

Status of Bachman's Warbler, A Progress Report¹

Paul B. Hamel, Dept. of Zoology, Clemson Univ., Clemson, SC 29631
Robert C. Hooper, Southeastern Forest Expt. Stn., Forestry Sciences
Lab., 2730 Savannah Hwy., Charleston, SC 29407

Abstract: -- Systematic searches for Bachman's warbler (*Vermivora bachmanii*) were conducted in and near historical nesting localities in South Carolina, 1975-1978, and Arkansas and Missouri in 1977. None were found during 2800 hours spent searching more than 7100 ha. Searches by others have yielded similar results. Seven reports of this species were made in South Carolina during the study. Efforts to locate reported individuals failed. An additional year of searching will be conducted in South Carolina in 1979.

The numbers of Bachman's warbler have dwindled steadily from population levels noted in the first decade of this century (Wayne 1910; Widmann 1897; Embury 1907; Howell 1910; Golsan and Holt 1914). Stevenson (1938) found the most recently discovered nest in 1937 near Tuscaloosa, AL. For the past 40 years the species has been extremely rare (Criscom 1948), observations or reports generally referring to one bird (Stevenson 1972), probably indicating transient individuals. In only a few instances (Barnes 1954; Chamberlain 1958; Shuler 1977b) were birds present for protracted periods, indicating possible territoriality. In only one of these latter observations (Shuler 1977b) was a female noted with the male(s), indicating the possibility of breeding.

This is not the only period in the 150 year recorded history since its description by Audubon (1834) during which observations have been scarce. Between 1833 and 1850 it was unreported. Gundlach (1855) found the species in Cuba during the 1850's. Subsequent to Gundlach's observations no reports were made until 1886 (Lawrence 1887). However, current scarcity occurs at a time when ornithological activity has been very intense.

The purpose of the present paper is to summarize our efforts to determine status of this species.

^{1/} Research supported by U. S. Forest Service, National Audubon Society, and Charleston, SC, Natural History Society.

We gratefully acknowledge the field assistance of numerous volunteers. Access to various areas was made easier by: R. Belser at Fairlawn Plantation; N. Brunswick at the Beidler Forest; M. Burnside at the Beidler Tract in the Congaree swamp; M. Nichols at Big Lake National Wildlife Refuge. R. Brooks of the Missouri Dept. of Conservation and C. W. Bomar of the Arkansas Game and Fish Commission were helpful in locating areas in their states. Field assistance was provided by L. Wright and J. Cely in South Carolina, and by B. J. Stern and J. Williams in Arkansas and Missouri. The Laboratory of Ornithology, Cornell Univ., provided tape recordings of the species' songs. S. Cauthreaux, M. Lennartz, H. LeGrand, A. Ross, and N. Brunswick have read and criticized the manuscript.

METHODS

Selection of Study Areas

Geographic Location. -- Geographic areas for search were in known breeding localities of the species, e.g., I'On swamp, SC (Wayne 1910), and Buffalo Island, MO (Widmann 1897). It was impossible to search Buffalo Island because it is now the town of Arbyrd, MO. Additional areas in South Carolina, Arkansas, and Missouri were chosen because they represented suitable areas near known nesting sites.

Habitat types. -- We used available literature and a planning conference held in Charleston, SC in 1974 to delineate habitat types for search. Immature and mature hardwood sawtimber stands with dense understories appeared

to be the most probable locations (Hooper and Hamel 1974). Typically, dense understories occur in ecotones between such bottomland hardwood stands and adjacent drier upland stands. Results of additional literature review (Hooper and Hamel 1977, Hamel et al. 1977) indicated that Bachman's warblers were associated with some degree of disturbance to the forest overstory. Such disturbance permitted increased sunlight to reach the ground and stimulated woody understory vegetation. In a further analysis at a site where the species occurred for five years, 1948-1953 (Shuler 1977b), Hamel has found that these individuals were occupying a pocosin. Pocosins are fire climax shrub bogs, commonly occurring in non-flooded interstream areas of the coastal plain (Radford 1974).

We believe habitat is characterized by trees of a preferred range of size and distribution, and relatively dense understory; nesting substrates also strongly suggest some early stage in secondary succession (Hooper and Hamel 1977). These findings indicate that Bachman's warbler habitat is not solely the stereotyped "deep dark swamp" commonly described in earlier literature; a search strategy must encompass a variety of successional stages of several forest types, such as mixed oak-sweetgum (*Quercus* sp.-*Liquidambar styraciflua*), sweetbay-red maple (*Magnolia virginiana*-*Acer rubrum*), etc.

Study Areas

Searches were conducted in South Carolina in March-May of 1975-1978, and in Arkansas and Missouri in May, 1977. Additional searches will be made in South Carolina in 1979.

South Carolina.--The primary study area in South Carolina is the Francis Marion National Forest in Berkeley and Charleston Counties, SC. This 100,000 ha national forest contains more than 20,000 ha of swamp forests in various successional stages. The forest also contains part of I'On swamp, where A. Wayne found most of the known nests (Hooper and Hamel 1977).

Searches were made also in the following areas in South Carolina (Figure 1): Francis Beidler Forest, 1975-1978; Caw Caw and Cardin Bridge swamps, 1976; Beidler Tract of the Congaree swamp, 1978. The Francis Beidler Forest is a sanctuary of the National Audubon Society in Dorchester and Berkeley Counties, SC. The 1460 ha of this primarily cypress-tupelo (*Taxodium distichum*-*Nyssa aquatica*) forest are divided approximately equally between virgin and cutover areas.

Caw Caw and Cardin Bridge swamps form an extensive drainage system in the southern part of Charleston Co., SC. Cardin Bridge swamp is the type locality of Bachman's warbler (Shuler and Sanders 1977).

The Beidler Tract of the Congaree swamp, in Richland Co., SC, is a 6070 ha bottomland forest in the floodplain of the Congaree River. Much of the area is virgin forest, containing a number of record and near record size trees of several species. Gaddy et al. (1975) recognized three general forest types in the area: cypress-tupelo, mixed hardwood, and swamp tupelo (*Nyssa sylvatica* var. *biflora*)-sweetbay. In addition to virgin stands, areas exist in each type which have been clearcut or selectively cut.

Arkansas-Missouri.--Searches were conducted at 6 separate locations during the 10 day field session in Arkansas and Missouri in May 1977. Three of these areas were in St. Francis River drainage (Figure 2) and the remainder in the Little River drainage. The most significant feature of these "sunken lands" is the nearly complete lack of swamp forests compared with those which existed during 1896-1910 when large populations of Bachman's warblers occurred.

The entire Ben Cash Wildlife Area, near Kennett, MO, owned by the Missouri Dept. of Conservation, lies within the levee system of the St. Francis River. Presently the area is subject to potentially continuous flooding rather than the intermittent flooding characteristic of pre-levee times. As a result little herbaceous undergrowth occurs in the parts of the area we visited. The forests are cypress-tupelo and the willow-cottonwood (*Salix* sp.-*Populus deltoides*, *P. heterophylla*) successional stage. Much of the area is probably only marginal habitat for Bachman's warbler because extensive flooding prevents establishment of much undergrowth.

We walked the right-of-way of the St. Louis Southwestern Railroad where it crosses the St. Francis River between Paragould, AR, and Cardwell, MO, and where it crosses part of the former Little River swamp east of Hornersville, MO. The forest is dominated by the willow-cottonwood type. The former area lies along the route described by Widmann (1897) in his discovery of the first reported nest of Bachman's warbler. Today the levees are scarcely 0.8 km apart at that point, the area is subject to considerable flooding, and little undergrowth exists. The latter area contains more undergrowth and a wider variety of tree species.

The Arkansas Sunken Lands Wildlife Area, near Caraway, AR, lies within the levees of the St. Francis River at a point where the levees are several km apart. As a result, flood waters

spread out more there than farther north, move more slowly, and do not scour the area of litter material. Forest types other than cypress-tupelo and cottonwood-willow are found, including somewhat dryer, less frequently inundated oak-sweetgum areas. Willow oak (*Q. phellos*), overcup oak (*Q. lyrata*), red maple, and other species occur there. At the time of our visit a five-year logging contract in the area was nearing completion. In several places logging activities have created small clearings under which nearly impenetrable tangles of blackberry (*Rubus* sp.), trumpet vine (*Campsis radicans*) and other woody species occur. The areas are similar to that described by Widmann (1897) as the site of the first Bachman's warbler nest.

Big Lake National Wildlife Refuge, near Manila, AR, is a cypress-tupelo swamp surrounding open, deeper water in the Little River. Much of the area is unsuitable for Bachman's warblers because of the lack of undergrowth, but two possible habitats for the species occur there. First, openings or channels in the swamp, called "runs," often have buttonbush (*Cephalanthus occidentalis*) growing along them, creating edge habitat of narrow openings lined with moderate-to-dense buttonbush undergrowth within cypress forest. Second, a levee runs along the eastern side of the Refuge. For much of its length the levee is an old roadbed with scattered trees and moderate-to-dense blackberries, other shrubs and herbs. Adjacent to the Refuge is an Arkansas wildlife management area of several hundred ha in which we did not search.

In Section 22, T16N, R9E, near Rives, in Dunklin Co., MO, bordered by levees that form the state line between Arkansas and Missouri, lies approximately 80 ha of privately owned forest land in Hornersville swamp. This woods is the largest woodland we encountered outside of the major levee systems. The area is ditched on all sides and drained early in the spring. The area has apparently not been completely cut since the original logging activities at the turn of the century. However, some small scale logging has occurred, creating many small openings containing blackberries, and matted vines of grape (*Vitis* sp.), trumpet, poison ivy (*Rhus radicans*) and other species.

Search Methodology

Searches were carried out as described by Hooper and Hamel (1974). A field crew of two persons paced along transects, stopping every 122 m where recordings of songs of two Bachman's warblers were played. At every fifth stop in 1975-1976, and every tenth in 1977-1978, the crew made a 10 minute count of all

birds detected and a habitat measurement using a modified technique (Hooper and Hamel 1974) of James and Shugart (1970). The 122 m interval between stops represented the approximate diameter of a Bachman's warbler territory (1.2-1.6 ha) (Barnes 1954; Chamberlain 1958) and because we determined that the recordings could be heard for 70-90 m.

Transects on the Francis Marion National Forest were established using aerial photographs and detailed maps of forest types. On the Beidler Forest and Beidler Tract in the Congaree swamp similar but less detailed maps were available. In the remainder of the areas transects were established subsequent to inspection of the areas.

Determination of the proper time to initiate searches in South Carolina was a somewhat perplexing problem. Bachman's warbler is an early migrant, arriving in South Carolina at about the same time as the northern parula (*Parula americana*) and black-throated green warbler (*Dendroica virens*). Early dates for these species are approximately the first (northern parula), second (Bachman's warbler) and third (black-throated green warbler) weeks in March (Sprunt and Chamberlain 1970). A Bachman's warbler nest with incubated eggs was discovered on 28 March 1918 (Wayne 1918). Our studies of specimen and sight records indicated that most birds are in Florida until the last week in March. Thus we decided to initiate our searches on about 20 March. The searches in Arkansas and Missouri were begun during the first two weeks in May, the time when Widmann (1897, 1898) recorded the first nest. Some searches were also conducted on foot, by automobile, or by canoe, and often did not employ the tape recordings.

Searches by Other Workers

H. Stevenson (1975) conducted two weekend searches during spring migration 1975. On 24-25 March he searched areas along the lower Suwanee River in Florida. On 19 April he searched part of the MORGANZA Spillway in the Atchafalaya Basin, Pointe Coupee Par., LA. On 20 April he searched near Lake Providence in East Carroll Par., LA. T. Imhof (pers. comm.) has averaged 1000 net hours/yr. during his 20-years' banding efforts at Fort Morgan on the Alabama coast, in early April. Members of the Northeast Arkansas Audubon Society have conducted bi-weekly searches in March-May for Bachman's warblers on Big Lake National Wildlife Refuge since 1975 (E. Johnston, M. Nichols, pers. comm.).

RESULTS

During 2800 hours of searching over a 4 year period, we have searched more than 7100 ha

- Gundlach, J. 1855. Beitrage zur ornithologie Cuba's. J. f. Ornithol. 3:465-480.
- Hamel, P. B., R. G. Hooper, D. F. Urbston, and A. McDonald. 1977. Bachman's warbler breeding habitat -- a hypothesis. Presented before 95th Annual Meeting of Amer. Ornithol. Union meeting, Berkeley, CA. (On file at R. M. Cooper Library, Clemson Univ., Clemson, SC.)
- Hooper, R. G., and P. B. Hamel. 1974. Study plan for a cooperative study to determine the status of Bachman's warbler on the Francis Marion National Forest in South Carolina. USDA For. Serv. Study Plan FS-SE-1951-1, 25 p. Southeast. For. Expt. Stn. Clemson, SC.
- Hooper, R. G., and P. B. Hamel. 1977. Nesting habitat of Bachman's warbler -- a review. Wilson Bull. 89:373-379.
- Howell, A. H. 1910. Notes on the birds of the sunken lands of southeastern Missouri. AUK 27:381-384.
- Imhof, T. A. 1973. Central southern region. Am. Birds 27:782-785.
- Imhof, T. A. 1977. Central southern region. Am. Birds 31:1010-1013.
- James, F. C., and H. H. Shugart. 1970. A quantitative method of habitat description. Audubon Field Notes 24:727-736.
- Lawrence, G. N. 1887. The rediscovery of Bachman's warbler, Helminthophila bachmani (Aud.), in the United States. Auk 4:35-37.
- Radford, A. E. 1974. Vegetation - habitats - floras: Natural areas in the southeastern United States. Univ. N. C. Student Stores, Chapel Hill. 289 p.
- Shuler, J. 1977a. Three recent sight records of Bachman's warbler. Chat 41:11-12.
- Shuler, J. 1977b. Bachman's warbler habitat. Chat 41:19-23.
- Shuler, J., and A. E. Sanders. 1977. A new look at the type locality of the Bachman's warbler. Chat 41:12-13.
- Shuler, J., P. Nugent, J. Trochet, and J. Van Os. 1978. Bachman's warbler observations continue in I'On swamp. Chat 42:23-24.
- Sprunt, A., and E. B. Chamberlain. 1970. South Carolina bird life, rev. ed. Reprint of 1949 ed. with a Supplement by E. M. Burton. Univ. S. C. Press, Columbia. 655 p.
- Stevenson, H. M. 1938. Bachman's warbler in Alabama. Wilson Bull. 50:36-41.
- Stevenson, H. M. 1972. The recent history of Bachman's warbler. Wilson Bull. 84:344-347.
- Stevenson, H. M. 1975. Report on two searches for Bachman's warbler. Unpubl. report. 10 p. USDA For. Serv., Southeast, For. Serv., Southeast. For. Expt. Stn., Clemson, S. C. (On file at R. M. Cooper Library, Clemson Univ., Clemson, SC.)
- Teulings, R. 1978. Southern Atlantic coast region. Am. Birds 32:992-993.
- Wayne, A. T. 1910. Birds of South Carolina. Contrib. Charleston Mus. 1, 254 p.
- Wayne, A. T. 1918. Some additions and other records new to the ornithology of South Carolina. Auk. 35:437-442.
- Widmann, O. 1897. The summer home of Bachman's warbler no longer unknown. Auk 14:305-309.
- Widmann, O. 1898. Bachman's warbler in summer. Osprey 3:13.

Table 1. Extent of coverage by year in searches for Bachman's warblers, 1975-1978.

Year	1975	1976	1977 ^a	1977 ^b	1978	Total
Duration	3/22-5/15	4/3-5/22	3/19-4/29	5/5-5/14	3/16-5/27	
No. of Stops	1055	714	375	85	665	2894
Ha covered using transect method	1572	1064	559	127	991	4313
Ha covered in other ways	--	892	650	697	560	2799
Total Ha	1572	1956	1209	824	1551	7112
Man-hours	801 ^c	708	557	210	579	2855

(a) Searches conducted in South Carolina.

(b) Searches conducted in Arkansas and Missouri.

(c) Estimated from total hours spent using same proportion of field time to total time as in 1976.

Table 2. Extent of coverage by area in South Carolina searches for Bachman's warbler, 1975-1978

Year	1975	1976	1977	1978	Total
Francis Marion National Forest, outside I'On swamp	1154 (100%) ^a	870 (32%)	317 (60%)	719 (69%)	3060
I'On swamp	186 (100%)	692 (78%)	657 (44%)	401 (57%)	1936 ^b
Beidler Forest	232 (100%)	138 (100%)	118 (59%)	176 (34%)	664 ^c
Cardin Bridge and Caw Caw swamps	--	255 (40%)	--	--	255
Congaree swamp	--	--	--	198 (92%)	198
Other areas	--	--	117 (8%)	57 (44%)	174

(a) Entries are expressed as "Total ha (% Covered by transect methods)"

(b) Approximately 40% of this area represents duplicate coverage given certain areas in more than one year

(c) Approximately 25% of this area represents duplicate coverage given certain areas in more than one year

Table 3. Reported sightings of Bachman's warbler, largely unconfirmed, made since Stevenson's (1972) review of the status of the species.¹

Date	Birds Observed	Location	Observers	Source
GEORGIA				
8 Aug. 1975	1♂	Long Co.	A. S. Johnson, C. Allen, J. L. Landers	(A. S. Johnson, pers. comm.)
3 Sept. 1975	1♂	Same place	J. L. Landers	(A. S. Johnson, pers. comm.)
These same observers searched the area in March and April 1976 and found no Bachman's Warblers.				
KENTUCKY				
20 May 1977	1♂, 1♀	Land-between-the-lakes	E. and G. Warwick (pers. comm.)	
B. L. Monroe, Jr. (pers. comm.) visited this location in May 1978 but found no birds.				
LOUISIANA				
April 1973	1♂	Cameron Parish	H. D. Pratt	(Imhof 1973)
April 1977	1♀	Cameron Parish	R. Newman, J. Hebrard, one other	(Imhof 1977)
MARYLAND				
16 May 1977	1♂	Seneca	Unknown to us	(E. F. Potter, pers. comm.)
SOUTH CAROLINA				
14 March 1974	1♂	Fairlawn Plant. ²	J. Lamey	(Shuler 1977a)
20 April 1975	1♂	I'On swamp	T. A. Beckett, S. Langston	(Shuler 1977a)
29 March 1976	1♂	I'On swamp	A. and M. Uterhart	(Shuler 1977a)
2 April 1977	1♂	Fairlawn Plant.	P. Nugent	(Shuler et al. 1978)
17 April 1977	1+	I'On swamp	J. Trochet	(Shuler et al. 1978)
25 May 1977	1♂	Hampton Plant., Charleston Co.	D. Klein (pers. comm.)	

Table 3. Continued

Date	Birds Observed	Location	Observers	Source
SOUTH CAROLINA, cont.				
27 April 1978	10 ³	I'On swamp	K. Bass	(Teulings 1978)

¹This list includes all reports since 1972 of which we are aware. We make no judgements of these reports. Inclusion of an observation does not indicate our belief that a Bachman's warbler(s) was actually seen. For further information about possible confirmations of certain of these reports and the difficulties involved in evaluating such reports, see text.

²Fairlawn Plantation is the privately owned portion of I'On swamp, Charleston Co., SC.

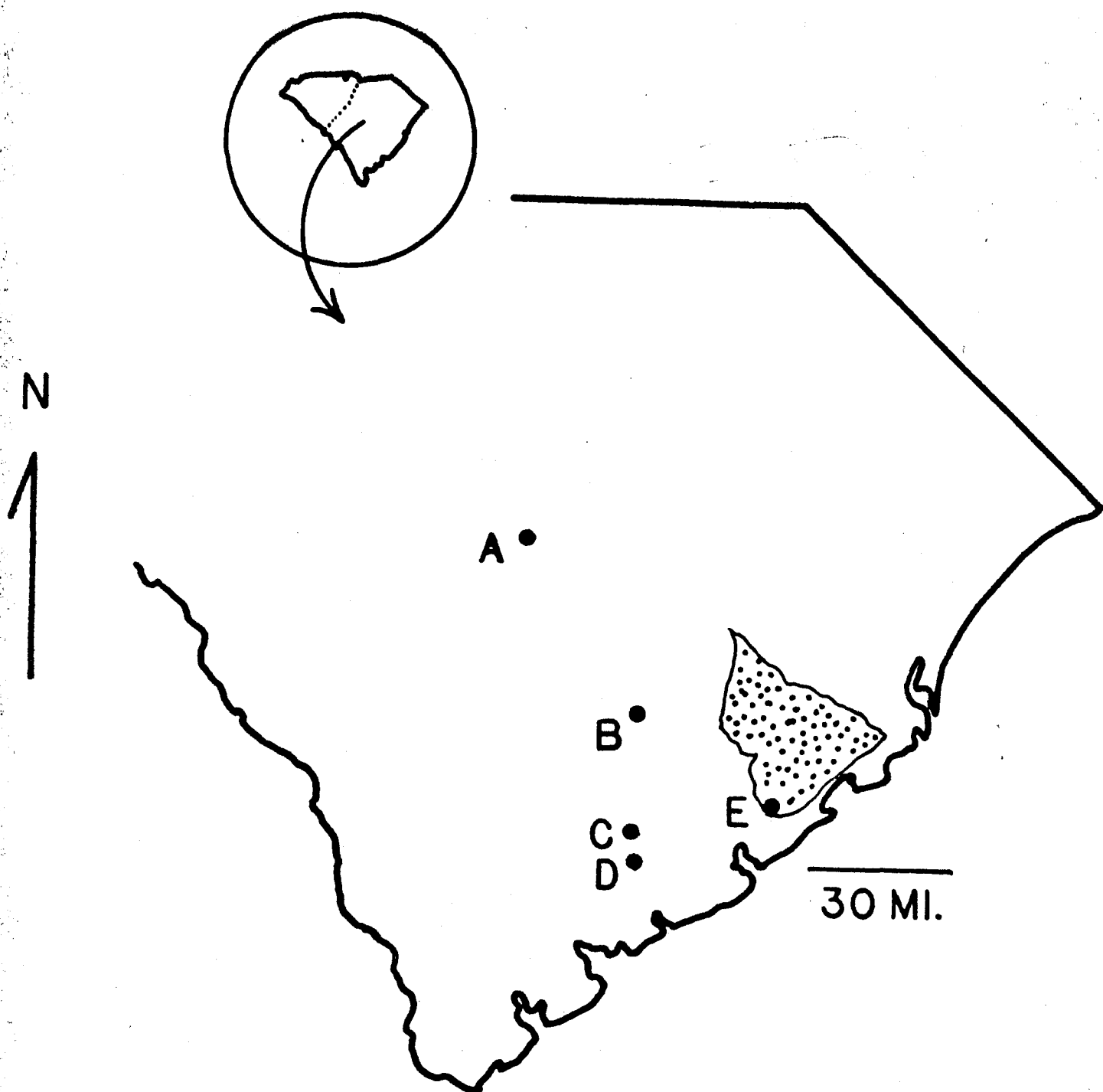


Figure 1. Bachman's warbler study areas in South Carolina.

Stippled area is Francis Marion National Forest. (A) Beidler Tract in the Congaree swamp; (B) Francis Beidler Forest; (C) Cardin Bridge swamp; (D) Caw Caw swamp; (E) I'On swamp.

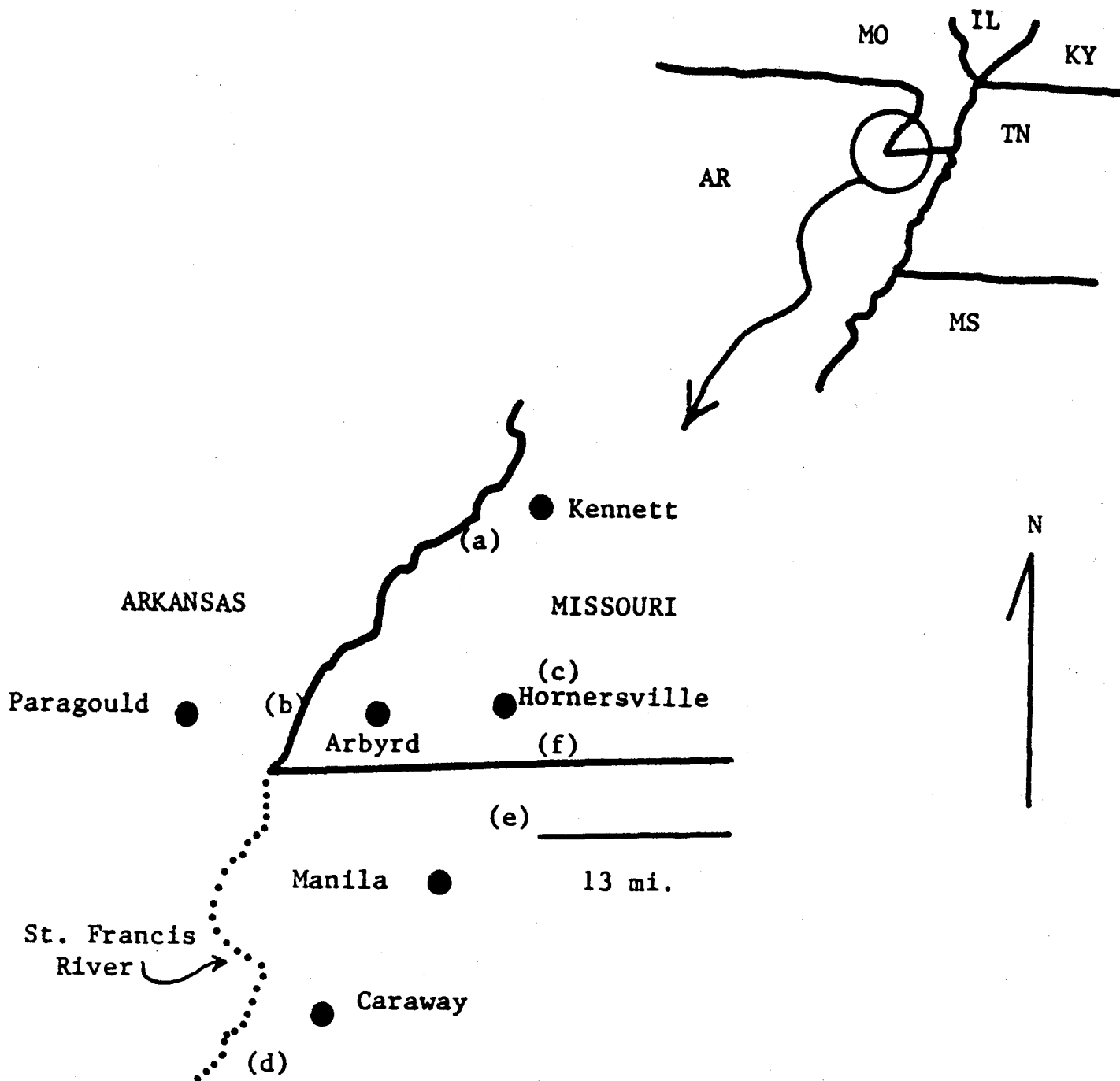


Figure 2. Bachman's warbler study areas in Arkansas and Missouri.

(a) Ben Cash Wildlife Area; (b), (c) St. Louis Southwestern Railroad; (d) Arkansas Sunken Lands Wildlife Area; (e) Big Lake National Wildlife Refuge; (f) Hornersville swamp.