

Range expansion and population increase of nesting Song Sparrows in Tennessee

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DURING THE PAST FIVE DECADES the breeding range of the Song Sparrow (*Melospiza melodia*) in Tennessee has expanded westward approximately 500 kilometers, from the eastern escarpment of the Cumberland Plateau to the Mississippi River, with most of the expansion taking place in the past 20 years. The breeding records involved in this expansion have occurred primarily along the rivers of middle and west Tennessee. Additionally, during the past 20 years the statewide breeding population of Song Sparrows has increased greatly. This increase may be related to weather conditions.

Before 1933 the Song Sparrow was limited as a breeding species to east Tennessee—*i.e.*, east of the western escarpment of the Cumberland Plateau (Ganier 1933). However, even in that part of the state it was considered to be absent on the Cumberland Plateau, an area about 70 to 100 kilometers wide running from the northern to the southern borders of the state and forming the western boundary of east Tennessee as Ganier defined it (Fig. 1). Data revealing the westward breeding progress of the species across the Plateau are largely absent, but data indicating the progress of the species across middle Tennessee, which lies between the western escarpment of the Plateau and the Tennessee River, and west Tennessee, which lies between the Tennessee and Mississippi rivers, are available.

The species was first recorded west of the Cumberland Plateau in middle



Tennessee during the breeding season of 1952, when a pair stayed in Cookeville, 15 kilometers west of the Plateau, throughout the spring (Mayfield 1953), though the first nest on the Plateau itself was not recorded until 1966 (Robinson 1966) and the first nest in Cookeville not until 1968 (Clark 1968). By 1965 it had moved westward about 75 kilometers to Manchester (Coffey 1965), and in 1970 a nest was located in Nashville (Jackson 1971), about 150 kilometers west of the Plateau. By 1975 the species had extended its range 100 kilometers farther west and crossed the

Tennessee River into west Tennessee, where one was recorded on a Breeding Bird Survey (BBS) in Benton County (S. Droege, per. comm.). In June 1976, the species' westward movement as a breeder in Tennessee was completed when a pair with a juvenile was recorded along the Mississippi River in Lake County (Waldron 1976), about 400 kilometers west of the Plateau.

Currently, Song Sparrows remain extremely rare breeders in west Tennessee. They have been recorded during the breeding season in only four of the region's 21 counties. Those four counties (with date of first appearance) are Benton (1975), Lake (1976), Shelby (1984), and Hardin (1985). In middle Tennessee Song Sparrows are local but rapidly increasing breeders. The species has been recorded during breeding season in at least 29 of the 40 counties in that region. Those counties (with date of first occurrence) are: Putnam (1952), Coffee (1965), Grundy (1966), Pickett (1968), Davidson (1970), Warren (1971), Cannon (1975), DeKalb (1979), Trousdale (1980), Sumner (1981), Smith (1981), Lewis (1981), Wayne (1982), Dickson (1983), Maury (1984), Humphreys (1984), Stewart (1985), Wilson (1985), Rutherford (1985), and Montgomery (1987); additionally, the sparrows are breeding in the following counties for which first dates are not available: Cheatham, Clay, Fentress, Franklin, Jackson, Macon, Overton, Van Buren, and White. The eleven counties in which the species has not yet been ob-

served during the breeding season are Bedford, Giles, Hickman, Houston, Lawrence, Lincoln, Marshall, Moore, Perry, Robertson, and Williamson.

The expansion of Song Sparrows from Cookeville to the Mississippi River was accomplished largely by birds occupying riverbottom habitat at elevations of 65–200 meters (200–600 feet). Stevenson and Stupka (1948) noted that Song Sparrows in the southeast were nowhere found in breeding season at altitudes from approximately 100–800 feet, a rule of thumb which the recent range expansion has clearly violated, since nearly all the records from middle and west Tennessee come from sites closely associated with river floodplains lying between these elevations. The species' use of the drainage of the Cumberland River as an expansion corridor has been suggested (Stedman 1986), while its use of the Elk, Duck, Buffalo, Tennessee, and Mississippi rivers, as well as their tributaries, in its rapid deployment westward as a breeding species is equally notable. It is not clear if river corridors played a role in the Song Sparrow's movement over the Cumberland Plateau. Mayfield (1953) found the species near a stream in Cookeville, but that is the only tenuous evidence suggesting this means of range expansion was used by Song Sparrows to pioneer the Plateau as breeding ground.

Although it is not clear if the Song Sparrow's *means* of expanding westward from Cookeville was different from what enabled it to move over the Plateau, it is clear the *rate* of its westward movement from Cookeville was faster than that which occurred when it

Table 1. Song Sparrow Numbers on Tennessee Breeding Bird Surveys (BBS), 1966–1986.

Route #/ Region	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
West TN:											
01	0	0	—	0	0	0	0	0	0	0	1
02	0	0	0	0	0	0	0	0	0	0	0
07	0	0	—	0	0	0	0	0	0	1	0
09	—	0	0	0	0	0	0	0	0	0	0
Middle TN:											
18	0	0	0	0	0	0	0	0	0	0	0
24	—	0	0	0	—	0	0	0	0	0	0
25	0	0	—	0	0	0	0	0	0	0	0
26	—	0	0	0	0	0	0	0	0	0	0
27	2	0	0	0	2	2	1	1	1	1	4
West Total	0	0	0	0	0	0	0	0	0	1	1
Middle Total	2	0	0	0	2	2	1	1	1	1	4
East Total	123	144	191	184	212	230	243	253	274	279	266
Route #/ Region	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	
West TN:											
01	0	—	0	0	0	0	0	0	0	0	
02	0	—	0	0	0	0	0	1	0	0	
07	0	0	0	0	0	0	0	0	0	0	
09	0	0	0	0	0	0	0	0	1	0	
Middle TN:											
18	0	0	0	0	1	1	2	1	—	0	
24	0	1	0	0	0	2	2	—	0	0	
25	0	0	0	2	0	1	0	1	1	0	
26	0	0	0	0	0	2	2	1	2	0	
27	2	8	9	6	13	13	17	17	17	20	
West Total	0	0	0	0	0	0	0	1	1	0	
Middle Total	2	9	9	8	14	19	23	20	20	20	
East Total	338	327	359	410	406	352	370	438	431	300	

crossed the Cumberlands. If presence of the species in summer is used to measure the rate of expansion, then it took 19 years (1933–1952) for the species to

move 100 kilometers across the Plateau to Cookeville, but 24 years (1952–1976) for it to move 400 kilometers from Cookeville to the Mississippi River. If

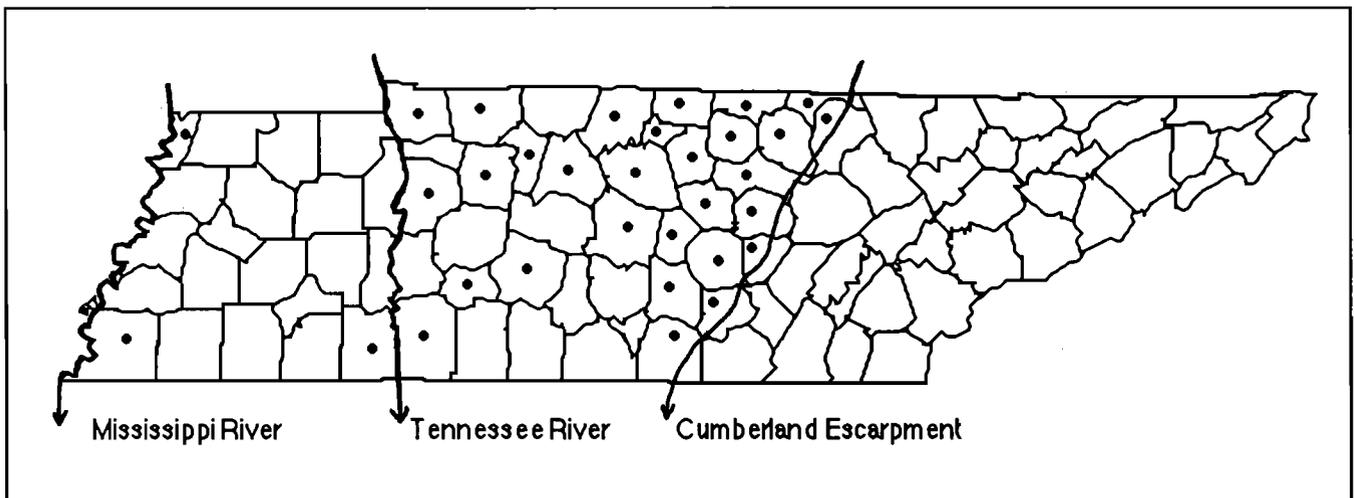


Figure 1. Breeding distribution of the Song Sparrow in middle and west Tennessee (presumed to breed in all counties east of the Cumberland Escarpment).

Table 2 Tennessee and Kentucky BBS Data Showing Effects of Harsh Winters on Song Sparrows in Kentucky.

State	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Kentucky:	351	308	365	343	344	325	579	524	481	599	613
Birds/Route; All routes used	14.6	9.6	10.1	10.4	11.5	10.5	14.5	15.9	17.2	19.3	19.2
Birds/Route; Only routes that ever recorded species	12.5	11.9	12.2	12.7	13.8	12.5	17.1	18.7	19.2	22.2	22.7
Tennessee:	125	144	191	184	214	232	244	254	275	281	271
Birds/Route; All routes used	3.9	3.7	5.0	4.7	5.2	5.5	5.8	6.0	6.6	6.7	6.5
Birds/Route; Only routes that ever recorded species	6.9	6.7	9.1	8.4	9.3	9.7	10.2	10.6	11.5	11.7	11.3

State	1977*	1978*	1979	1980	1981	1982	1983	1984	1985	1986
Kentucky:	455	390	365	327	352	526	558	434	229	322
Birds/Route; All routes used	15.2	12.6	10.4	10.2	10.7	17.0	17.4	16.7	11.5	11.9
Birds/Route; Only routes that ever recorded species	18.2	14.4	13.0	12.6	13.5	20.2	22.3	21.7	14.3	**
Tennessee:	340	336	368	418	420	371	393	459	452	320
Birds/Route; All routes used	8.1	8.4	9.0	10.2	10.2	9.5	10.1	11.5	11.9	8.0
Birds/Route; Only routes that ever recorded species	14.2	15.3	15.3	17.4	18.3	16.9	17.9	20.9	20.6	**

* BBS season following a harsh winter. **Data not available.

positive breeding evidence is used to measure this rate, than it took 35 years (1933–1968) to move across the Plateau to Cookeville, and only eight years (1968–1976) to move from there to the Mississippi.

As Song Sparrows expanded westward in Tennessee, the breeding population of the species increased dramatically throughout the state. Indeed, the explosive increase in its numbers may well have provided the population pressure needed to stimulate the rapid westward expansion of its breeding range. Breeding Bird Survey data (Table 1) offer the clearest indication of the species' increase in numbers in all areas of the state. These data also provide an indication of the approximate years when the species first appeared in middle and west Tennessee.

Breeding Bird Survey data further demonstrate that the Song Sparrow population in Tennessee has not been greatly affected by harsh weather, especially that which occurred during the winters of 1976–1977 and 1977–1978. In Kentucky, Song Sparrow numbers were noticeably reduced following those winters (Table 2) as were populations to the northeast of Tennessee (Robbins, Bystrak, and Geissler 1986). The westward expansion of the Song Sparrow in

Tennessee, consequently, may be related to meteorology. If it is predicted that reproductive success should be higher in areas less likely to experience periodic winter-kill than in those areas more likely to experience it, then Song Sparrows may have moved west as a breeding species in Tennessee to compensate for losses that were due to inclement weather to the north and northeast, as well as to reduce the pressure of an increasing population on available habitat.

The expansion of the Song Sparrow as a breeding species into middle and west Tennessee has been attended by similar breeding range extensions in Kentucky and Alabama. Mengel (1965) describes the gradual southwestward movement the species has displayed in



Kentucky since early in the twentieth century and notes the use of river floodplains as breeding habitat by summering or nesting birds in the extreme southwestern part of the state, while Imhof (1976) and Summerour (1979, 1980, 1983, 1986) chronicle its southwesterly movement in Alabama, a movement whose timing closely parallels that in Tennessee.

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