

# Breeding Status of the Song Sparrow (*Melospiza melodia*) in the Piedmont of the Upper Pee Dee Region of the Carolinas

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The Song Sparrow (*Melospiza melodia*) breeds throughout most of the Piedmont physiographic province of North Carolina. Its breeding status is still poorly defined in the extreme southeast where the birds would be confined to partly open brushy areas with shrubs, hedges, and grasses within cities and towns (Sykes 1966, Seriff 2018, LeGrand et al. 2019). The current breeding range of the Song Sparrow in the upper Pee Dee region within the Piedmont of the Carolinas is unclear because evidence of long-term occupancy during the breeding season is lacking.

LeGrand et al. (2019) state that Song Sparrows breed in every county in the southeastern Piedmont of North Carolina, but Seriff (2018) did not document any breeding records east of Charlotte or southeast of Salisbury, Rowan County. Further east and southeast, Song Sparrows are apparently established along the Wilgrove Breeding Bird Survey (BBS) route (present 12 of 19 years since 2001; 63%). Single Song Sparrows were reported during two years each on two other BBS routes east of Wilgrove (Uwharrie, now inactive: 1993, 1997; Oakboro: 2005–2006). No Song Sparrows were reported along the Biscoe route, which passes near but not within Troy, Montgomery County (Pardieck et al. 2018). Near the North Carolina border in South Carolina, Song Sparrows have nested no further east than western Lancaster County at a park in Lancaster in 1984 and 1992 (LeGrand 1993, Cely 2003, Seriff 2018).

The purpose of this note is to document the current breeding status of the Song Sparrow in this region. This note includes unpublished breeding evidence of Song Sparrows at Troy, Montgomery County, NC, in 1994.

## Methods

I covered the same geographic area of the upper Pee Dee region in the Carolinas for Song Sparrow in 2018 as I did for the House Wren (*Troglodytes aedon*; McNair 2019). The upper Pee Dee region as defined herein includes six counties or portions thereof in two states, and a total of 29 cities and towns ranging in human population size from 110 in McFarlan, NC to 9080 in Rockingham, NC. In 2019, I obtained additional data on Song Sparrows at Troy, NC. Troy (elevation 202 m) includes a commercial district centered along two main highways and mature residential communities that are heavily vegetated with old trees. All neighborhoods have been stable with few habitat changes having occurred over the last 25 years. Most residential dwellings are detached single units over 50 years old. Each residence is typically fronted by a dense lawn, bordered by ornamental shrubs and backed by lawns, shrubs, gardens, or play areas. Railroad tracks pass through the center of town.

I conducted a complete census of singing male Song Sparrows at Troy over 13 days from 9 April to 6 May. A total of 20 hours was devoted to this effort, 57% before noon (mostly mid-morning) and 43% after noon (mostly early evening). I used the spot-mapping method to delineate their territories. A minimum of 2 registrations of singing males at the same site recorded at least 10 days apart were required for designation as established breeding territories. Singing males that did not meet this criterion were considered “floaters”, i.e., not on established territories. I also recorded any additional breeding evidence (e.g., females present) during the 2019 census.

I calculated the density of singing male Song Sparrows on established territories (ignoring floaters) by connecting the perimeter of the outermost territories by straight lines and dividing this area by the total number of male territories. The location of one established territory was an outlier, so I also calculated the density of singing male Song Sparrows on established territories at Troy by ignoring this outlier.

I compared these two density measurements of Song Sparrows at Troy to other density measurements based on the spot-mapping method that are available from Breeding Bird Censuses (BBC) conducted in residential or commercial areas of eastern North America where Song Sparrows have been present (Aldrich 1984, Arcese et al. 2002). I extracted these studies through 2009, the last year results were published after an earlier hiatus from 1997–2000 (Gardali and Lowe 2006, Lowe and DeSante 2012) and from other available literature that used the spot-mapping method. Censuses from these missing years and after 2009 are not accessible (Hochachka 2019).

Many confounding variables can affect analyses of BBC data, including plot size, so except for results from two plots of 6.1 ha that were available from a very detailed study (Beissinger and Osborne 1982) and a larger plot from The White House (Evenden and Pyle 1972, Evenden 1979), all other plots were a minimum of the recommended 8.1 ha (Engstrom 1981, Engstrom and James 1984). Most extracted BBC studies were conducted in one or two years, but longer studies were available from Massachusetts (3 years) and at Carey, Ohio (5 years).

I excluded censuses conducted in areas such as cemeteries or arboretums, suburban or urban parks, or wooded ravines in suburban areas. These censuses did not contain or rarely contained residential and commercial buildings so would not be comparable to Troy, NC or other censuses cited herein.

I grouped all census plots into five categories: mature residential, recent residential, residential, suburban development in pine-oak forest, residential and commercial. Categories are based on detailed descriptions of habitat characteristics such as the presence and number of tall trees and age and extent of residential housing.

## **Results**

I only found singing male Song Sparrows on territory at Troy. Eight singing males (plus two females) were detected during surveys on 14 May 1994, whereas six singing males were detected on 19 May 2018.

In 2019, I documented 34 singing male Song Sparrows on established territories (plus at least 6 females) during a complete census of the entire town and settled outlying areas adjacent to the town boundary (Figure 1). I also documented four floaters, three of which were located outside the perimeter of the established territories.

Birds on established territories were located in residential yards or in vegetated commercial areas including three males present in ruderal habitat in lumber yards, two beside yarn plants, and two along a railroad track through the center of town. Only five territories (15%) contained streams, although intermittent running water was available on territories at many other sites (e.g., fountains at the town hall, swimming pools and water baths at residences, sprinkling systems and outside faucets in all areas).

The breeding density of territorial male Song Sparrows at Troy in 2019 was 0.10 males/ha or 1 male per 10.05 ha based on an area of 341.69 ha. If one outlier of an established male territory is removed, the breeding density was 0.14 males/ha or 1 male per 7.03 ha based on an area of 231.9 ha (Figure 1).

The low breeding densities of singing male Song Sparrows at Troy are comparable to four BBC plots in eastern North America categorized as residential and commercial areas (Table 1). All breeding densities on BBC plots were low ( $\leq 0.3$  males/ha) except for higher densities on four of the six plots conducted in mature residential areas (Table 1). Breeding densities were not associated with plot area (Figure 2) (Spearman's  $r = -0.26$ ,  $n = 14$ ,  $P = 0.38$ ). Troy was excluded because of large plot size. The highest breeding density at Oxford, Ohio was an outlier.

## **Discussion**

This study documents that territorial Song Sparrows are established at Troy, NC, but Song Sparrows were not breeding in early successional habitat at any other location in the upper Pee Dee region of the Carolinas. Troy (3,414) is the largest town in Montgomery County, but Song Sparrows do not breed in the larger town of Wadesboro (5,467) in Anson County, NC (U.S. Census Bureau 2018). Wadesboro is closer than Troy (75 km compared to 87 km) and east-southeast of established breeding populations at Charlotte, NC. This suggests that Song Sparrows arrived at Troy from a west-northwesterly direction, perhaps from Statesville (via Salisbury and Albemarle) where breeding was first confirmed in the Piedmont in 1933 (Sykes 1966, Seriff 2018).

The low breeding densities of Song Sparrows at Troy, which is at the limit of its southeasterly breeding range, were similar to similarly categorized communities in eastern North America (Aldrich 1984, Arcese et al. 2002, this study). The highest breeding densities in mature residential plots at Oxford, Ohio (Beissinger and Osborne 1982), an outlier, further supports the conclusion that inclusion of small plot sizes can lead to spurious, unsupported, or unreliable results (Engstrom 1981, Engstrom and James 1984).

The future expansion of the Song Sparrow along the breeding range front in the upper Pee Dee region of the Carolinas where habitat is not a limiting factor is difficult to predict. Single unmated male Song Sparrows singing on territories for more than one day have been documented slightly further east of Troy at Biscoe, Montgomery County (4 May–16 June 2018; McNair, unpubl.) and nearby in the Sandhills of Moore County at Southern Pines (3–7 June 1999; Davis 2000, LeGrand 2019) and at Pinehurst (21 May–8 June 2018; McNair, unpubl.). The spread of this species to cities and towns such as Troy at the limit of its breeding range is not detrimental because a new species has been added to the otherwise limited avifauna in these environments where habitat is not ephemeral. A firm population estimate is now available from Troy, NC, where suitable Song Sparrow habitat and nest strata are probably not saturated. However, unlike the House Wren

(McNair 2019), the breeding status of the Song Sparrow has remained static in the upper Pee Dee region for over 25 years.

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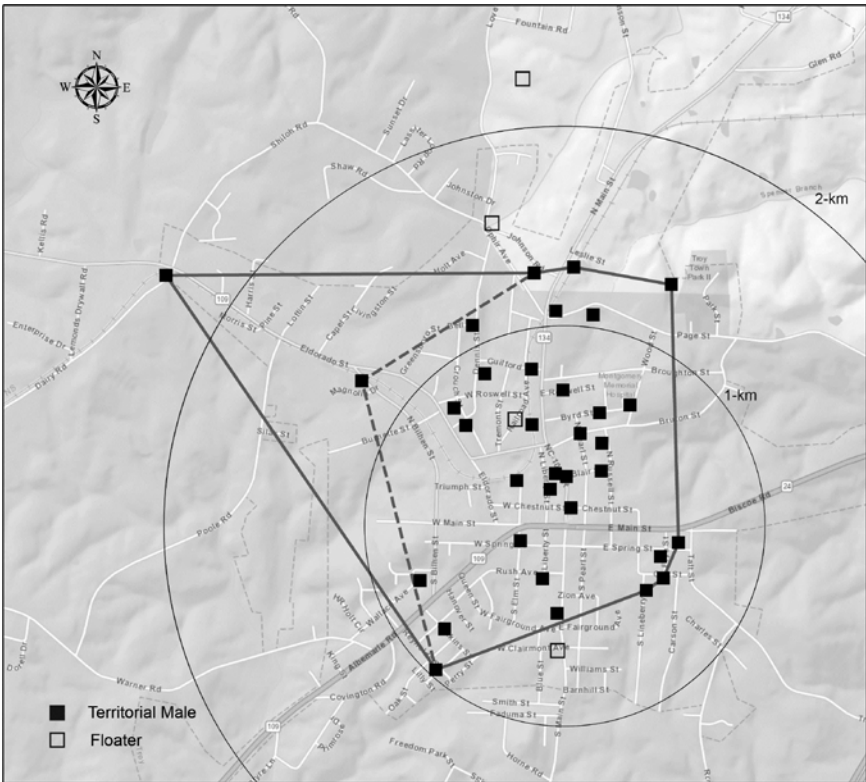


Figure 1. The location of 34 established breeding territories and 4 floaters of singing male Song Sparrows at Troy, NC, in 2019. Filled squares represent established territories, whereas open squares represent floaters. The thick solid dark gray line connects the perimeter of the established territories, whereas the inner thick segmented dark gray line that connects to the solid dark gray line excludes one established breeding territory (an outlier, based on its relative isolation compared to all other established territories). The two thin black lines represent concentric rings of 1-km and 2-km distances from the center of Troy (intersection of NC Highways 27 and 134).

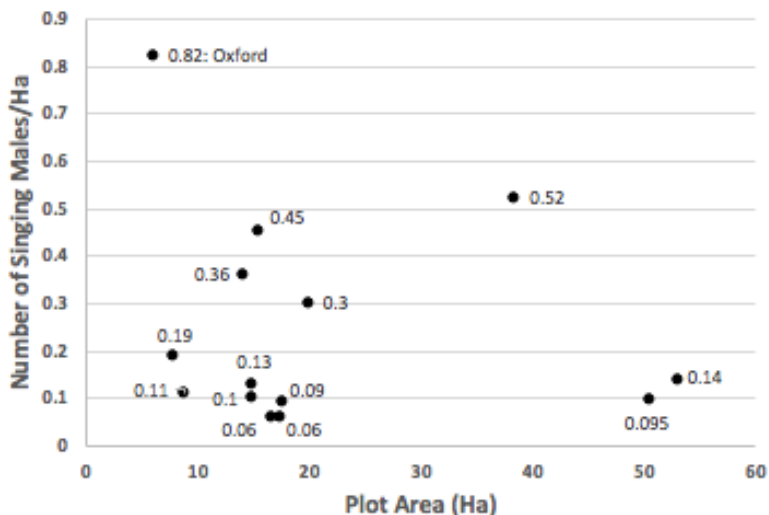


Figure 2. Breeding densities of singing male Song Sparrows in relationship to plot area on 14 BBC censuses in eastern North America. Breeding densities for seven sites with two measurements were collapsed into one measurement per site by taking the mean of both measurements. For sites with more than two measurements, breeding density was collapsed into one measurement by taking the mean of the range of measurements.

Table 1. Breeding densities of Song Sparrows at Troy, NC, compared to other breeding densities obtained from Breeding Bird Census (BBC) plots in residential or commercial areas of eastern North America.

State or Province	Locality	Year	Plot Area (ha)	Density (singing males/ha)	Reference
<b>Mature Residential</b>					
Ohio	Toledo	1971	17.6	0.09	Tramer 1971
Ohio	Oxford: 2 Sites	1976	6.1	0.66, 0.98	Beissinger and Osborne 1982
Ohio	Carey	1976–1977, 1979–1981	12.1–16.19	0.15–0.56	Claugus 1977–1978, 1980–1982

State or Province	Locality	Year	Plot Area (ha)	Density (singing males/ha)	Reference
New York	Ithaca	1965	15.4	0.45	Simmers 1965
New Jersey	Prospect Park	1976	8.9	0.11	de Wall Malefyt 1977
Virginia	Fairfax County	1979	38.5	0.52	Aldrich and Coffin 1980
<b>Recent Residential</b>					
Ontario	Ottawa	1976	53	0.14	Erskine 1977
New Jersey	Bernardsville	1995	20	0.3	Fantina 1996
<b>Residential</b>					
Washington, DC	The White House	1972, 1978	7.9	0.25, 0.13	Evenden and Pyle 1972; Evenden 1979
<b>Suburban Development in Pine-Oak Forest</b>					
Massachusetts	Plymouth County	1979–1980, 1982	15	0.03–0.17	Smith 1983
<b>Residential and Commercial</b>					
Manitoba	Swan River	1972	17.5	0.06	Erskine 1972
Québec	Senneterre	1969	15	0.13	Erskine 1970
New Brunswick	Sackville	1979, 1981	50.5	0.07, 0.12	Erskine 1980, 1982
Ohio	Carey	1982–1983	13.76, 19.4	0.07, 0.05	Claugus 1983, 1984
North Carolina	Troy <sup>1</sup>	2019	341.69, 231.9	0.10, 0.14	This study

<sup>1</sup>Includes two calculations for two areas: 1) for all established territories within the plot, and 2) excludes one established territory (an outlier compared to the locations of all other established territories).

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