

JOB FINAL REPORT

State: California

Project Number: W-54-R-6 Project Title: Special Wildlife Investigations

Job Number: II - 5.12 Job Title: Salt Marsh Song Sparrow Study

Period Covered: February 4, 1974 - October 4, 1974 Job Type: Survey and
Inventory

SUMMARY:

Three races of song sparrow (Melospiza melodia) occur only in marshlands of the San Francisco Bay Region: Alameda (M. m. pusillula), Samuel's (M. m. samuelis) and Suisun (M. m. maxillaris) song sparrows. Economic development along shorelines of the San Francisco Bay area have destroyed or degraded salt marsh song sparrow habitat causing disappearance of the birds in parts of their former ranges. A survey of the status of these three races was conducted from February to October 1974 to determine current distribution and abundance of the birds and to identify factors detrimental to maintenance of their populations. A reconnaissance was made of known salt and brackish marshes, and sample areas were selected for population density determination. Compared with known ranges in 1900, current distributions of all three subspecies are reduced, especially in the middle portion of San Francisco Bay between San Pablo Bay and San Mateo Bridge. Breeding population densities in various habitat types were determined in selected portions of the ranges of these subspecies. In song sparrow habitat unaltered by land fills, diking or other land uses, densities recorded in 1974 are similar to densities recorded in previous studies. Brian Walton, who conducted the 1974 study, will continue research through September 1975 under contract with U. S. Fish and Wildlife Service.

BACKGROUND:

Three races of song sparrow (Melospiza melodia) are restricted in distribution only to marshlands in the San Francisco Bay region. The Alameda song sparrow (M. m. pusillula) occurs in salt marshes bordering south San Francisco Bay; the Samuel's song sparrow (M. m. samuelis) occurs in salt marshes around San Pablo Bay; and the Suisun song sparrow (M. m. maxillaris) inhabits marshes of the Suisun Bay area.

Habitat, abundance and geographic variation of each subspecies were studied by Marshall (1948a, 1948b). Johnston (1954) reported on the breeding biology of the Samuel's and Alameda races. An intensive population study of Samuel's song sparrow was conducted in San Pablo Bay from 1950 to 1955 by Johnston (1956a, 1956b). More recently, Gill (1972) collected nesting data on the Alameda song sparrow and gathered breeding population density along selected transects.

Economic developments along shorelines of the San Francisco Bay area have removed or altered salt marsh song sparrow habitat causing the disappearance of these birds from parts of their former ranges. Lack of current information on the status of these three races created the need for a survey of the effects of habitat alteration on population densities and ranges.

Brian Walton, graduate student at San Jose State University, was hired to conduct the survey from February to October 1974, concentrating on distribution and abundance of the breeding population of song sparrows.

This study is the first part of an intensive study of the salt marsh song sparrow population. The second phase, extending from October 1974 to September 1975, is being conducted by Brian Walton under contract with the U. S. Fish and Wildlife Service.

OBJECTIVES:

Objectives of the 1974 survey were to determine abundance, distribution and current status of each race of salt marsh song sparrow of the San Francisco Bay region and to determine habitat needs of these birds for their continued survival.

PROCEDURES:

A reconnaissance was made of known salt marshes and brackish marshes within the former ranges of the three salt marsh song sparrow races mapped by Marshall (1948a). Maps, knowledgeable people, and literature were consulted to locate suitable remaining habitats. Aerial surveys were flown on April 19 and 24 to aid in the location of these marshlands.

Sample areas were selected to determine breeding population densities in various habitat types. Densities were determined using techniques described by Marshall (1948b) and Johnson (1956b). Breeding territories of song sparrows are distributed linearly one by one along tidal sloughs. By walking along these sloughs, Walton recorded the numbers of singing males to determine territory spacing. Also recorded were numbers of female song sparrows sighted. Species of special concern, such as rare or endangered species, were also recorded. From 366 to 1,646 meters (1,200 to 5,400 feet) of sloughs were walked in each area sampled.

Habitat types sampled were categorized as saltmarsh (Salicornia flats, Salicornia-Grindelia associations or Spartina marshes unaltered by land fills, diking or other land uses), brackish marsh (such as Scirpus, Typha or Salicornia associations, unaltered), salt marsh (altered), brackish marsh (altered), fringe (marsh vegetation limited to edges of dikes, land fills or other margins of high ground bordering salt or brackish water areas). Locations censused by Johnston (1956b) and Gill (1972) were resurveyed and results compared.

Whenever possible, field work was conducted during periods of high tide. Observations were made with 7x binoculars and 15x spotting scope.

FINDINGS:

Ranges

About the turn of the century salt marsh song sparrows were distributed continuously over broad areas around Suisun Bay, most of San Pablo Bay and the southern portion of San Francisco Bay. The birds also were distributed continuously along portions of much of central San Francisco Bay (Figure 1).

Ranges of all three subspecies are now reduced from the 1900 distribution (Figure 2). Habitat loss has resulted in greater separation between the main portions of the range of each race, particularly between the Samuel's and Alameda races. Greatest range reduction has occurred along shorelines of San Francisco Bay from the south shores of San Pablo Bay to San Mateo Bridge. In this area, only small populations of Alameda and Samuel's song sparrows remain in remnant, isolated marshes. Alameda song sparrows have been eliminated from the west shore of south San Francisco Bay north of Belmont Slough, Foster City.

The main range of the Alameda song sparrow now extends from Coyote Creek, at the southern extremity of the Bay, northward along the west shore of south San Francisco Bay to Belmont Slough and along the east shore to San Lorenzo. Small populations also occur in small marshes at the northeast shore of Richmond Inner Harbor at El Cerrito, along the shoreline from Emeryville to the Oakland Bay Bridge Toll Plaza, and at Arrowhead Marsh at the mouth of San Leandro Creek in San Leandro Bay.

Samuel's song sparrows are presently distributed in marshes around San Pablo Bay continuously from Gallinas Creek in the west, along the northern San Pablo bayshore, and throughout the extensive marshes along the Petaluma, Sonoma and Napa rivers. Formerly more widespread from Richardson Bay to San Rafael Bay, only small populations remain in small isolated marshes at the western extremity of Richardson Bay, along Madera Creek, and at the lower end of San Rafael Creek. Along the southeast shoreline of San Pablo Bay, isolated populations occur in small marshes between Wilson Point and Pinole Point, and at the mouths of San Pablo Creek and Wildcat Creek.

Suisun song sparrows are distributed over most of their original range, occurring in marshes from Martinez eastward along the south bayshore of Suisun Bay to Pittsburg then north of Suisun Bay throughout the extensive Suisun marshlands. The only remaining wetlands supporting these birds in Carquinez Strait apparently is at the north end of Southampton Bay.

Density of Breeding Populations

A transect was established in each of 64 sample areas to determine breeding density in various habitats of each race. In habitat of the Alameda race, 27 areas were censused entailing 20,619 meters (67,650 feet) of sloughs; five additional areas were checked for the presence of birds but transects were not run. In Samuel's song sparrow habitat, 26 sample areas (18,174 meters or 59,625 feet of sloughs) were censused; four additional areas were checked but not censused. In Suisun song sparrow habitat, 11 areas were sampled (6,789 meters or 22,275 feet of sloughs censused), and 9 additional areas were checked but not censused.

Widths of territories across sloughs were variable but were approximately 9.1 meters (30 feet). Johnston (1956b) multiplied the length of slough by the figure 30 feet in determining acreage of habitat occupied by breeding Samuel's song sparrows in Salicornia habitat. This figure was used in determining breeding density for the 1974 study.

Densities of breeding populations ranged from 41 pairs per hectare (16.6 pairs per acre) in salt marsh habitat to 5.9 pairs per hectare (2.4 pairs per acre) in fringe vegetation (Table 1).

TABLE 1
RANGE IN BREEDING POPULATION DENSITIES RECORDED IN VARIOUS HABITAT TYPES

Breeding Habitat	Subspecies	Distance Between Pairs				Density			
		Meters		Feet		Pairs/Hectare		Pairs/Acre	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Salt marsh (unaltered)	Alameda	27.4	54.9	90	180	20.5	41.0	8.3	16.6
" " "	Samuel's	36.6	68.6	120	225	16.6	32.4	6.7	13.1
Brackish marsh (unaltered)	Suisun	41.1	73.2	135	240	15.6	27.4	6.3	11.1
" " "	Samuel's	45.7	68.6	150	225	16.6	24.7	6.7	10.0
Salt marsh (altered)	Alameda	54.9	109.7	180	360	9.9	20.5	4.0	8.3
" " "	Samuel's	82.3	100.6	270	330	10.6	13.1	4.3	5.3
Brackish marsh (altered)	Suisun	54.9	118.9	180	390	9.1	20.5	3.7	8.3
" " "	Samuel's	64.0	118.9	210	390	9.1	17.5	3.7	7.1
Fringe vegetation	Alameda	91.4	182.9	300	600	5.9	11.9	2.4	4.8

Eight areas censused by Johnston (1956b) and Gill (1972) were resurveyed in 1974 and densities were compared (Table 2). Areas selected were those not altered by filling, diking or other land use. Densities of Alameda song sparrows in 1974 tended to be -slightly higher than those reported in 1971 by Gill, but for the Samuel's and Suisun races, 1974 densities were somewhat lower than the highest densities reported by Johnston from 1950 to 1955. These differences were not great and may have been due to differences in census procedures used by each researcher or, in some cases, differences in time of year that transects were conducted. Sizes of census areas checked in 1974 in Samuel's and Suisun song sparrow habitats were smaller than areas sampled by Johnston, and this may have contributed to the observed density differences. In San Pablo Marsh, density of Samuel's song sparrows fluctuates from one year to the next (Johnston, 1956b). The density differences between the 1974 study and previous studies are no greater than the year to year differences recorded by Johnston.

Discussion

The Alameda song sparrow has been affected by urbanization throughout its range. Only limited areas of brackish vegetation remain, and few remaining areas of complex salt marsh exist. Salt marshes have been largely converted to salt evaporation ponds. Management of remaining salt marsh by the San Francisco Bay National Wildlife Refuge is needed to insure future habitat for this race.

The Samuel's song sparrow has been affected by urbanization in the southern portion of its range. In this area the vulnerable salt marsh has been filled and much of the remaining vegetation occurs in narrow fringe along landfill. Small remnant populations in this area rely on upland vegetation for food and cover. In the northern portion of the range in the extensive Petaluma, Napa and Sonoma River marshes song sparrows inhabit salt and brackish vegetation and maintain high concentrations. Two large salt marsh complexes, Gallinas Creek and the northern San Pablo Bayshore, contain dense concentrations. Diking to form pasture and agricultural lands and salt evaporation ponds has destroyed much of the original marshland. Proper management and conservation of native habitat by the San Pablo Bay National Wildlife Refuge and private-interests is needed to maintain remaining populations.

The Suisun song sparrow has been affected by urbanization in the southern portion of its range. The population in this area is reduced to isolated groups of individuals in the remaining marshes. In the northern portion of its range there are large areas of suitable habitat remaining which are currently managed as duck clubs or refuge. The large network of sloughs in these areas is subjected to daily tidal flow and provides habitat for the sparrows. Management, of the marsh occasionally eliminates sparrow habitat in some areas when large Salicornia or Scirpus flats are allowed to dry out or flood. Unless there is a great change in the land use of this area, there appears to be adequate habitat for these song sparrows.

TABLE 2

BREEDING POPULATION DENSITIES RECORDED IN 1974 COMPARED WITH DENSITIES RECORDED IN 1950's BY JOHNSON 1956) AND IN 1971 BY GILL (1972)

Subspecies	Location	Y e a r	Transect Length		Area		Density			Source	
			(Meters)	(Feet)	(Hectares)	(Acres)	Pairs	Pairs/Hectare	Pairs/Acre		
<u>Salt Marsh Habitat:</u>											
Alameda song sparrow	Mud Slough	1971	610	2000	0.6	1.4	11	19.5	7.9	Gill,. 1972	
	" "	1971	762	2500	0.9	1.7	7	9.9	4.0	Gill, 1972	
	" "	1974	640	2100	0.6	1.4	13	20.0	8.1	Walton	
	Mowry Slough	1971	670	2200	0.6	1.4	13	21.5	8.7	Gill. 1972	
		" "	1974	754	2475	0.9	1.7	16	23.2	9.4	Walton
	Triangle Marsh	1971	914	3000	0.8	2.0	20	24.7	10.0	Gill, 1972	
		" "	1974	823	2700	0.7	1.8	18	24.7	10.0	Walton
	Samuel's song sparrow	San Pablo Marsh	1953	933	3060	0.8	2.1	22	25.9	10.5	Johnston, 1956b
" "	" "	1953	1090	3575	1.0	2.5	24	24.0	9.7	Johnston, 1956b	
" "	" "	1953	732	2400	0.6	1.6	17	25.7	10.4	Johnston, 1956b	
" "	" "	1953	1366	4480	1.2	3.0	25	20.3	8.2	Johnston, 1956b	
" "	" "	1974	640	2100	0.6	1.4	8	19.8	8.0	Walton	
" "	" "	1974	732	2400	0.6	1.6	10	18.8	7.6	Walton	
<u>Brackish Marsh Habitat:</u>											
Samuel's song sparrow	Napa River	1950-1955	1509	4950	1.4	3.4	28	20.3	8.2	Johnston, field notes	
" "	" "	1974	1097	3600	1.0	2.5	14	13.8	5.6	Walton	
Suisun song sparrow	Cordelia Slough	1950-1955	2743	9000	2.5	6.1	42	17.0	6.9	Johnston, field notes	
" "	" "	1974	1097	3600	1.0	2.5	16	15.8	6.4	Walton	
" "	Southampton Marsh	1950-1955	1646	5400	1.5	3.7	30	20.0	8.1	Johnston, field notes	
" "	" "	1974	732	2400	0.6	1.6	13	20.0	8.1	Walton	
" "	Pittsburg	1950-1955	732	2400	0.6	1.6	12	18.5	7.5	Johnston, field notes	
" "	" "	1974	366	1200	0.3	0.8	5	15.3	6.2	Walton	

ANALYSIS:

Breeding populations of these three song sparrow races are not distributed evenly over salt and brackish marsh habitat. Accurate maps of marsh vegetation types in the San Francisco Bay area needed before data on population density can be used in accurately estimating population size. Such maps are not now available. As work continues during 1974-75, efforts will be directed to obtaining accurate habitat data through ground and aerial methods.

Some of the smaller marsh areas in the study area were not visited during the breeding season because of time limitations. These areas will be surveyed in the 1975 breeding season.

Detailed results of current research are contained in Department of Fish and Game, Nongame Wildlife Investigations files. This information includes locations and descriptions of sample areas, population data, observation of other wildlife species, and preliminary recommendations for habitat improvement or protection.

Literature Cited

Gill, R., Jr. 1972. South San Francisco Bay breeding bird survey, 1971. Calif. Dept. Fish and Game, Wildlife Management Branch Administrative Report No. 72-6, 68 pp.

Johnston, R. F. 1954. Variation in breeding season and clutch size in song sparrows of the Pacific Coast. Condor 56:268-273.

_____. 1956a. Population structure in salt marsh song sparrows. Part I - Environment and the annual cycle. Condor 58:24-44.

_____. 1956b. Population structure in salt marsh song sparrows. Part II - Density, age structure and maintenance. Condor 58:254-272.

_____. (Field notes filed at Museum of Vertebrate Zoology, Univ. Calif., Berkeley).

Marshall, J. T. 1948. Ecological races of the song sparrow in the San Francisco Bay region. Part I - Habitat and abundance. Condor 50: 193-215.

_____. 1948. Ecological races of the song sparrow in the San Francisco Bay region. Part II - Geographical variation. Condor- 50: 233-256.

RECOMMENDATIONS:

Information obtained during the 1974 survey prompted the following recommendations for continued research on the salt marsh song sparrow races in the San Francisco Bay area.

1. A complete sequence of aerial photographs be taken of all fresh, brackish and salt marshes at low tide to enable preparation of detailed vegetation maps of the region.

2. Continue status surveys of each race of song sparrow to accurately determine population size, to further develop census methods, and to determine degree of isolation of each subspecies.

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