



2022–23 OHIO HUNTER QUESTIONNAIRE SUMMARY SMALL GAME ANALYSIS

June 2023

Summary

The Ohio Department of Natural Resources (ODNR) Division of Wildlife distributed a hunter questionnaire following the 2022–23 hunting season to a random sample of individuals with a valid Ohio hunting license. The number and proportion of respondents, estimated number of hunters, reported land use for each species, and reported and estimated total harvest are reported below for each species of small game in Ohio. This report is focused on small game species. White-tailed deer, wild turkey, and waterfowl are not covered in this report beyond hunter participation rates (Table 1).

Methods

Division of Wildlife staff identified 322,505 adult (i.e., ≥ 18 years old) license holders during the 2022–23 hunting season. However, not all active license holders had listed email addresses. Division of Wildlife staff found 255,696 active license holders with listed email addresses and selected 8,000 resident and nonresident license holders at random. Questionnaires were distributed via email through the survey software provider [Qualtrics](#) on March 1, 2023. Survey recipients were given 30 days to complete the survey. Individuals that had not completed the survey after one week received a reminder email. Questionnaires asked recipients about their 2022–23 hunting season. Questions included whether they hunted in Ohio, which species were pursued, how many days they hunted, and total harvest for each species.

Hunter participation and harvest estimates were generated using survey responses. To estimate hunter participation, we divided the number of participants that reported pursuing a species by the total number of responses. The proportion of respondents pursuing each species was then extrapolated to the number of active license holders (that includes annual, multi-year, and lifetime hunting licenses) in Ohio during the 2022–23 hunting season (Equation 1 in Appendix 1). Harvest was estimated by multiplying the estimated number of hunters with the mean annual harvest reported by respondents (Equation 2 in Appendix 1). For migratory bird species, estimates were computed separately for respondents registered to the USFWS Migratory Bird Harvest Information Program (HIP) and respondents that were not registered for HIP and then added together. Estimated flush rates of upland game birds and land usage were calculated by using the proportion of respondents answering respective questions. All estimates were resampled 5,000 times to bootstrap confidence intervals. All data analyses were conducted using Program R (version 4.2.2, R Core Team 2022).

Results and Discussion

While 8,000 license holders were randomly selected, questionnaires were only distributed to 7,674 recipients because some questionnaires were returned as undeliverable. Questionnaires were completed by 1,651 respondents, for a response rate of 21.5%. At least one species of small game was pursued by 43.3% of questionnaire respondents. On average, respondents pursued 2.2 game species. Respondents pursued 0.9 species of small game on average. In total, respondents spent 8,929 days in pursuit of small game. The average hunter spent 5.4 days hunting small game during the 2022–23 season. The total harvest of small game reported by questionnaire respondents was 7,158 animals. Below are the summaries of survey responses and hunter and harvest estimates for each species of small game in Ohio.

Squirrel: Squirrels were pursued by 21.8% of questionnaire respondents and there were an estimated 70,322 squirrel hunters in Ohio during the 2022–23 season (Table 1). Squirrel hunters averaged 7.2 days afield (Table 1). Of the respondents pursuing squirrel, 68.2% hunted solely on private land, 15.5% hunted solely on public land, and 16.1% hunted on both public and private land (Table 2). Of all respondents who pursued squirrel, 23.7% hunted squirrels in public wildlife areas, 4.5% hunted squirrels in state forests, 3.6% hunted squirrel in national forests, and 7.6% hunted squirrels in Ohio State Parks (Table 3). Squirrel hunters harvested an average of 2.8 fox squirrels and 3.4 gray squirrels per hunter during the 2022–23 hunting season. On average, squirrel hunters harvested about 1 fox squirrel and 1 gray squirrel for every 2 days afield (0.49 fox squirrels harvested/day afield and 0.57 gray squirrels harvested/day afield). Total estimated harvest of fox squirrels and gray squirrels was 195,144 and 240,658, respectively, during the 2022–23 season (Table 1).

Eastern Cottontail: Eastern cottontails were pursued by 14.5% of questionnaire respondents and there were an estimated 46,686 eastern cottontail hunters in Ohio during the 2022–23 season (Table 1). Eastern cottontail hunters averaged 5.6 days afield (Table 1). Of the questionnaire respondents in pursuit of eastern cottontail, 65.3% hunted solely on private land, 19.9% hunted solely on public land, and 14.6% hunted on both public and private land (Table 2). Of all respondents who pursued eastern cottontail, 26.7% hunted on wildlife areas, 1.8% hunted on state forests, 3.7% hunted on national forests, and 4.1% hunted in Ohio State Parks (Table 3). Rabbit hunters harvested an average of 3.2 eastern cottontails per hunter. On average, rabbit hunters harvested 3 eastern cottontail for every 4 days afield (0.73 eastern cottontail harvested/day afield). Total estimated harvest of eastern cottontail was 150,020 during the 2022–23 season (Table 1).

Mourning Dove: Mourning doves were pursued by 9.0% of questionnaire respondents and there were an estimated 21,753 mourning dove hunters in Ohio during the 2022–23 season (Table 1). Of all the dove hunters who responded to the questionnaire, 81.1% registered for the Harvest Information Program (HIP). All migratory bird hunters are required to complete HIP certification annually. Mourning dove hunters averaged 3.4 days afield (Table 1). Of the questionnaire respondents in pursuit of mourning dove, 58.6% hunted solely on private land, 28.5% hunted solely on public land, and 12.9% hunted on both public and private land (Table 2). Of respondents who pursued dove, 33.7% hunted doves reported hunting on wildlife areas, 0.0% hunted doves in state forests, 0.0% hunted doves in national forests, and 7.8% hunted doves in Ohio State Parks (Table 3). Dove hunters harvested an average of 10.4 mourning doves per hunter during the 2022–23 hunting season. On average, dove hunters harvested 3.6 mourning doves for every day afield. Total estimated harvest of mourning dove was 206,423 during the 2022–23 season (Table 1). The estimated harvest by HIP-compliant dove hunters was 164,282 (79.6% of the harvest). Differences in methods likely result in disagreeing estimates of dove hunters and mourning dove harvest by the Division of Wildlife and the United States Fish and Wildlife Service (USFWS; <https://www.fws.gov/program/migratory-bird-harvest-surveys>).

Ruffed Grouse: Ruffed grouse were pursued by 1.1% of questionnaire respondents and there were an estimated 3,516 ruffed grouse hunters in Ohio during the 2022–23 season (Table 1). Ruffed grouse hunters averaged 6.1 days afield (Table 1). Of the questionnaire respondents in pursuit of ruffed grouse, 20.4% hunted solely on private land, 66.7% hunted solely on public land, and 13.7% hunted on both public and private land (Table 2). Of all respondents who hunted ruffed grouse, 53.4% pursued ruffed grouse on wildlife areas, 27.1% pursued ruffed grouse in state forests, 26.4% pursued ruffed grouse in national forests, and 19.5% hunted ruffed grouse in Ohio State Parks (Table 3). Questionnaire respondents flushed an average of 0.14 ruffed grouse per day during the 2022–23 season (Table 4). Ruffed grouse hunters harvested an average of 0.1 ruffed grouse per hunter during the 2022–23 hunting season. On average, grouse hunters harvested 1 ruffed grouse for every 33 days afield (0.03 ruffed grouse harvested/day afield). Total estimated harvest of ruffed grouse was 195 during the 2022–23 season (Table 1).

American Woodcock: American woodcock were pursued by 1.1% of questionnaire respondents and there were an estimated 2,218 American woodcock hunters in Ohio during the 2022–23 season (Table 1). Of the American woodcock hunters who responded to the questionnaire, 80.0% were registered for HIP. American woodcock hunters averaged 4.1 days afield (Table 1). Of the respondents who pursued American woodcock, 26.3% hunted solely on private land, 29.7% hunted solely on public land, and 12.9% hunted on both public and private land (Table 2). Of all respondents who hunted American woodcock, 53.9% pursued woodcock on wildlife areas, 13.3% pursued American woodcock in state forests, 0.0% pursued woodcock in national forests, and 6.8% pursued American woodcock in Ohio State Parks (Table 3). Questionnaire respondents flushed an average of 0.7 American woodcock per day during the 2022–23 season (Table 4). Hunters harvested an average of 0.4 American woodcock per hunter during the 2022–23 hunting season. On average, woodcock hunters harvested 1 American woodcock for every 10 days afield (0.11 American woodcock harvested/day afield). Total estimated harvest of American woodcock was 787 during the 2022–23 season (Table 1). Woodcock hunters who were HIP-compliant accounted for the entire woodcock harvest. Differences in methods likely result in disagreeing estimates of woodcock hunters and American woodcock harvest by the Division of Wildlife and USFWS (<https://www.fws.gov/program/migratory-bird-harvest-surveys>).

Northern Bobwhite: Wild northern bobwhite quail were pursued by 0.3% of questionnaire respondents and there were an estimated 977 northern bobwhite hunters in Ohio during the 2022–23 season (Table 1). Northern bobwhite hunters averaged 12.0 days afield (Table 1). Of the questionnaire respondents in pursuit of northern bobwhite, 59.3% hunted solely on private land, 41.0% hunted solely on public land, and 0.0% hunted on both public and private land (Table 2). Of respondents who pursued northern bobwhite, 39.7% hunted bobwhite on wildlife areas, 20.1% pursued bobwhite in state forests, 20.5% pursued bobwhite in national forests, and 19.7% pursued bobwhite in Ohio State Parks (Table 3). Questionnaire respondents flushed an average of 0.4 northern bobwhite per day (Table 4) during the 2022–23 season. No survey respondents who pursued wild northern bobwhite quail reported harvest. Therefore, we could not estimate harvest for the 2022–23 season. The average annual harvest over the past five years (2018-2022) was 409 northern bobwhite.

Stocked quail (quail raised in captivity and released) were pursued by 0.1% of questionnaire respondents and there were an estimated 391 stocked quail hunters in Ohio during the 2022–23 season (Table 1). Stocked quail hunters averaged 1.0 days afield and average harvest per hunter was 14 quail during the 2022–23 hunting season (Table 1). On average, stocked quail hunters harvested 7 quail for every day afield. There were an estimated 2,735 stocked quail harvested by hunters in Ohio during the 2022–23 season (Table 1).

Ring-necked Pheasant: Wild ring-necked pheasants were pursued by 1.8% of questionnaire respondents and there were an estimated 5,665 pheasant hunters in Ohio during the 2022–23 season (Table 1). Wild ring-necked pheasant hunters averaged 3.1 days afield (Table 1). Of the respondents who pursued wild ring-necked pheasant, 29.7% hunted solely on private land, 59.0% hunted solely on public land, and 10.9% hunted on both public and private land (Table 2). Of all respondents who hunted wild ring-necked pheasants, 59.2% pursued wild ring-necked pheasant on Wildlife Areas, 3.8% hunted in state forests, and 7.5% hunted in Ohio State Parks (Table 3). Questionnaire respondents flushed an average of 0.7 wild ring-necked pheasants per day (Table 4) during the 2022–23 season. Wild ring-necked pheasant hunters harvested an average of 0.4 wild ring-necked pheasants per hunter during the 2022–23 hunting season. On average, wild pheasant hunters harvested 1 ring-necked pheasant for every 5 days afield (0.20 ring-necked harvested/day afield). Total estimated harvest of ring-necked pheasant was 2,539 during the 2022–23 season (Table 1).

Stocked pheasant (pheasant raised in captivity and released, includes pheasants released by Division of Wildlife staff on state wildlife areas) were pursued by 8.3% of questionnaire respondents and there were an estimated 26,701 hunters of stocked pheasants in Ohio during the 2022–23 season (Table 1). Stocked pheasant hunters averaged 3.9 days afield and average harvest per hunter was 6.6 pheasants during the

2022–23 hunting season (Table 1). On average, stocked pheasant hunters harvested 1.8 pheasants for every day afield. There were an estimated 177,173 stocked pheasants harvested by hunters in Ohio during the 2022–23 season (Table 1). The Division of Wildlife released 14,090 stocked pheasants on select wildlife areas and partner properties.

Feral Hogs: Feral hogs were pursued by 0.4% of questionnaire respondents and there were an estimated 1,367 feral hog hunters in Ohio during the 2022–23 season (Table 1). Feral hog hunters averaged 2.2 days afield (Table 1). Feral hog harvest could not be estimated due to the small number of survey respondents who pursued the species. The average annual harvest over the past five years (2018-2022) was 390 feral hogs.

Groundhogs: Groundhogs were pursued by 9.1% of questionnaire respondents and there were an estimated 29,496 groundhog hunters in Ohio during the 2022–23 season (Table 1). Groundhog hunters averaged 13.3 days afield (Table 1). Groundhog hunters harvested an average of 7.2 groundhogs per hunter during the 2022–23 hunting season. On average, groundhog hunters harvested nearly 1 groundhog for every day afield (0.88 groundhogs harvested/day afield). Total estimated harvest of groundhogs was 211,943 during the 2022–23 season (Table 1).

American Crow: American crows were pursued by 1.7% of questionnaire respondents and there were an estimated 5,469 crow hunters in Ohio during the 2022–23 season (Table 1). American crow hunters averaged 7.0 days afield (Table 1). American crow hunters harvested an average of 3.2 American crows per hunter during the 2022–23 hunting season. On average, American crow hunters harvested 3 American crows for every 4 days afield (0.75 American crows harvested/day afield). Total estimated harvest of American crows was 17,385 during the 2022–23 season (Table 1).

Coyote: Coyotes were pursued by 14.5% of questionnaire respondents and there were an estimated 46,686 coyote hunters in Ohio during the 2022–23 season (Table 1). Of the questionnaire respondents pursuing coyote, 86.8% hunted solely on private land, 4.6% hunted solely on public land, and 8.6% hunted on both public and private land (Table 2). Of respondents who hunted coyote, 7.7% pursued coyote on wildlife areas, 0.4% pursued coyotes on state forests, 0.2% pursued coyotes on national forests, and 0.9% hunted coyotes in Ohio State Parks (Table 3). Coyote hunters averaged 8.8 days afield (Table 1). Coyote hunters harvested an average of 2.5 coyotes per hunter during the 2022–23 hunting season. On average, coyote hunters harvested about 1 coyote for every 5 days afield (0.19 coyote harvested/day afield). Total estimated harvest of coyote was 116,227 during the 2022–23 season (Table 1). This total only includes coyotes harvested through hunting.

Other species: Raccoon were pursued by 4.4% of respondents, totaling an estimated 14,260 raccoon hunters in Ohio during the 2022–23 season (Table 1). Wilson's snipe and rails (sora and Virginia rail) were pursued by 0.1% of questionnaire respondents. There were an estimated 656 snipe and rail hunters in Ohio during the 2022–23 season.

License holders who did not hunt in Ohio: There were 5.6% of questionnaire respondents who indicated they did not hunt in Ohio, for a total estimate of 17,971 license holders who did not hunt in Ohio during the 2022–23 hunting season (Table 1).

Table 1. Number and proportion of respondents claiming to hunt each species or who did not hunt during the 2022–23 hunting season (n) and the estimated number of hunters and those that did not hunt during the 2022–23 season in Ohio by species with 95% confidence intervals (CI). Estimates were derived from responses to the 2022–23 Ohio Division of Wildlife Ohio Hunter Questionnaire (n = 1,651). “Stocked” refers to game birds reared in captivity. “NA” indicates that there was no reported harvest and, therefore, could not estimate total harvest across the hunter population. A dash (–) indicates that questionnaire participants were not asked questions regarding days hunted or harvest.

| Species | Percent Respondents | Estimated License Holders | Estimated License Holders 95% CI | Mean Annual Days Afield | Reported Annual Harvest | Mean Annual Harvest/hunter | Total Estimated Annual Harvest | Total Estimated Annual Harvest 95% CI | Harvest/day |
|----------------------|---------------------|---------------------------|----------------------------------|-------------------------|-------------------------|----------------------------|--------------------------------|---------------------------------------|-------------|
| Fox Squirrel | 21.8% | 70,322 | 69,851–70,798 | 7.2 | 999 | 2.8 | 195,144 | 161,995–231,470 | 0.49 |
| Gray Squirrel | 21.8% | 70,322 | 69,851–70,798 | 7.2 | 1,232 | 3.4 | 240,658 | 176,402–323,505 | 0.57 |
| Eastern Cottontail | 14.5% | 46,686 | 46,300–47,084 | 5.6 | 768 | 3.2 | 150,020 | 108,057–202,966 | 0.73 |
| Mourning Dove | 33.2% | 21,753 | 21,399–22,108 | 3.4 | 1,449 | 10.4 | 206,423 | 131,825–216,956 | 3.27 |
| Ruffed Grouse | 1.1% | 3,516 | 3,401–3,633 | 6.1 | 1 | 0.1 | 195 | 0–644 | 0.03 |
| American Woodcock | 0.9% | 2,218 | 2,092–2,342 | 4.1 | 6 | 0.5 | 787 | 119–1,706 | 0.11 |
| Stocked Pheasant | 8.3% | 26,761 | 26,460–27,063 | 3.9 | 907 | 6.6 | 177,173 | 105,675–281,699 | 1.82 |
| Ring-necked Pheasant | 1.8% | 5,665 | 5,517–5,812 | 3.1 | 13 | 0.4 | 2,539 | 1,190–4,159 | 0.20 |
| Stocked Quail | 0.1% | 391 | 352–430 | 1.0 | 14 | 7.0 | 2,735 | 1,460–4,170 | 7.00 |
| Northern Bobwhite | 0.3% | 977 | 916–1,038 | 12.0 | 0 | 0.0 | NA | NA | 0.00 |
| Feral Hog | 0.4% | 1,367 | 1,296–1,439 | 2.2 | 0 | 0.0 | NA | NA | 0.00 |
| Groundhog | 9.1% | 29,496 | 29,170–29,819 | 13.3 | 1,085 | 7.2 | 211,943 | 170,660–258,336 | 0.88 |
| American Crow | 1.7% | 5,469 | 5,332–5,611 | 7.0 | 89 | 3.2 | 17,385 | 8,803–27,200 | 0.75 |
| Coyote | 14.5% | 46,686 | 46,311–47,081 | 8.8 | 595 | 2.5 | 116,227 | 59,457–189,548 | 0.19 |
| Raccoon | 4.4% | 14,260 | 14,033–14,491 | – | – | – | – | – | – |
| White-tailed Deer | 84.1% | 271,326 | 270,906–271,733 | – | – | – | – | – | – |
| Wild Turkey | 24.2% | 77,940 | 77,460–78,414 | – | – | – | – | – | – |
| Snipe/Rails | 0.4% | 656 | 607–707 | – | – | – | – | – | – |
| Ducks | 9.8% | 22,797 | 22,467–23,127 | – | – | – | – | – | – |
| Geese | 9.7% | 22,320 | 22,002–22,652 | – | – | – | – | – | – |
| Did not hunt in Ohio | 5.6% | 17,971 | 17,723–18,218 | – | – | – | – | – | – |

Table 2. Estimated proportion of respondents pursuing each species who reported hunting on private land, public land, and both public and private land during the 2022–23 season by species with 95% confidence intervals (CI). Estimates were derived from responses to the 2022–23 Ohio Division of Wildlife Ohio Hunter Questionnaire (n = 1,651).

| Species | n | Private | 95% CI | Public | 95% CI | Private and Public | 95% CI |
|----------------------|-----|---------|-------------|--------|-------------|--------------------|-------------|
| Squirrel spp. | 333 | 0.682 | 0.631–0.723 | 0.155 | 0.117–0.198 | 0.161 | 0.126–0.201 |
| Eastern cottontail | 220 | 0.653 | 0.591–0.718 | 0.199 | 0.145–0.255 | 0.146 | 0.100–0.195 |
| Mourning dove | 140 | 0.586 | 0.507–0.664 | 0.285 | 0.207–0.357 | 0.129 | 0.079–0.186 |
| Ruffed grouse | 15 | 0.204 | 0.000–0.400 | 0.667 | 0.400–0.867 | 0.137 | 0.000–0.333 |
| Northern bobwhite | 5 | 0.593 | 0.200–1.000 | 0.410 | 0.000–0.800 | 0.000 | 0.000–0.000 |
| Ring-necked pheasant | 27 | 0.297 | 0.148–0.481 | 0.590 | 0.407–0.778 | 0.109 | 0.000–0.222 |
| American woodcock | 15 | 0.263 | 0.067–0.467 | 0.597 | 0.333–0.867 | 0.129 | 0.000–0.333 |
| Coyote | 221 | 0.868 | 0.819–0.910 | 0.046 | 0.023–0.077 | 0.086 | 0.054–0.122 |

Table 3. Estimated proportion of respondents pursuing each species who reported hunting on state wildlife areas, state forests, national forests, or state parks during the 2022–23 season with 95% confidence intervals (CI). Estimates were derived from responses to the 2022–23 Ohio Division of Wildlife Ohio Hunter Questionnaire (n = 1,651).

| Species | n | Wildlife Areas | 95% CI | State Forest | 95% CI | National Forest | 95% CI | State Parks | 95% CI |
|----------------------|-----|----------------|-------------|--------------|-------------|-----------------|-------------|-------------|-------------|
| Squirrel spp. | 333 | 0.237 | 0.192–0.282 | 0.045 | 0.024–0.069 | 0.036 | 0.018–0.057 | 0.076 | 0.048–0.108 |
| Eastern cottontail | 220 | 0.267 | 0.199–0.291 | 0.018 | 0.005–0.036 | 0.037 | 0.014–0.064 | 0.041 | 0.018–0.068 |
| Mourning dove | 140 | 0.337 | 0.264–0.421 | 0.000 | 0.000–0.000 | 0.000 | 0.000–0.000 | 0.078 | 0.036–0.121 |
| Ruffed grouse | 15 | 0.534 | 0.267–0.467 | 0.271 | 0.067–0.467 | 0.264 | 0.067–0.467 | 0.195 | 0.000–0.400 |
| Northern bobwhite | 5 | 0.397 | 0.000–0.800 | 0.201 | 0.000–0.600 | 0.205 | 0.000–0.600 | 0.197 | 0.000–0.600 |
| Ring-necked pheasant | 27 | 0.592 | 0.406–0.778 | 0.038 | 0.000–0.111 | 0.000 | 0.000–0.000 | 0.075 | 0.000–0.185 |
| American woodcock | 15 | 0.539 | 0.267–0.800 | 0.133 | 0.000–0.333 | 0.000 | 0.000–0.000 | 0.068 | 0.000–0.200 |
| Coyote | 221 | 0.077 | 0.041–0.104 | 0.004 | 0.000–0.014 | 0.002 | 0.004–0.045 | 0.009 | 0.000–0.023 |

Table 4. Average flush rate of upland game birds by respondents to the Ohio Hunter Questionnaire during the 2022–23 season by species with standard deviation (SD) and 95% confidence intervals (CI). Responses for northern bobwhite and ring-necked pheasants are only for wild birds. Estimates were derived from responses to the 2022–23 Ohio Division of Wildlife Ohio Hunter Questionnaire (n = 1,651).

| Species | Mean flushes/day | SD | 95% CI |
|----------------------|------------------|------|-----------|
| Ruffed Grouse | 0.14 | 0.10 | 0.03–0.39 |
| American Woodcock | 0.66 | 0.34 | 0.28–1.56 |
| Ring-necked Pheasant | 0.66 | 0.19 | 0.35–1.09 |
| Northern Bobwhite | 0.43 | 1.66 | 0.00–7.67 |

Appendix 1. Formulas used to estimate hunters and harvest in Ohio.

Equation 1: To calculate the estimated number of hunters pursuing a species the equation below was used, where x = number of respondents who indicated that they pursued a species, n = the total number of survey respondents, A = the total number of active license holders, and N_{est} is the total estimated number of hunters pursuing a species:

$$N_{est} = \frac{x}{n} \times A$$

Equation 2: To calculate the estimated harvest of a species the equation below was used, where x = number of respondents who indicated that they pursued a species, n = the total number of survey respondents, A = the total number of active license holders, r = reported harvest, and H_{est} is the total estimated harvest of a species:

$$H_{est} = \frac{x}{n} \times A \times \frac{r}{n}$$