

Fire Management Species Profile

Bachman's Sparrow (*Peucaea aestivalis*)

Federal Status (24): Not listed

State Ranking (24):

Imperiled- GA, KY, MS, OK, TN, VA

Vulnerable- AL, AR, FL, LA, MS, NC, SC, TX

Historical-DC, IL, IN, MD, OH, PA, WV

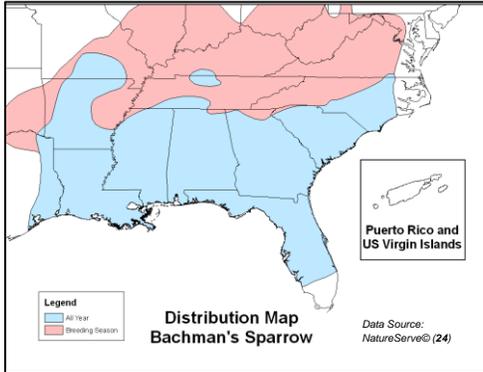


Photo - Rachel Cass

Bio Facts (11)

Size: 5.5 inches

Nesting: ground
May-June; averages
2 clutches per season

Feeding: granivore
(herb and pine seeds) and insectivore

Eggs: 3-5

Incubation: 12-14 days

Landscape Conservation Cooperatives: South Atlantic, Peninsular Florida, Gulf Coastal Plains and Ozarks, Gulf Coast Prairie, Appalachian, North Atlantic, Eastern Tallgrass Prairie

Landfire Zones: 32, 37, 44, 45, 46, 47, 48, 49, 52, 53, 54, 55, 56, 57, 58, 59, 61, 62, 98, 99

Desired Vegetation Structure and Fire Components

Criteria	Monitoring Variables
Canopy/Sub-canopy	Open pine canopy; canopy cover <50%; < 80 trees greater than 3 in dbh per acre (including dead trees); BA < 60 sq ft per acre
Mid-story	Little to no mid-story of trees and large shrubs 3 to 16 ft; allow 2-5 trees per 250 acres for perching; midstory cover <30-40%
Understory	Dense understory less than 3ft with grass cover >60%; forb cover >30 % and woody understory cover <30%
Ground Cover	Dense ground cover >80%; with patches of exposed mineral soil for bird movement and escape; litter cover>75%; mean litter depth to < 0.5 inches
Fire Regime	Natural fire regime 1-5 years; average 2-3 years in mature forests(>80yrs); moderate departure 5-10 years; high departure >10 years
Fire Regime Condition Class	Most desired FRCC1 (low departure from natural) and FRCC2 (moderate departure); some suitable habitat may occur in FRCC3
Seasonality	Early growing season favors habitat structure (Mar-April); Fires that occur April through June may increase winter food availability and promote higher winter abundance
Fuel Models	In well maintained habitat, fuel models include grass (GR3, GR5, GR6, GR9); grass-shrub (GS3, GS4); shrub (SH4); timber-understory (TU3)
Burn Severity	During nesting season, low burn severity is favored to allow unburned patches to develop for escape (CBI<1.5); outside nesting season moderate burn severity acceptable; CBI<2.3
Fire Behavior	During nesting season, low to moderate fireline intensity; flame length <10 ft; <75% burn is acceptable in areas where nests reported
Landscape Considerations	Matrix of suitable habitat patches (>185 acres) of mature, younger forests and regeneration harvests connected by corridors to allow movement between patches. Fire mgt consider timing and spatial arrangement of treatments in matrix

The objective of the Fire Management Species Profile project is to identify habitat management objectives that are specific, measurable, achievable, clearly communicate among habitat management professionals and are firmly based in the best available science. Their use is intended to guide habitat managers in setting local objectives for habitat management in fire-adapted ecological systems. Fire management objectives are specific to habitat conditions in which maintenance and improvement, rather than restoration, of habitat condition is the goal.

In the Southeastern US, Bachman Sparrow is a year-round resident of open pine woodland habitats with 50% or less canopy cover, a dense ground cover (> 60%) below 3ft in height and limited mid-story cover (< 10%). Understory and ground cover should be dominated by native grass cover (>60%) and forb cover (>30%) with low shrubs (< 30%) and branches from dead and standing trees scattered throughout the habitat available for perching. Birds nest on the ground. At the soil surface, patches of open bare mineral soil should be available (approximately 20%) with litter cover >80%. Litter depths should be <0.5 inches. Birds also use recently planted clear-cuts and young pine plantations with dominant grass cover of more than 65% as well as areas with low woody percent cover (<30%) of palmetto (*Sabal spp.*) or gallberry (*Ilex spp.*) in the understory.

Desired Habitat Conditions

Bachman's sparrow is endemic to the Southeastern US and is primarily a non-migratory bird resident associated with pine woodlands and other open habitats. Habitat loss is considered one of the most significant threats to this species (23).

Distribution: Historically, species known to breed from Illinois, Ohio, Indiana, West Virginia, Pennsylvania, and Maryland, today is found to breed primarily from central Florida north to southern Virginia, west to Tennessee, Kentucky, and Missouri to eastern Oklahoma, and eastern Texas (12, 20, 22, 23) and south along the coastal plain. It is considered locally common along the outer coastal plain, uncommon along the inner coastal plain and rare in the Piedmont region (23).

Habitat Types: In general, prime habitat for Bachman's sparrow is mature (>80 year old) pine stands [longleaf (*Pinus palustris*), loblolly (*P. taeda*), shortleaf (*P. echinata*), slash (*P. elliottii*), and mixed oak-pine] that are frequently burned (<3 year burn interval) and they can also occur in intermediate-age and young pine woodlands as well as recently cutover areas (<5 year old) (13, 14). Sparrows abandon sites if fire is excluded for more than three years (8). Birds are not found in the first year of recently cutover lands and occupy a clear cut from 4 to 7 years following clearing (13). They can be found in recent clear-cuts with planted longleaf, slash, loblolly or shortleaf pine where little bluestem (*Schizachyrium scoparium*) or other native grasses dominate the ground cover. It has been found in young slash pine stands with gallberry or palmetto present (3). In addition, Bachman's sparrow will occupy open field and prairie sites (8).

Canopy and sub-canopy: Bachman's sparrows use areas with open canopies (<50% canopy cover) (24). The species is more abundant in areas with vegetation <3 feet high (14, 18). Mature stands with lower tree densities (<81 trees per acre and 15 to 60 sq ft BA) is preferred over areas with more trees per acre (17). Longleaf and loblolly stands of different ages and management have shown Bachman's sparrow densities were negatively related to the amount of vegetation (by volume) in the mid-story and canopy layers (>7ft) in South Carolina, Florida and Georgia (14, 16, 24). In addition, sparrow breeding areas had significantly lower percent canopy cover, shorter woody vegetation, and fewer trees and shrubs compared to unoccupied areas (17, 18).

Mid-story: Bachman's sparrow occurs in habitats with lower density of tall trees and shrubs in the mid-story. In Texas, occupied sparrow habitat had fewer trees than unoccupied habitat (1). In South Carolina and Georgia, sparrow habitat had lower amounts of vegetation above 7 feet compared to unoccupied habitats (14, 16). In loblolly and shortleaf pine habitats in Arkansas, lower percent canopy cover, shorter woody vegetation, and fewer trees and shrubs were found in breeding sites (18). In Missouri, sparrows occurred in habitats with <30 % woody cover, lower percentages of saplings and trees as well as total woody vegetation (5).

There is evidence of the need for perch availability in sparrow habitat, especially in recently cleared areas and young pine plantations. Higher numbers of sparrows occurred in pine plantations in Florida when artificial snags were added to sites compared to areas without any snags (3). In addition, tall shrubs and standing dead vegetation above 6 feet may provide perching habitat for sparrows as reported in clear cut lands and very young pine stands (14, 17, 30). The lack of available perches may explain the absence of

Bachman's sparrow from old field vegetation (16).

Understory/Ground Cover: Dense, low growing ground cover is a key component of Bachman's sparrow habitat (14, 17, 24, 28). In a study of breeding Bachman sparrow habitats in Arkansas, Alabama, Florida, South Carolina and North Carolina, sparrows occupied sites with lower percent woody cover, tree densities, and forb cover and with higher percent ground cover, grass cover and litter cover (17). Vertical vegetation density was greater below a height of 3 feet than above (17). Young fire-maintained slash pine plantations in northwestern Florida have shown sparrow abundance to be correlated to the relative amount of grass present in the ground cover (28). Sites occupied by sparrows in longleaf pine woodlands of Florida, managed for the red-cockaded woodpecker (*Picoides borealis*), had higher understory vegetation densities ≤ 2 feet and sparse mid-story compared to unoccupied sites (24). In addition, the density of bluestem grass (*Andropogon spp.* and *Schizachyrium spp.*) was significantly greater in occupied than unoccupied sparrow sites (24). Further, sparrows were more abundant in mixed pine-grassland restoration sites compared to more traditionally managed timber sites in Mississippi where there was greater understory, grass, and forb cover present (32). In Texas (30), herbaceous ground cover was greater in areas occupied by Bachman's sparrows. There was more grass and forb cover found in occupied sparrow habitat in glades of Missouri than unoccupied glades (5). In longleaf pine forest in Georgia, Bachman's sparrow was more abundant in areas where ground cover was primarily Beyrich threeawn (*Aristida beyrichiana*), compared to relatively disturbed communities comprised of bluestem (*Andropogon spp.*) and silkgrasses (*Pityopsis spp.*) (26). In contrast, sparrows at Piedmont National Wildlife Refuge in Georgia occurred in areas with taller understory vegetation of shrubs and hardwoods (16). Bachman's sparrows may favor a patchier than evenly distributed ground cover. In Georgia, sparrows did not occur in open areas with more uniformly distributed herbaceous vegetation (16). Studies in Texas suggest the species may favor tall grass in clumpy rather than uniform distributions (30). Uneven distribution of the ground cover may play a role in the foraging success and availability of food and nesting success.

Litter: A high percentage of litter cover (>60 to 90 %) and shallow depths (<0.5 inches) have been reported for sparrow habitat throughout the southeast (17, 18). Litter provides habitat for sparrow prey; however, too much litter may impede foraging (17). In a study in loblolly and shortleaf pine plantations of Arkansas, litter cover was greater in areas occupied by sparrows than unoccupied sites (78% and 89% respectively). Further, sparrows occurred in area with less litter depth (0.5 inches) compared to unoccupied sites (1.6 inches) (18).

Breeding information: Bachman's sparrows begin establishing territories as early as mid-February, two months before breeding. Eggs are laid from late April through July but most commonly May to June. Clutch size ranges from 3-5 eggs with 2-3 broods per year. A female may start a new nest while feeding chicks from another. Young sparrows are tended by both parents. Incubation is from 12-14 days. Young leave the nest from 9-10 days but are fed by parents for 25 days (22, 23).

Nesting information: Sparrows nest in dome shaped nests on the ground in dense cover, under grass tufts or low shrubs, or in grassy openings, fields, or areas with scattered trees (9, 14, 22, 23).

Nest Predation and Parasitism: Nest failures result mainly from predation by small mammals, hawks and snakes, nest abandonment, and burning (10). Some parasitism by brown-headed cowbirds (*Molothrus ater*) has been documented (7, 10, 11).

Role of Fire: Fire return interval of <5 years is required for the maintenance of Bachman's sparrow habitat (14, 15, Error! Reference source not found., 28, 29). In Florida, Bachman's sparrow occurred in a longleaf pine stands following the first three years after annual spring fires; canopy cover was 43% and ground cover was 85%. Five years after the burns stopped, canopy cover increased to 91%, ground cover decreased to 21%, and breeding no longer occurred (15). In longleaf pine stands in Alabama and Florida, sparrows were more abundant in areas burned on ≤ 3 year rotation compared to > 4 year rotations (29). Bachman's sparrow decline in numbers 3-5 years after an area is burned (15) and probably move around the landscape in search of recently burned areas (8). Sparrows increased in abundance by >50% when surrounding vegetation was burned (8). Increased abundance is most likely due to changes in food resources and structure of ground-cover vegetation from the fire.

Common food resources used by wintering Bachman's sparrow include seeds from fall flowering forbs and grasses that benefit from early growing season burns (8, 24). The effect of seasonality of fire on insect prey populations of Bachman's sparrows warrants further evaluation (8). Fire also plays a role in reducing the impenetrability of densely matted grass accumulations over time by consuming up the vegetation at the ground level for better visibility and maneuverability of sparrows along the ground in search of food resources (8, 18).

Bachman's sparrow may be most vulnerable to fire during nesting season when eggs and young are most likely to be negatively impacted (9). However, since Bachman's sparrow is known to reneest and typically raise 2 broods per season this may reduce the overall impact of nest mortality and productivity (8). Early growing season burns may allow more time for reneesting (4).

Mechanical treatments: Studies have shown that there is greater abundance of Bachman's sparrow in areas where mid-story and/or canopy have been thinned (2, 6, 31, 32) with some limitation (24, 24). Timber management practices such as prescribed burning, site preparation and thinning have may have a strong effect on habitat structure, especially the understory vegetation, for Bachman's sparrow (14). In addition, mechanical treatments can result in a significant reduction in ground cover and the loss of habitat structure for the bird.

Landscape/SpatialityTemporarity (Mobility, Area Sensitivity, Insularity-Connectivity Consideration)

Territory size is variable for Bachman's sparrow and has been reported during breeding season from 1.5 to 7 acres in Missouri and an average of 6 acres in Arkansas (5, 18, 19). Breeding territories were reported in Florida to be an average of 12.5 acres (20, 21) but in winter in central Florida were estimated at only 2 acres (10). In general, home range size is considered to be about 6 acres for this species (18). Bird density is also variable and has been reported from 1.9 birds per 25 acres in Texas (1) to 4.8 birds per 25 acres in South Carolina (14) to 9.2 birds per 25 acres in Georgia (16).

Bachman's sparrow may have limited dispersal and colonizing abilities which could lead to its limitation to occupy scattered suitable habitat patches in a large landscape (13). This suggests that landscape level considerations should include minimizing suitable patch isolations. Factors such as size, shape, and diversity of habitat patches, connectivity among patches and corridors between patches that allow for dispersal should also be considered (13). It is recommended that a minimum of 185 acres during the breeding season of suitable habitat in a square or circular shape be provided in a larger landscape matrix of open habitats (managed timber stands and clear cuts of various ages) and mature pine forests (13, 20). The arrangement of suitable habitat patches on the landscape will be critical as Bachman's sparrow has been found to decline in numbers as the distance from suitable habitat patches increases (13). Corridors between suitable habitat patches provide sparrows a way to enhance movement between patches and increase colonization across managed landscapes (13). For example, pine-grass restoration corridors connecting patches of suitable habitat across the landscape enhanced the stabilization of Bachman's sparrow populations in a landscape with many unsuitable habitat patches (32). Fire management across the landscape should also be considered. The size and arrangement of burn blocks could influence the movement of sparrows across the landscape as birds move in response to shifting habitat conditions (8, 27).

Literature Cited

1. **Brooks, R. A. 1987.** Avifaunal populations of regenerating clearcut areas in eastern Texas, with emphasis on the Bachman's sparrow and prairie warbler. Master's Thesis. Stephen F. Austin State University, Nacogdoches, TX. 57pp.
2. **Burger, L. W, Jr., C. Hardy, and J. Bein. 1998.** Effects of prescribed fire and midstory removal on breeding bird communities in mixed pine-hardwood ecosystems. Pages 107-113. *In*: Pruden, T. L. and L. A. Brennan, (eds.). Fire in ecosystem management: shifting the paradigm from suppression to prescription: Proceedings, Tall Timbers Fire Ecology Conference; 1996 May 7-10, Boise, ID. No. 20. Tallahassee, FL. Tall Timbers Research Station.

3. **Caine, L. A. and W.R. Marion. 1991.** Artificial addition of snags and nest boxes to slash pine plantations. *J. Field Ornithology* 62:97-106.
4. **Carlilie, L. D. 1997.** Fire effects on threatened and endangered species and habitats of Fort Stewart Military Reservation, Georgia. Pages 227-231. *In: Greenlee, J. M., (ed.). Proceedings: 1st congress on fire effects on rare and endangered species and habitats; 1995 November 13-16. Coeur d'Alene, ID. Fairfield, WA. International Association of Wildland Fire.*
5. **Chambers, R. J. 1994.** Habitat relations of Bachman's sparrow and other birds on Missouri glades. Master's Thesis. University of Missouri-Columbia, Columbia, MO. 60 pp.
6. **Conner, R.N., C. E. Shackelford, R. R. Schaefer, D. Saenz, and D. C. Rudolph. 2002.** Avian community response to southern pine ecosystem restoration for red-cockaded woodpeckers. *The Wilson Bulletin* 114:324-332.
7. **Cox, J. A. and C. D. Jones. 2007.** Home range and survival characteristics of male Bachman's sparrows in an old-growth forest managed with breeding season burns. *J. Field Ornithology* 78:263-269.
8. **Cox, J. A. and C. D. Jones. 2009.** Influence of prescribed fire on winter abundance of Bachman's sparrow. *The Wilson Journal of Ornithology* 121:359-365.
9. **Cox, J. A. and B. Widener. 2008.** Lightning season burning: friend or foe of breeding birds? *Miscellaneous Publication 17, Tall Timbers Research Station, Tallahassee, FL. 16pp.*
10. **Dean, T. F. and P. D. Vickery. 2003.** Bachman's sparrows use burrows and palmetto clumps as escape refugia from predators. *Journal of Field Ornithology* 74: 26-30.
11. **Dunning, J.B., Jr. 1993.** Bachman's sparrow. Pages 1-16 *In: Poole, A, P. Stettenheim, and F. Gill (eds). The Birds of North America. No. 38. Philadelphia, PA. The Academy of Natural Sciences, Washington, DC. The American Ornithologists Union.*
12. **Dunning, J.B., Jr. 2006.** Bachman's sparrow. *Birds of North America* [Online]. Cornell Laboratory of Ornithology. Issue # 038. Available: <http://bna.birds.cornell.edu/bna/species/038> [Accessed: May 22, 2008].
13. **Dunning, J.B., Jr., R. Borgella, Jr., K. Clements, and G.K. Meffe. 1995.** Patch isolation, corridor effects, and colonization by a resident sparrow in a managed pine woodland. *Conservation Biology* 9:542-550.
14. **Dunning J.B., Jr. and B. D. Watts. 1990.** Regional differences in habitat occupancy by Bachman's sparrow. *Auk* 107:463-472.
15. **Engstrom, R. T., R. L. Crawford, and W. W. Baker. 1984.** Breeding bird populations in relation to changing forest structure following fire exclusion: a 15-year study. *The Wilson Bulletin* 96: 437-450.
16. **Gobris, N. M. 1992.** Habitat occupancy during the breeding season by Bachman's sparrow at Piedmont National Wildlife Refuge in central Georgia. Master's Thesis. University of Georgia, Athens, GA. 45pp.
17. **Haggerty, T. M. 2000.** A geographic study of the vegetation structure of Bachman's Sparrow (*Aimophila aestivalis*) breeding habitat. *Journal of the Alabama Academy of Science* 71:120-129.
18. **Haggerty, T. M. 1998.** Vegetation structure of Bachman's sparrow breeding habitat and its relationship to home range. *Journal of Field Ornithology* 69:45-50.
19. **Hardin, K. I. T. S. Baskett, and K. E. Evans. 1982.** Habitat of Bachman's sparrow breeding on Missouri glades. *The Wilson Bulletin* 94:208-212.
20. **LeGrand, H.E., Jr. and K. J. Schneider. 1992.** Bachman's sparrow, *AIMOPHILA AESTIVALIS*. Pages 299-313 *In: K. J. Schneider and D. M. Pence (eds.). Migratory nongame birds of management concern in the Northeast. U.S. Fish and Wildlife Service, Newton Corner, MA.*
21. **Lower Mississippi Valley Joint Venture. 2008.** Landbird habitat suitability index model: Bachman's sparrow *Amophila aestivalis* [Online], Available: http://www.lmvjv.org/hsi_model/ [Accessed: Dec 27, 2010].
22. **McKittrick, M.C. 1979.** Territory size and density of Bachman's sparrow in south central Florida. *Florida Field Naturalist* 7:33-34.
23. **Meyer, R. 2006.** *Aimophila aestivalis*. *In: Fire effects information system, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [Accessed: Dec 27, 2010].*
24. **NatureServe: Ridgely, R.S., T.F. Allnutt, T. Brooks, D.K. McNicol, D.W. Mehlman, B.E. Young, and J.R. Zook. 2003.** Digital Distribution Maps of the Birds of the Western Hemisphere, version 1.0. NatureServe,

Arlington, VA.

25. **Plentovich, S., J. W. Tucker, Jr., N. R. Holler, and G. E. Hill. 1998.** Enhancing Bachman's sparrow habitat via management of red-cockaded woodpeckers. *Journal of Wildlife Management*. 62:347-354.
26. **Provencher, L., N. M. Gobris, L. A. Brennan, D. R. Gordon, and J. L. Hardesty. 2002.** Breeding bird response to midstory hardwood reduction in Florida sandhill longleaf pine forests. *Journal of Wildlife Management* 66:641-661.
27. **Rutledge, B.T. and L. M. Conner. 2002.** Potential effects of groundcover restoration on breeding bird communities in longleaf pine stands. *Wildlife Society Bulletin* 30:354-360.
28. **Seaman, B. D. and D. G. Krementz. 2001.** Movements and survival of Bachman's sparrows in response to prescribed summer burns in South Carolina. Pages 227-240 *In: Eversole, A. G. (ed.). Proceedings of the annual conference of the Southeastern Association of Fish and Wildlife Agencies; 2000 October 28-November 1; Baton Rouge, LA.*
29. **Tucker, J. W, Jr., G. E. Hill, and N. R. Holler. 1998.** Managing mid-rotation pine plantations to enhance Bachman's sparrow habitat. *Wildlife Society Bulletin* 26:342-348.
30. **Tucker, J. W., W. D. Robinson Jr., and J. B. Grand. 2004.** Influence of fire on Bachman's sparrow, an endemic North American songbird. *Journal of Wildlife Management* 68:1114-1123.
31. **Wan, R. and A. K. Wan. 1987.** Vegetational characteristics of early successional sites utilized for breeding by the Bachman's sparrow (*Aimophila aestivalis*) in eastern Texas. Master's Thesis. Stephen F. Austin State University, Nacogdoches, TX. 46pp.
32. **Wilson, C. W., R. E. Masters, and G. A. Bukenhofer. 1995.** Breeding bird response to pine-grassland community restoration for red-cockaded woodpeckers. *Journal of Wildlife Management* 59:56-67.
33. **Wood, D.R., L. W. Burger, J. L. Bowman Jr., and C. L. Hardy. 2004.** Avian community response to pine-grassland restoration. *Wildlife Society Bulletin* 32:819-829.

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