
First nesting records of Worthen's Sparrow *Spizella wortheni* for Nuevo León, Mexico, with a habitat characterisation of the nest site and notes on ecology, voice, additional recent sightings and leg coloration

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Discutimos los primeros ejemplos de unos nidos del Gorrión Indefinido Altiplanero *Spizella wortheni* en el estado de Nuevo León, México. Presentamos información acerca de la ecología del sitio, la voz, unas otras ocurrencias mas recientes y el color de las piernas.

Como resultado de observaciones recientes, se describe aquí un nuevo hábitat nidificatorio para *Spizella wortheni* en el noreste de México. Este hábitat se sitúa en una de las zonas menos habitadas del país, y por eso ha sido poco estudiada y relevada. Sugerimos que números importantes de *S. wortheni* tal vez residan en México a través de una ancha banda de estepa arbustiva árida, y que futuros relevamientos deberán incluir este hábitat poco conocido.

Durante el invierno se conforman importantes concentraciones de *wortheni*, ocasionalmente en compañía de otras especies. Es posible que estas bandadas se vean fuertemente atraídas a sectores con aguas permanentes.

El canto de *wortheni* comienza con una nota susurrante hacia arriba o hacia abajo seguida de 10–17 notas con idéntico tono y espaciamiento, compuestas por elementos más agudos y más graves exhibiendo resonancias muy poco espaciadas. *S. pusilla* emite un canto más rápido y acelerado, al que le falta la nota introductoria. Las llamadas de *wortheni* y *pusilla* son un tanto diferentes. *S. passerina* tiene un canto un poco más largo con al menos el doble de notas que cualquiera de las otras dos especies. Como *wortheni*, sus notas tienen resonancia.

El color de los tarsos es variable, lo que puede estar relacionado con la estación.

Introduction

Worthen's Sparrow *Spizella wortheni* is one of the least known North American emberizines. The type-specimen, taken in Silver City, New Mexico in 1884, is the only record from the USA¹. Its breeding range is reported to include "western Zacatecas, and southwestern Tamaulipas, [and] presumably elsewhere in northeastern Mexico"¹. The status and distribution of this globally threatened species, along with all known records up until 1993, were documented by Wege *et al.*¹². During recent decades, virtually all records have come from a small cluster of sites near the Nuevo León–Coahuila border, just two of the eight states in which the species has been recorded^{7,12}. Factors contributing to its decline include habitat loss to agriculture, overgrazing and erosion from cattle herding, and possibly a decline in native herbivores which may help maintain the sparrow's habitat¹². Most recent sightings are from near Tanque de Emergencia, c.42 km south of Saltillo, Coahuila. This site, where Aldegundo Garza de Leon found *wortheni* in the early 1960s (A. R. Phillips *in litt.*), was recently popularized by A. M. Sada⁸. Between 1986–1997, many birders observed breeding and wintering *wortheni* there. There are no confirmed nesting records of *wortheni* in Nuevo León, although specimens and tape-recordings from May 1959 and June 1981 were probably of breeding birds¹². Several visits to this state by Sada and Howell between August 1987–April 1990 failed to produce additional summer records¹⁰.

Here, we document the first nests of the species in Nuevo León, and a subsequent summer record of a territorial pair in the same vicinity. Qualitative and quantitative characteristics of the vegetation in and around the nest site are discussed, as are the importance of various habitats to the survival of this declining species. Sonagrams are presented of the songs of *wortheni* and the closely related Field *S. pusilla* and Chipping Sparrows *S. passerina*. Additional winter sightings from Coahuila, and variation in leg coloration are also discussed.

Methods

After finding *wortheni* at Las Esperanzas, Nuevo León, CWS and GWL observed the species for c. 20 minutes to determine their primary habitat use areas. Two vegetation transects were established, where foraging and territorial song were most frequent. Each transect was 30.3 m-long; the starting point for each transect being determined from a pair of random number coordinates paced from a fixed point. The azimuth of the first transect was selected at random; the second transect was at right angles to the first. Subsequently, they discovered that both transects were within c.30 m of the birds' nest and not differing, in habitat, perceptibly from the nest site.

A simplified line intercept methodology was used to characterise the habitat³. The vertically projected

ground cover of each individual of all woody species along each transect was measured to the nearest 3 cm and summed over each transect. The size distribution of the single dominant woody species was estimated by measuring the maximum height and width (to the nearest cm) of each individual intersecting a transect. The height and width of the shrub containing *wortheni*'s nest were measured and compared to shrubs in the vicinity with a modified Student's t-test (single observation versus sample mean) at $\alpha = 0.05$. Percentage ground cover of grasses (which were in early vegetative growth stages) was estimated by counting the intercepts at 100 evenly spaced points (30.5 cm apart) along each transect.

Recordings analyzed include: *wortheni* taped by Lasley from 12h15–12h40, on 18 June 1994 at Las Esperanzas, Nuevo León; and *pusilla* and *passerina* taped by Sexton on 26 May 1997 at the Simons unit of Balcones Canyonlands National Wildlife Refuge, Burnet Co., Texas. Recordings were made with Mineroff modified Sony TCM-5000EV cassette recorders, Mineroff SME BA3 microphone amplifiers (Mineroff Electronics, Inc., Elmont, NY), and Sennheiser ME-80 directional microphones. Sonagrams were generated with a Macintosh computer using Canary 1.2 software (Cornell Laboratory of Ornithology, Ithaca, NY). Pertinent settings included: Sample rate: 22,050 Hz; Sample size: 8 bits; Frame size 256 points; Grid resolution time 5.805 ms; Grid resolution overlap 50%; Window function: Hamming; Filtering 0–12 kHz; Display style: Smooth. After being created in Canary, spectrographs were imported into ClarisWorks 4.0 (Claris Corporation, Santa Clara, California) for framing and printing. Vouchers of the original field recordings will be deposited in the Texas Bird Sounds Library, Sam Houston State University, Huntsville, Texas.

Behaviour and nest site description

On 18 June 1994, GWL and CWS discovered a singing male *wortheni* 4 km south of the village of Las Esperanzas, Nuevo León (see *Cotinga* 7: 28 for map)². They tape-recorded and photographed it on the state line, and as it flew c.50 m or more into the states of Coahuila and Nuevo León. The bird sang from the ground, and from atop low four-winged saltbush *Atriplex canescens*, a strand of barbed wire, and a stop sign. It often carried a moth or another food item while it sang. Eventually, the singing bird disappeared into a bush just inside Nuevo León, where a nest with an incubating female was discovered. The nest cup, constructed of tightly woven, fine grasses, was 10 cm above ground in a 20 cm high by 100 cm wide four-winged saltbush (Fig. 1). In overall size, the nest shrub was the largest available in the vicinity. It did not differ significantly in height from those sampled along the transects ($t = -0.054$, $df = 27$, $p > 0.05$), but was significantly wider ($t = 3.27$, $df = 27$, $p < 0.01$). The nest, partially visible from outside, was placed in a dense portion of the shrub shaded by overhanging branches. The outer diameter of the nest was 7 cm; the inner diameter 4 cm. The nest's depth could not be measured without disturbing the structure. When approached, the female departed the nest, revealing two pale blue eggs with extensive brown to chestnut mottling at the large end. The eggs were estimated to be 12 x 10 mm. Immediately after the nest was photographed, the female returned.

On 5 July 1994, JPG visited the same site, finding an empty nest and no sign of the parents or young. However, in similar habitat c.0.8 km to the east, an active nest with three young in a four-winged saltbush c.0.6 m tall was located. The plant, the largest of several, grew out of nearly bare desert hardpan that had a few *Condalia* shrubs at its edges. At the nest, the parents fed young apparently several days old. Close to the nest, JPG noted alert and aggressive Curve-billed Thrashers *Toxostoma curvirostre* he suspected of preying on the earlier nest. Additional searching of the area on 4–5 July failed to produce other *wortheni*.

On 1 July 1996, at c.16h00, RAB, TLE and G. Mueller found *wortheni*, south-west of Las Esperanzas (Fig. 2): a singing male later joined by its mate. The pair's behaviour suggested they were in their nesting territory. The habitat was lightly vegetated alkaline hardpan with a sparse growth of four-winged saltbush. Other birds in the area have been listed previously².

Vegetative characterisation and its significance

The pair of *wortheni* at Las Esperanzas nested in a very simple, low, arid shrub-grassland community. The site (c.19 km east-north-east of the Tanque de Emergencia nesting location), is at c.1,900 m in a gently sloping intermontane valley between wooded ridges 5–10 km to the north, west and south. The nesting territory was on an almost flat, whitish, unconsolidated, sandy loam substrate probably of an alkaline nature (Fig. 3). Because the 18 June sighting was near the end of the dry season, very little vegetative growth or flowering activity was evident, and ground cover estimates described below under-represented vegetative cover typical of the growing season. The ground cover of woody plants in the vicinity of the nest averaged 9.7% on the two transects, comprised entirely of three woody species: four-winged saltbush (9.4%), spiny-leaf zinnia *Zinnia acerosa* (0.3%) and a few cholla cactus *Opuntia* sp. not intercepted on the transects. Grasses were low and sparse, dominated by tobosa *Hilaria mutica*, grama (probably) *Bouteloua gracilis* and an unidentified *Panicum/Leptoloma*. Forbs were virtually non-existent. The mean height of saltbushes across both transects was 20.6 ± 10.4 cm. ($n = 28$); their mean width was 37.2 ± 18.9 cm. The few zinnias on the transects were not measured in detail; they were

approximately 5 cm tall and 10 cm wide. Estimated ground cover of grasses was 36.5% (*Hilaria* 33%, *Bouteloua* 3.5%, others < 0.1%). Other birds in the area included Horned Lark *Eremophila alpestris* (common), Western Meadowlark *Sturnella neglecta* (few) and Curve-billed Thrasher (one).

Because of our small sample, we cannot make broad statements about how typical these nest sites are for *wortheni*. Our characterisation of the Las Esperanzas nest site differs somewhat from the species' habitat described elsewhere¹². At Las Esperanzas, there was much more open and low vegetation with less of a woody component. Within several km of the Las Esperanzas site were a variety of other open habitats. In contrast to the nesting area, they had either no shrub component (e.g. cropland, low grassland, prairie dog town) or the shrub component was taller and/or denser with such genera as *Atriplex*, *Condalia*, *Guaiacum*, *Koeberlinia*, *Opuntia* and *Yucca*. Both Wege *et al.*¹² and the present authors noted that overgrazed pastures and prairie dog towns at Tanque de Emergencia were utilised infrequently by *wortheni* and then only when nearby low shrubs were available for cover. Moreover, in June 1994, CWS and GWL failed to find the species in healthy rank mid-grass pastures of *Bothriochloa* sp. near Tanque de Emergencia (CWS & GWL unpubl. data), suggesting that taller grasslands and areas lacking a shrub component are unattractive to the species. On 1 July 1996, RAB, TLE and G. Mueller searched other habitats around Las Esperanzas, including irrigated potato and alfalfa cultivation and grazed, dry, or weedy fields, but failed to find *wortheni*.

Various *wortheni* sites in Zacatecas, Coahuila, Nuevo León and Tamaulipas reviewed by Wege *et al.*¹² may be characterised as open shrub grassland. They all exhibited a shrub component, often 1–2 m tall, occasionally with taller yucca *Yucca*, juniper *Juniperus* and pine *Pinus*. Non-breeding flocks of *wortheni* at Tanque de Emergencia also used shrubs larger than those typical of the Las Esperanzas nest area. Typically, they foraged on the ground in short grassland. When disturbed, they retreated to an open perch on shrubs up to 2 m tall (e.g. *Juniperus* and *Rhus microphylla*) or sought cover in lower denser shrubs such as *Koeberlinia spinosa* (CWS and GWL unpubl. data).

Given the floristic diversity of the various sites where the species has been observed (Wege *et al.*¹², present paper), we suggest that *wortheni* is not dependent on any particular shrub association, but keys-in on certain vegetational structural components among these arid, open and high elevation plateaux and basin habitats. Shared attributes of these sites include open areas with low grasses for foraging, and a moderate complement of low dense shrubs into which *wortheni* can retreat and may nest. Taller shrubs and trees may serve as observation or song perches, but evidence from Las Esperanzas suggests that a lack of shrubs over 0.5 m tall is not a deterrent to habitat occupancy. There is some indication that the species may prefer ecotonal areas between open areas and more heavily wooded areas¹² but this is not the case at the Las Esperanzas site.

Additional records from Tanque de Emergencia

Although nesting *wortheni* may be thinly dispersed, wintering birds frequently congregate, e.g. on 28 November 1986, Howell and Webb observed flocks of 30–50 at Tanque de Emergencia¹². Recent sightings there include the following records of *wortheni* and associated species. During October 1990, GWL and R. Wauer observed at least six birds (see below). A visit on 29 November 1992 by Day and Thacker (*in litt.*) yielded at least 60 *wortheni*, perched on bushes and fence wires and feeding on the ground with Canyon Towhees *Pipilo fuscus*. CWS noted small flocks in October 1993. On 21 January 1995, JPG visited the site and encountered a single species flock of 70 feeding and moving in a rather compact mass; at one point, 36 birds gathered in a small shrub. Other birds present nearby included Ferruginous Hawk *Buteo regalis*, Prairie Falcon *Falco mexicanus*, Baird's Sparrow *Ammodramus bairdii*, Cassin's Sparrow *Aimophila cassinii* and Chestnut-collared Longspur *Calcarius ornatus*. TLE visited the site on 5 March 1997 and observed 4–6 *wortheni* flocking with Vesper Sparrows *Poocetes gramineus* which far outnumbered them. The birds foraged across sparse bunch grass interspersed with small four-winged saltbush, eventually arriving to bathe and drink at an artificial pond, with diked walls, for livestock. TLE suspects the presence of dependable water may be more important than the surrounding vegetation in attracting concentrations of wintering *wortheni* and other grassland birds. Indeed, Sada⁸ observed "The sparrows have always been within sight of the tank."

On 17–18 June 1994, GWL and CWS failed to detect *wortheni* at Tanque de Emergencia, despite extensive searching. While in the vicinity, they conducted an ad hoc breeding bird survey comprised of 15 closely spaced stops over a 5 km route, detecting the following species and total number of individuals: Western Meadowlark (134), Horned Lark (16), Scaled Quail *Callipepla squamata* (13), Cassin's Sparrow (12), Curve-billed Thrasher (eight), Mourning Dove *Zenaida macroura* (five), Cactus Wren *Campylorhynchus brunneicapillus* (four), Botteri's Sparrow *Aimophila botterii* (at least two), Northern Flicker *Colaptes auratus* (two), Canyon Towhee (two), Common Nighthawk *Chordeiles minor* (one), Loggerhead Shrike *Lanius ludovicianus* (one) and Sparrow sp. (one).

Vocal characteristics and comparison with Field and Chipping Sparrows

Both *wortheni* and the similar Field Sparrow are considered to comprise a superspecies¹. Although some authors

consider them conspecific, Webster and Orr argue convincingly for maintaining them as distinct species¹¹. The western *S. p. arenacea* exhibits reduced rufous on the crown, face and upper breast, and is particularly similar to *wortheni*; all birds in south New Mexico, south Texas and north-east Mexico should be critically examined. Both Rising⁷ and Howell & Webb⁶ note the proportionally longer tail and whiter wingbars of *pusilla*, and the more solid cap of *wortheni*. Below, we compare the songs of *wortheni* with *S. p. pusilla* and the vocally similar *S. passerina*.

Spontaneous territorial songs of *wortheni* were delivered at a rate of c.7/minute. The delivery consists of a thin, introductory seep note (sliding upward from 6.7–8.4 kHz) followed by 10 chip notes that sound flat and harsh due to their wide frequency range (2.1–8.6 kHz) and complex small-scale structure (Fig. 4A). The chips were delivered at intervals of 130 msec (start to start). Songs lasted 1.7–2.6 seconds; after playback, agitated songs included up to 17 chip notes. In Zacatecas, Webster and Orr¹¹ heard various male *wortheni* commence their songs with either an upward or downward slurred note, followed by a higher pitched trill. They perceived the song as “a cross between the song of an Eastern Field Sparrow *S. p. pusilla* and that of a Chipping Sparrow, for there was a slurred down note followed by a higher pitched trill with no intermediate notes or gradual accelerando.” Zacatecan birds represent the subspecies *S. w. browni* and may differ in voice, as apparently they do in their darker coloration (*contra* Rising⁷). Elsewhere, the song has been described as “*peee churrrrr*, with the initial note slurred and generally but not always on a lower pitch, or a dry rattle, resembling that of the Chipping Sparrow”⁷; and, based on Sada’s recordings, “a dry chipping trill” lasting 2–3 seconds, suggesting a Chipping Sparrow or Dark-eyed Junco *Junco hyemalis*⁶. July songs taped by Delaney in “fairly flat, prairie-type terrain” (*in litt.*) on the high plains of Coahuila have a similar dry rattle; on the cassette, the introductory note is almost imperceptible⁵.

The call notes were described by Howell & Webb as *tssip* or *tsip*, sometimes repeated rapidly⁶. They ranged from c.4–10.2 kHz, with a modal frequency of c.7–8 kHz, and a duration of c.17–21 msec (Fig. 4B).

Territorial songs of *pusilla* recorded in central Texas represent one of the populations closest to breeding *wortheni*. The sonagram depicts a series of similarly pitched notes, accelerating slightly at the end (Fig. 4D). Although *pusilla*’s repertoire is variable, we have not heard individuals whose songs are not distinguishable from *wortheni*. The call note (Fig. 4C) is superficially similar to *wortheni*, perhaps a bit more metallic; the sonagram reveals a somewhat smaller frequency range (5.5–8 kHz), lower modal frequency (c.6–7 kHz) and a slightly longer duration (30–35 msec).

The territorial song of *passerina* consists of a long series of sharp chip notes, lacking the high thin introductory element characteristic of *wortheni* (Fig. 4E). In several central Texas examples we examined, the frequency range was 3.5–7.7 kHz. The pace of its trill is about twice as fast as *wortheni*’s; spacing between elements averages c.64 msec (or c.16 elements/second compared to c.8/second in *wortheni*). As with *wortheni*, each chip note in the long series actually consists of two parts with lower and higher pitched elements delivered together. In *passerina*, the lower elements span a range of c.3.5–6.4 kHz; the upper elements c.6–7.75 kHz. The structure of the lower elements in the songs of both species show closely spaced resonances. In *passerina* these occur at intervals of c. 280 Hz; in *wortheni*, these resonances are centred c. 400 Hz. This fine-scale resonance is not evident in the individual elements of the song of *pusilla*.

Leg colour

The leg colour of *wortheni* is variable. Recent works describe it as “black or horn colored”⁷ or “dark dusky flesh to blackish brown”⁶. Phillips and Holmgren (*in litt.* 1990 to W. Pulich and later to GWL) suggested that leg colour might be a useful field mark for *wortheni*. During October 1990, GWL and R. Wauer observed six birds at Tanque de Emergencia, and mist-netted one for hand-held photos, one of which has been published^{4,10}. All had black legs (Fig. 5). Photographs taken at Las Esperanzas during June 1994 (GWL), and July 1996 (TLE and RAB) clearly depict individuals with rather bright pink to pale orange legs (Fig. 2). These changes may be related to age but our small sample suggests they are seasonal.

Conclusions

Recent observations reported in this paper describe a new habitat for breeding Worthen’s Sparrow in north-east Mexico. This habitat is situated in one of the most sparsely inhabited regions of the country, and therefore has been poorly studied and surveyed. We suggest that significant numbers of Worthen’s Sparrows may reside in Mexico across a broad expanse of arid shrub-grassland, and that future surveys should include this poorly known habitat.

Significant concentrations of *wortheni* occur during winter; occasionally in the company of other species. These flocks may be strongly attracted to permanent water.

Songs of *wortheni* begin with an upward or downward slurred note followed by 10–17 identically pitched and paced notes composed of higher and lower pitched elements exhibiting closely spaced resonances. *Pusilla* delivers a faster, accelerating song lacking an introductory note. Call notes of *wortheni* and *pusilla* are slightly

different. *Passerina* sings a slightly longer song with at least twice as many notes as either of the above species. Like *wortheni*, its notes are resonant.

The leg colour of *wortheni* is variable, which may be seasonally related.

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