
Bachman's Warbler

Vermivora bachmanii

Federal Status:	Endangered (March 11, 1967)
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Critical Habitat:	None Designated
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Florida Status:	Endangered
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Recovery Plan Status:	Not Applicable
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Geographic Coverage:	South Florida
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Bachman's warbler (*Vermivora bachmanii*) is the rarest songbird native to the U.S. Historically, this species was known for dramatic changes in population size, possibly in response to the irregular reproductive cycle of the bamboo (*Bambusa* spp.). Loss of breeding and wintering habitat, as well as harvest for the millinery trade, led to a severe decline of this species. Bachman's warbler was the seventh most common migrant along the lower Suwannee River in earlier times.

The last sighting of Bachman's warbler in Florida was reported in 1977. The last confirmed sighting anywhere in the U.S. was in 1988.

Description

Bachman's warbler is one of the smallest warblers with a total length of 10 to 11 cm. The bill is slender with a slightly downward curve. The male is olive-green above with yellow forehead, lores, eye-ring, chin, and underparts, a black throat and crown, and dusky wings and tail. Males also have a yellow shoulder patch and bright rump. The female lacks any black coloration and has olive green upperparts with yellow forehead and underparts. The eye-ring is whiter than in the males, and the crown is grayish. Immature males resemble females. Males are not difficult to distinguish from other warblers, however, the drab coloration of the females and immatures makes positive identification difficult (Hamel and Gauthreaux 1982, World Wildlife Fund 1990, Curson *et al.* 1994, Stevenson and Anderson 1994, Hamel 1995, Anderson 1996). In his description of Bachman's warblers viewed at long distances, Brewster (1891) described the crown of both sexes as being always carried in a slightly raised fashion, giving the head of the bird a "fluffy" appearance.

The song of the Bachman's warbler is a *zeep* or buzzy *zip* given by both sexes (Hamel 1995). It is somewhat reminiscent of the pulsating trill of the Northern Parula (*Parula americana*) (Brewster 1891, Curson *et al.* 1994).

Taxonomy

Bachman's warbler is in the order Passeriformes, family Emberizidae. It is thought to be closely related to the blue-winged warbler (*V. pinus*) and golden-winged warbler (*V. chrysoptera*) (Hamel 1995, Anderson 1996). It was first named as *Sylvia bachmanii* by John James Audubon who, in 1833, described the bird discovered by Reverend John Bachman in a swamp near Charleston South Carolina (Terres 1980, AOU 1983).

Distribution

Bachman's warbler breeds in the southeastern U.S. and winters in western Cuba and the Isle of Pines (now known as Isla de Juventud or Island of Youth) (Figure 1). There are no breeding records for Florida; this species is an early spring and fall transient. Breeding has been documented in northeastern Arkansas, southeastern Missouri, southwestern Kentucky, central Alabama, and southeastern South Carolina and possibly in northeastern Oklahoma. Most authorities agree that if the Bachman's warbler still exists it is most likely in the I'on Swamp area in Charleston and Berkeley Counties, South Carolina. There has been one winter record for Florida (Hamel 1995, Anderson 1996).

Habitat

The habitat associations most often used by breeding Bachman's warblers are uncertain since very small numbers of Bachman's were left when habitat investigations began (Hamel 1995). The information available indicates that migratory habitat preferences differ from winter and breeding habitat preferences in that the bird seems to tolerate a wider range of conditions and uses a greater variety of vegetative associations. Migratory and winter records are scarce, especially since the rapid decline in the early 1900s. As a result, information on the preferred types of migratory and winter habitat are almost nonexistent.

Historic records indicate the Bachman's warbler typically nested in low, wet, forested areas containing variable amounts of water, but usually with some permanent water. Although these areas were described in general as being forested, characteristic tree species included: sweet gum (*Liquidambar styraciflua*); oaks (*Quercus* spp.); hickories (*Carya* spp.); black gum (*Nyssa sylvatica*); and other hardwoods. Openings in the forest canopy with a ground cover consisting of dense thickets of cane (*Arundinaria gigantea*), palmetto (*Serenoa minor*), blackberry (*Rubus cuneifolius*), gallberry (*Ilex glabra*), and other shrubs and vines are also characteristic of nesting habitat. The nests are located near the ground. The debate on nesting habitat associations seems to center on whether or not Bachman's warbler is dependent on old-growth bottomland forest or areas that have been disturbed with dense understories of palmetto and cane. In the Mississippi alluvial valley and other breeding areas, the birds were known to use a variety of habitats including upland forest (Hamel 1995).

Migratory habitat preference is unclear; however, Bachman's warblers have been known to use a wide range of habitat types during migration, including forest canopy (Anderson 1996). Many of the museum collection records

that provide general habitat and location information may be imprecise. It is apparent, however, that floodplain forest is an important habitat for migrating Bachman's warblers. Records from the Florida Keys in the late 1800s state that the birds were seen in scrub vegetation on the "immediate" coast (Hamel 1995).

Winter habitat use may include a broader array of vegetative communities since Bachman's warblers have been found in dry, semi-deciduous forest, forested wetlands, and forested urban areas. Winter specimens have been collected from a variety of lowland and other habitats throughout Cuba (Hamel 1995). Specifics concerning habitat preference of this species in winter are not available.

Behavior

Reproduction

The only confirmed nest observations for Bachman's warbler were recorded from 1897 to 1937. Of these, 26 were from the I'on Swamp area of South Carolina, and several others were reported from Louisiana, Kentucky, Maryland, and near the Long/McIntosh County line in Georgia (Hooper and Hamel 1977). Nesting was documented in southern Alabama as late as 1937 (Stevenson and Anderson 1994).

Bachman's warblers nest in spring, following spring flooding, between late March and early June. Information on courtship and pair bonding is lacking although, like other *Vermivora*, it is assumed this species is monogamous. In 1939, a male was observed displaying by flitting in low bushes and spreading his tail; since no female was noted, however, it is not known if this was a courtship display (Stevenson and Anderson 1994). All known nests have been located in dense undergrowth within a meter of the ground. Usual clutch size consists of three or four eggs, although clutches of five have occasionally been recorded. Although nest construction has not been observed, females are the only gender to have been observed carrying nesting material. Information on re-nesting or second broods is not available. It is not known if incubation duties are shared, however, females have been observed on nests. Nest parasitism has not been documented, but this species is likely subject to nest parasitism by brown-headed cowbirds (*Molothrus ater*) (Hamel 1995).

Hatchling descriptions and data, as well as age to fledging, and the nature and extent of parental care, are not available for this species. Both parents apparently feed young fledglings. No additional information is available regarding reproductive success or survivorship (Hamel 1995, Anderson 1996).

Males are known to defend a small (<1 ha) breeding territory and are assumed to breed in the first spring following hatching. Life span and lifetime reproductive success information are also unavailable (Hamel 1995).

Foraging

Information on food habits of Bachman's warbler is unavailable; however, an insect diet similar to other *Vermivora* is suspected. A 1924 record of five specimens from Alabama noted that stomach contents included the remains of caterpillars and a few fragments of Hymenoptera, probably ants (Howell 1932). Bachman's warbler appears to be a foliage gleaner; migrants have been

observed feeding on dead clustered leaves of hackberry (*Celtis laevigata*) and the terminal leaflets of other tree branches. These warblers have also been observed feeding on the wing in the manner of a flycatcher (Brewster 1891). Feeding behaviors appear rather slow and deliberate, with the birds sometimes hanging upside down from the branches (Brewster 1891). In migration, they may foliage glean high in canopy habitats. Brewster (1891) describes abundant flocks of migratory birds feeding high in cypress (*Taxodium* spp.) trees in the Suwannee River.

Migration

Bachman's warbler is a neotropical migrant. Records indicate this species migrates southward in late summer and returns to the breeding grounds in early spring. One group of birds moves generally along the East Coast, and another skirts the Gulf Coast and continues up the Mississippi Valley. Birds migrating along the East Coast begin to move southward during July and apparently pass through Key West by early September. Historically, a good portion of these migrants funneled through the Florida Keys. There were numerous sightings of Bachman's warblers in Key West, and a record of 21 of the birds being killed in 1889, when they struck an offshore light at Sombrero Key, on the Atlantic Ocean side of Marathon, Florida. Others were reportedly killed by shotgun pellets in Key West (W. B. Robertson, Jr., former NPS and USGS/BRD biologist, personal communication 1998). Migration is believed to occur primarily at night (Howell 1932, Curson *et al.* 1994, Stevenson and Anderson 1994, Hamel 1995).

Relationship to Other Species

No information is available on predators of this species. Although suspected, nest parasitism by brown-headed cowbirds was never confirmed. Several observers noted that the Bachman's warbler displayed aggression toward other species of small passerines, although interspecific territoriality was never documented (Stevenson and Anderson 1994, Hamel 1995).

In migration, Bachman's warblers associated with other neotropical migratory birds including: prairie (*Dendroica discolor*) yellow-rumped (*D. coronata*), yellow-throated (*D. dominica*) and palm warblers (*D. palmarum*); northern parula (*Parula americana*); blue-gray gnatcatchers (*Polioptila caerulea*); tufted titmice and Carolina chickadee (*Parus bicolor* and *P. carolinensis*), red-eyed and solitary vireos (*Vireo olivaceus* and *V. solitarius*), ruby-crowned kinglets (*Regulus calendula*), Carolina wrens (*Thryothorus ludovicianus*), catbirds (*Dumetella carolinensis*), brown thrashers (*Toxostoma rufum*), and towhees (*Pipilo erythrophthalmus*) (Brewster 1891, Stevenson and Anderson 1994).

Status and Trends

Although Bachman's warbler was first described in 1833, it remained relatively unnoticed for the next 50 or so years. Population estimates are qualitative in nature and range from rare to abundant. Bachman's warbler was, at one time, the seventh most common migrant along the lower Suwannee River (Brewster 1891, World Wildlife Fund 1990, Ehrlich *et al.* 1992, Hamel 1995). A dramatic decline

occurred between the early 1900s and 1940 or 1950. Recognition of this decline resulted in the need to list the species in 1967 with the original listing of threatened and endangered species under the Endangered Species Preservation Act of 1966 (32 FR 4001; 35 FR 8495).

Current population numbers are not known. Between 1975 and 1979, an exhaustive search was conducted in South Carolina, Missouri, and Arkansas. No Bachman's warblers were located (Hamel 1995). The last sighting in Florida was from a single bird observed near Melbourne in 1977. The last confirmed sighting anywhere in the U.S. was in Louisiana in August of 1988 (Curson *et al.* 1994, Stevenson and Anderson 1994, Hamel 1995, Anderson 1996). Based on these records, it is widely believed that Bachman's warbler is either extinct or on the verge of extinction.

Various theories have been postulated to explain the population trends of Bachman's warbler and the causes of decline during the late 19th and early 20th centuries. Bachman's warbler may have historically been rare; however, with the advent of logging in the Mississippi alluvial valley new breeding areas for the species may have been created. This creation of additional breeding habitat may have resulted in an increase in the species' population between the late 19th and early 20th centuries. Subsequent, additional land clearing and development activities in the Mississippi alluvial valley from the 1920s on may have destroyed these breeding areas, resulting in a population decline. Concurrently, land clearing activities in Cuba may have exacerbated the situation by limiting wintering habitat for this species. It is also theorized that severe hurricanes may have killed many Bachman's warblers, rendering it difficult for the remaining breeding birds to locate one another (Hamel 1995).

Another theory on the decline of Bachman's warbler involves destruction of wintering habitat in Cuba. Loss or alteration of wintering habitat apparently increased winter mortality, resulting in lower numbers of breeding birds (Anderson 1996). Others theorize that Bachman's warbler requires specific cane habitat for nesting, and the loss of this vegetative community led to a severe decline (Stevenson and Anderson 1994, Hamel 1995, Anderson 1996). It is doubtful that the factors causing the decline of this diminutive migratory species will ever be clearly identified.

With little information available on the life history and ecology of this species, and no recent occurrence records, it is difficult to identify management actions. Urbanization has not slowed significantly since the Bachman's warbler was first noted to be in decline. Alteration or loss of breeding and wintering habitats undoubtedly have had adverse effects, although these are difficult to quantify. The lack of known migratory habitat or vegetation associations also hampers potential management and protection efforts. Threats reported from the late 1800s included collisions with lighthouses. Although no collisions have been reported in this century (Stevenson and Anderson 1994, Hamel 1995), it is possible that some mortality from collisions with microwave towers or similar structures could occur.

Perhaps the greatest threat to the species is its large historic breeding range and low population size. With population numbers presumed to be abysmally low, it will be difficult, if not impossible for breeding birds to find mates. This alone could lead to its eventual extinction.

Management

No recovery plan exists for this species. The lack of information on the ecology of the species, or on any recent records of occurrence, have resulted in limited recovery efforts. A habitat enhancement project was undertaken on the Francis Marion National Forest in South Carolina, but no birds were found in the enhanced or surrounding areas. No management of wintering habitat has been undertaken.

Researchers believe that the habitat near this bird's last known nesting sites may have improved after Hurricane Hugo since the forest canopy was removed from many areas. However, no confirmed breeding records have been reported from this area of South Carolina or other historically used areas since the mid-1960s. Several sightings were made on Cuban wintering grounds during the late 1980s (Curson *et al.* 1994).

Since Florida is outside the breeding area, and only affords migrants stopover opportunities, identification of important stopover sites would be the most valuable conservation measure to employ. To undertake this, however, more information on the types of habitat preferred during migration stops is needed.

Literature Cited

- American Ornithologists' Union. 1983. Checklist of North American birds. Sixth Edition. Allen Press; Lawrence, Kansas.
- Anderson, B.H. 1996. Bachman's warbler. Pages 124-127 in J.A. Rodgers, H.W. Kale, and H.T. Smith, eds. Rare and endangered biota of Florida, volume V: Birds. University Press of Florida; Gainesville, Florida.
- Brewster, W. 1891. Notes on Bachman's warbler (*Helminthophila bachmani*). Auk 8:149-157.
- Curson, J., D. Quinn, and D. Beadle. 1994. Warblers of the Americas, an identification guide. Houghton Mifflin Company; New York, New York.
- Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1992. Birds in jeopardy. Stanford University Press; Stanford, California.
- Hamel, P.B. 1995. Bachman's warbler (*Vermivora bachmanii*). No. 150. in A. Poole and F. Gill, eds., The birds of North America. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and the American Ornithologists' Union; Washington, D.C.
- Hamel, P.B. and S.A. Gauthreaux, Jr.. 1982. The field identification of Bachman's warbler (*Vermivora bachmanii* Audubon). American Birds 36(3):235-240.
- Hooper, Robert, and Paul B. Hamel. 1976. Nesting habitat of Bachman's warbler--A review. Unpublished report for the United States Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; Clemson, South Carolina.
- Howell, A.H. 1932. Florida bird life. Coward-McCann, Inc.; New York, New York.
- Robertson, W.B., Jr. 1998. Comments on technical/agency draft multi-species recovery plan for South Florida. August, 1998.
- Stevenson, H.M. and B.H. Anderson. 1994. Birdlife of Florida. Pages 539-540. University Press of Florida; Gainesville, Florida.
- Terres, J.K. 1980. The Audubon Society encyclopedia of North American birds. Alfred A. Knopf; New York, New York.
- World Wildlife Fund 1990. Pages 712-713 in Mathews, J.R. ed., The official guide to endangered species of North America. Beacham Publishing, Inc.; Washington, D.C.

Recovery for the Bachman's Warbler

Vermivora bachmanii

Recovery Objective: NOT AVAILABLE (no recovery plan for this species)

South Florida Contribution: CONDUCT SURVEYS during the migration

Recovery Criteria

The best scientific information available raises questions about whether the Bachman's warbler still exists in South Florida or elsewhere. Unless new information demonstrates that the Bachman's warbler still exists and continues to migrate in South Florida or that they could be re-introduced into South Florida, no recovery criteria will be developed or proposed.

Species-level Recovery Actions

S1. Determine the distribution and status of the Bachman's warbler in South Florida.

- S1.1. Conduct surveys for the Bachman's warbler after identifying potentially suitable migratory habitat for this species.

