Ohio Department of Natural Resources
DIVISION OF WILDLIFE

NORTHERN BOBWHITE POPULATION STATUS REPORT

October 2021

Summary

Ohio's remaining quail populations are highly fragmented with two main populations in 1) Preble and Butler counties and 2) Adams, Brown, Clinton, and Highland counties. Small population fragments can be found in Fayette, Ross, Jackson, Lawrence, and Gallia counties. In 2021, the bobwhite quail population estimate was 2,700 (95% confidence interval: 1,600–4,600). Since 2011, the quail population has declined 71%, an annual rate of decline of 11.5%. Population densities across southern Ohio averaged approximately 1 quail per 100 acres. Densities of 20 quail per 100 acres need to be maintained to withstand any harvest (Guthery et al. 2000).

Introduction

Northern bobwhite quail (*Colinus virginianus*; "quail" hereafter) are a species of game bird native to Ohio. Quail were not likely abundant prior to settlement by Europeans. Early agricultural practices implemented by European-American settlers after forests were cleared likely created conditions suitable for robust populations of quail in Ohio. However, changes in agricultural practices and habitat loss over the past 75 years are suspected to be the primary causes of decline of this popular game bird. Continued monitoring of quail populations in Ohio helps to inform and guide conservation efforts targeted toward this species.

Methods

Division of Wildlife staff completed 147 roadside survey routes among 13 counties in southern Ohio in 2021 (Fig. 1). These randomly selected routes consisted of six survey stops each and were conducted from mid-May to late June annually. Staff recorded quail seen or heard during each of four, one-minute survey intervals. A hierarchical distance sampling framework was used to investigate factors influencing abundance and we used the 'gdistsamp' function in the package *unmarked* in program R, version 4.1.1 (Fiske and Chandler 2011, Chandler et al. 2011, R Core Team 2021, Royle et al. 2004). Because most quail observations were of whistling males, population estimates based on whistle counts were doubled, assuming a 1:1 sex ratio in the population.

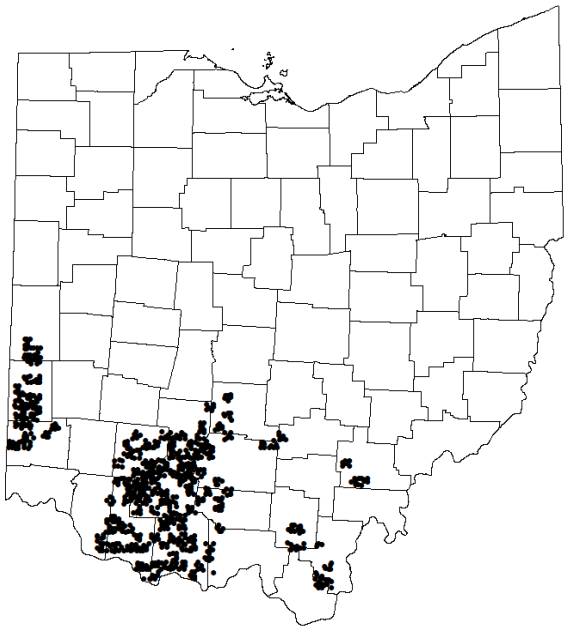


Figure 1. Quail survey distribution in southern Ohio, 2021. Each black dot represents one stop location.

Quail counts (males/stop) were used to develop predicted abundance maps for comparison to similar maps generated by Spinola and Gates (2008). To develop this range, we used the *automap* package in R (Hiemstra et al. 2009; R Core Team 2021), which fit an interpolated surface to the number of detected quail across the surveyed area in Ohio. This output was then overlayed on a map of Ohio counties.

Results and Discussion

A total of 146 quail were detected among 884 route stops, for an index of 0.17 quail/stop. Distance sampling analysis estimated an average density of 0.012 male quail/ha (95% confidence interval: 0.007–0.020; 0.005 quail/acre) across Ohio's occupied quail range. Accounting for a 1:1 sex ratio and assuming all males are paired yields an average estimated density of 0.023 quail/ha (95% confidence interval: 0.014–0.039; 0.01 quail/acre). The occupied range of quail in Ohio was estimated to be 116,000 ha (286,642 acres). Therefore, the estimated statewide quail population in 2021 was 2,700 quail (95% confidence interval: 1,600–4,600).

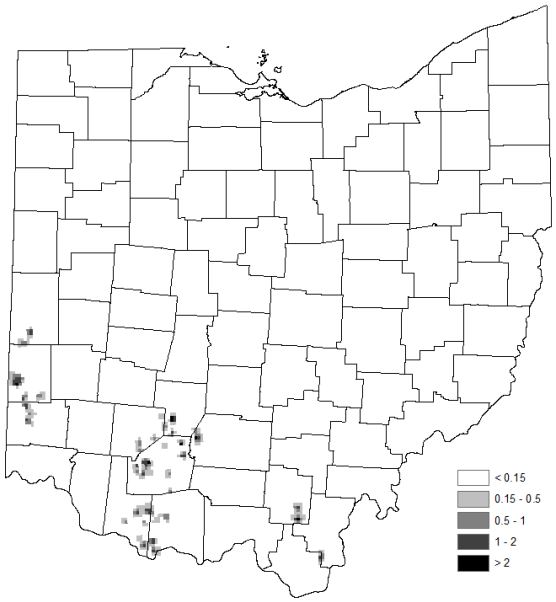


Figure 2. Map of bobwhite index of abundance (individuals heard per stop) during 2021 in Ohio

The quail distribution in Ohio is largely composed of small population fragments, with few core populations remaining (Fig. 2). Measurable populations remain in three core areas: southwest Ohio (Darke, Preble, and Butler counties), south-central Ohio (Clinton, Fayette, Ross, Highland, Adams, and Brown counties), and southeast Ohio (Jackson, Lawrence, and Gallia counties). The predicted distribution suggests the population has become more fragmented since 2017 (Appendix 1).

The statewide population estimate of quail in The Second Atlas of Breeding Birds in Ohio was 9,200 (95% confidence interval: 8,700–10,100; Rodewald et al. 2016). In a decade, Ohio's quail population has decreased 71%, or an average decline of 11.5% each year. The decline is likely a result of continued habitat loss and degradation. Research suggests that harvest can be maintained on quail populations when there is an average of 20 quail/100 acres (Guthery et al. 2000). In 2021, there was an average of 1 quail/100 acres in Ohio.

Efforts to improve quail habitat should be focused in areas where quail exist in Ohio. Quail populations are limited by severe weather within Ohio and the upper Midwest. Working to provide brushy cover that provides shelter during snow and ice events is critical to remaining quail populations. Additionally, providing fields with sufficient grass cover provides suitable nesting cover. Areas with bare ground and forbs (i.e., wildflowers) provides cover for quail with broods. Placing suitable cover for broods in proximity to nesting cover will assist in chick survival. The National Bobwhite Conservation Initiative recommends a minimum habitat goal of 1,500 acres of intensively managed quail habitat, or 25% of an area 6,000 acres or larger, to achieve minimum viable quail densities (NBCI 2015).

References

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Appendix 1. Historic predicted distribution of northern bobwhite in Ohio.



Figure A1. Map of bobwhite index of abundance (individuals heard per stop) during 2014-2017 in Ohio.

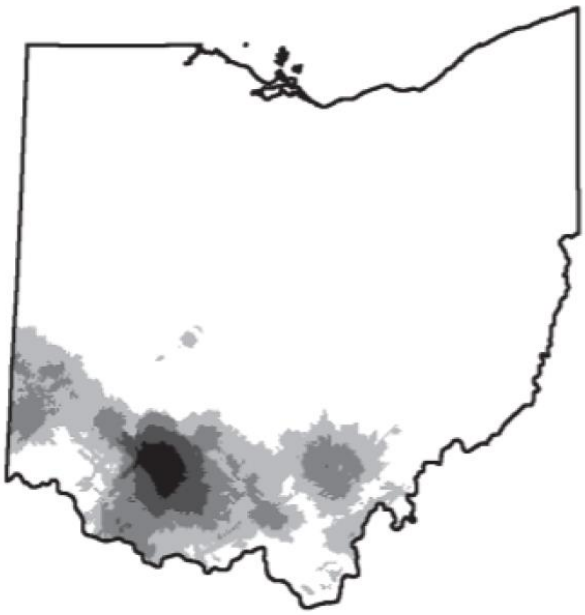


Figure A2. Map of bobwhite index of abundance (individuals heard per stop) during 2002 in Ohio (from Spinola and Gates 2008).