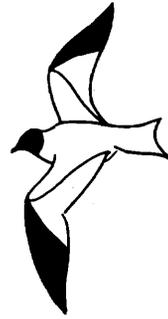


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NEW LOCATIONS FOR THE FIVE-STRIPED SPARROW IN THE UNITED STATES

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The Five-striped Sparrow (*Aimophila quinquestriata*) was first reported in the United States in 1957 just west of Madera Canyon in the Santa Rita Mountains of southeastern Arizona (Binford 1958). The species was not observed in the United States again until 1969 when at least two were found southwest of Patagonia, Arizona, where it has appeared every year since (Snider 1969, 1970, 1971; Monson 1973; Bill Harrison pers. comm.). The 1957 bird was considered an accidental (Phillips et al. 1964) and, because the area had been worked by numerous ornithologists before 1969, the population at Patagonia was considered by many to have just been established. No real effort was made to look for other populations in the United States except for limited explorations in the vicinity of the Patagonia population and in areas to the west by Jim Silliman, Kathy Groschupf and myself in 1975 and 1976. But on 12 June 1977 a Five-striped Sparrow was seen in lower Sycamore Canyon south of the Atascosa Mountains, Santa Cruz Co., Arizona (Bill Harrison pers. comm.). That report instigated a thorough search of Sycamore Canyon and, ultimately, an extensive search in the vicinity of the Atascosa and Santa Rita mountains. This paper reports the results of those searches.

METHODS AND MATERIALS

From an analysis of the habitat characteristics of the Patagonia and Sycamore Canyon locations, descriptions of Five-striped Sparrow habitat in Mexico (Wolf 1977), and communications with other observers, two major habitat requirements for Five-stripes appeared to be steep hillsides and riparian vegetation with a closed canopy. A "search image" derived from these two characteristics alone was used to locate likely areas using U. S. Geological Survey topographic maps and aerial photo-

FIVE-STRIPED SPARROW

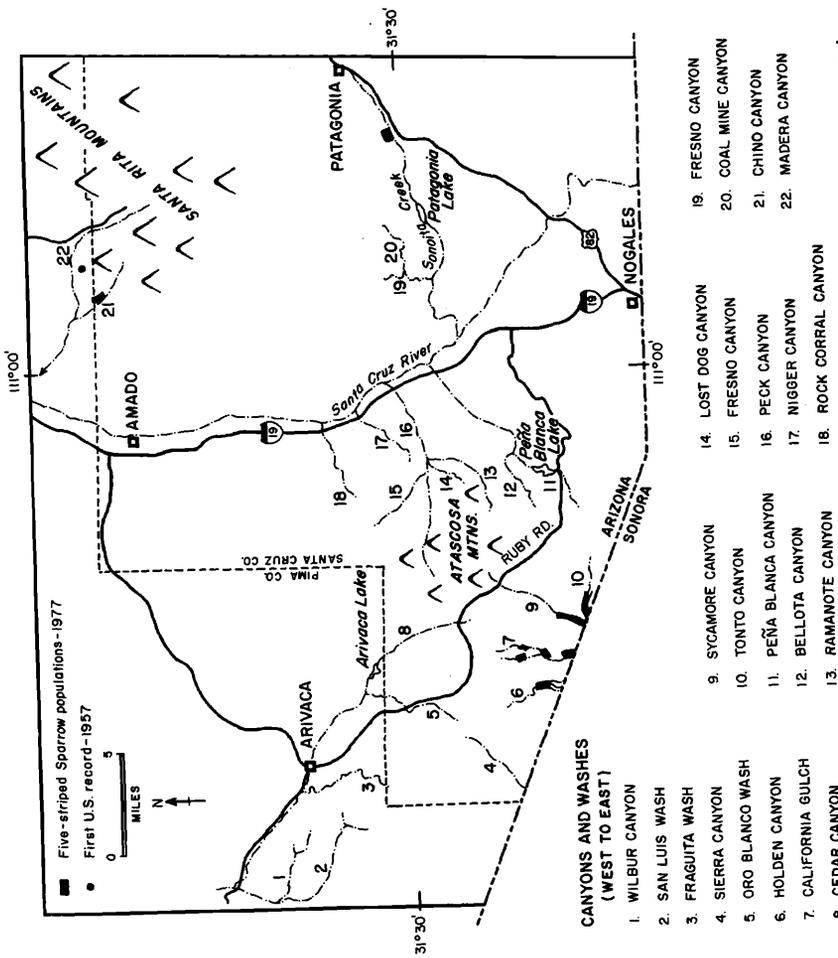


Figure 1. Five-striped Sparrow (*Amphispiza quinquestrata*) populations found in southeastern Arizona in 1977.

FIVE-STRIPED SPARROW

graphs from the University of Arizona library. Results of later searches modified this image; riparian vegetation was dropped as a requirement and was replaced by thick hillside vegetation. Only areas below 4000 ft. elevation were considered. A flight over part of the area was also helpful in locating and evaluating areas with appropriate features. Appropriate areas were visited, and taped songs were played intermittently to locate birds. Sexes were identified primarily on the basis of song; only males are known to sing (Wolf 1977, pers. obs.). Any bird accompanying a singing bird was assumed to be a female.

RESULTS

Eighteen areas that seemed suitable for Five-stripes were located in the vicinity of the Atascosa and Santa Rita mountains. Fourteen of these areas were visited between 5 July and 1 September 1977 (Figure 1). The remaining areas were not visited, due mainly to their inaccessibility, but are described later. The areas where new populations of Five-striped Sparrows were found are listed below. All elevations and place names are from USGS topographic maps. Elevations are given only to the nearest contour interval and represent elevations along canyon bottoms.

SYCAMORE CANYON. This canyon was walked from the vicinity of Yank Spring to the Mexican border on 5 July. Elevations walked range from 4000 to 3500 ft. Twelve male and eight female Five-stripes were found in approximately the lower 1.9 km walked (3500-3600 ft.). The birds appeared to be regularly spaced, but those encountered closer to the border were more closely packed and no birds were found in the southernmost 0.2 km where the hillsides are not as steep. Sixteen of the 20 birds were on the east (west-facing) slope, one pair was along the west side of the canyon floor and one pair was seen on both north and south slopes where the canyon runs east-west. Hillside vegetation is mostly desert scrub with scattered grasses. *Acacia* (*Acacia* sp.) and mesquite (*Prosopis* sp.) are among the common shrubs with scattered One-seed Juniper (*Juniperus monosperma*), oak (*Quercus* sp.) and Saguaro (*Carnegiea gigantea*). Amole (*Agave schottii*) is also a conspicuous hillside plant. Dominant riparian plants are Arizona Sycamore (*Plantanus wrightii*), oak, ash (*Fraxinus* sp.) and mesquite, the latter forming dense thickets along the wash edges in the lower part of the canyon. There was no water in the wash. Males responded vigorously and immediately to taped songs, often approaching to within a few feet of the tape recorder.

CALIFORNIA GULCH. California Gulch is here used to include a portion of Tres Amegos Gulch as well. Part of this area (California Gulch at 3750 ft.) was visited briefly on 25 July. In a distance about 0.3 km long at least two males and one female Five-stripe were found on the east slope. On 6 August a walk was made from the above area down to the Mexican border (3500 ft.). Also covered was Tres Amegos Gulch from its junction with California Gulch up to an elevation of 3750 ft. Nine males and one female were recorded as follows: three males in the same area as visited on 25 July, three males and one female in an area of California Gulch within 0.6 km above the junction with Tres Amegos Gulch, one male 0.5 km above the Mexican border, and two males in Tres Amegos Gulch near its junction

FIVE-STRIPED SPARROW

with Warsaw Canyon. Nine of the 10 birds were on steep hillsides on the east slope. Vegetation on these hillsides consists of dense shrubs 1-2 m high, including acacia, mesquite, Chuparosa (*Anisacanthus thurberi*), Kidneywood (*Eysenhardtia polystachya*) and Trumpet-Bush (*Tecoma stans*), and scattered grass clumps. Vegetation on the west slope is similar but less dense. The only tall riparian vegetation consists of widely scattered oaks, ashes and, in places, Fremont Cottonwoods (*Populus fremontii*). On 25 July males responded well to taped songs, though not as vigorously as those in Sycamore Canyon on 5 July. Virtually no responses were elicited on 6 August; all males were located by unprompted songs.

CHINO CANYON. Elevations checked in this canyon range from 3600 to 3800 ft. On 5 August two males and one female Five-stripe were found at an elevation of approximately 3680 ft. A pair was on a northwest-facing slope and the other male was on a west slope. Vegetation on the steep hillsides where birds were found consists of dense bushes, mostly acacia, mesquite, Chuparosa and scattered oaks, hackberry (*Celtis* sp.), and Ocotillo (*Fouquieria splendens*). Mesquite and hackberry are present along the dry wash. Both males responded to taped songs. Chino Canyon was revisited briefly on 11 August and a nest containing four eggs was discovered. The male did not respond to the tape.

TONTO CANYON. Virtually all of Tonto Canyon that lies in the United States was walked on 6 August. Elevations range from 3600 ft. at the border up to 4000 ft. Twelve males and a female were observed in approximately 1.3 km. Tonto Canyon runs essentially east-west here; four birds were seen on the south slope and eight were on the north slope. Hillsides are covered with shrubs similar to those in California Gulch, though not as densely. There is virtually no tall riparian vegetation. Water was flowing most of the length of the canyon and there were many seemingly permanent pools. Most birds responded to taped songs though not vigorously. One male was seen carrying food.

HOLDEN CANYON. On 6 August seven males and one female were found in a 1.1 km stretch at elevations from 3650 to 3700 ft. The canyon was covered from an elevation of 4000 ft. down to about 3650 ft., which is about 1.1 km from the Mexican border. All birds were seen on the east slope although one male was also foraging on the lower west slope. Hillside vegetation is almost exactly like that in California Gulch. There is no continuous tall riparian vegetation along the dry wash, only scattered mesquites and willows (*Salix* sp.). There was no response to the tape. In addition to the eight adults that were found, the pair was followed to a nest that contained four large young. The last 1.1 km of this canyon were not covered due to logistics and more birds may be found in this area.

No Five-stripes were found in the following areas. They are included to better establish habitat requirements and to serve for future reference. Tapes of Five-stripe songs were played only at Cedar, Bellota and Peña Blanca canyons.

CEDAR CANYON. Cedar Canyon was walked on 29 July from near its intersection with the Ruby Road down to Arivaca Lake (4350 to 3800 ft.). Hillside vegetation is dominated by junipers and does not resemble any hillsides where Five-stripes have been found. There were occasional pools of water in the wash but no tall riparian vegetation.

FIVE-STRIPED SPARROW

BELLOTA CANYON. Bellota Canyon was walked on 29 July from an elevation of approximately 4100 down to 3700 ft. where it joins Peña Blanca Canyon. Hillsides are covered with oaks and junipers or grasses depending on exposure. Riparian vegetation is mostly oak with scattered ash and mesquites. There are no steep hillsides at the lower elevations.

PEÑA BLANCA CANYON. The area covered was from Peña Blanca Lake down to the junction with Bellota Canyon (3800 to 3700 ft.). Steep hillsides along the canyon are either nearly vertical with little vegetation or are covered with oak woodland. Riparian vegetation varies from oak, Arizona Walnut (*Juglans major*) and Desert Willow (*Chilopsis linearis*) to areas dominated by sycamores.

ORO BLANCO WASH. A small area along Oro Blanco Wash about 1.6 km north of where it crosses Ruby Road was checked on 29 July. The elevation is about 3700 ft. Hillside vegetation consists of thick shrubs, and riparian vegetation is predominantly large hackberries and walnuts. This area closely resembles areas where Five-stripes occur but is quite small (about 2 ha).

AGUA CERCADA. This refers to an area in the Sycamore Canyon drainage on the west side of the Atascosa Mountains near Agua Cercada Spring. Elevation of the area is 4350 ft. or higher. A visit was made only to the lower part on 29 July. Hillsides are densely covered with manzanita (*Arctostaphylos* sp.) and oaks.

PECK CANYON. Used here to refer to areas of lower Peck Canyon from its junction with Fresno Canyon (3600 ft.) down to the vicinity of the Kane Ranch (3500 ft.), Lost Dog Canyon from its junction with Peck Canyon (3600 ft.) up to an elevation of 3800 ft., Ramanote Canyon from its junction with Peck Canyon up to an elevation of 3700 ft., and Fresno Canyon from its junction with Peck Canyon up to an elevation of 3750 ft. This area was explored on 15 August. One possible Five-stripe was heard singing in Fresno Canyon at a distance but could not be found. Hillside vegetation varies from oak-juniper woodland to mesquite grassland; in places, especially in Fresno Canyon, there are limited areas of acacia, small mesquite, and Chuparosa that look marginally suitable for Five-stripes. Riparian vegetation consists mostly of ash.

FRAGUITA WASH. An area along this wash about 4.0 km south of Arivaca at an elevation of about 3850 ft. was checked on 15 August. The north-facing hillside is oak woodland and the south-facing is mesquite grassland. Riparian vegetation is mostly willow, ash and Desert Willow.

COAL MINE CANYON. This canyon was explored on 17 August from its junction with Fresno Canyon (3760 ft.) up to about 3840 ft. Appropriate hillsides are either oak woodland or sparsely covered with shrubs. Areas along Fresno Canyon from Coal Mine Canyon to Sonoita Creek are also sparsely covered with the same shrubs. The species of shrubs are the same as those in many of the locations where Five-stripes occur. Riparian vegetation in Coal Mine Canyon is mostly mesquite.

SIERRA CANYON. The 0.8 km of this canyon above the Mexican border were explored on 1 September 1977. The vegetation on the northwest-facing slope is predominantly mesquite and acacia with widely scattered Kidneywood, Chuparosa and barberry (*Berberis* sp.). Vegetation of the floodplain below is mostly scattered mesquite and oak. Hillside vegetation appears to be too open for Five-stripes but there are a few small pockets of relatively dense vegetation that may be suitable.

FIVE-STRIPED SPARROW



Male Five-striped Sparrow (*Aimophila quinquestriata*) with caterpillar in Ocotillo near Patagonia 31 July 1974.



Habitat of Five-striped Sparrows in Chino Canyon, Santa Cruz County, Arizona, 20 August 1977.

DISCUSSION

The large number of Five-striped Sparrows found in the canyons described certainly indicates that the species is well established in the United States. The total number of adults seen in Arizona in 1977 including the pair at Patagonia was 57 (43 males and 14 females). Three factors suggest that these census figures are minimal estimates for the areas searched:

- 1) The low level of response by males to taped song later in the year leaves open the possibility that some birds were missed.
- 2) Observations of Five-stripes at Patagonia for 3 years indicate that females are inconspicuous and easily overlooked while nesting. Relatively large numbers of females were seen only in Sycamore Canyon which was visited in early July when they were apparently not yet nesting. From these two observations I believe that most males have mates.
- 3) More birds may be located in the uncensused part of Holden Canyon.

There is also the possibility of our having missed areas where Five-stripes are established. Some areas that were not checked but which seem likely are listed below. Behavior of the birds in new locations, including the discovery of nests in Holden and Chino canyons and the male seen carrying food in Tonto Canyon, along with observations of the Patagonia population provide evidence that most birds were breeding.

Of interest is whether Five-stripes have only recently become established in the United States or have been here for some time. Although we can never be certain which view is correct, it is interesting to review the evidence. The isolated locations of the populations suggests that they would receive few visits from ornithologists. Access to virtually all the new locations requires high-clearance vehicles and relatively long hikes. With one exception, I can find no records of visits to these locations by qualified ornithologists in the summer months. Lower Sycamore Canyon was visited in "late June" by Van Rossem "one year" (Allan Phillips *vide* Amadeo Rea). Van Rossem worked extensively in Sonora and described the northern subspecies of the Five-striped Sparrow. But Van Rossem found Five-stripes in Sonora only at elevations below 2000 ft. (Van Rossem 1945) and probably did not expect them in Sycamore Canyon. Five-stripes are conspicuous only when singing and even then the similarity of its song to that of other species, especially Black-throated Sparrow (*Amphispiza bilineata*), makes it likely that they could easily be overlooked, unless they were specifically searched for.

The discovery of the Patagonia population in 1969 is generally accepted as a case of recent establishment since the area was well worked in prior years. But one could easily walk the riparian areas without being aware of Five-stripes on the neighboring slopes, especially if un-

FIVE-STRIPED SPARROW

familiar with the song. The site where the Patagonia population has been since 1969 was located only after the discovery of a bird at a popular roadside birding area approximately 0.5 km away (Bill Harrison pers. comm.). Also, the birds located in Chino Canyon are only about 4 km from the site of the one collected in 1957. Could that bird have wandered from a population in Chino Canyon?

Undoubtedly populations fluctuate from year to year like that at Patagonia (2 to 10 adults in the last 4 years) and it is likely that they may be locally extirpated and reestablished. The possibility also exists of a phenomenon like that exhibited by the Rufous-winged Sparrow (*Aimophila carpalis*), which apparently virtually disappeared from Arizona for 50 years and then reappeared as a fairly common though local species (Phillips 1968). Nonetheless the discovery of such a large number of Five-stripes makes the status of this species in southeast Arizona more than "casual," as listed by Peterson and Chalif (1973).

The habitats where Five-stripes are found in the United States are similar to those in Mexico (see Wolf 1977). For the six known Arizona locations the habitat characteristics are dense bushy vegetation and grasses on steep hillsides between 3500 and 4000 ft. Riparian vegetation is not required except perhaps where hillsides are less densely vegetated. Permanent open water is not necessary. Although most of the birds occur in canyons that flow into the Rio Magdalena in Mexico, Five-stripes are not restricted to them. The populations at Patagonia and in Chino Canyon occur along the drainage systems of the Santa Cruz River, which flows north into Arizona.

Probably the most important habitat requirement of Five-stripes is the presence of thick bushes 1-2 m high. This vegetation apparently occurs in Arizona only where the correct combinations of slope, soil, elevation, rainfall and exposure are met. Density of the shrubs is apparently more important than the species composition. Some areas such as Peck Canyon and both Fresno Canyons have essentially the same plant species as places with Five-stripes but at lower densities. However some shrubs do occur at all six locations, notably acacia, mesquite, Chuparosa and probably Kidneywood.

Most of the mountain ranges and foothills of southeastern Arizona (the area south of Interstate 10 and east of the Baboquivari Mountains) do not contain areas that meet the habitat requirements outlined above. This includes the Baboquivari Mountains which Phillips et al. (1964) cited as the eastern boundary of an area where Five-stripes seemed likely to appear. The areas that have steep hillsides are covered with oaks and areas at the right elevations are not steep enough. Guadalupe Canyon in extreme southeast Arizona and southwest New Mexico, which has been considered a likely Five-stripe location by local Arizona birders, is higher (4250 ft. or higher) than any of the locations where Five-stripes are known to occur in the United States.

FIVE-STRIPED SPARROW

The only other locations in southeastern Arizona where Five-stripes seem likely are in the vicinity of the Atascosa Mountains. The following areas seem to meet the habitat requirements but have not been checked:

WILBUR CANYON and SAN LUIS WASH. About one mile of north-facing slopes of two forks of upper San Luis Wash at elevations of 3850 to 3950 ft. are covered with dense vegetation, but vegetative type is not discernable from aerial photographs.

NIGGER CANYON. Parts of the southeast slopes of Nigger Canyon from 3500 to 3600 ft. appear to be covered with shrubs. The hillsides are steep but not high.

ROCK CORRAL CANYON. North-facing hillsides above 3600 ft. in this canyon may contain suitable areas.

Other suitable sites exist in this general area but all are probably too small to support a Five-stripe population. It seems likely, however, that this species may occasionally occur at some of these areas as well as some of those mentioned earlier where none were found, especially areas around Sierra and Peck canyons.

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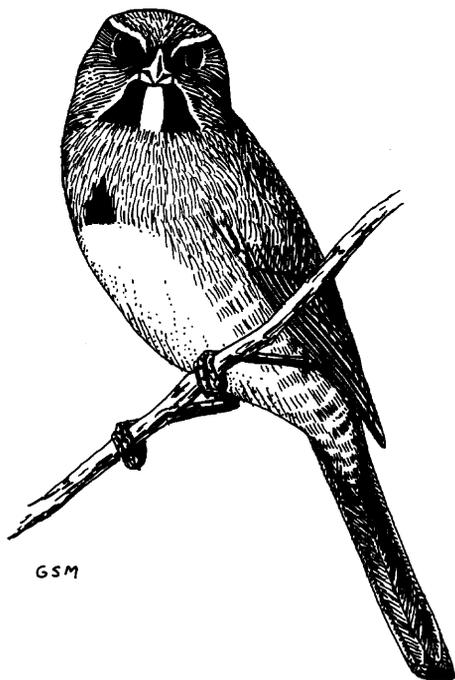
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FIVE-STRIPED SPARROW

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Sketch by G. Scott Mills