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## Breeding Range Extension of the Coastal Plain Swamp Sparrow

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**ABSTRACT.**—The Coastal Plain Swamp Sparrow (*Melospiza georgiana nigrescens*) is morphologically distinct, restricted to a narrowly-defined habitat type, and geographically isolated within the mid-Atlantic Coastal Plain. The breeding range has been considered to extend from the Nanticoke River in Maryland north to the Hudson River. We report a previously undocumented population near Warsaw, Virginia that extends the known range south and west into a region of the Chesapeake Bay with extensive tidal fresh and brackish marshes consistent with the habitat requirements of this form, but for which there has been no documented breeding. A broader investigation of occurrence within appropriate habitat seems warranted given the small global population size and uncertain status within the southern portion of its range. *Received 9 November 2006. Accepted 2 August 2007.*

The Coastal Plain Swamp Sparrow (*Melospiza georgiana nigrescens*) is restricted to tidal fresh and brackish marshes of the mid-Atlantic coast. The form is distinctive in having a larger bill, grayer plumage, and more black in the crown and nape compared to other Swamp Sparrows (Bond and Stewart 1951, Greenberg and Droege 1990). Breeding populations appear to use a limited range of habitats that contain a mix of marsh vegetation and shrubs with a characteristic structure that typically forms along the marsh-upland interface (Meanley 1975, Beadell et al. 2003)

The known breeding distribution of the Coastal Plain Swamp Sparrow has been extended over time as expanded survey efforts have discovered new breeding locations. The subspecies was initially described from several specimens from the Nanticoke River near Vienna, Maryland (Bond and Stewart 1951). Investigations have extended the range west to near Washington, D.C. and north to the mouth of the Hudson River (Stewart and Rob-

bins 1958, Greenberg and Droege 1990, Droege and Blom 1996). The breeding range since 1957 has been described to extend from the Nanticoke River in Maryland north to the Hudson River (AOU 1957, Mowbray 1997). Beadell et al. (2003), in a recent evaluation of the breeding population, established a center of abundance around Delaware Bay and the Tuckahoe and Mullica rivers in coastal New Jersey. Greenberg and Droege (1990), in an earlier review of the breeding range, reported no evidence of breeding south of Maryland. Clapp (1997) reported no confirmed breeding records for coastal Virginia. Here, we report on a previously undocumented population of *M. g. nigrescens* near Warsaw, Virginia.

### METHODS

Mulberry Point Marsh (37° 59' 30" N, 76° 53' 35" E) is 178 ha along the oligohaline reach of the Rappahannock River near Warsaw, Virginia. Vegetation within the marsh is dominated by big cordgrass (*Spartina cynosuroides*), salt meadow hay (*S. patens*), marsh hibiscus (*Hibiscus moscheutos*), cattail (*Typha angustifolia*), and olney threesquare (*Scirpus olneyi*) with a diverse mixture of other marsh species. The marsh contains numerous tree and shrub hummocks. Historically, parts of the marsh have been used for agriculture and cattle grazing, and the marsh is disturbed by a roadway, a dike system, and limited ditching. These alterations along with the natural hummocks create topographic variation, habitat diversity, and an extensive network of marsh-upland ecotones. Normal tidal variation along this reach of the river is ~0.5 m.

We received a report of 14 birds within the marsh during June 2004 (F. T. Atwood, pers. comm.) and conducted a spot-mapping effort between 24 May and 13 June 2005 to: (1) estimate population size, and (2) document breeding. We systematically walked throughout the entire marsh surface twice and mapped

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locations of all singing males on aerial photographs. The overall number of singing males and their approximate locations were consistent between surveys. We assumed the number of singing males provided a good estimate of the breeding population but made no attempt to identify their pairing status. We spent ~2 hrs on 24 May observing birds to locate nests for a limited number of pairs. We did not follow nests through time to ascertain breeding success.

#### OBSERVATIONS

We mapped 41 singing male Coastal Plain Swamp Sparrows that appeared to be defending discrete territories. Birds were not evenly distributed throughout the marsh but were concentrated within patches containing three-square and scattered groundsel (*Baccharis halimifolia*) trees. All patches of any size (>0.25 ha) of this habitat supported birds. Patches comprised entirely of taller vegetation (e.g., big cordgrass) were not occupied. Singing males perched on shrubs within the meadow vegetation or on trees or shrubs along the edge of meadows. We located five active nests during the morning of 24 May. These included two nests under construction and one nest each with 2, 3, and 4 eggs, respectively. All nests were at or near the base of groundsel trees and hidden in clusters of newly emerging leaves.

#### DISCUSSION

Documentation of the Mulberry Point Marsh population of Coastal Plain Swamp Sparrows extends the known breeding range south into Virginia. The site is 90 km west and 30 km south of the Nanticoke River in Maryland. More importantly, this site is within the lower western shore of Chesapeake Bay, a region with extensive tidal fresh and brackish marshes consistent with the habitat requirements of this form, but for which there has been no documented breeding. The size of the population places it among the largest currently known in the Chesapeake Bay portion of the range. A cursory survey of Island Farm Marsh, 8 km down river from Mulberry Point on 14 July 2005 resulted in the location of 5 singing males. Documentation of birds at a second site suggests the possibility that breed-

ing may be more extensive than currently known.

The Coastal Plain Swamp Sparrow appears to be morphologically distinct, geographically isolated, and specialized in a narrowly-defined habitat type. These are characteristics of other sparrow forms such as the Dusky Seaside Sparrow (*Ammodramus maritimus nigrescens*) (Sykes 1980), Cape Sable Seaside Sparrow (*A. maritimus mirabilis*) (Pimm et al. 1996), and Ipswich Savannah Sparrow (*Passerculus sandwichensis princeps*) (Smith et al. 2003) that were extirpated or have been of high conservation concern in recent decades. A recent assessment of the population of Coastal Plain Swamp Sparrow within Maryland, Delaware, and New Jersey resulted in a conservative estimate of 28,000 pairs and suggested a decline in both abundance and distribution along the western shore and lower eastern shore of the Chesapeake Bay (Beadell et al. 2003). Given the uncertain status of this form in the southern portion of its range, a broad investigation of occurrence within appropriate habitat seems warranted. Consideration of listing of the Coastal Plain Swamp Sparrow by appropriate agencies and jurisdictions as a species of conservation concern may facilitate conservation efforts.

#### ACKNOWLEDGMENTS

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## Polyandry and Sex Ratio in the Song Sparrow

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**ABSTRACT.**—Polyandry occurs when females form social bonds and gain simultaneous parental care from multiple male mates. It is thought to be rare in birds and to occur more often in territorial species when the Operational Sex Ratio (OSR; ratio of mature males to females) exceeds one. We asked if variation in the OSR affected the rate of polyandry in Song Sparrows (*Melospiza melodia*) over 30 years on Mandarte Island, British Columbia, Canada. We found no correlation between OSR and polyandry ( $R_s = 0.04$ ,  $df = 28$ ,  $P = 0.86$ ), but positive correlations between OSR and percent females with more than one social mate ( $R_s = 0.44$ ,  $df = 28$ ,  $P = 0.01$ ), and percent females sharing a territory with a replacement male and her dependent young ( $R_s = 0.46$ ,  $df = 28$ ,  $P = 0.009$ ). We suggest that polyandry in Song Sparrows is limited by the intolerance of territorial males towards intruders, but that it occurs when females occupy the territories of two or more males and gain their simultaneous care for the dependent young of a single brood as a consequence. *Received 2 October 2006. Accepted 25 July 2007.*

Cooperative polyandry, wherein two or more males mate with one female and contribute care to a single brood, is rare in birds

(Jenni 1974, Oring 1986). However, in species that compete to defend breeding territories, the frequency of polygamy is often related to the ‘Operational Sex Ratio’ (OSR, ratio of mature males to females in a population; Emlen and Oring 1977, Davies and Lundberg 1984, Lank et al. 1985, Reynolds 1987, Wik-tander et al. 2000, Pilastro et al. 2001). Thus, it is possible that polyandry is rare in some species either because the OSR is rarely skewed sufficiently to favor it or because territory defense by males prevents females from receiving the care of two males at one nest simultaneously (Arcese 1989a).

Song Sparrows (*Melospiza melodia*), often considered to be monogamous (e.g., Verner and Willson 1966), are now known to engage regularly in genetic polyandry (O’Connor et al. 2006) and social polygyny, the latter being more common when OSR favors females (Smith et al. 1982, Arcese 1989a). We describe the first cases of cooperative polyandry in Song Sparrows and ask if variation in the OSR predicted their occurrence over 30 years on Mandarte Island, British Columbia, Canada. We expected that OSRs favoring males would increase the rate of polyandry, unless territoriality prevented multiple males from feeding one brood simultaneously.

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## METHODS

*Study Area.*—Mandarte is a ~6-ha islet about 10 km southeast of Sidney, British Columbia where Song Sparrows have been studied continuously since 1975 (Smith et al. 2006). Song Sparrows on Mandarte Island nest mainly in shrub patches that cover about a third of the islet, are individually marked, and defend territories year-round with peaks in aggression in fall and late winter through spring. Territories were mapped annually and the breeding status of all adults was assessed each 3–7 days from March or April to the end of breeding from 1975 to 2005 (except 1980; see Smith et al. 2006).

*Mated and Territorial Status of Males.*—We recorded instances from 1975 to 2005 where more than one male was observed feeding young from one brood simultaneously or sequentially in the course of a female's nesting cycle. We choose feeding by males as the main criteria for polyandry because 'pair bonds' are difficult to quantify and genetic evidence was available in only 4 years. Although extra-pair fertilization and mate switching are common in Song Sparrows (Arcese et al. 2002, O'Connor et al. 2006), neither constitute polyandry (Oring 1986). In contrast, cases in which females gain parental care from and maintain social contact with two males simultaneously are generally considered to be polyandrous (Jenni 1974, Oring 1986), and were defined by us as engaging in 'cooperative polyandry'. In contrast, we defined cases wherein males fed young from single broods sequentially, such as after a territory take-over (Arcese 1989b), as 'sequential polyandry'. We also recorded instances wherein a male neighbor or replacement without young of their own carried food to young on a neighboring or newly acquired territory or were followed persistently by begging young, as suspected cases of sequential or cooperative polyandry. OSR equaled the ratio of sexually mature adult males to females alive in late April each year.

*Statistical Analyses.*—We used SYSTAT 11.0 for all analyses (Systat Software Inc., Point Richmond, CA, USA) and Spearman's rank correlation to test for links between OSR and the frequency of polyandry, the percent of females with more than one social mate in

a year, the percent of females whose young came into contact with a replacement male, and rate of 'adoption' (feeding) by replacement males. Frequency data were analyzed by Chi-square with the Yates correction applied.

## RESULTS

On average ( $\pm$  SD),  $16 \pm 9\%$  of females (range = 0–37%) occupied territories with two or more social mates annually from 1975 to 2005. Females gained new social mates by occupying two or more territories within a breeding season (55 cases) or forming social bonds with replacement males after a territory take-over (111 cases); the latter occurring more often ( $\chi^2_{\text{yates}} = 15.8$ ,  $df = 1$ ,  $P < 0.001$ ). Eighteen of 72 males (25%) were known or suspected to have fed fledglings that remained on their natal territory after the replacement male's arrival.

Cooperative polyandry was confirmed once and suspected twice, but sequential polyandry was more common with seven confirmed and eight suspected cases. Overall, 3.7% of 492 females and 6.5% of 505 males that bred during 1975 to 2005, bred at least once in a polyandrous group. Three males were recorded in polyandrous associations twice in their lifetimes.

One case of cooperative polyandry was observed in detail in May 2005. On 24 April, two young hatched in a nest on the territory of male M1 and female F1. On 4 May, M1 lost part of this territory to neighbor M2. Rather than remaining in M1's territory, however, F1 occupied both territories and interacted with both M1 and M2, which each fed one of F1's fledglings to independence on about 23 May. F1 laid the first egg of her second nest inside M2's territory on 12 May. Two suspected cases of cooperative polyandry also occurred when females expanded their range to occupy the territories of unpaired males with two fledglings tended by her new social mate and one by the previous social mate.

Sequential polyandry occurred in two ways. In three cases, females moved to a neighbor's territory with all her dependent fledglings. In 12 cases, replacement males occupied the territories of females with dependent young. In all 15 cases, both males fed young from a single female's brood sequentially.

Contrary to expectation, OSR and annual

percent of females in suspected or confirmed cases of polyandry were unrelated ( $R_s = 0.04$ ,  $df = 28$ ,  $P = 0.86$ ). OSR was related positively to the percent of females that had more than one social mate in a year ( $R_s = 0.44$ ,  $df = 28$ ,  $P = 0.01$ ), and to the percent of females that mated with replacement males while still caring for the fledglings of a prior mate ( $R_s = 0.46$ ,  $df = 28$ ,  $P = 0.009$ ). The proportion of replacement males that fed dependent young alive at the time they occupied their new territory was also unrelated to the OSR ( $R_s = 0.04$ ,  $df = 28$ ,  $P = 0.83$ ).

Fifteen of 18 (83%) males known or suspected to have fed their new mate's young were previously the female's neighbor, but three polyandrous males were non-territorial floaters. Thus, many polyandrous males probably interacted socially with females whose young they later fed prior to the time they began sharing a territory. However, in 43 cases where polyandry could have been detected, neighbors were not more likely to feed the young of a previous male than were floaters (43% of 35 vs. 38% of 8 cases, respectively).

#### DISCUSSION

Polyandry was rare among Song Sparrows on Mandarte Island but did occur when females with dependent fledglings occupied the territories of adjacent males and received simultaneous parental care from those males as a result. Over 30 years, 3.7% of females and 6.5% of males bred in cooperative or sequentially polyandrous groups at least once, compared to 21% of females and 13% of males exposed to polygyny (Arcese 1989a).

We found no relation between the OSR and frequency of polyandry, perhaps because it occurred so rarely. However, percent females paired to more than one male in a season, and percent fledglings occupying a territory with a replacement male, each increased with the OSR. These results suggest the availability of unmated males and level of male competition affect female breeding dispersal and male replacement, but they are contrary to the idea that OSR affects polyandry.

Emlen and Oring (1977) predicted that polyandry will occur more often when adult sex ratios favor males; an idea well-supported in *Prunella*, where polyandry is relatively common at OSR's as extreme as 1.48 (*P. mod-*

*ularis*; Davies and Lundberg 1984) and 1.38 (*P. collaris*; Davies et al. 1995). In contrast, polyandry was rare in Song Sparrows on Mandarte Island even though the OSR averaged  $1.67 \pm 0.66$  (SD,  $n = 30$  years) and exceeded 2.50 in 3 years. We suggest this difference between species arises as a consequence of intolerance by territorial male Song Sparrows toward intruders.

Whereas males of many polyandrous species feed young from a single brood within the bounds of one territory (Davies and Lundberg 1984, Hartley and Davies 1994, Briskie et al. 1998, Goetz et al. 2003), intolerance by male Song Sparrows may prevent genetically polyandrous males from simultaneously feeding their young except when they are divided among adjacent territories. O'Connor et al. (2006) noted that ~27% of nestling Song Sparrows on Mandarte Island were fathered by males other than the social mate and that most extra-pair males were neighbors. Most (86%) polyandrous males we identified were also neighbors of the female whose young they later fed. Thus, it is possible that male Song Sparrows fed young from adjacent territories according to their confidence of paternity (e.g., Davies and Hatchwell 1992). If true, extra-pair males might also be expected to engage more often in vigilance and alarm calling while their extra-pair mates incubate or tend nestlings in an adjacent territory.

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## Novel Courtship Behavior in the Little Greenbul (*Andropadus virens*)

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**ABSTRACT.**—The Little Greenbul (*Andropadus virens*) is a common African forest bird that is thought to form monogamous pair bonds. In March 2007, I observed a male hanging below a presumed female perched on a branch, apparently inspecting her cloaca and clinging to her when she flew from that branch, while singing throughout. This apparent mate guarding behavior suggests that extra-pair fertilizations may occur in this species. *Received 3 May 2007. Accepted 11 September 2007.*

Extra-pair paternity (EPP) is a widespread phenomenon in socially monogamous birds (Birkhead et al. 1987) and has been docu-

mented for many temperate bird species, such as Great Reed Warbler (*Acrocephalus arundinaceus*) (Hasselquist et al. 1996). It has also been reported for tropical species, such as Blue-black Grassquit (*Volatinia jacarina*) (Carvalho et al. 2006) and Red-backed Fairywren (*Malurus melanocephalus*) (Karubian 2002). There appears to be no general rule that explains the occurrence of EPPs across socially monogamous species (Griffith et al. 2002, Westneat and Stewart 2003).

Males also sire young of multiple females in species with polygynandrous mating systems such as Dunnock (*Prunella modularis*) (Davies 1983), the related Alpine Accentor (*P. collaris*), and the unrelated Smith's Longspur (*Calcarius pictus*) (Birkhead et al. 1993). Po-

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lygynandrous species also have much larger cloacal protuberances than socially monogamous species (Briskie 1993).

Davies (1983) described the unusual behavior of cloaca-pecking in the polygynandrous Dunnock in which males peck female cloacas to induce release of sperm from other males. To my knowledge this is the only example of male birds stimulating the ejection of sperm when its paternity is in doubt. Females, however, eject sperm from subordinate males in feral fowl (*Gallus gallus*) (Pizzari and Birkhead 2000), and when sperm is old and degraded in Black-legged Kittiwakes (*Rissa tridactyla*) (Wagner et al. 2004). Males of several bird species are known to eject eggs from nests when EPPs are suspected (e.g., Sand Martins [*Riparia riparia*] [Alves and Bryant 1998] and Blue-footed Boobies [*Sula nebouxi*] [Osorio-Beristain and Drummond 2001]).

The Little Greenbul (*Andropadus virens*, Pycnonotidae) is a common African forest passerine that occurs in primary and secondary tropical rainforest, forest edges, and gallery forest in sub-Saharan Africa. Previous work has documented variation in Little Greenbul morphology and song across an ecological gradient (Smith et al. 1997, Slabbekoorn and Smith 2002), but less is known about its breeding behavior. It has traditionally been described as a territorial breeder (Fishpool and Tobias 2005) with males competing for territories by singing all day during the breeding season. Playback experiments indicate that males respond strongly to the potential threat of conspecific intruders by approaching close to or flying noisily above or past a loudspeaker projecting conspecific song. Males may also change their song performance in response to playback by singing back more continuously or falling completely silent (A. N. G. Kirschel, unpubl. data). The objective of this paper is to describe courtship behavior in the Little Greenbul that could imply the occurrence of EPPs or an alternative mating strategy such as polygynandry.

#### OBSERVATIONS

I observed an apparently novel behavior between two Little Greenbuls on the morning of 23 March 2007 while recording the song of a male at the Limbe Botanic Gardens in Cameroon (4° 0' N, 9° 12' E). A singing male was

hanging upside-down from a horizontal branch behind a perched bird, presumed to be a female. The male was flapping his wings continuously to remain suspended from the branch. His head was facing the rear end of the perched bird and he appeared to be inspecting its cloaca (Fig. 1). The male remained in this suspended position, singing intermittently, for several minutes while the perched bird remained on the branch apparently unperturbed. Both birds flew to one branch and then another after 5 min of recording with the singing male clutching on to the back of the suspected female in flight. Shortly thereafter the two birds separated.

#### DISCUSSION

This was a single observation of a behavior not previously reported. I posit the territorial male was inspecting the female as part of a mate guarding strategy, perhaps investigating for evidence of extra-pair copulations. It became more difficult to observe the two birds when they started moving to other perches and I did not observe copulation. This observation suggests the mating system of the Little Greenbul may be more complex than previously understood. Male Little Greenbuls spend so much time singing that females could have opportunities to move to neighboring territories to seek extra-pair fertilizations from males they perceive to be superior. This behavior has been reported for Great Reed Warblers where females moved through several territories before choosing a male; male reproductive success was correlated with song repertoire size (Hasselquist et al. 1996). The cloaca inspection behavior could represent high levels of EPP and social monogamy in the Little Greenbul or it could represent an alternative mating strategy, such as polygynandry.

The Little Greenbul's presumed sister taxon, the Yellow-whiskered Greenbul (*Andropadus latirostris*), is known to have a complex mating system. Males display in leks where they occur at high densities, at least in parts of the species' range, but are territorially monogamous at lower densities (Fishpool and Tobias 2005). The only record of courtship behavior in the Little Greenbul involved a singing male beating its wings, slightly lowering its tail, and puffing its throat as a suspected female approached through the foliage (Keith

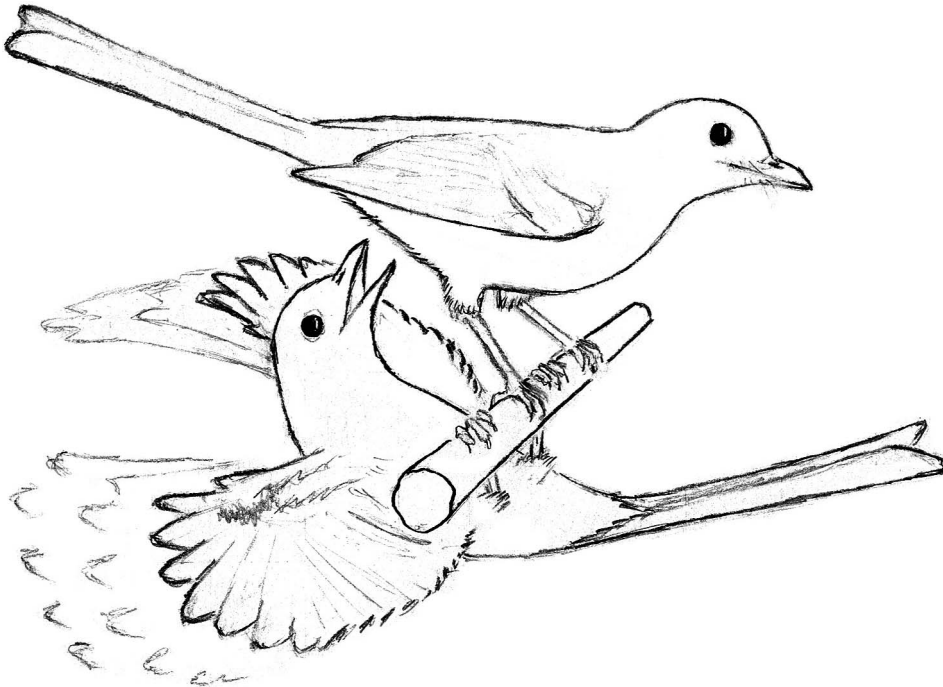


FIG. 1. Male Little Greenbul suspended from a branch inspecting the rear of a presumed female, while singing. The observed birds were in approximately this position at the Limbe Botanic Gardens in Cameroon with the male clinging either to the branch or perhaps the toes of the upper bird, while moving its head up and out of view behind the perched bird.

1992). Gatherings of 6–10 singing males are not thought to represent lekking behavior because there is no evidence of site fidelity in these congregations (Brosset and Erard 1986, Fishpool and Tobias 2005). Brosset and Erard (1986) also described the Little Greenbul as nomadic and rarely territorial, suggesting song might have a greater role in sexual selection than territory defense. Further behavioral studies, and perhaps a comparison of cloacal protuberances with other species, are needed to gain a better understanding of the Little Greenbul's mating system. Moreover, work is needed to ascertain whether the courtship behavior observed in Cameroon is a novel behavior in birds or convergent to the cloacapecking strategy of mate guarding.

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## A Recording of a Type B Song of the Yellow-throated Warbler

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**ABSTRACT.**—On 28 April 2006 in Ohio and again on 19 May 2006 in North Carolina, I observed and, on the April occasion, recorded a Yellow-throated Warbler (*Dendroica dominica*) singing a type B song. A sound spectrogram of this rare song is compared with the more common type A song of this species. I present evidence that my recording is a type B song and speculate on the rare condition and function of this song. *Received 15 February 2007. Accepted 19 July 2007.*

The Yellow-throated Warbler (*Dendroica dominica*) is a common neotropical migrant that breeds in the southeastern United States (Hall 1996). Its song is described by Peterson (2002: 230) as “a series of clear slurred notes dropping slightly in pitch.” Most males sing only one song, but there are a few reports of Yellow-throated Warblers singing a second song (Hall 1996). The second song has been

described as more musical than the type A song and consisting of four notes on the same pitch, three descending, and ending with one on a higher pitch (Nice 1931). It is not known whether this second song functions like a type B song (*sensu* Spector 1992). The objective of this paper is to: (1) describe the type B song of the Yellow-throated Warbler and (2) report on the context in which this song was observed.

### OBSERVATIONS

On 28 April 2006 in Lawrence County, Ohio and again on 19 May 2006 in Graham County, North Carolina I observed Yellow-throated Warblers, one at each site, singing an atypical song. In accordance with the infrequent reports of a second Yellow-throated Warbler song, I only heard two individuals singing this song during an estimated 400 hrs of fieldwork with this species during two seasons. Both observations occurred at dusk around 1930 hrs and, in both cases, the sing-

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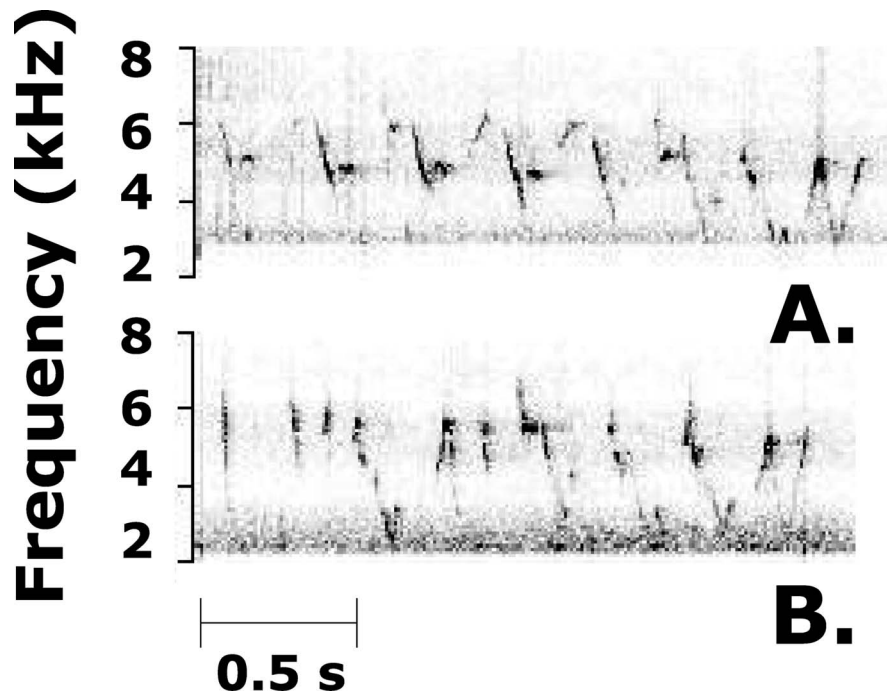


FIG. 1. Spectrograms of the two Yellow-throated Warbler song types as sung by a breeding male in Lawrence County, Ohio. A. Type A song. B. Type B song. Sound below 2 kHz was removed from the spectrogram to eliminate visually distracting background noise.

ing birds mixed chip-like call notes with the song. I recorded the Ohio bird singing this song, which, to the best of my knowledge, is the first recording of the type B song of the Yellow-throated Warbler.

I made a sound spectrogram of the type B song (Fig. 1B) using program Syrinx and compared it to the more common type A song as sung by the same bird (Fig. 1A). Comparison of the two song types reveals the repeated descending note that dominates the type A song is incorporated into the second song. For example, the last phrase, consisting of several descending notes followed by an ascending note, is similar in both songs. The introduction, however, differs between songs. The type B song is less accented with a single descending introductory note followed by two slightly down-slurred notes and a note that is again similar to the descending note in the type A song. This phrase is repeated and followed by the last phrase which is similar to the last phrase of the type A song. Raw recordings of all the songs discussed are available from the author.

#### DISCUSSION

The type B song (Fig. 1B) is consistent with the only description of a Yellow-throated Warbler second song (Nice 1931) in that it contains several notes on the same pitch (although these are mixed with slurred notes) and four descending notes followed by one that is an upsweep, or a rising note. In addition to matching the only description of the Yellow-throated Warbler second song, evidence the observations I am reporting are type B songs include details common to both observations which fit the pattern of type B song use outlined by Spector (1992). For example, both instances occurred at dusk when the type B song is more frequent and the type A song is usually absent (Spector 1992). The birds in both cases sang type B songs in rapid succession and mixed chip-like call notes between songs, which are characteristics associated with type B songs for *Dendroica* species (Spector 1992). Type B songs typically increase in frequency later in the breeding season (Spector 1992) and both of my observa-

tions came rather late in the breeding season for Yellow-throated Warblers, which begin nesting earlier than most neotropical migrants (Hall 1996).

The context of my observations also agrees with a general pattern of type B song function (Spector 1992). The Yellow-throated Warbler is relatively habitat-specific and, in the eastern portion of its range, prefers the canopy of mature pine (*Pinus* spp.) stands consisting of ~a dozen trees (pers. obs.). This habitat configuration seems to be most common in isolated patches within young deciduous forests. In the west, this bird prefers sycamore (*Platanus* spp.) trees along stream bottoms or mature bald cypress trees (*Taxodium* spp.) within a swamp (Hall 1996). All of these circumstances cause Yellow-throated Warbler occurrence to be patchy and it is rare to find more than 2–3 singing individuals within earshot of one another (pers. obs.). The type B song functions in male-male interactions in most *Dendroica* species and I propose the patchy distribution of breeding males within appropriate habitat make Yellow-throated Warbler male-male interactions less frequent. This has made the need for a type B song uncommon in this species. This idea appears to be corroborated by the context in which I observed this rare type B song. In both cases, the song was observed where Yellow-throated Warbler density was unusually high. In Ohio, I could hear six singing Yellow-throated Warbler males from the spot I recorded the type B song. Likewise, in North Carolina, Yellow-throated Warbler density was the highest I have observed, and I could hear seven singing males from where

I heard the type B song. I conducted field work with Yellow-throated Warblers at eight other sites in seven states and did not hear this song at any of these locations, where I could not hear more than four, and usually no more than two, males singing from any one location.

The bird in Ohio belonged to the western *D. d. albilora* subspecies whereas the bird in North Carolina belonged to the eastern *D. d. dominica* subspecies indicating that a second singing behavior in the Yellow-throated Warbler continues to function in both of its major subspecies. I predict the type B song is more common in the western *albilora* group as the densities of this warbler are generally higher there than in the east.

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