Ohio Department of Natural Resources
DIVISION OF WILDLIFE

# RING-NECKED PHEASANT POPULATION STATUS REPORT

October 2021


## Summary

Annual roadside crow-count surveys are used to estimate Ohio's pheasant population. In 2021, survey results estimated a statewide population of 2,820 (95% confidence interval: 1,320–11,580) male (rooster) pheasants. Pheasant populations are highly fragmented with highest concentrations found in south-central Ohio. Current population estimates represent a significant range contraction and an approximate 90% decline in Ohio pheasant numbers reported a decade ago. Habitat models revealed that efforts to increase CRP continue to be the best approach to support remaining populations.


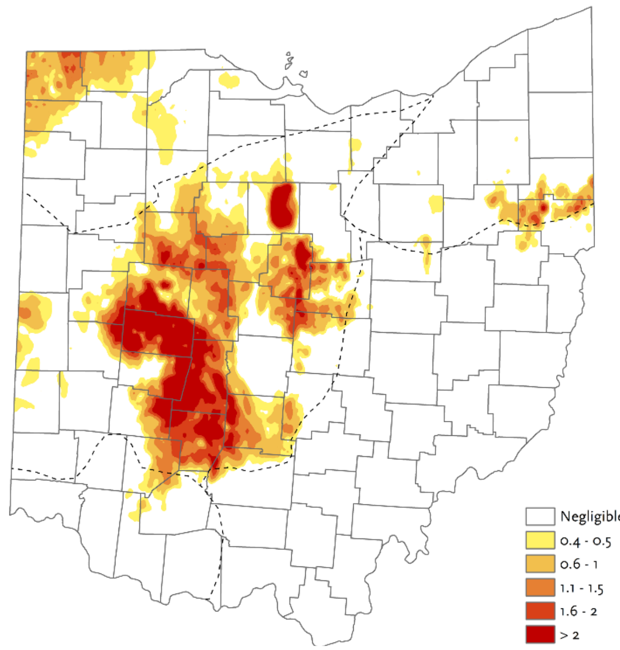


**Figure 1. Ring-necked pheasant distribution in 2010 from The Second Atlas of Breeding Birds in Ohio (Rodewald et al. 2016; used with permission).**

## Introduction

Ring-necked pheasants (*Phasianus colchicus*; "pheasants" hereafter) were introduced to Ohio in the late 1800s and have since become a popular game bird. Pheasant populations peaked in the 1930s and 1940s, after which these birds experienced long-term declines (Leedy and Laub 1987). Primary causes for pheasant population declines are primarily attributed to changing agricultural practices and habitat loss. Continued monitoring of pheasant populations in Ohio helps to inform and guide conservation effort of this species.

## Methods

Division of Wildlife staff annually complete spring roadside pheasant crow-count surveys. New survey routes were designed and implemented during 2020 and 2021. To establish survey routes, we first overlaid the state with a 6 x 6 km blocks. Each 6 x 6 km block was subdivided into 2 km x 2 km cells, for a total of 9 cells for each block. Route blocks were selected using a random number generator (each route block has an assigned number). For each randomly selected route block, the 9 cells were assigned a random number (1–9). The first 6 stops (in numerical order) that had a safe roadside area to survey were included on the route. Route stops were placed on roads with lower traffic levels

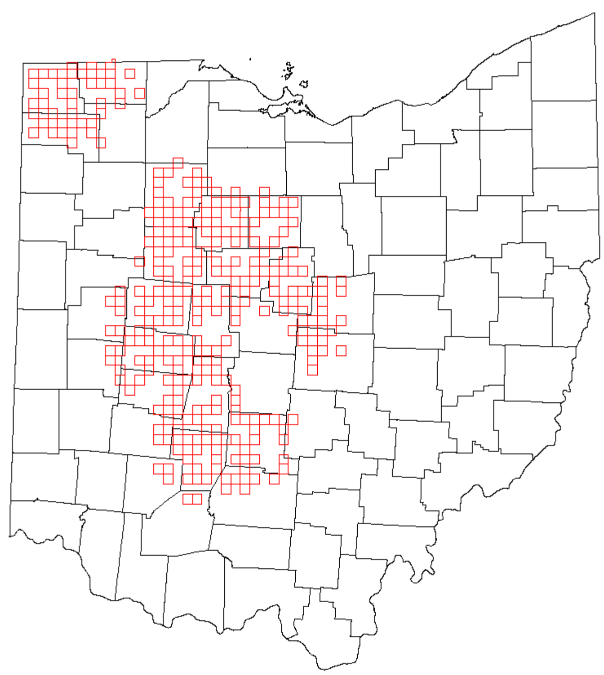

**Figure 2. Distribution of ring-necked pheasant roadside survey routes in Ohio during 2020 and 2021. Survey locations are in red.**

(for example, state and federal highways were avoided) to ensure the safety of observers and reduce instances of noise from passing traffic. We then focused routes on the estimated distribution of pheasants in Ohio from The Second Atlas of Breeding Birds in Ohio (Fig. 1; from Rodewald et al. 2016), with an emphasis on central and northwest Ohio. We visited all route stops in 2018 and 2019 to ensure locations were safe. The number of routes selected for inclusion, meeting all the above criteria was 292 (1,764 stops; Fig. 2).

Roadside point-count surveys were conducted between 1 April and 15 May on 145 routes during 2020 and 2021. Point-count surveys began 40 minutes before local sunrise and were concluded by 90 minutes after sunrise. Each survey was 4 minutes in length, the time in which most pheasants will call at least once (Luukkonen et al. 1997). At each survey stop, we recorded date, start time, wind conditions, cloud cover, and whether or not there was dew, frost, or recent rain present. Surveys were not conducted when wind speeds exceeded 20 km/hr (12 miles/hr) or if there was precipitation. During the survey, we recorded the number of vehicles passing. If a pheasant was detected, we plotted the location of the individual on a map and measured the distance from the point to the individual in meters and recorded sex.

We assessed landscape features using the 2019 National Land Cover Database (NLCD; available: https://www.mrlc.gov/data) and land enrolled in the Conservation Reserve Program ("CRP" hereafter) in Ohio (Provided by the USDA Ohio Farm Service Agency). The CRP layer was rasterized to cell sizes of 30 $m^2$ (323 square feet) to match those from the NLCD. The CRP layer was reclassified into present or absent, while the NLCD was reclassified into seven categories: cropland (cultivated), developed (barren land, developed open space, developed low intensity, developed medium intensity, developed high intensity), grassland (herbaceous, pasture/hay), forest (deciduous forest, evergreen forest, mixed forest, woody wetlands), scrub/shrub (scrub/shrub), wetlands (emergent herbaceous wetlands), and open water (open water). We compiled the percent cover of CRP and the reclassified NLCD groups listed above within a 798 m (2,618 ft) radius, equivalent to an area of 2 $km^2$ (494 acres).

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). We used a stepwise selection process to develop abundance models. To estimate the effects of land cover on abundance, we first fit univariate models, taking the model with the best fit and adding 1 covariate at a time until we had a model containing 3 variables. To keep a covariate in the model, the beta value could not overlap 0 at the 85% confidence limits (Arnold 2010). To limit model overdispersion, detection was held constant during the modeling process. We used Akaike's Information Criterion corrected for a small sample size and model weights to rank models and identify the most parsimonious model for land cover covariates influencing pheasant abundance (Burnham and Anderson 2002). Following the identification of the most parsimonious model, percent land cover from the 2019 NLCD and percent CRP was summarized for a 2 $km^2$ grid across the estimated 2010 pheasant range from the Ohio Breeding Bird Atlas II. We then used the most parsimonious model to estimate pheasant abundance across the historic pheasant range using the 'predict' function in the *unmarked* package in R.

We created an estimated pheasant range by interpolating (through Kriging) a distribution using the raw pheasant counts. 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 pheasants across the surveyed area in Ohio. This output was then overlayed on a map of Ohio counties.

**Results and Discussion**

In 2020 and 2021, a total of 149 pheasants were observed among 1,752 stops statewide, with a statewide index of 0.09 pheasants per stop. From 2010 and 2021, the occupied wild pheasant range shrunk in area (Fig. 3). Pheasant populations are primarily concentrated in south-central Ohio, with

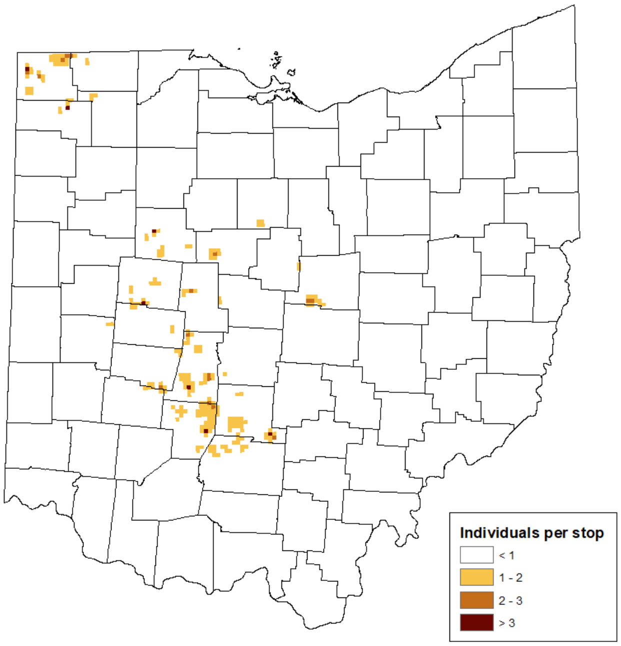


**Figure 3. Ring-necked pheasant distribution (Predicted number of pheasants/stop) developed using 2021 roadside surveys.**

isolated populations scattered throughout portions of central and northwest sections of the state. Based on locations of remaining populations in Ohio, pheasants likely rely heavily on public lands (e.g., wildlife areas and wildlife production areas managed for open grassland) and CRP, especially the Scioto River Conservation Reserve Enhancement Program, for habitat.

The most parsimonious model for pheasant abundance in Ohio included percent land cover of CRP, developed land, and forested land. Percent CRP increased pheasant abundance, whereas developed and forest lands decreased pheasant abundance (Table 1, Fig. 4). Using the most parsimonious abundance model from above, we estimate that there were 2,820 (95% confidence interval: 1,320–11,580) male pheasants in Ohio during 2021. Sex ratio may be skewed, because of regulations restricting harvest to males. Sex ratios among Ohio pheasant populations have not been estimated in over 5 decades. As a result, an estimate of total population size was not attempted.

Our surveys and analysis suggest that pheasant populations are highly fragmented within Ohio. Efforts to conserve pheasant populations in Ohio should target areas where populations remain, with an effort to connect pheasant populations that are nearby. Farm Bill programs, especially the CRP, continue to be the best tool to promote pheasant cover on private lands. Promoting Farm Bill programs within landscapes supporting wild pheasants will be critical to stabilizing the population within Ohio.

**Table 1. Mean standardized β coefficients and 85% confidence limits (CL) for factors influencing abundance of ring-necked pheasants within a 2 km² area in Ohio.**

| Variable | Value | 85% LCL | 85% UCL |
|---|---|---|---|
| Intercept | -7.48 | -7.76 | -7.20 |
| % CRP | 0.47 | 0.33 | 0.60 |
| % developed | -1.00 | -1.39 | -0.62 |
| % forest | -0.37 | -0.59 | -0.16 |
| Detection | -2.10 | -2.42 | -1.78 |

Public land managers with extant pheasant populations should work to combat woody encroachment in upland habitats and improve conditions in upland fields to maximize the cover for pheasants. Previous research suggests that female survival during the non-breeding season and chick survival are the most important demographic periods to population growth (Clark et al. 2008). Most public areas in Ohio with wild pheasants have ample dense grass, which provides over-winter cover, as well as suitable nesting cover. Efforts to increase forb diversity and cover and reduce grass density provide food resources and suitable cover for rearing broods. Improving woody corridors and wooded field borders by removing some mature trees and controlling invasive shrub species will provide brushy cover and may increase over-winter survival of female pheasants.

Our results also highlight research needs for pheasants in Ohio. Because of the fragmented nature of Ohio's pheasant population, research focused on pheasant dispersion and movement in a landscape with isolated patches of cover would be welcome. Additionally, most research investigating pheasant harvest were completed in past decades when pheasant populations were more robust. Revisiting some of this research may be warranted, given the current fragmented population within Ohio. More intensive surveys concentrated in areas with extant pheasant populations will better inform population estimates and provide a better idea of population fragmentation. Last, developing a cost-effective method to estimate pheasant sex ratios would help to improve our understanding of Ohio's pheasant population and allow for a more robust population estimate.

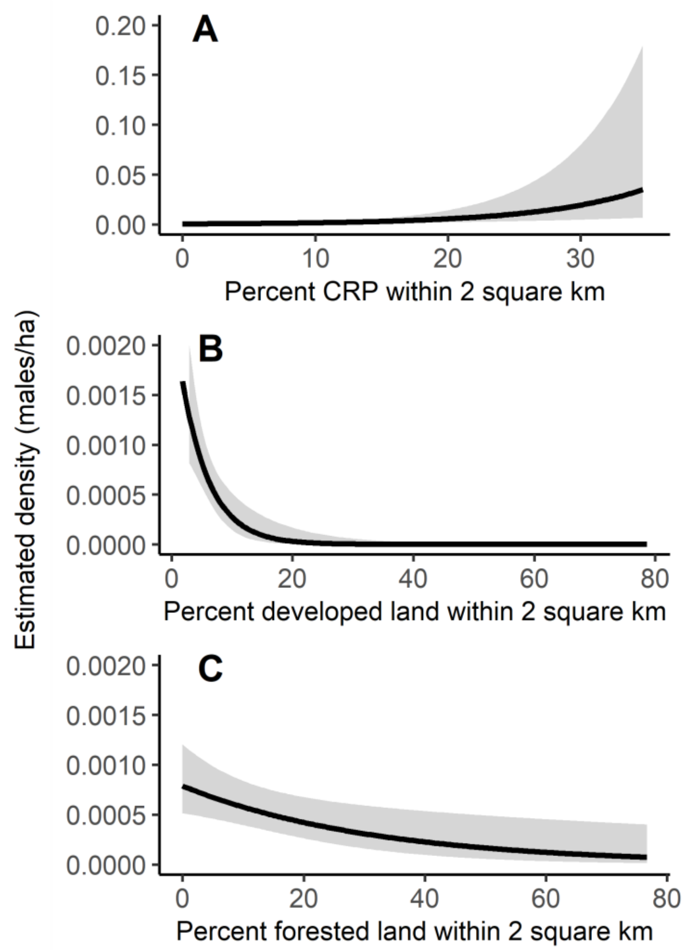


**Figure 4. Estimated ring-necked pheasant abundance for percent CRP (A), developed land (B), and forest land (C), while holding the other variables constant at the mean value. Gray shading indicates the 95% confidence interval.**

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