**Bachman’s sparrow state-wide status assessment**

Introduction

The Bachman’s sparrow (*Peucaea aestivalis*) is a NC Wildlife Action Plan priority species, is state-listed as Special Concern in NC, and is a high priority in SE Partners in Flight plans. According to the USGS Breeding Bird Survey, this species has experienced a range-wide annual decline of -3.1% (95%CI: -4.1, -2.1) since 1966 (Sauer et al. 2012). Anecdotal evidence has suggested a range contraction in NC. A state-wide status assessment has not previously been conducted for this species.

In the mid-1900s, Bachman’s sparrows ranged as far north as Illinois, Indiana, Ohio, and Pennsylvania (Dunning 2006). The species has been extirpated from the northern third of its range in recent decades, and North Carolina likely represents the current northernmost extent of the range on the east coast.

The species was historically reported as utilizing a variety of early successional habitats with a lush herbaceous understory, including open pine woodlands, clearcuts, old fields, and power line rights of way (Haggerty 1986, Dunning and Watts 1990, 1991, and Dunning et al. 2000). Recent anecdotal evidence has suggested that Bachman’s sparrows are primarily only found presently in fire-managed longleaf pine woodlands.

This study was initiated in 2011 with the following objectives:

1. Determine the present distribution of potential habitat areas within the historic range of Bachman’s sparrow in North Carolina
2. Determine the present state-wide breeding distribution and relative abundance of Bachman’s sparrow in North Carolina
3. Document habitat associations of Bachman’s sparrow in NC
4. Provide technical guidance to landowners and land managers with potential to support Bachman’s sparrow
5. Develop a state-wide conservation plan for Bachman’s sparrow

Methods

The current Bachman’s sparrow distribution and status is being assessed across the historic range in North Carolina. This range was defined by the GAP predicted distribution and historic records. Historic records were compiled from the NC Natural Heritage Program, NC Museum of Natural Sciences, NC Wildlife Resources Commission (NCWRC), US Forest Service, US Fish and Wildlife Service, US Geological Survey Breeding Bird Survey, North Carolina State University, and ebird.

Surveys are conducted at 3 types of points. One is historic Bachman’s sparrow observations from 2005 or before (records from 2006 to present are assumed to still be extant). The second is potential Bachman’s sparrow habitat areas identified in GIS. The third is locations with high potential habitat identified in the field and not otherwise selected by GIS or historic records.

To select survey points in GIS, the historic range was divided into 1,482 grids using 3,952 ha (9,765 ac) US Geological Survey quarter quads. These grids were examined in GIS using 2011 aerial photography and data layers which may indicate the presence of Bachman’s sparrow habitat. One layer was the NC Natural Heritage Program’s Wet-Xeric Longleaf-Wiregrass Woodland landscape habitat indicator guild. This layer represents areas where there are records of indicator species closely associated with longleaf woodland habitat as well as contiguous areas with suitable habitat. We also used the Potential Upland Habitats layer created by the NC Sandhills Conservation Partnership which indicates areas identified by aerial photographs which appear to have longleaf pine trees and no evidence of ground disturbance, such as bedding, but those sites had not been ground-truthed. Finally, we used the GAP predicted distribution for Bachman’s sparrow. We used the NC Natural Heritage Program’s Managed Areas layer to indicate which properties (both public and private) may be more likely to be managed for wildlife habitat.

For all these data layers and for other areas within the selected grids, we examined the aerial photograph at approximately a 1:12,000 to 1:16,000 scale and assessed whether there appeared to be open pine woodland, clearcut, old field, or powerline right-of-way habitat. In locations where there appeared to be potential habitat in a patch of at least ~50 acres (we adjusted the patch size threshold depending on landscape context), we placed a survey point, regardless of land ownership. We attempted to place points in locations where we could maximize detection of birds in the patch, and also to facilitate access. Points were placed at least 500m apart, up to a maximum of 16 points per grid.

We randomly selected 25% of the grids in the eastern Piedmont, Sandhills and southern Coastal Plain to initially assess for potential habitat. We later assessed all the remaining grids in the Sandhills and Southern Coastal Plain plus some additional grids in the eastern Piedmont that had the highest potential for habitat. The later assessment was informed by the results of our initial survey work. The earlier assessment of randomly selected grids was more inclusive of potential habitat areas while the later assessment was more discriminatory and avoided smaller habitat patches and those that were more likely to have marginal habitat.

As of January 2014 we identified xxxx potential survey points. X points had clearcut habitat within 200m, x points had powerline habitat, and x points had open pine woodland habitat. A point could have more than one habitat type within 200m.

We secured permission to survey from public land managers and reached out to a total of 270 private landowners via letters and personal contacts. Overall, 139 private landowners granted permission, 29 denied permission, and we got no response from 102.

Personal contacts was the most effective way of securing private landowner permission. We asked permission via phone and in person from landowners that we know and asked permission through other natural resource professionals with landowner relationships. We had particular success with the US Fish and Wildlife Service Safe Harbor program and the NCWRC Corporate Cooperative Upland habitat Restoration and Enhancement (CURE) program. These 71 personal contacts yielded 63 yes (89%), 4 no (6%), and 4 no response (6%).

We sent out letters to 199 landowners and 76 of them (38%) granted us permission to conduct a survey, 25 denied permission (13%), and 98 had no response (49%). In the Southern Coastal Plain we followed up with email or phone calls to non-respondents, and this increased our response rate. We sent 97 letters and had a total of 43 (44%) landowners grant permission, 18 (19%) say no, and 36 (37%) no response. In the Sandhills we did not follow up with every non-respondent. We sent 102 letters and 33 (32%) landowners said yes, 7 (7%) said no, and 62 (61%) no response.

We ground-truthed the habitat at points for historic Bachman’s sparrow locations and GIS selected points which were publically accessible or where we had permission. Point count surveys were conducted at points with suitable habitat, defined as at least 4 acres within view with >20% native herbaceous groundcover (“clump grasses” and forbs) >10 inches tall. If better habitat was present nearby the point could be moved up to 150m to maximize coverage of good habitat. For points that were rejected due to insufficient habitat, we recorded the reasons (e.g. closed canopy, fire suppression, land use change, etc).

While in the field, if we encountered a large patch of high quality habitat >500m from other survey points, a point was added in the field. We took a digital photo of each survey point (including rejected points) showing a representative image of the habitat available.

Point count surveys were conducted between first light and 11:00am on mornings without precipitation, and wind <10mph**.** The survey consisted of 4 minutes of passive listening followed by a 4 minute period of Bachman’s sparrow song interspersed with silence, with aggressive chip notes and song played at the end. In addition to Bachman’s sparrows, we also recorded counts of 7 other priority species associated with fire-managed longleaf pine habitat (Table 1).

Results

The placement of points combined with on-the-ground habitat assessment provides an index of potential habitat across the range. The greatest amount of potential habitat is in the Sandhills region around Fort Bragg and Sandhills Game Land (Figure 1). A band of potential habitat goes from SE Cumberland Co to southern Pender Co where another band of potential habitat runs along the immediate inland area of the southern coast. A scattering of potential habitat remains in the Eastern Piedmont, but most of this consists of small habitat patches with relatively low potential for Bachman’s sparrow. This habitat mapping exercise reveals that very little potential habitat remains in southern upper coastal plain (centered around Robeson & Columbus Counties) or the upper central coastal plain (Sampson and counties and north) while potential habitat is patchily distributed along the coast. This raises concerns over habitat connectivity and the ability of remaining Bachman’s sparrow populations to disperse across the landscape and find new habitat patches.

Figure 1. Potential habitat assessment for Bachman’s sparrow.

We visited x survey points placed in GIS to assess the presence of suitable habitat on the ground. Of the x points, we rejected x (48%). Of the points we rejected, x (x%) had problems with access or excessive road noise, while x (x%) were rejected because of insufficient habitat. Of the x points with insufficient habitat, x (x%) had a dense midstory, x (x%) had a closed canopy, x (x%) had been converted to an incompatible land use, x (x%) had recently been burned, x (x%) had recent ground disturbance, and x (x%) had additional reasons to reject, ranging from habitat patch size being too small, recent forestry activity, and other misc. reasons for insufficient ground cover (note that many points had multiple reasons for being rejected so totals do not sum to 100%).

We visited x historic locations (sparrow records older than 2006). x of the x locations (x%) no longer had suitable habitat. We detected sparrows at x of the historic locations for a minimum persistence of x%. Since we were more interested in persistence of a sub-population than persistence at a given point, we assessed whether there was a recent observation within 5 miles of each historic record. By this standard x of x historic locations had a recent observation within 5 miles. The historic records that appear to have been extirpated fall primarily on the outside edges of the distribution in NC, including the northern fall line, Triangle region, SE Piedmont, and the SW and NE edges of the lower southern coastal plain (Figure 2).

We detected sparrows at 45 out of 275 (16%) points placed in GIS and we detected sparrows at 3 out of 58 (5%) field-added points. All together, we detected a total of 81 Bachman’s sparrows at 56 of the 363 (15%) points surveyed (average 0.22 sparrows detected per point surveyed, range 0-3). The most sparrows were detected in the Sandhills region and none in the Piedmont. The majority of these observations were on managed lands, including Sandhills Game Land, Suggs Mill Pond Game Land, Camp Mackall, Fort Bragg, Weymouth Woods State Nature Preserve, Croatan National Forest, and two different preserves managed by The Nature Conservancy.

A few Bachman’s sparrows were found on private land in longleaf thinned heavily in advance of development construction with a broomstraw (*Andropogon* spp) dominated understory- two instances in Moore Co and another in Brunswick Co.

Several Bachman’s sparrows were detected on the Moss Foundation, a large privately owned longleaf forest in Moore County managed with fire for equestrian activities and enrolled in the Safe Harbor program. Bachman’s sparrows were detected on x additional private properties managed with fire under the Safe Harbor program.

X of x sparrow observations (91%) with habitat data were in longleaf pine forest, the other 7 (x%) were in other pine woodlands. We observed one sparrow in a clearcut/young loblolly plantation which had been burned the year before. Other than that, there were no observations in clearcut, old field, or powerline habitats. X of x (91%) sparrow observations with fire history data were at locations with evidence of recent fire (i.e. fire scars on trees, wiregrass flowering, or other evidence of fire within the last ~4 years).

We surveyed many private land locations where herbaceous ground cover was present but no Bachman’s sparrows were detected, including quite a few sites close to (<5 miles) existing sparrow populations. In most of these cases the herbaceous groundcover was created by mechanical means (timber cutting, mowing, etc) and very few are managed with fire. Most of the locations where Bachman’s sparrows were found are managed with fire, and it may be that fire plays a critical role in altering micro-habitat conditions, such as litter depth.

The most abundant of our “secondary species” was prairie warbler which was found at 192 out of 350 points (55%) with an overall average of 0.99 birds detected per point (range 0-6, Table 1). The next most commonly detected of our secondary species was brown-headed nuthatch, detected at 119 points (34%) with an average of 0.49 birds detected per point (range 0-5, Table 1). Red-cockaded woodpecker was detected at 10 points (9 in the Sandhills and 1 in the Southern Coastal Plain).

Table 1. Secondary species observed during 8 minute point count: average number of birds detected per point in 2012. PRAW = prairie warbler, BHNU = brown-headed nuthatch, NOBO = northern bobwhite, RHWO = red-headed woodpecker, FISP = field sparrow, RCWO = red-cockaded woodpecker, LOSH = loggerhead shrike.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Region | # points | PRAW | BHNU | NOBO | RHWO | FISP | RCWO | LOSH |
| Piedmont | 43 | 0.721 | 0.233 | 0.047 | 0.023 | 0.186 | 0.000 | 0.000 |
| Sandhills | 284 | 0.996 | 0.542 | 0.268 | 0.225 | 0.158 | 0.049 | 0.004 |
| Southern Coastal Plain | 23 | 1.478 | 0.348 | 0.217 | 0.261 | 0.000 | 0.043 | 0.000 |
| Grand Average | 350 | 0.994 | 0.491 | 0.237 | 0.203 | 0.151 | 0.043 | 0.003 |

We sent letters to over 100 private landowners detailing the results of the survey, offering suggestions for enhancing habitat on their property, and providing a list of resources for technical and financial assistance for landowners. So far at least one landowner has acted on our suggestions for habitat improvement, several are planning to continue beneficial practices that they already started, and several others have asked for more information or are considering our recommendations.

Plans for 2014 include analyzing data, presenting preliminary results to multiple stakeholders, completing the state-wide status assessment in the spring of 2014, and starting a conservation/recovery plan.

Literature Cited

Dunning, John B. 2006. Bachman's Sparrow (Peucaea aestivalis), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/038>; [doi:10.2173/bna.38](http://dx.doi.org/10.2173/bna.38)

Dunning and Watts 1990

Dunning and Watts 1991

Dunning et al. 2000

Haggerty 1986

Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. 2012. The North American Breeding Bird Survey, Results and Analysis 1966 - 2011. Version 07.03.2013 [*USGS Patuxent Wildlife Research Center*](http://www.pwrc.usgs.gov/), Laurel, MD

Appendix (analysis code)