Ohio Department of Natural Resources
DIVISION OF WILDLIFE

CROWN CITY WILDLIFE AREA NORTHERN BOBWHITE POPULATION STATUS REPORT

June 2025

Summary

Crown City Wildlife Area supports the largest known population of northern bobwhite quail (*Colinus virginianus*) on public lands in Ohio. Staff from the Ohio Division of Wildlife have monitored the northern bobwhite population annually using roadside surveys conducted in late spring and early summer. Assuming a 1:1 sex ratio, the 2025 spring population estimate for Crown City Wildlife Area was 159 northern bobwhite (95% confidence interval [CI]: 88–287 northern bobwhite).

Introduction

Crown City Wildlife Area is a reclaimed strip mine located in Lawrence and Gallia counties in southeastern Ohio, owned and managed by the Ohio Division of Wildlife. Like all wildlife areas in Ohio, Crown City Wildlife Area is managed for all species of wildlife and to provide opportunities for wildlife recreation. Northern bobwhite are a species of upland game bird native to Ohio. Like many species of grassland dependent wildlife, northern bobwhite have undergone substantial population declines throughout Ohio and much of the eastern United States. Crown City Wildlife Area hosts the largest known population of northern bobwhite on public land in Ohio. Much of the management on Crown City Wildlife Area is targeted to maintain and enhance grasslands, which is believed to benefit the northern bobwhite population. Ohio Division of Wildlife staff have annually surveyed the northern bobwhite population at Crown City Wildlife Area since 2019.

Methods

Division of Wildlife staff established 25 roadside survey stops within Crown City Wildlife Area, following protocols established by the National Bobwhite and Grasslands Initiative (Morgan et al. 2014). These randomly selected survey stops are at least 200 meters apart. Surveys were conducted annually from 15 May to 30 June between 30 minutes before sunrise and four hours after sunrise. Each stop was visited three times in all years, except 2020 when each stop was visited twice. Staff recorded all northern bobwhite seen or heard during each five-minute survey. Staff estimated the distance to each northern bobwhite observed.

To estimate population density and abundance, Ohio Division of Wildlife staff used a distance sampling framework and the Distance package for R, version 4.3.3 (Miller et al. 2019, R Core Team 2024). We removed the farthest 10% of observations to obtain a better model fit (Buckland et al. 2001). Then, we fit hazard rate, half-normal, and uniform detection keys. Akaike's Information Criterion and model weights were used to rank and select the top-ranked model. We used a Cramer-von Mises test and a chi-squared test to assess model goodness-of-fit. All northern bobwhite observations were of whistling males. Therefore, we assumed that there was a 1:1 sex ratio in the population and doubled the density estimates. The adjusted density estimate was then multiplied by the predicted area of northern bobwhite habitat within Crown City Wildlife Area to estimate the population size.

Results and Discussion

Ohio Division of Wildlife staff recorded 82 total northern bobwhite observations in 2025 across all visits (visit 1: 13; visit 2: 39; visit 3: 30). The half-normal key function was selected as the model of best fit. In 2025, the estimated northern bobwhite density on Crown City Wildlife Area was 5.7 male northern bobwhite/km^2 (2.2 male northern bobwhite/mi^2; 0.023 male northern bobwhite/acre; 95% confidence interval [CI]: 3.2–10.4 male northern bobwhite/km^2) across Crown City Wildlife Area. Accounting for a 1:1 sex ratio yields an estimated density of 11.5 northern bobwhite/km^2 (29.8 northern bobwhite/mi^2; 0.047 northern bobwhite/acre; 95% CI: 6.4–20.8 northern bobwhite/km^2). There was an estimated 13.83 km^2 (5.34 square miles; 3,417.5 acres) of northern bobwhite habitat at Crown City Wildlife Area. Extrapolating the density estimate to the entire area yields a population estimate of 159 northern bobwhite (95% CI: 88–287) on Crown City Wildlife Area (Fig. 1).

Overall, the population of northern bobwhite seems to be stable to increasing on the wildlife area. The spring population estimates suggest that populations at Crown City Wildlife Area vary annually.

Beginning in 2022, encroaching woody vegetation, primarily autumn olive and black locust, was treated with herbicide to create more grassland habitat on the wildlife area. Reducing shrub and tree encroachment on the wildlife area allows for additional nesting cover. Northern bobwhite are limited by extreme winter weather events, especially the duration of snow cover, in the northern portion of their range (Janke et al. 2017). Continued monitoring of the Crown City northern bobwhite population will allow for a better understanding of the effects of management and winter conditions on this small population.

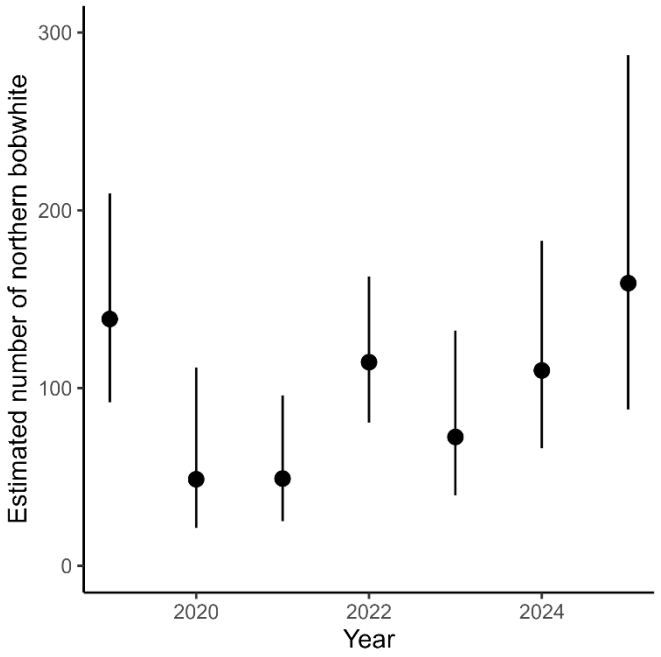

Figure 1. Total estimated abundance of northern bobwhite, assuming a 1:1 sex ratio, from 2019–2025 at Crown City Wildlife Area, Gallia and Lawrence counties, Ohio. Shown with 95% confidence limits.

References

Buckland, S.T., D.R. Anderson, K.P. Burnham, J.L. Laake, D.L. Borchers, and L. Thomas. 2001. Introduction to distance sampling. Oxford University Press. New York. 432 p.

Janke, A.K., T.M. Terhune, R.J. Gates, and C.R. Long. 2017. Northern bobwhite population responses to winter weather along their northern range periphery. Wildlife Society Bulletin 41:479–488.

Miller, D.L., E. Rexstad, L. Thomas, L. Marshall, and J.L. Laake. 2019. Distance sampling in R. Journal of Statistical Software 89:1–28.

Morgan, J. P., K. Duren, and T.V. Dailey. 2014. NBCI Coordinated Implementation Program. Addendum, The National Bobwhite Conservation Initiative: A range-wide plan for recovering bobwhites. National Bobwhite Technical Committee Technical Publication, ver. 2.0. Knoxville, TN. Available: https://nbgi.org/

R Core Team. 2024. R: A language and environment for statistical computing. R Foundation For Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.