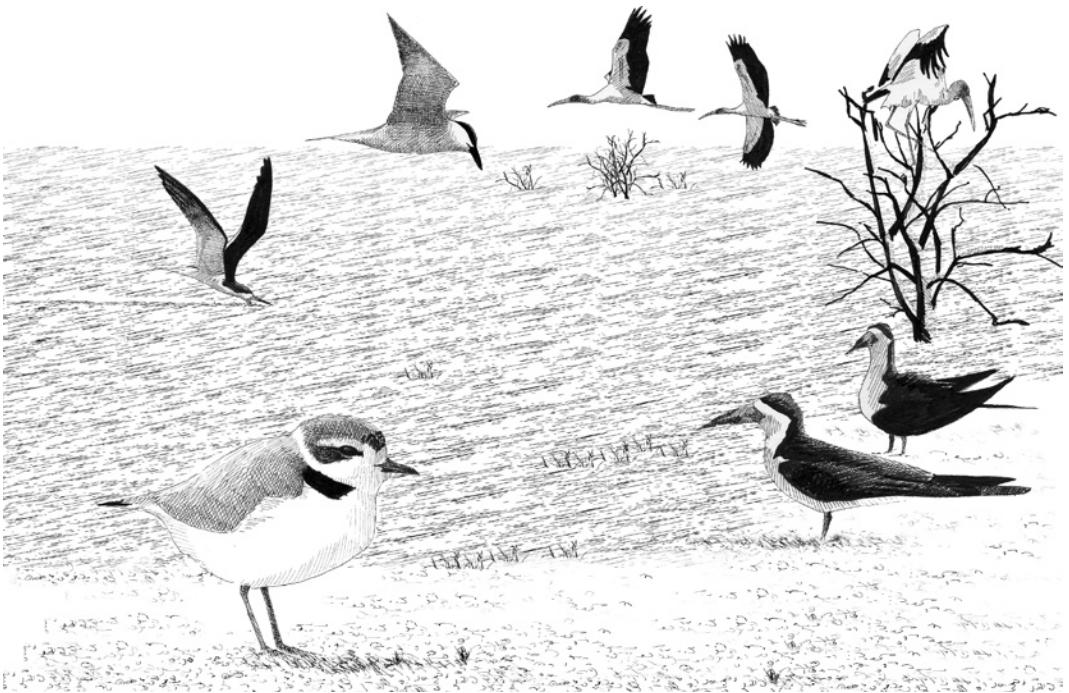


II

SPECIES ACCOUNTS



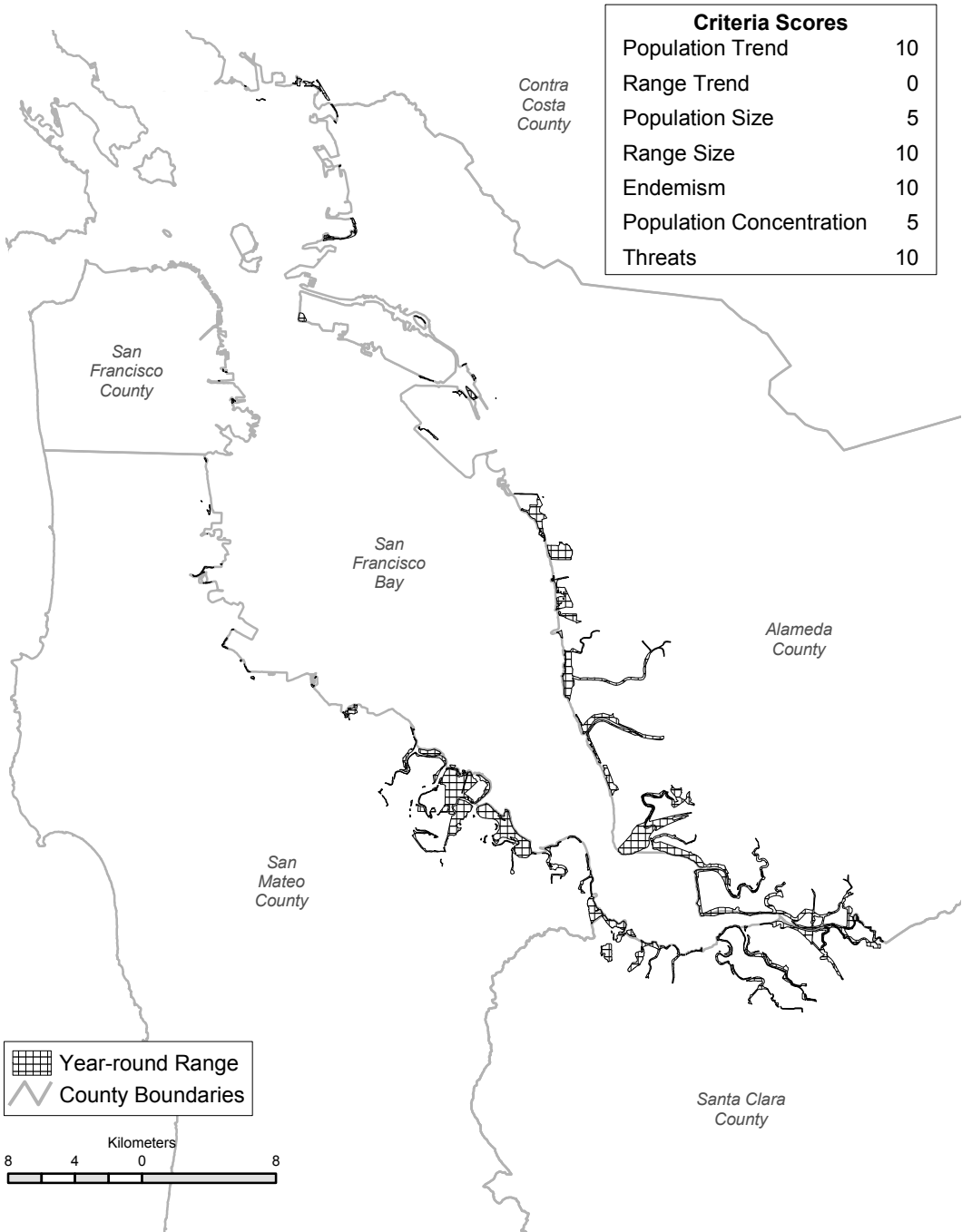
Andy Birch

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ALAMEDA SONG SPARROW (*Melospiza melodia pusillula*)

YVONNE CHAN AND HILDIE SPAUTZ



Year-round range of the Alameda Song Sparrow, a California endemic, on the basis of recent fine-scale mapping of tidal marsh in areas of occupancy. Restricted to the fringes of south San Francisco Bay, where numbers of sparrows appear to have declined moderately and the range has been severely fragmented (particularly prior to 1945).

SPECIAL CONCERN PRIORITY

Currently considered a Bird Species of Special Concern (year round), priority 2. Not included on the original prioritized list (Remsen 1978), but included on CDFG's (1992) unprioritized list.

BREEDING BIRD SURVEY STATISTICS FOR CALIFORNIA

Data inadequate for trend assessment (Sauer et al. 2005).

GENERAL RANGE AND ABUNDANCE

Song Sparrows (*Melospiza melodia*) range from southern Alaska across central and southern Canada south through the United States into northern (locally to central) Mexico and Baja California; sparrows occupy large part of northern range in summer only, much of mid-central and southern portion in winter only (AOU 1998, Arcese et al. 2002). In California, the species is resident in much of the state except for the higher mountains and most of the southeastern deserts away from the Salton Sink and Colorado River valley (Grinnell and Miller 1944, Small 1994). Of the 24 subspecies currently recognized, 9 occur in California (Patten 2001, Arcese et al. 2002).

The Alameda Song Sparrow (*M. m. pusillula*) is endemic to California, where it is restricted to tidal salt marshes on the fringes of south San Francisco Bay (Grinnell and Miller 1944). The largest concentrations occur in the tidal salt marshes near Dumbarton Point, Alameda County (PRBO unpubl. data). The distinctiveness of the Alameda Song Sparrow is based on morphology, plumage, and molecular markers (Ridgway 1899; Marshall 1948a; Aldrich 1984; Chan and Arcese 2002, 2003).

SEASONAL STATUS IN CALIFORNIA

Year round, nonmigratory; breeds from late February to mid-August (J. C. Nordby and A. Cohen unpubl. data).

HISTORIC RANGE AND ABUNDANCE IN CALIFORNIA

Grinnell and Miller (1944) described the Alameda Song Sparrow as an "abundant" resident of salt marshes along the edge of San Francisco Bay extending from the city of San Francisco, south to Palo Alto and Alviso, Santa Clara County, and along the eastern edge of the bay to the south of El Cerrito, Contra Costa County. Historic locations of confirmed breeding include the mouth

of San Francisquito Creek, Palo Alto, Santa Clara County (Grinnell 1901). Museum egg sets collected in 1883–1926 document nesting at seven additional sites in San Mateo and Alameda counties (CAS and MVZ data).

The Alameda Song Sparrow was likely found historically where tidal marsh habitat was available within its described range. The estimate of historic tidal marsh habitat for the Alameda Song Sparrow in the 19th century prior to development ranges from 26,600 to 28,000 ha (Marshall and Dedrick 1994; SFEI 1998; Goals Project 1999, 2000). Assuming that sparrow densities were the same as those found today (4.2–6.3 birds per ha, PRBO unpubl. data; see below), 20% of birds were nonbreeding "floaters" (Nur et al. 2000), and habitat extent was 27,300 ha (the mean of the range estimates), the historic breeding population was probably between 92,000 and 138,000 individuals.

Since the 19th century, tidal marsh habitat within the breeding range of the Alameda Song Sparrow has been severely reduced by diking and filling for salt evaporation ponds and urban development (Marshall and Dedrick 1994, Goals Project 1999). This loss resulted in habitat fragmentation, localized extirpations, and an overall population decline. Reduction in habitat has occurred most severely on the west side of the San Francisco Bay between the San Mateo and Dumbarton bridges and on the east side from Richmond south to Hayward (Walton 1978). Given the extent of marsh present today, 3982 ha (Marshall and Dedrick 1994, SFEI 1998; see below), this represents a decrease of about 85% from predevelopment estimates (Marshall and Dedrick 1994; SFEI 1998; Goals Project 1999, 2000). If the extent of tidal marsh was the same in 1944 as it is now, the breeding population size of Alameda Song Sparrows in 1944 may have been similar to current levels, between 13,400 and 20,000 birds (see below). However, it is reasonable to expect that sparrow numbers were at least 20% higher in 1944 (16,080 to 24,000 birds) than now, given the direct and indirect effects of subsequent increases in human population, such as habitat loss and degradation, introduced predators, and invasive species, which have been particularly dramatic in south San Francisco Bay (see below).

RECENT RANGE AND ABUNDANCE IN CALIFORNIA

Since Grinnell and Miller (1944), the general range of the Alameda Song Sparrow appears to

be relatively unchanged (see map), although there have been localized areas of habitat loss and restoration. No continuous tracts of tidal marsh >1000 ha remain, 11 parcels are >100 ha, 78 are 2–100 ha, and at least 70 are <2 ha (SFEI 1998). Half of the existing tidal marsh habitat, and presumably a corresponding proportion of the existing population of sparrows, is found within the seven largest sites.

Currently, the Alameda Song Sparrow is confined to tidal salt marsh habitat located on the fringes of the south arm of San Francisco Bay east to El Cerrito, south to Alviso, and west to San Francisco (see map). These sparrows are found in all relatively large marshes (e.g., Dumbarton Marsh, Palo Alto Baylands, Hayward Regional Shoreline, Emeryville, Alameda, San Leandro, San Lorenzo, and Coyote Creek) and in most remnant patches of marsh vegetation along sloughs, dikes, and levees, including some highly disturbed and urbanized sites (Delisle 1966 in Walton 1978, PRBO unpubl. data, H. Spautz pers. obs.). The largest concentrations probably occur in the tidal salt marshes near Dumbarton Point (PRBO unpubl. data).

The Alameda Song Sparrow lives at high densities averaging 16 birds per ha in some salt marshes with significant shrub cover, such as portions of Dumbarton Marsh (Nur et al. 1997). These estimates are similar to densities observed for Samuels (*M. m. samuelis*) and Suisun (*M. m. maxillaris*) Song Sparrows (PRBO unpubl. data). Across the breeding range of *pusillula*, however, mean absolute density is much lower, at approximately 5.2 birds per ha (95% C.I.: 4.2–6.3, PRBO unpubl. data). Estimates of the current size of the total breeding population of the Alameda Song Sparrow range from 13,400 to 20,000 individuals, on the basis of the estimate of 4.2 to 6.3 birds per ha and the assumption that 20% of adults are floaters (Nur et al. 2000).

ECOLOGICAL REQUIREMENTS

The Alameda Song Sparrow inhabits tidal salt marshes that have an appropriate configuration of vegetation, water, and exposed ground (Marshall 1948b). Vegetation is required for nesting sites, song perches, and concealment from predators. In particular, the height of the vegetation may be limiting for Song Sparrows because tides may flood low-lying nests. The dominant plants of tidal salt marshes in San Francisco Bay are cord grass (*Spartina* spp.) in low elevations of the marsh, pickleweed (*Salicornia* spp.) on slightly

higher ground, and gumplant (*Grindelia* spp.) even higher along slough edges. Marshall (1948b) noted that Song Sparrows were either absent or less dense when cord grass was <46 cm high and missing from areas of pickleweed <30 cm high. It is clear that within their territories Alameda Song Sparrows require some upper marsh vegetation for nesting, so that nests remain dry during all but the highest tides (J. C. Nordby and A. Cohen unpubl. data).

The Alameda Song Sparrow prefers tidally influenced habitat. Where the marsh plain is intersected by sloughs, Song Sparrow territories are arranged linearly along the slough, providing each pair with access to the slough and its overhanging banks for food and cover. In marshes with no sloughs, tidal influence is still required; in diked areas with stagnant water, few Song Sparrows are found (Marshall 1948b). Exposed ground for foraging is required. In tidal salt marshes, dense pickleweed is opened by small mammal trails and tidal action. Marshall (1948b) noted that the densest vegetation within which Song Sparrows can exist is *Scirpus* set at least 2–5 cm apart at the base, providing openings for foraging on the ground. The year-round diet of the Song Sparrow in California is roughly 79% vegetable and 21% animal matter, the latter taken mostly in May (Beal 1910).

Analyses of the relationship between the abundance of tidal marsh Song Sparrows and a series of vegetation and habitat variables indicated the sparrows respond positively to shrub cover (primarily gumplant and Coyote Brush [*Baccharis pilularis*]) and negatively to pond cover and to *Juncus balticus* cover, which tends to be too sparse or short for nesting (Spautz et al. 2006). At the landscape level, all three tidal marsh Song Sparrow subspecies (including the Suisun and Samuels Song Sparrows) were positively associated with marsh size and proportion of adjacent natural upland, and negatively with the proximity to nearest water edge, with the proportion of adjacent agriculture, and, paradoxically, with the proportion of marsh (tidal or nontidal) in the surrounding area (Spautz et al. 2006). Thus, Song Sparrows tend to be denser along upland edges of large marshes, especially where shrubs and other natural vegetation are present.

The Alameda Song Sparrow may be particularly suited to the highly saline marshes of San Francisco Bay. In a study of salt tolerance, Basham and Mewaldt (1987) found that Alameda Song Sparrows were able to maintain their body weight under saline conditions, whereas individuals of the neighboring subspecies, the Santa Cruz Song

Sparrow (*M. m. santaecrucis*), could not. Hence, salt tolerance may act as an isolating mechanism preventing gene flow and introgression with other Song Sparrow subspecies.

THREATS

Habitat loss has historically been a major threat to the Alameda Song Sparrow. However, with the acquisition in 2003 by the State of California and the U.S. Fish and Wildlife Service of 15,100 ha of salt ponds in San Francisco Bay for wetland restoration, the potential habitat for the Alameda Song Sparrow is likely to double (Philip Williams & Associates et al. 2005). If these plans are realized, which is uncertain at this time, it undoubtedly will take many decades until tidal marsh habitat develops sufficiently to support sustainable Song Sparrow populations.

The primary threat to the Alameda Song Sparrow is most likely the negative impact of invasive, non-native Salt-water Cord Grass (*Spartina alterniflora*) and related hybrids (*S. alterniflora* x *S. foliosa*; Takekawa et al. 2006). The non-native *Spartina* grows further down the tidal gradient than any native tidal marsh plant species; it also grows in the mid- to high-marsh zones, where it can displace native plants (Ayres et al. 1999). Alameda Song Sparrows occupy areas that have been invaded, but so far no bird has been found to have a *Spartina*-only territory (J. C. Nordby and A. Cohen unpubl. data). Non-native *Spartina* reduces Song Sparrow reproductive success because nests placed in *Spartina* are at lower elevations relative to the tides and therefore are more likely to flood than nests placed in native vegetation (J. C. Nordby and A. Cohen unpubl. data). Non-native *Spartina* may also be affecting Alameda Song Sparrows indirectly by facilitating an increase in numbers of Marsh Wrens (*Cistothorus palustris*), which are known nest predators and may be competing with the Song Sparrows for space and food resources. However, a major effort to eradicate non-native *Spartina* from the bay is currently underway and will likely confine the spread, if not completely eradicate the infestation.

Another major threat may be changes in salinity of the salt marshes at the southern end of the San Francisco Bay from freshwater runoff from adjacent urban areas such as San Jose (Basham and Mewaldt 1987, Marshall and Dedrick 1994). The Alameda Song Sparrow is genetically the most distinct subspecies of Song Sparrow in the San Francisco Bay region (Chan and Arcese 2002),

and the decrease in salinity may increase the likelihood of interbreeding with neighboring subspecies by enabling their access to tidal salt marshes where previously the salinity was intolerable. Decreases in salinity may also result in vegetation changes, such as increases in *Scirpus* (H. T. Harvey & Associates 2003), which would augment Marsh Wren numbers and thereby potentially impact the sparrows' reproductive success.

Sparrows in the remaining tidal marsh habitat, which is now fragmented within a mostly urban matrix, may suffer increased predation from domestic cats (*Felix catus*) and Norway Rats (*Rattus norvegicus*; Walton 1978). Brown-headed Cowbirds (*Molothrus ater*) also parasitize a significant proportion of Alameda Song Sparrow nests (Greenberg et al. 2006), and although it is unknown whether parasitism has a significant impact on sparrows' reproductive success, cowbirds are also known to destroy nests to increase future parasitism opportunities (Arcese et al. 1996).

Additionally, inability to disperse may limit individual population recovery. Although tidal marsh Song Sparrow abundance tends to be negatively related to the proportion of urbanization in the surrounding landscape (PRBO unpubl. data), abundance is highest on habitat edges (Spautz et al. 2006).

Although threats from global climate change are beyond the scope of management at the state level within the next 20 years, it is likely that projected future increases in sea level from global warming would increase flooding and alter the salinity regime, the vegetation composition, and the distribution of tidal marsh habitat (IPCC 2001).

MANAGEMENT AND RESEARCH RECOMMENDATIONS

- Protect and restore tidal salt marshes in south San Francisco Bay, giving high priority to protection of large continuous marshes (e.g., Dumbarton Marsh) and restoration of large areas of former marsh (e.g., Bair Island). Efforts should focus on restoring tidal influence and providing areas of higher ground with shrub cover (*Grindelia* or *Baccharis* spp.).
- Restore dispersal corridors, particularly in highly fragmented areas.
- Research the effect of invasive exotic plant species on tidal salt marsh habitat and on Song Sparrow population density and reproductive success.

- Document changes in vegetation and habitat where changes in salinity from urban runoff have occurred and monitor whether the integrity of subspecies may be threatened by introgression if habitat barriers between populations are removed.
- Identify habitat requirements and ecological conditions that support self-sustaining populations; pay particular attention to ideal restoration of tidal marsh habitat and the importance of landscape-level factors.
- Research effects of flooding on Song Sparrow nest success, which may be crucial for restoration planning.
- Study the effect of Marsh Wrens on Song Sparrow population levels, density, and reproductive success, particularly in relation to invasive *Spartina*.
- Identify important nest predators and evaluate predation control measures if necessary.

MONITORING NEEDS

The Breeding Bird Survey is inadequate for monitoring changes in the population dynamics of this subspecies because it is restricted to tidal salt marshes, which are inaccessible and ineffectively surveyed from roads. Standardized point counts conducted annually within the tidal marsh habitat could provide an index of breeding population size and trends. Breeding productivity could be estimated by establishing nest monitoring plots within the tidal marshes. Because of the openness of the habitat, it is unlikely that constant-effort mist-netting would be effective in providing estimates of survival and productivity.

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